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An Idea of Mobile Network Portability to minimize Radiation effect

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***Abstract*:**

Many of us use mobile phones to communicate with one another at work, at home or for convenience from just about any where we are! Mobile phones have become very much a part of our way of life. There are, however, some of us who are concerned about the health and safety effects related to the use of mobile phones and on transmission from the base station. It is with in mind that radiation, mobile phone, base station and your heath attempts to make radiation from mobile phone systems more understandable and also to separate myth from fact And also the biological effects due to the exposure of radiations have become a subject of intense debate. The present evidence on mobile phone radiation exposure is based on scientific research and public policy initiative to give an overview of what is known of biological effects that occur at radiofrequency (RF)/ electromagnetic fields (EMFs) exposure [1]. The conflict in conclusions is mainly because of difficulty in controlling the affecting parameters. Biological effects are dependent not only on the distance and size of the object (with respect to the object) but also on the environmental parameters. Solution for minimizing the radiation effect is Mobile Network portability (MNP).The term MNP allows customers who wish to switch mobile operator when the absence of the home network. Many customers are changing one's telephone numbers can be a major inconvenience, by this MNP customer can select their home network to another available network. By implementing this system in urban areas which will reduces the radiation effect because no need to deploy many all base stations (depends on service provider), only one or two base stations are enough to serve all the needs in that particular area.

Keywords; Mobile Network Portability ,GSM, Electromagnetic Radiation, Mobile phone, hand-held Cellular telephone, radiation risk.

I.INTRODUCTION TO GSM

Architecture of the GSM network

The GSM technical specifications define the different entities that form the GSM network by defining their functions and interface requirements.

The GSM network can be divided into four main parts:

- The Mobile Station (MS).
- The Base Station Subsystem (BSS).
- The Network and Switching Subsystem (NSS).
- The Operation and Support Subsystem (OSS).

The architecture of the GSM network is presented in figure 1.

Mobile Station

A Mobile Station consists of two main elements:

- The mobile equipment or terminal.
- The Subscriber Identity Module (SIM).

The Terminal

There are different types of terminals distinguished principally by their power and application:

- The `fixed' terminals are the ones installed in cars. Their maximum allowed output power is 20 W.
- The GSM portable terminals can also be installed in vehicles. Their maximum allowed output power is 8W.
- The handhelds terminals have experienced the biggest success thanks to their weight and volume, which are continuously decreasing. These terminals can emit up to 2 W. The evolution of technologies allows decreasing the maximum allowed power to 0.8 W.

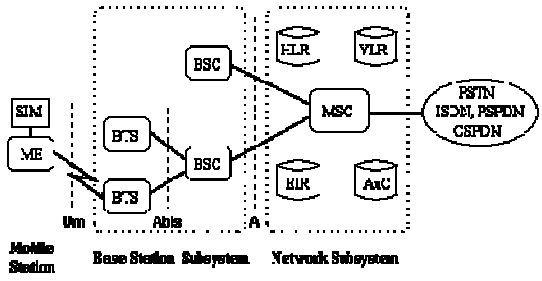

Fig 1: Architecture of the GSM network

The SIM

The SIM is a smart card that identifies the terminal. By inserting the SIM card into the terminal, the user can have access to all the subscribed services. Without the SIM card, the terminal is not operational.

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The SIM card is protected by a four-digit Personal Identification Number (PIN). In order to identify the subscriber to the system, the SIM card contains some parameters of the user such as its International Mobile Subscriber Identity (IMSI). Another advantage of the SIM card is the mobility of the users. In fact, the only element that personalizes a terminal is the SIM card. Therefore, the user can have access to its subscribed services in any terminal using its SIM card.

The Base Station Subsystem

The BSS connects the Mobile Station and the NSS. It is in charge of the transmission and reception. The BSS can be divided into two parts:

- The Base Transceiver Station (BTS) or Base Station.
- The Base Station Controller (BSC).

The Base Transceiver Station

The BTS corresponds to the transceivers and antennas used in each cell of the network. A BTS is usually placed in the center of a cell. Its transmitting power defines the size of a cell. Each BTS has between one and sixteen transceivers depending on the density of users in the cell.

The Base Station Controller

The BSC controls a group of BTS and manages their radio resources. A BSC is principally in charge of handovers, frequency hopping, exchange functions and control of the radio frequency power levels of the BTSs.

The Network and Switching Subsystem

Its main role is to manage the communications between the mobile users and other users, such as mobile users, ISDN users, fixed telephony users, etc. It also includes data bases needed in order to store information about the subscribers and to manage their mobility. The different components of the NSS are described below.

The Mobile services Switching Center (MSC)

It is the central component of the NSS. The MSC performs the switching functions of the network. It also provides connection to other networks.

The Gateway Mobile services Switching Center (GMSC)

A gateway is a node interconnecting two networks. The GMSC is the interface between the mobile cellular network and the PSTN. It is in charge of routing calls from the fixed network towards a GSM user. The GMSC is often implemented in the same machines as the MSC.

Home Location Register (HLR)

The HLR is considered as a very important database that stores information of the subscribers belonging to the covering area of a MSC. It also stores the current location of these subscribers and the services to which they have access. The location of the subscriber corresponds to the SS7 address of the Visitor Location Register (VLR) associated to the terminal.

Visitor Location Register (VLR)

The VLR contains information from a subscriber's HLR necessary in order to provide the subscribed services to visiting users. When a subscriber enters the covering area of a new MSC, the VLR associated to this MSC will request information about the new subscriber to its corresponding HLR. The VLR will then have enough information in order to assure the subscribed services without needing to ask the HLR each time a communication is established. The VLR is always implemented together with a MSC; so the area under control of the MSC is also the area under control of the VLR.

The Authentication Center (AuC)

The AuC register is used for security purposes. It provides the parameters needed for authentication and encryption functions. These parameters help to verify the user's identity.

The Equipment Identity Register (EIR)

The EIR is also used for security purposes. It is a register containing information about the mobile equipments. More particularly, it contains a list of all valid terminals. A terminal is identified by its International Mobile Equipment Identity (IMEI). The EIR allows then to forbid calls from stolen or unauthorized terminals (e.g, a terminal which does not respect the specifications concerning the output RF power).

The GSM Interworking Unit (GIWU)

The GIWU corresponds to an interface to various networks for data communications. During these communications, the transmission of speech and data can be alternated.

The Operation and Support Subsystem (OSS)

The OSS is connected to the different components of the NSS and to the BSC, in order to control and monitor the GSM system. It is also in charge of controlling the traffic load of the BSS. However, the increasing number of base stations, due to the development of cellular radio networks, has provoked that some of the maintenance tasks are transferred to the BTS. This transfer decreases considerably the costs of the maintenance of the system.

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II .Communication management

The Communication Management layer (CM) is responsible for Call Control (CC), supplementary service management, and short message service management. Each of these may be considered as a separate sub layer within the CM layer. Call control attempts to follow the ISDN procedures specified in Q.931, although routing to a roaming mobile subscriber is obviously unique to GSM. Other functions of the CC sub layer include call establishment, selection of the type of service (including alternating between services during a call), and call release.

Call routing

Unlike routing in the fixed network, where a terminal is semi-permanently wired to a central office, a GSM user can roam nationally and even internationally. The directory number dialed to reach a mobile subscriber is called the Mobile Subscriber ISDN (MSISDN), which is defined by the E.164 numbering plan. This number includes a country code and a National Destination Code which identifies the subscriber's operator. The first few digits of the remaining subscriber number may identify the subscriber's HLR within the home PLMN.

An incoming mobile terminating call is directed to the Gateway MSC (GMSC) function. The GMSC is basically a switch which is able to interrogate the subscriber's HLR to obtain routing information, and thus contains a table linking MSISDNs to their corresponding HLR. A simplification is to have a GSMC handle one specific PLMN. It should be noted that the GMSC function is distinct from the MSC function, but is usually implemented in an MSC.

The routing information that is returned to the GMSC is the Mobile Station Roaming Number (MSRN), which is also defined by the E.164 numbering plan. MSRNs are related to the geographical numbering plan, and not assigned to subscribers, nor are they visible to subscribers.

The most general routing procedure begins with the GMSC querying the called subscriber's HLR for an MSRN. The HLR typically stores only the SS7 address of the subscriber's current VLR, and does not have the MSRN (see the location updating section). The HLR must therefore query the subscriber's current VLR, which will temporarily allocate an MSRN from its pool for the call. This MSRN is returned to the HLR and back to the GMSC, which can then route the call to the new MSC. At the new MSC, the IMSI corresponding to the MSRN is looked up, and the mobile is paged in its current location area (see Figure 2).

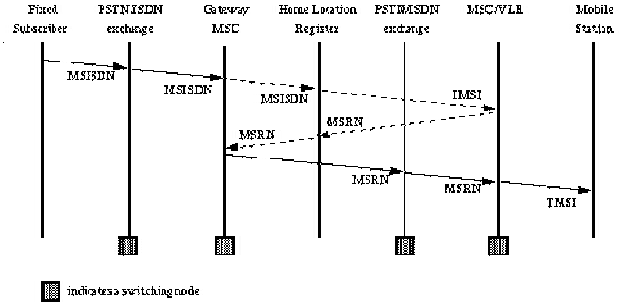

Fig 2: Call routing for a mobile terminating call

III. Radiation power and effects

The maximum powers that GSM mobile phones are permitted to transmit by the present standards are 2 W (900 Hz) and 1 W (1800 Hz)†. However, because TDMA is used, the *average* powers transmitted by a phone are never more than one-eighth of these maximum values (0.25 W and 0.125 W, respectively) and are usually further reduced by a significant amount due to the effects of adaptive power control and discontinuous transmission. Adaptive power control (APC) means that the phone continually adjusts the power it transmits to the minimum needed for the base station to receive a clear signal. This can be less than the peak power by a factor of up to a thousand if the phone is near a base station, although the power is likely to be appreciably more than this in most situations. Discontinuous transmission (DTX) refers to the fact that the power is switched off when a user stops speaking either because he/she is listening or because neither user is speaking. So if each person in a conversation is speaking for about half the time, he/she is only exposed to fields from the phone for that half of the conversation. In summary, the largest output from a phone occurs if it is mainly used at large distances from the base station or shielded by buildings, etc. In this situation, the *peak* powers could approach the values of 2 W (900 Hz) and 1 W (1800 Hz) and the *average* powers could approach the values of 0.25 W (900 Hz) and 0.125 W (1800 Hz).

Effects

Many scientific studies have investigated possible health symptoms of mobile phone radiation. These studies are occasionally reviewed by some scientific committees to assess overall risks. A recent assessment was published in 2007 by the European Commission Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR). It concludes that the three lines of evidence, viz. animal, in vitro, and epidemiological studies, indicate that "exposure to RF fields is unlikely to lead to an increase in cancer in humans". With the way technology has grown, especially in the field of genetic engineering, has led scientists to figure out a way to alter how food is made. This raises concerns and lot of questions regarding the methods they are using. From what possible side

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effects can occur to the risks it poses to everyone and everything. Unfortunately, there has been limited research and testing done. With that in mind there is not enough information available about the hazards of genetically modified foods. But, what we do know is alarming. Most of the debates surrounding GM foods are focus on the following three issues: 1. Human and environmental safety, 2. Labeling, and 3. Consumer choice. In this section of the paper I will be discussing how genetically modified food can be dangerous on the health of humans. First we will start with the definition of Genetically Modified (GM) is "a special set of technologies that alter the genetic makeup of such living organisms as animals, plants, or bacteria. Bacteria is general term, refers to using living organisms or their components, such as enzymes, to make products that include medicines and vaccines, foods and food ingredients, feeds, and fiber The unique structure of GM food creates risk to humans which can affect them in the following ways: allergic reactions, toxicity, antibiotic resistance, adverse health side effects and death. It is impossible to foresee the damage inflicted by genetic food; it is a matter of wait and sees what consequences occur because of it. During the genetic modification process, proteins from organisms that have never before been a part of the human food chain are being used and so, GM food may cause allergic reactions. Allergens could be transferred from foods people are allergic to into foods that they think are safe.

How the cell Phone radiation works

When you speak into a cell phone, the sound of your voice goes through a transmitter that encodes the sound into a sine wave. A sine wave is a continuously fluctuating wave that radiates out from the antenna, and is measured in hertz. Once the encoded sound has been placed on the sine wave the transmitter sends the signal to the antenna, which then sends the signal out into space in all directions. The transmitter in your phone operates on about 0.75 to 1 watt of power, with 2 W at peak usage. This electric current running through the transmitter circuit also creates an electromagnetic field around it. As the electric current moves back and forth, the fields continue to build and collapse, forming electromagnetic radiation. Thus, cell phone radiation is generated in the transmitter, and is emitted through the antenna in the form of radio waves. In the case of cell phones, the frequencies of these radio waves fall in the low frequency microwave range.

Advantages and Disadvantages of Mobile Phone Effect

As time passes by technology are growing faster and move faster. The most important and common part of technology in our life is mobile phone technology. We bring mobile phone with us in everywhere that we go and use it on a daily basis. It is being the part and parcel of our daily life. Mobil phone have been around for quite some time, but as time goes on, mobile phones continuous to gain many features. A mobile phone started out as simple device that had only numbers, and most people used them for emergencies only. Nowadays, cell phones have many features such as phone calls, text messaging, taking pictures accessing the web, using calculator etc as many accessories. People become addicted in cell phone because they are getting many facilities by using it. For example whenever they go outside they can take the phone with them because of its size, networking range, a full charge battery, essay connection etc.There is no doubt about the benefits of mobile phones. Mobile phones have so many advantages but there have some disadvantages too. It has become a vital element for every person but nowadays it has also becoming an addiction to the young generation. If we talking about Bangladesh, nine out of ten young people in the town area, have own a mobile phone. They use it in various purposes. Their attraction of mobile phone is increasing day by day. Medical science says that the radiation of mobile phone is too bad for human health.

IV.PROPOSED WORK

Mobile Network portability (MNP) enables mobile subscribers to select their service providers or their location without having to change their existing phone numbers. If the subscribers are notable to get the services of their service provider, they can select their service providers which are available. This infuses competition among service providers and forces them to improve their service standards to check subscriber churn, and also reduces the effect of radiation in that particular area. A significant technical aspect of implementing network portability is related to the routing of calls or mobile messages (SMS, MMS) to a number once it is ported to some other network. Network portability is essential to maximize the benefits of a competitive telecommunications market. For example, Network Portability of the type that allows users to select their operator when the home network is not present.

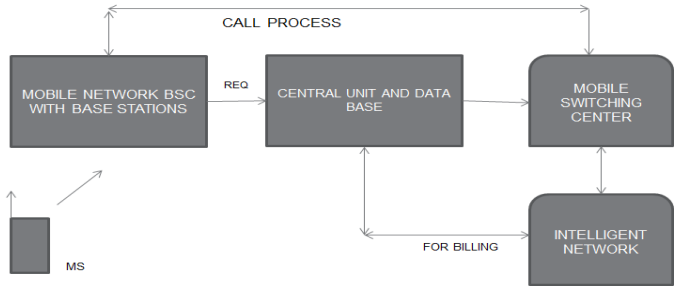

Fig 3: proposed system model

Terms considered in the mobile network and network portability.

Donor network: it is the network that the customer presently using.

Recipient network: it is networks currently serve. the recipient network is a network that subscriber need to switches from the other service provider.

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This MNP is implemented in 3 phases n the major requirements and implementation steps are given below.

1. Getting permission
2. Finding rural and urban areas (less people density)
3. Installation of the central system.

Getting permission

In this phase all the services providers need to give permission to access their network, it is necessary because of each service provide serve their network with the limited no. of frequencies which are allocated by the ITU. Before getting the permission from other service provider subscriber can serve or receive the frequencies which are allotted for that particular operator only. Once if we get the permission subscriber can select the other network when the absence or unavailable of their home network.

Finding rural and urban areas

Here we need to find the areas where more no of towers are present with less density by using this MNP we can reduce the number of tower and also minimizing the radiation effect.

Installing the central unit

By installing a central unit between the BSC and MSC, we can route the call from one service to other service without any disturbances of call failure.

Network porting process involves a set of parties, which includes donor (or current serving SP), recipient (new SP) and many participants (other service providers not related to the number that is being ported). The basic requirement of the porting process is that a subscriber needs to initiate a request to the service provider. The request can be initiated to either of the service providers (current serving SP or the new SP). Network porting database can be maintained and implemented by centralized approach

In this approach, the regulatory authority of the country sets up the guidelines, policies and processes for network portability. All the service providers in the country have a shared and well-defined interface with a centralized NP administration center for processing the porting request of a selected service provider. This adheres to a clear set of service level agreements for each of the steps involved in the process and it is mandatory for the service providers to follow them.

Any porting request from any of the service providers is sent to the NP administration center first, to which all the service providers' network portability solutions are integrated with. A request that comes from the new SP to the NP administration center is sent to the present serving SP for clearance and connection establishment with the remaining network. The centralized approach is the most preferred solution for reducing the radiation effect.

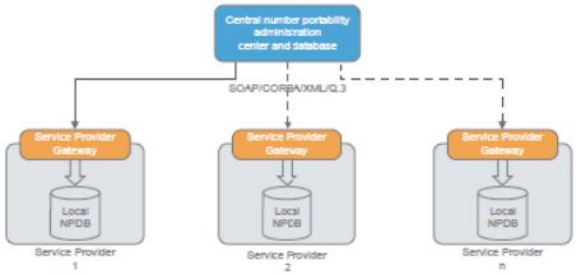

Fig 4: centralized unit

V.FACTORS INFLUENCING THE SUCCESS OF NETWORK PORTABILITY

• *Subscriber Awareness:* Subscribers needs to be aware of Network Portability (NP), its advantages, and how to go about it.

• *Simplicity:* Network Portability success mainly depends on the simplicity of the process. Subscriber can no need to change their service if it is not available in their area, they can select their required operator or service provider.

• *Speed:* Speed is one of the major factors that affect the success of NP. Service level agreements should be stringent enough to minimize the time taken to port the number to other network. This increases the level of customer satisfaction

• *Safety:* reducing the number of tower in the particular area will be a radiation free which in directly safe the life of a human.

VI.CONCLUSION

Network portability is the one through which user receives the desired network at any place. So that users in rural and urban areas doesn't face the problem of Signal blocking. Service provider cannot provide its service at each and every place. Hence, this process can be implemented. Disadvantages expected from this process are less. A major advantage obtained from this process is the reduction of radiation effect.

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