

A Location Based Emergency Alert Service

E. Y. Han

ETRI, Telematics division

161 Gajeong-dong Yuseong-gu, Daejeon 305-350, Korea

hey63097@etri.re.kr

H. O. Choi

ETRI, Telematics division

161 Gajeong-dong Yuseong-gu, Daejeon 305-350, Korea

hochoi@etri.re.kr

Abstract: This research work is concerned with a location-based alert service in wireless communication network environment. The alert service automatically transfers alert message to subscriber in the disaster area. This research work deals with automatic alert services that automatically provide people in emergency area with the state of emergency. The alert service uses the mobile device to inform its urgency to the subscribers in its area. The location tracking service will give the list of people in emergency area.

The all processes of this research work are followed as. First, when a disaster or a calamity comes in, an emergency management center receives the emergency to analyze its shape and size and to declare the place to 'the disaster area.' Secondly, then the center finds information of mobile device subscribers in the disaster area. Finally, the center automatically generates a shape of text or audio of alert message of the emergency to send the message to the subscribers in the disaster area.

Our mobile automatic alert service proposed above is so efficient that the subscribers in disasters area may meet the emergency more efficiently and may save their own valuable lives and properties more safely.

Keywords: Location-based service, disaster, emergency, alert service, subscriber.

or police station, take an emergency call from subscribers in emergency, they move to the emergency place and. In this case, it is not possible to get out until subscribers recognize that they are in the emergency. In the private safety service, there is a method that the old or young persons with a position tracking able terminal are informed their position through faithful terminal with specific key.

But, in some emergencies like typhoon, flood, wildfire and landslide, subscribers may not be able to estimate their emergency condition. In these cases, it is required that emergency centers that manage the conglomerate information should announce the emergency condition to the people in its area.

In order to solve the above-mentioned requirement, this research work deals with automatic alert services that automatically provide people in emergency area with the state of emergency. The alert service uses the mobile device to inform its urgency to the subscribers in its area. The location tracking service will give the list of people in emergency area.

1. Introduction

Recently, the rapid development of wireless telecommunication market and high-resolution positioning technologies like GPS (Global Positioning System) has enabled LBS (Location Based Services), for example, 'Friend finder' that is a service for person's location tracking to be provided anywhere, anytime.

In addition, the LBS technology meets as well individual requirement as social requirement of utilizing information and communication technology as national information infrastructure for effective management of resource and public or private safety in emergency rescue system, disaster management system, etc.[1]

Therefore, we can define 'Enhanced wireless emergency services' as a service that finds location of subscribers in emergency to use wireless communication network and informs their location to response department such as the fire station and police station.[2]

The existing public emergency service in wireless communication network is a method that when the emergency centers like hospital, fire station, 119 center

2. The status of Domestic wireless emergency services

1) Standardization for wireless emergency Services

LBS Standardization Forum founded in 2001 has advanced into Industrial Council of LBS in which government, research institutes, and industry take part. The council takes charge of standardizing and developing technology policy related to LBS. Especially, standards for wireless emergency services was developed as "Mobile emergency services Stage 1" by the SIG for mobile emergency services and was adopted as Korean national standards by TTA (Telecommunication Technology Association: <http://www.tta.or.kr>). Table 1 shows the status of the international and national standards related wireless emergency services.

[Table 1] The Status of Standardization for mobile emergency services

No	Specification	State
TTAS-KO-06.0047	LBS Platform Stage 1 : Functional Requirements	TTA 2003/6
TTAS-KO-06.0048	LBS Functional Interface Stage 1 : Scope and requirements	TTA 2003/6
TTAS-KO-06.0059	Mobile Emergency Services Stage1 : Functional Requirements	TTA 2003/5
TTAS-KO-06.0060	LBS Platform Stage2 : location information request-reply protocol(Korea Location Protocol Verson 1.0)	TTA 2003/5
TTAS-KO-06.0067	Position Determination Technology for Mobile Equipments Stage 1: Functional Requirements	TTA 2003/6

Courtesy:<http://www.tta.or.kr>

Standards have been developed by LBS Standardization Forum to meet international requirements by considering the scope of accuracy of network for E-911 services of American FCC or E112 services of Europe. Moreover, at the crisis, to save wireless telecommunication subscribers' lives rapidly and accurately in the 119 fire station, infrastructures for mobile alert services are to be constructed through introducing AGPS or network-based technology by supplying standards for wireless emergency services.

2) The Status of Domestic Wireless Emergency Services System

The population of domestic wireless telecommunication terminal has increased from 29.23 million in the late 2001 to 36.12 million in the presence of July 2004[3]. Especially, the number of 119 calls is 14,845,979 by wire and wireless totally, 5,125,981 by only wireless and is increasing more and more [4].

On the other hand, with launching democrat government, to prepare a measure to counter disaster, in March, 2003, under the Ministry of Government Administration and Home Affairs, 『National Disaster Management System Task Force』 consisting of 60 persons from 14 Departments and 7 research institutes) is made. 'Basic Law of Disaster and Security Management' passed through a debate and a public hearing is enacted in March, 2003 and through renaming the National Emergency Management Agency in June, 2003, efforts for preparing a measure to counter disaster systematically are being made.

In constructing realistic applications to mobile alert services, the Electronics and Telecommunication Research Institute(ETRI) carry out the "Project for Enhancing the 119 Control Center" and implement pilot service for editing fire management object and constructing control center system in mobile environment. What is important is that it is the network for alert service that is compliant to the domestic situation by a provincial government and other provincial governments are constructing the related system [2]. Figure 1 shows the entire system flow.

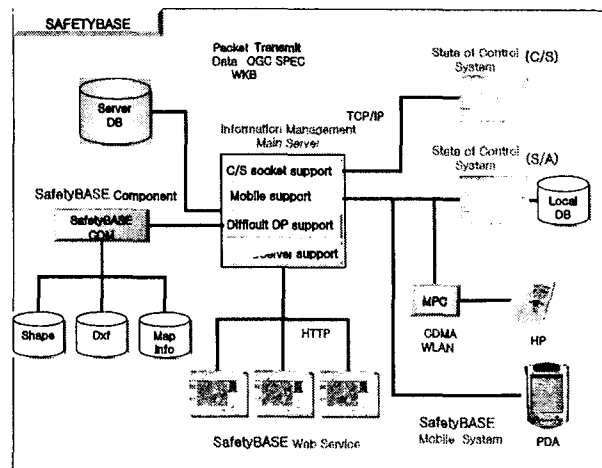


Fig 1. System of SAFETYBASE

Since 2003, the Ministry of Government Administration and Home Affairs has promoted the "Project for Constructing the Mobile Phone Location Information System" which aims to an efficient emergency safety action finding accurate location coordinate of mobile phone 119 caller and supplements the present "119 location information system" that searches location coordinate providing only phone number at the time of mobile phone call.

Principal action items are to construct location information query system among 119 location information center and provincial fire stations, to install an official network among 125 119-call centers in the way that find the location coordinate of mobile phone subscribers automatically, and to construct the system that communicate location information from central location information center to related center, as soon as the 119 emergency call arrived at emergency control center and 125 nationwide 119-call centers to be able to send and receive information utilizing government network and fire network.

Expected effects are the reduction of the emergency reporting time by automatic location information acquisition, the location information acquisition in the case to be difficult to report the location information of reporters such as by foreigners, the old and the weak, in the mountainside, in the highway and the alert service in the emergency area.

3. The Location-Based Alert Services

As stated in the chapter 2, with the development of wireless telecommunication, the location-based mobile services systems seem to be constructed. This system is an effective solution to saving life in the natural disaster like typhoon and the careless accidents like the frequent traffic accidents and the destruction of Sam-Poong Department Store.

Therefore, in this research work, we propose the design methodology of the location-based mobile alert ser-

vice system for providing text service of SMS and advanced alert record system to anyone among mobile phone subscribers who cannot recognize the emergency.

The flowchart of the whole location based alert service system in this research is as follows. [Figure 2] shows the flow chart of the location-based mobile alert service system.

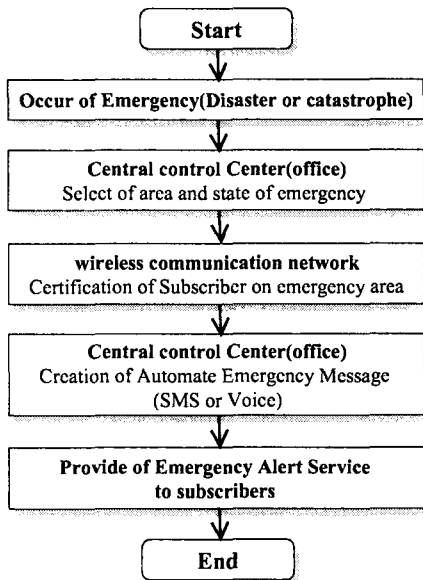


Fig. 2 the flow chart of the location-based mobile alert service system

The whole location-based mobile alert service system consists of three steps. First step is to declare emergency area in which the control center receives emergency call and analyzes emergency type and degree when the emergency like disaster or catastrophe occurs. Second step is to grasp wireless handset subscribers in the declared area using wireless network. Third step is to provide emergency alert service to subscribers in the emergency area, generating short text message and voice for emergency.

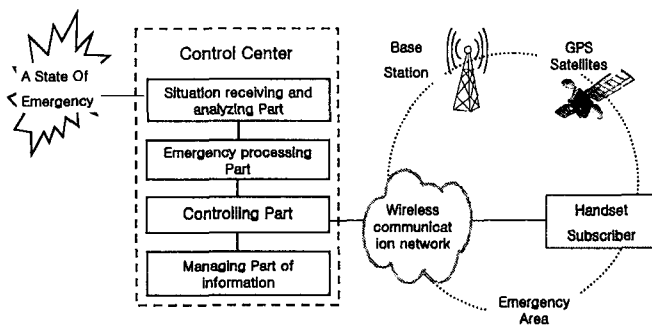


Fig 3. Example of System

And, "Fig. 3" is an example of the system of the location-base alert service system. The system consists of control center (for example, the National Disaster Control Headquarter, fire station Headquarter, police station Headquarter), base station, wireless networks, GPS satellites and subscriber's terminals. The internal parts of

control center are the situation receiving and analyzing part, emergency processing part, controlling part and information managing part.

The control center where receives and analyze disaster and catastrophe rapidly may be the National Disaster Control Headquarter, fire station headquarter that receives 119 calls, police station headquarter that receives 112 calls, the institute in charge in district or emergency management institute. The control center analyzes the emergency degree through the situation receiving and analyzing part, declares the emergency area by analyzing the emergency degree through the emergency processing part, transfers the declared area information by wireless network through the controlling part and generates alert message for emergency automatically, acquires and stores the subscriber's information in the disaster area and the information of the disaster area through the managing part.

Wireless telecommunication network is said to be an environment that can trace the location of the subscriber's mobile terminal like mobile telecommunication network (for example, SKT, KFT, LGT)

'Fig. 4' shows the flow chart of acquiring the information of location based terminal subscriber in the emergency area and automatically transferring alert messages. If the emergency occurs, the control center receives the emergency call and declares the emergency area and sends the declared emergency area information to wireless telecommunication network. On arrival of the declared emergency information, the wireless telecommunication network searches the mobile device subscriber in the emergency to the control center. After receiving a list of subscriber information, the control center generates the emergency information and automatically sends alert message a short textual or vocal type of alert message to the mobile device subscribers through wireless telecommunication network.

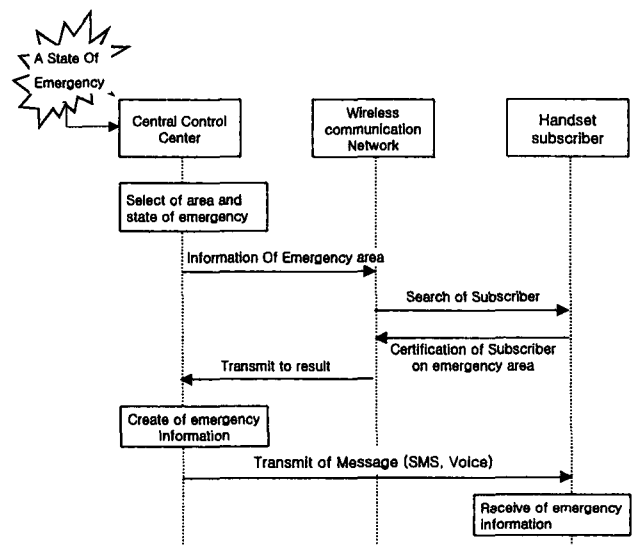


Fig 4. Flow of transmitting messages

4. Conclusions

We have proposed, in this paper, the mobile alert services system that has an effect on saving the valuable lives and properties of mobile device subscriber. In this system, the control center calls the mobile device subscriber to meet with the emergency efficiently using the wireless telecommunication networks.

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