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## NEAR FIELD COMMUNICATION IN MOBILE APPLICATIONS

*The near field communication (NFC) technology is a new rising trend in mobile applications. This paper discusses the basics of this technology, and the key scenarios, which include mobile payments, device communication and "smart" marketing posters.*

*Keywords: mobile payments; NFC; device communication; RFID.*

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## ВИКОРИСТАННЯ БЕЗДРОТОВОГО ЗВ'ЯЗКУ БЛИЖНЬОЇ ДІЇ У МОБІЛЬНИХ ДОДАТКАХ

*У статті описано відносно нову технологію – бездротовий зв'язок ближньої дії як актуальну тенденцію розвитку додатків для мобільних приладів. Коротко представлено саму технологію, а також ключові сценарії її використання у різноманітних сферах діяльності, зокрема, для електронних платежів, комунікації між самими засобами зв'язку та у "розумних" постерах у вуличному маркетингу.*

*Ключові слова: мобільні платежі; бездротовий зв'язок ближньої дії; передача даних між засобами зв'язку; радіочастотна ідентифікація.*

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## ИСПОЛЬЗОВАНИЕ БЕСПРОВОДНОЙ СВЯЗИ БЛИЖНЕГО ПОЛЯ В МОБИЛЬНЫХ ПРИЛОЖЕНИЯХ

*В статье описана относительно новая технология – беспроводная связь ближнего поля как актуальная тенденция в развитии приложений для мобильных устройств. Коротко представлена сама технология, а также ключевые сценарии её использования в различных сферах деятельности, в частности, для электронных платежей, коммуникации между различными средствами связи, а также в "умных" постерах в уличном маркетинге.*

*Ключевые слова: мобильные платежи; беспроводная связь ближнего поля; передача данных между средствами связи; радиочастотная идентификация.*

### NFC overview

Near field communication (NFC) is based on RFID (radio frequency identification) tags and provides a very short range and very narrow band messaging service, usable for different scenarios, ranging from simple pairing Bluetooth devices, launching applications or web-sites up to "smart" marketing posters. NFC could be used also with device-to-device connectivity, allowing users to physically tap their devices reducing the necessary pairing or setting up a server or client software; they now could be set up automatically, improving general user experience in specific applications (Ok, 2010).

NFC is the set of standards for mobile devices to establish radio communication with each other by bringing them into close proximity, no more than a few (about four) centimeters. Standards defined by NFC Forum cover communication protocols and data exchange formats. They are based on the existing RFID standards, like ISO/IEC 14443 or JIS-X 6319-4, which allows for interoperability with existing con-

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tactless card infrastructure. The NFC forum, non-profit industry association was founded in 2004 and now has over 190 members: manufacturers, application developers etc. (NFC Forum, 2013).

NFC operates at 13.56 MHz the unlicensed radio frequency ISM band, on ISO/IEC 18000-3 RFID air interface with the data transfer rates ranging from 106 kb/s to 424 kb/s. Technology is bidirectional, always involves an initiator and a target, typically initiator actively generates an RF field powering the passive target, but there is peer-to-peer communication possible; this gives a possibility for using passive tags, stickers or cards, as well as regular mobile devices against each other (ISO, 2013).

There is now a lot of NFC handsets available from different vendors – the Google's Android operating system supports NFC and a contactless payment software, Google Wallet; BlackBerry supports NFC on the devices running BBOS 7.0 or greater and the Microsoft introduced NFC for Windows 8 and Windows Phone 8 platforms, along with the Wallet application. Though, Apple's iPhone and the iOS version 6.0 do not support NFC at this moment (Hedman, Chae, 2013).

#### **NFC mobile payments**

The compatibility of NFC with the existing RFID technologies made it possible to create a mobile payments system based entirely on mobile devices, not only on RFID-equipped debit or credit cards. Mobile manufacturers create "wallets", a special kind of applications especially for payments, as mentioned earlier, there is also a possibility (or necessity, depending on a manufacturer) to use a special secure SIM card which provides security for the payment process.

From the user's perspective, it is easier to carry only a phone, which can be used to perform payments in shops via regular terminals; when the only thing a user needs to do is to install specific phone banking application integrated with the virtual wallet on the smartphone. This technology is getting traction at the moment, but on the other hand, it is often said that NFC payments (not only via mobile devices, but also by RFID-equipped cards) "solve the problems which does not exist" or are "too complicated and offer too less benefit" (Boden, 2013).

In Poland, mobile operators partner with banks and credit card companies: Orange and Polkomtel coopered with BZ WBK (Brown, 2011) and PTC coopered with Inteligo introducing early NFC payments tests as early as in 2010, when this technology was less popular than today (Clark, 2010).

#### **Passive tags and smart posters**

There is a possibility of using NFC passive tags, which are powered when the phone is being physically "tapped" with the tag in "smart posters", e.g. posters giving more than static information. This was trying to be achieved by using two-dimensional QR codes requiring user to pull off the phone, launch proper application and scan codes using the phone's camera, but the technology is not getting as popular as it was predicted earlier, possibly due to technical difficulties and general "awkwardness" when people are judged when scanning QR codes.

NFC smart posters are simpler, does not require any user interaction apart from the physically tapping marked place on the poster with his phone. Passive tags using the NDEF protocol may start different actions on the user's phone, ranging from launching websites to launching applications or changing settings in phone configu-

ration (with user consent, depending on phone manufacturer) (Nosowitz, 2012). This may be used under different scenarios, there are such phone accessories which can start applications or settings – one of the Nokia's auto car holders, for example, run special application prepared for drivers, allowing fast access to maps and calls over the loudspeaker, when the phone is cradled.

On the other hand, smart posters in public places may still not be popular for the similar reasons as QR codes – the user tapping the poster may be considered as strange for general public, which may stop this technology getting broader popularity.

### **Mobile devices and autoconfiguration**

There is a possibility of using NFC tags in the automatic configuration of mobile devices. For example, Bluetooth pairing requires user to turn on Bluetooth, search for devices, input 4 digits of PIN code (although most devices use standard codes, like 1234 or 0000), before the device is configured with the mobile phone.

With NFC, the process could be as simple as tapping the phone with the device and configuration is automatically started with no more user intervention. This may be expanded to BYOD (Bring Your Own Device) scenarios, where IT departments may place physical NFC tags and the user is only required to tap the tag in order to connect and configure workplace's wireless network with the secure protocol.

NFC "tapping" could be used in many other autoconfiguration scenarios, one of the most interesting is the cryptographic keys exchange, which does not require users secure communication by uploading keys to the Internet database, but only keys exchange is performed when physically tapping the other user's device. This may also configure secure communication channel, install applications etc. (Opoku, 2013).

Probably the most popular NFC interaction will be with sharing content from one device to another – instead of setting up a Bluetooth or Wi-Fi connection, software will automatically configure transmission channel best suitable for content type and devices over a simple tap (Dachs, 2012). This technology should be interoperating with different vendors, and the studies show that simple content (vCards/contacts, URLs, simple messages) types are transferred over NFC without any problem, but stop working when connecting different device operating system and trying to transfer videos, music or photos. This issue have to be resolved before NFC sharing will get popular. The studies show also that position of NFC antennae is very important when initiating transfer and could be hard to find at the first try.

### **Summary**

NFC is the set of technologies allowing devices to communicate wirelessly with each other over a very short distance. This is compatible with existing contactless technologies, like RFID, which allows faster implementation.

There is a possibility of using NFC in mobile payments scenarios, as the smartphone may replace traditional credit/debit cards, however the technology is not rising as fast as it was predicted to be. On the other hand, there are different other NFC scenarios which may be implemented, from autoconfiguration, through changing device behavior when tapping, or sending additional information from "passive" things from the world; finally, going to sharing content via NFC is one of the most interesting possibilities for this technology.

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