SimplyTapp

The ABCs of HCE

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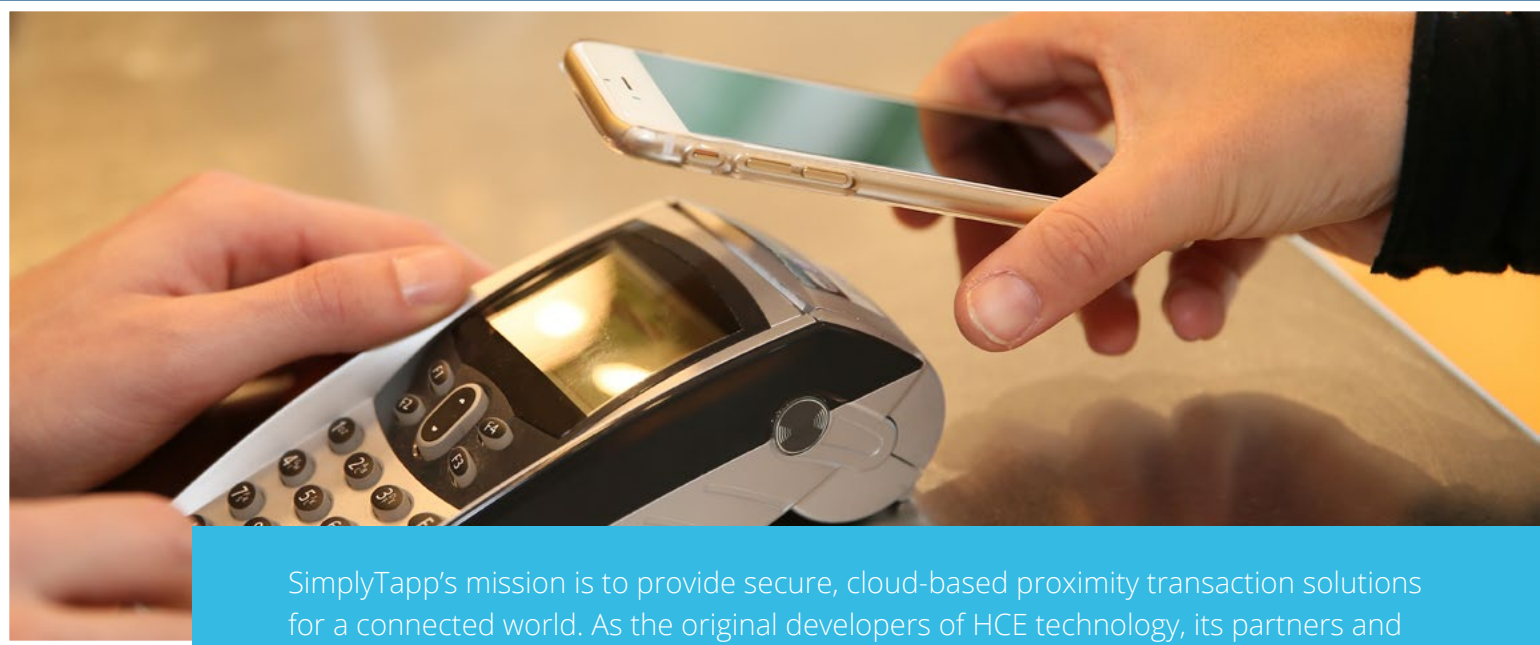
SimplyTapp's mission is to provide secure, cloud-based proximity transaction solutions for a connected world. As the original developers of HCE technology, its partners and customers have the freedom and flexibility to accelerate their business initiatives in a changing mobile market.

Introduction

Since the introduction of the first Android phone with NFC capabilities in 2010, mobile and contactless payments technology have shown incredible potential for the banking and payments industries. As more mobile payments technologies hit the market, the payments industry continues to get one step closer to a new, better world that no longer requires plastic credit cards.

NFC is one of many technologies that offers card issuers the opportunity to provide customers with a secure, customizable and contactless user experience. However, card issuers and consumers alike have been hesitant to adopt this technology for a variety of reasons, ranging from the misconception that it is too complicated to fear of security risks.

To make mobile payments as a whole more easily accessible to card issuers, SimplyTapp developed host card emulation (HCE) technology, which enables developers to leverage mobile devices for secure tap-and-go payments and other real-world transactions. In other words, with HCE, anyone can develop a mobile application that can be used as a smart card.

This white paper will present readers with a primer on host card emulation (HCE) technology and its implications for real-world transactions, with a particular focus on monetary applications.
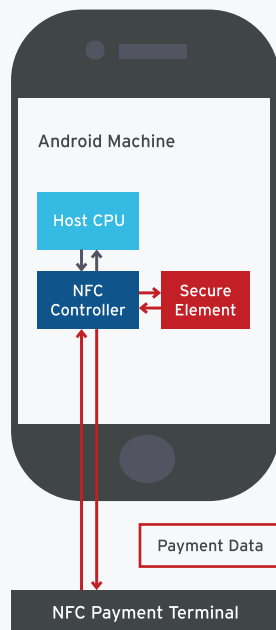
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What is HCE?

"Host card emulation," or HCE, is a term used to describe the software architecture that creates a secure communication channel between an NFC terminal and remotely hosted payment credentials. With HCE, consumers' phones serve as secure proxies for payment cards, transit cards, room keys, event passes and more.
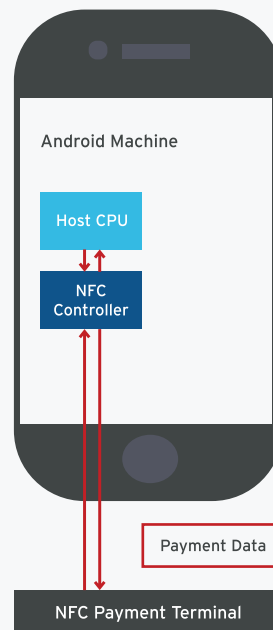
The NFC controller within Android phones allows the terminal at the point-of-sale to communicate with a secure payment application in the cloud and complete the transaction. This works exactly like a contactless card would at a POS terminal, except the card is now replaced by the phone.

How Host Card Emulation Works

Card Emulation with a Secure Element

Android Machine

Host CPU

NFC Controller   Secure Element

Payment Data

NFC Payment Terminal

Host Card Emulation

Android Machine

Host CPU

NFC Controller

Payment Data

NFC Payment Terminal

Key Terms to Know

To get a full grasp on HCE, it's important to understand associated terms and how they relate to the technology.

Near Field Communication (NFC)

A short-range (typically 10 centimeters or less) wireless communication technology for smartphones and other connected devices that enables data transfer (such as contactless payments) between devices. NFC enables users to complete transactions with HCE applications such as loyalty and transit cards simply by tapping their mobile devices on NFC readers without needing to pull up the app.

Magnetic Secure Transmission (MST)

This technology can turn virtually any smartphone into a contactless payment system. It sends a magnetic transmission to a terminal's card reader, causing it to act like a receiver – without having to upgrade the terminal's software or hardware. Currently, the devices are estimated to work with about 90 percent of payment terminals.

Bluetooth Low Energy (BLE)

This is a communication frequency that runs on a smartphone and has a range of 40 to 50 meters. BLE-enabled phones are immediately recognized when a customer walks into a store or venue that has an antenna or antennas installed there. BLE technology is aimed at novel applications in the healthcare, fitness, beacons, security, and home entertainment industries. On the payments side, it has the potential to offer consumers hands-free payments by using an app to place and verify an in-store payment and receive a receipt via email.

Secure Element (SE)

The secure element refers to a tamper-resistant platform that can host applications and sensitive data, most often in the form of a SIM card. Traditional, SE-based mobile and contactless technologies require card issuers to partner with equipment manufacturers and mobile network operators that own those SEs within consumers' mobile devices, which makes it difficult to offer a unique, branded contactless experience.

Cloud-Based Payments (CBP)

To date, mobile payments have required the use of a hardware secure element (SE) in mobile handsets and cloud-based payments eliminate the need for SE. Instead, HCE enables Android apps to perform the functions of an SE by leveraging secure cloud storage instead of a secure chip in the device.

Virtual Secure Element (VSE)

The virtual secure element protects the true card, key or pass credential outside of the mobile device or physical hardware and allows the issuer 100 percent control over how, when, with whom and for how long their assets can be used. It also offers the convenience and flexibility of mobile transactions without the hassles of negotiating with device manufacturers and mobile network operators.

Secure Element vs. Virtual Secure Element

Secure element (SE)-based NFC technologies have been in practice for a few years now, but there is much room for improvement and a better customer experience. Following are several drawbacks associated with traditional, SE-based contactless and mobile technologies:

- Card issuers must depend on equipment manufacturers and mobile network operators that own those SEs within consumers' mobile devices to access and deploy those SEs to their customers.

- Once those SEs are deployed, financial institutions are also dependent on third-party manufacturers and network operators to maintain or improve their contactless banking and payments solution. Because of those dependencies, traditional SEs are more difficult and more costly to scale. As a result, the consumer experience suffers.

Even the newest industry solutions like recently-launched Android Pay and Apple Pay present financial institutions with unnecessary and costly stipulations (transaction fees and marketing costs). On the other hand, a virtual secure element implemented on a bank's secure server provides the following key benefits:

- Protection of the true card, key or pass credential and allows the issuer 100 percent control over how, when and for how long those assets can be used.

- Convenience and flexibility of mobile transactions without the hassles of negotiating with device manufacturers and mobile network operators.

- Freedom for banks to use their own tokenization instead of card network tokens.

For every card using SimplyTapp's own technologies, a virtual secure element is created and deployed in the card issuer's secure cloud servers. The issuer is in control of the life cycle of the virtual card, allowing their system to update or distribute new payment cards or passes to the consumer's mobile app.

Cloud-Based Payments

The evolution of HCE lies within the cloud rather than relying on a hardware secure element as traditional NFC payments do. In the transaction cycle, the most important element flowing through the system is a card number. With HCE, banks can use their own tokenization, convert real customer card data into secure tokens and host those tokens in their cloud, encompassing a broader spectrum of approaches and facilitating a more flexible system that works for card issuers and financial institutions of a wider variety.

With HCE technology, the transaction takes place within the trusted, private cloud of the card issuer. This eliminates burdens of operational risks and data protection for mobile carriers and retailers, and the task of issuing and safeguarding card credentials stays within the bank's domain.

SimplyTapp's solution works by connecting a mobile device with the card issuer's cloud network to retrieve credentials that are then exchanged with the contactless terminal.

SimplyTapp's proprietary technology provides the ability to conduct secure transactions even while the mobile device is not actively connected to a mobile network to provide truly flexible payments anywhere and in any environment.

How HCE is Used

HCE bridges the gap between card issuers and their customers, making mobile payments a reality as customers pay in-app and at the point-of-sale, There are several practical applications for HCE technology across industries, including retail, transit, ticketing and hospitality.

Retail

Shoppers are increasingly reliant on their mobile phones and enjoy the simplicity and convenience of transacting via their devices – both in-store and online. HCE can support gift cards and private-label cards for retailers, providing them with a secure environment to accept payments at the point-of-sale while integrating with any existing loyalty programs.

Transit

Travelers enjoy the speed and ease of seamless transit while avoiding the cost and inconvenience of replacing lost, stolen or damaged cards. Using HCE technology, travelers can move their transit cards to their smartphones for mobile, contactless transit payments. Gone are the days of digging through a wallet for a transit card or a few dollar bills to add to the card. Instead, travelers can tap their smartphones on NFC-enabled terminals and move through the gate.

Ticketing

With HCE, airline passengers can purchase in-flight movies, upgrade seats or pay for checked baggage, all from their smartphones. Event attendees -- such as those at music festivals or sporting events -- can purchase concessions, exchange loyalty rewards, buy merchandise and more. With payment and check-in data instantly loaded onto their smartphones, guests only have to tap their phones on NFC terminals to get where they want to be.

Hospitality

With payment and check-in data instantly loaded on their smartphones, HCE technology enables guests to tap their phones to check in and unlock their rooms. Guests can also enjoy other perks via their mobile devices, such as purchasing drinks at the hotel bar or accessing meeting rooms. Loyalty programs, guest preferences and aggregate travel data are all enhanced to cultivate brand loyalty and improve the overall customer experience.

Identification

Ticketing

NFC

Time & Attendance

Loyalty & Memberships

Physical Access

Cashless Payment

Secure PC Log-on

Transit

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Common HCE Myths Debunked

The decision to implement an HCE-enabled mobile payments system requires card issuers to cut through misconceptions around the technology that are still rife in the marketplace. Here, we expose several common misunderstandings or myths surrounding HCE.

Myth	Truth
The only way to perform HCE safely is to rely on network-based tokenization	Network-based tokenization is when the mobile or card networks create and manage tokens for multiple card issuers in a payment network. HCE takes away the burden of relying on the major card networks by granting card issuers the flexibility of using their own tokenization to convert real customer card data into secure tokens.
HCE/CBP is less secure than SE	HCE allows for the direct integration within a bank's secure cloud environment and transaction flow. There are four unique benefits HCE facilitates: [1] support for device biometrics, [2] issuance of limited use keys (LUK), [3] provisioning of transaction tokens and [4] support for real time threat assessment. In addition, HCE & CBP have been supported by all major payment networks.
Hosted card transactions involve a higher interchange fee	There are two per transaction costs to the merchant, a lower one when the card is physically there (card present), a higher one when the card is not. HCE/CBP is often mistakenly perceived as a more costly, card not present cost, when in reality it's the same as a card present transaction.
HCE/CBP requires constant connectivity	HCE technology enables consumers to conduct secure transactions whether or not they are connected to a mobile network, providing flexible payments anywhere. In the event that users cannot connect via their mobile devices, card issuers can through HCE allow a limited number of transactions to "reside" on the mobile devices until a connection is made again.
HCE/CBP requires new POS equipment	Most POS systems today have capabilities to accept contactless card payments and more and more terminals come standard with NFC capabilities. With HCE, the NFC controller within an Android phone works exactly like a contactless card would at a POS terminal, except the card is now replaced by the phone.
Tokenization is a requirement for HCE/CBP	While tokenization is a common measure to make HCE and cloud-based payments more secure, it is not a requirement. Banks also have the option to use alternate, dynamic primary account numbers (PANs) with each transaction for increased security, greater control and lower costs.

Implications for the Payments Industry

Mobile and contactless payments should be simple, scalable and affordable in today's payment landscape where consumers carry – and use – multiple cards.

HCE provides a contactless payments and mobile banking experience that is not only secure and endorsed by major card networks (Visa, MasterCard, AMEX and Discover), but easier to provision with, scalable for growth and flexible to future needs.

Enabling card issuers to leverage their customers' pre-existing hardware for card-present transactions at the point-of-sale, all from within their own secure server, has the potential to change the payments ecosystem and encourage more mobile payments adoption.

Free of ties to device manufacturers and mobile network operators, HCE can drive mass mobile payments adoption, as it offers a less complex and less costly approach to mobile payments for developers. App developers anywhere can build custom contactless applications, offering the opportunity to easily deploy these applications across industries.

NFC solidified the future of contactless payments, and the introduction of HCE on the Android platform means no consumer segment will be left behind.

Conclusion

As the title suggests, the ultimate goal of HCE is to make mobile payments easy and accessible to everyone. Right now, there is a struggle surrounding which part of the ecosystem will own and maintain the customer relationship. It is estimated that the mobile payments market will reach $2.8 trillion by 2020, creating much demand for continued innovation. The time is now for banks to finalize their mobile strategies and begin aggressively rolling out their applications if they expect to remain top-of-mind with their customer's preferences for payments.

Key factors driving the growth in mobile payments include:

- Almost all consumers have NFC-enabled phones

- Merchants are making an effort to get educated and updated for mobile acceptance

- HCE provides the "tunnel" for banking apps (namely software) to easily leverage the NFC radio connection between phone and POS

- Cloud-based payments offer banks a new opportunity by enabling complete control and management of their issuance aligned with the future

Mobile payment adoption has had a slow start -- but the technology and standardization is now in place to allow rapid acceleration. HCE will play a key role in this transformation and is paving the way for increased simplicity and widespread adoption of mobile wallets by card issuers and consumers alike.

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About SimplyTapp

SimplyTapp's technology powers payment functionality on Android devices for card-issuing banks and provides a simple and secure transaction environment for industries including retail, transit, ticketing and hospitality.

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