

NFC: THE REVOLUTIONARY TECHNOLOGY OF NEAREST FUTURE

Lazareva M.E.,

Scientific supervisor Gavrilina L.E.

Siberian Federal University

Smartphones, smart cards and other smart devices are already omnipresent in our daily lives and used for payments, access control, transportation, etc. The ubiquity of mobile devices and the variety of services that they provide have led to many new research challenges and securing mobile communication has become essential.

Today there are a lot of mobile technologies that simplify our life. In this article we will focus on a new technology called NFC. Since most mobile phones in the near future will use Near Field Communication (NFC), the importance of this technology is growing. NFC-enabled mobile phones can communicate with each other and also with other similar devices, e.g. contactless cards, creating in this way an NFC-based Internet of Things.

Now mobile devices can be used for physical interaction with tagged, everyday objects in order to facilitate the interaction with associated information or services. Users can interact with the latter by touching wireless NFC/RFID tags or by taking pictures of visual markers with their mobile devices. Tagged objects like posters, leaflets or advertising columns can serve as physical user interfaces (UI) that advertise ubiquitous information or services and facilitate their discovery. Physical UIs can adopt features of mobile UIs, complement them and thus compensate constraints of mobile devices. Instead of browsing nested menus on small screens, application features and options can be mapped to physical UIs from where users can select them directly. Many applications take advantage of the touch-like interaction between them to facilitate mobile payment, ticketing or information retrieval. These and other examples benefit from the simple interaction with single tags but neglect the potential of tagged objects for further physical interaction. Nevertheless, NFC can be used for more elaborate interactions with physical UIs that comprise multiple tags. Examples are posters for mobile ticketing, menus for home delivery or control panels for multimedia players.

Digital services provide us with support and enrich our everyday lives. Access to digital services and applications can be provided by embedding technology into our everyday surroundings so that we can reach the digital world and its services whenever needed. This paper examines how tags can provide service and content access points for a mobile user in versatile environments to access and interact with the digital world.

NFC technology

NFC is a short-range wireless technology that allows electronic devices to exchange data upon touching. NFC combines both reading and writing modes into the same device. It is also capable of receiving and transmitting data at the same time. NFC standards have been built over existing radio frequency communication standards (e.g. RFID and smart card standards). Like the RFID Standards 14443 NFC uses an inductive coupling. Similar to the transformer principle, the magnetic near-field of two conductor coils is used to couple the polling device (initiator) and listening device (target). The operating frequency is 13.56 MHz, and a bit rate of 106 kbit/s (partly also 212 kbit/s and 424 kbit/s) is used. Modulation schemes are amplitude on/off keying (OOK) with different modulation depth (100% or 10%) and binary phase-shift keying (BPSK).

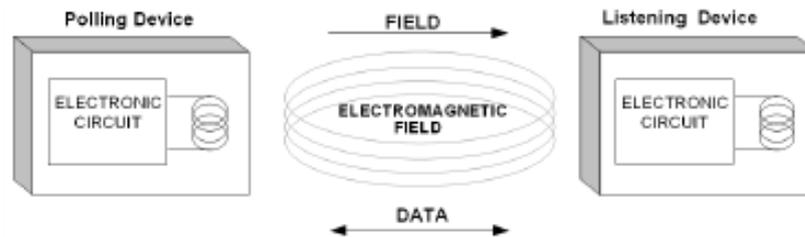


Figure1 – Polling device (initiator) and listening device (target) configuration

NFC use cases

Many possible NFC applications are being considered. The special advantage of NFC is its straightforward mode of use. Simply touch or place a device close to something to initiate the desired service. Some typical uses are:

- mobile payment: this technology allows to pay with NFC phones for tickets or taxi rides, to pay at contactless POS (point of sales), store vouchers on NFC phones;
- authentication, access control: NFC makes it possible to store electronic keys on NFC phones, to provide secure building access, to get secure PC log-in, to lock/unlock car doors, to setup home office with a touch by NFC phone;
- data transfer between different NFC-units (peer-to-peer data exchange) like NFC-smartphones, digital cameras, notebooks, tablets, MACs: exchange electronic business cards, printing out photos by holding the camera close to printer;
- access to digital information: using this technology in NFC phone owner can read schedules from smart poster to phone, download maps from smart poster to NFC phone, record location such as a parking in NFC phone;
- ticketing: storage theater / attraction / event tickets on NFC phone.

NFC-enabled handsets

In 2012, handset vendors released more than 40 NFC-enabled handsets. Google includes NFC functionality in their Android mobile operating system and provides a NFC payment service, Google Wallet. BlackBerry devices have also supported NFC using BlackBerry Tag on a number of devices running BlackBerry OS 7.0 and greater. Mastercard has added further NFC support for PayPass for the Android and BlackBerry platforms, enabling PayPass users to make payments using their Android or BlackBerry smartphones. Microsoft added NFC functionality in their mobile OS with Windows Phone 8, as well as the Windows 8 operating system. Microsoft provides the "Wallet hub" in Windows Phone 8 for NFC payment, and can integrate multiple NFC payment services within a single application.

Conclusion

Only time will tell how quickly NFC technology will penetrate into markets and become ubiquitously accessible for all mobile users. The first mobile devices with NFC capabilities have already been on the market for some time, but the low quantity still hinders their application development. Adoption of NFC technology is in the situation, where the device manufacturers are waiting for signals from application providers and users for a need to integrate NFC technology into equipment, and the application providers and end users are waiting for the technology to become more common, allowing more uses.