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An introduction to Near Field Communication

Near Field Communication (NFC) is a form of wireless communication technology enabling data transfer by putting two devices close to each other. The main idea behind NFC is to integrate wireless payment and tag reading in mobile phones along with peer-to-peer communication. An example of the benefit with NFC peer-to-peer communication is that it gives the possibility to quickly setup a Bluetooth or a WLAN connection with a simple swipe. NFC devices can not only be used with the upcoming wireless payment terminals but can also replace contactless plastic cards used in the already established RFID infrastructure.

NFC is a technology based on RFID and operates at 13.56 MHz. An RFID system consists of two components, a target, which is the object to be identified, and a reader. The reader is an electronic device that powers up and initiates contact with a target. The reader and the target are the main components of every RFID system.

Most RFID tags are passive, which means that they have no power supply of their own. Instead, they are powered by the field generated by the reader. Passive tags can therefore be much smaller and cheaper than active tags, which have their own batteries, although the reading range is more limited.

NFC technology development was initiated by Sony and Philips. The key feature that differentiates NFC from RFID is the possibility of bidirectional transfer of information which allows bidirectional communication between NFC devices. To connect two devices together, one simply brings them very close together or makes them touch physically.

NFC is expected to be heavily deployed within the next two years and trials are currently ongoing all over the world. NFC has several areas of use. The main idea is to replace people's wallets with digital payments through the mobile phone. Mobile phones and SIM cards that can store and run various software applications make a powerful platform to be utilized together with NFC. The three maybe most promising areas are public transport payment, credit card replacement and advertising. Further possibilities are identity cards, electronic keys, configuration and setting up other communication protocols such as Bluetooth and WLAN.

NFC is already on its way to becoming a part of everyday life and in order to achieve successful consumer adoption of this technology, involved companies need to work together closely and applications need to be interoperable.

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Current NFC standards are written by the ISO/IEC and ECMA organizations but the so called NFC Forum, which is a group composed of several companies, is now developing new NFC standards.

The main objective of the master's thesis was to assemble an RF measurement system for testing of NFC-enabled devices at Sony Ericsson Mobile Communications. Two different measurement systems were used for comparison's sake and they provided virtually the same results. The main difference between the measurement systems was that one of them was much more automated than the other.

All tests performed with the measurement systems were done according to the procedures specified in the ISO/ECMA NFC standards since the NFC Forum had not published finalized specifications at the time of the thesis.

A limitation on the handsets used was that some of them were running the operating system Android 2.3.2 Gingerbread, which did not support the so called card emulation mode. Due to this, some tests were ignored.