Purpose

Intelligent Transportation Systems (ITS) refers to a broad range of technologies, including information processing, communications, traffic control, and electronics, which can be used to improve the safety, efficiency, dependability, and cost effectiveness of the transportation system. More specifically, ITS technologies can:

- Collect and transmit real-time information on traffic conditions and bus transit schedules for travelers before and during their trips, making trips more predictable and thereby saving traveler's time and money;
- Improve the efficiency of the roadway network with technologies such as traffic signals that respond to flows and peak demands;
- Improve the productivity and cost effectiveness of public transit through automated vehicle locator systems that increase on-time performance and in-vehicle monitoring systems that ensure timely vehicle maintenance;
- Mitigate congestion by reducing the number of traffic incidents, clearing them more quickly when they occur, and rerouting traffic around them where appropriate;
- Support better emergency response times and services;
- Improve safety through monitors that detect early bridge and roadway icing and alert drivers;
- Improve the productivity of commercial fleets by using automated tracking, dispatch and weigh-in-motion systems that speed vehicles through much of the paperwork typically associated with interstate commerce; and
- Assist drivers in reaching desired destinations with navigation systems enhanced with path finding or route guidance.

Given all the different existing and emerging technologies, it is important that standards be developed nationally and regionally to ensure that projects are integrated and will work together with ITS systems from other agencies and jurisdictions. Federal law requires that all Federally funded ITS projects be in conformance with an adopted national ITS architecture and appropriate technical standards in order to provide consistency with ITS strategies and projects. However, it is recognized that not all elements of the national architecture may be applicable for every state or region. Thus, conformance with the national architecture is interpreted to mean use of it to develop a regional architecture, which is required for larger metropolitan areas such as Milwaukee or Madison. An ITS architecture is a structured approach or framework for defining, planning, and integrating ITS. It defines needed systems and functions and how to integrate different types of existing and future technology projects so they work seamlessly and cost effectively. The architecture identifies agreements and standards and the interconnections and information exchanges among the different systems of each agency and jurisdiction. A common vocabulary defined by the ITS architecture allows better communication between colleagues.

Integration Benefits Save Time and Resources

The National Intelligent Transportation Systems (ITS) Architecture is a framework for developing and deploying ITS. It consists of resources (knowledge) and tools that help facilitate the deployment of effective and interoperable ITS. The National ITS Architecture helps regions gain the full benefits of intelligent transportation systems by aiding the purchase of compatible equipment and services.

The National ITS Architecture guides multilevel efforts in implementing systems that are compatible nationwide to:

- Minimize the risk and cost of deployment
- Improve inter-jurisdictional, interagency, and public-private communications
- Increase efficiency and effectiveness
- Improve product quality
- Streamline operations

The National ITS Architecture accommodates multiple designs using diverse technologies of ITS system components, while assisting agencies to achieve the benefits of interoperability of easier administration, enhanced use, and easier management. Its purpose is to make sure that systems are compatible from one location to another and with each other in a particular location, for example, that the information being gathered for real-time ramp metering could also be used for traveler information. Thus systems can be integrated both functionally and geographically. Individual implementers can use this architecture to guide the design of their own systems, thus

eliminating duplication of effort, which will reduce costs and errors. With the National ITS Architecture, implementers are able to avoid the costs and delays associated with false starts.

Regional ITS Architectures

Organizations included in the Architecture are public and private organizations that perform transportation and public safety functions. These include state, county, and municipal traffic agencies, emergency service providers (law enforcement agencies, emergency medical responders, fire departments, and tow service providers), media, and information service providers (ISPs). The geographical extent of Wisconsin's Regional Architectures is bound by the regions established by the Wisconsin Department of Transportation. Information flow connections crossing the line bounding these counties are considered to end in generic "terminators" in order to make the Architecture geographically extensible.

The Regional ITS Architectures throughout Wisconsin were developed to address interagency coordination among transportation and public safety organizations in the region that provide transportation services. Information exchanged among transportation and public safety organizations must be timely, accurate, useful, and consistent to enable these organizations to fulfill their functions. As demand for related services increases and organizational responsibilities increase, existing systems owned and operated by these organizations will require enhancements. Transportation and communications technology is growing exponentially, providing multiple solutions to real or perceived system deficiencies. In order to address these increased demands in a logical, efficient, and readily understandable manner, a common method of describing these systems and proposed enhancements is needed, readily available to all participating organizations. Any architecture shows the relationships established by interconnections among system elements. In an ITS regional architecture, these elements include transportation user services performed, actual subsystems owned or operated by each participating organization, and the information flows among them.

Two important uses of the Architecture are to provide a comprehensive description of the existing transportation infrastructure in the region and to provide a baseline for future infrastructure and system development. The Architecture shows what regional transportation-related organizations are doing today, and the subsystems, information flows, and processes that make these activities possible. It does so in the language and grammar defined by the FHWA National Architecture and satisfies the interim federal regional architecture requirement. It should also be one of several regional architectures developed and eventually integrated into the Wisconsin ITS Architecture, in order to provide a consistent platform for ITS project evaluation across the state. Planned subsystems and information flows are also included and flagged in the architecture, to show the direction of transportation communications infrastructure evolution. Future transportation projects can be readily entered into the architecture, allowing the proposed informational connectivity to be compared with existing and planned conditions. This is expected to be the more important of the two uses, as regional ITS architectural compliance is and will remain a requirement for federal ITS project funding.

The National ITS Architecture is a common framework for planning, defining and integrating intelligent transportation systems and their technologies. It defines: Tasks and functions, such as gathering traffic information or requesting a route; the physical devices that carry them out, such as loop detectors or telecommunications links; and the paths and connections by which data flows among the various physical devices to accomplish the task or fulfill the function.

Development of regional ITS Architectures throughout Wisconsin were completed in 2002 and includes the following federally required components:

- Description of the region;
- List of participating agencies and other stakeholders and their ITS inventories;
- An operational concept that assists in defining roles and responsibilities of the participating agencies and other stakeholders;
- List of interagency agreements necessary to operate and implement the systems identified in the inventory;
- Functional requirements for systems;
- Interface requirements between systems and information flows between subsystems and terminators;
- ITS standards that support regional and national interoperability; and
- Sequence of ITS projects required for implementation.

Development of the regional architecture started with a stakeholder outreach effort focused on determining existing and planned ITS deployments. User needs were assessed and user services that could fill stakeholder needs were determined. All ITS deployments must fit within the current or future regional ITS architectures.