INNOVATIVE INTEGRATED SUBSCRIBER MODULE TECHNOLOGY

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Abstract

Today's Subscriber Identity Module (SIM) card technology is an innovative approach to technology, which is made of one network number which may be of GLO/MTN/VMOBILE/9MOBILE network; the subscriber identity number (SIN) resides in the SIN Card. It is associated with a lot of problems, such as crack in hearing, where the caller and called subscribers are unable to clearly hear themselves due to signal distortion or a total mute in the sound level, but still being charged by the accounting mechanism of the network, without recourse to the aforementioned problems, leading to unwanted headache by the users. The SIM card is the database used in a GSM network, as a small memory device (chip) on a card, containing the user identification data for single network. To do away with the aforementioned problems in the single SIM technology, this paper takes a look at the possibility of developing an innovative integrated subscriber identity module (IISIM) card. Here, a memory card will contain a number of network numbers (GLO, MTN, VMOBILE, 9MOBILE and others), which enables a subscriber for selectivity, that is change from one network (of poor standard) to another network (of better standard). The method used is based on the integrated circuit (IC) technology in electronics, which allows for circuit selectivity, as energy and cost saving technique in mobile station.

Keywords: Innovative; Integrated; Subscriber; Identity; Module; Card

Introduction

The SIM card is the database used in a GSM network, as a small memory device (chip) on a card, containing the user identification data for single network. Inside the SIM card resides the SIN, and other data pertaining to the subscriber (Nokia Networks Oy, 2002), which enable the establishment of communication. The recent SIM card technology contains a single network number (SNN), such as that of GLO/MTN/VMOBILE/9MOBILE. For mobile phones to use a number of networks, it must have a number of network ports, which leads to enormous energy consumption, huge cost and bigger mobile systems.

To eliminate this issue, The development of an Innovative Integrated Subscriber Identity Module (ISIM) Card, a multiple network technology, to possess all the networks, with each having its SIN in a single SIM was proposed. This will allow for individual network, such as GLO, MTN, 9MOBILE, AIRTEL and any other to reside in one SIM card. This willenable for selection by the subscriber to and/or move from one network (of poor standard) to another network (of better standard). The method used is based on the integrated circuit (IC) technology in electronics, which allows for circuit selectivity, as energy and cost saving technique in mobile station.

This proposed network system could be likened to the integrated circuit (IC) technology, in which circuit components such as transistors (likened to GLO network), diodes (Likened to MTN network), resistors (Likened to 9MOBILE network), capacitors (Likened to AIRTEL network) and other electronics components (Likened to OTHER networks) are interconnected in a small chip (Likened to a small memory device containing all the networks) of semiconductor material to perform a complete electronic/communication function, in order to ease cost, energy consumption and also eliminates the idea of impeded hearing, since all networks will endeavour for standard knowing the idea of choice by selection exists.

Literature Review

The invention of Smart card started in the seventies by Michel Ugon (Guillou, 1992). The French group of bankcards CB (Carte Bancaire) was created in 1985 and has allowed the diffusion of 24 million devices (Fancher, 1997). For the physical characteristics, the first draft proposal was registered in 1983. A long discussion resulted in the standardization of the contact location. Next was the standardization of signals and protocols which resulted in standards ISO/IEC 7816/1-4. Logical security came next, as it was clear from the beginning that there was a need for

cryptographic capabilities, though this was a bit difficult due to the limited computing power and the few bytes of RAM available at that time (Quisquater, 1997). Today's world uses smart technology in many forms.

Over the years, continued developments in GSM SIM smart card standards have produced innovations such as SIM Toolkit, which defines how to deliver value-added services to the handset menu system (Mohammed et al, 2004). The latest Java card SIM Toolkit cards allow the operator to offer handset services including customized stock, weather and traffic information, banking, email, and airline reservations.

One major technology that could be likened to this ISIM card technology is the Integrated Circuit (IC) technology, which overruns the discrete bulky circuit in electronics. This IC technology was first built in 1958 by Jack Kilby at Texas Instruments. In 2004 Intel Pentium 4 microprocessor was built, this consists of approximately 55 million transistors, 512Mbit DRAM (> 0.5 billion transistors). This has the following merits; smaller size, faster, cheaper and of lower power revolutionary effects on society; just as would be for the ISIM card technology.

Another area that could be likened to this work is the work of the Fuzzy logic that was first proposed by Lofti A. Zadeh of the University of California at Berkeley in a 1965 paper. He elaborated on this idea in his 1973 paper that introduced the concept of "linguistic variables", (Zadeh, 1973), which in this article equates to a variable defined as a fuzzy set. In 1974, fuzzy set was successfully applied to an industrial control of cement kilns (Mamdani and Assilian, 1975); that was, say, ten years after the proposal by Zadeh.

Methodology

This area shows the design steps in the innovative development. The main idea in this proposed IISIM is that it contains a number of networks inseparably inserted in a single small package, which is selectable, to perform communication functions.

The Proposed ISIM Methodology

The proposed IISIM technology algorithm is as stated below:
i Chip development on a card
ii Network integrations into step (i)
iii Scale of integration

Algorithm to Initiate Call

The algorithm to start a Call process is as shown below:
i. Tap the call app.,
ii Select a number to be called, a drop-down of available networks appears
iii. Select the preferred network
iv. Initiate the call
v. In case of a poor network, select another network

i. Chip development on a card

A chip (small memory device) is part of a computer system for keeping information, for a remarkable purpose. This is to be created on a card, for firmness. See Figure 1.

ii. Network integrations into step

The networks required or agreed upon shall be programmed into this small memory device carried by the card. These networks shall be selectable by preference.

Scale of Integration

The chip may be made to contain as many numbers as agreed by the parties involved in the business. This could range from 2 to as many as appropriate.

The Card Technology (Present and Proposed)

The present SIM card technology is made up of a single network, which could be GLO or MTN or 9MOBILE etc, as shown in Figure 2 (a - d). To use more than one network in a mobile phone, the phone must possess more than one network ports; these phones are bigger in size, energy consuming and costly. In order to curb this effect, this research work proposes the development of an IISIM card technology as shown in Figure 3; to combine all the networks in one SIM card for choice of selection. In the ideology of Figure 3, once the call app is tapped and a number chosen, a drop-down of networks appears, where a preferred net is chosen for onward call initiation and communication. In the case of the network chosen being poor, another network is selected for onward communication.

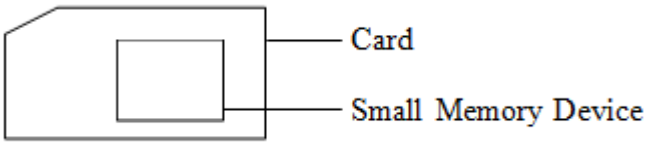


Figure 1: Small Memory Device in a Card



Figure 2(a)

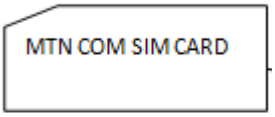


Figure 2(b)



Figure 2(c)



Figure 2(d)

Figure 2: Single SIM (Present) Card Technology

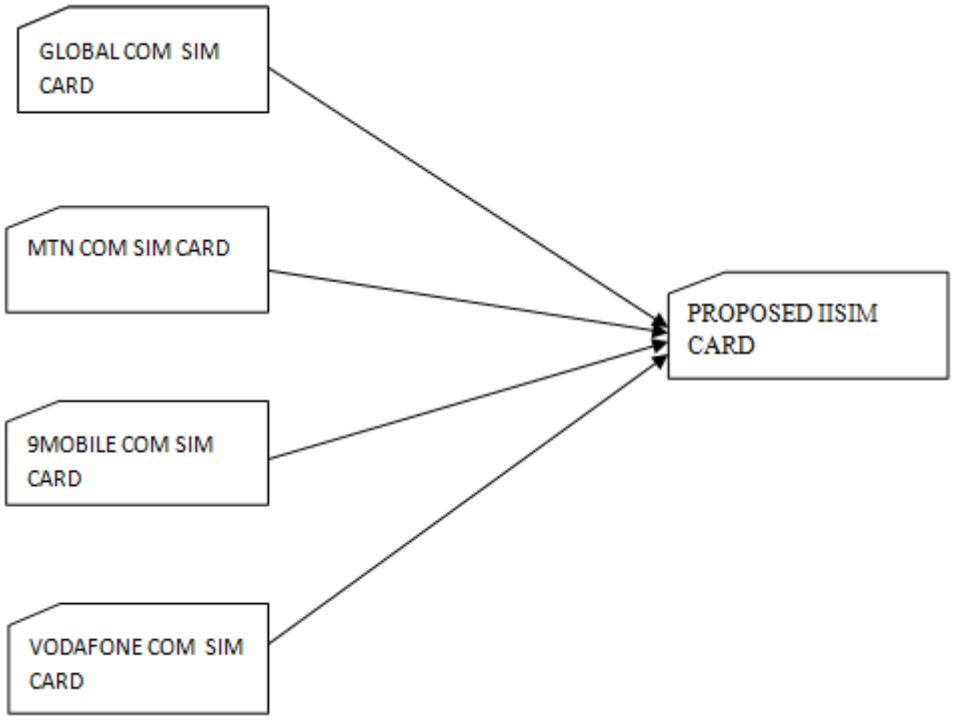


Figure 3: Proposed IISIM Card Technology

Operational Guide lines of the Proposed ISIM Card

Mobile Station (MS)

In the Mobile Station, there are contents, suchas the mobile phone and the SIM, which contains the subscriber data and is one port SIM cell phone system, containing a network with a single SIN. The proposed card is also a single port IISIM, but with multi-networks and multi-SIN in a card. Commonly, a mobile station with a network port compared with a mobile station with two or more network ports and with same make, module, battery capacity; the mobile station with a network port lasted longer than that of two port networks in terms of energy consumption, while that of two port networks was better than that of three port networks.

In order to initiate a call, step one is to insert the IISIM card into the cell phone/mobile equipment, which means constituting the mobile station, then input the called subscribers number or dial the number from the phonebook, a drop down of the preferred network will appear, the preferred network (GLO, MTN, 9MOBILE, AIRTEL), which would have been pre-programmed in the IISIM will be selected by the caller subscriber and subsequently makes connection for communication. See Figure 4.

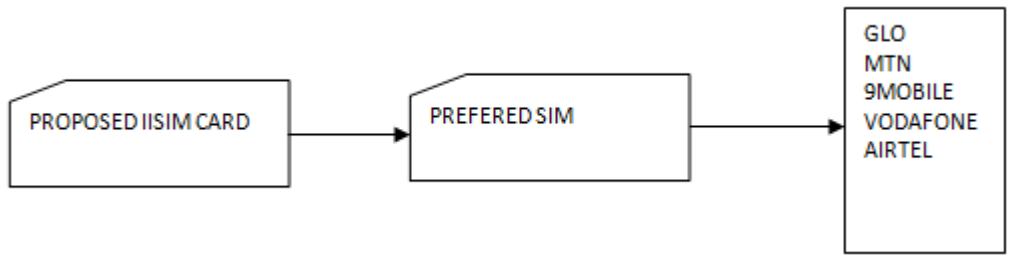


Figure 4: Proposed ISIM Card MENU

Recharging the ISIM Card Technology

To recharge the IISIM card, a central recharge technique, to be achieved through programming (a proposed work indeed), will be adopted, once the central recharge is made, it applies to all the network living in the IISIM.

Merits/Implications of the Proposed ISIM card are:

i. Lead to further reduction in card production cost compared to producing same amount of networks in one; subsequently, reduction in final consumer cost.

ii. Production energy consumption is also likely to reduce.

iii. Handier cell phone or mobile station as a whole.

iv. Unwarranted change in SIM card unneeded (in the case of single SIM), since preferred network is chosen from the log.

v. Reduction in energy consumption, compared to when each network is applied at different ports in a single mobile phone.

vi. Finally, it opens up a competitive market on the part of the network providers and in terms of efficiency, since final consumers are optionally induced.

Conclusion

One SIM technology has no doubt brought about a great impact to the GSM system. Giving by discrete electronics circuit, which brought glamour to electronics world, the emergence of the IC technology in this world of electronics brought great remarkable revolution better than the discrete circuit; making electronics world more compact and glamorous. Same case goes to this IISIM card technology; this will give compactness to the mobile station and competitiveness in the area of network provision. Finally, a better energy and cost effectiveness will be realized in the system at large.

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