Technology and Standardization in Telematics: Telematics Reference Model

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Abstract: Telematics is an emerging industrial field made up of the convergence of technologies. The key technologies for Telematics are server-side technology, terminal-side technology, communication-related technology, and positioning technology. Standardization in Telematics is now getting more notice these days. Domestic situation is explained for several related facilities such as ETRI, TTA, and Telematics Standardization Forum. In this paper, we will focus especially on the standard reference model that is the most fundamental framework of Telematics technology standardization. In the reference model, the Telematics system is composed of Telematics client part, communication part, and Telematics server part. The Telematics client part consists of terminal, positioning device, and car electronic devices. Communication part can be composed of various telecommunication channels such as CDMA, WLAN, DMB, WiBro, etc. which can guarantee the seamless two-way communication. Telematics server part is composed of TSP(Telematics Service Provider) server and CP(Contents Provider) servers gathering and managing the various Telematics services. This Telematics reference model is expected to be utilized as the base architecture in developing the technology and standards from now on..
Keywords: Telematics, Standard, Reference model

1. Introduction

Now a days, Telematics is emerging based on the infra of telecommunication network, road, and auto industry. Telematics is defined as an in-vehicle multimedia service that offers infotainment as well as location and traffic information via mobile communications networks.

In Korea, the development of Telematics technology is being propelled due to the national funding policy, and the domestic standardization process has also started. Standard in Telematics plays the role of converging the related information technologies and create new value-added services. For the nature of Telematics as a convergence and application industry, the base architecture of Telematics defining the essential and core components of it is necessary to develop the technologies and standard interfaces in a systematic and unified manners. For this reason, we designed the standard reference model of Telematics that is expected to be utilized as a fundamental framework of technology and standard.

In this paper, we will look briefly at the current status of the development of technology and the domestic standardization efforts. Most of the part of this paper is allotted to explain about the Telematics reference model in detail.

2. Telematics Technologies

The Korean government especially the Ministry of Information and Communication is committed to the implementation of the Strategy to achieve $20,000 GDP per capita earlier than the original schedule[1]. For this purpose they promote an effective industrial development model that creates future growth engine through the strong collaboration among IT services, infrastructure and manufacturing. One of the future growth engines is Telematics. To make the vehicle the 3rd digital life space the key success factors are extracted and according to them the core projects are launched. The key success factors are the development of killer service and contents, core technology, and creation of domestic and global market need. For core technology factor several projects are launched which can be grouped as the server technology, communication technology, terminal technology, and test-bed technology. Diagram for the Telematics core technology is shown in Fig. 1.

3. Domestic Standardization Status

According to the national projects on the development of Telematics technology, the standardization has also started at the beginning of this year. Domestic standard for Telematics is being developed mainly by ETRI(Electronics and Telecommunications Research Institute), TTA(Telecommunications and Technology Association), and Telematics Standardization Forum.

ETRI is doing the national project developing the standard related to the core technology that is also conducted in ETRI. This project is being performed in relation with the GIS, ITS, and LBS due to the tight relationship among them.

TTA is established to Perform IT standardization tasks efficiently to advance IT industries and related technologies and to contribute to our national economy[2]. Development of standardization on Telematics is performed in Telematics PG(Project Group) that is newly organized early this year. The terms-of-reference of this PG includes the development of standard in Telematics server, terminal, and service interface, and conformance test specifications. Twenties of members are participating this PG and doing activities.

The Telematics Standardization Forum is organized to develop so called the de facto standard in Telematics.

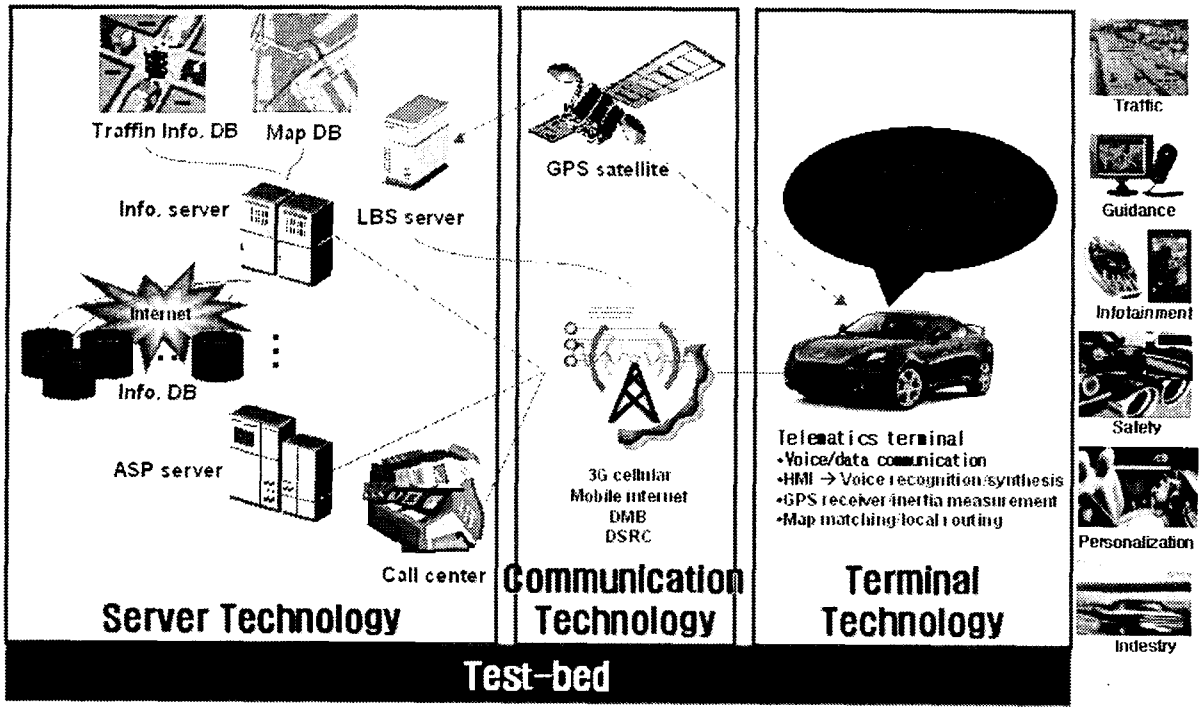

Fig. 1. Telematics core technology diagram

This forum is established by KOTBA(Korea Telematics Business Association) this year and three sub-workgroups(WGs): Terminal WG, Contents WG, and Inter-operability WG. Several work items are proposed to each WG and standard drafts are currently being made now[3].

4. Standard Reference Model

The Telematics standard reference model plays the role of a fundamental framework for the development of technology and standard. We have designed the reference model as shown in Fig. 2. that is composed of three parts: Telematics client part, communication part, and Telematics server part. The Telematics client part consists of terminal, positioning device, and car electronic devices. Communication part can be composed of various telecommunication channels such

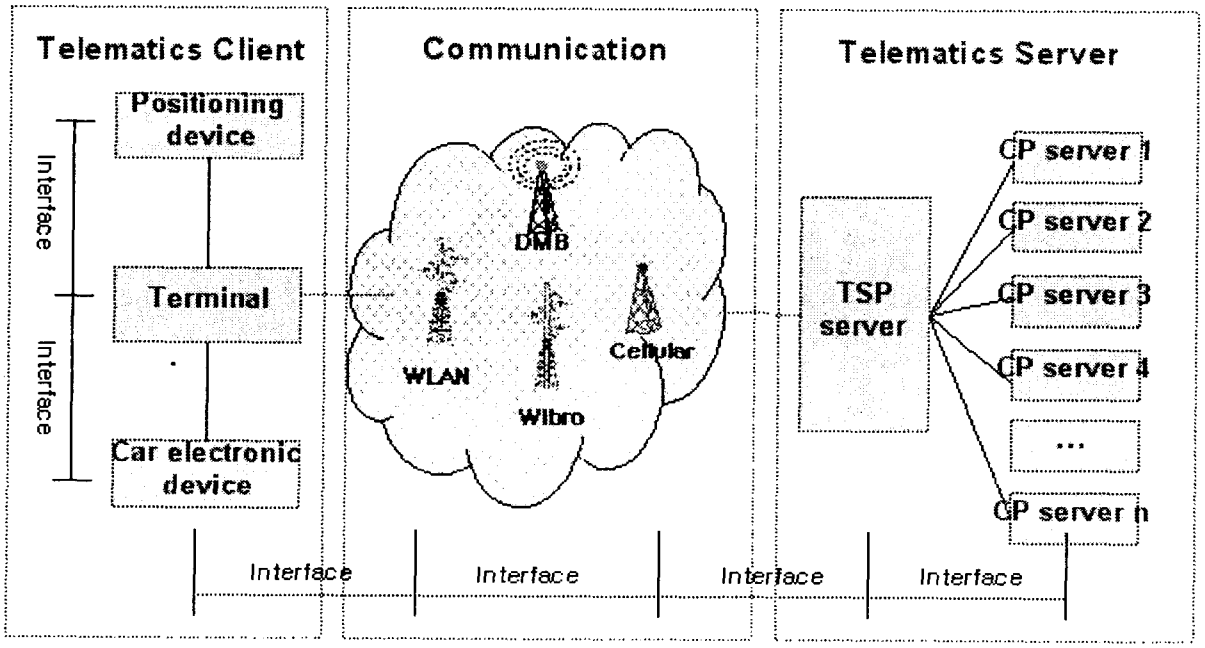

Fig. 2. Telematics standard reference model

as CDMA, WLAN, DMB, WiBro, etc. which can guarantee the seamless two-way communication. Telematics server part is composed of TSP(Telematics Service Provider) server and CP(Contents Provider) servers gathering and managing the various Telematics services.

Between these parts and components in a part, interfaces to interchange data and/or service should be defined. Each of these interfaces can be work item on which standard issues can be made. The possible work items are:

- Terminal to positioning device interface
- Terminal to car electronic device interface
- Terminal to TSP server interface
- TSP server to CP server interface
- Terminal platform specification
- TSP server platform specification

We will discuss in some more detail about each part of reference model.

1) Telematics Client Part

This part is composed of terminal, positioning device, and car electronic device. This part can start and end the Telematics service via HMI(Human Machine Interface) with user.

Terminal contains several layers from the bottom, H/W, driver, OS, and S/W platform on which the application programs are run.

Positioning device can be composed of several positioning modules such as GPS, RFID, Pseudo satellite, and so on. The combination of these positioning modules can enhance the accuracy and precision of positioning. Positioning device is to get the real time position data of running vehicle.

Car electronic device contains the car-multimedia system, electronic sensors for collision and break, and ECU(Electronic Control Unit). This device should send and receive the signal to and from the Telematics terminal. Fig. 3 shows the architecture of Telematics client part.

2) Communication Part

Telematics communication should guarantee the two-way telecommunication between server and terminal based on the various communication infra such as CDMA, WLAN, WiBro, DMB, etc. This various communication channel should be controlled and scheduled properly to support the seamless communication regardless to the speed of vehicle and the type and size of contents. Overall diagram for communication part is shown in Fig. 4.

3) Telematics Server Part

This part is composed mainly of TSP server and CP servers. TSP should respond to the request for service from Telematics client. CP server gathers and process the service information such as location of moving objects, traffic information, weather information, etc. and provide it to TSP server. This part should provide the following functions:

- User log-in/log-out
- Service priority
- Service QoS(Quality of Service)
- Service response time
- Data encryption
- User certification
- User profile management
- Service charge

Diagram for this part is shown in Fig. 5.

5. Conclusions

For the success of Telematics, the core technology should be inter-operable and each service and system should be compatible. The standard of technology and interface plays a key role in supporting the systematic development and inter-operability of technologies and concentrating the industrial efforts and finally strengthening the competence of industry.

This Telematics reference model is expected to be utilized as the base architecture in developing the related technology and standards from now on. This model should also be revised or versioned-up if there is the additional requirement from industry.

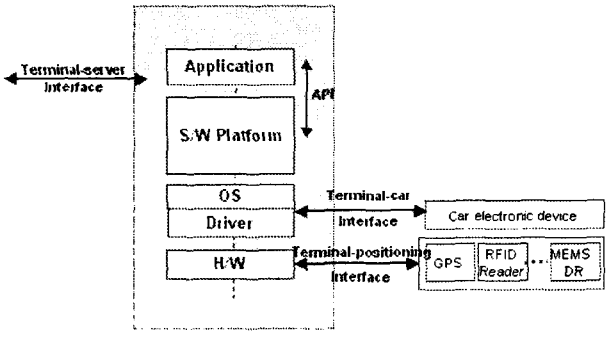

Fig. 3. Architecture of Telematics client part

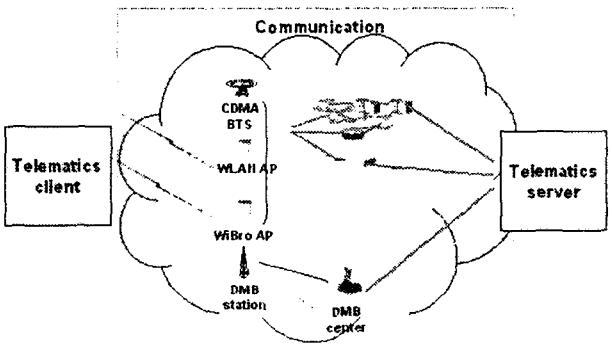

Fig. 4. Telematics communication part

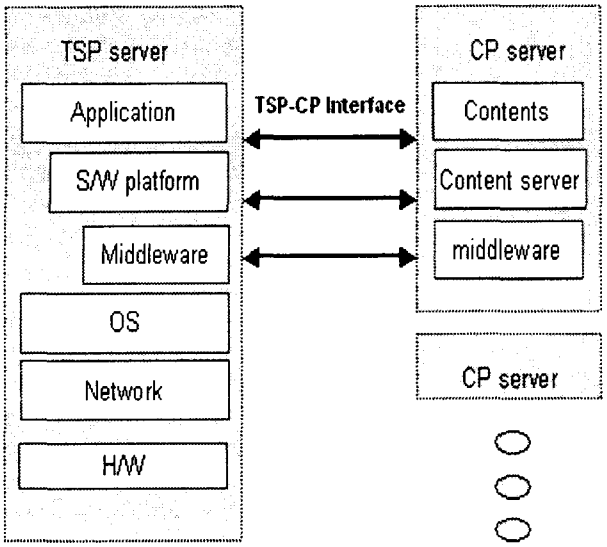

Fig. 5. Telematics server part

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