

CURRENT STATUS OF UTMS' EMERGENCY CALL SYSTEM

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BACKGROUND

Although a number of measures have been taken to reduce death by traffic accident, there hasn't been an effective means to reduce time between incident occurring and the receipt of a call through 110 or 119. Such time reduction would improve the percentage of successful rescue operations. Cellular phone and PHS, which are rapidly increasing in number, have an advantage of calling right from the actual spot of an accident, but there is a concern that the caller has a difficulty in identifying and describing the location, resulting in delay in locating the accident and sending emergency vehicles.

In an effort to provide a solution to such concerns, in-vehicle emergency call system are being studied in different countries. In Japan, it is raised as an integral component of the overall ITS project. In U.S.A., it has been in operation as a feature of the vehicle-based mobile communication services at General Motors and Ford ("Onstar" and "Rescue" respectively) since 1996. In Germany, a similar operation is planned to be launched at Daimler-Benz by the end of 1997 ("TeleAid").

Each of the Emergency Call Systems utilizes a location detecting function via GPS (Global Positioning System) and the existing communication means by the use of cellular phone network and forwards information necessary for rescue operations upon receipt, at a privately owned operation center, of the emergency call originating from the vehicle.

Although a number of similar emergency call systems have been studied in Japan,

adoptions of many different private services would cause confusion at rescue organizations and economical inefficiency. Because the purpose of the emergency call system is speedy rescue operations, good quality and consistent services must be provided to all users. The system should be beneficial to as many citizens as possible. Standardization is also studied at ISO TC204/WG14. Coordination with international specification should be considered, too.

In this respect, Emergency Call System Sub-committee was launched in July of 1997 by car makers and electronics manufacturers alike, who are the members of New Traffic Control System Association.

SUMMARY OF THE EMERGENCY CALL SYSTEM

The System's effects

The system's direct effects are early detection of emergency, accurate identification of the location, early recognition of the accident conditions. There are consequential effects such as traffic control assistance and others. These are to bring benefits not only to the users, but also to rescue organizations dealing with accidents/ medical emergencies and other traffic users. The following are specific benefits by functions.

Early detection of emergency occurrence

One touch call function from the vehicle

Time to find a communication means such as a pay phone or an emergency phone upon accidents/ medical emergencies. Pressing of a switch or the automatic calling function will immediately send for rescue. Although cellular phones and industrial wireless make it possible to call out of the vehicle, these means are less perfect than Emergency Call System in securing correct system functioning upon collision and having one-touch call button effective in panicking situations.

Automatic call function at times of injury or unconsciousness

Automatic calls assisted by collision detection sensor, etc. can send for rescue at times when passengers are heavily injured or unconscious. Presently, there is a need for a third party for such calls, especially in absence of witness at night or in the countryside, resulting in a considerable call delay. Such problems are solved by this automatic call function.

Function to connect to the fire department in the right precinct

Currently, calls from cellular phones does not always guarantee connection to the right fire department, resulting in a need for a re-dial and delay in rescue. This system achieves faster rescue by designating a fire department based on the vehicle location and connecting to it. It enables connection to the nearest fire department when there are two of them depending on which direction of the freeway the vehicle is heading.

Understanding of accurate location

Even when the caller is upset or unfamiliar with the geography, the vehicle location will be transmitted as data, increasing speed and accuracy in identifying the location. Rescue is possible, even when the victim can not talk because he/she is unconscious or heavily injured.

Early recognition of the accident's status

HELP center can report the description of the vehicle to the police and the fire department by sorting members' data based on vehicle ID transmitted from the in-car terminal. This can be of great use in dealing adequately with the accidents and initiating rescue operations. It is possible to discover quickly the information on hazardous items upon accident of vehicles carrying such items. In the future, it will also be possible to quickly acquire personal information such as medical history/ blood type and more detailed accident status by use of IC cards and a passenger detection sensor.

Traffic Control Guidance

By introducing the system which transmits emergency information recognized at HELP Center to the traffic control center, accidents information gets quickly transmitted to the traffic control system and traffic information providing system, leading to secondary collision protection and smooth traffic by defusing otherwise heavy traffic. Other information include accident location, vehicle information such as hazard-carrying and large vehicles. Information including accident conditions and scope of damages is also expected to be handled in the future. This particular function remains to be materialized.

Other consequential effects

Accident data accumulated at HELP Center can be effectively used to reduce social damages caused by traffic accidents through statistical analyses.

This concludes characteristic description of the effects of the system. It is planned to clarify quantitative effects such as time reduction, death reduction and other social effects through system validation tests and investigations.

Method of developing the system

Communication media and in-vehicle terminal used

It is estimated that for the system in 1999, in-vehicle terminal based on navigation system and hands-free phone system will be the main terminal. It utilizes as the communication media, the existing cellular phone network which has a relatively large coverage and uses reasonably priced communication terminals. Other communication media such as MCA are also studied in addition to cellular.

For system around 2003, when increased usage of HELP is expected, the launch of exclusive wireless network, which would provide solution to the currently uncovered area and noise problems, is being studied for its viability and the expected return on its investment. The development of low cost exclusive in-vehicle terminals will be studied to enable standard installation into different vehicles including motor bikes currently equipped with exclusive wireless.

Service providing style and protocol

The main style of emergency call service is considered to be the one that provides services to the signed-up members through the in-vehicle terminal using navigation system and cellular phone which are currently in use in the private sector. Because different in-vehicle terminals use different communication protocols, emergency calls travel via different information providers and reach HELP Center after protocol conversion. (Information providers won't use operators, so as to avoid call delay.) On the other hand, for users who use emergency call function only without signing up for information services, the development of in-vehicle terminals for direct access to HELP Center with an use of an universal protocol is being planned. This type of users are considered to increase, in light of increased public recognition of emergency call system and the lowering cost.

With the above background, HELP Center will need membership contract and call reception not only via information providers, but also directly from the end user. The details of specific methods will be studied separately.

Call forwarding to public institutions

It is planned that calls received at HELP Center will be forwarded to the police and the fire department mainly in voice in 1999. Although it is desirable to accelerate the process by displaying the data information on operators' terminals at the police and the fire department, the standardization of the communication protocols and system introduction into the police and the fire department have been raised as items to be studied. There are no specific time table to be shown at this time.

Scope of the system applied

Service function

As a result of the study of various service contents, the service will be focused on the rescue of traffic accident while driving and medical emergency at the time of the operation launch in 1999. Vehicle theft (automatic call upon theft and tracing of stolen vehicle) will be studied in the next step.

The rescue in vehicle failure and other emergencies will not be dealt with, because the private companies' information providing services are covering part of them and competition with them is anticipated in the future.

System structure

The factors that the system consists of

The system consists of the following five basic factors. (See the attached Chart1 HELP system chart)

"In-vehicle terminal" which detects emergency and transmit identification codes and location information.

"In-vehicle terminal" transmits location information by using GPS and ID data to HELP Center either by pressing of the manual emergency call button or by sensor which is automatically activated upon collision, and has wireless which enables a voice dialog with HELP Center.

"HELP Center" that receives emergency calls and identify the caller's location, judges the necessity of contacting rescue organizations and acts as an intermediary between the

caller and the rescue organizations.

HELP Center is equipped with "Location identifying apparatus" which identifies the address of the call originating location by the received data and "Data sorting apparatus" which identifies the call originating vehicle and the caller and designates rescue organizations. It has operators stationed around the clock who are capable of judging the necessity of contacting the rescue organizations.

"Communication network" that transmits information between the in-vehicle terminal and HELP Center.

For the time being, "Communication network" utilizes the existing communication media such as cellular phone. For the future, a network will be studied with the concept of HELP-exclusive wireless.

"Rescue organizations (the police headquarters, the local police station and the fire department in each prefecture)" that receive information from HELP Center.

Information will be transmitted in voice from HELP Center to "Rescue organizations (the police headquarters, the local police station and the fire department in each prefecture)" to avoid special investment in equipment for the time being. The study will continue in anticipation of the introduction of ISDN which enables receipt of data information.

"Communication network" that transmits information between HELP Center and the rescue organizations (the police headquarters, the local police station and the fire department in each prefecture).

The communication network has a forwarding apparatus that connects to the line of the local rescue organizations.

There is a case where private "Information providers" act as an intermediary between the above-mentioned in-vehicle terminals and HELP Center in the communication network. Their role is only to recognize the in-coming call as emergency and converts it into a standardized communication code for HELP Center to be able to receive it.

The flow of in-coming call processing

Receiving of call from in-vehicle terminals

Receiving of call via information providers

Emergency calls placed from in-vehicle terminals, that have the access capability to information providers, travel via an information provider and reaches HELP Center after the protocols is converted. The system can forward calls efficiently without delay. It forwards calls in a limited time without needing operators stationed at the information providers.

Receiving of calls without going through information providers

The in-vehicle terminals that use the standardized universal protocol for the emergency call system communicates directly with HELP Center using the universal protocol.

Receiving of in-coming calls and processing of data

Upon receipt of information that either comes straight from an in-vehicle terminal or via an information provider through protocol conversion, the caller's location and their personal information are displayed on the operator's terminal after automatically tapping into the map and contracted users' information data base.

Because the system enables dialog immediately after the data communication is terminated, the operator verbally confirms the condition, judges the type of emergency such as accident, medical emergency, etc., immediately connects to the police or the fire department, reports necessary information such as location, the caller's phone number, etc. and assigns a direct communication line between the caller and an operator at the public organization. Although the dialog gets recorded and stored for PL purposes until the public organization takes over, dialogs won't be intercepted nor recorded once the operator at the public organization takes over. Information will be provided in case there are inquiries from public organizations in regards to personal and other information, based on the contract with the user.

The Center's map-matching for accurate location confirmation, what items to have as personal information, detailed items of the information content to be provided to the public organizations and procedures will remain as items for future study.

Means of communication to public organizations

In the stages when the system for data transmitting to and from HELP Center is not in

place at the public organizations, information will be transmitted in voice data from the operators of HELP Center to the public organizations.

Acceleration of the process and reducing of workload at the Center by sending data directly to the public organizations are the important items to be studied for the future.

Fig 1 HELP System chart

