

# Special Article on Mobile Multimedia and ITS

## Overview of Emergency Report Services

One of the most important themes for ITS is how to execute rescue activities quickly in response to traffic accidents, sudden illnesses during driving and other emergency situations. This article addresses emergency report services, which are becoming increasingly popular in Japan.

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### 1. Introduction

The rapid penetration of mobile phones and Personal Handyphone Systems (PHS) has led to a steady increase in the number of emergency reports made from such handsets in recent years.

While the strength of mobile phones and PHS lies in their usefulness in making on-the-spot reports in the event of an emergency, their weakness is that it is difficult to locate where the caller is and the possibility of the report being directed to a police/fire station or an ambulance service in a different area.

Emergency report services (often referred to as "Mayday Services") tackle these weaknesses, and help to ensure quick response to traffic accidents and other emergency situations.

The object of this article is to provide an overview of emergency report services, with reference to the case of HELPNET, launched in September 2000.

### 2. Overview of Emergency Report Services

Suppose you encountered a traffic accident. What are the potential scenarios? An injured person might be semi-unconscious, or might be in a state of panic. There might be no means to communicate nearby. At night, even if you managed to find a phone, it might be too dark to see any signs or landmarks, which are essential upon identifying your location. In the worst-case scenario, depending on your location, the rescue crew might not be able to find you for hours.

In these circumstances, there is a higher risk of delay in rescue activities. Emergency report services aim to ensure

that a quick and accurate report is made even under such circumstances, so as to increase the chance of lifesaving and prevent the possibility of secondary hazards, by handling accidents and executing emergency rescue activities in the early stages.

In other countries, emergency report services are widespread, especially in the U.S. In Japan, such services have become available through the Daimler Chrysler Group's E-call and Japan Mayday Service Co., Ltd.'s HELPNET. Figure 1 shows the outline of HELPNET's service.

In emergency report services, DoCoMo and other telecommunications carriers play a part in regard to communication links and mobile phones. However, emergency report services are based on normal calls rather than emergency calls that are made by dialing 110, 118 or 119.

### 3. System Configuration

HELPNET's system consists mainly of terminals installed in cars, mobile phones and the center's system.

The outline is as follows.

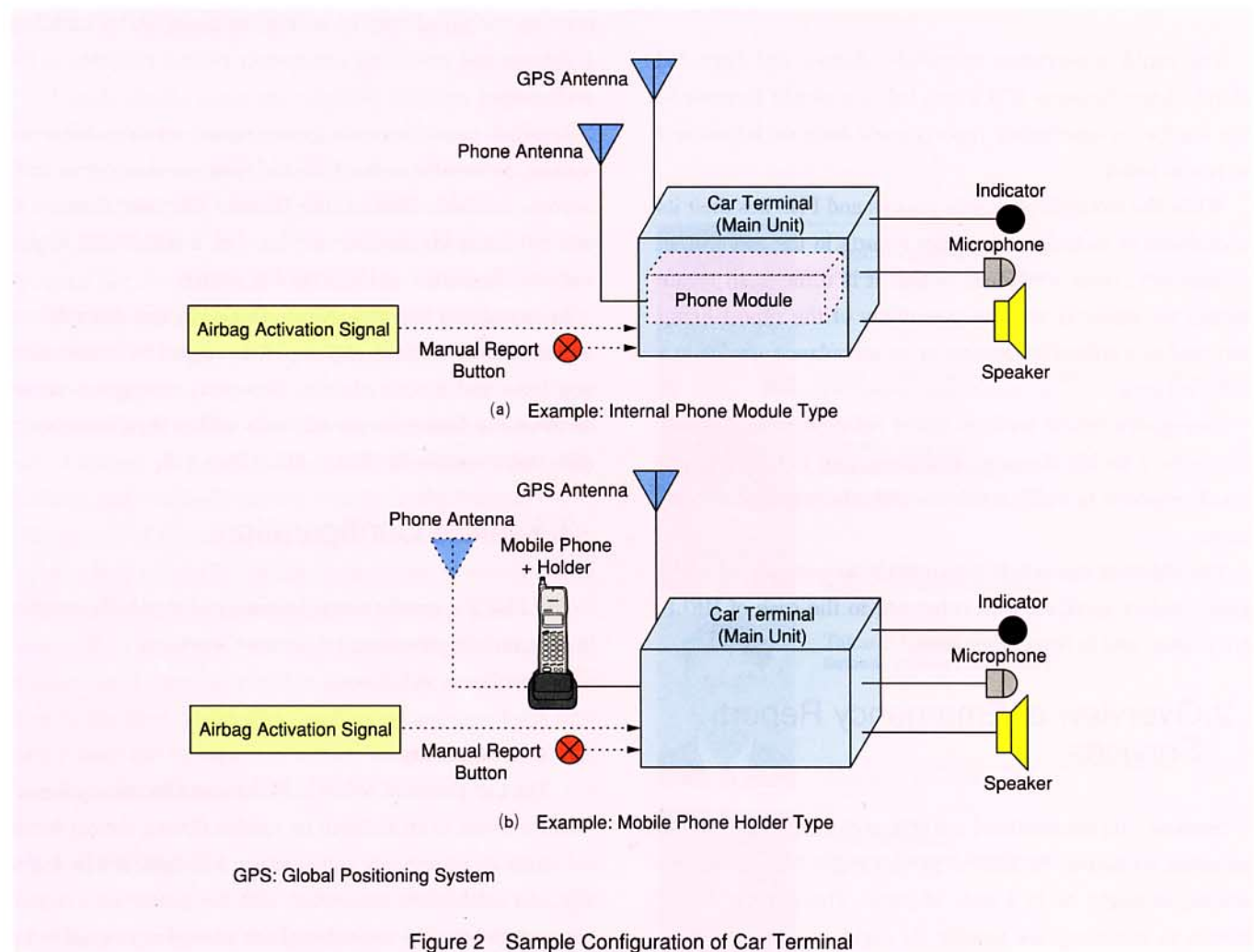
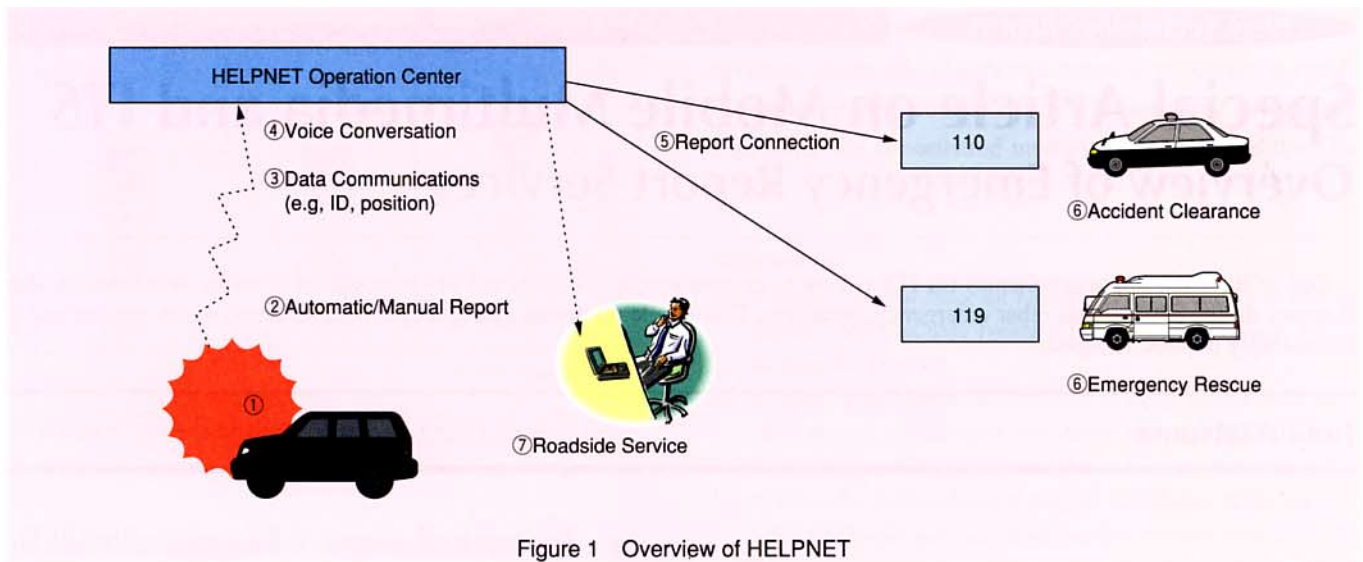
#### 3.1 Car Terminals

##### (1) The Car Terminal's Role in Making an Emergency Report

In the event of an accident or sudden illness, the car terminal emits an emergency signal either automatically or manually, and establishes connection with the center via a mobile phone network. The emission of the emergency signal is followed by the transmission of the car terminal's ID number, data on the vehicle's location and its trail at the time of the accident. After this data transmission, the communication links are kept open but switched to voice communication.

##### (2) Configuration of Car Terminal and Overview of Functions

Car terminals are made by automakers and car-terminal



manufacturers to whom Japan Mayday Service — the HELPNET service provider — has disclosed the technology. The reliability of car terminals is ensured by design guidelines relating to shock resistance and other features, including the performance of mobile phones.

For example, terminals that are designed to be built into vehicles must satisfy passenger protection standards, which require the terminal to be mounted in the vehicle and operate normally after a collision test.

Figure 2 shows a sample configuration of a car terminal. It



should be noted, however, that the configuration and reliability requirements vary with the model and grade of the terminal.

The following functions are common to car terminals.

① Position data gathering

Identifies the vehicle's position with a combination of Global Positioning System (GPS), Differential GPS (D-GPS), gyrosensor, local-map matching and other positional information technologies, and stores data of the current position and the course taken in the past.

The combination of technologies depends on the model of the car terminal.

② Storage

Stores the car terminal's ID (Identification Number), the center's phone number, report log, etc. Each car terminal carries a unique ID.

③ Emergency report

The emission of an emergency report signal may be triggered either manually or automatically. Manual triggering occurs when a special button is pressed. Automatic triggering occurs when the airbag activator or a similar sensor automatically detects a collision.

Some car terminals only support manual triggering, while others support both manual and automatic. Once triggered, the emergency report will be given priority over any normal call, even when the mobile phone is in use.

④ Communication

The car terminal transmits an emergency report signal via a mobile phone.

The mobile phone must either have an internal phone module installed in the car terminal, or have a special holder in which it can be placed to work with the terminal. It must also support both data and voice communications, and be able to switch from data to voice communication

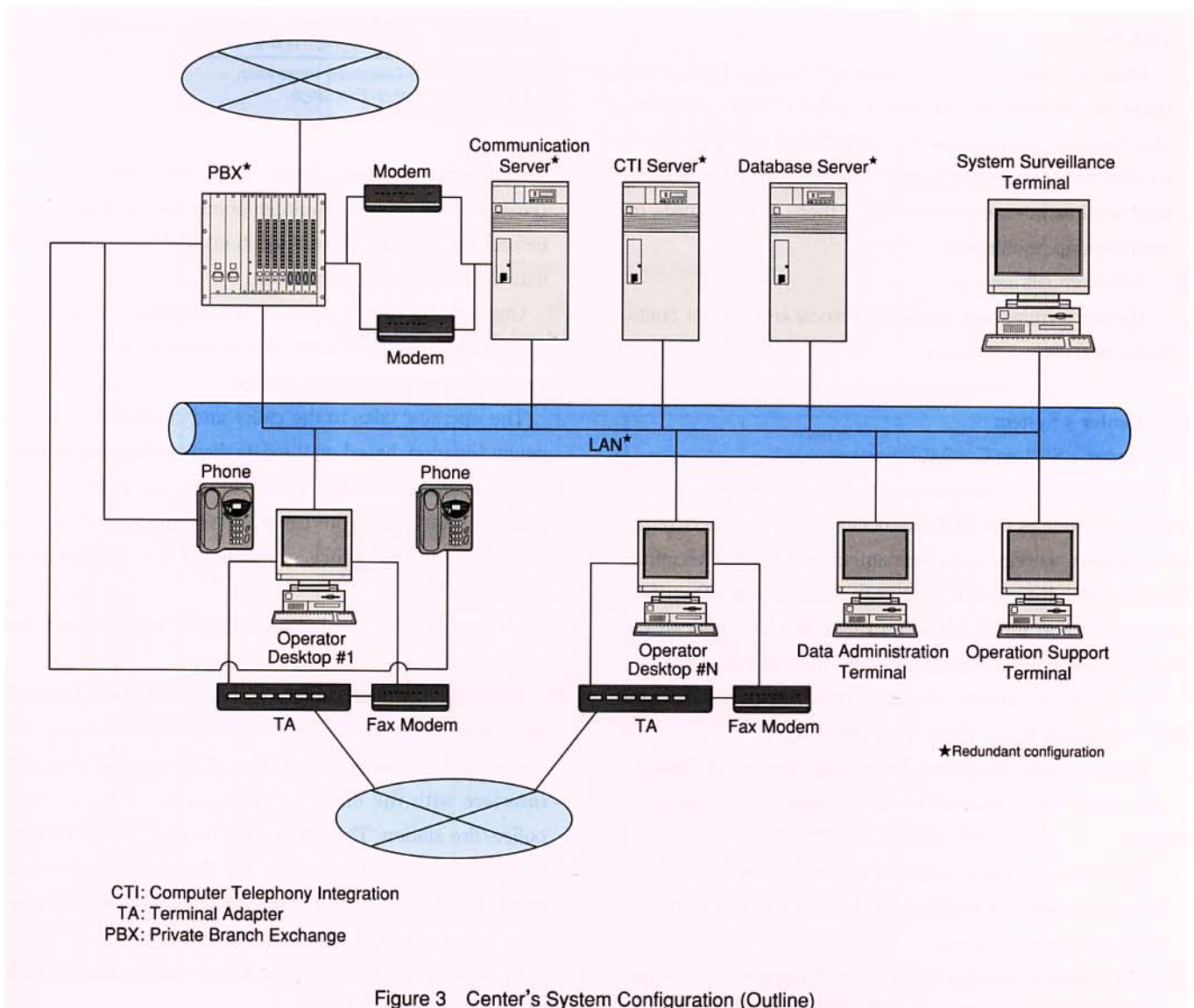


Figure 3 Center's System Configuration (Outline)

without disconnecting.

When the mobile phone emits an emergency report signal, the calling number display function will be activated. When disconnected, it will try to reestablish the connection for a certain number of times, or for a specific period.

#### ⑤ Power control

The car terminal's operation depends on the status of the vehicle's power supply. Some car terminals also have a backup power supply in addition to the main power supply, which enables them to report even when the vehicle's power is down.

#### ⑥ User interface

This consists of a manual button, user report display function (e.g, report in progress, report failure, outside range) and indicator display function.

#### ⑦ Regular/irregular diagnosis

The diagnosis of the car terminal, including its communications functions, is performed through communication with the center.

Diagnosis may be either regular or irregular. Upon diagnosis, the information received is collated with a database of subscriber information: the car terminal will not be able to send an emergency report if it indicates that the service contract has been terminated or if there is no records of membership registration.

#### ⑧ Self-diagnosis

The car terminal automatically detects any interior faults inside and gives a warning.

### 3.2 Center's System

#### (1) Center's System Configuration

The center's system receives and processes emergency reports, as well as the tasks associated with regular/irregular diagnosis, service commencement and service termination. It is also designed to work with databases of subscriber information and billing data. Its reliability is enhanced by adopting a redundant configuration for the main devices.

The center's system configuration and functions are shown in Figure 3 and Table 1, respectively.

#### (2) Procedures for Receiving/Processing Emergency Reports

The center receives and processes emergency reports as follows.

- ① The center's system receives an emergency report from the car terminal. In response, it displays a notice of reception on the center screen.
- ② The center's system plots a point showing where the car is on the electronic map, based on the position data sent

Table 1 Main System Functions at the Center

Equipment	Functions
PBX	A switching system that interconnects telephone extensions to each other, as well as to outside telephone networks.
Communications Server	Communicates with the car terminal in response to an emergency report. Delivers data to operator desktops. Communicates in the event of regular/irregular diagnosis.
CTI Server	Controls the PBX. Administers links.
Database Server	Administers the database of subscriber information, etc. Processes database search requests from other devices.
Operator Desktop	Displays emergency reports, subscriber information, police and ambulance services in the area. Communicates with a police or fire station via fax or data communications.
Data Administration Terminal	Maintains databases. Processes billing information.
Operation Support Terminal	Administers the map database. Supports operations.
System Surveillance Terminal	Collects information and displays system operation status.

CTI: Computer Telephony Integration  
PBX: Private Branch Exchange

from the car terminal. At the same time, the car's trail (position data showing multiple points the car had passed before reaching the current location) and the subscriber's data are displayed on the screen.

- ③ Once all the data processing is completed, the center's system switches from data communication to voice communication without disconnecting.
- ④ The operator talks to the caller and confirms the emergency situation, based on the data displayed on the screen.
- ⑤ The operator calls the police and/or fire station in the area by referring to the car's current position data, and describes the emergency situation and the accident location.

Meanwhile, the line between the car terminal and the center is on hold.

- ⑥ Then, the communication link between the car terminal and the center is interconnected with the link between the center and the police/fire station. The operator does not interfere with the dialogue between the caller and the police/fire station. The caller must request rescue crew to come if necessary. However, if the situation is obviously a traffic accident (e.g, the airbag is activated, or the caller does not respond), the operator will call for rescue.
- ⑦ In some cases, the center will send information regarding the emergency report to the police/fire station, via



data communications or map facsimile.

- ⑧ If disconnection occurs during communication due to changes in the radio wave status, the operator will ring the caller and reconnect him/her to the police/fire station.
- ⑨ Other than the above, the operator can connect the caller to the Japan Automobile Federation (JAF) and other roadside service companies upon request.

### 3.3 Communications Protocol

#### (1) Message Data

Two types of data are sent from the car terminal with an emergency report: the basic message and the position mes-

sage. First, the basic message is sent, carrying the minimum data required for rescue activities, and then the position message is transmitted, which includes information to improve the accuracy of positioning, such as the car's trail.

Table 2 Message Data Items

	Information Item
Basic Message	Call type (manual/automatic), time of accident, car terminal's ID, mobile phone's number, position data (e.g. positioning system, latitude, longitude, speed, direction) x 2, text data, etc.
Position Message	Position data x n, text data

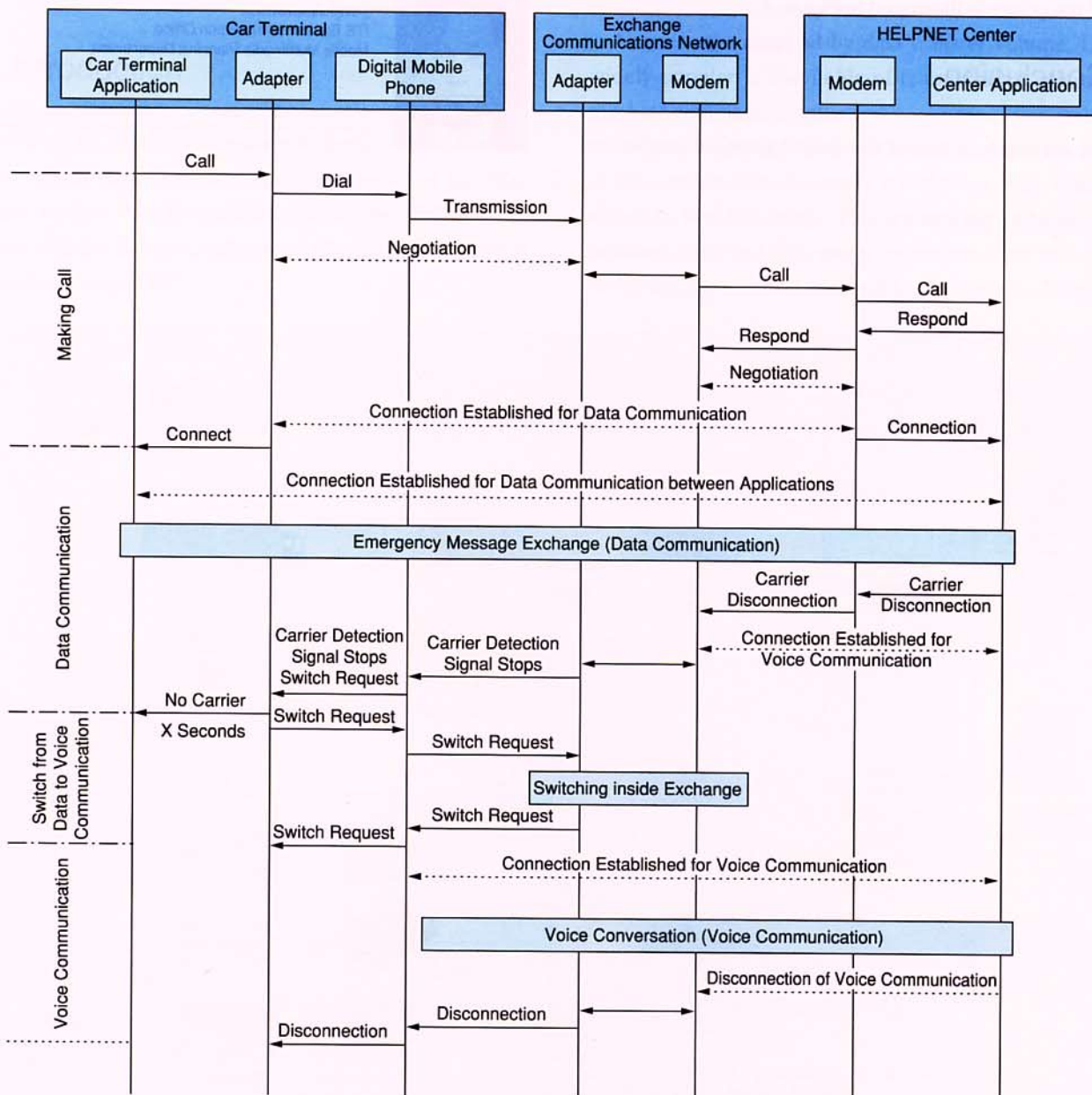


Figure 4 Sequence of Emergency Report Data and Voice Switching

The purpose of this arrangement is to ensure that even if disconnection occurs during data communication, some kind of action can be taken as long as the transmission of the basic message has been completed.

The main information items of each type of message are as shown in Table 2.

(2) Sequence of Communications between Car Terminal and Center

The transmission of the emergency report involves data communication between the car terminal and the center (basic and position messages). Once this is complete, it is switched to voice communication.

The sequence of communications between the car terminal and the center is illustrated in Figure 4.

## 4. Conclusion

Improved safety is one of the most important themes for

ITS.

In a recent Web survey, more than 80% of questionnaire respondents said that they were interested in emergency report services. This indicates how high the demand is for this type of safety.

It also indicates that the emergency report service will be a highly successful application in the ITS field. Its significance goes much further, however, as its social benefits will be tremendous.

It is hoped that the quick penetration of emergency report services will help to save many lives.