

# NEAR-FIELD COMMUNICATION: WHERE NEXT?

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We live in a fast-moving world: people want to search for their favourite content, order it, have it delivered, consume and exchange it on a single device. Mobile phones, which benefit from their compactness, connectivity and multimedia functionality (as well as their 'always on' and GSM localisation features), are fast becoming the preferred medium for personal access to a wide range of services, such as games, music, shopping and internet access. They are also much-loved by their owners who are keen to use their phones for more and more services.



Nowadays, almost everyone carries at least one phone. During the past decade developments in mobile services have moved from basic voice and short messaging to multi-media services, TV and Internet, as well as such applications as health-care monitoring.

For the past twenty years chip-based cards have been the prominent means of accessing data bases and carrying out transactions: first, simple memory cards, followed by contact smart cards and then contactless cards.

A big problem for all these developments has been the need to carry a different card for each service (transport, cinema, supermarket, library, clubs, work access.....). The introduction in the 1980s of remote-memory telephone

cards seemed a solution - no card, just an access phone number and password to record, but they, too, evolved into 'real' cards! During the 1990s there were many experiments with electronic purses and multi-application cards, yet few succeeded in catching the public's imagination.

The obvious answer was to take advantage of all that embedded processing power and have a single card divided into separate accounts. Or one device to carry all the applications - mobile phones being the logical choice.

As I write, it is about mid-day and my pocket is bulging with all the cards I am carrying. I have already lost track of the different cards I have used today: travel card, rail card, credit and debit cards, fidelity cards....

That is where Near Field Communication (NFC) comes in.

## What is NFC?

Near Field Communication, which was developed in 2004 by NXP Semiconductors and Sony, is an international standard for a form of short-range high-frequency wireless technology combining contactless identification and interconnection. It allows for the exchange of data between devices placed within roughly 10 centimetres (4 inches) of one another. This very short range, using inductive-coupling (where loosely coupled inductive circuits share power and data) gives NFC-enabled transactions a high level of security.

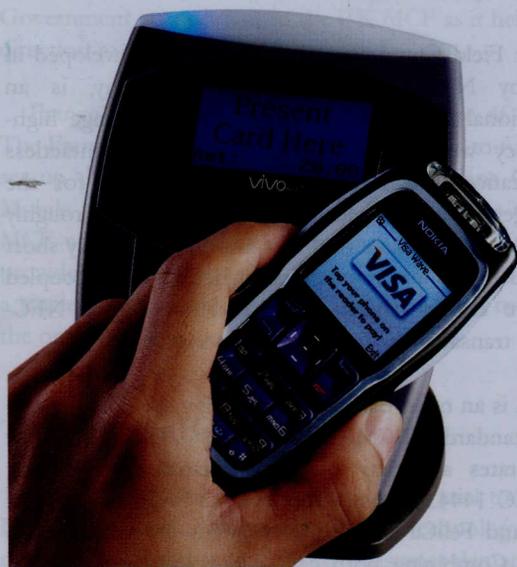
NFC is an open-platform technology specified by two main standards: ECMA-340 and ISO/IEC 18092. It incorporates a variety of earlier standards, including ISO/IEC 14443 types A (normal) & B (banking/short range) and FeliCa and is primarily for use with mobile phones. Combining both card and reader into a single device permits communication with smart cards and other NFC devices. The technology is similar to that of proximity RFID tags and contactless smart cards, but employs several new features. It is also compatible with existing wireless infrastructures (including Bluetooth, Wi-Fi and RFID) and, as with these, uses the unlicensed 13.56-MHz frequency range.

NFC offers substantial advantages over basic contactless smart card technology, including peer-to-peer and high-speed two-way communications as well as access to the mobile phone's facilities. This opens up the

possibility of more complex and interactive uses, as well as the ability to modify applications on the phone via the communications link to, for example, download software or disable functionality.

The secure element recommended by the GSM Association (GSMA) for the payment application in mobile phones is the Universal Integrated Circuit Card (UICC), commonly known as the SIM card. UICCs have become increasingly sophisticated, with much-enhanced processing power, increased memory and extended security management. As a result, they can be divided into security domains allowing third-party providers the ability to manage and operate their own services independently of the telephone company. To overcome possible technical problems, some banks and other suppliers are testing external stickers for phones as an alternative to internal contactless tags.

An important change that NFC brings to transactions is that it requires the new intermediary role of Trusted Service Manager (TSM) to provide reliable links between card-issuing banks (CIBs) and telephone operators. But who such a person should be and how many TSMs are appropriate per country or per application has yet to be decided.



Evidence from trials by both Visa and Mastercard suggests that once customers have made purchases through NFC they become increasingly enthusiastic about using the technology: it encourages an increase in spending and customers have enjoyed the speed and convenience of simply swiping their phones to make purchases, rather than having either to sign or to bother with PINs. This is confirmed by the GSMA which suggests that users prefer NFC as a payment mechanism: it is simple, convenient, quick, easily understood and encourages 'impulse' transactions.

While NFC is mainly being promoted as a means of contactless payment (other examples of use have been ticketing, calendar synchronisation, electronic business cards and access to online digital content), many other types of transaction are possible. Theoretically, the applications are limitless. Business travellers would be able to buy groceries, access buildings or car parks, book and pay for hotels, airline, rail or road travel (including fuel, tolls and parking meters): not just pay for them, but obtain receipts and, later, download these to add to expenses claims - no more fiddly bits of paper! Downloading from information services is another option. For leisure, one might share photos, buy and download music and videos, or use the phone to purchase cinema, theatre or restaurant tickets. A further stage could allow one person to pay for a group and then be reimbursed by 'mating' the other members' phones with their own.

In a domestic context, messy coupons might be eliminated by downloading them from shop tills, while timetables and maps could similarly be copied from bus stops or station notice boards. NXP have even demonstrated a poster incorporating an embedded microchip that sends information about featured artistes and song titles to PDAs or phones, allowing customers to download and pay at nearby kiosks.

## **“ NFC OFFERS SUBSTANTIAL ADVANTAGES OVER BASIC CONTACTLESS SMART CARD TECHNOLOGY,.. ”**

### **Pay-Buy-Mobile**

There are, currently, many NFC tests taking place. However, one co-ordinated project, involving more than 50 operators around the world, was launched in 2007 by the GSMA. This is a mobile network operator-led 'Pay-Buy-Mobile' (PBM) initiative using mobiles to make fast, secure payments in a retail environment through NFC/contactless technology. By involving the big operators from the start, it has been possible to create a common viewpoint: this, according to the GSMA, is key to avoiding fragmentation in such a new market.

To install the service, the credit card application is downloaded into the secure environment of the UICC. Several credit or debit cards can be stored in the same UICC, increasing the convenience of Pay-Buy-Mobile to the consumer. In use, data transferred from the handset to the reader is communicated to financial organisations using the same secure process as is used for conventional card transactions.

According to the GSMA, trials have suggested that users prefer this form of payment.

## Other experiments

The beauty of NFC is that a multitude of cards, applications and services can be held on a single virtual card. However, rather than using all-encompassing 'wallets', most experiments to date have been restricted to just one or two applications: some ticketing trials, for example, fail even to allow the user to check balances or credit card details. This restricts the validity of the experiments.

While many trials have been taking place around the world (encouraging a new breed of NFC consultancies to spring up), very little attempt has been made, so far, to merge them into a coherent whole. Time-scales are long and promised benefits are yet to appear.

Nevertheless, interesting projects are taking place: Mobifetch allows consumers to carry and redeem coupons, while retailers avoid the usual printing, distribution and redemption costs; Oulu, Finland (the venue for the recent NFC Week) has projects covering parking, public transport, theatre tickets, schools, day-care and services for the elderly; the Korean Republic's LG Sangnam Library uses a mix of NFC and Bluetooth for database access and to transfer content to mobile phones for the print-disabled. Indeed, NFC should have many possibilities for libraries, with its ability to handle entry control, data downloading, access to information resources, payment for services and much more.

One country that has decided to invest in NFC is France. Caen and Strasbourg have been involved in what is, perhaps, the most ambitious NFC test so far, with a wide-range of shops and services involved. Even so, only 1000 consumers were allowed to participate. The French government recently announced a bigger trial in the Nice area (but with some projects also covering other cities) incorporating transport, businesses (for access control and catering), coupons, a multi-function university card, a multimedia museum guide (also to be tried in Paris), tax management for domestic staff, hospital medical records, retail stock management, customer loyalty and logistics for butchers.

## Unanswered questions

I have already raised several issues. Unfortunately, the way that NFC tests have been carried out so far, leaves many more questions unanswered. For example, is there a strong business case for mobile networks to roll out contactless services? Will the introduction of 'smart' advertisements be sufficient to lure people to see films or go to matches? Could the mobile networks cope with having many simultaneous users in small spaces, such as sports stadiums?

According to Eric Nizard, of the French consultancy LIC, NFC's power is also its weakness. Gathering so many wireless technologies in one standard makes full interoperability nigh on impossible. So islands of specialisation will inevitably develop.

We also need to know whether a wide variety of applications (with different ones for some categories of user) and varying, possibly conflicting, aims for operators, survive together on the same phone?

Certification is another issue - who will have the time to do it - and how? At the moment this can take a year for a payment card (for SIM cards it's much shorter). Separate testing is likely to be required for each application against every phone type - and the supply of the hand-sets, themselves, is likely to move slowly. That, of course, means the build-up of a significant user-base will take time - even in Japan, where 50% of mobile phones are already claimed to be NFC-enabled. Another area in which little has been said, so far, is the role of identification - photo or fingerprint? We also need to know what will happen to the tags, and the cash placed on virtual cards, if a hand-set is stolen. Assurances need to be given by banks and telephone operators as to who will be responsible. It would be unfortunate if we were to see a repeat of the misunderstandings that followed the arrival of chip-and-pin in Britain, with the transfer in emphasis for loss from the card-issuers to customers.

There are also likely to be competition issues for service providers. For example, will competing loyalty card schemes be allowed on the same hand-set? Will the banks be happy to share virtual cards and their security features, as well as agreeing on who controls security? Branding is important, too: for example, how will the all-important logos be presented on-screen? Whose will have priority - or will they revolve? And who will have 'ownership' of customers?

This latter point is particularly important when several similar applications come to be on the same hand-set: when you reach the till or the ticket office, whose virtual card will you use? Then there is the key issue: how will the financial proceeds be distributed? If agreement amongst hand-set manufacturers, carriers and the banks on these issues is not reached quickly, a long-drawn-out debate could ensue - putting the full-scale introduction of NFC back by many years.

The French government's recent announcement of major funding for NFC tests is to be applauded. We now need others urgently to follow in their footsteps and provide funding, research facilities and support for real-life tests. NFC promises to be an excellent innovation that will benefit everyone. If it is to be a success, we need answers to all these questions very soon.

# NFC

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