

Vehicle Sensor Information Management Method

YoungBag Moon', MinJeong Kim, YeonJun Choi, SunJung Kim, OhCheun Kwon
Telematics S/W Platform Team, Telematics Research Division
Electronics and Telecommunication Research Institute
161 Gajeong-dong, Yuseong-gu, Daejeon
KOREA

Abstract: - Telematics supplies various services to drivers through GPS technology and mobile communication network. Vehicle case, various mounted sensors are managed and controlled through in vehicle network. Telematics Terminal connected CAN and manages sensor information, it is connected TSP. In this paper, we introduce management method of vehicle sensor information from Telematics Terminal.

Key-Words: - Telematics, Vehicle Sensor, CAN, Information Management

1 Introduction

Telematics technology is a compound word of communication and informatics. It is defined services that offer various information such traffic guide, emergency rescue, remote vehicle diagnostic, internet service(banking, news, email, messenger and VoD) and mobile office through location technology and mobile communication network

Basic configuration technology of Telematics divides location trace, traffic/map information, communication technology, voice recognition and vehicle terminal. Location trace is GPS(Global Positioning Service), navigation and mobile communication technology is CDMA/WLAN/DSRC/ITS/DAB/DMB etc. In vehicle communication configures MOST, CAN and J1850, and terminal needs element technology of Display, Storage, CPU, OS, Bus, etc.

CAN(Controller Area Network) is a high-integrity serial data communications bus for real-time applications. It has excellent error detection and confinement capabilities and now being used in many other industrial automation and control applications.[1]

Here, CAN connects ECU for keeping up best driving and state in vehicle communication. A vehicle mounted sensor connect to ECU(Electronic Control Unit) collects information and joints collected information through CAN. Telematics terminal connects ECU through CAN and the terminal manages vehicle information and it possible link to TSP(Telematics Service Provider) Center.

Proliferation of microprocessor based on a vehicle sub-system such as EEC(Electronic Engine Control), ABS(Anti-Lock Brakes) and Electronic Suspension

Control has led to a situation where a multitude of sensors, actuators, inputs, outputs and application specific diagnostic schemes are found in automobiles.[2]

A sensor is a device or apparatus that generally senses and measures an object and measurement amount to transfer to electrical signal. Case of vehicle, various sensors mount and more and more demand increase.

Telematics terminal manages information of vehicle mounted sensor through communication network such CAN, serial communication and enables effective use to remote vehicle diagnostic, performance improvement of vehicle. At this point, vehicle sensor generates performance information and it have application to RVD, Emergency rescue service, etc. This paper writes systematical effective management method of generated information to vehicle sensor in Telematics terminal and shows information transfer red vehicle communication system in Telematics configuration environment.

2 System Configuration

2.1 Vehicle communication system

Figure 1 shows communication system configuration transported information from vehicle sensor to Telematics terminal. ECU manages vehicle sensor and several ECU connect communication gateway to CAN. Communication gateway connects Telematics terminal to serial communication. Telematics terminal gains performance/fault

information from vehicle sensor through basic serial communication

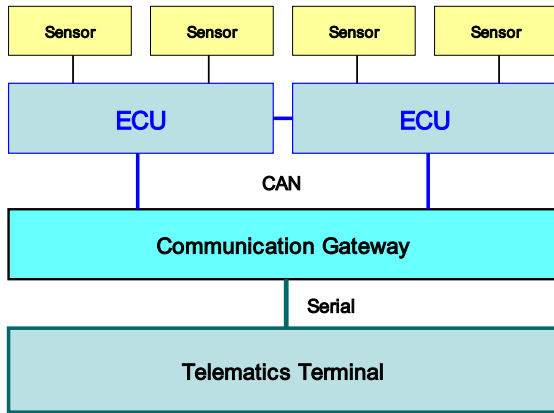


Figure 1-Communication System Configuration

2.2 Telematics Infrastructure

Telematics technology, which utilizes various telecommunications such as DMB, CDMA, WRAN, DSRC, etc., is increasingly being applied to provide services for in-vehicle telematics systems. Telematics systems are also expected to upgrade existing services and expand safety-related services effectively using in-vehicle services in cooperation with external service contents. Fig 2 shows general telematics infrastructure and in-vehicle telematics system.

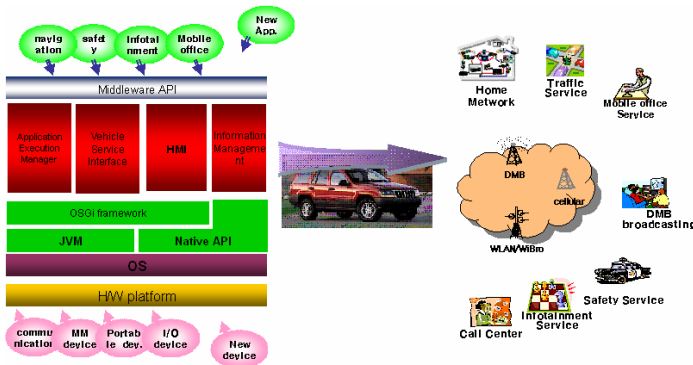


Figure 2-Telematics infrastructure and in-vehicle telematics system

To provide various services in telematics terminal, middleware should support following services[3].

- Communication service: uniform access for various kinds of communication such as CAN, MOST, CDMA, DSRC, Bluetooth, etc.
- Positioning Service: get a current positioning data of car in a uniform way

- Persistent Storage Management service(PS): management on persistent storage shared between applications and services
- Vehicle Information Management service: provide vehicle static & dynamic information from vehicle
- TSP Connection service: process an application protocol for telematics services between a terminal and a TSP(Telematics Service Provider) center
- Application Execution Management service(AEM): application execution characteristics in vehicle environment (status like suspended, resumed) and application priority management
- Vehicle Service Interface(VSI): AMIC based network neutral messaging schemes and APIs
- Personal Information Management Service: personalized information management framework for adaptive vehicle and application services
- HMI Service: access to vehicle equipped I/O devices

3 Function Software module

3.1 Information management module

A sensor information transports Telematics terminal to communication gateway. A transported information manages at Information Management module of middleware. This module offers Vehicle Information Management service, TSP Connection service and VSI(Vehicle Service Interface) and it connects to TSP Interoperation module.

Figure 3 shows relation of communication gateway and Telematics terminal managed information. A communication gateway communicates telematics terminal to serial communication and Communication Management module of Telematics terminal sends sensor information to Information Management module.

Information management module has function of history management, information inquiry, request, report and connect TSP Interoperation module supply remote service of vehicle diagnostics, emergency rescue, etc.

A fault information send from ECU to management module in Telematics terminal. Performance and fault

information manages at Information Management Module in Telematics terminal. Information Management Module sets class of fault information and a classed fault information stores to current table and history table, manages to Fault Information History Management.

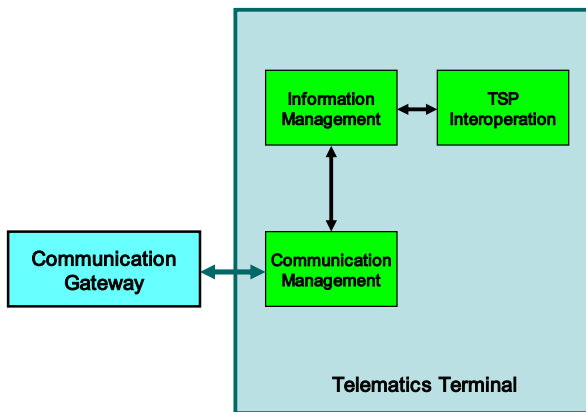


Figure 3-Relation of Communication gateway and Telematics Terminal

Performance information collects by performance request message is sent from Information Management module to ECU and store performance current table, history table and manages to Performance Information History Management. Information Management module connects TSP Interoperation module and offers request and query function about current and history value.

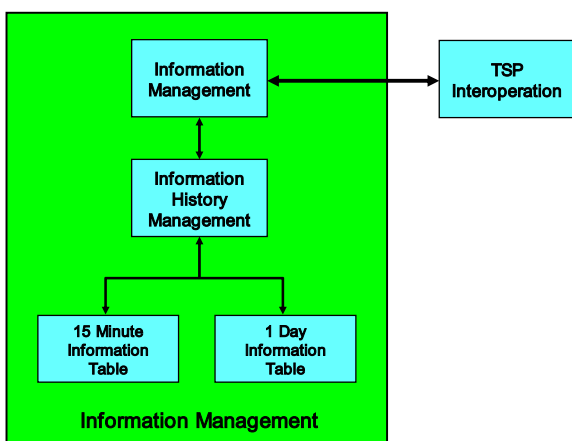


Figure 4-Information Management Module

3.2 Information transport sequence

Figure 5 shows request sequence that fault/performance information transports to

Telematics terminal. Performance information generates sensor which collects ECU. The ECU sends information to Telematics terminal that set fault class and store management table. Information Management Module sends performance information request message to the ECU and it receives request message and transports performance information to Telematics terminal. Transported performance information stores performance management table. Fault information generates that performance information come to fault condition

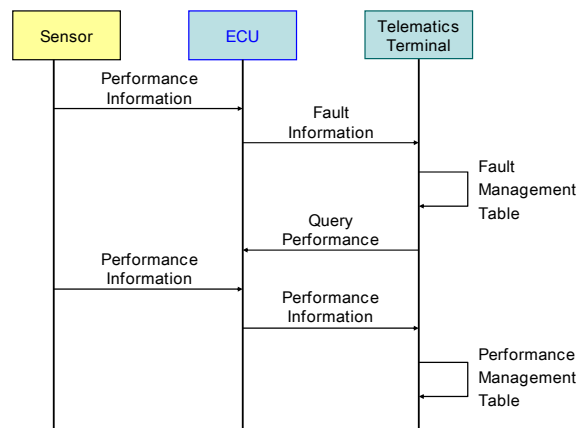


Figure 5-Information flow Sequence

4 Conclusion

A ECU deals vehicle sensor information connected Telematics terminal through CAN and communication gateway. Vehicle sensor information manages current, history table to Information Management module in Telematics terminal and state change about something wrong enable systematical management. Sensor information enables various service offer trough interoperate TSP center.

References:

- [1] CAN, <http://www.bosch.com>
- [2] Vehicle Fault Diagnostics Using a Sensor Fusion Approach, Muldoon SE, Kowalczyk M, Shen J, *Proceedings of IEEE Sensors 2002*
- [3] Analysis and Design of Middleware Architecture for In-vehicle Telematics Applications, M.J. Kim, et al, *ITS Congress, 2005*