

# Near Field Communication

## *What is NRC?*



Near Field Communication (**NFC**), is a short-range, high frequency and low power wireless communication system. This technology, through the use of magnetic induction, creates a radio-wave field that allows for the exchange of data between two devices at a short range (usually 4 cm or less). Essentially, there is an active device (which acts as a reader) and a passive device (which acts as a tag). The reader generates a radio frequency (RF) field that checks the immediate area for nearby tags.

Once the tag comes into the field range, it will establish a link between the devices and proceed to follow the commands of the reader. The tags can be programmed to store personal data such as debit and credit information, loyalty program data, PIN numbers, and contacts among other things. The tags are inexpensive to produce and can be implemented in nearly any object, including mobile phones, stickers, posters, key fobs, glass, etc.

In this way NFC is an evolution of the Radio-Frequency Identification (**RFID**) and other short range wireless technologies currently employed in contactless payment systems, public transit and retail systems throughout North America, Europe and Asia. The fundamental difference between these two wireless technologies is that NFC operates via two way communication (meaning that it can both transmit and receive information) rather than RFID's one-way form of transmission. In fact, mobile payments via magnetic induction have become one of the standard forms of payment in Japan, albeit through RFID capabilities. It is also similar to Bluetooth in the sense that they are both short-range communication devices, without the configuration (or pairing process) required by Bluetooth – since NFC does not need to be manually configured, they can simply be touched or tapped together to establish an instant connection. Additionally, NFC is compatible with existing RFID infrastructures (such as Visa's PayWave system) which are currently distributed by influential and multinational corporations including Visa, MasterCard and Sony.

## *What are NFC's applications?*

According the [NFC Forum](#)<sup>1</sup>, the primary functions of NFC technology are to promote sharing, pairing and transactions between NFC devices. These concepts are outlined below:

### *1) Sharing*

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<sup>1</sup> An umbrella association of companies, formed in 2004 Near Field Communication with the purpose of “developing specifications, ensuring interoperability among devices and services, and educating the market about NFC technology. The Forum has 150 members consisting of major communications juggernauts such as Nokia, Samsung, Toshiba, Google and Visa.

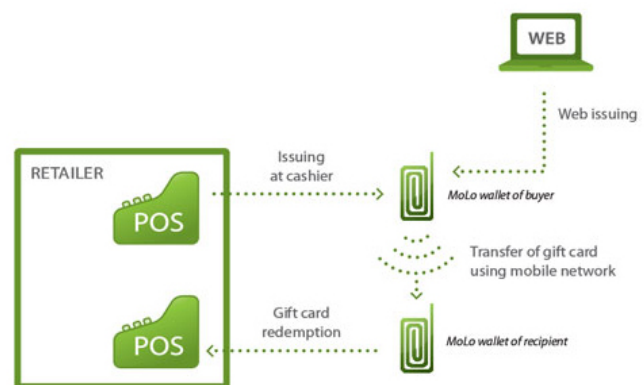
An active NFC-enabled device can interact with another active NFC device or with a passive tag. Users can share files, urls, music, applications, business data, gaming information, etc with each other by tapping their NFC-enabled devices together. Peer-to-peer communication via NFC is limited by the technology's relatively slow speeds of less than 0.5 Mbps (which is less than a ¼ of Bluetooth). This is an area of communication that needs to be explored by NFC application developers in order to hone in on the corner of the market dominated by faster wireless applications such as Bluetooth and Wi-Fi.

## 2) Pairing

Pairing an NFC device with a smartphone can allow the phone's processor and memory to be used for more advanced applications. Using the NFC device to configure to a NFC-enabled router, Bluetooth, or Wi-Fi connection could allow the user expanded content sharing. This would require co-operation between the application developers and these organizations for increased user ability.

## 3) Transaction

This concept is the main focus for NFC technology and the most important for retailers. An NFC device embedded in a smartphone is configured to work as a credit or debit card and can be tapped against an NFC-enabled payment terminal to complete the transaction.



For the customer, instead of needing to carry around physical forms of payment, they can store virtual payment cards or electronic cash on their mobile phones. Furthermore, NFC could consolidate the contents of a user's wallet into their mobile phone<sup>2</sup>, creating a digital wallet (e-wallet) that is compact, secure and easy to use. NFC capabilities are already being rolled out in the latest generation of smartphones, they are cost effective (costing a few cents per tag), energy efficient (less than 15mA) and compact (40 nm 'large'). Currently there are 100 million people in the world with NFC-enabled mobile phones, and this number is expected to triple by 2014.

### **What does this mean for retailers?**

While NFC technology presents some amazing possibilities for the customer, it can be a fantastic tool for retailers willing to capitalize on its marketable capabilities. While NFC can be enabled on vending machines, point-of-sale (POS) equipment, cash machines, and kiosks, it can

<sup>2</sup> Including transit passes, library cards, loyalty cards, office building pass-cards, and government issued ID's.



easily be attached to any object within a retail environment.<sup>3</sup> Posters could be enabled with an NFC chip that functions like a QR code – providing promotional information, product info, or a URL- without the need to open an application, take a picture and connect to the internet. Retailers could send promotions or coupons directly to the customer’s mobile phone at the point of sale that could be redeemed *directly from the phone itself*.

More importantly, NFC has the potential to make important customer data available to the merchant instantaneously. When a customer makes a purchase on their NFC-enabled smartphone, their phone transmits their purchasing habits and demographic information, *along with* their bank numbers or credit details. This is an extremely valuable tool for retailers and marketers who can then tailor advertisements to the consumer directly based on their particular buying habits.

### ***What about security?***

Although NFC is considered to be inherently secure owing to its limited communication range and potential data encryption, there are certain limitations to the technology. Primarily when it comes to data security; encrypted communication is not a mandatory requirement of NFC specifications, so data is vulnerable to eavesdropping and modification. Secondly, theft of an NFC enabled device could prove to be troublesome for the owner, since the device could be used to make unauthorized payments at compatible terminals until the device is reported. As a result of these two factors, the onus of security is upon the user to ensure that their information is properly protected from potential interference. Ensuring data security will require the co-operation of NFC device providers (who must safeguard the products with AES standard data encryption), customers (who will need to protect their devices with passwords, keypad locks, anti-virus software, etc), application providers, banks and retailers (who will need adequate security systems in place to ensure authentication and prevent spyware or malware from infecting their systems).

Fortunately for consumers there are some safeguards in effect to ensure their information is being protected. First, POS security, under the ISO 14443 protocol, is standard in any retail environment with existing RFID infrastructure. Additionally, third-party developers of NFC enabled devices (such as mobile phone companies) have already begun to include encryption security within their current and soon to be released products. The benefit of third-party encryption allows for developers to provide custom security features appropriate to the application at hand.

### ***Conclusion***

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<sup>3</sup> Including posters, product packaging and displays.

NFC technology has great potential to succeed in a retail environment, providing retailers are willing to make the investment in the technology. This will not be a huge issue for businesses with existing RFID infrastructure in their retail outlets, since NFC is compatible with this technology. Smaller business may not be willing to invest in NFC's two way advertising capabilities, but this tool will prove to be a major asset to any business interested in consumer demographics. With backing from highly influential banks, software developers, global payment organizations, and telecommunications companies, NFC technology is likely to become widespread in the retail environment.

### ***Resources***

Foresman, Chris. "Near Field Communications: a technology primer." (Online) Available at <http://arstechnica.com/gadgets/guides/2011/02/near-field-communications-a-technology-primer.ars>, accessed 28 September 2011.

Gardiner, Bryan. "What is Near-Field Communication." (Online) Available at <http://gizmodo.com/5707321/what-is-near+field-communication>, 6 December 2010.

Kessler, Sarah. "NFC Technology: 6 Ways It Could Change Our Daily Lives." (Online) Available at <http://mashable.com/2010/05/06/near-field-communication/>, 6 May 2010.

NFC Forum. "NFC in Action." (Online) Available at [http://www.nfc-forum.org/aboutnfc/nfc\\_in\\_action/](http://www.nfc-forum.org/aboutnfc/nfc_in_action/), accessed 28 September 2011.