Global Rollout of Telematics Service

● Naoki Harashina

Along with the advent of the age of big data utilization, services and areas covered by telematics services are increasing globally. The forms of services are undergoing a shift from those provided by service providers to those offered by automotive original equipment manufacturers (OEMs), which have their own service centers and launch services independently. As an example of big data utilization, Fujitsu has planned the rollout of a traffic information provision service, which is one type of telematics service, for automotive OEMs in Europe. For the rollout of this service, we have adopted the traffic message channel (TMC) data format based on our understanding that adopting a standard traffic information data format for service data input and output will be key to the service's success. This paper describes the global rollout of Fujitsu's traffic information provision service.

1. Introduction

In recent years, telematics services offered by car manufacturers globally have been increasing and their target areas have been expanding. Telematics services are intelligent transport system (ITS)-related services that connect cars to the Internet using terminals such as smartphones. Telematics services have the following three purposes.

1) Improvement of convenience through information provision (traffic information, e-mail, weather forecasts, etc.)
2) Implementation of safety and security features (automatic emergency calling upon airbag activation, tracking during vehicle theft, etc.)
3) Provision of services for commercial vehicles (travel performance management on a daily or monthly basis, etc.)

Fujitsu is rolling out traffic information provision services that use the company's ITS and big data utilization technologies. Lately, it has been focusing on needs for telematics services that can be used in common in the various countries and regions of Europe. To achieve the broad rollout of these services, it is important that the formats of input data such as the map and vehicle probe data, and the formats of output data such as the traffic information data generated from the input data, are standard formats used throughout Europe. In Europe, with its many different countries and car manufacturers, standardization of input and output data is important. The adoption of data formats widely used in Europe will allow easy service provision to a large number of car manufacturers. This paper introduces the activities of Fujitsu with regard to traffic information provision services for Europe.

2. Telematics service model

A recent topic regarding telematics services in Japan and overseas is the launch by Japanese car manufacturers of the provision of telematics services in many countries and regions including China and the Middle East. Further, car manufacturers in countries other than Japan are forging ahead with the development of telematics services as a result of the provision, particularly in Europe, of the eCall (emergency call) service being made mandatory in all vehicles from 2015.

Each car manufacturer provides telematics services to users in either of the following two ways:

1) Offers the user its own telematics services, with its own in-house service programs and vehicle data.

2) Offers the user the telematics services provided by a telematics services provider (TSP), as is.

As examples of TSPs, ZENRIN and NAVITIME are famous in Japan, and TomTom and INRIX are famous in other countries.

Japanese car manufacturers and car manufacturers in countries other than Japan employ different service provision models. Japanese car manufacturers employ provision model 1) above, such as Toyota Motor Corporation's T-Connect and Nissan Motor Co., Ltd.'s CARWINGS, and Honda Motor Co., Ltd.'s Internavi. On the other hand, most of the car manufacturers in countries other than Japan employ provision model 2) above. Also, in providing model 2), the services of multiple TSPs may be included in one package, depending on the services being offered.

In recent years, many car manufacturers in countries other than Japan, in preparation for the upcoming age of big data utilization, are seeking to differentiate themselves from competitors by creating unique telematics services, or creating their own data centers and vehicle data aggregation operations. Various car manufacturers have begun treating the vehicle data of their vehicles as big data, using this data to improve various services, for service collaborations with other industries, and for feedback to manufacturing divisions.

Thus, the environment surrounding telematics services is undergoing major changes with the advent of the era of big data utilization.

3. Traffic information provision services

Fujitsu offers FUJITSU Intelligent Society Solution SPATIOWL (hereafter SPATIOWL, pronounced "spey-shee-owl"), an application platform for the utilization and management of big data, and telematics services that use SPATIOWL (**Table 1**).

SPATIOWL provides traffic information generation, forecasting of traffic information, and provision of vehicle information and communication system (VICS) traffic information and realizes "improvement of convenience through information provision" mentioned at the beginning of this paper, which is the purpose of automotive telematics services. Based on two types of input information, namely traffic information provided

Table 1
SPATIOWL function list (as of October 2013).

	Function	Details
Basic	Location information platform	• User authentication and management • Terminal and device management • System operation status management and monitoring • Spatio-temporal management of data containing location information • Disclosure of information registered in data layer • Management of location and state of vehicles/Management of facility information (POI) • Libraries facilitating application development even on smartphones (Mobile Pack)
Options	Traffic information generation	Generation of traffic information from the probe data of customers (such as taxis)
	Forecast traffic information	Forecasting of traffic information from stored data
	VICS traffic information	VICS traffic information
	Taxi probe traffic information	Provision of taxi probe traffic information
	Route search	Route search between 2 points, taking into account traffic information
	Voice synthesis	Conversion of text data into voice data and voice data format conversion
	Voice recognition	Recognition of speech content (words, phrases) from voice data
	Voice dialogue processing	Function performing data retrieval through voice dialogue
	Voice diagnosis	Detection of stress level and the like from voice data
	Travel data analysis	Analysis of driving conditions based on image and numeric data during travel
	Spatio-temporal data analysis	Area analysis, route analysis
	Telematics	Functional component for implementation of telematics service
	Urban information management	Functional component for implementation of urban information management service

POI: Point of interest

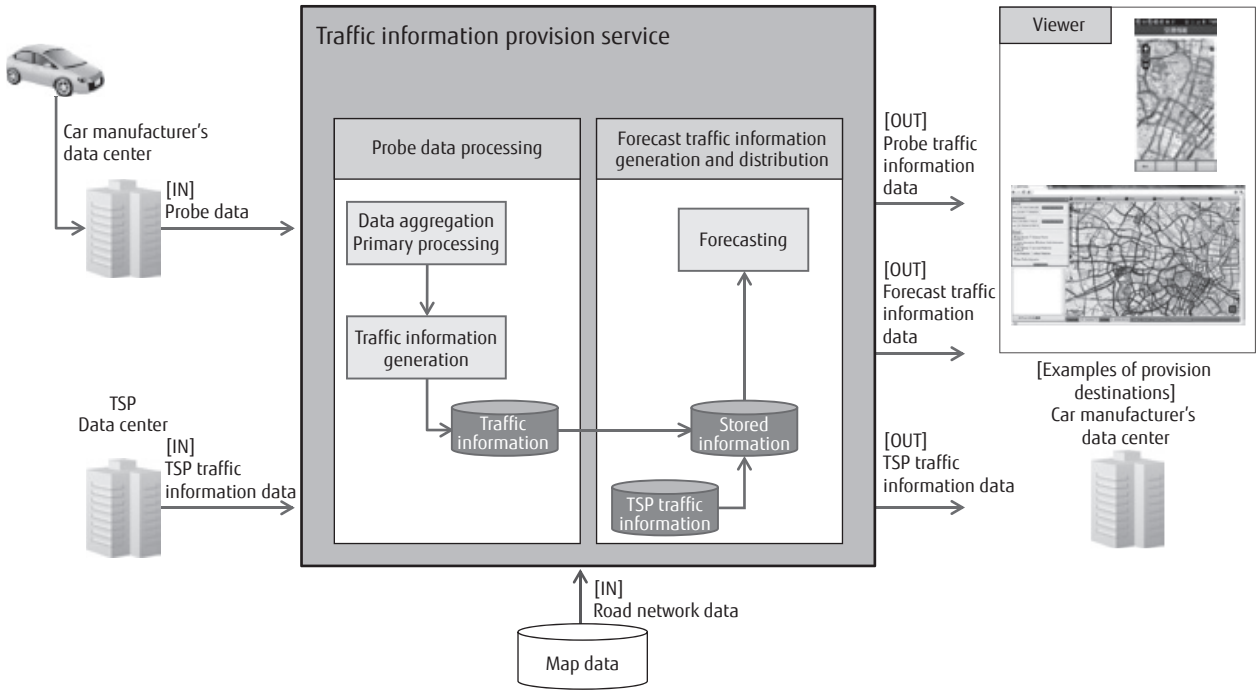

Figure 1
Traffic information provision service.

by the TSP [note 1] and vehicle probe information (hereafter probe data) [note 2], this service outputs and provides traffic information classified into three levels of traffic congestion for each road according to the average speed of vehicles traveling on the road.

Probe traffic information data is generated from the probe data and map data (road network data). For each road that a vehicle travels on, probe data is aggregated and analyzed, and traffic information is generated at five-minute intervals. Further, the traffic information data supplied by the TSP can be supplied as TSP traffic information data as is, and forecast traffic information data can be created based on past traffic information data and supplied (**Figure 1**). Further, this service is characterized by the fact that the probe traffic information data and TSP traffic information data can be merged on a road by road basis, making it possible to provide highly accurate traffic information.

Based on the above, traffic information provision services could be said to be one type of data utilization services that analyze and utilize vehicle probe information that constitutes big data.

Car manufacturers globally are able to utilize their own probe data, which allows them to offer distinctive information services tailored to their own drivers. In addition, by using TSP traffic information data for areas where their vehicles do not travel, car manufacturers are able to provide traffic information that covers extensive areas.

As it aims for a global rollout of a telematics service, Fujitsu decided to launch its traffic information provision service in Europe as an example of a big data utilization service that takes advantage of the following merits.

1) Effectiveness in terms of data aggregation for big data utilization

The generation of traffic information requires the aggregation of the probe data of 3% or more of all the vehicles that are actually on the road. Traffic information cannot be generated based on the probe data of

note 1) Synonymous with congestion information, this is information that is required when displaying with red, yellow and green lines the three traffic congestion levels of roads on car navigation and smartphone navigation screens.

note 2) Information that can be acquired from sensors mounted on vehicles. Such information includes the vehicle's location, speed, mileage, and remaining fuel.

a handful of vehicles only. Traffic information accuracy depends on the amount of probe data acquired. In this regard, car manufacturers are well positioned to acquire the large amounts of probe data required for big data utilization.

2) Provision of services that take advantage of know-how acquired in Japan

Traffic information provision services are already being provided to car manufacturers in Japan. Car manufacturers to whom traffic information provision services are not yet provided can use basic functions already developed for other car manufacturers, allowing service provision in a short time because development is not necessary.

Further, car manufacturers who already use traffic information provision services can also roll out in a short time and across wide areas high-quality services that use traffic information generated from the probe information yielded by their own vehicles and the traffic information of TSPs.

4. Main points for global rollout

As mentioned above, the standardization of the data formats that should be used for the three types of input data, namely probe data, map data (road network data), and traffic information data, is key for the rollout of Fujitsu's telematics service in Europe. This section discusses the possibilities for Europe in this regard, in light of the data formats that are applied in Japan.

The probe data format must be unique to each car manufacturer. In addition to common information such as location information and vehicle speed, probe data includes manufacturer-specific information. For this reason, standardization of the data format for probe data is considered difficult. Accordingly, in Europe, a dedicated tool for converting the format of each car manufacturer into the format defined by Fujitsu must be separately developed for each car manufacturer.

Many different formats exist in Europe for map data and traffic information data. Map data formats include Traffic Message Channel (TMC), Post Geographic Information System (PostGIS), and Digital Road Map (DRM). Traffic information data formats include TMC, Open, Compact and Royalty-free Dynamic Location Referencing (OpenLR), Vehicle Information and Communication System (VICS), and Transport Protocol Experts Group (TPEG).

As most car navigation systems and traffic information display systems that are currently being provided in Japan display the traffic information of main roads using VICS supplied data, the VICS data format is the main traffic information data format in that country. By providing traffic information in the VICS data format, Fujitsu can expect a greater market impact.

Similarly to the above-described assumption for Japan, it is estimated that application of the TMC traffic information data format, which has become the industry standard, particularly in Europe, is essential for the rollout of traffic information in Europe, and also for higher competitiveness.

5. Standard provision data format: TMC

This section gives an overview of the TMC data format and explains why Fujitsu adopted this format.

Traffic information data provided in the TMC data format includes information such as traffic incident content, incident time, and incident location. However, as the incident location data in TMC format data representing traffic information does not include latitude and longitude information, TMC format data cannot be used to provide road information and traffic information. Therefore, matching of road network data that includes the latitude and longitude information and TMC format data is required to identify locations. The following two methods for matching these two types of data are available.

1) Use of TMC tables

Matching tables called TMC tables include IDs for specifying TMC format data, IDs for specifying roads, and coordinates of start and transit points. The congestion information in TMC format data can be displayed on the map screens of navigation and other applications by providing the latitude and longitude information included in the target road ID matched using TMC tables.

2) Embedding of specific IDs in map data.

Traffic information on a road map can be displayed by implementing logic examples (search and extraction of traffic information of target IDs by using TMC IDs allocated to the target road IDs in map data as keywords) in traffic information display applications of navigation systems.

Whether they use method 1) or method 2), manufacturers that provide map data must input TMC tables or the TMC IDs corresponding to each road in the map data.

A survey of the various manufacturers that provide map data for Europe showed that they all create TMC tables or input TMC IDs for each road in the map data. For reference, in Japan, the various manufacturers that provide map data input VICS-specified data ID information for each road in their map data. So it is assumed that by adopting the TMC data format used in Europe, Fujitsu will be able to support most European maps.

6. Conclusion

Fujitsu has planned the rollout of a telematics service in the form of a traffic information provision service for automotive OEMs in Europe. This service will be launched using the traffic message channel (TMC) data format, as we believe that adopting a standard traffic information data format for service data input and output will be key to the service's success.

As its next step following completion of a service providing traffic information in the TMC data format, Fujitsu is planning to expand its service to include support of European standard formats. Specifically, it is aiming for support of TPEG, which is an extended version of the TMC data format. Compared with the TMC data format, the TPEG data format achieves larger data capacity per unit data. Through its use, Fujitsu aims to create a service that allows provision of parking information, weather information, etc. in combination with traffic information, through links to TPSs or content providers, and thereby boost market share for its telematics service in Europe.

Naoki Harashina
Fujitsu Ltd.
Mr. Harashina is currently engaged in sales promotion activities for the SPATIOWL service.