

Mobile Communication Using Near Field Communication and Radio Frequency Identification

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Abstract:- Near Field Communication(NFC) is one of the short range radio wireless communication technologies which operates at a frequency of 13.56MHz and has maximum data transfer rate of 424kbps.Near Field Communication provides secure communication between electronic devices. The Communication in NFC is established by putting two NFC enabled devices around 20cm theoretically and 4cm practically. NFC technology works based on the radio frequency Identification(RFID) technology .RFID provides magnetic field induction to establish communication between devices. NFC offers contactless smart card standard .The advantage of using NFC is its short transmission range which prevents eavesdropping on NFC enabled devices. The traditional plastic cards like credit card ,debit card are replaced by NFC tags.NFC is complementary to Bluetooth with their long distance capabilities. The three modes in NFC are read/write mode, card emulation mode and peer to peer mode .In read mode the application reads the data from NFC tag and in the writer mode ,the application writes data into the tag .In card Emulation mode the tag acts as a contactless smart card and is highly secure .In peer to peer mode ,it enables two NFC enabled device to exchange data .This paper provides an overview of NFC technology including existing system ,protocols ,types, proposed system, experimental setup and future enhancements.

Index Terms- Near Field Communication , NFC tags, Bluetooth , Protocols , Standards ,Wi-Fi.

1. INTRODUCTION

NFC is a short range radio wireless technology that enables communication between two NFC enabled gadgets. When NFC enabled gadgets or mobile phones are brought together then the communication occurs. NFC is based on radio frequency communication standards ,that provides magnetic field induction. With the help of NFC it is possible to read the information from long distance with reader devices[1]. A communication network (either public or private) which doesn't depend on any corporal connection between two communication entities and have elasticity to be mobile during communication. The GSM and CDMA technologies offer Mobile Communication[12]. Mobile phone communication user personal access has been devised in the day to day applications of life . All the private data is getting

hacked easily and this hacking takes place when the user's login password information are easily decrypted. It is difficult to keep in mind all the personal details and also it is difficult to carry notebook to know our personals details. It is not secure to carry around bank account books and storing the credit card ,debit card etc pin or any account number is a tedious part of day to day life. If someone cracks the 4 digit pin number they can easily access the ATM card and commit their own transactions. In order to replace this difficulty, NFC tags are designed .The encrypted data is stored in the NFC tags and the tags are tapped to the NFC enabled mobile phones to enable the information stored. There are four types of NFC tags available and based on the business requirement and the storage the tags has been changed[2]. The user can know their personal details in any situation by simply tapping the NFC tag to the mobile phone.

The Tag 1 Type is based on the ISO14443A standard. The data stored in the tags are transferred to the NFC enabled devices. These tags are read and re-write capable. Memory availability is 96 bytes which is sufficient to store a website URL or other small amount of data and the memory size is extended up to 2 kb.

2. EXISTING SYSTEM

The existing system comprises of the RFID tags and credit card being used in various spheres of life. It is used in fashion, amusement parks, ticketing, sports, guns and many more applications. The NFC systems are used at homes, driving in the car, to give access to Wi-Fi network .

2.1. Barcode

A barcode is a visual representation of data which is scanned and interpreted for information. As shown in Fig 1, Each barcode contains a certain code that works as a tracking technology for products. Barcode is represented in a sequence of lines or other shapes.



Fig 1: BARCODE

In order to read the barcode, the barcode scanner needs to be quite close more or less than 15ft. They have no read or write capabilities and they do not contain any added information such as expiry date etc. They only contain the information about manufacturer and product. Barcodes are less secured than RFID as they can be easily reproduced or forged.

2.2 RFID

RFID is compared to a grain of rice[8] .It uses electromagnetic fields to detect and track tags

attached to objects. RFID tags holds electronically stored data.

RFID tags are used in many industries. It is embedded in clothes, cash, pets and people .For example RFID embedded in an automobile during invention can be used to footpath its progress through the meeting line.

2.3. NFC Ticketing

In the ticketing application, the user wants to carry a NFC enabled mobile phone to read and store the ticket[3]. The user can access code from the reader . A NFC reader is connected to the ticketing server. The user can read the ticket from the NFC reader and store it..

2.4. NFC mobile payment system

In NFC Mobile Payment System, credit card or debit card prerequisites of the user are stored in the secure element which is built in the OS[4]. The user NFC reader can read the prerequisites to transfer the money from the account to finish the payment.

3. PROPOSED SYSTEM

The proposed system invokes the usage of this NFC to access the data that is stored in the NFC tags of Type1.The bank details and account number can be stored. This data is accessed by creating an application and reading the contents of the card into the phone application. The security level is high as these details can be accessed only by the known users of the application.

The system involves NFC tags and NFC Operation mode . Just like Bluetooth and Wi-Fi, and all manner of other wireless signals, NFC works on the theory of sending information over radio waves. Near Field Communication is another standard for wireless data transitions, meaning that there are specifications which devices have to stick to in order to communicate with each other properly.

3.1 Read/Write

An android application for reading and writing NFC tags was created. As shown in Fig.2, NFC option was enabled in the NFC embedded mobile phone .In order to write the data, tap the NFC tag into the mobile phone and write the necessary information that the user wants to store and once the tag is tapped ,the tag writing process got done. In order to read data from

the tag, select the read tag option from android app and tap the tag to the device[10][11].

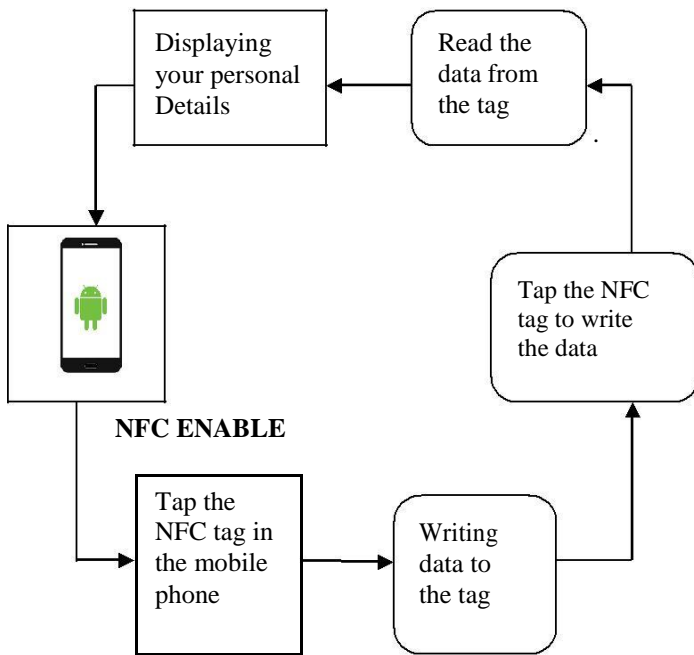


Fig 2:READ AND WRITE

NFC improve data security and easy access with the help of Near Field Communication (NFC) .NFC is a set of standards for portable devices that allows to establish peer to peer radio communication by passing or putting them together .NFC facilitate the way of secrecy of data and information storage .

3.1.1 NFC tags

NFC tags are passive devices, which does not require a power supply of their own .There are four basic tag types of NFC tags that have been defined. These are provided designations 1 to 4 and each has a different format and memory capacity[5].

The different NFC tag types as shown in Fig 3 are:

- **Type 1 :** The Type 1 tags are read and re-write capable. Memory availability is 96 bytes .
- **Type 2:** The NFC Type 2 tags are read and re-write capable. The basic memory availability 48 bytes and is expanded to 2 kb.
- **Type 3:** The NFC Tag Type 3 tags are applicable for tedious applications .The memory capacity is 2kb. The cost is higher.
- **Type 4:** The NFC Tag Type 4 tags are pre-configured .They can be read / re-writable, or read-only. The memory capacity is 32 kb .

Fig 3:TAG TYPES

3.1.2 Reader/Writer Mode

In Reader/Writer mode of operation, NFC application perform two operations to store data in the tags-Read/write. In the writer mode ,the initiator writes the data into the NFC tag in NFC forum defined message format. In the reader mode ,the initiator reads the data from the tag by simply tapping the tag on the NFC enabled mobile phone[6]. The read/write mode of communication is not secure. Some of the applications supported by this mode are

- Smart Poster
- Remote Marketing
- Remote Shopping
- Social Networking

3.2 Online Shopping App

In card emulation mode, the NFC enabled mobile device acts as a contactless/wireless smart card. Some examples of smart card are debit card, credit card, access cards etc. Data transfer in this card Emulation mode is highly secure[7]. This supports the following applications.

- Payment
- Loyalty
- Ticketing
- Access control



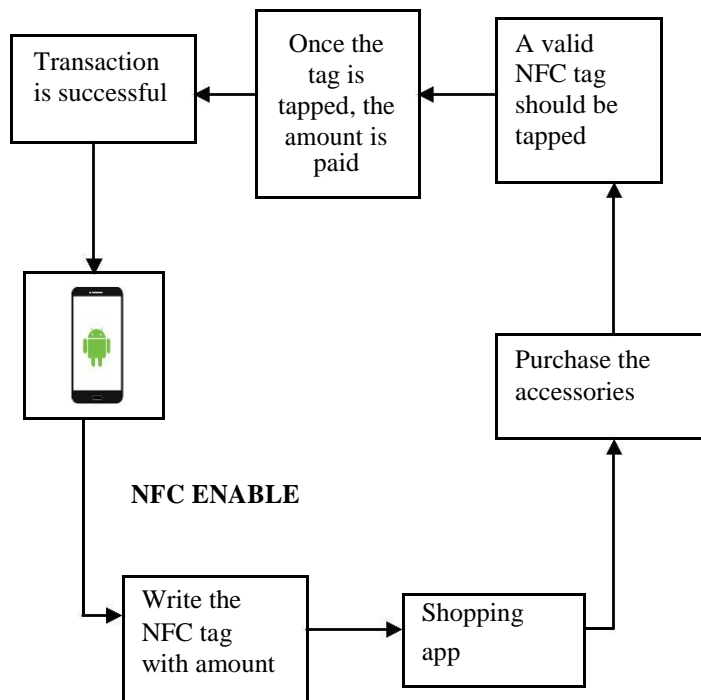


Fig 4: ONLINE SHOPPING APP

As shown in Fig.4, An Online shopping app is created and after purchasing the product tap the NFC card on the NFC enabled device, Once the NFC tag is verified using the Radio frequency identification, the amount is paid and the transaction is completed[9].

4. CONCLUSION

This paper covered the entire details of Near Field Communication (NFC) technology for facilitating secure mobile applications and demonstrate it through the proposal of NFC applications. NFC can be combined with existing infrared and Bluetooth technologies for improving the range of NFC. NFC offers a secure and simple way for transferring data between two electronic gadgets. The advantage of NFC is its similar in temperament with RFID technology. NFC technology works based on RFID technology. RFID uses magnetic field induction to initiate communication between electronic devices in close distance. NFC operates at a frequency of 13.56MHz and has maximum data transfer rate of 424kbps. NFC is complementary to Bluetooth with their long distance capabilities. This paper provides an overview of NFC technology including existing system, protocols, types, proposed system, experimental setup and future enhancements.

5. FUTURE ASPECTS

Many applications of NFC are the porch to current solutions. Wireless payment and ticketing solutions are available across the world and, are compatible with NFC enabled devices. This technology provides the possibility to create different types of NFC applications.. Some of the gadgets such as iPad, iPhone and iPod are embedded with NFC technology. It is possible to create a safe, reliable and trusted operation for money exchange with a simple touch of NFC enabled devices.. Google's Smartphone app, Google Wallet, allows users to load entire credit card information and pay with the swipe of their phone. NFC compatible Smartphone was created by Visa and Samsung which will carry special content that aims to make purchases.

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