Data Storage enhancement in NFC Chip Using URL

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Abstract – *Nowadays, every minute day to day process are dealt electronically by using machines to save time. A demand for faster and better way of data sharing in a reliable and faster way is increasing day by day.   Taking this into consideration, this paper proposes a way for enhancing data storage in NFC chip. Near Field Communication (NFC) is a new communication technology that allows mobile phones to emulate smart cards such as the business cards. NFC embedded business cards enables the user to transfer one's personal or professional information with a tap on any smart phone which has NFC. NFC business card is proposed with the help of which a businessman can simply tap the card on clients' phone and share details. Each NFC business card has an NFC chip hidden inside it, which when tapped by an NFC mobile phone links to online content or a web page using URL stored on chip.*

Key Words: **NFC (Near field communication), URL, data sharing, smart phone, data storage**

1. INTRODUCTION

In this modern era, people showcase their excellence by putting technology to use throughout the day. Near field communication is a short-range high frequency wireless communication technology that enables the exchange of data between devices over about a 10 cm distance. It allows users to seamlessly share content between digital devices. A business card with a NFC chip embedded in it is used to transfer business and personal information. These business cards are efficient, time saving and economical as well.

A person maintains his profile on the website and includes all the entities that he wants to incorporate on his business card. On the user end, he has to simply tap the business card containing NFC chip on his clients NFC enabled Smartphone to transfer a unique link to his account on the website. The client can open the link from his browser to access all the information the user has saved on website. The person can add, delete and update his profile as and when needed. The updates are automatically included in NFC business card without the need to replace the card.

As compared to traditional business cards, a large amount of data can be incorporated in a very small business card. Another advantage is that a person has to only maintain a single business card instead of many printed cards. The website holds a new social profile of the user onto it, which can be accessed by his clients for reference and data retrieval purpose.

2. PROBLEM DESCRIPTION

The traditional business cards can have a detail of only limited attributes. Conventionally they are small and can fit in a wallet or a card holder. But due to small size and limited printing area, it becomes very difficult to include many details in this card. In addition having a photo printed is also rarely seen. Finally taking prints of cards in bulk is also a loss making venture.

On the contrary, suppose there is a change of business or there is any deviation in the fields the card holds, then replacing or changing the same from all the cards is also next to impossible. It is therefore by virtue of the new NFC business cards, all the above mentioned problems can be dealt with ease. Any person wanting to change his details or update a new designation can do so by simply updating the information on the website. NFC business card need not be printed many times. Only few or even a single copy is enough to provide a data sharing to all the clients. The design can be maintained pretty well because all the details are stored in the NFC chip and not printed on the card.

3. BACKGROUND RESEARCH

3.1 NFC Operation

NFC stands for "Near Field Communication" enables short range communication between compatible devices. This requires at least one transmitting device, and another to receive the signal. A range of devices can use the NFC standard and can be considered either passive or active, depending on how the device works.

Passive NFC devices include tags, and other small transmitters, that can send information to other NFC devices without the need for a power source of their own. Active devices are able to both send and receive data, and can communicate with each other as well as with passive devices. Smart phones are the most common implementation of active NFC devices.
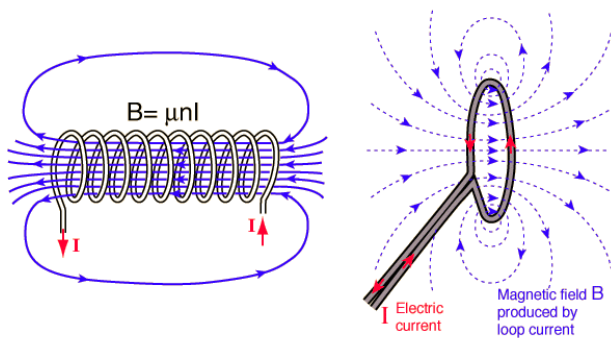
Fig -3.1.1: Working of NFC

NFC standard has particular specifications. The transmission frequency for data across NFC is 13.56 megahertz. Like all radio signals, these travel in waves, with peaks and troughs. The distance from the peak of one wave to the next is a wavelength. At 13.56 megahertz, that means the signal moves 13.56 million wavelengths in the span of a second. The technology used in NFC is based on older RFID (Radio-frequency identification) ideas, which uses electromagnetic induction in order to transmit information. It can be used to induce electric currents within passive components as well as just send data. This means that passive devices don't require their own power supply, and can instead be powered by the electromagnetic field produced by an active NFC component when it comes into range. Electromagnetic fields can be used to transmit data or induce electrical currents in a receiving device. Passive NFC devices draw power from the fields produced by active devices, but the range is only short.

In order to determine what sort of information is to be exchanged between devices, the NFC standard currently has three distinct modes of operation [7] for compliant devices.

i)   Peer-to-peer mode, which allows two NFC-enabled devices to exchange various pieces of information between each other. In this mode both devices switch between active, when sending data, and passive states when receiving.

ii)   Read/write mode, where the active device, possibly your Smartphone, links up with another device in order to read information from it. This is the mode used when you interact with an NFC advert tag.

iii)   Card emulation, whereby the NFC device can be used like a smart or contactless credit card in order to make payments or tap into public transport systems.
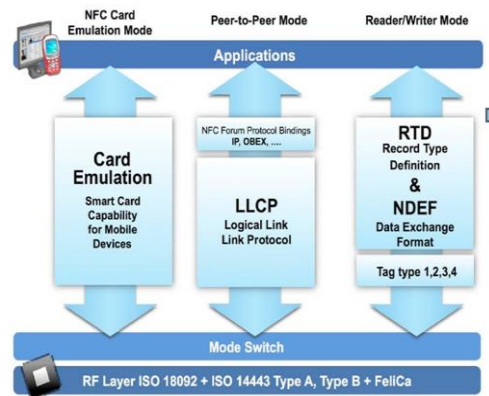

Fig -3.1.2: Modes of operation of NFC[7]

3.2 NFC Comparison with existing technology

NFC technology has a very less transmission range which can be calculated to approximately 10 centimetres, this makes it very much strong to be hacked. Your data remains protected due to this advantage. Secondly, the set up time for a NFC device is less than 0.1 second. Hence this proves to be an added advantage over the other file transfer protocols such as Bluetooth, infrared and similar technology. The operation frequency of the NFC is merely 13.56MHz which is far more less than the other devices for a FTP. Many of the devices operate at a frequency within the range of Giga hertz. Therefore comparatively NFC stands tall. Major advantage of the NFC technology is the power consumption. A NFC device consumes a significantly less or no power since it works on the principle of Magnetic Induction.

Table -1: Comparison with RFID & Bluetooth[7,5]

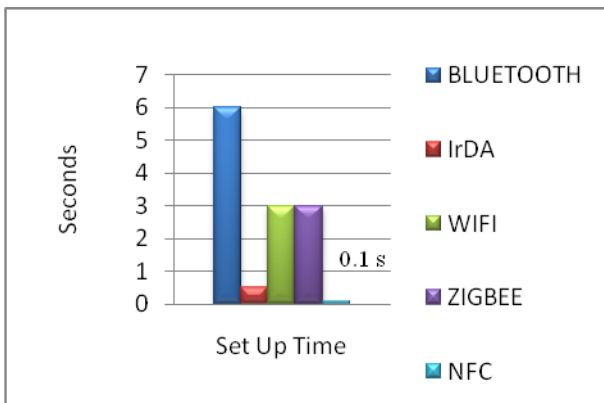| Aspect	NFC	RFID	Bluetooth
Network Standard	ISO 13157 etc.	IEEE 802.15.1	IEEE 802.15.1
Range	Upto 10cm	< 1 m	Upto 30m
Frequency	13.56 MHz	13.56 Mhz (varies)	2.4–2.5 GHz
Bit rate	424 kbit/s	50kbit/s	2.1 Mbit/s
Set-up time	< 0.1 s	< 0.1 s	< 6 s
Power consumption	< 15mA (read)	Same as NFC(15mA)	High
Connectivity	Touch/Tap connect	Send/Receive information	Configuration needed

Fig -3.2.1: Setup time comparison
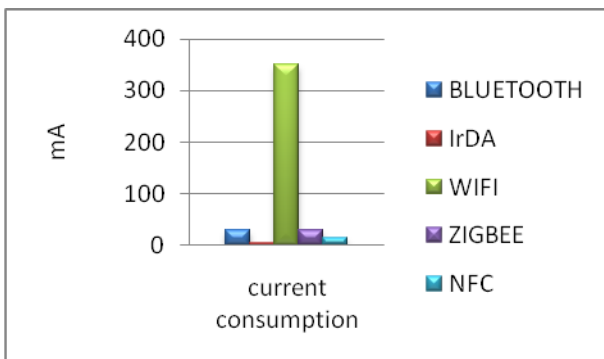
Fig -3.2.2: Power consumption comparison.

3. 3 NFC Security Issues

The security of this protocol in practice depends on the quality of the synchronization which is achieved between the two devices. Obviously, if an eavesdropper can distinguish data sent by A from data sent by B, the protocol is broken. The data must match in amplitude and in phase. Once the differences between A and B are significantly below the noise level received by the eavesdropper the protocol is secure. The level of security therefore also depends on the signal quality at the receiver. The signal quality However again depends on many parameters (e.g. distance) of the eavesdropper. In practice the two devices A and B must aim at perfect synchronization. This can only be achieved if at least one of A or B is an active device to perform this synchronization.

Major NFC security areas[5] are:-
- Eavesdropping
- Data corruption
- Data modification
- Man-in-middle attack

4. APPROACH FOR DATA ENHANCEMENT IN NFC CHIP

NFC embedded business cards enables the user to transfer one's personal or professional data in just a tap on any NFC enabled smart phone.

The user is allowed to create his/her new social profile on the website, from where he is allowed to select as many number of entities to be incorporated in the NFC business card. He has the advantage of add, delete and update entities to his own social profile. The Admin will be responsible for providing the user with the NFC business card with a URL specific to each user. This URL is written onto NFC chip using an android application named NFC TOOLS and coded. The input for this process can be made available on the admin page of the website where in a complete list of Authenticated users are available and hence the admin can then code the card according to the correct user requirements. URL cannot be changed or altered.

Hence, when a NFC business card is tapped by an NFC mobile phone, it will link to online content or a web page using URL stored on chip. Any amount of data can be stored on website which can be located using URL stored on NFC card.

5. CONCLUSION

The approach provided in this paper will ease the method of sharing personal information to others, in a very quick and effective way, in today's world. This technique will help in storing large amount of data in a very portable way. It will help the users to carry their very own public profile and share it with other users in the flick of a second. It showcases how large amount of data can be stored into the NFC chip with the help of URL. Many of the hardships such as data integrity, data redundancy and sharing on professional grounds were eliminated due to effective use of NFC micro-chip technology.

REFERENCES

[1] Anusha Rahul, Gokul Krishnan G, Unni Krishnan H and Sethuraman Rao, "NEAR FIELD COMMUNICATION (NFC) TECHNOLOGY: A SURVEY", (IJCI) Vol. 4, No. 2, April 2015

[2] [Hongwei Du, "NFC Technology: Today and Tomorrow", International Journal of Future Computer and Communication, Vol. 2, No. 4, August 2013351

[3] Shyamal Pampattiwar, "Literature Survey on NFC, Applications and Controller", International Journal of Scientific & Engineering Research, Volume 3, Issue 2, February-2012 1, ISSN 2229-5518,

[4] http://www.centrenational-rfid.com/

[5] Manas Pulipati, K. Phani Srinivas, "Comparison of Various Short Range Wireless Communication Technologies with NFC", International Journal of Science and Research (IJSR), India Online ISSN: 2319-7064

[6] NFC Connection Handover, NFC Forum, Technical Specification. Available online: http://nfcforum.org/our-work/specifications-and-application-documents/ (accessed on 13 April 2015).

[7] K.Preethi, Anjali Sinha,Nandini, " Contactless Communication through Near Field Communication ",

  International Journal of Advanced Research in Computer Science and Software Engineering ,Volume 2, Issue 4, April 2012 ISSN: 2277 128X

[8] B. Joan, (n.d.). "Difference Between RFID and NFC," Difference Between. Retrieved September 26, 2011, at www.differencebetween.net/technology/difference-between-rfid-and-nfc/

[9] NFC Forum (2006). NFC Data Exchange Format (NDEF), Technical Specification, 1.0.

[10] NFC Application - NFC Applications and Interoperability Requirements for NFC Devices, NXP White Paper, Revision 1.0, 2011

[11] Vedat Coskun, Busra Ozdenizci, Kerem Ok, "A Survey on Near Field Communication (NFC) Technology".

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