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Safety and Emergency help Alert for Women using Commercial Mobile Alert Service

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Abstract: In emergencies, governments have long utilized broadcasting media like radio and TV to disseminate up to date real time information to citizen. In the same context, however, some other technologies like mobile location based service have not been utilized to full extent or potential. The value of such services could be foreseen in the case of critical situations where the coordination of emergency management procedures with location awareness activities in paramount. This paper introduces a safety procedure for woman for help in case of emergency situations using location based technology.

Currently all applications or services provided for safety of woman in an emergency situation uses pre-stored emergency contacts as required by the victim, and whenever an emergency situation arises these pre-stored numbers gets alert messages regarding the emergency situation of the victim and sometimes it's not possible for an immediate help. This paper proposes a new concept based on the concept of Commercial Mobile Alert Service (CMAS) for dealing with emergency situation by using the cell broadcasting technique. Instead of sending messages to selected contacts only, proposed method broadcast messages to all the mobile user as well as selected pre-stored contacts who are presently located within the same geographical area where an emergency has occurred so that an immediate help is reached.

Keywords: *WEA (Wireless Emergency Alerts) , GPS (Global Positioning System), cell broadcast.*

1. INTRODUCTION

Women's safety is often discussed, but little is being done to make cities safe for women. As more and more young girls and women use public transport to travel to either places of work or study, their chances of facing harassment increases considerably. Unfortunately, these issues don't get the attention of the society. A study on safety for woman showed that 99 percent girls felt that the city was not safe due to lack of street lights and high raised walls of residential houses on either side of the roads.

Due to all these issues Researchers, Engineers and many other people started preparing new methodologies to safe guard the people (especially woman) from any harassment and helping them in any emergency situation.

Currently the mobile applications and mobile features provide users a very user friendly SOS (Save Our Souls) applications [11] developed in android platform where an emergency situation of the user as a message is sent to all the contacts in the phone menu or all the pre-registered phone numbers in the application. The applications even are capable of sending the location of the user. But it has been observed that at times the instant communication of messages and the help required by the victim precisely is a problem as the help may not be reached immediately due to time constraint.

This paper represents how this problem can be solved. Instead of sending an emergency situation message of the victim to all pre-registered numbers only , we try to extend our idea and try to use the cell broadcasting methodology to broadcast an emergency message to all the nearby mobile users in that particular area where an emergency situation has been issued so that an immediate help may be reached.

2. LITERATURE SURVEY

Emergencies and their aftermath have been a part of civilization since time began. Emergencies including natural and man-made disasters, by their nature, cannot be predicted precisely in their timing, effects, or intensity. However, human societies have always practiced Emergency Management (EM) activities. Such activities have evolved from simple precautions and scattered procedures into more sophisticated management systems that include preparedness, response, mitigation, and recovery strategies [1]. In the twentieth century, countries have utilized technologies like sirens, radio, television, and Internet to deliver warnings and real time information to citizens. Over the past few years, other technologies like mobile phone messaging systems have been exploited to complement traditional emergency systems. They have emerged as a practical solution since users' location(s) can be determined using different existing positioning techniques, which then facilitates the providing of services based on derived location information [10]. European Telecommunications Standards Institute has discerned between two types of mobile emergency service applications [3]. The first is initiated by a citizen in the form of a mobile phone call or a distress Short Message Service. This service is known as wireless E911 in the United States and E112 in the European Union. In this case, mobile service providers are obliged to provide information regarding the location of the originated call or message with accuracies within 50 to 150 meters [4]. The second is initiated by the government in which alerts, notifications, or early warnings are disseminated (pushed) to all citizens located in designated area(s).

Several studies have proposed mobile technologies as possible solutions to deliver location-based emergency information and warning notifications [5-6]; however, their feasibility has not been well documented. Several studies have proposed mobile technologies as possible solutions to deliver location-based emergency information and warning notifications [5-6]; however, their feasibility has not been well documented.

Currently all applications or services provided for safety of woman provided by government or any third party software uses pre-stored emergency contacts as required by the user, and whenever an emergency situation arises these pre-stored numbers gets alert messages regarding the emergency situation of the user.

This paper proposes a new concept for dealing with emergency situation. Instead of sending messages to selected contacts only , we broadcast messages to all the mobile user as well as selected pre-stored contacts who are presently located at the place where an emergency has occurred.

3.1. Applied Mobile Technology Solutions For Emergency Management Applications

Mobile technologies have emerged as possible solutions to deliver warning notifications and emergency alert information. For example, the new 3G standard "Multimedia Broadcast Multicast Service (MBMS)" could be used to broadcast emergency information to disaster areas with rich multimedia content like voice instructions

and evacuation maps [9]. Determining which technology to utilize depends essentially on emergency services providers' perception of the types, capabilities, and limitations of currently used mobile handsets and other handheld devices. Perhaps the two most feasible technologies that fulfill the requirements of emergency alert information service are the common Short Message Service (SMS) and the less used but comparable Cell Broadcast Service (CBS). Both could be used for geo-specific EM purposes and two technologies would operate with almost all mobile devices available today. A brief introduction of the two technologies and their characteristics are presented in this section.

3.1.1. Short Message Service

SMS is a well-know asynchronous protocol of communication. It is capable of transmitting limited size of binary or text messages to one or more recipients. SMS offers virtual guarantee for message delivery to its destination [3]. In case of an unavailable network coverage or temporary failure, the message is stored in the Short Message Service Centre (SMSC) network component and delivered when the destination becomes available. The message will also be delivered if the mobile handset is engaged with a voice and/or data activity. SMS messages do not consume much bandwidth although the network might become overloaded if an immense number of SMS messages and/or phone calls have been initiated simultaneously. Delays can occur and may result in delivery failure, especially during emergencies and disasters time. SMS does not provide any geo-specific location information by itself. Such information like cell ID must be obtained from other resources by mobile service provider. However, SMS does have the potential to be used in location-based emergency services. Mass SMS messages can be directed to specific mobile numbers when they have been identified to exist in designated area(s).

3.1.2. Cell Broadcast Service

Cell broadcasting technology is a service delivered by mobile providers where uniform text messages are broadcast indiscriminately to all mobile handsets in a specific geographic area. The messages could be broadcast to all towers in a carrier network covering a whole country or to a specific cell covered by a single tower. Cell Broadcast Service (CBS) has not been widely adopted in commercial applications. Unlike SMS, the nature of CBS does not allow for two-way interactive communication. Although there are few proprietary solutions that exist today, they require specific Subscriber Identity Module (SIM) toolkit and special back-end content management systems [8]. However, one example is found in the United States where television and radio stations in rural states pay to broadcast messages to mobile users in situations like severe weather in hope to attract users to their channels for further information [7]. The cell broadcasting spectrum has the capacity of 64000 different channels. Each channel could be used for a different type of messaging, e.g. weather warnings, traffic reports, public health advices, etc. Some channels are reserved for broadcasting specific-purpose messaging types. For example, the "cell/area info display" service allows a cell to broadcast its geospecific information (Name or ID) directly to its handsets by utilizing channel 050.

CBS does not require the foreknowledge of mobile phone numbers. Analogous to radio, only the activated channel (switched to) would receive the broadcast. The handset has to be switched on to start receiving messages. A message will not be received if the handset is switched on after broadcasting.

3.1.3. SMS and CBS for Location Based Emergency Management

It is important to mention that other technologies such as Enhanced Messaging Service (EMS), Multimedia Messaging Service (MMS), and MBMS might be potentially used to deliver geo-specific emergency alert messages. However, all the cases that have been recorded were deployed by using either SMS or CBS.

Table 1 presents a comparison of characteristics of the two technologies in the domain of EM.

Table 1
Characteristics of SMS and CBS for EM

Characteristics	*Short Message Service*	*Cell broadcast service*
Handset Compatibility	All Handset support SMS	Most handset support CBS except few *e.g.* nokia 3310
Transmission form	Unicast and multicast communication	Broadcast service message received indiscriminately by every handset within broadcast range
Mobile number dependency	Dependent. foreknowledge of mobile number is essential	Independent. Message is received on activate broadcast channel.
Geo-information	Achieved by obtaining cell ID from the network operator	Cell(s) location is known for broadcaster beforehand.
Service barring	No barring	Received only if the broadcast status is set to "ON"
Reception	Message is received once the mobile is switched "ON"	No reception if handset is switched on after broadcast.
Congestion and delay	Affected by network congestion. Immense number of SMS may produce delays.	Congestion is unlikely as CBS are sent on dedicated channel. almost no delays.
Delivery failure	Network overload might cause delivery failure	Busy mobile handset might fail to process a CBS message
Delivery confirmation	Sender can request delivery confirmation	No confirmation of delivery
Repetition rat	No repetition rate	Can be repeated periodically within 2 to 32 minutes intervals.
Language format	Identical to all receivers	Multi-language messages can be broadcast

3. EXISTING ANDROID SOS APPLICATIONS

There are lot many android applications available in the web today. Some are free and many need to be procured. Some of the SOS based Android Applications are listed below.

3.1. SOS Emergency Support prepared by American Red Cross

This application provides step-by-step instructions on dealing with a variety of emergencies, including choking, broken bones, strokes, allergic reactions and many more. It is a free application. It provides dozens of videos to coach a person through emergency protocols. Easy access to 9-1-1.If a person is not from the US, the application will determine what country the person is in and dial the appropriate number.[11]

3.2. Olalashe Emergency Alert Button (SOS)

Olalashe Emergency SOS is an emergency SOS application. It allows entering in-case-of-emergency-contact from phonebook. Send SMS to contact registered that the user is in trouble. Click the widget button to trigger the application [11].

3.3. Location based triggering system

This is also an SOS application. It also allows entering in case of emergency contact from phonebook. It sends a SMS to contact registered that the user is in trouble along with the location of the person in an emergency situation [11].

4. PROPOSED MODEL

The proposed model is designed and implemented with the objective that it has to be user friendly and triggering of the application should take least time and help has to be arrived as soon as possible. The idea behind this proposal is the concept of **wireless emergency alert** (WEA) previously known as **commercial mobile alert service** (CMAS) which uses the **Cell Broadcast** technology which is the most effective method of broadcasting public warning alerts in emergency situations. One message can be sent to millions of devices, instantly, based on subscribers' location to selected telephone cells. Cell Broadcast therefore enables location-specific emergency alerts without the need to register or track devices. As well as being better for privacy than SMS. Also unlike SMS text services, Cell Broadcast has its own dedicated broadcast channel and continues to function even when the network is congested as often happens in emergency situations. This makes Cell Broadcast perfectly suited to public warning. In fact, it is the only viable solution today.

Wireless Emergency Alerts (WEA) are emergency messages sent by authorized government alerting authorities through your mobile carrier. Government partners include local and state public safety agencies, FEMA, the FCC, the Department of Homeland Security, and the National Weather Service.

Every mobile should be CMAS or WEA enabled and a person in an emergency situation should contact the alerting authority using the SOS technique. The details of the person along with her/his location is sent to the alerting authority, And these authority further process and use the cell broadcast technique to send an help message to all the people situated at that particular location where an emergency has been arrived.

5. WORKING TECHNOLOGY

The working technology of the proposed system can be depicted as an example of Commercial mobile alert service as shown in the figure:

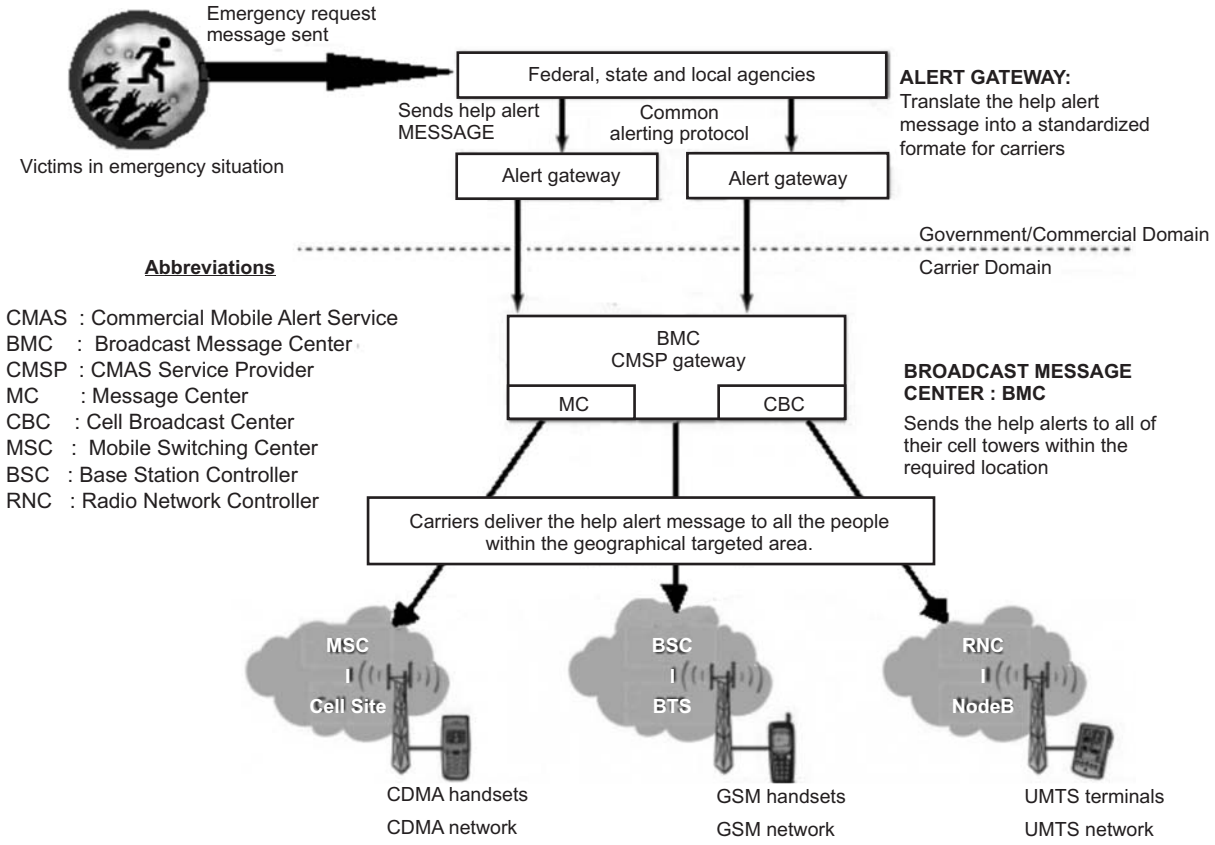

Figure 1

We can make use the CMAS technology for the safety of woman and any other person in an emergency situation.

5.1. Working procedure

Step 1: In an emergency situation the person in need has to send an emergency request message to the alerting authority agency by any of the SOS technique. This alerting authority creates and sends an help alert message to an alert aggregator. The aggregator primary purpose is to coordinate the response to the emergency message that has occurred in a particular location.

Step 2: The alert aggregator receives the help alert.

Step 3: The alert aggregator translates the help alert message into a standardized format for carriers to broadcast the help alert to any CMAS enabled mobile device.

Step 4: The help alert is sent to the wireless carriers systems, which sends the help alerts to all of their cell towers within the required location where an emergency has been issued.

Step 5: The wireless carriers deliver the help alert message to all the people who have an CMAS enabled device within the geographical targeted area.

6. COMPARISON BETWEEN EXISTING MODEL AND PROPOSED MODEL

Table 2

Characteristics	*Existing models*	*Proposed model*
Service used for communication	Short message service(SMS)	Cell broadcast
Transfer of message	An emergency help message is sent to only pre-stored contacts.	An emergency help message is sent to pre-stored contacts as well as message is broadcasted to all the people in that location.
Response time	May be slower	Faster than existing model
Geo-information	Achieved by obtaining cell ID from the network operator	Cell(s) location is known for broadcaster beforehand.

7. CONCLUSION

In spite of pervasive presence of mobile technologies, their feasibility in safety management has been scarcely documented. This paper proposes an overview of the new way that can be used to improve the safety and emergency measure towards the public. In comparison with the previous technologies and methodologies used towards the safety and emergency measure , this methodology improves the time for instant communication of messages and the help required by the victim in emergency is received faster. The current situation of India regarding girl harassment is a very big issue and government can implement this procedure or methodology in a wider way to improve the safety and emergency measure towards the safety for woman and any help required by any victim in emergency is achieved in a much faster way.

8. ACKNOWLEDGMENT

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