Session Five
ITMS Technology

Raj Ghaman, Federal Highway Administration — presiding

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Gary E. Euler
Federal Highway Administration

Using a series of viewgraphs, Mr. Euler provided a framework for thinking about ITMS technology. He stressed the need to think of the technology aspects of ITMS in a broad and comprehensive manner. Mr. Euler covered the following major elements during his presentation.

- Surveillance and monitoring provides the basis for the development of ITMS. The four elements of a comprehensive surveillance system include point detection, area detection, probes, and AVI/AVL. All of these are needed for a comprehensive system. Each provides different information that is needed in the system.

- The information provided through the different elements needs to be processed or fused, which is a term coined from the military. Data fusion is a term applied to the decision process utilized with the information provided by a variety of sources. IVHS provides the opportunity to rethink the approach to incident detection and develop new techniques and approaches that may be more effective in the long run.

- The processed data can be used for a number of purposes. For example, providing this information to individuals in the home and workplace can help improve the travel decision-making process. The focus of many IVHS programs to date has been on providing in-vehicle information. However, a number of recent projects are focusing on obtaining a better understanding of the different travel markets and the types of information travelers desire. It is important to remember that the information provided by these systems must be accurate, reliable, and based on what people want.

- The information provided through ITMS is also used in the control and management of the transportation system elements. These include the broad areas of traffic controllers, speed advisories, incident management, routing, and pricing.

- There are a number of software challenges that will need to be addressed in the development of ITMS and IVHS. These include dynamic assignment, traffic condition prediction, and combining ITMS and ATIS.

- A number of issues are associated with the communication functions of ITMS. These focus on how much information is available, how frequently it should be provided, and the costs of the different methods of dissemination. The involvement of the private sector will be needed in this area and creative approaches will be necessary to facilitate this involvement.

- IVHS system architecture is also another important area. This will establish the basic framework for IVHS. It will identify the functions to be included and will define how the system will be designed. It will define the type and nature of the infrastructure needed to support the desired functions and will outline the components of the system for manufacturers and the private sector. In essence, it will define what functions are to be accomplished and how they will be accomplished.

- The IVHS America System Architecture Committee has recommended to the U.S. Department of Transportation that a substantial amount of funding be made available to

support different teams working in parallel to sketch out IVHS architecture. The number of teams would be narrowed the second year to focus on designing those system that appear most feasible and to identify the benefits and costs of these. At the same time, the committee recommended a consensus building process that would involve all the major stakeholders. This consensus building process would reach out to all groups and organizations to ensure that they understand the issues, process, and have an opportunity to participate in the development of the system architecture.

INFORM System Hardware and Software

Daniel H. Baxter
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Mr. Baxter presented on overview of the INFORM system architecture. He covered the operational objectives of the system, the development of the system architecture, and the process for adoption. Major points covered included:

- The first step to understanding the complex system architecture needed in any ITMS project is to understand what the system is trying to accomplish. Once the objectives, which are often relatively simple, are outlined, the system can be designed and developed to meet these.

- The INFORM system was built around the integrated motorist information system (IMIS). The system has built on this with functions and enhancements added over time. The operational goal of IMIS, which was more a control and information system, was to marry a freeway traffic management system with an arterial street traffic management system.

- The INFORM corridor includes more than one longitudinal freeway, which made it an ideal setting for the demonstration. Initially, the project focused on balancing the utilization of capacity between those freeways and the major arterials in the corridor.

- The selected architecture for the system was to implement the freeway controls for all the facilities using one rule-based system architecture. A rule-based architecture basically means that a set of rules is developed and adopted that apply to each of the freeway management segments. The simplest rules, which might address failed equipment, will apply to a large number of problems that the system has to process. Other sets of rules are then developed for other issues. A table or matrix format is used to illustrate these, so that each type of problem or occurrence has a rule to cover the appropriate response.

- The integration of the freeway traffic management system and the urban traffic control system was accomplished through the use of shared memory. This approach was a relatively simple process, but at the time it represented a new technique. It allowed for the coordination of strategies for freeway-to-freeway diversions, freeway-to-arterial coordination, and the interface of ramp metering and freeway and arterial operations.

- Other elements, such as the master controller for the 75 variable message signs, were added to the system. Automated message generation, capacity balancing through traffic diversion, and surface-street sensitive ramp metering are three areas the INFORM system focused on.

- Although the hardware is now outdated, the basic approach and concepts utilized in the development of the INFORM system do provide a good model for other areas.