

# Mobile RFID/NFC Association Environment Using Dual Tag

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**Abstract.** This paper analyzed the standard statuses of NFC that is promoted internationally. Also, the mobile RFID related technologies that offer similar services as NFC were also analyzed to understand the potential linkage to NFC and the requirements for the linkage.

**Keywords:** Dual Tag, Mobile RFID, NFC, UHF, Dual Band

## 1 Introduction

The recently emerged 13.56MHz substitution no-touch close range wireless communication technology, NFC will be widely applied in practical life, such as mobile transportation card or credit card transactions with the integration with Smartphones in the future. Therefore, the nations and companies are attempting to gain the leading power in this technology, especially focusing on the standardizations. When the NFC technology is utilized in the future, it will be connected to various technology standards, such as mobile RFID and it is important to understand the most pressing areas for standardization. Next, the developed standardizations should be understood around the world to find the additional targets and promote the standardizations.

Mobile RFID/NFC linkage technology means a provision of integrated 2 existing mobile RFID services by developing the 900MHz mobile RFID reader and the NFC reader/tag into one SoC to be put on a USIM card. The mobile RFID technology can be divided into the ISO/IEC 18000-6C and ISO/IEC 29143 based 900 MHz technology and the ISO/IEC 18092 based 13.56 MHz technologies from the NFC forum. The 900 MHz based mobile RFID reader and 13.56 MHz based NFC reader/tag can be put on the USIM card in the SoC manner to enable the mobile RFID service using the existing 3G cell phones. This enables the global mobile RFID development that used the data scale for the interface and application among the 900

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MHz substitution international standardized RFID reader, NFC standard module, and the handheld device.

This paper analyzed the standard statuses of NFC that is promoted internationally. Also, the mobile RFID related technologies that offer similar services as NFC were also analyzed to understand the potential linkage to NFC and the requirements for the linkage.

## **2 Suggested Mobile RFID/NFC Linkage Method**

The linkage of the mobile RFID and NFC technologies occurs through the linking of the NFC type 3 tag memory structure of dual tag to the code system of mobile RFID. In detail, the mCode system, a mobile RFID code system, is encoded with a standard ISO/IEC 15961, ISO/IEC 15962, ISO/IEC 18000-6C and transitioning the results into the NDEF type message that can be stored in the NFC type 3 tag memory. The linking procedures using the dual tag for mobile RFID/NDC are as follows:

- Code system encoding: Follow the encoding method of mobile RFID standard to encode the data with mCode code system.
- NDEF encoding: re-encode into NDEF type so that the NFC device can read the mRFID encoding values.
- Storage and Linking: NDEF type data can be stored in the dual tag with tag memory structure in the type 3 shape from NFC forum to link.

### **1) Mobile RFID code system encoding step**

The mCode among the mobile RFID code systems is used to find the linking method. Among the mCode, if the D class code is used, then the total length of the code system is 96bt and 16 hexadecimal with TLC of E12, Class of 4, CC of 1234 1234 and SC of 5678 9012 are assumed.

### **2) NDEF encoding step**

In the second step, the encoding data calculated from the first step are changed to NDEF type for the NFC device to recognize the data. When the data are changed, the standard record type from NFC forum of "T (Text Record Type)" is applied to allow the production of data in UTF-8 type strings and the completed data can be stored in the NFC forum type 3 tag memory structure.

### **3) Data storage and linking step**

The NDEF type record from step 2 is saved to dual tag comprised of NFC forum type 3 tag to complete the preparation for linking. The dual tag from this process stores the information on mobile RFID code system in the NDEF type. Therefore, both mobile RFID devices and NFC devices can approach these data. If NFC device received the NDEF encoding data, then the NFC chipset can immediately decode the NDEF data. On the other hand, if the mobile RFID device received the data, then the NDEF decoder that can decode the NDEF data should be used additionally to change

the data to mCode type, which will subsequently be changed to FQDN shape according to the mobile RFID code management realization guideline to be sent to ADS or ODS. The figure below simplifies such a process.

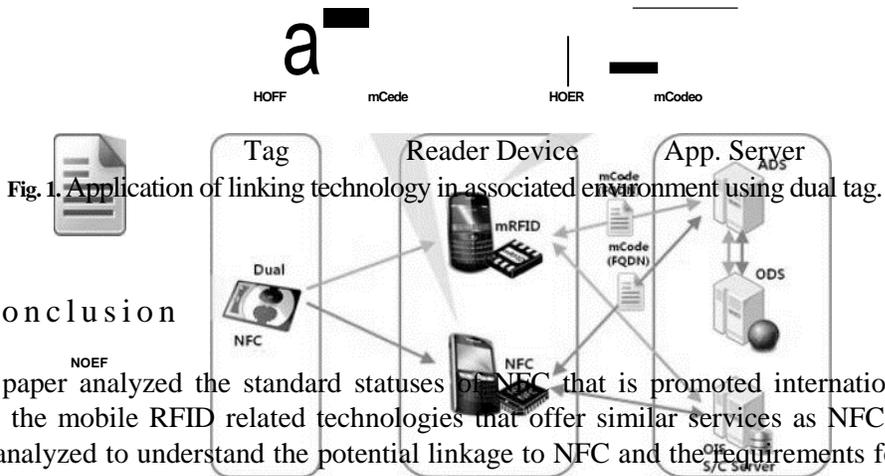


Fig. 1. Application of linking technology in associated environment using dual tag.

### 3 Conclusion

This paper analyzed the standard statuses of NFC that is promoted internationally. Also, the mobile RFID related technologies that offer similar services as NFC were also analyzed to understand the potential linkage to NFC and the requirements for the linkage. In addition, the introduction of dual tag and the code system linkage suggested a linking method to maximally use the existing infrastructure and the requirement satisfaction was analyzed. Lastly, based on the analysis, the future direction for the new standard design was suggested.

### References

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