

Near Field Communication

Organising everyday life intuitively



An information flyer from:

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As with so many trailblazing technologies, Near Field Communication technology (NFC for short) ostensibly embodies a paradox: it works without contact and that is precisely the reason it brings us into contact with the future.

The connection to the future

The most innovative aspect of this transmission standard is the option to transmit information over short distances quickly, simply and securely without a fixed connection. As a rule, a device equipped with NFC is held in the vicinity of another carrier – and an exchange of information and authorisations takes place.

This technology does not tie us down with cables, but intuitively connects us over a few centimetres on a wireless basis. Some of these applications help us to transfer important information securely, some enable new and enhanced services to be offered – and some simply make life less complicated and more pleasant. One thing is clear: NFC is a technology of international importance which is currently spreading rapidly and quickly finding increased acceptance.

In Asia similar contactless transmission technologies are already used every day in mobile phones, monitors and in many other places. They support people when buying tickets, for example, when paying in shops or when saving individual configurations at home.

In parallel to this, a dynamic market is emerging which endeavors to make the positive features of NFC available for large sections of the general public. Worldwide, ever more vendors and institutions are developing applications and equipment for this technology of the future.

The aim of this information flyer is to provide some background information on the technology, development and opportunities of NFC. But we wish above all, on the basis of specific typical ap-

plications, to show that this technology is geared towards short spans - not only of distance, but also of time: NFC is the technology of the near future.

We hope you will enjoy discovering NFC!



► **The most impressive thing about NFC technology is its simplicity: data transfer can be initialised by means of intuitive operator actions.**

“NFC is simple. NFC can be used intuitively. The standard enables our passengers to quickly access dynamic timetable information. It also makes it easier to buy RMV Tickets via mobile device. That is why we are setting up an NFC tag infrastructure which forms the access point to our offerings and services. The RMV is an innovative transport association which is utilising the advantages of NFC – to the benefit of our customers.”

Prof. Knut Ringat, Managing Director and Spokesperson of the Board of Management, Rhein-Main-Verkehrsverbund GmbH (Rhine-Main Transport Association)

Six questions about NFC technology

1 How does NFC work?

Near Field Communication (NFC) is an intuitive, contactless form of data transfer which can establish a connection between two media over a short distance. NFC itself can be used for the direct exchange of data or to call other contactless data transfer technologies, such as WLAN or Bluetooth®.

2 Where can NFC be used?

Use of NFC is conceivable in a large number of sectors and application areas. Depending on an application’s requirements, technical implementation of NFC is simple, quick and inexpensive. The use of NFC permits existing facilities to be further enhanced.

3 How does NFC protect your data?

The commercial introduction of NFC will be accompanied by a constant, open and constructive dialog between providers, regulatory authorities and certification authorities. The focus here is not just on the design of technical procedures and the encryption mechanisms which are to be used, but above all on the protection and handling of personal and person-related data. Consequently, the most stringent security measures apply for the production of what are known as secure elements, for instance SIM or microSD cards, which are employed as storage media for applications such as credit cards or electronic ticketing.

4 Why does NFC complement other transmission technologies?

WiFi or Bluetooth® technology transmits large volumes of data over long distances. However, connection setup involves several steps. These can be drastically reduced using NFC.

5 Why NFC and not RFID?

NFC is a radio technology which has evolved from Radio Frequency Identification (RFID) technology. The main difference with NFC is that it only permits data exchange over distances of up to 10 centimetres, and offers enhanced security mechanisms as well. To make NFC usable on a cross-product and cross-application basis, the specifications of data formats and necessary security procedures have been described. NFC thus permits not only information about products to be read out, but also standardised, secure data exchange between electronic devices for everyday use.

6 Where did NFC originate?

In 2002 a consortium – consisting of the high-tech companies Philips Semiconductors (a Philips subsidiary which is today called NXP) and Sony – began to derive an extract from RFID. The definition of a new and globally standardised data transmission technology began with the establishment of the NFC Forum by Sony, NXP and Nokia in 2004. From the outset the aim was to simplify a large number of situations in everyday life for customers and companies.

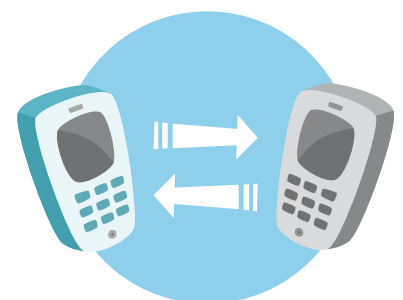
The various transmission modes



► An NFC medium, for example a mobile phone, reads out a passive NFC chipcard.



► An NFC medium, for example a mobile phone, is read out by an active NFC medium, for example a ticket checking device.



► NFC as a line thrower: for instance two NFC carriers establish a Bluetooth® connection to transmit large volumes of data.

"Nobody who's experienced NFC in practice will want to do without it. This is confirmed by the participants in the more than 70 projects which Nokia has conducted around the world on the topic of NFC. Telephone users need only touch their phones to exchange business cards, photos or calendar entries or to start a game with each other. The simple and intuitive handling immediately appeals to everybody! We assume that NFC will further change how mobile phones are handled and used in the near future."

Jeremy Belostock, Head of NFC, Nokia

How is NFC used?

The navigation system on the information superhighway

In 2007 281 billion gigabytes of data was transferred over the internet; in 2011 it is anticipated that the incredible volume of 1.8 trillion gigabytes of data will be available. Innovative and intelligent technologies such as NFC can help people find their way through the data labyrinth: objects equipped with NFC can become the portal to the digital world – with more detailed information as well as service and entertainment offerings.

For example, merely touching a film poster equipped with an NFC chip costing only a few cents with an NFC-capable device enables a trailer to be displayed and tickets to be reserved at the nearest cinema. Such a service was offered for the first time for NFC telephones from Nokia in the city of Oulu in 2007. Since 2009 a similar application has been helping Nokia customers in Monaco to obtain background information on the city's sights which is stored on the internet. To do this the mobile phone only needs to be held near a poster equipped with NFC.

With NFC it is possible to call the operating instructions for a new washing machine by merely touching it with a mobile phone. Shelves in the supermarket which are equipped with NFC provide information about the origin and treatment of fruit and vegetables. An NFC mobile phone can, for example, indicate whether the engine oil you have just checked is suitable for your car or, for instance, whether particular medications interact with each other.



► **Digital networking of products and the mobile phone will in future enable complex services to be implemented which combine information and thus provide intelligent advice for the user.**

Simple mobile access to the internet

Public WLAN hotspots are being offered increasingly frequently for accessing emails, downloading data or surfing while people are out and about. However, it is generally extremely complex to use them as they are necessarily often safeguarded by complicated access passwords. NFC interfaces provide a way to enhance the attractiveness of WLAN hotspots while still guaranteeing security. Here the security information for dialling in is simply read out by means of NFC and the connection to the internet is set up automatically. Whether you are on a train, at home or in a public place: WLAN hotspots can become quicker and safer thanks to NFC technology, naturally while still complying with the necessary security requirements.

► **NFC labels enable connection setup to the mobile internet to be made significantly easier.**



“As an innovation leader, Deutsche Bahn is always open to new technologies in order to make public transport more attractive and to overcome technical barriers. The mobile phone – one of a traveller’s most important companions – and NFC technology allow us to offer new, innovative sales and information solutions. Before they begin their journey, customers with an NFC mobile phone simply check in at an NFC contact point as with Touch&Travel, set off and log out again at an NFC contact point at their destination. The fare is displayed directly on the mobile phone. Invoicing takes place at regular intervals by means of direct debit or credit card.”

Ulrich Homburg, Head of Passenger Transport, DB Mobility Logistics AG

The mobile phone becomes a ticket

The use of NFC at stops and stations is the quick and convenient alternative to buying a ticket at a ticket desk or ticket machine. Before they begin their journey, customers with an NFC mobile phone simply check in at an NFC contact point as with



Touch&Travel, set off, and after they have logged out at their destination automatically receive a ticket for the entire journey for the correct price.

Or – as at the Rhein-Main-Verkehrsverbund (RMV – Rhine-Main Transport Association) – after touching the NFC contact point they just select their final destination and then receive the appropriate ticket. At the RMV customers on some means of transport also have the option of logging in and out via NFC in the vehicle itself. Depending on the design of the application, the necessary checking infrastructure can be active or passive. The NFC technology also permits other services to be implemented, such as parking facilities or information on site.

► **The following principle applies for Touch&Travel: log in, set off, log out, pay! Whether for long-distance, local or urban transport.**

► www.touchandtravel.de

► **The Rhein-Main-Verkehrsverbund (RMV) offers its customers RMV-HandyTickets throughout the transport association via what are known as ConTags. In some means of transport it is also possible to buy the ticket in the vehicle. Active NFC readers have been installed in the vehicles for this purpose.**

► www.rmv.de

► **No more hunting for change, no more waiting at the desk: buying tickets using NFC is quick, simple and convenient.**



"In particular because of its intuitive handling we see very great potential for use of NFC technology in vehicles and in car keys. In times of constant availability of information and increasing networking of everyday personal objects, ease of operation is a decisive factor for future innovations. For example, setting up a secure Bluetooth® connection between vehicles and mobile phones should be as intuitive as putting a car into first gear when driving. NFC makes this simplicity feasible."

Prof. Dr.-Ing. habil. Raymond Freymann, Managing Director, BMW Forschung und Technik GmbH

The intelligent interface in the car key

The multifunctional car key developed at the BMW Group will in future allow BMW drivers to do more than just open doors or start the engine. For example, an NFC unit enables tickets for public transport to be stored or access to be obtained to a reserved hotel room. If you want, you can have information about your car displayed – for instance whether it is locked, how much fuel you have or the precise location of the vehicle – on a mobile terminal with an NFC interface by holding the key against the device.

► **More than a gimmick: BMW keys containing an NFC chip in conjunction with other NFC acceptance points become all-round service providers – for example at the petrol station cash desk, in the hotel or on local public transport.**



Intuitive functions in the vehicle



An NFC interface integrated into the dashboard permits the driver to communicate intuitively with the vehicle. There are many scenarios for this: for example, touching the NFC logo on the dashboard causes the Bluetooth® telephone to configure itself automatically for use in the vehicle. Personal settings could also be transferred to the onboard computer by NFC tags, which, for instance, are integrated into the key fob or wristwatch. A business card could also be read out and stored as a navigation destination. Websites are called, a radio station is set or new software is activated in the vehicle by holding the relevant NFC tag against the dashboard. The uses planned for vehicles are as varied as NFC itself.

► **Technology is customised: settings can be transferred from one car to another in the NFC clock.**

“Everybody carries a mobile phone round with them nowadays. With payment by radio (NFC) we want to offer our customers a simple and convenient method of payment for all purchases at real,- SB-Warenhaus (a self-service department store company) and thus increase the range of innovative services we provide in the retail trade.”

Dr. Gerd Wolfram, Head of CIO Office, METRO AG

Paying in a jiffy – securely, quickly and simply

The METRO GROUP has been testing contactless payment at the real,- Future Store in Tönisvorst since 2008.

When paying by radio, every customer who has a mobile phone with NFC capability can take advantage of contactless and cashless payment – regardless of the size of the purchase. Searching for the right amount of cash or an EC or credit card which you have left at home thus becomes a thing of the past. To pay, customers simply hold their mobile phone in front of the reader. Then they must enter a PIN to release the data – and that is all that is required to complete the payment transaction. The enormously accelerated checkout procedure benefits both the customer and the retailer.

In response to positive customer feedback regarding the first practical test, the METRO GROUP will be making convenient contactless payment with NFC available to a broader customer base in 2011.

► **Cash was what we used yesterday: payment transactions are completed in a fraction of a second at active NFC acceptance points. The customer’s NFC mobile phone is a passive participant in this process.**



Social networks: connections via NFC



The acceptance of social networks can be promoted still further by means of mobile terminals such as laptops, PDAs and mobile phones – and in particular by smartphones. Networking does not necessarily have to take place over insecure online services – NFC terminals such as mobile phones offer an extremely charming and personal variant of face-to-face networking: The development of this technology will in the future further encourage the linking of relationships in the virtual world with those in the real world.

► **Connecting People 2.0: since NFC, laborious data exchange with classical business cards has become a thing of the past. With mobile terminals, first mobile phones and then people will come closer together.**

"The NFC Forum actively promotes the development of the NFC ecosystem. As the very first instance, the partners in the NFC Forum is developing specifications which are based on open industry standards. To guarantee compatibility worldwide, we have to date completed 15 specifications. These will be complemented by our certification programme, which will be started in 2010. This programme will enable vendors to check that their products comply with the NFC Forum specification and to have them certified. By publishing the many innovative NFC solutions and options, we convey the variety and performance capability of NFC technology to various branches of industry and to the end customers."

Koichi Tagawa, Chairman NFC Forum and General Manager, Global Standards and Industry Relations Department, Sony

NFC: a new technology is gaining ground

NFC is a technology of global importance. To permit the best possible use to be made of its advantages, it is necessary to draw up suitable specifications and to guarantee the compatibility of services and equipment. Consequently some 130 companies around the globe now belong to the independent NFC Forum, which was founded in 2004. Vendors, application developers, financial institutions and many others cooperate constructively to promote the use of NFC in entertainment electronics, mobile devices and PCs.

Basically the same rules apply for NFC as for many new technologies: the development time and the subsequent agreements which are required in worldwide committees have a long lead time. However, many important hurdles were also cleared during this long-distance run.



► **Selecting the components of an NFC ecosystem. Standardised processes can be guaranteed by specifications which are valid worldwide.**

In 2009 an important milestone was reached with the finalisation of the NFC specifications. At that time NFC was ready for use in broad application areas and in large markets.

A wide range of cross-industry NFC projects and technical innovations with NFC are emerging for 2011 and 2012. The initiators of this information flyer are therefore convinced that NFC will prove successful on a wide scale.

We invite you most cordially to become more involved with the NFC world. Naturally you are also welcome to contact us directly.



Contactless data transmission: an overview

2003:

- ▶ Approval of NFC as ISO-IEC standard 18092 on 8/12/2003. This includes the standards ISO-IEC 14443 and FeliCa.

2004:

- ▶ Foundation of the NFC Forum on 18/4/2004 by NXP Semiconductors, Sony and Nokia.

2005:

- ▶ The companies RMV, HSB, Nokia NXP, Cubic and Vodafone for the first time test NFC ticketing on a global basis.

2007:

- ▶ RMV, VGF, Telekom and Nokia introduce the NFC Ticketing Service on a regional basis.

2008:

- ▶ Touch&Travel is launched at the CeBIT in Hanover.

2005–2008:

- ▶ The first NFC mobile phones are issued.

2009:

- ▶ Mastercard issues 61 million contactless credit cards which can be used for payment at 153,000 acceptance points worldwide.
- ▶ NFC-based contactless payment transactions are introduced or tested in pilot projects in Dubai, Singapore, India, London and Spain.

2010:

- ▶ The Sony VAIO F laptop is equipped serially with an NFC interface.
- ▶ Orlen Deutschland equips all Star petrol stations with a contactless payment option.
- ▶ First pilot projects of contactless pay cards at savings banks.
- ▶ NFC Forum now has around 130 members, such as Nokia, Microsoft and Samsung. More information is available at www.nfc-forum.org.
- ▶ A consortium of French Telecom, bank and transport companies and retailers are testing various information, ticketing and payment services in Nice.

2011:

- ▶ The new ID card of the Federal Republic of Germany will be NFC-compatible. This will permit totally new applications in the field of e-Government or online payment transactions.
- ▶ All EC savings bank EC cards will be equipped with a contactless payment function.

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