# Identity Identification and Contactless Technology Using Near Field Communication (NFC)

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## Abstract:

*T*he world of electronics further  more each and every one further  change from one electrical device to all the flexible devices, by moving as of device to network devices. Alternatively, user does not tolerate the complication in adding to struggle of establish a network of relations between devices along with each other. Therefore we know how to set several network functions and handle it in the PC world, other than not within the world of electronics. By means of the Near Field Communication – Interface  Protocol (NFCIP-1), according to which user of electronic procedure, which give the use of protected way of communication  between  a variety of devices  devoid of  effort  is considerable academic in the formation of their own network concept  is simple  striking. According to communicate between two devices, as well as bring them together, with Protocol NFCIP-1 and the wireless network to compact with them in the peer mild and here is the exchange of configuration data using NFC, and here you cannot continue with the devices, some of the longer and faster than protocols such as Bluetooth or wireless Ethernet (Wi-Fi).*

*Key words: Information security, Privacy, NFC, Devices, Tags*

## I.  INTRODUCTION

NFC is a very essential technique. At this point determination is the combination of technology in mobile phones to make people's lives much easier. Along with those company Nokia as well as some other company in the marketplace nowadays with the attendance of NFC in mobile phone of their own. Determination exist part of mobile phones in the upcoming. NFC has a lot of applications in day by day life. We will not be need to carry cards, different electronic such as access cards, debit cards / credit cards and identity will be the cards are already in the cell phone, and will use them anywhere we want and will not transfer data easily from any device to any more. And also do not need to repeat the keys because we can use only one phone instead of keys. Even more, we can buy and store e-tickets on the cell phone and there is also set of criteria to resolve the work of smart phones and similar devices to be the wireless contact them by touching each other or make them side by side, and not more than the distance of a few centimetres. There is also the current and anticipated applications include data sharing, and simplified setup of more complex communication such as Wi-Fi. Communication is also possible between the device and the NFC chip unpowered NFC, which is name "tag".

## II.  THEORETICAL CONSIDERATION

### 2.1 NFC (Near Field Communication)

Now develop into a technology shift from one machine to the network in addition to the devices connected to a single concept from hardware to various devices purposes.  It  is important that consumers do not face difficulties in the hardware constitution for the institution of a network, leading to near field communications, will be the NFC is a combination between identity and connectivity from beginning to end technologies  that  contactless  proximity between in sequence plus become easy communication between small electronic devices to be created to urge the magnetic induction when they are touching the devices or become closer to each other with a few centimetres to enable communication between them. Also been established and peer-to-peer network for data exchange. just the once you create a communications network that means the wireless technologies can be used such as Bluetooth along with Wi-Fi to exchange a large quantity of data and growing the variety of communications including .Let's take an example if you have a laptop and cell phone equipped with NFC, then you can easily download data from Internet into your cell phone by simply touching your cell phone with laptop. Like that you may take pictures from your cell phone and if you want to show those pictures to your friends on big screen (TV) then you may just touch your phone with TV and show them, or if you want to print those pictures then by touching the cell phone with NFC equipped printer will give you the prints of those pictures. This principle works with any kind of devices equipped with NFC to communicate with each other. There is no need to set up the communication link initially. Suppose you want to transfer a file from one laptop to other by using novel technologies, like Bluetooth or Wi-Fi. You need to manually set up the communication link between laptops. But if you are using NFC enabled laptops, then you may transfer the file by just touching both laptops.

In another situation you may establish the link using NFC and once communication link is established Bluetooth or Wi-Fi can be used to  transfer data. Advantage of  using  this method is to transfer larger data or continuing the communication session if devices go away after touching each other [1].NFC enables two way communications between electronic devices. And has the capability to write to the RFID (Radio  Frequency  Identification)  chip.  Therefore

bidirectional communication between NFC-equipped cell phone and NFC reader can be established. That makes the possibility to develop complex applications like payment, secure exchange of data and identity's authentication [4]. NFC tools touching paradigm. Pitiful is a famous and interactive method in human lives. This makes NFC technology easy to learn and use. This touching paradigm was initially used in RFID(Radio Frequency Identification) technology. In RFID technology items marked with tags contain transponders which emit messages in the form of signals. RFID readers were used to read those messages. NFC is now integrated with this RFID technology.

The tags to be readable by NFC reader should have 4 to 10 byte unique ID. This unique ID is used for the identification of the tag. There are multiple manufacturers in the industry, so ID's length may vary in size [5].From the technical point of view, NFC is blend of contactless smart card technology and cell phone. NFC capable of devices normally operates in three different modes. Card Emulation mode, Peer-to-Peer mode, and Reader-Writer mode. In card emulation mode NFC device behaves like a reader e.g. NFC tag. This tag has the capacity to store data securely and the applications of this mode are electronic ticketing and payments. In peer to-peer mode two devices equipped with NFC can exchange data directly by touching each other. Applications of P2P mode are transferring data between laptop and cell phone. Printing of data by touching laptop with printer. In reader-writer mode NFC device can read or write the tags in similar fashion like RFID tags [6].NFC can read and write data on RFID chip. And RFID (Radio Frequency Identification) chip can be embedded in everything starting from paper to machinery. RFID is mainly used for tracking and identification through radio waves [04]. NFC core applications include connecting electronic devices, Accessing digital contents and making contactless transactions.

## 2.2 NFC Modes of Communication
Three modes of communication are defined by NFC forum.
- Read/Write mode
- Cardemulation mode
- Peer-to-peer mode

In read/write mode NFC phone can read or write to the tag. For example smart poster.
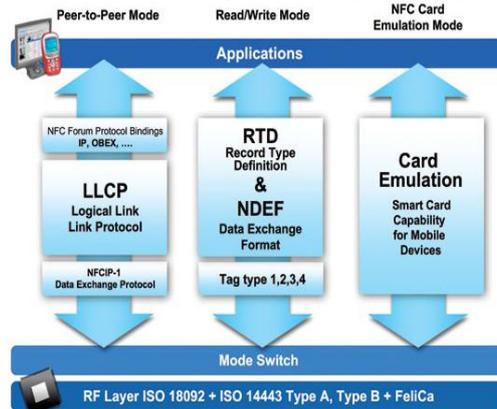


Figure 1: NFC Modes of Communication [19]

Contactless communication supports this mode [7]. At the same time as in tag emulation mode NFC phone acts like smart card. For example, mobile as electronic wallet. Third mode is peer to-peer mode in which link level communication is established between two NFC phones. For example exchange business cards.



Figure 2: Examples of NFC Communication Modes

## 2.3 NFC Modes of Operation
RF signal communications between transmitter as well as receiver create the main division between NFC in addition to previous RF wireless communication mode. NFC depends upon straight magnetic/electrostatic combination between devices as a replacement for of freely broadcasting of radio waves, such as in Wi-Fi. NFC devices can activate on

low electric or magnetic field strength due to its short variety communication property [8]. Field Strength of NFC [8] NFC system can operate either in active or passive mode depending upon requests. ECMA-340 is the standards which define the mode of operation.

Table 1: ECMA-340 showing Magnetic

| Field level | Field strength | Description |
|---|---|---|
| Hthreshold | 0.1875 A/m | Minimum field detection level |
| Hmin | 1.5 A/m rms | Minimum un-modulated field strength |
| Hmax | 7.5 A/m rms | Maximum un-modulated field strength |

*2.3.1 Active Mode*

Here this approach both devices generate RF (radio frequency) field to transfer data. In these circumstances any of the devices can be the architect in addition to other will be the target. While in passive mode, only one device generates the RF field and other uses load modulation to transfer data.

In this situation initiator of the communication will generate field and target determination use load modulation. Throughout the message, the initiator starts the communication in a scrupulous mode at a exact speed. Target finds out the current speed and replies back to the initiator. Termination of the communication takes place either when two devices move out of the range or application gives command to terminate it [1].During communication either initiator or target generates RF field of level H min that does not go beyond the field level of H max[9].

*2.3.2 Passive Mode*

This mode has a key benefit for battery powered devices. For battery powered devices low consumption of battery is the basic priority. Thus NFC allows battery powered devices such as cell phones to operate in passive mode. In this mode RF field is generated on the other side. Consequently battery power is save that was essential to be used for generating RF field. In passive mode intention operates always between H min and H max magnetic field strength [9]. NFC protocol is also well-suited with connectionless smart card protocols like Felicia and Mifare. NFC device know how to work with both smart card and smart card reader. An additional benefit of the NFC device is that it can be use as smart card, as well as smart card reader [1].Devices can not change mode of communication (Active/Passive) during single transaction unless target is removed or deactivated. Even transfer speed of target to initiator along with vice versa may not effect the change in mode [9].

## 2.4 NFC Stickers

These stickers are the different solution to NFC devices with contactless cards. They are self bonding agent along with smaller in size, can fit on any device, like a cell phone. They are simple to use and have potential of gaining significant business benefits. For production and personalization standard they are following A1 credit card format standard. Although NFC sticker can save start up cost, their production cost is more than simple contactless cards. Only the increase in volume of such sticker can reduce its cost. According to a survey volume of NFC sticker is increased in 2009 and during 2010 and in 2011 it is expected that there will be significant increase in their volume, reducing its price [10].



Figure 3: NFC Stickers [20, 21]

## 2.5 How NFC works

There are four ways how NFC works.
    1. Phone to phone
    2. Phone to device

3. Phone to tag
4. Phone to reader

*2.5.1 Phone to Phone*
In this category two cell phones capable of with NFC communicate by way of each other. They can transfer music files or pictures by just touching each other.
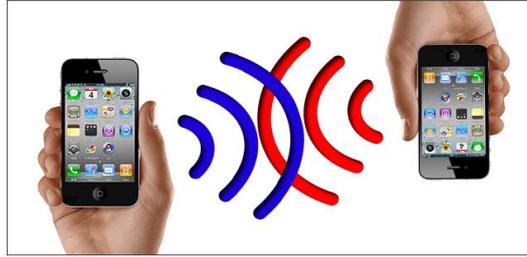

Figure 4: Phone to Phone NFC Transaction [11]

*2.5.2 Phone to Device*
At this juncture NFC equipped cell phone can communicate with any device. For pattern, by just touching phone with NFC capable of printer can issue the pictures stored in cell phone. Otherwise by poignant payment device can execute payment transaction.


Figure 5: Phone to Device Transaction [12]

*2.5.3 Phone to Tag*
Tag contains data. Normally tags are embedded on posters for advertising intention. Cell phone is touched with tag and data from tag is transferred to cell phone. For example there is a tag on bus terminal which by touching cell phones transfers bus timings and other details.


Figure 6: Phone to Tag Transaction [13]

*2.5.4 Phone to Reader*
We can purchase furthermore store electronic tickets on our cell phones. Cell phone can communicate through external reader by in a minute touching it with person who reads. So one can purchase ticket easily as a substitute of standing and waiting in a long queue


Figure 7: Phone to Reader Transaction [14]

**2.6 NFC Applications**
NFC fall under three different categories upon its usage in different fields.
    1- Service initiation category
    2- Peer-to-Peer category
    3- Payment and Ticketing category

Service initiation in this scenario functioning of NFC is the same as of RFID. NFC device reads some data from a tag and uses this information in several different ways. In this case tag serves as transponder, it might be a turned off cell phone. NFC device can read the data even if the cell phone is powered off.  Illustration of such scenario can be the advertisement or in sequence placard [16].  In  this application NFC tag is fixed near information desk, user touches  its NFC device  with  tag  along with  retrieves  the information. Presume this tag is placed in university for guidance on the subject of study schedule of students. Whenever student wants to know his course schedule, he brings his NFC device close to NFC course tag and retrieves the information of his course schedule Peer-to-Peer In this application direct link between two devices is set up to transfer data. Amount of data may not be too large. If user wants to transfer large amount of data, Wi-Fi or Bluetooth correlation can be set up, but that is invisible to user [16]


Figure 8: Peer-to-Peer data transfer [3]

**Payment and Ticketing**
In this scenario cell phone is second-hand as electronic wallet. Nowadays we are using cards only for payments. But with NFC capable of device multiple functions could be composed under the identical proposal. Virtual money can be loaded in the cell phone that can be used to pay travelling tickets or parking fee [16]


Figure 9: Presenting e-ticket to machine [17]

**2.7 NFC Usage Models Touch to Connect**
NFC allows us to retrieve information from our environment.  NFC allows cell phones to collect information store on day by day life objects in the form of NFC tags. For example, food packing, flight schedule, street signs, signs on bus stops; sign on posters, airline information, advertisement information, hotel charges, train timings and much more. As a result of adding NFC tags on magazines, posters and other advertisement panel's user can get existing cell phone services like SMS and Internet based services using their NFC cell phones [18]. Touch to Pay With the help of NFC users can keep contactless cards and tickets in their cell phones. Instead of keeping tickets and debit/credit cards separately, user can store all the cards and tickets in their NFC equipped cell phone [18]. NFC mobile wallet facilitates by showing current balance, last ten transactions, and works on all contactless readers [19].


Figure 10: NFC payment [19]

NFC right to use control application facility provide entry to any access control point like parking gates, tunnels, university entrance, and staff entrance to association. This application can be used at any exit control point. NFC phone can also act as terminal for current RFID contactless cards. Nevertheless it has the ability to integrate with Misfire technology [19].



Figure 11: NFC Access control [19]

**Touch to get Parking Information**
NFC parking application facilitate user to collect parking information on his/her NFC cell phone by just touching cell phone to NFC tag that gives you the parking service information i.e. location to park your means of transport, parking duration, parking rent. It saves user's lot of time and decreases the queue time in parking lots [19].



Figure 12: Collecting Parking Information [19]

You can install this application by SMS and can pay the parking fee through the GSM operator [19].
Touch for Entertainment Accessing web site, transfer/copying data, accomplishment movie advertisements, initiating phone call or sending SMS by single touch, purchase tickets of concerts, club or cinema, making hotel suspicions, storing discount coupons on NFC cell phones with using them later are all part of NFC entertainment. We can buy any entertainment deal using M-Wallet on NFC cell phone [19].



Figure 13: Copying picture from NFC Frame [20]

Touches to have shopping NFC shopping application provide you the capability to manage your shopping cart by using NFC cell phone. By bringing your NFC phone closer to the product tag you can get product in sequence (size, colour, manufacturing date, expiry date, price weight etc). Several products could be added to cart and at the
Closing stages user can view the total price. Even user can keep all the record of previous shopping and can perform comparison like price compare etc. Amount can be paid instantly through NFC phone and user can further store shopping receipt on his/her cell phone. This technology also helps shopkeeper to manage the shelf [19]

Figure 14: Getting Product Information [21]

Touch for Kiosk Services Kiosk service facilitates user to get different NFC-based services and applications at a single point. Tag services include SMS services, call services (Emergency numbers), entertainment activities, train/bus/flight programme, location information (for visitors) etc.



Figure 15: NFC Kiosk Services [19]

## III. ANNOYANCE FOR NFC

Along with the start-up costs, there are two other annoyance. If NFC were used in office buildings, it may begin to blur the lines of office and relaxation, due to the ease of taking work home with you just by using your phone. NFC can also be seen as disruptive technology. Tools can be considered disruptive when it makes another technology become obsolete. If we are able to transfer files using our phones, we will no longer need USB's, making them obsolete. The biggest problem with NFC is security. If someone were to lose their phone, the person that found it could have access to a multitude of things including high security offices, debit and credit cards, and potentially someone's NFC integrated household door. Employees will need to be extra careful about where they place their phones.

- NFC technology is relatively new, so not every mobile phone will be compatible with this technology
- The average retailer does not have a strong reason to switch over to NFC technology when traditional technology works "just as fine"
- security issues are always prevalent with technology - people can lose their NFC smart phones and their personal information can be compromised

## IV. NFC APPLICATIONS

Through the simple and intuitive usage, there is a high potential for different applications where the usability would benefit from NFC technology y. In this chapter, we will focus only on some of them.

### 4.1 Payment solutions

In payment solutions, the biggest benefit would be that it is possible to integrate NFC technology in other devices which are always carried with the owner (e.g. car key or mobile phone). There are big commercial roll outs planned where NFC systems are used for payment.

In New York, Google is already testing their NFC payment solution for Android powered mobile phones, called *Google Wallet*. This happens in cooperation with the MasterCard *Pay Pass* system [15, 6].

In Germany the *Sparkasse* bank wants to start in the end of 2011 with the delivery of NFC ATM cards. Their plans are that by 2015 each of their customers will have such a card [40].

But not only has the ATM carded need to be changed; all the terminal have to be upgrade to provide the NFC functionality. The payment company is willing to take the improvement costs because of forecasts that a lot of the customers will use their mobile phone with NFC payment solutions and thus the costs of the card construction resolve shrink. The purchaser hopes that the usage of these wireless systems will speed up the payment communication and so they could save money by means of each costumer [16].

**4.2 Healthcare**

During healthcare, the whole thing has to be documented precisely. Doing as a result is not always trouble-free in addition to the standard exhausted life in a hospital would not make it easier. NFC systems could help at this point reduction time with increasing the protection.

Here the usual prescription design, a nurse has to find out which drug is required, fetch it, check if it's the right, give it to the patient along with document it. By the use of an NFC enabled system in the hospital, the human resources could get a medication list, for all of their patients on their mobile devices, and at the pharmacy an auto-mated medication dispenser could provide the correct medications. In the next step the nurse gives the medication to the patients, checking each first by touching the patients ID, it would show which medication is required. Touching next the medication would perform the check and give an alarm if there is anything wrong. If it's the right medicine in the right dosage, it will document that it has been given to the patient. Such a system would decrease the problems of medication errors; this would save money and time, and increase the patient's safety [11].

NFC could also be a benefit in the care of the elderly or patients. Elderly people usually have problems interacting with new technologies. Since NFC is very simple and natural to use, the inhibition would be very low. For example, on the market there are a lot of Bluetooth enabled sensors for collection of vital values available. Combining them with NFC tags it would be easy for the people to connect them with a mobile device, which could utilize them. By insertion this technology well in the daily schedule of the people a lot of money for think about giving could be saved while raising the patient's safety at the identical time [1].

**4.3 Rescue organizations**

There could be a great benefit in using NFC technologies in res cue organizations (e.g. paramedic services, fire fighters).

As there are studies for Germany, that 70% of health-related emergencies happens at home and about 23% of the population lives alone, there would no one be able to give the paramedics information about medical history of the patient. For such cases, there are concepts to use NFC in combination with the *German electronic Health Card*, where the medical history could be stored. [3] Suggest the placement of NFC tags contain the medical identity near the front door of the residence of people who live alone. In urgent situation a paramedic or doctor could read the tag with their mobile phone, connect over a secure connection to the health care database and retrieve the required information. For the privacy of the patients there have to be strict limitations regarding who has when access to the medical information [3].

The increasing safety design of vehicles makes it more and more difficult for rescue personal to evacuate people from crashed vehicles. Thus the *FIA Foundation* initiated a project called *Rescue Sheet* [4], where in the vehicles, A4 sized standardized information papers are placed. The placement of this paper is recommended behind the driver's sun visor, but it could be different for each car manufacturer or the paper could be removed by the owner of a vehicle. Usually the existence of such a card is shown by a sticker in the windshield of the vehicle. Combining this sticker with an NFC tag where the safety information is stored, there would be no need for the emergency personal to search for the paper. Additionally the emergency personal could automatically receive updates of this information over the air (with a mobile internet connection).

NFC tags could also help fire fighters. For large buildings there have to be alarm plans, with information the fire fighters need in emergency cases. These plans are usually bulky maps stored in security closets. In an emergency case, they have to be fetched from the closet and if there are more squads in action, there are often too few maps. By placing NFC tags in the building at strategic positions, each squad could fetch the information on their mobile device, with localized information about the section of the building where they are, and they do not need to search in the bulky maps for their actual location. In case of smart buildings far more functions could be realized. For example, switch of electricity or gas tube by concerning with building controls.

Another possibility for the use of NFC could be for rescue or security organizations on an alarm to simply touch an NFC sender to retrieve the order information on the own mobile device and acknowledge the application of the order. At an NFC sys-tem this would be possible within milliseconds, where most other wireless systems need seconds to minutes to establish a connection. Such an extension could also be a benefit for the *Warn- und Alarm System* project, be-cause then there would be no need for a constant connection to the mission control equipment. This would result in a higher flexibility and lower power consumption.

**V. CONCLUSIONS**

We are in this report and a brief description of the security and privacy threats to the devices NFC. The same technology and security threats the same wireless technology. Compared with other wireless technologies some of the threats have an impact on the low NFC, such as eavesdropping, which is difficult to achieve through the transaction due to the distance in less communication between devices and the denial of the attack, which will only affect the normal operation for some time.

The data conversion, data corruption, and the follow of the sequential devices NFC. Because when we look at the use cases with regard to smart posters, where addresses are used malicious websites to direct users to malicious websites or services.

Know how to be used to download malevolent software on the mobile phone. Can then be used malicious software to eavesdrop on the data entered on the keyboard or attempt to access sensitive data, which threatens the security of other applications. Encryption gives us better way to secure communications. But the question is which encryption method to use here, either symmetric or asymmetric.

Symmetric encryption has its own issues, like key distribution and trust, etc. Asymmetric encryption technique increases transaction time and more utilization of battery power. This is not suitable in terms of low powered devices. Advanced encryption techniques like ECC (Elliptic Curve Cryptography) can be used to solve such issues. Using appropriate encryption technique depends on the use case. In sensitive environments, where more security is required, asymmetric cryptography should be used despite of its increased transaction time property. Using NFC devices will affect personal privacy by tractability.

Possibly someone could read UID of a NFC tag from a distance and see that the same phone passes at a later time. Having GPS in the cell phone will help attacker to pin point your location. Cell phone affected by malware can collect all of the information stored in the cell phone or the information typed by the keyboard and can send it back to the attacker. No doubt NFC technology will ease our life. Its touch and go facility will be fun for the people. But, this technology is not mature yet and has lots of security and privacy issues. Using NFC devices for entertainment will be fun. But for business use we think that this technology is not yet ready. and privacy threats faced by NFC, discussion and critical analysis of these issues by looking from different aspects? Impact of privacy issues on daily life will also be addressed.

## VI.   FUTURE WORK

As more countries apprehend the potential of NFC technology, it will be adopt universal.NFC technology is already used in Japan and South Korea. Additionally, it seems like NFC technology is the next step to making smart phones better.

Based on its feature, NFC shows enormous potential and optimistic prospect. There is speculation that NFC phones will achieve half of the market share (mobile phones) by 2015. If NFC technology became widespread, individuals would basically change their way of making transactions and the change of daily living.

NFC technology can foster innovation that can make our lives more efficient and convenient.

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