Mobile Ticketing System of Local Train for nonNFC

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***Abstract*— Near field communication (NFC) is a set of ideas and technology that enables Smartphone's and other devices to establish radio communication with each other by touching them together or bringing them into proximity. This technology thus can be useful only for high end phones. To overcome this drawback this paper presents an application for ticketing system of local trains using RFID technology and based on the concept of NFC for nonNFC. All the users can use this application without having the need of NFC feature in their phones. Thus this application will be much more easy and user friendly to everyone.**

Keywords—NFC(Near Field Communication),RFID(Radio Frequency Identification),RFID Tag, RFID Reader, GPRS, Ticketing System

I. INTRODUCTION

The possible applications of RFID[1] and NFC technology[2][3] are immense. NFC (Near Field Communication) is a young radio technology which finds special application in the field of mobile consumer electronics. NFC is a short-range wireless technology that works on the 13.56 MHz frequency allowing a secure data exchange between devices placed at small distances (a few centimeters). RFID, realizes automatic identification and data transfer via electromagnetic radio signals typically by means of an active reader that is connected to a source of energy and a passive electronic tag that is a transponder receiving its power from the reader by magnetic induction.

In this proposed system, the application for nonNFC Ticket is developed. This system will make use of the Near Field Communication technology[4] along with the mobile phone (Java and GPRS Enabled) to carry out the ticketing transactions. One can register and get a subscription tag to scan it through RFID reader which will give a unique ID of the passenger to the sever which in turn provide an e-ticket to the commuter on his mobile.

II. LITERATURE SURVEY

The use of NFC in ticketing has already been analyzed in a few prior trials and research projects. Some of the projects based on NFC that are already implemented are:

O¨BB (Austrian Federal Railways)[5]:ŐBB offers the service named as Handy Tickets based on NFC. In this system Ticket can be obtained on NFC Enabled mobile phone via SMS. The customer has to be register first and then he can buy the tickets by sending an SMS. Customer receives an special code. Before starting the journey customer needs to verify this code at terminal via NFC.

In 2005 the German transport association RMV (Rhein--Main-Verkehrsverbund) started a pilot project, where customers could use their NFC enabled mobile phone to purchase tickets. Based on a best-price-policy passengers only had to check in/out at a terminal in the bus when they entered or left, in order to receive the cheapest ticket for the route.

Touch and Travel[6]l: This is the NFC trial by German National Railway Company in 2008. For this trial Check In / Check Out principle is used. The customer has to touch their NFC enabled mobile phones at a special touch points before entering and after leaving a vehicle, as shown in Fig.1.. The system automatically calculates the price for the route and the bill is generated at the end of the month.

For above systems,user must have NFC enabled device.
One of the most popular systems for RFID based mobile ticketing is operating in London. The so-called Oyster Card works as contactless smartcard for prepaid mobile ticketing and can be used on all public transport services within the London area. For this user need to carry separate smartcard.

Fig 1. Touch and Travel System.

III. PROPOSED SYSTEM

In the proposed system initially the user is required to open an account with railways and should keep their account funded[7]. On the other side railway will create a master

database with the user ID and the amount.

With every subscription, a RFID card will be given which has to be identified by the RFID scanner mounted at the railway stations. This will contain the authentication details of the user which will be checked with the database. After successful authentication the commuter will enter the destination, class and number of ticket fields as per requirement and send it to the server using the GPRS feature. The fare for the same will be calculated and the amount will be deducted from the user's prepaid account. After this the ticket will reach the commuter's mobile in an RMS (Record Management Store) format which cannot be modified, fabricated or tampered by the user thus maintaining the security aspect.

A. Block Diagram

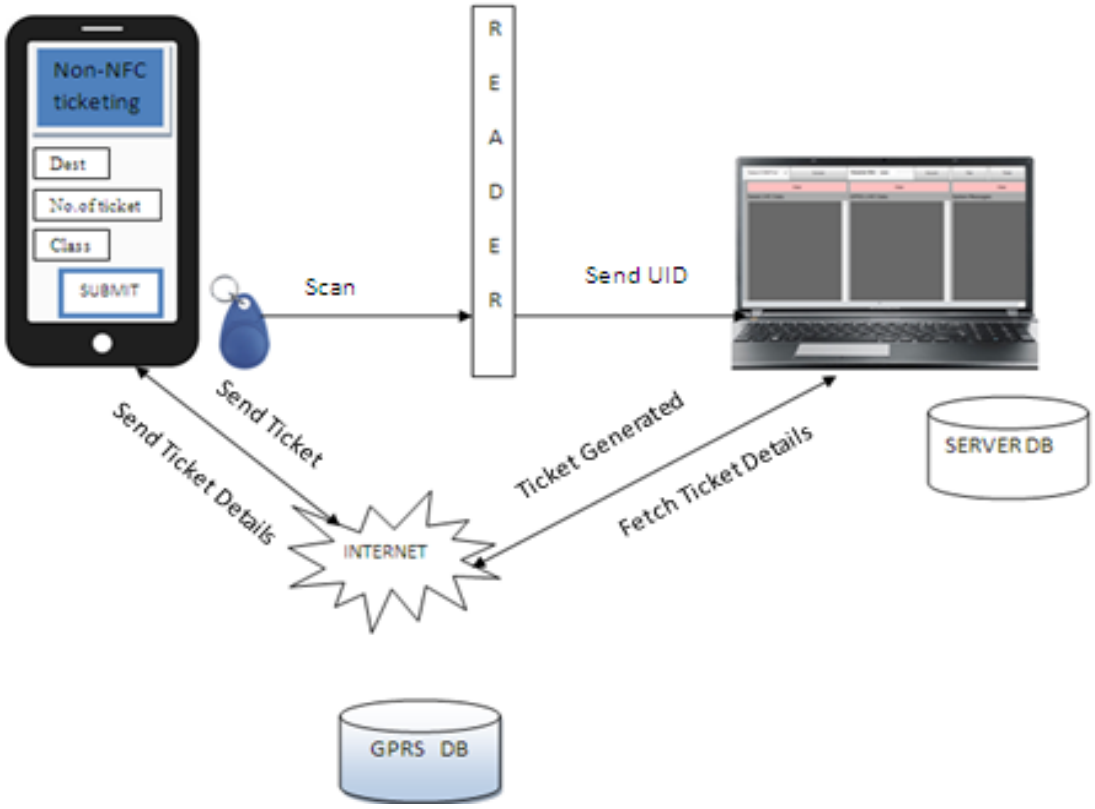

Fig.2. Architecture of proposed system

B. Components

1) Mobile Phone: The first component will be a GPRS enabled mobile phone with an RFID chip attached to it. The mobile phone will be fed with a computer program coded entirely in Java.

2) RFID Reader [8]: The RFID Reader is the second component which is meant to be mounted on the wall of Railway Stations that would be accessible to the commuters.

3) Server: This is the most important component that is supposed to manage the entire system. The server will consist

of the user database i.e. their unique ID's and a computer program coded in VB.NET.

4) RFID Chip [8]: RFID is abbreviation of Radio Frequency Identification. The job of this chip is to store 10 digits ID of the card which when brought near the reader should send that ID detail to the server. RFID chip is shown in Fig.3

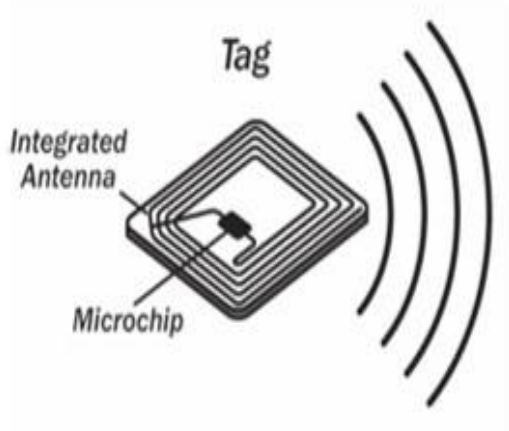

Fig.3. RFID Tag

C. Working

The basic working of the system with the above mentioned four main components is explained as per the flow under. Initially the commuter willing to issue a ticket will open the application fed into his mobile phone [9]. The application

would consist of all the necessary details to be entered for issuing a basic ticket like destination, no of commuters, etc. After successfully entering the details the user will submit those over the internet. The next step would be that the user will have to quickly get his mobile phone scanned with the RFID Reader mounted on the Railway Stations, which will lead scan the RFID chip on the users' phone thus obtaining his unique ID, as shown in Fig.2. This ID will be transferred over to the Server. The Server in turn will connect to the internet to fetch the details entered by the user and create a ticket in RMS format. RMS format is a kind of data storage format which cannot be tampered by the user. This RMS ticket will be sent to the users' mobile phone via the internet thus completing the entire transaction. The ticket will be a timed version which will last for a stipulated time in which the user is meant to complete his journey. In the meanwhile the server maintains an account of every user and while a ticket or transaction has been requested the amount will be deducted from the balance, further making it easier in the payment terms too.

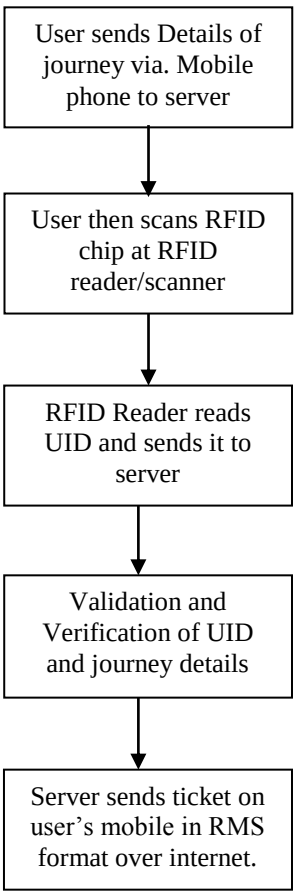

Fig.4 . Flow of the System

D. Features

The Following are the prominent features of the above discussed system

- No need to stand in any type of queue,
- Using own mobile for ticket,
- Time effective,
- Amount will be deducted from our prepaid account,
- Up to 10 cm range,
- Password Protected transaction,
- Password based Encryption,
- Easy to Interface,
- Paperless E-ticketing.

E. Technology & Programming Languages

The followings are the various Programming Languages and Technologies that are going to be used in the proposed system

- Mobile side: Java Based Mobile Programming, For GPRS link, Web client and RMS Database
- PC Side:VB.net 2008 Based Application Software[10], For Serial Port Programming Database SQL[11], For Web client GPRS internet link.

IV. SCOPE AND APPLICATION

The system is developed only for

- Mumbai suburban railway as Mobile E-ticketing system.
- Proposed system can be used for Bus Transport system.
- This system can be used for shopping in supermarket.

V. CONCLUSION

The Proposed system can overcome the biggest drawback of the existing NFC Ticketing systems. This system allows the customer to use NFC Ticketing even they don't have high-end mobile phones. Thus the system will be suitable for Indian economic environment and can be easily implemented with the existing ticketing systems. The system can work with most of the mobile phones that are used today thus increasing the usability of the system.

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