



Payments System Research Briefing

Are Contactless Payments Finally Poised for Adoption?

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Two types of contactless payments, near-field communication (NFC) and quick response (QR) code, have seen a boost from the COVID-19 pandemic.

Although the U.S. payments industry has long anticipated contactless payments taking off, consumer adoption has been slow. In 2020, however, the COVID-19 pandemic and ensuing demand for more hygienic, touch-free payment alternatives led to a significant increase in contactless payment adoption. Has contactless technology met the moment with an attribute consumers and merchants prefer over other available payment options? This *Briefing* looks at near-field communication (NFC) and quick response (QR) code contactless payment technologies and their prospects for greater adoption.

Two Main Technologies of Contactless Payments

The payments industry has anticipated contactless payments catching on in the United States for nearly two decades, driven primarily by two technologies: NFC and QR code.^[1] To make an NFC payment, a consumer must have a payment device with a chip embedded, which can be a payment card, a smartphone, or a wearable device such as a smartwatch. For the payment device to transmit payment information at the point-of-sale (POS), the POS terminal must have radio frequency identification (RFID) technology enabled.^[2] When both a chip and RFID are present, a payment card can be tapped on or waved over the POS terminal, and a smartphone or wearable device can be used in close proximity to the POS terminal to allow data to be shared through several layers of authentication from hardware to software (Allison 2017).

Early on, as credit card networks were promoting acceptance for smaller ticket sales, NFC contactless was thought to be the next payment wave; that wave never materialized (Bradford 2005). In 2014, as the United States migrated to EMV chip card technology and NFC-based digital wallets such as Apple Pay were introduced, expectations rose again for NFC-based contactless payment adoption. But merchants and consumers still did not use contactless payments widely (Bradford and Maniff 2015).

NFC contactless payment adoption lagged for several reasons. U.S. card issuers were slow in sending out contactless cards with embedded chips to their customers (Schulze 2019). Many retailers lagged in accepting chip-based payments because it was costly and complex (Weisbaum 2015). Among retailers that adopted chip technology, many did not enable RFID functionality. Even when retailers enabled RFID and accepted digital wallets, consumers did not make many contactless payments—not because they had any real objection to digital wallets, but because they liked their cards and did not see a compelling reason to change how they paid at the POS (PYMNTS 2020). Although contactless payments can be more secure and faster than dipping a credit card or paying with cash, these attributes were not enough to prompt adoption.

In addition to contactless cards and digital wallets, QR-code technology developed as another way to make contactless payments. QR codes can be either dynamic or static, and both QR-code types are available to merchants and consumers (Bradford, Hayashi, and Toh 2019). Dynamic codes are specific to each individual transaction. A merchant-presented dynamic QR code requires the merchant to integrate the payment service of an app provider into their POS system and present the QR code to a consumer to read with a smartphone. Static codes are unique to an individual merchant or consumer and do not vary by transaction. A merchant-presented static QR code does not require additional equipment or technology; instead, the merchant acquires a QR code associated with its account either at a bank or at a payment service provider. To make a payment, a merchant presents a QR code that consumers can scan using an app on their smartphone. The consumer then enters the payment amount to complete the transaction. When a consumer presents either a dynamic or static QR code for payment, they use their smartphone to display a QR code associated with their wallet, which the merchant scans to complete the transaction. In contrast to NFC contactless payments, accepting QR code payments requires little or no additional equipment, so merchants' cost to accept them is likely lower.

Merchants ranging from dine-in and quick-service restaurants to top 10 retailers and gas stations have been adopting QR-code technology in their own mobile apps. In addition to enabling contactless payment through proprietary apps, QR codes can be linked to loyalty programs and allow rewards and offers to be presented at the time of payment. They can also save information about transactions, orders, and preferences. Starbucks's QR code POS payment app, which is consumer-presented and static, is a standout. Research conducted by eMarketer in 2018 showed the Starbucks app to be the most popular in-person or proximity mobile payment method overall, with 23 million people in the United States making purchases through it at least once every six months. Adoption of the Starbucks QR code payment app surpassed Apple Pay and Google Pay, as well as Samsung's own mobile payment option (Taylor 2018). Merchants such as Walmart, Kohl's, and Kroger use merchant-presented, dynamic QR codes. As measured by the number of mobile app customers, 58 million Americans have the Walmart mobile app on their smartphone (Shevlin 2019).

Prior to the COVID-19 pandemic, contactless payments appeared to be gaining in consumer adoption. According to American Express's 2019 digital payments survey, one-quarter (26 percent) of consumers had made a contactless payment at least once in

the previous six months, and American Express expected that the number would likely increase as more contactless cards were issued in 2020 and as a growing number of U.S. merchants began to accept contactless payments (American Express 2019). According to eMarketer, Apple Pay had more than 30 million registered users in the United States as of October 2019, making up nearly half of all mobile payment users in the country. Google Pay had around 12 million users, while Samsung Pay had nearly 11 million users (Dumont 2020).

A Changing Tide in Contactless Adoption

The COVID-19 pandemic seems to have provided consumers and merchants with a more compelling reason to adopt contactless payments: the desire for an alternative to touching cash, PIN pads, and a pen for signature-based payments. According to Mastercard Contactless Consumer Polling, more than half of consumers now use some form of contactless payments (White 2021). According to American Express, 70 percent of its merchants say their customers have asked for contactless payments, and 73 percent of its merchants prefer their customers to pay with a card or mobile app instead of handling cash (American Express 2020). The 2020 State of Retail Payments study, conducted for the National Retail Federation by Forrester, found 67 percent of retailers surveyed now accept some form of no-touch payment.^[3] Of these retailers, 58 percent accept contactless cards that can be waved over or tapped on the reader, up from 40 percent in 2019, and 56 percent that take digital wallet payments on mobile phones, up from 44 percent. Similarly, Visa reports that tap-to-pay transactions in everyday segments in the United States, including grocery and pharmacy, have grown more than 100 percent year-over-year (Visa 2020). These statistics are in sharp contrast to how contactless adoption was faring prior to the pandemic.

Examples from major retailers support these statistics. The grocery store chain Kroger, which has accepted contactless card payments since 2015, began piloting Apple Pay, Google Pay, and other mobile payment programs in August 2020 (Kroger 2020). On Marqeta's payment platform, which supports food or grocery delivery workers shopping for clients, the number of chip-based contactless payments increased by 128 percent from the end of February through mid-May 2020 (Moeser 2020). Prior to the pandemic, Marqeta already had been promoting contactless payments and mobile wallets for the gig economy workforce.

Restaurants are beginning to adopt contactless payments aided by QR code providers such as Up n' go and Shift4 Payments. The QR codes offered by these providers do not trigger a payment. Instead, restaurant patrons are directed to a payment page that lets them check out with a credit card. Up n' go, which launched in 2018, accepts Apple Pay, Google Pay, and Venmo as well. Up n' go enables consumers to make contactless payment without downloading an app, registering for an account, or providing any personal information. Instead, a consumer simply scans a QR code on their receipt using their smartphone's camera to pay on Up n' go's mobile site without any further interaction (Dahlmann 2020). Up n' go's business began to increase in June 2020 and is now used in over 1,000 restaurants in 49 states. In October 2020, Up n' go surpassed one million

transactions. Shift4 Payments' QR Pay offers an additional option that presents a QR code on a payment terminal that can be brought to the diner's table instead of a receipt. After the diner scans the code with their smartphone, the bill is displayed and payment can be made from the phone's web browser with a payment card. Shift4 Payments also has an option that enables a merchant to display a custom QR code on their menu, table tent, or placemat. When the customer scans the code with their smartphone, it opens the menu in their phone's web browser and allows the customer to submit an order to the POS and pay from their phone.

Contactless payments are also occurring at the gas pump. For example, in November 2019, Costco announced that tap-to-pay was available at all of its Costco gas stations. Costco now enables payment with a mobile wallet as well. Additionally, ExxonMobil gas pumps offer a dual-function pay option via NFC or QR code (Pucci 2020). While a customer can use the Exxon Mobil Rewards+ mobile app to pay from within the car and earn rewards, they can also tap their smartphone on a QR code sticker on an ExxonMobil gas pump or use the phone's camera to scan the QR code to authorize payment. The Exxon Mobil Rewards+ app intuitively opens to proceed with payment, while those without the app can pay with Apple Pay or Google Pay. Exxon Mobile anticipated that its more than 11,500 stations across the country would have this new technology at pumps by the end of 2020.

In addition to NFC-based digital wallets, QR code-based digital wallets such as those from PayPal and Venmo are gaining adoption. These wallets generate a QR code on the customer's phone that represents a pre-selected funding source—a card or a PayPal or Venmo balance—that the store's scanner will read and process. In November 2020, CVS Pharmacy became the first national retailer to integrate PayPal and Venmo QR-code technology in the POS at 8,200 standalone locations across the country (CVS Health 2020). Since January 2020, CVS reported a 43 percent increase in contactless transactions. New research from PayPal reinforces this trend, showing that more than one-third (34 percent) of surveyed consumers would not buy from merchants at all if QR code-enabled payments were unavailable (CVS Health 2020).

In addition to QR code acceptance by individual merchants, QR code-based payments have been embraced by planners of major events, such as the 2021 Super Bowl. Due to the pandemic, Visa worked with the National Football League, banks, and merchants to fast-track a plan to make the 2021 Super Bowl a cashless, fully contactless payment experience (Fitzgerald 2021). The cash-free zone in Tampa encompassed parking, the "Super Bowl Experience" fan event outside the stadium, and nearby shops. Visa worked to convert key merchants to contactless payments to guarantee that all future Super Bowls it sponsors will be cash-free (but with cash-to-card kiosks available at stadiums so that patrons who prefer cash can still transact).

What Lies Ahead for Contactless Payments?

The ways QR codes can be used to make payments continues to evolve, which has resulted in market fragmentation. EMVCo, a global technical body that facilitates worldwide interoperability and acceptance of secure payment transactions, established a standard for QR codes in 2017 (Latgé 2020a). The EMV QR-code specification can enable account-based payments (such as ACH) as well as card-based payments (NFC Forum 2019). The ability to enable both types of payments increases the interoperability, efficiency, and flexibility of QR code deployments (Latgé 2020b). It also offers the potential for QR code-based mobile payments to take advantage of instant payments, which would allow merchants to receive funds and send refunds to their customers more quickly than with other digital payments.

NFC payment technology is evolving as well. In 2019, the NFC Forum released its NFC Money Transfer Candidate Specification (NMT). NMT is purported to improve payment speed and efficiency by eliminating the need for a camera or scanner used in QR code-based solutions. Instead, NMT provides an open framework that enables payment service providers to map their already defined data exchange for QR code-based payment solutions with NFC communication. The specification works between all NFC-enabled devices including smartphones and card readers. The NFC Forum says its new specification will replace QR codes with a single tap. The group also says the new specification will offer more secure transactions than QR codes.

Consumers' adoption of contactless payments may continue after the pandemic. The 2021 Visa Back to Business study found that nearly half of surveyed consumers thought that a contactless payment option is one of the most important safety measures stores can offer (Visa 2021). Over half (65 percent) said that post-vaccine, they would prefer to use contactless payments as much as or even more than they do currently. Only 16 percent of consumers said they would revert to their old methods of payments even after a vaccine is widely available. Furthermore, 85 percent of surveyed consumers have come to expect digital options when they shop in-person. As for the method of contactless payment, 62 percent expect to be able to tap a credit or debit card, 41 percent expect to be able to use mobile payment apps, and 37 percent expect an option to pay with a mobile wallet.

Chip cards are in consumers' physical wallets, merchants are enabling RFID in their terminals and adopting QR methods of payment, digital wallets are enabling NFC and QR code payments, and consumers are demonstrating and expressing a desire for contactless payment options. This momentum may present the best opportunity yet for meaningful, sustained adoption of contactless payments. However, whether the pandemic has provided a tipping point is still anyone's guess.

Endnotes

- [1] Contactless payments also can be made with magnetic signal transmission (MST), a proprietary technology owned by Samsung that emulates the swiping of a physical card at the point-of-sale, or with biometrics, such as a fingerprint used to authenticate a payment or facial recognition initializing contact with a payment account.
 - [2] RFID technology relies on a device with an antenna that produces the fields that power a contactless card or device and allows communication. In addition to the hardware, software is also required to facilitate communication.
 - [3] The Forrester Analytics Consumer Technographics COVID-19 Survey (Wave 2) was fielded from May 8 to May 15, 2020. Forrester fielded the retailer survey from June 2020 to July 2020. The report was published on November 10, 2020.
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