

NFC: NEAR-FIELD COMMUNICATIONS

A Look Into the (Near) Future of NFC

NFC, HUH?

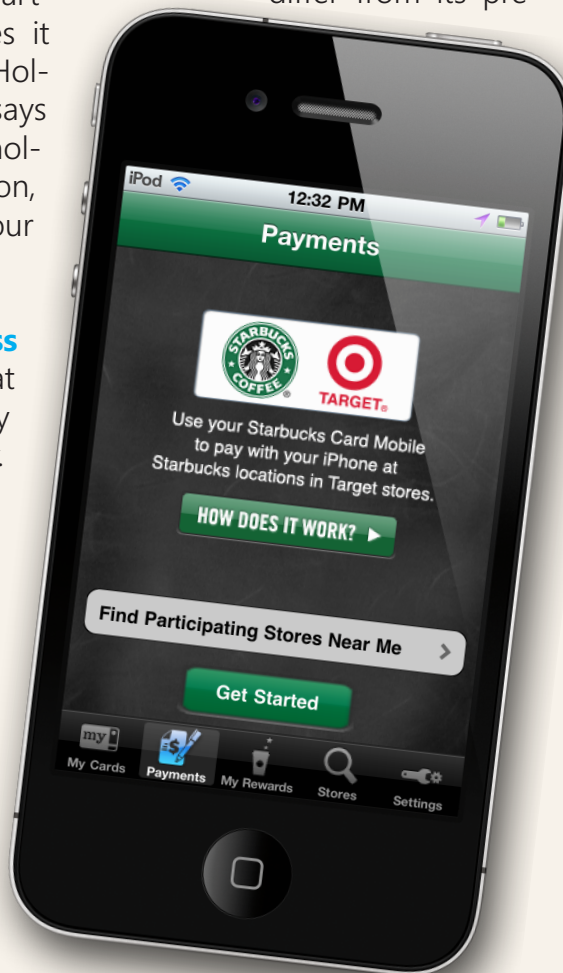
Imagine if your smartphone could do everything from make contactless payments with a tap of your phone to become your hotel or house key. Away with all your CVS, Giant, Safeway, and Staples loyalty cards—let your smartphone take their place. Does it seem like something from a Hollywood movie? Well, reality says otherwise. A not-so new technology, near field communication, is on its way to simplifying our lives even more.

NFC is a **short-range wireless connectivity technology** that builds upon Radio Frequency Identification technology. What exactly is RFID?

- It is capable of accepting and transmitting information beyond just a few meters; it is less restrictive than NFC
- It uses radio frequency waves that act as passive, active, or a combination of both
- It does not need a direct line of sight to

read information

Sony and Philips first developed NFC in 2002. As an extension of RFID, NFC is completely compatible with existing structures, tags, and contactless smart cards. It does, however, dramatically differ from its pre-



decessor. NFC operates at high frequencies (13.56 MHz) to allow the exchange of data between enabled devices. Communication begins when two enabled devices are in extremely close proximity to each other (4 - 10cm) or if two enabled devices physically touch one another. In essence, this technology brings connectivity to the physical world.

The **Near Field Communication Forum** was created in 2004 and seeks to advance NFC technology by developing specifications, educating the market about NFC, and ensuring interoperability among services and devices. The forum's 140 members consist of application developers, financial services institutions, manufacturers, and more.

NFC PREDICTIONS

NFC-enabled mobile devices stand to benefit most from the type of technology NFC provides. Factors such as chip, handset, and tag manufacturers have slowed its adoption to this point, but Android devices that contain NFC

chips are already on the market and the iPhone 5 is expected to have built-in NFC capabilities as well.

In comparison to countries abroad, very few devices equipped with NFC exist in the U.S.; these few include Nokia, Samsung, LG, and Motorola devices. According to the [latest research by Mercator Advisory Group](#), 116 million smartphones equipped with NFC will ship this year. Between 2012 and 2015, the shipment number should rise to 510 million.

IN A NUTSHELL: HOW NFC WORKS

NFC is often called an “application enabler.” It opens various roads of communication and transactions in a quick, user-friendly way. This not only makes electronic services or other interactions accessible to more people, but it also transcends age and technical ability.

So how does it work? Think of NFC performing a handshake between two devices that are close together. The device that first extends or initiates the handshake is the “initiator” and tries to establish a connection. Once connected, the two devices exchange data through NFC directly or through other wireless technologies such as Bluetooth and WiFi.

Let’s take this a step further and look at the roles the two devices

play. The initiator is the active device, which contains power sources and is usually a mobile device that contains an NFC reader/writer. The target is the passive device, which does not have any available power sources. The passive device contains an NFC tag, which is basically a printed circuit integrating stored data and an antenna which can be read by an NFC-enabled device.

The NFC Forum developed **three modes of operation** that will allow for the integration of the technology into our daily lives. NFC devices can easily switch from one mode of operation to another. These modes are:

1. *Reader/Writer Mode*

The Reader/Writer Mode is usually for the exchange of content information. For instance, if you come across a movie poster with an NFC tag, you can download any available data (such as a movie trailer, a discount coupon, or reviews) by reading the tag with your NFC-enabled device. Another great example is a self-

**116 MILLION
SMARTPHONES
EQUIPPED
WITH NFC WILL
BE SHIPPED
THIS YEAR.**

guided museum tour with NFC tags placed throughout an exhibit.

2. *Card Emulation Mode*

The Card Emulation Mode involves the NFC device acting as a NFC tag, similar to the traditional contactless smart card. When you make a payment, for example, you touch your device to a NFC reader, which receives or reads the necessary data.

3. *Peer-to-Peer Mode*

The P2P Mode is when two devices exchange data. Suppose business owners John and Jane meet for the first time at a mobile strategy conference and they want to keep in touch. With NFC there’s no need to carry around and exchange business cards; instead, it would only take a tap of their phones to trade their contact information.

NFC USES/SCENARIOS

NFC-like technology is not a new commodity. Think about the ID badges or key fobs that open doors. Remember when MasterCard (PayPass) and ExxonMobil (Speedpass) implemented their “pay on the go” mini kiosks? These are very common examples, but there are countless more which breed convenience, synchronization, productivity, communication, and the rapid exchange of information—all in real-time.

Below are just a few scenarios that illustrate the limitless possibilities offered by NFC.

1. *Contactless Payments*

The most common example is contactless payments: using a mobile device as a digital wallet. Say you're on the way to the office, but you want to stop for your morning cup of coffee. With just a swipe or tap of your mobile device, you can be in and out quickly, eliminating the need to carry cash or your credit card. In terms of contactless payments, NFC technology can also include the extension of redeemable coupons, promotions, and the use of loyalty cards. At the time of purchase, customers can swipe mobile phones to unlock a variety of discounts.

2. *The Sharing of Content*

We do everything with our mobile devices—take pictures, record videos, take notes, read, write/edit documents, build contacts, download/listen to music...all of which we love to share. NFC technology promotes quick and easy sharing between two mobile devices, as well as with other consumer electronics such as cameras, TVs, and printers. Most impressively, trading information only requires a quick touch between devices. In the office, you can streamline business and revolutionize the way you swap business cards, spreadsheets, and documents.

Pairing NFC and consumer electronics works similarly but depends on the overall size of the transfer data. For instance, data that is reasonably small (up to a kilobyte) may solely use NFC to transmit the data, but other situations may call for NFC to establish another wireless connection method (such as Bluetooth or WiFi) to carry the information for sharing.

Suppose you have photos on your mobile device or digital camera that you want to print. In that case, you'll touch your device against the NFC-enabled printer. Because of the size of the files,

In essence, this technology brings connectivity to the physical world.

you'll connect via Bluetooth to transmit the digital photos from the device to the printer.

3. *Ticketing & Transportation*

The transportation industry is one of the industries set to reap the benefits of using NFC. According to the **American Public Transportation Association**, nearly 14 million people depend on buses, trains, light rails, subways, cabs, and trolleys each day. That's a substantial number of fare transactions, not to mention

riders looking for information on transit schedules.

Most public transportation requires fare, which comes in the form of a paper ticket, plastic/metal token, or an electronic card. The use of NFC technology removes the burden of carrying cash, loose coins, and/or credit cards. Commuters will profit from being able to monitor real-time transit information and schedules via signs that are embedded with NFC-readable information.

ENTERPRISE ADVANTAGES & BENEFITS OFFERED BY NFC

NFC presents numerous benefits to both mobile users and businesses. In general, it is a versatile technology that can find a niche in virtually every industry or situation. Convenience and simplicity of use are obvious advantages. The compatibility between NFC and existing RFID structures, tags, and contactless smart cards is another plus because it eliminates the need to create and/or develop an entirely new system.

Given the wide range of possibilities for developers and the number of devices that will soon come pre-equipped with NFC chips, it has become a very attractive technology. Market and consumer outreach efforts, as



Contact PointAbout at 202.391.0347, info@pointabout.com or visit www.pointabout.com for more information.

well as the opportunity to gather valuable market research, are just the beginning. For instance, a customer in a mall scans a shirt's NFC tag with their mobile device to gather more information on the product (such as availability in another store location, size information, or perhaps the lowest price). Once the customer receives the requested product data, the customer's interest in the product can then be made known to the company, which helps them understand the customer's interests. This leads to a deeper knowledge of the consumer and could enhance targeted marketing (e.g. tailored promotions, loyalty point incentives, and coupons).

This also works in reverse. Using NFC, consumers can effortlessly share information about companies—sales, promotions, and product data—that can result in an increase in foot traffic, sales, and referrals.

TACKLING SECURITY ISSUES

The development of technology and ease of sharing raise security concerns. As NFC continues to develop, more security risks are coming to light. **Common attacks and threats** include data

modification, eavesdropping, and "man-in-the-middle" attacks. Depending on the mode (passive or active) of the devices in question, the attack may or may not be a success.

Threat: Data modification, in short, is when an attacker intends for a valid, but manipulated, message to be sent to the receiving phone.

Solution: Establish a secure channel or rely on the NFC device to continuously check the radio frequency field while transmitting information and to discontinue the transmission when a threat is detected.

Threat: Eavesdropping is a more common threat because devices communicate through radio frequency waves. An attacker, using an antenna, can literally grab and decode the transmitted signals.

Solution: Establish a secure channel.

Threat: Albeit a rarity, the "man-in-the-middle" attack involves two parties that want to start a conversation but that instead get duped by an attacker into a third party conversation.

Solution: Use active-passive communication mode.

As the technology matures and NFC-enabled smartphones hit the market, companies are actively researching, seeking, and developing ways to combat threats. It is imperative to craft safe and secure ways to transmit information.

CONCLUSION

Like all new technologies, security concerns still remain. Nevertheless, the benefits of NFC mobile services are immeasurable. NFC-enabled devices can change the way we make transactions, exchange information, and send and receive data.

In 2011, the big names in mobile technology plan to integrate NFC with their new devices. Both Android and Blackberry **already have or will have NFC-supported models**; the media predicts that Apple will follow suit in its next generation of iPhones. The next few years will see more NFC support in mobile devices. It'll be a matter of time before commerce, transportation, and other institutions develop the infrastructure to jump into the game.