NFC Phones and the Four Convergences

The contactless smart card has steadily gained importance in the United States, despite the fact that credit card companies have universally adopted magnetic stripe cards and infrastructure, thereby making it difficult for other payment systems to gain a foothold in the market.

In coming years, the role of contactless technology is poised to grow considerably in the U.S. market. This growth, however, does not necessarily guarantee a larger role for the card form factor. Contactless technology as a whole will make deeper and wider inroads using a variety of tokens, not solely using contactless cards. In fact, paradoxically, technological changes could ensure that the contactless card remains a secondary token, while contactless technology expands in other forms, such as fobs, tags, and particularly, cell phones.

The introduction of Near Field Communication (NFC) phones is a milestone. It marks the first large-scale rollout of contactless readers to standard consumers, rather than distribution only to specialized security users or application providers. Any major shift such as this is bound to have widespread ramifications. As cell phones equipped with NFC technology become increasingly available and commonplace, phones can easily replace wallets, keys, paper tickets and ID cards. Rather than carrying an ungainly set of keys and a half-dozen credit and ID cards, users will be able to check in to work, school, libraries and other institutions, buy goods, and make payments with a single, secure device. Phones can also serve as active terminals. Consolidating multiple tasks into a single phone could also encourage the development of new uses for NFC phones. This broad (and growing) use of NFC phones will likely create four dramatic convergences:

1. **Convergence of payment terminal and payment instrument.**

NFC phones have the potential to replace both the card and the card reader, acting as a payment instrument as well as a payment terminal. The ScholarChip mobile platform already provides this phone-to-phone integration for non-financial transactions, such as attendance, ticketing, and hall monitoring for students.

For example, students checking into class can touch their cards or fobs to an Android phone or tablet controlled by a teacher or administrator, thereby creating an instant attendance transaction without any paper or web-based manual intervention. The same technology can be used for ticketing for a variety of events. Authorized attendees gain entrance by tapping their cards or phones against an NFC phone or tablet, eliminating the inefficiencies associated with paper ticketing. Additionally, the new tablet and phone point-of-sale terminals allow users to make purchases in a mobile environment.

Unlike standard contactless cards and fobs, the current Android operating system and hardware do not generate a static ID. An Android phone can be read by many standard card readers, but the phone’s ID changes randomly. This actually can be turned
into an advantage as, with the appropriate implementation, non-static IDs can be used to provide a high level of transaction security, particularly in phone-to-phone transactions.

In short, NFC phones have the potential to create a convergence of existing payment terminals and payment instruments while still maintaining high levels of security.

2. Convergence of online and offline payment.

Credit card processors have traditionally divided transactions into two categories: “Card present” and “card not present” transactions. In “card present” transactions, the user or cashier physically swipes the credit card through a magnetic stripe card reader. “Card not present” transactions refer to payments made online or over the phone.

The distinction between “card present” and “card not present” transactions will cease to be meaningful, however, as cards will have contactless chips and both computers and NFC phones can be set up as payment readers. Customers will be able to use their cards as tokens, and NFC phones can be used as virtual payment terminals. For example, a person buying books, clothes, groceries, or other goods online will be able to complete his purchase simply by tapping his contactless card against an NFC-equipped computer or tablet. Rather than entering his credit card number, billing information, security code, and expiration date, he will be able to make the payment with a single tap of his contactless card. This method of contactless payment has the potential to be much more efficient—and more secure—than the current online payment process.

ScholarChip has enabled these features in all its school-based applications for a number of years. Use at home, however, has been limited by the fact that most desktops do not have built-in smart card readers, and users typically do not purchase USB-based card readers, even when they are available as add-on options. The introduction of NFC-enabled phones as a consumer item will radically alter this landscape and allow the use of smart tokens with mobile phones and tablets. It will be common to have users “tap” their token to make a payment, rather than enter their credit card numbers. Additionally, the tokens can be used as a secure identifier for users’ electronic wallets and payment instruments, increasing the use of e-checks and other non-credit card payment options.

The convergence of online and offline payments could potentially create a drastic shift in the model of shopping and making payments on the Internet.

3. Convergence of active and passive tokens.

NFC phones and smart cards will now work interchangeably, allowing for a host of secure applications to function with the phone as the hardware token. The cards and fobs are “passive” tokens, as they do not have power and require a card reader in order to power the on-board chip. NFC phones and tablets, on the other hand, are “active” tokens as they have power and applications that generate and alter the token’s ID. The widespread availability of NFC phones as consumer products will allow interchangeable use of both passive and active tokens.
There are some technical challenges in this area. A phone is not an exact substitute for a contactless card, as the Android phone operating system does not generate a unique ID. Using the NFC phone as a “card emulator” would require the cooperation of many hardware supply chain partners. This might not happen quickly. There are however possible solutions for companies that control their own terminal hardware. The solutions involve essentially bypassing the need for a standard card ID and using the phone-to-phone NFC communications to create a layer of security.

Already, ScholarChip has enabled its school attendance stations, physical door access terminals, and payment terminals to accept both smart cards and NFC phones. The next challenge will be to do so in the more restrictive and security-conscious open loop payment system. ScholarChip will be beta testing these products later this year.

4. Convergence of payment processing and applications.

Traditionally, online stores have used a supermarket metaphor. Shoppers collect their desired items in a virtual “shopping cart,” and are then expected to pay for all their items together when they are finished browsing through the selection of that particular brand-name online store. In the virtual world, the check-out process translates into end-of-session authentication of the user’s credit card information.

But this metaphor, based on the experience of shopping in physical stores, is not the only model for online shopping. Widespread use of NFC technology has the potential to create an “always authenticated” model, meaning that users’ credit card information will be authenticated throughout the process. Using a secure device, buyers will be able to purchase items at any point during application use, not just at the end of the session. This model can be particularly effective when purchasing products that do not require physical shipping. For example, Amazon employs an early form of this “always authenticated” model in its Kindle e-reader platform. The Kindle reader hardware serves as an authentication token for “one-click” purchases. The user can buy and download books at any time without going through the cumbersome process of entering credit card details. This model works for Amazon as Amazon controls the hardware. To expand this model for content providers who do not control the hardware will require a standard platform for authentication that is more secure than a simple login. NFC phones and tablets provide just such a platform.

Instead of a login, which is insecure, or a special-purpose physical device attached to a purse (as with an e-reader), the user will simply tap a token to access any content or purchase a product directly from within the application without resorting to a shopping cart or interrupting the application flow.

These four convergences will dramatically alter the payment and authentication landscape. The model for making payments and purchasing goods online could change considerably, with users relying less on magnetic stripe cards and more on secure devices to conduct financial transactions online.
Similarly, NFC phones have the potential to reduce inefficiencies in other areas, including ticketing and identification.

The widespread availability of NFC phones as a consumer product will also enhance security in a number of areas such as securing and authenticating documents. For example, ScholarChip is testing a simple concept to provide strong authentication for ground mail documents. The document has an NFC sticker with a non-reproducible, globally unique ID. Users can tap the document against their NFC phones to authenticate it from a central server, and to receive updates and specific private information that might not be appropriate to send in the mail. In essence, prosaic documents such as bank statements, invoices, etc. can provide strong identification tokens for secure electronic communication.

New contactless technology, while increasing the potential uses of contactless cards in some areas, also presents the possibility that future users will rely much less on cards—whether magnetic stripe or contactless. The convergence of active and passive tokens can give users a more comprehensive tool with which to track spending, and that tool can also be used as a secure form of identification.

Technology providers who anticipate these changes will benefit. As with all technological shifts, there will be winners and losers on the business side, but consumers will likely experience gains in both convenience and security.