Toward Realization of VICS - Vehicle Information and Communications System

Kaoru Tamura, Makoto Hirayama
VICS Promotion Council
2nd FL., Bansui Bldg.
5-16, Toranomon 1-chome, Minato-ku, Tokyo Japan
Phone: +81-3-3592-5492 FAX: +81-3-3592-5494

Abstract

The VICS (Vehicle Information & Communication System) Promotion Council is participated in by over 200 companies and organizations. Since its establishment in October, 1991, the Council has been conducting research on an information distribution system for drivers with the support of three major ministries: the National Police Agency, the Ministry of Posts and Telecommunications, and the Ministry of Construction. It also continuously reviews the system. As a result, the basic form of the traffic information distribution system is made clear for drivers in Japan.

To make the results of its reviews up to now widely understood by the public, the VICS Promotion Council is currently preparing demonstration.

This paper describes the demonstration, introduces VICS' objectives and the reasons for its establishment, and describes the current status of the its activities.

- Outline of VICS
- VICS demonstration

The public demonstration is scheduled to be held on November 9 and 10, 1993 in the Tokyo Metropolitan area with the cooperation of the National Police Agency, the Ministry of Posts and Telecommunications, and the Ministry of Construction.

Introduction

The automobile is used by people for the sake of convenience, and road traffic demand is on the increase.

Traffic jam and an increase in traffic accidents have been the result, and the original objective of automobile transportation —— "reaching one's destination with safety, comfort, confidence and speed" —— has become more and more difficult to achieve. This problem is widely recognized.

Nevertheless, traffic control is becoming more sophisticated thanks to new roads, road improvement, traffic signals and traffic control systems, and traffic safety education as administrative measure. The fact remains, however, that traffic continues to increase, making road traffic more difficult and unpleasant.

The practical application of the Vehicle Information and Communication System (hereafter referred to as VICS) contributes significantly towards solving these problems by offering a new form of road traffic information to drivers.

Outline of VICS

Objectives of VICS

Objectives: Demand for traffic information has not only greatly increased, but has become more and more sophisticated.

By providing any information in any format drivers want "anytime, anywhere" in response to various drivers' needs, VICS makes it easier to make intelligent driving decisions. By knowing the roads where traffic tends to be jammed, drivers can select optimal routes. In addition, by precisely understanding traffic condition, driver's mental stability can be maintained. It is VICS' objective to "contribute to safe and smooth road use and to improving environmental protection".

The more drivers utilize the information VICS provides, the smoother and safer driving will become as a whole. Each individual who utilizes this information benefits many other drivers who do not directly make use of it, thus VICS will benefit and contribute to society significantly.

Ground for realization: Road traffic is a problem throughout the world. To cope with this, Japan has been laying a solid foundation for a new approach utilizing information communications systems like VICS.

First, a road traffic information collection system has already been built by the public sector. The information for the new information communications systems is already in existence and waiting for effective utilization.

Second, on-board intelligence of vehicles is improved and popularized so that it can use the new information technologies.

Already, approximately 400,000 vehicles have navigation systems

installed, and this is a major factor in the successful building of a nation-wide digital road map database.

Third, development of a mobile communications system which provides information for such vehicle equipment is near completion. Tests of the Advanced Mobile Traffic Information and Communication system (AMTICS), the Road and Automobile Communication System (RACS), and of FM multiplex broadcasting by the Telecommunications Technology Council indicate a promising future for these technologies.

Compared to foreign countries, Japan has a highly-developed basis for the creation of a road traffic information and communication system. What remains to be done is to conduct practical application of this basis.

The VICS Promotion Council is working to making this system a reality at the earliest possible date.

The VICS Organization

Establishment of the VICS Promotion Council: In introducing the new road traffic information system, the National Police Agency, the Ministry of Posts and Telecommunications, and the Ministry of Construction started work to systematize each system developed by each organization involved as a VICS, and inaugurated the "VICS Contact Office" in March 1990 to achieve this, in the recognition that the various systems which have been developed by various organizations should be harmonized and that radio frequencies should be effectively used, based on contribution to traffic safety and smoothness.

In December 1990, the establishment of VICS Promotion Council was planned by the three ministries mentioned above as a preparatory body for the establishment and smooth management of VICS operation body. The VICS Promotion Council was inaugurated in October 1991 with over 200 corporations and organizations participating including most members of the AMTICS Practical Promotion Council and the RACS Practical Promotion Council, which had previously been disbanded to make way for VICS.

VICS Promotion Council Review Organization: The VICS Promotion Council is an organization, which currently has 207 members from the private sector (including eight members from the US and Europe origin) and receives support from the government sector and academic sector.

VICS Promotion Council contains a review body that evaluates its activities through committee meetings.

The review body consists of 3 committees whose subcommittees review different aspects of VICS' activities to improve its progress and efficiency. (See Fig. 1.)

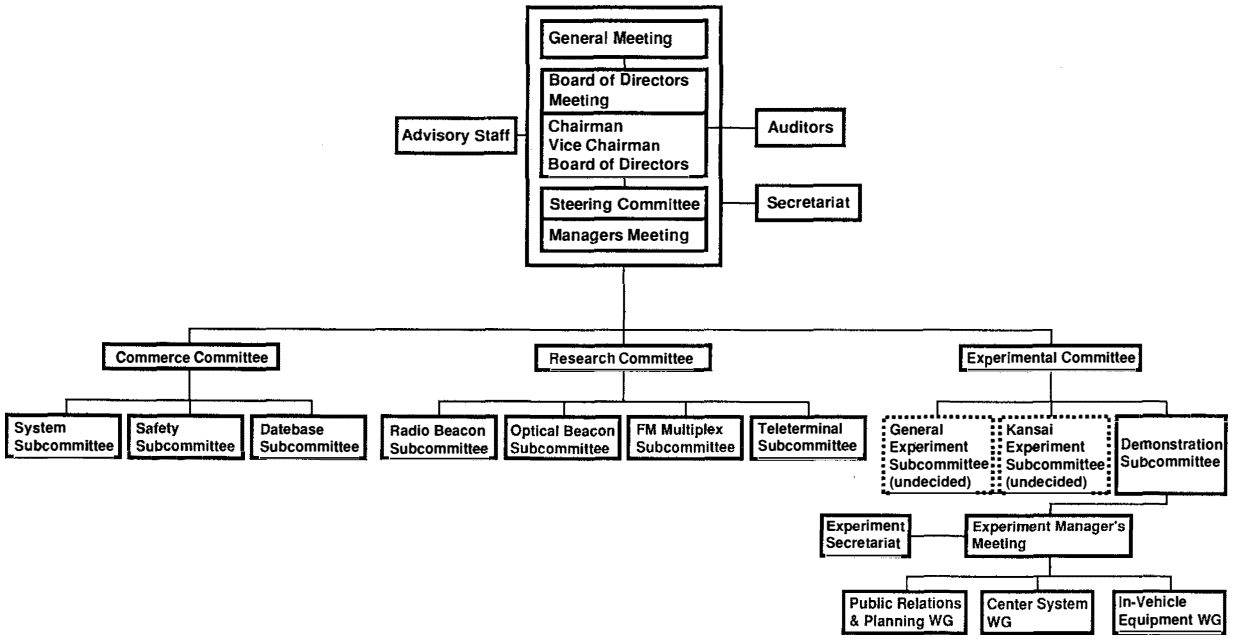

FIG. 1 Organization of VICS Promotion Council

The Commerce Committee is composed of three subcommittees: the System Subcommittee, which reviews VICS' features for practical application, and income and expenditures of VICS operation body; the Safety Subcommittee, which reviews product performance and whether the utilization of VICS information adversely affects safety, and the Database Subcommittee, which carefully investigates what information users want in VICS.

The Research Committee includes the Radio Beacon Subcommittee, the Optical Beacon Subcommittee, the FM Multiplex Subcommittee, and the Teleterminal Subcommittee, and is currently reviewing the harmony between actual utilization methods and VICS in general.
In the Experimental Committee, the Demonstration Subcommittee was set up in Autumn of last year to carry out demonstration to announce the efficiency and usefulness of VICS.

System Outline

Distribution information: VICS works to increase sophistication of navigation by providing information and promoting the effective utilization of road networks. The information includes the following.

(1) Road traffic information
- Traffic jam information (section, degree)
- Accident information (location, causes)
- Traffic restriction information (location, contents)
- Others

(2) Road traffic related information
- Parking information (location, availability)
- Others

Utilization of VICS information: VICS information is provided as realtime information, and the most effective method available is to utilize the navigation system road map screen. The more drivers utilize VICS information, the more beneficial the effects on road traffic in general will be. For this reason, the Council is considering such type of information distribution that more people can easily utilize VICS information.

The following three types of display are under consideration.

(1) Map display
- To display traffic jams, accidents, etc. on the in-vehicle road map and help drivers get information on the entire traffic.

(2) Simplified graphic display
- Text and simplified graphics presented via an in-vehicle TV-type display that shows VICS information.

(3) Text display
- VICS information displayed in text on the liquid crystal display of an in-vehicle radio set and audio set.

System configuration: The VICS system is illustrated in Fig. 2. This figure shows the total VICS concept in accordance with the flow of VICS information.

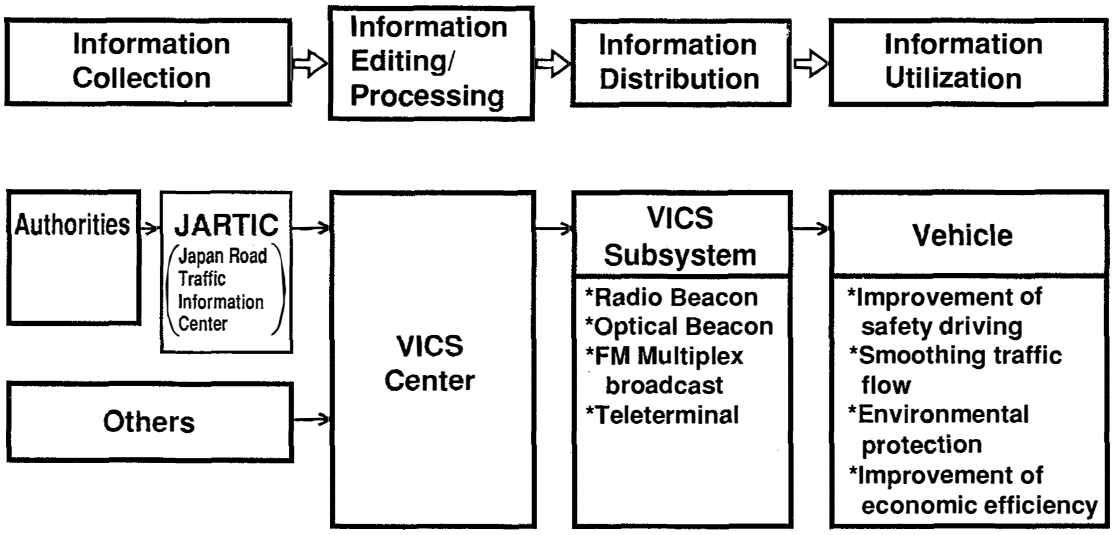

FIG. 2 General Concept of VICS

The VICS structure includes four functions: information collection, editing/processing, distribution, and utilization.

Information on traffic jams and accidents is already collected by public safety commissions and road administrators. The VICS center edits and processes the information it receives. In addition, parking lot and other information is received from other organizations.

For information editing/processing, VICS center receives information and data sent from multiple information sources and sends it to the proper media for transmission in a unified and centralized manner.
Beacon, FM multiplex broadcast, and teleterminals are under

study by VICS Promotion Council as information distribution media. Methods of utilization and the advantages and special features of each media are also being studied.

To enable people to take appropriate action in driving such as choosing a less congested road by utilizing VICS information, in-vehicle equipment manufacturing companies are developing their own in-vehicle equipment in line with the safety guideline plan drawn up by the Safety Subcommittee. The VICS Promotion Council would like to see healthy competition leading to improved equipment and better information utilization.

At VICS, these four functions must be fused. If even one is missing, the goals of traffic safety and smoothness cannot be achieved.

VICS Demonstration

Purpose

As a result of its review up to this time, the VICS Promotion Council has been able to clarify the basic form of a traffic information distribution system for drivers in Japan, and clarify its social, economic, and safety-improvement effects and impact on society and industry. To inaugurate this system as soon as possible, the Council has decided that a public promotion effort is essential.
To this end, the VICS Promotion Council is conducting not only a review, but is also performing experiments in the field and preparing experiment sites for users. Through this, experience is being obtained, and demonstration is planned to make the effects of the system clearer.

Review Organization

A concrete review of the current demonstration is now being made by the Experimental Committee and the Demonstration Subcommittee, which were organized in October 1992.

Fifty-five corporations and organizations are participating in the Experimental Committee, and fifty-three of these corporations and organizations in the Demonstration Subcommittee.

The Demonstration Subcommittee includes the following working groups:

- The Public Relations & Planning Working Group, which carry out a plan to effectively gain acceptance and understanding of VICS.
- The Center System Working Group, which review infrastructures.
- The In-Vehicle Equipment Working Group, which review and manufacture equipment for use in vehicles.

These working groups are making extensive reviews, while closely communicating with the subcommittees of the Commerce Committee and the Research Committee.

Demonstration Plan

Basic requirements for demonstration: It is possible to obtain a correct understanding and evaluation on the part of users by conducting the demonstration according to specifications similar to those that will be used in practical application. By so doing, user's suggestions can be reflected in the system's specifications. The demonstration should utilize the system that will be adopted for actual use.

For infrastructure, information, and in-vehicle equipment, practical application can be considered as shown below.

(1) Implementation with the same infrastructure as used in practical application: Information processing and distribution process by same procedure used in practical application.

(2) Implementation using the same information used at the time of practical application: Realtime data on traffic jams, restrictions, accidents, travel time, parking information, etc.

(3) Implementation with the same in-vehicle equipment as that used in practical application: Free design based on the originality of in-vehicle equipment manufacturing companies

Conditions matching those at the time of practical application: For practical application of VICS, marketability and social acceptability must be ensured. In the demonstration and system verification, basic function evaluation and VICS social acceptability and marketability will need to be evaluated. The contents of these are described below in detail.

In the plan of the present demonstration, the most important feature is that the system's marketability be confirmed. This will divided into information and media aspects, and conditions will be set as described below. From an early stage of the Demonstration Subcommittee's review, these conditions have been requirements for decision of value of implementation of the demonstration.

(1) Multiple information sources (unified information processing) The information obtained independently by public safety commissions and road administrators could until now only be obtained separately via many kinds of media and at different places. By unifying this and related information in digital form, VICS can systematically provide information of various types matched to user needs.

(2) Realtime information (required information when necessary) In Japan, a number of different vehicle navigation systems are already on the market. Among these, a route guide function to show the user the route to a desired destination is available. However, this guide does not show traffic conditions at that time. By providing road traffic information in realtime, the user can select routes more intelligently. Some manufacturers' equipment includes a vacant route guide that is automatically displayed. This reduces travel time and alleviates road jam. The travel time reduction is the most important factor in

VICS marketability.

(3) Multiple media (background of various products responding to needs)
These media include a beacon, which (from the user viewpoint) provides location-specific information intermittently in micro zones, and FM multiplex broadcast, which provides wide-range information everywhere and at all times. Healthy development will require a user-oriented system. The demonstration will therefore need to include many types of in-vehicle equipment and be conducted under actual road conditions.

Verification of VICS system: In the demonstration, two basic functions will be evaluated: operational reliability in relation to the demonstration specifications, and the efficiency of the information distribution function.

(1) Verification of operational reliability
It is necessary to confirm the reliability of information processing and communications lines and the display operation of this rapidly-changing dynamic information distribution system.

(2) Verification of efficiency
To verify efficiency, the usefulness, accuracy of information distribution location, display visibility, ease of understanding, etc. will be confirmed. In verifying these, compatibility with existing information distribution media will be taken into consideration.

Verification of VICS social acceptability and marketability: The most important part of the VICS demonstration is the preliminary evaluation of social acceptability and marketability. This evaluation will be made through a public questionnaire survey after finishing the above function verification.

(1) The social acceptability evaluation will be conducted to see if the participants agree that the system is beneficial in the demonstration.

(2) It is presumed that companies will freely design and manufacture in-vehicle equipment in a soundly competitive way. To establish a market that many users can utilize as soon as possible, a wide range of prices and services are needed. Proper evaluation can be made by providing multiple types of equipment for vehicles used in the demonstration.

Description of Demonstration

Total system: A total view of the demonstration system is shown in Fig. 3. In the demonstration, beacons (radio and optical) and FM multiplex broadcasting media will be used.
Information distribution media: The review was made in conformance with the seven layers of OSI to match media.

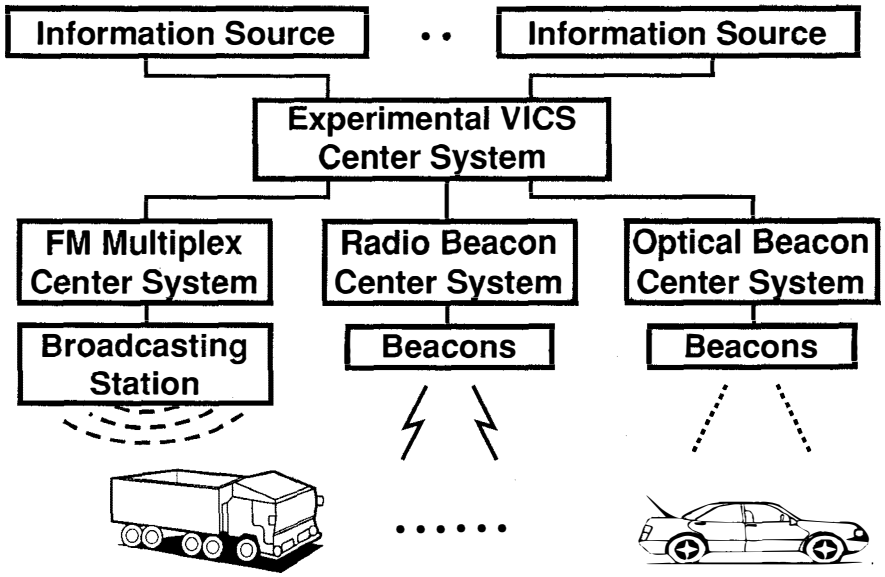

FIG. 3 Vehicle and On-board Equipment Outline of the Experimental System

Layers 5 to 7 of each media are currently reviewed in VICS Promotion Council.

(1) FM multiplex broadcast (wide-range information distribution)
Data communications are made by utilizing the subchannel of FM multiplex broadcast. The transmission rate is 16 kbps, and 288 bits are transmitted as one packet. A single service zone coincides roughly with that of an FM radio station.

(2) Radio beacon (intermittent micro-zone information distribution)
The beacon reviewed concretely up to now is a communi-

DOCKET ALARM

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts

Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research

With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips

Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS
Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS
Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS
Sync your system to PACER to automate legal marketing.