

Several vendors are developing and marketing products that extend the capabilities of Near Field Communication technology.

By Bob Violino

May 4, 2009—Near Field Communication (NFC) is a short-range, high-frequency (13.56 MHz) wireless technology that allows for the exchange of data between two NFC-enabled devices, such as mobile phones, over a distance of a few centimeters. Among the applications enabled by NFC are contactless transactions for payment and transit ticketing, simple data transfers and access to online content. It's one of the fastest-growing wireless technologies, and now a number of vendors are launching products that extend its capabilities.

In addition to mobile phones, a variety of devices and machines can be NFC-enabled, according to the [NFC Forum](#), a Wakefield, Mass., organization formed in 2004 to advance the use of NFC technology, ensure interoperability among devices and services, and educate the market regarding NFC. These include cash registers or other point-of-sale (POS) equipment, vending machines, turnstiles, parking meters, ATMs and PCs. The technology can also be used with posters, street signs and other public points of interest, certificates, food packaging and other items.



The TazCard, a handheld tablet in a credit card format, features a touch screen and fingerprint-based biometric authentication, communicates via NFC, USB and ZigBee technologies, and is designed to save and transmit personal data in a secure manner.

The use of NFC technology is growing, says Peter Preuss, the NFC Forum's marketing chair and a

senior manager at [Nokia](#). NFC devices are being used in more than 65 projects worldwide, he explains, enabling users to make payments and access bus gates. A 2008 study conducted by [ABI Research](#) found that more than 419 million NFC chipsets will be shipped by 2012, and that NFC chipset shipments and revenue will continue growing steadily over the next five years, as the market adapts to the new technology.

In November 2008, the [GSM Association](#) (GSMA), a global organization comprising licensed GSM mobile network operators and the technology vendors that serve them, called on mobile phone manufacturers to include an NFC chip with a single-wire protocol and a subscriber identity module (SIM) chip in all commercially available handsets they make by the middle of 2009. The association said this would "ensure that consumers can reap the benefits of mobile payment services as soon as possible."

The announcement was designed to stimulate the worldwide use of NFC phones. According to GSMA, a series of operator trials, under the organization's Pay-Buy-Mobile initiative, have shown that consumers can use NFC handsets to quickly, easily and securely pay for goods and services in stores, restaurants and train stations. The Pay-Buy-Mobile trials took place in nine nations: Australia, Canada, France, Japan, Korea, Malaysia, Taiwan, Turkey and the United States; further pilots are currently planned across 14 additional countries.

"There is a huge latent demand for a large variety of mobile transaction services," says Rob Conway, GSMA's CEO, "of which there is universal interest in proximity payments, as trials across the world have already shown." Conway says the organization is committed to ensuring that mobile payment services are delivered as efficiently and cost-effectively as possible, adding, "but this will require device manufacturers to make sure that the vast majority of commercially available handsets incorporate the single-wire protocol and [NFC] features as standard." That, he notes, would allow the industry to leverage significant economies of scale and ensure greater accessibility of NFC services for mobile users.

But some vendors say the market has been slow to emerge because device makers do not want additional costs, and consumers don't want to purchase new devices. These companies have been keeping a close watch on NFC's potential and are now developing and marketing NFC-enabled products that they believe will help support the growth of NFC adoption among consumers.

In the Cards

[Tyfone](#), a Portland, Ore., startup firm, has developed a memory card that turns any mobile phone with a standard memory card slot into an NFC device. The Tyfone u4ia Secure Memory Card (SMC) will help spur consumer adoption of NFC technology, says Mike Feliciano, Tyfone's senior VP of business development.

"The primary barrier to NFC is the cost to provision NFC capability to devices, and finding a return on investment [ROI] that is acceptable to the various [industry] stakeholders," Feliciano says. "Consumer studies do not indicate a willingness to switch or purchase NFC-enabled phones, so the MNO's [mobile

network operators] have to find another way to fund the ROI. The other stakeholders have thus far rejected revenue-sharing proposals, and [also] have concerns about risk, fraud, disintermediation and control."



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Even after multiple years of negotiations and numerous worldwide trials, Feliciano says, "there is no acceptable solution on the horizon, and not a single trial has moved to an actual implementation. Therefore, the existing paradigm is stuck with a chicken-and-egg scenario of investment/device availability versus customer usage/ROI."

Products like Tyfone's SMC enable a "new paradigm," Feliciano says, as industry stakeholders and consumers don't need to invest in the cost of NFC phones in order to leverage NFC capabilities. "Unlike with a SIM, the SMC can work in both GSM and CDMA phones," he adds. While a SIM's security levels are incompatible with the payment industry, Feliciano says, the SMC uses a smart-card chip that already meets security requirements for use in the payment industry. "A memory card approach for the secure element has game-changing potential," he states, because a growing percentage of mobile phones worldwide are equipped with memory card slots.

Tyfone's SMC is one component of a package solution that also includes device software and a middleware application stack. The device software provides the communication path to the SMC and middleware, while the middleware application stack provides all client solutions, including communications, connectivity, security and administrative functions.

The SMC allows for secure and contactless payment functions by embedding a dual-interface smart-card chip and miniature antenna on a standard memory card. The card can meet the [National](#)

Institute of Standards and Technology's (NIST) level 4 electronic authentication, says Carol Grunberg, Tyfone's director of marketing, and allows a standard memory card to perform non-memory functions, such as account activation, multi-factor authentication, cryptography key storage and secure payments. The SMC technology is supported on regularSD, MiniSD and MicroSD memory card form factors.

Tyfone's memory card can be used for ISO 14443- and Mifare-compliant RFID contactless payments in closed-loop implementations, such as transportation systems, as well as in open-loop implementations. such as [MasterCard's PayPass](#) or [Visa's Paywave](#) payment systems. The Tyfone platform can be configured to scale from consumer mobile banking to business/investment banking applications with enhanced security, and from closed-loop mobile payment to open-loop mobile contactless payments.

The Tyfone platform is available now in several configurations that address different business segments and uses. "The market opportunity for our technology and solutions is large, growing and global, with multiple business segments and use cases," Feliciano states. "The opportunity includes converting existing electronic transactions [debit and credit, for example] to mobile, converting non-electronic transactions—cash and check—to mobile, and taking advantage of the GPS location-based service capability of mobility to capture new payment and service discovery transactions through marketing and advertising."



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The platform is currently being used in the financial and retail sectors. In 2008, Tyfone conducted 21 tests in the marketplace through various global organizations, which the company says validated the technology. This year, the focus is on closed-loop trials, leading to certification by MasterCard, VISA and other companies.

Tyfone is using various distribution models for the platform. An SMC can be "issued" similarly to how a financial institution provisions a plastic card to a consumer. A card can also be sold at retail, similar to how pre-paid cards are sold. And it can be bundled with handsets or sold as an accessory.

Tyfone, Feliciano indicates, sees its technology as an alternative to address the demand for NFC and the needs of all stakeholders, and as complementary to the GSMA initiative. "We offer the potential to dramatically accelerate the rollout and adoption of mobile payments on a global basis," he says.

Personal Wallet

Another company—[TazTag](#), a Brittany, France, business launched by a team of engineers in 2008—is developing products based on contactless communication technology, such as NFC. The company's TazCard is a handheld tablet, in a credit card format (6 millimeters, or 0.2 inch, thick), that features a touch screen and fingerprint-based biometric authentication, and can communicate via NFC, USB and ZigBee technologies. The card is designed to save and transmit personal data in a secure manner.

The TazCard can be used as a "personal wallet," says the company's CEO, Eric Fouchard. But consumers can also use it to order and pay for food at a fast-food restaurant, or register for a flight at an airport, then track the flight's status from any location supported by a ZigBee infrastructure. In addition, the TazCard has applications for access control, ticketing, couponing, payments and customized applications.



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According to Fouchard, a TazKiosk provides the interface between a TazCard's communications capabilities and networks such as Ethernet and Wi-Fi. "We are able to encrypt a ZigBee communication initiated with NFC with a network kiosk," he says. "You can access a [TazKiosk] to interface with a back

office" or other application.

How does the TazTag technology complement the GSMA initiative? "There are several markets where the GSMA is not allowed: hospitals, museums, high security zones, military zones, etc.," Fouchard states. "Our product can address these markets."

TazTag also offers a Java-based development kit that enables integrators to develop customized applications. The company provides access to its technical support, a TazCard and a few tags to work with. Fouchard says the firm has received many advance orders for the development kit, and that it expects to begin delivering it in the summer.

In February 2009, TazTag and [Atmel Corp.](#), a designer and manufacturer of microcontrollers and radio frequency (RF) components, announced plans to collaborate to bring to market contactless solutions to stores and protect personal data. As a first step in the collaboration, TazTag is using Atmel's turnkey security module in its TazCard product.

Secure Payments

Like Tyfone, [Giesecke & Devrient](#) (G&D), a global company based in Munich, Germany, that specializes in smart cards and services, has developed a mobile security card that provides contactless smart-card security with data storage functions. Among the possible contactless applications the card can support are contactless payment, electronic access control to buildings, electronic event and transit ticketing, and electronic passes for companies, libraries and universities.

The Mobile Security Card CL enables mobile phones to be used for secure payment functions, as well as for other mobile applications. The card can be slipped into any mobile device that has a slot for microSD cards, a format for removable flash memory cards used primarily in mobile phones, but also in handheld GPS devices, portable media players and digital audio players.



D&G supports several NFC customer trials around the world, including Germany's "Touch and Travel" system.

The G&D card includes a cryptography controller with an NFC-compatible interface, along with the flash memory, and is designed to add security and payment functions in mobile phones, and for other mobile applications. The card's interface is based on the ISO 14443 and Mifare standards.

To use the card in contactless mode, the device in which it's inserted must have an antenna for the contactless communication link; the card has two additional standardized contacts for this purpose. A battery is not required to operate the contactless interface, because power is tapped from the radio field generated by the card reader.

A secure communication link is established when the antenna comes within a few centimeters of a reading device, says Kai Grassie, the head of G&D's new business division, and users can deploy the same card for authenticated access to all services requiring a digital identity.

The G&D card supports applications such as secure banking transactions and the storage of digital certificates for public key infrastructure (PKI) applications. Other potential uses include secure authentication when using single sign-on procedures to access enterprise networks, or attaching digital

signatures to documents.

NFC is a key technology for D&G, according to a company spokesperson. Along with Nokia, the firm has formed a joint venture known as [Venyon](#), to develop and operate a secure service platform to be used for the over-the-air provisioning of consumer applications, such as credit cards and transportation tickets, to consumers' NFC-enabled mobile devices. Venyon will also act as a trusted service manager for mobile operators, banks, transport companies, retailers and other service providers that offer applications for NFC-equipped devices.

Moreover, D&G also supports several NFC customer trials around the world, including the "Touch and Travel" system in Germany, a joint project of German railway operator [Deutsche Bahn](#), [Deutsche Telekom](#) and [Vodafone](#). According to the company spokesperson, the Mobile Security Card CL and the NFC SIM-Card are two separate technical solutions for different customer requirements.

Also offering NFC-based applications is [Cell Idea International](#), headquartered in Hong Kong. The company provides two types of microSD cards that it says can be used for mobile payments.

According to Cell Idea, the Secure NFC microSD card (N-type) combines smart card security and standard embedded flash, and works with mobile phones that have NFC-technology embedded. The card can serve as a storage device, as well as a secure smart card for applications such as electronic wallets and mobile ATM. The card is available in various memory configurations, the company reports.

The other card, Secure Contactless microSD card (D-type), also combines smart card security with standard embedded flash. When inserted into a mobile phone, Cell Idea explains, the card enables applications such as mobile banking, mobile wallet and online payments. With the card, phones with an embedded antenna can be used as a contactless terminal.

"Cell Idea strongly believes in the value of contactless and NFC technologies," says Omer Katz, the company's chief technology officer.

Vendors expect to introduce more products and capabilities that leverage NFC technology this year. For example, Grunberg says, Tyfone's Secure Memory Card—in addition to transmitting ISO 14443 and Mifare payment functionality—is capable of being used to enable read functionality (for smart posters and billboards, for instance, as well as for securing online Internet PIN debit transactions). The read capability is in the works for a late 2009 engineering proof-of-concept, he says. The card is not expected to be commercially available until sometime in 2010.

D&G is currently working on new products for ticketing and parking applications, though the company spokesman indicates it is still too early to provide details.

And Cell Idea is developing a product called WithMe, which it says will enable non-NFC phones to have NFC capability. This device will emulate NFC and contactless technologies, and will be able to be connected to any phone using Bluetooth technology. The company is also looking into additional software and service solutions leveraging NFC technology, but declines to divulge details at this time.

The NFC Forum, Preuss says, "is pleased to see momentum building for diverse NFC-based products and application development. Each is one step further toward providing the needed assets to build a global NFC ecosystem."

According to Preuss, research shows that NFC has typically received a high approval rating from consumers, stemming from its ease of use and the convenience it provides. "We see frequent announcements of new NFC projects starting up," he states. "We strongly encourage developers to build new innovative applications using NFC to make everyday life easier."