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Chapter 1
Introduction

Introduction

This report summarizes the results of the Intelligent Transportation System (ITS) Early Deployment Study for the bi-state Kansas City metropolitan area. The purpose of this study was to identify the ITS user services appropriate for Kansas City and develop a Strategic Deployment Plan based on these user services. Following a discussion of the transportation characteristics in the Kansas City metropolitan area and an examination of the user services, this Strategic Deployment Plan documents the system architecture, alternative technologies, and deployment plan for an intelligent transportation system in the Kansas City area.

Participating Agencies

The Early Deployment Study is a joint project of the Kansas Department of Transportation (KDOT) and the Missouri Highway and Transportation Department (MHTD), and is being administered by KDOT. A project Steering Committee, which includes representatives from KDOT and MHTD, as well as the Federal Highway Administration (FHWA) and the Mid-America Regional Council (MARC), has provided suggestions and feedback throughout the study, meeting nine times during the course of the 12 month study.

Intelligent Transportation Systems

The United States has one of the most extensive and best transportation systems in the world. However, increasing vehicle miles of travel have resulted in increased congestion and decreased mobility in many urban areas. Highway travel delays in urban areas total more than two billion hours annually, costing billions of dollars in productivity and lost working hours[1]. And the situation, left unchecked, may be expected to get even worse. According to a study by FHWA, delays on urban freeways are expected to increase by 360 percent in the central cities and by 433 percent in outlying areas in the twenty years between 1985 and the year 2005[2].

The increasing demand for transportation comes at a time when there are limited opportunities to build more roadway lanes. Construction and reconstruction activities are often physically constrained by urban development. The addition of roadway capacity is also limited by environmental regulations which discourage (or in some cases do not allow) the construction of additional facilities for single occupancy vehicles, and by social opposition to roadway projects which facilitate low density development and urban sprawl.

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[1] US Department of Transportation, *Moving America, New Directions, New Opportunities, A Statement of National Transportation Policy, Strategies for Action*. February 1990.
[2] Federal Highway Administration, *Urban and Suburban Highway Congestion*, Working Paper No. 10, Washington, DC, December 1987.

In response to the need to address increasing congestion and increasing demand without building additional facilities, and in response to the need to better utilize the existing facilities, more and more urban areas are turning to advanced technologies. These advanced technologies are generally components of an intelligent transportation system (ITS).

Intelligent transportation systems were formerly called intelligent-vehicle highway systems (IVHS), however, the name was changed to reflect the fact that these systems encompass not only highways and cars, but all modes, including transit, rail, and air, as well as intermodal connections. Commercial vehicle operations, including highway, rail, air, waterway, and intermodal connections, are also incorporated into ITS. Furthermore, note the inclusion of the term system, which emphasizes that all modes and functions of the transportation system should be integrated to provide optimal efficiency and system performance.

As a general definition, intelligent transportation systems are systems that utilize advanced technologies, including computer and process control technologies, to enhance the safety and efficiency of the transportation system. Although there is no distinct origin to ITS, activities can be traced to a number of projects that began in the 1970s and 1980s[1]. These activities were initiated in a number of different countries, and involved government, industry, academic institutions, and trade and professional organizations. The various activities gradually merged into a single concept, evolving to focus on the transportation system, and not merely on discrete system components.

In the United States, individual cities and states undertook early activities. Federal involvement was formally initiated with the Intermodal Surface Transportation Efficiency Act (ISTEA), promulgated in December 1991. This legislation authorized $660 million of federal funds to support ITS activities over a six-year period. This funding, which has been supplemented by ITS funding in the annual U.S. Department of Transportation appropriation acts, has been used for early deployment planning studies such as this one, as well as other ITS projects.

Focus of ITS Study

The major focus of the Early Deployment Study is on the freeways in the Kansas City metropolitan area. This focus on the freeways is justified by the fact that freeways are the backbone of the transportation system in the Kansas City area. Kansas City has more freeway miles per capita than any other city, and freeways account for over 70 percent of the vehicle miles traveled in the metropolitan area[2]. Because freeways serve so much of the travel in Kansas City, investments that have a positive impact on freeway operations can result in substantial benefits.

Arterials and transit, while an important element in the transportation system, play a smaller role in terms of overall mobility in the metropolitan area. The smaller role of arterials and transit is reflected by the fact that arterials and transit are included in the plan where they

[1] Discussion based on *Smart Highways, Smart Cars*, Richard Whelan, Antech House, Inc., 1995.
[2] David L. Schrank, Shawn M. Turner, and Timothy J. Lomax, *Trends in Urban Roadway Congestion - 1982 to 1991, Volume 2: Methodology and Urbanized Area Data*, Research Report 1131-6, Texas Transportation Institute, September 1994.

impact freeways (for example, arterials may serve as alternative routes when there is an incident on the freeway), and to the extent that they impact the transportation system as a whole.

Focus of Strategic Deployment Plan

The focus of the intelligent transportation system described in this Strategic Deployment Plan reflects the priority user services. The primary component of the Strategic Deployment Plan is a freeway monitoring and advanced traffic management system. This system addresses the highest priority user services: Incident Management, Traffic Control, Emergency Notification and Personal Security, Emergency Vehicle Management, and En-Route Driver Information. This system will also meet the objectives identified by the surveys provided at the public meetings: reduce congestion, manage traffic, and provide information. These and all of the user services are discussed in Chapter 3.

The Strategic Deployment Plan also contains provisions for the deployment of intelligent transportation technologies related to transit. This component addresses the transit related highest priority user services: Public Transportation Management and Public Travel Security. This component also encourages alternatives to the single occupancy vehicle, the fourth ranking objective identified by the surveys provided at the public meetings.

Organization of Report

Following this introductory chapter, Chapters 2 and 3 summarize the existing conditions and priorities. Chapter 2 provides a discussion of the transportation system characteristics, problems, and opportunities in the Kansas City area. Chapter 3 defines the user services, and identifies which ones are appropriate in the short, medium, and long term.

Chapters 4 through 7 address the system architecture, the technologies that may be used for an intelligent transportation system, the expected benefits and costs of the proposed system, and the plan for deployment.

Chapter 4, which examines the system architecture, presents the three alternative architectures considered, and discusses the analysis procedure used to select the recommended architecture.

Chapter 5 provides a discussion of the technologies that could be used for an intelligent transportation system. Following a discussion of the characteristics, benefits and limitations of various technologies, a discussion of strategies for the application of these technologies are provided, and ITS activities in selected urban areas are reviewed.

Chapter 6 analyzes the benefits and costs that would be expected to result from deployment of the proposed intelligent transportation system. Benefits are estimated for the recommended freeway management system, and costs are estimated for individual components, as well as for the recommended system.

Chapter 7 discusses the proposed deployment plan. Priorities, a deployment schedule, and an operations plan are presented, as is a discussion on interagency coordination and opportunities for public/private partnerships.