Automated Model To Save Energy In Hand Held Communication Devices During Natural Calamities

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Abstract
In recent years mobile phone communication has become a part of human's life. Although technology advances there is a lack of communication during crisis, to overcome the crisis during natural calamities hand held communication plays vital role to save the life of peoples. This paper proposes ideas to save energy in hand held devices during natural calamities such as flood, earthquake, cyclone, etc. Recharging the batteries of hand held devices is a challenging job due to supply of electric current during that time, the role of service provider in maximizing the energy is much important than the individual role with the advancement of modern technology, the service provider can restrict the service utilisation of the individual such that GPS, GPRS and multimedia facilities of their hand held devices. This paper discusses ways to handle the energy efficiency by the service provider and user.

Keywords: GPS, GPRS, Natural Calamities

1. Introduction

In this section, we provide the background of mobile phone services and the life a battery , the following section provides a study on batteries and existing mobile switching center role, section III proposes the ways in which the life a battery can be enhanced by the user and the mobile switching center. A mobile phone (also known as a wireless phone, cell phone, or cellular telephone) is a little portable radio telephone. The mobile phone can be used to communicate over long distances without wires. It works by communicating with a nearby base station (which is called a "cell") which connects it to the main phone network. As the mobile phone moves around, if the mobile phone goes too far away from the cell it is connected to, that cell sends a message to another cell to tell the new cell to take over the call. This is called a "hand off," and the call continues with the new cell is connected to the phone. The hand-off is carefully done so well and that usually the user will never even know that the call was transferred to another cell. Mobile phones are powerful platforms for sensing, sharing, and querying people-centric information with the direction of Mobile Switching Center (MSC), MSC is the place that provides telephony switching services and controls calls between telephone and data systems. The MSC switches all calls between the mobile and the PSTN and other mobiles. In real life, the phone battery must be shared with voice calls, SMS, emails and pictures. In recent years, there has been a revolution in the industry of wireless portable devices, Smart phones are equipped with essential gadgets such as global positioning system (GPS), digital camera, and multiple communication interfaces. As a result, the functionality of these devices is not limited to exchanging voice calls, rather users use their phones to access email, browse Internet, and play multimedia contents[4]. The features and functionalities of these devices are improving day by day with reduced size and price. Accordingly, the usage of these devices are becoming more and more common in daily life and user expectations in terms of running heavier applications are rising rapidly. These devices are generally powered by small, re-chargeable batteries, and unfortunately, the growth in battery technology has not kept pace with the rapidly growing energy demand of these smart devices. For example, the battery of a state-of-the-art smart phone lasts only 4 -5 hours when online video is played. A *GPS* aided navigation application runs around the same amount of time when it runs solely on battery. This dependence on battery energy puts a severe constraint on the availability of these devices. Moreover, it is not feasible to equip the handheld devices with full-featured hardware components due to size and limited battery energy. Consequently, these devices are not capable of running resource intensive applications, which limits the functionality of these devices.

2. Literature Survey

2.1 Studies on Batteries in Mobile Phones

Power Management for mobile devices is a must and each component of a mobile device should be designed to be energy efficient. Power requirements highly depend on the device type, and on the task the device is used. For example, handheld devices require rechargeable, high-capacity batteries. This section discusses the three dominant types of rechargeable batteries in use today and the discharge of battery by usage:

- **NickelCadmium(NiCd)** is the most prevalent and rugged type of rechargeable battery on the market. NiCd batteries perform better in extreme temperatures and can endure approximately 750 charge and discharge cycles. However, they are prone to "memory effect" , when they are not completely discharged each cycle.
- **NickelMetalHydride(NiMH)** is a step up from NiCd batteries. It offers up to 40 percent additional capacity

compared to a NiCd battery of equal size. NiMH batteries are not as subject to memory effect degradation. These batteries generally have a life expectancy of approximately 400 charge/discharge cycles.

- **LithiumIon(LiIon)** is the newest technology in portable power. LiIon will deliver roughly twice the run time of a comparable NiMH battery. LiIon batteries are more expensive, however, and are available for a very limited number of devices. They must also be charged by a charger designed specifically for LiIon batteries. LiIon technology also has a life span of about 400 charge/discharge cycles and is completely immune to memory effect.

Table 1. A comparison of NiMH and Li-Ion and Lithium Polymer

NiMH	Li - Ion and Lithium Polymer
Made from Nickel Metal Hydride.	Made from Lithium Ion.
Higher energy density. Twice the capacity of NiCad.	Same energy as NIMH, but weigh 20-35% less.
More run time.	More run time, at lighter weight, thus ideal for cell phones, camcorders etc.
Battery's capacity reduces over time due to frequent recharging.	Can be recharged without capacity reducing
Environment friendly, since they do not contain heavy metals.	Environment friendly, as they do not contain mercury or cadmium and other such toxic metals.
Require less maintenance.	Require little maintenance.
Phones cost- Rs. 4,000 to Rs.6,000	Phones cost- Rs. 3,000 to Rs. 45,000

Batteries don't last longer than a few days. The battery life depends on:

1. Connectivity of the Model
   a. Bluetooth
   b. Wi – Fi
2. Sound
   a. Keypad sound
   b. Track pad sound
3. Vibration Mode
4. Brightness
5. Contrast
6. Games
7. Social networking sites visit
8. Browsing
9. Music player
10. Videos
11. Applications

But to be fair to the battery designers we have to admit that nowadays' smart phones require much more energy than previous model mobile phones because of the application existing in the smart phone.

2.2 Study on Mobile Station (MS) and Mobile Switching Centre (MSC)

The **mobile switching center** (MSC) is the primary service delivery node for GSM/CDMA, responsible for routing voice calls and SMS as well as other services such as conference calls, FAX and circuit switched data. The MSC sets up and releases the **end-to-end connection**, handles mobility and hand-over requirements during the call and takes care of charging and real time pre-paid account monitoring [1] . In the GSM mobile phone system, in contrast with earlier analogue services, fax and data information is sent directly digitally encoded to the MSC. Only at the MSC is this re-coded into an "analogue" signal. There are various different names for MSCs in different contexts which reflect their complex role in the network; all of these terms though could refer to the same MSC, but doing different things at different times.

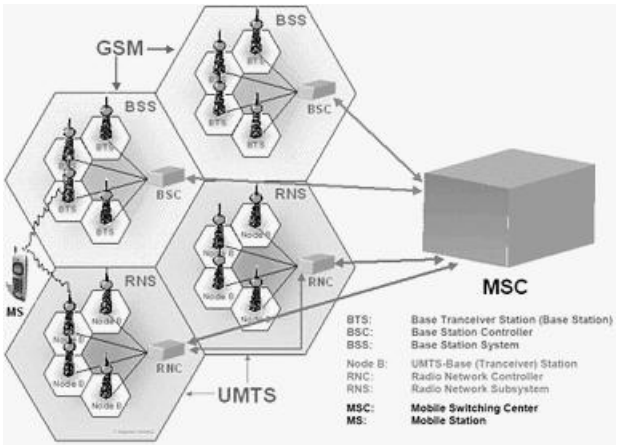

Figure 1. Communication between Mobile Station (MS) and Mobile Switching Centre(MSC)

The **Gateway MSC** (G-MSC) is the MSC that determines which visited MSC the subscriber who is being called is currently located at. It also interfaces with the PSTN. All mobile to mobile calls and PSTN to mobile calls are routed through a G-MSC. The term is only valid in the context of one call since any MSC may provide both the gateway function and the Visited MSC function, however, some manufacturers design dedicated high capacity MSCs which do not have any BSSs connected to them. These MSCs will then be the Gateway MSC for many of the calls they handle. The **visited MSC** (V-MSC) is the MSC where a customer is currently

located. The VLR associated with this MSC will have the subscriber's data in it. The **anchor MSC** is the MSC from which a handover has been initiated. The **target MSC** is the MSC toward which a Handover should take place. A mobile switching centre server is a part of the redesigned MSC concept starting from 3GPP Release 4[5].

3. Proposed Model

Maximizing the means of battery life is important for day to day activities as well as during sudden natural calamities[3] this will be the most important for emergency communication to others. The end user of the mobile phone have to determine the type of battery that they are using, or will use, they must provide the necessary maintenance for the battery in order to maximize its life and usefulness. Life of a battery can be extended in many ways most of the times it depends on the end user only, in general this begins when the user take the battery out of the box and before its initial use.

- **Initializing.** New batteries come in a discharged condition and must be fully charged before use. NiCd and NiMH batteries should be charged for approximately 16 hours initially, and LiIon batteries should be charged for about five to six hours. For NiCd and NiMH batteries, you should run your battery through at least two to four full charge/discharge cycles before putting it into ordinary service. This will help obtain maximum capacity of the battery. When charging the battery for the first time, the device may indicate that charging is complete after just 10 or 15 minutes. This is normal with rechargeable batteries.
- **Conditioning.** NiCd batteries must be fully discharged and then fully charged every one to three weeks, depending on frequency of use. Failure to do so will result in "memory effect" and will significantly shorten the battery's life. the NiMH battery has negligible memory effect and the LiIon battery has no memory effect, they do not require conditioning.
- **Exercising.** The workload on a battery directly affects its run time. In order to maximize battery life, users can apply the following tips to increase the usage time and life of their batteries.
- Consider the type of cellular phone and technology (analog or digital) you are using. Some phones require less power.
- Consider the number of features in use. More features require more power.
- Roaming requires more battery usage than using a local network.
- User habits will obviously affect the amount of run time you will get from each charge.
- Antenna efficiency, network efficiency, operating temperature, and proximity to a cellular antenna site will also affect battery consumption.

The above points are based on the user knowledge of the mobile phone and the user technical knowledge of the mobile, but when the user is unknowledgeable to the above things battery life cannot be extended during the normal day to day activities as well as during natural calamities. This paper describes the design objectives to accomplish the task of resource sharing in energy efficient manner by the service provider itself,

- ***Communication Link:*** Connection establishment is a prerequisite for sharing resources among participating devices, and Internet can be used to establish such connections. However, Internet is not available when a user remains outside of user's workplace, and also, integrity and security of the personal data always remain a major concern. Also, routing data through Internet where source and destination are in close proximity will unnecessarily burden the Internet. Therefore, a local communication link that requires low energy, and meet security constraints is suitable for this purpose. On the other hand, a wired connection requires a physical contact by cables, and it also limits the movement of a device, thus a wireless link is much preferred for this purpose. During disaster , this communication link can be discarded so that energy can be saved to a moment[2].
- ***Service On-demand:*** A server is able to provide instant access to its resources when it remains available all the times. Consequently, it consumes energy to remain always *On*. Thus when a server is not used frequently,it wastes energy most of the times just to remain available. This situation can be avoided if a server becomes available only when its service is needed. We call it *service on-demand*. A client device awakes a server when it needs service. Here, saving of energy comes with a latency in getting service after a request is made. During the emergency the service provider can be taken care of this SOD to cut off the service automatically in the specified area, so that the end user device energy can be saved

- ***Energy Saving:*** Sometimes a client accesses resources on a server to attain some functionality which that client does not possess, and in such scenario, energy saving is not an objective for both client and server. However, in some situations, a client accesses high capacity resources of a server to save its time and energy. In such cases, we assume that the server comes with an adequate supply of energy, resources. And we mainly focus on energy saving in the client device. The condition of saving energy is relaxed only when functionality enhancement is prime objective.

The following figure.2 provides the services to be provided and not to be provided during emergency,

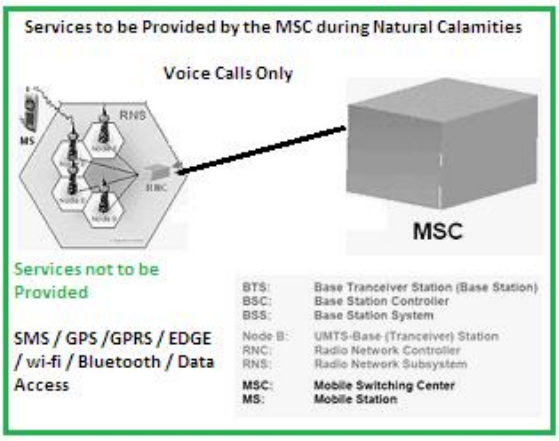

Figure 2. Services to be provided by the MSC

4. Conclusion

Mobile Switching Center , can also be enhanced with the option to monitor and control the device during emergency by curtailing the user usage of games , music , minimum brightness and providing only the service which took minimum battery life so as to contact the person during emergency. The service provider has to take care of the above points into consideration to save the energy without affecting the privacy of the user.

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