Near Field Communication

*The future or the present?*

**Introduction**

The following subject that is being discussed in this e-book is Near Field Communication and from here on referred to as NFC. This subject is written by Yoeri Sweep; Sweep is a 4th year student of Fontys Academy of Creative Industries and studies CO-IEMES which stands for Communication, international Event Music and Entertainment Studies. Sweep is known for his enthusiasm and creative thoughts. He is always thinking about how to solve problems and is always trying to come up with new products, services and how to market them.

I have chosen to tell you more about Near Field Communication because it is a fast increasing technology which most of us don’t know a lot about yet. Nevertheless most of us use it every day already. In my opinion NFC will get much more important in the nearby future. Therefor I would like to briefly inform you about the way that NFC works, where NFC can be used for and how you could even use it yourself already. This chapter will also contain an interview with an expert in which the future of NFC will be described.

**Theoretical Exploration**

So what is NFC exactly? NFC is a technology which enables short range communication between compatible devices. One of the devices needs to be transmitting. For example, it can be used to quickly send a photo file from one to another device, while the other device needs to receive the signal (Triggs, 2013). This can be compared to Bluetooth transferring, although NFC is a lot easier to use in crowded places; it works just by tapping the other device. While using Bluetooth, it is necessary to search (and wait) for a longer time. Since smartphones became regular, Bluetooth is not regularly used for transferring files anymore because of the access to platforms as WhatsApp (NFC, n.d.).

You might still not really understand what the difference between NFC and Bluetooth or even Wifi file sharing is. The only difference that we have discussed so far is transferring via tapping the other device only, but how in the world does that actually work?

There are two different types of devices that use NFC; passive and active devices. The most common active device is the smartphone. Other active devices are for example public transport card readers and touch payment terminals. So it is very possible that you already use NFC techniques every day, for example by contactless payment. Active devices can receive information from passive devices and send and receive information from other active devices. Passive devices are not able to communicate with other devices on their own, they need an active device to communicate. A passive device can never share data with another passive device. On the other hand, a passive device does not need power to communicate; it needs an active device to make contact with it. The active device uses power to make contact with the passive device, the passive device uses the active’s device power to send the information that’s on it to the active device. Passive devices are not able to process information from other devices. For passive devices, think of NFC tags and other small transmitters such as public transport cards (for example the Dutch OV-Chipkaart and the English (London) Oyster Card and some debit cards for contactless payments. All given examples have a NFC tag implemented, therefor it can all be put under NFC tag.

You are probably asking yourself right now where NFC arose from and what the mechanism behind a NFC tag (passive device, no power) is for it to work. NFC arose from the RFID technique, what stands for Radio Frequency Identification. With RFID it is only possible to send information; NFC makes it possible to have two-way traffic between devices. Though the distance in which it operates can be much bigger with the RFID technique. On the other hand, as described before, a NFC tag does not need its own power source. The tag receives the energy from the reading/writing device. The NFC tag only operates in a very short distance; mainly from around 2 to 3 centimetres distance (Chandler, 2012).

But how does the tag convert the power of the transmitting device to share its own message? Where NFC, Bluetooth and Wifi transferring all allow wireless communication and exchange of data between different digital devices, they do not use the same method. Bluetooth and Wifi use radio transmissions to communicate and share between devices, but NFC uses electromagnetic radio fields. A NFC tag consists of a microchip with a sort of antenna around it. This sort of antenna converts the high-frequency magnetic field of the transmitter, for example a smartphone, to power (Triggs, 2013). In that way the chip can send information (mostly an url) to the smartphone. This method makes it possible for a non-power/non-electricity supplied product (for example a business card) to transfer data to a power supplied product, such as a smartphone. When the (for example) smartphone makes contact with the business card, the business card’s NFC Tag uses the electromagnetic energy of the smartphone’s NFC tag to send the message that has been stored on the tag to the smartphone. The storage space on NFC tags is very low, the message normally contains a link to a webpage or something alike (Strickland, 2012).

**How to use NFC tags yourself**

NFC tags are the main example of passive devices. They can be provided as stickers, but also in cards, keys and many other products. You mainly find NFC tags as interactive signs on advertisements. These NFC tags are sometimes also described as ‘the new QR-code’. The difference is that a QR-code has to be scanned with the camera of the device. A NFC tag is scanned just by tapping with the device, no program needs to be opened to use it. The smartphone only needs to have NFC implemented and NFC should be turned on to be used.

NFC tags are very convenient for both private and business purposes and are very easy to install and use. To install a NFC tag, a mobile application is needed. There are a lot of these apps available for free. With such an application you can write a link, actions or a text on the tag and even put a password on it so that no one can overwrite it. Because of that, I bought some NFC tags to test them and to inform you about the use of NFC tags and its possibilities. First of all, there are applications and options to set NFC tags with settings that only work on your device and there are options that work with every device. This depends on the application or option you have chosen. Some examples of applications are: NFC Tools, NFC Tagwriter (by NXP), and Trigger. Trigger can only be used with a mobile phone that has the Trigger application downloaded. It is not suited for marketing or any other way of reaching people. However, it does have way more options than writing a tag for every device. For example, it is possible to put Bluetooth on and or off, play a sound, text a sms, tweet a message, brightening screen or start a media file. These actions can even all be written on one tag, in that way your mobile will execute all actions listed. Due to various safety threats, the above mentioned options are not possible to save on a public NFC tag. Otherwise it would make NFC very easy to commit fraud with.

I always use NFC Tagwriter or NFC Tools, both are very easy to work with and have a wide range of options to write on your NFC tag. With NFC Tools it is also possible to write actions on the tag that do not work on every mobile phone, like with the Trigger application (NFC Tools, n.d.). NFC Tagwriter does not have the possibility to write such tasks. What I am discussing in this chapter is the business part of NFC and what it can mean to a company, therefor I am using NFC Tagwriter. It is very easy to store a web link on a NFC tag, so that people who tap the tag are directed to your website. So this could also be your Facebook address or a YouTube video or channel and many other links. It is also possible to store your contact details on a tag, so that people who tag it receive a pop-up to store your details in their phone. So no need to drag around hundreds of business cards anymore. Other possibilities are to send a location, a plain text pop-up, login to wifi (with password already set), open an email (with message, title and receiver already entered), open window to dial a pre-set number, open a given location, start an application (needs to be installed on receiver’s device) and open a pre-set sms. Let’s take you through setting up a NFC tag with a link. First of all, you need to have a phone that has NFC functionality and a NFC tag, you can order those all over the web. NFC tags are not very expensive and they are rewritable so you don’t need a lot of them to try them out. Make sure that you order formatted tags. Download NFC Tagwriter (by NXP) and open the application. Choose for ‘Write tags’, then choose for ‘New dataset’, now choose ‘link’. Now you can put in a title, that is optional. Choose URL and put in the link: <http://www.neverhaveiever.org>. This is a fun way to try NFC out on a party with friends, probably most of them do not know this technique yet. Put the technique between two pieces of paper and see how they react when they try it out. This link, as it already says, opens an ‘I have never ever phrase’ in your browser, if anybody has done what the phrase says they need to drink. As you notice it is also possible to add the unique identifier to the tag and to add the interaction counter mirror. By using these settings, a company (or person) is able to see which tag (UID) is tapped and how many times it has been tapped (interaction counter) (NFC Tagwriter by NXP, 2016). If you are using the link that I shared with you, then do not choose any of these options because it will affect the link. Choose ‘save and write’, you can see that there is also the possibility to write these settings to multiple NFC tags. You need to do this one by one but you do not have to relaunch these settings. There is also the possibility to put a write-security on the tag, so that other people cannot just steal your tag and overwrite it. When ready choose ‘write’, tap the NFC tag, then choose ’confirm writing’ and tap the tag again. Now you can just close all your applications (make sure NFC is enabled in the menu) and tap the tag to see if it works. I can tell you, it will!

**CEO of NFC-Nederland, Jan Van Erven, about the present and future of NFC**

Because I wanted to get to know more about the future of Near Field Communication, I have spoken with Jan Van Erven, the CEO of NFC-Nederland. This is the biggest supplier of NFC tags in the Netherlands. Jan Van Erven started NFC-Nederland three years ago. NFC-Nederland sells all kinds of products with NFC tags in it, they mainly serve companies but also sell small amounts to individuals. The first year he did not really make any profit out of it, because it was not a well-known product yet. At this point he is very busy and has numerous big clients. “Awareness of NFC is mainly caused by the banks, which have introduced contactless payments”. Van Erven tells us that his revenue will probably get a lot lower in the coming years. This is due to the fact that Van Erven mainly supplies companies of different products with NFC tags inside, such as cards and keychains. He mentions that in the future everybody will have their cards saved on their smartphone, from discount cards to company passes and debit cards. There have already been some experiments with contactless payment by smartphone instead of debit card. This is already possible with the by Van Erven so called Card Emulation Mode. Of course NFC tags will stay existing in for example different communication means. According to Van Erven this will even become easier: “They are already developing a printer that can print the antenna and chip that are inside the tag, it will not take long until it is here. This will make NFC tags a lot cheaper and will make them mass producible. In this way it will also make it very appealing for newspapers and other printed media to use, because it can directly be printed inside the product.” When I asked Van Erven where he uses NFC for himself, I learned about some new NFC products. “I use NFC a lot, I use it in my daily life, for websites that I need to visit quickly or other small stuff. But I also use it as my key to my home, I have got a NFC cylinder lock, if I tap it with my device my lock unlocks so that I can enter. It is very easy, no keys needed.” Van Erven also told us that it is possible to let somebody in by sending your ‘key’ to someone else and put a timer on it, so that it only works once or only for 10 minutes. Furthermore, you are able to see who locked and unlocked the door and at what time. Also you never have to worry again about locking the door, because you can always check if it is locked or unlocked from wherever you are. But wouldn’t it be dangerous that everything would be on your smartphone or isn’t it easy to hack such a tag or use a stolen device? If your smartphone is good protected, there is no need to worry. For NFC to work, the screen needs to be unlocked. So if it is not unlocked it does not work. According to Van Erven, it is possible for a smartphone to read out a NFC tag, but this is not simple to do. However, if a good tag is used, such as the Mifare Desfire, it is not possible to do this. Which has the possibility to have a tiny security programme installed on it. Also Van Erven uses NFC tags as his business card. Although this seemed a great idea it did not really work out that way. Because a lot of people do not know what NFC is and how to use it, they did not get what to do with the card, even though it told them to scan it. That is why Van Erven has changed it into a normal business card but instead of putting the tag inside, he has put it on the back. In that way people notice the tag and ask what it is. This is a great way for him to market his product, but also to explain how it works. It now redirects to a page on his website that has various information about him and his company, also there is a button on the page to add Van Erven as your contact. So maybe that is something to think about when using a NFC tag as your business card, because not everybody will understand.

**Recommendations**

Once again, if you would like to start exploring the possibilities of NFC tags then I would recommend NFC Tagwriter (by NXP) and NFC Tools as applications to use. As told before, NFC Tools can write both public NFC tags and private (only when installed same application) NFC tags. NFC Tagwriter has a lot of security options and additional options like the Unique Identifier and the interaction counter.

I know that it sounds a little geeky, but I would like to recommend you to read the [Tagwriter user manual](https://inspire.nxp.com/tagwriter/tag-writer-user-manual.pdf) because it makes working with NFC tags a lot easier if you know what you are doing. Also it shows all the other options the application provides that I did not discuss in this chapter. This of course applies if you choose to work with NFC Tagwriter. [This article](http://trendblog.net/creative-and-useful-ways-to-use-nfc-tags-with-your-smartphone/) shows and explains 18 creative and useful ways of using NFC tags, some of these tips are very convenient. Maybe you will find some helpful tips, or you can come up with a new function by getting inspired.

To go deeper into what NFC is, not by reading but by watching a video fits some people better. [This video](https://www.youtube.com/watch?v=aAX8LY5Wh4U) perfectly explains what NFC is, what the tags do, how to program them and many more. There is another [shorter video](https://www.youtube.com/watch?v=qp5il7yhM4Y) that quickly explains how to use the task options with Trigger. Because I did not discuss Trigger in this article, it may be helpful to watch this if you want to set some private commands. This video also describes their top 5 features with NFC, maybe these are helpful for you too.

**Conclusion**

We have already seen everything that NFC expert Jan Van Erven had to say about NFC and how he sees the future of NFC. Now I will shortly summarize the future and put my own thoughts to it. So as Van Erven already explained, we will probably be paying with our smartphone in the near future. Also all other cards that are used will be stored on the smartphone and the smartphone will be our key to our home. I think NFC tags will also get very important in advertisements, it makes it easy to put hidden content inside different products. When the time comes that it is very cheap to manufacture the tags, it will be found in papers everywhere. Linking to products, websites, emails, newsletters, fill in forms and many more. I am very excited to see how this will all work out and therefor I will be monitoring NFC closely.

**Sources**

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