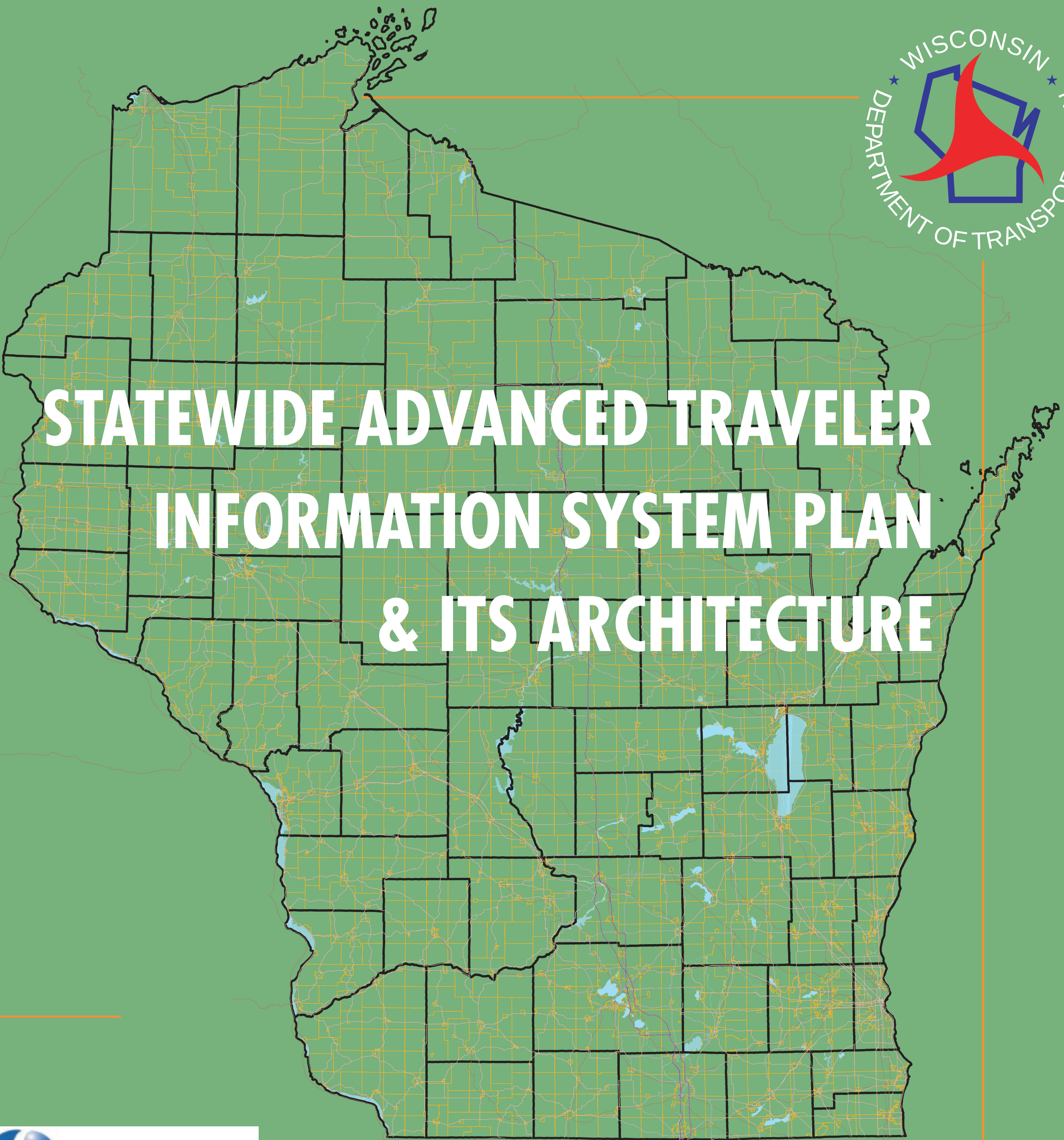
WISCONSIN DEPARTMENT OF TRANSPORTATION



STATEWIDE ADVANCED TRAVELER INFORMATION SYSTEM PLAN & ITS ARCHITECTURE

SmartWays
Wisconsin's Intelligent Transportation System
Helping you travel better

August 2001

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GLOSSARY OF ACRONYMS AND ABBREVIATIONS

AAA	Automobile Association of America
ATC	Advanced Traffic Signal Controllers
ATIS	Advanced Traveler Information Systems
ATMS	Advanced Traffic Management Systems
AVL	Automatic Vehicle Location
BAS	Bureau of Automation Services
CAD	Computer-Aided Dispatch
CATV	Cable Access Television
CCTV	Closed-Circuit Television
CMS	Changeable Message Sign
CVISN	Commercial Vehicle Information Systems and Networks
CVO	Commercial Vehicle Operations
DMS	Dynamic Message Signs
DNR	Department of Natural Resources
DTID	Department of Transportation Infrastructure Development
DTIM	Department of Transportation Investment Management
ESS	Environmental Sensor Stations
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GCM	Gary/Chicago/Milwaukee Corridor
GPS	Global Positioning System
HAR	Highway Advisory Radio
http	Hypertext Transfer Protocol
ITE	Institute of Transportation Engineers
ITIS	International Traveler Information Interchange Standards
ITS	Intelligent Transportation Systems
ITSA	Intelligent Transportation Society of America
LRMS	Location Referencing Messaging Specification
MDC	Mobile Data Computer
MDT	Mobile Data Terminal
MPO	Metropolitan Planning Organization
NTCIP	National Transportation Communications ITS Protocol
NWS	National Weather Service
PC	Personal Computer
RFP	Request for Proposals
RFPP	Request for Partner Proposals
RWIC	UND Regional Weather Information Center
R/WIS	Road/Weather Information System
SAE	Society of Automotive Engineers
SDO	Standards Development Organizations
TCIP	Transit Communications Interface Profiles
TIC	Travel Information Center
TMO	Transportation Management Organization
USDOT	United States Department of Transportation
VMS	Variable Message Sign

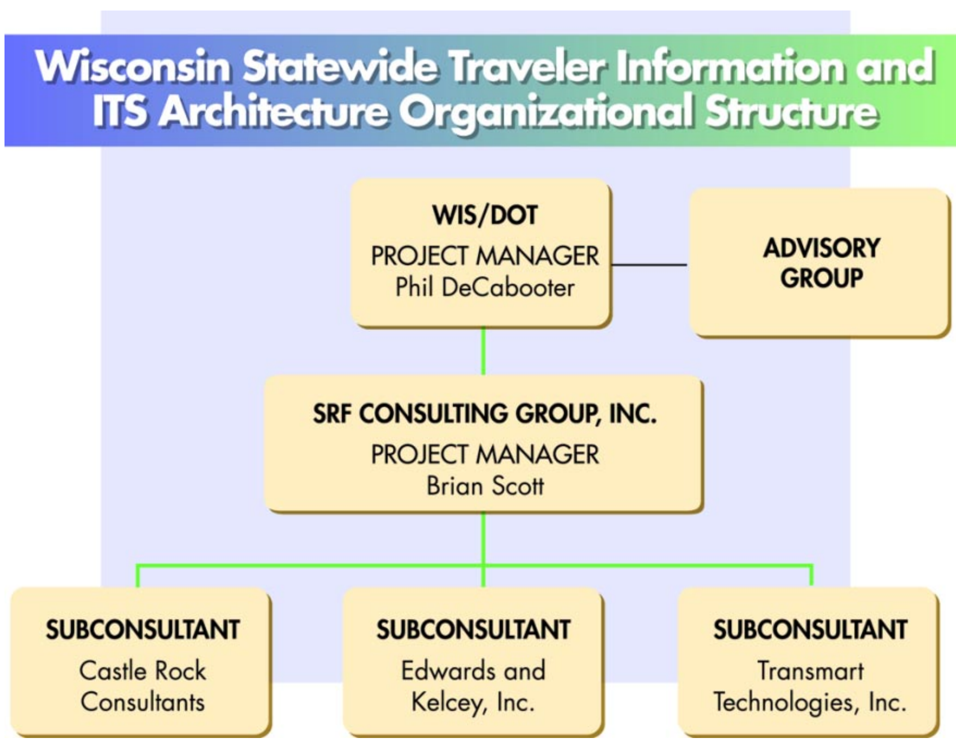
0. EXECUTIVE SUMMARY

INTRODUCTION

The Wisconsin Statewide Advanced Traveler Information System (ATIS) Plan and ITS Architecture provides the Wisconsin State Department of Transportation (WisDOT) with a comprehensive ITS planning and deployment tool, which may be applied to a statewide plane.

The Statewide ATIS Plan develops the statewide framework for how traveler information is to be shared between transportation districts and the methods for disseminating information to travelers in Wisconsin. The statewide ITS Architecture defines the relationships and information sharing needs between ITS systems in the region.

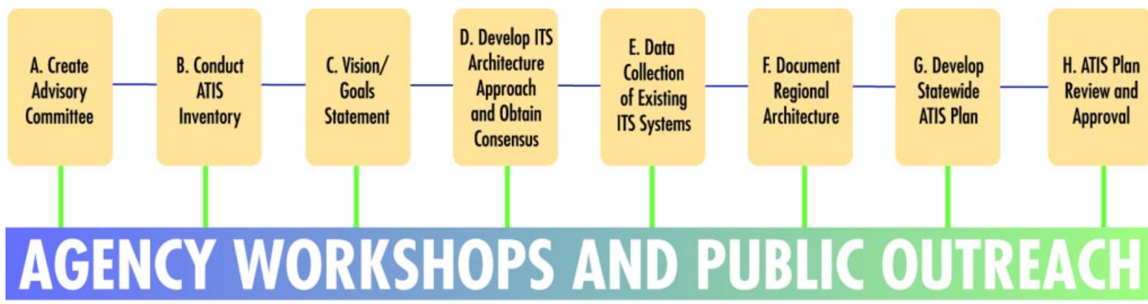
To insure proper oversight and guidance, from the departments perspective, an Advisory Group was formed and charged with the responsibility of leading the development of both the ATIS Plan and the ITS Architecture (see diagram below).



The resulting document developed under this effort provides the Advisory Group, and the appropriate WisDOT executives and policy makers with a summary of the status of existing ATIS systems throughout the state, as well as, define the overall direction for deploying ATIS and ITS in Wisconsin.

ATIS Plan Deployment Process

The development of the ATIS plan and ITS architecture was accomplished by following a process that assessed the status of existing systems in Wisconsin, solicited input from the stakeholders and incorporated this stakeholder input into the development of the plan throughout the process.



SRF Consulting Group, Inc.

ATIS PROCESS
STATEWIDE TRAVELER INFORMATION & ARCHITECTURE

Definition of ATIS Elements

One of the initial steps was to define the ATIS elements. ATIS elements identify and analyze the attributes of traveler information (who, what, when, where, how and why):

- **Who** are the markets and customers for information services?
- **What** is the actual travel-related information that should be delivered?
- **When** (at what point before or during the trip) should information be delivered?
- **Where** (in what geographic area) should the information be delivered?
- **How** (by what method) will the information be delivered to the user?
- **Why** is the information being provided? What is the desired outcome?

The **Who** of ATIS elements is broken down into 36 current and potential customers of ATIS. The list of potential customers has been grouped into categories that reflect their likely use of similar ATIS information. The main customer bundles are listed below:

1. Travelers
2. Transit and Paratransit Providers
3. Emergency Service Dispatchers (air and land)
4. Fleet Managers/Dispatchers
5. Agencies/Jurisdictions
6. Other Users/Disseminators

What information these users receive is an integral component of all ATIS. Specific travel-related information sets were chosen by the Advisory Group for this purpose and are summarized as the following bulleted items.

- Route specific road conditions – weather-related
- Road construction/operations
- Weight restrictions – weather-related
- Trip travel times/operating or actual speeds
- Congestion levels
- Incidents
- Weather conditions – visibility, etc.
- Posted detours
- Closures/alternate routes
- Tourist information: lodging and activities, gas stations, truck stops
- Medical emergency facilities locations
- Transit scheduling
- Park-and-ride locations
- Airport and parking information
- In-vehicle road guidance
- "Mayday"
- Parking availability – metro area
- Event parking and information

The **When** of the ATIS elements is critical to the effectiveness of the data being delivered. If the timing of the delivery is poor the information will be useless to the user. The data timing/accuracy may be either: current (real-time or delayed), periodic, or forecasted. The trip related timing may be: before the trip, during the trip, on-site/at-site, or at all times.

Geographic area plays a role when considering **Where** the information should be introduced to users, should ATIS information be introduced in metro areas only whether it be by spot, small area, corridorwide, or metrowide. Or, should ATIS information span to other cities, sub-regions, rural areas, statewide, or even out of state.

How the information is disseminated to the user is the final piece of the ATIS puzzle. The following is a subset of the ATIS dissemination methods.

- Phones/cellular phones
- Pagers
- Kiosks
- View-only monitors
- Fax
- Internet/websites/e-mail
- Intranet
- Commercial radio
- HAR
- TV/Cable TV
- VMS/CMS
- Mobile Data Terminals
- In-vehicle devices
- HAT
- Printed media
- Static roadway signs

ATIS Vision & Goals

Next, a vision statement was developed for ATIS throughout the State of Wisconsin. The Advisory Group developed the following vision statement using the definition of ATIS as its foundation.

VISION STATEMENT
TRAVELERS AND TRANSPORTATION OPERATORS IN WISCONSIN WILL HAVE THE INFORMATION THEY NEED TO HAVE A SAFE, EFFICIENT AND SATISFYING TRIP.

Wisconsin holds both long-term and short-term milestones for the ATIS vision. In the short-term the goal is to provide timely core information to core users at selected geographic locations, and long-term the goal is have a mix of public- and private-sector entities delivering accurate, consistent and reliable information to make travel safer and more efficient, and to increase user satisfaction.

Current and Planned ATIS Initiatives

An inventory of the existing, currently underway and planned ATIS projects in Wisconsin was performed. The inventory was done on a high-level basis, a few of the attributes include: users of the system, travel information provided, geographic area served, etc. The types of projects inventoried were: CDSI, Gateway, Monitor and ICOP to name a few.

ATIS Data Quality Standards

Once the inventory of the existing systems was complete, the Advisory Group identified the desired quality of the information to given to customers. Data Quality Standards (DQSs) have been identified for each of the ATIS element groups identified by the Advisory Group and are included in this report. These DQSs can be used as a tool for comparing existing or planned ATIS systems to Wisconsin's vision, goals and objectives for ATIS. Secondarily, the DQSs can be used as a high-level planning tool for executives and policy makers when planning future ATIS projects.

DQSs are reflected by two key concepts: data types and data attributes. Data types are classes of data that are necessary to support traveler information systems. Data attributes are defined as measurable parameters for a given data type.

Having identified the quality of existing data being provided based on the predefined attributes and the data types the information "gaps" in the quality, amount and type of data collected may be addressed. Refer to chapter six in the text to reveal in-depth detail regarding this topic.

PUBLIC AND PRIVATE SECTOR ROLES

The roles and responsibilities of the public- and private sectors with respect to ATIS and the role of business model selection for ATIS was defined next. The public-sector goal is to maximize transportation safety and efficiency while minimizing travel times and costs. Public-sector focus tends to be on cost-effectiveness measures, not cost recovery. Private-sector businesses focus on cost-revenue measures for determining the effectiveness of any system deployment.

In the way of business models for ATIS, there are four general methods of public/private integration:

- Model I – Public Centered Operations
- Model II – Contracted Operations
- Model III – Franchise Operations
- Model IV – Private, Competitive Model

Along with business models, there are market forms that fall in-line with business models. The business model that is selected for use with ATIS will effect the nature of competition or "market form" for ATIS throughout the state. The following table (Business Model Selection Criteria) details the relationship between business models and market forms.

Model	Market Form	Cost	Competition	Prod Diversity	Objectives Met
Public-Centered Operation	N/A	High	Very Low	Low	High
Contracted Operations	Monopoly/ Oligopoly	Medium	Low	Low	High
Franchise Operations	Monopoly / M. Competition	Medium	Medium	Medium	Medium
Private, Competitive Model	Perfect Competition	Very Low	Very High	High	Low

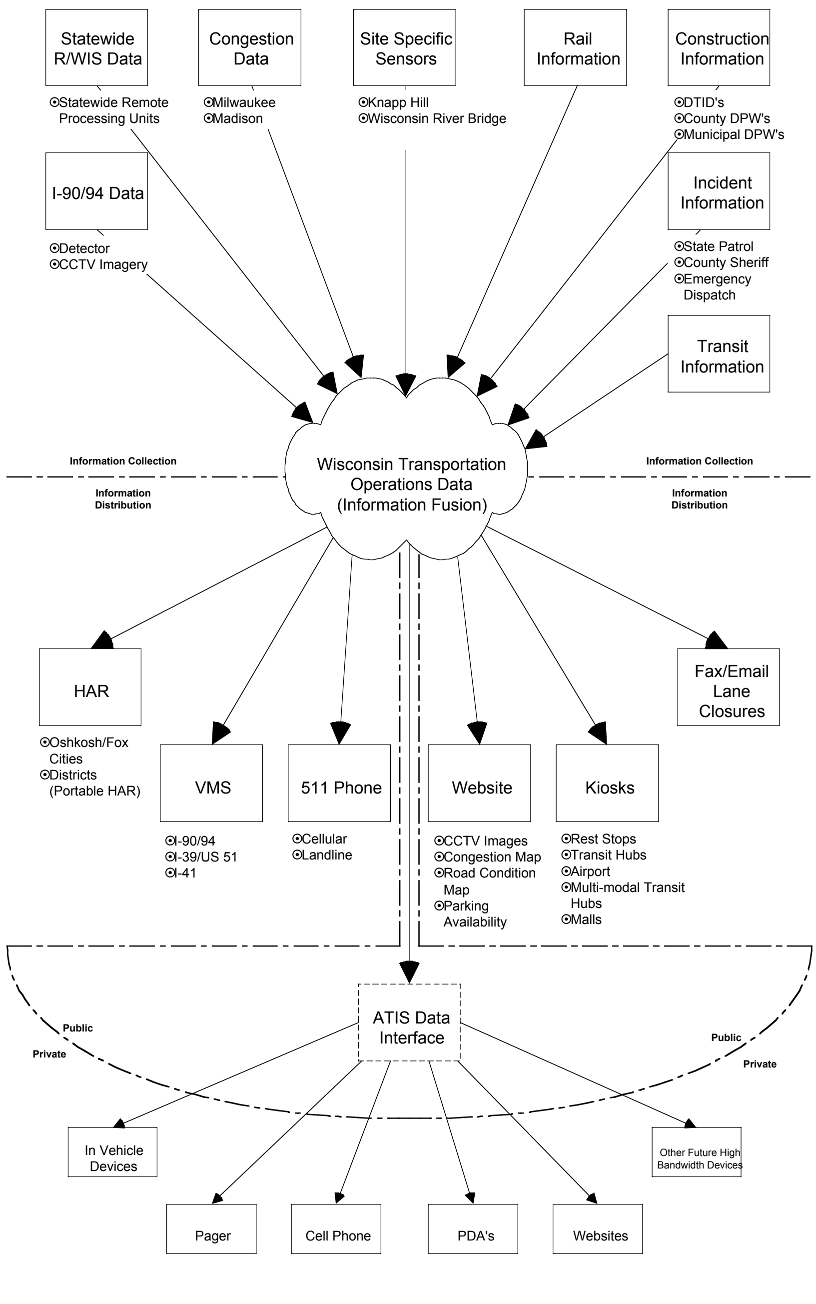
Refer to chapter seven for further detail regarding this topic.

ATIS IMPLEMENTATION PLAN

ATIS development guidelines and an implementation plan are necessary to properly direct ATIS efforts in Wisconsin. A preliminary set of guiding principles were defined to create the foundation for developing ATIS. The ATIS deployment plan is one that fits with the WisDOT Statewide ITS Planning Guidelines. These guidelines provide a method for establishing the structure of WisDOT ITS planning on a statewide basis of a ten-year time frame.

A Statewide ATIS systems approach requires that any element incorporated into the system is part of a planned, coherent, integrated whole. A result of the work performed on the project, a model for the collection, fusion and dissemination of traveler information was developed. The following figure displays this model.

WISDOT ADVANCED TRAVELER INFORMATION SYSTEMS
PROPOSED PROJECT INTER-RELATIONSHIP DEVELOPMENT DIAGRAM



When developing the ATIS plan, the goal was to focus on the integration of existing traffic operations data and integrate this data into useful traveler information. A selection index was devised to rate the appropriate travel-related information for dissemination, which in turn would drive the project selection for deployment. An example is as follows:

		Maturity				
What is the Travel-Related Information that is Delivered?	**Priority Index**	**Data**	**Comm**	**Processing**	**Maturity Total**	**Selection Index**
Trip travel times/operating or actual speeds	5	3	3	3	3	**15**

This information was used to identify "early winner" projects for inclusion in the ATIS Deployment Plan. The SRF Team, along with the Advisory Group, developed projects that would address the ranked information sets. The projects identified as "early winner" projects are listed below:

1.0 ATIS Database Design
2.0 Synthesized Advanced Traveler Information Systems (ATIS), Pilot Project
  2.1 Statewide Road Condition Data Collection and Information Integration
  2.2 Statewide Construction Information Data Collection and Integration
  2.3 Traffic incident Information Collection and Integration
  2.4 Congestion Information Collection and Integration
  2.5 Parking Availability Information Collection and Integration
3.0 Automated Daily Lane Closure Information (Automated Dissemination)
4.0 Highway Advisory Radio (HAR) and Telephone (HAT), Pilot Project
5.0 511 Abbreviated-Dial Traveler Information Number Conversion
6.0 511 Weather Forecast Information System (ATWIS)
7.0 ATIS Information Kiosks, Pilot Project
8.0 Integration of TOC Data across two Districts, Pilot Project
9.0 Statewide Communication Infrastructure

RECOMMENDATIONS

Recommendations were made to assist with the coordination of ATIS elements in project initiatives and operations in Wisconsin. Many of the recommendations have identified the accountable organization for each.

Recommendation #1: **Implement Oversight of ITS Projects**
Purpose: Provide direction on ATIS initiatives that require coordination with existing statewide systems as well as district system.
Responsible Organization: DTIM or DTID

Recommendation #2: **Identify Staff Accountable for ATIS and ITS Coordination**
Purpose: Creates single point of contact for ATIS and ITS projects
Responsible Organization: DTID

Recommendation #3: **Create and Ongoing ATIS Technical Group**
Purpose: Provide technical advice for all projects involving ATIS elements and to provide a forum for face-to-face communications and coordination among technical leaders of ITS projects.
Responsible Organization: Current members of Advisory Group

Recommendation #4: **Conform to the ITS Guidelines and Project Development** Process
Purpose: Ensure a particular initiative fits within the statewide ATIS plan and within ITS Guidelines
Responsible Organization: NA

Recommendation #5: **Define Accessibility to Public Sector Data by the Private Sector**
Purpose: To clearly define a WisDOT policy to address whether or not a fee should be charged for data or develop a quid quo arrangement. This would ensure that all service providers are treated equally.
Responsible Organization: NA

Recommendation #6: **Continue Work on ATIS Policy Regarding Public/Private Sector Roles**
Purpose: Continually update or remain on top of issues as components of the statewide traveler information system are deployed and as technology and market forces affect the dissemination and sale-ability of this information.
Responsible Organization: NA

NATIONAL ITS ARCHITECTURE

The main goal of the Statewide ITS Architecture for the Wisconsin Department of Transportation is to provide a framework for the development of ITS systems in Wisconsin that will allow for the integration and interoperability of disparate systems. The secondary goal of development is to conform to the National ITS Architecture.

The two main components of the National ITS Architecture are the Logical and Physical Architecture. The Logical Architecture presents a functional view of the ITS user services. While the Physical Architecture partitions the functions defined by the Logical Architecture into systems, and at a lower level, subsystems, based on the functional similarity of the process specifications and the location where the functions are being performed.

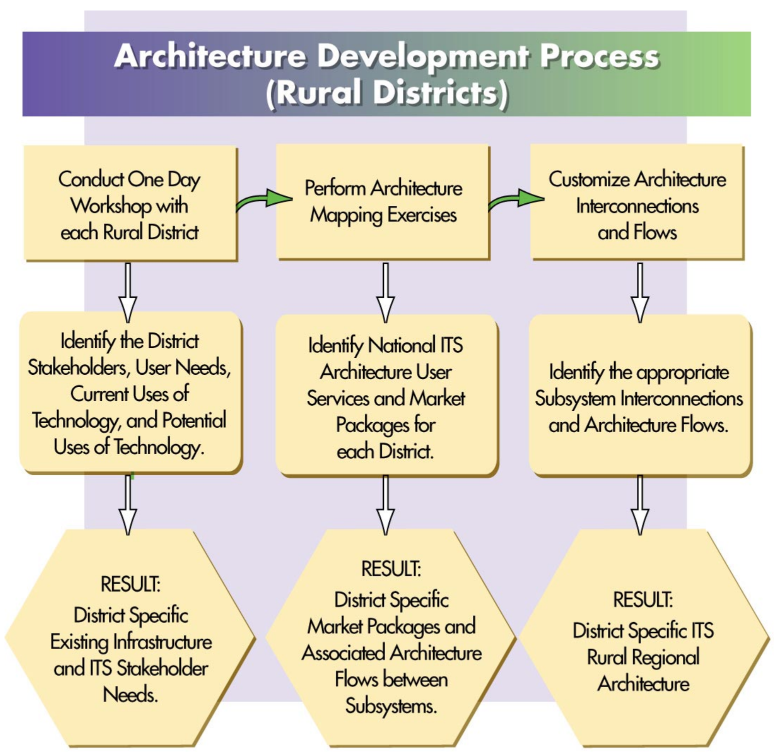
The Physical Architecture has a distinct graphical hierarchy that provides a layered effect to the level of detail. The first being the "Sausage" diagram, second the "Interconnect" diagram, and third the "Subsystem Architecture Flow" diagram. Each of these three views of the architecture allows the user to take away specific insight into the composition of the architecture.

STATEWIDE ITS ARCHITECTURE DEVELOPMENT PROCESS

The Advisory Group, along with the help of the SRF team, decided to implement a three-tiered architecture approach for the Wisconsin Statewide Architecture. The three-tiered approach allows for the movement from one tier to the next across the board without significantly hindering the level of detail that one must use. The middle level, or regional level, served as the starting point for the statewide effort.

The state was divided up into eight (8) regions. The regions then divided into metropolitan and rural WisDOT districts. The rural districts are the focus of this effort while the metropolitan districts are being completed under separate tasks and will be incorporated into the statewide architecture database.

The rural regional architectures were developed using a process the SRF Team designed, a graphical representation of this process follows:



The statewide architecture was compiled using the five rural regional architectures.

Regional ITS Architectures

The regional ITS architectures were broken down into five separate architectures based on the WisDOT district boundaries. The regional architecture provides a thorough description of the region, identifies the participating agencies and associated stakeholders. It indicates high-level functional requirements, and defines the interface requirements and information exchanges with planned and existing systems and subsystems. The regional architectures also identify the appropriate ITS standards which support the regional and national interoperability of the architecture.

Following the regional architecture development process each district regional architecture began with a workshop being conducted in the corresponding district. The existing ITS infrastructure was documented during this session, along with identifying the regional issues and needs.

For each district the inventoried needs were mapped into the National ITS Architecture, and that product was customized to reflect the ITS architectural make-up of the district. Each of the five WisDOT district architectures are discussed in depth in chapter 12 of the final plan document.

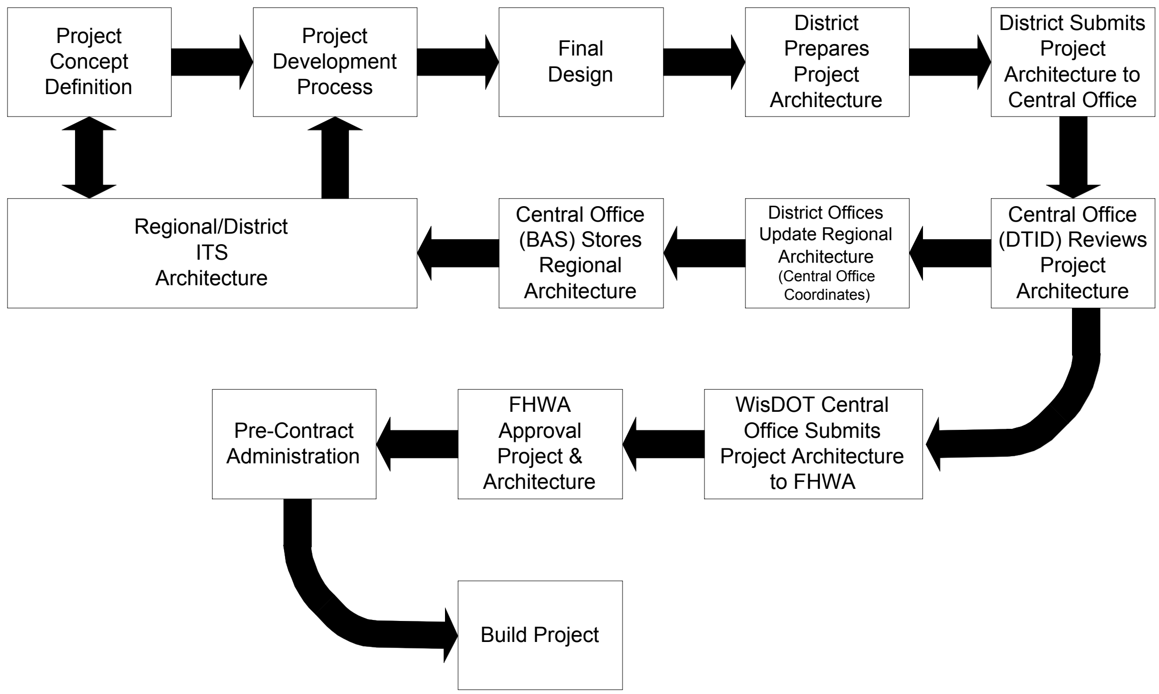
Statewide ITS Architecture

As was previously mentioned, the statewide architecture was developed using the architectures from Districts 4-8 for this effort. Districts 1, 2, and 3 are currently in the process of development or require modifications to each of their respective architectures. That being said, the Statewide ITS Architecture is merely an extension of the regional architectures in conglomerate. Due to its open, modular nature the architecture will be able to receive the other district architectures upon completion, as well as, any additions that may be necessary in the future.

Statewide ITS Architecture Operations and Maintenance

The Statewide ITS Architecture is a planning tool that will need to be maintained. Thus, a key item not overlooked by the Advisory Group was the assignment of the appropriate organization to be accountable for the architecture maintenance and any necessary operation of the database.

BAS was identified as the appropriate WisDOT organization to house the architecture. As updates to the architecture become necessary DTIM, DTID and BAS would be responsible for architecture technical support. In addition to these organizations, a support contract with a consultant may be necessary to provide the added architecture knowledge. Architecture updates should be approved by DTIM and the current Advisory Group. And DTIM may also be responsible for securing the necessary funding to move approved projects forward to final design. An approval process was developed by the Advisory Group for project architecture development (see below).



It is recommended that the process for the development of ITS projects be incorporated into the existing WisDOT Facilities Design Manual, for which, DTID has been identified to coordinate.

1. INTRODUCTION

The Wisconsin Statewide Advanced Traveler Information System (ATIS) Plan and ITS Architecture are setting the stage for the planning and deployment of ITS on a statewide basis. The Statewide ATIS Plan develops the statewide framework for how traveler information is to be shared between transportation districts and the methods for disseminating information to travelers in Wisconsin. The statewide ITS Architecture defines the relationships and information sharing needs between ITS systems in the region. This report is divided into two major sections: Chapter two through nine deals with the statewide ATIS plan; while chapters ten through fourteen provide an overview of the ITS architecture. The actual statewide ITS architecture materials are provided in an electronic database format.

ATIS Planning and Deployment:

Many of the Wisconsin Department of Transportation (WisDOT) districts are in the process of planning, and in some cases, deploying ITS projects that have a traveler information component. For example, projects in District 1 that involve a major traveler information component include:

- Interstate Traffic Monitoring and Traveler Information Project
- Advanced Signal Operations/Coordination & Surface Street Traffic Monitoring Project
- County Maintenance Snow & Ice Management Project
- Agency Data Sharing
- Enhanced Weather and Pavement Conditions Monitoring
- Rural, Non-Interstate Traffic Monitoring
- Arterial Dynamic Message Signs and Dynamic Trailblazer Signing
- Communications Infrastructure

The ITS efforts underway in districts, such as the planning and future installation of surveillance systems on I-94, I-90 and I-39 (traffic detectors and CCTV), will allow the transportation districts and other Wisconsin agencies to assess the real-time status of traffic along these important corridors. WisDOT will then be able to use information gathered from these surveillance systems to provide detailed traveler information via ATIS tools such as variable message signs. The information that can be conveyed to travelers includes a broad range of travel-related information such as:

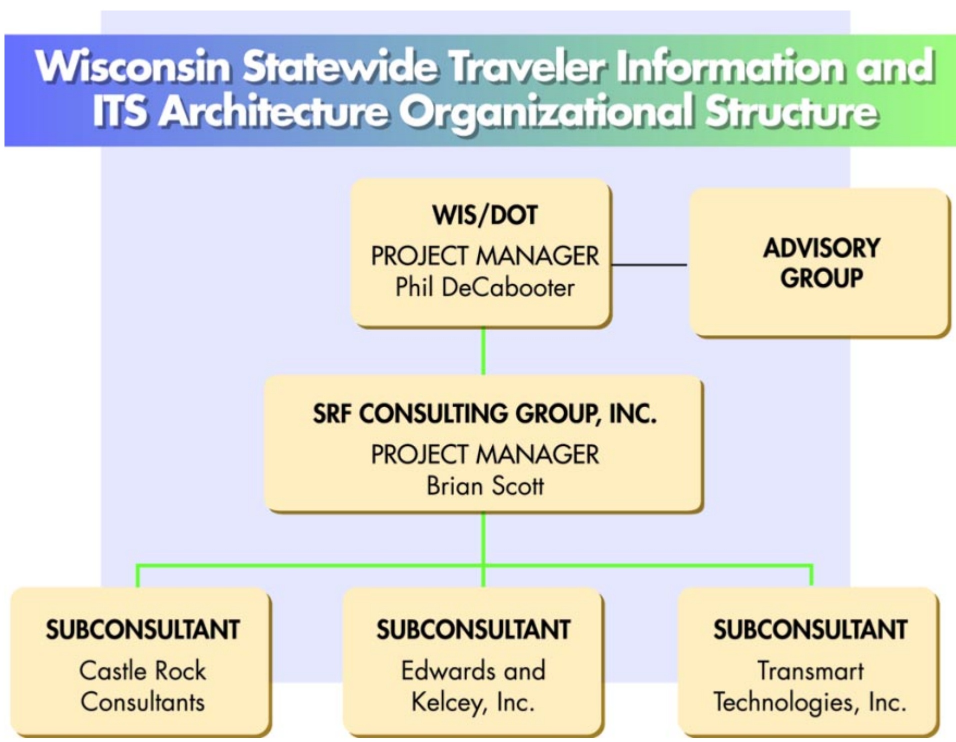
- Road conditions
- Weather conditions
- Congestion information
- Construction information and lane closures
- Accident locations and expected duration to clear

- Effects of construction, maintenance and incidents on traffic flow
- Recommended alternate routes and en-route traveler information via signing along these alternate routes

While the Statewide ATIS Plan develops the framework or blueprint for ATIS deployments, the district efforts take ATIS deployments in Wisconsin through the next steps of development including the planning, design and deployment of the traveler information systems.

The Advanced Traveler Information Systems (ATIS) and ITS Architecture Advisory Group was established by WisDOT in early 2000. The Advisory Group was charged with the responsibility for leading the development of two very important planning projects: the Statewide ATIS Plan and the Statewide ITS Architecture. The organizational structure for this project is shown in Figure 1.

Figure 1



The Statewide ATIS plan identifies short- and long-term goals and includes all ATIS activities in which WisDOT is either a leader or a participant. Development of this plan will help ensure that the travelers' and agencies' needs, constraints, opportunities and responsibilities are addressed, and that the resulting ATIS deployments and systems meet the needs and expectations of each agency and the public.

Statewide ITS Architecture:

The Statewide ITS Architecture forms the framework for integration of ITS systems throughout Wisconsin and with systems in bordering states. This ITS Architecture helps to:

- Identify all of the stakeholders that need to be involved with ITS projects
- Describe the processes that are performed
- Define the interconnections between systems and subsystems
- Develop a blueprint for integration of these systems
- Deploy integrated systems

Using the ITS Architecture can produce the following benefits:

- Reduce design costs and development time
- Provide for orderly and efficient system expansion
- Result in lower system costs over the life-cycle of the system
- Foster better communications between people and systems
- Reduce the risk of deploying and operating systems

Document Purpose:

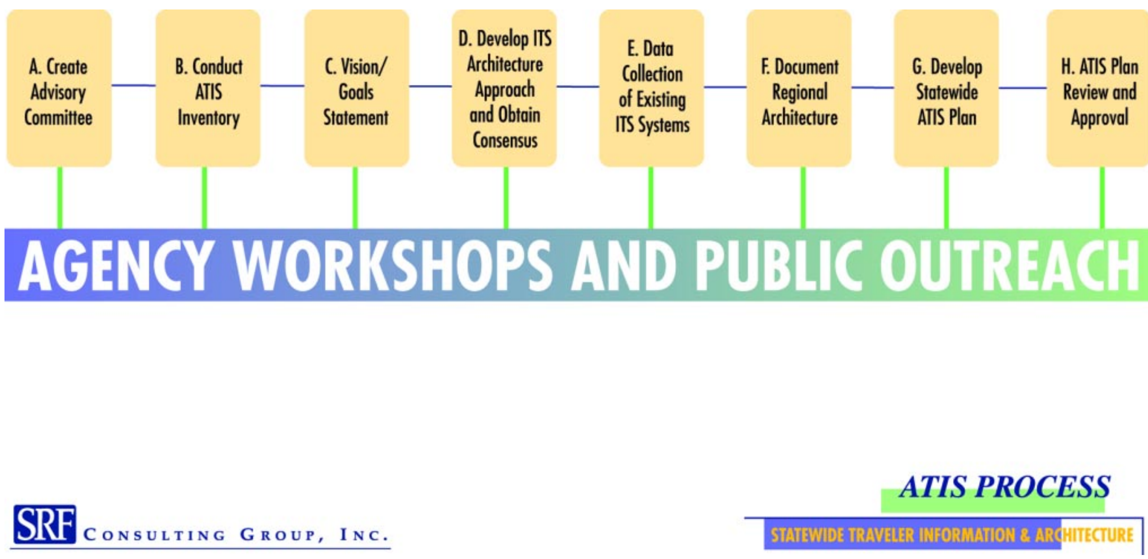
The purpose of this document is to provide the Advisory Group and WisDOT executives and policymakers with a summary of the status of existing ATIS systems in Wisconsin and to define the overall direction for deploying ATIS in Wisconsin. This direction has been documented in the ATIS vision, goals, objectives and performance measures.

The desired outcome of this effort is to help the Advisory Group and WisDOT management in developing a level of understanding of ATIS, what ATIS is from a statewide perspective and to obtain a fundamental understanding of the ITS Architecture.

2. ATIS Plan Development Process

Development of the ATIS plan and ITS Architecture was accomplished by following a process that assessed the status of existing systems in Wisconsin, solicited input from the stakeholders and incorporated this stakeholder input into the development of the plan throughout the process. This section provides an overview of the process used to develop the ATIS Plan and Statewide ITS Architecture. Figure 2 provides a graphical representation of this process.

Figure 2



A. Creation of Advisory Committee and project development process

An Advisory Group was assembled to oversee project activities and provide overall project management direction to the SRF consultant team. The Advisory Group members included the project manager, Phil DeCabooter from WisDOT Department of Transportation Investment Management (DTIM), ITS section representatives from the central office (Department Transportation Infrastructure Development (DTID), Bureau of Automation Services (BAS), State Patrol, etc.), along with representatives from the WisDOT districts and the Federal Highway Administration (FHWA).

The Advisory Group formed as part of this project helped to ensure that the traveler's and agencies' needs, constraints, opportunities, and responsibilities were addressed, and that the resulting ATIS deployments and systems meet the needs and expectations of each agency and the public.

The Advisory Group participated in the development of an ITS vision, goals and objectives for the project; identification and assessment of wants and needs and sensitive issues related to ATIS. The team met on a monthly basis throughout the project and reviewed the project deliverables and provided input on the technical analysis associated with the project.

B. ATIS System Inventory

An inventory of major state projects that exist, are currently underway, or are planned, was completed to determine the state of ATIS deployment in Wisconsin. This high-level inventory included a review of information previously documented in project reports and was augmented by interviews of key stakeholders involved with selected projects or programs. The inventory documented the definition of a stakeholder and identified who the key stakeholders are, what their roles are, which customers are served, what data is provided, which delivery mechanisms are used by each initiative, etc. The inventory organized the ATIS-related projects by the organization responsible for them.

An aggregation of metropolitan, regional and statewide projects was used to provide geographic context to the users of each project. This analysis was used to identify gaps or overlap in the types of data items provided by ATIS systems.

C. Vision/Goals Statement

A series of workshops was conducted with the Advisory Group to present the status of ATIS in Wisconsin and to determine the desired future roles of the key stakeholders in providing ATIS information.

The objective of this task was to work with the key stakeholders to develop the vision, goals and objectives of ATIS in Wisconsin. A key outcome of this task was to help the Advisory Group develop a general understanding of ATIS and what ATIS is from a statewide perspective, and to obtain a fundamental understanding of the ITS architecture.

From this task, a clear, concise and easy-to-understand vision statement and guiding principles for ATIS deployment were developed. This vision statement and goal statements for Wisconsin strive to build upon the base of ATIS and ITS systems that exist in the region and set a high level direction for traveler information systems.

The vision developed for ATIS in Wisconsin helped to identify the priority goals for ATIS from which more detailed action plans and objectives were documented. The goals and objectives provided the foundation for formulating the policy regarding the roles of the public and private sector in developing and operating ATIS systems.

D. Statewide ITS Architecture Approach & Rural Architecture Workshops

The objective of this task was to agree on the ITS Architecture focus for the remainder of this project. The ITS Architecture approach defined by the Advisory Group was the implementation of a three-tiered statewide architecture. The three-tiered architecture approach builds its foundation on the project level, stepping to the regional level, and continuing to the statewide tier.

For the ITS Architecture, the state was divided into regions, which are defined by the district boundaries. From these regions, metropolitan and rural regions were identified. The SRF team used a series of workshops with each of five rural districts to define current and future ITS needs. The workshops were conducted with state, county, city and other public agencies to identify the current and potential ITS applications of ITS in Wisconsin and to develop the user requirements for the statewide ITS architecture.

E. ITS Systems Data Collection

This step involved collection of information on the status of existing ITS systems for development of the statewide architecture.

F. Architecture

The ITS architecture provides a common structure for the design, implementation and operation of ITS systems. It is a flexible framework around which multiple design approaches can be developed. In developing the Wisconsin ATIS architecture, information gathered during the ATIS system inventory task and rural ITS architecture workshops was mapped to the National ITS Architecture to ensure consistency.

The physical components were grouped into categories based on their function and location. This provides a method of examining ITS systems based on the relative location of the individual subsystems. Existing, planned and desired (future) information flows were documented in the statewide ITS Architecture. See Chapter 11.

G. Statewide ATIS Plan

The next step was to develop the Statewide ATIS Plan. This plan, in conjunction with the supporting ITS Architecture, defines the framework for ITS and ATIS in Wisconsin. This plan provides the framework of how existing and future systems, services and projects "fit in" to the statewide ATIS system. The plan:

- Enables existing and future stakeholders to determine their role in the statewide ATIS
- Aids stakeholders in matching projects and concepts to the statewide ATIS
- Aids WisDOT in prioritizing projects
- Helps decision-makers in matching resources to projects

The Advisory Group also worked through the potential business models for ATIS deployment. The main attributes and characteristics of several business models were documented and presented to the group.

The plan provides recommendations on the future ownership and development of ATIS in Wisconsin based on technical, legal, financial and political issues.

H. Plan Review and Approval

The final step in the process was the plan review and approval. The draft plan was distributed to the committees for review, followed by presentations of the plan by the SRF team. Comments were incorporated into the final deliverable documents.

3. DEFINITION OF ATIS ELEMENTS [1]

In this report, the term "travelers" is sometimes used as a substitute term for "customers" or "users." Also used interchangeably in this report are the terms "data" and "information." Generally speaking, data refers to the raw material collected. This data can be given to travelers/customers either as unprocessed data or as processed, value-added information. In both cases, the customer receives information. If the data is passed on to other information service providers for them to add value to it, the passed-on data is considered data, not information.

The objective of providing advanced traveler information is to enable users to make informed decisions about their travel to achieve certain desirable outcomes (e.g., more relaxed, faster, safer travel). To understand the elements of the ATIS process and how to achieve its objectives requires an analysis of the who, what, when, where, how and why:

- **Who** are the markets and customers for information services?
- **What** is the actual travel-related information that should be delivered?
- **When** (at what point before or during the trip) should information be delivered?
- **Where** (in what geographic area) should the information be delivered?
- **How** (by what method) will the information be delivered to the user?
- **Why** is the information being provided? What is the desired outcome?

Each of these elements must be defined to provide a complete description of a specific ATIS initiative. Working through the descriptions of each element helps to provide a picture of how a project will integrate into the elements of other projects, either planned or in place.

INFORMATION (WHAT), CUSTOMERS (WHO), AND OUTCOMES (WHY)

In defining ATIS in Wisconsin, it is necessary to first identify what types of information will be delivered, to whom it will be provided and what the expected outcome of delivering this information will be. This basic description of ATIS elements provides the foundation for exploring specific implementation opportunities.

Table 1 identifies 36 current and potential customers of ATIS. The list of potential customers has been grouped into categories that reflect their likely use of similar ATIS information. Additionally, specific information items, the customers served by the information items, and the outcomes of delivering the information items are identified and summarized in Table 2. Please note that the numbers in the customer column of Table 2 directly correlate with the numbers assigned to each customer in Table 1.

An analysis of Table 2 indicates that there is a great deal of overlap of expected outcomes from the information provided. Table 3 shows how each information item can serve a variety of outcomes.

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(1) A portion of the information contained in this section was taken from the "Minnesota Statewide Plan for ATIS" prepared by SRF Consulting Group, Inc. for the Minnesota Department of Transportation due to the similarities in travelers and traveler information in Minnesota and Wisconsin.

TABLE 1
ATIS CUSTOMERS

1. **Travelers**

By Mode

- 1.1 Auto drivers
- 1.2 Auto passengers
- 1.3 Transit riders
- 1.4 Para transit riders
- 1.5 Telecommuters
- 1.6 Pedestrians
- 1.7 Bicycle Riders
- 1.8 Freight carriers

By Travel Purpose

- 1.9 Commuters (work trips)
- 1.10 Non-work (non-peak periods)
- 1.11 Recreation
- 1.12 Seasonal/2nd residence commuters
- 1.13 Tourism
- 1.14 Pass through traffic (trucks/automobiles)

2. **Transit & Paratransit Providers**

- 2.1 Vehicle drivers
- 2.2 Reservations/scheduling
- 2.3 Dispatching
- 2.4 Trip planning
- 2.5 School administration/school bus driver

3. **Emergency Service Dispatchers *(air and land)***

- 3.1 Ambulance
- 3.2 Police
- 3.3 Fire
- 3.4 State Patrol
- 3.5 Highway Helpers
- 3.6 Tow Truck Operators

4. **Fleet Managers/Dispatchers**

- 4.1 Shippers
- 4.2 Transit dispatchers
- 4.3 Delivery fleets
- 4.4 Freight carriers

5. **Agencies/Jurisdictions**

- 5.1 State/county/city/transit, etc.
- 5.2 Maintenance/operations
- 5.3 Traffic Management Centers
- 5.4 Transit Operations

6. **Other Users/Disseminators**

- 6.1 News/TV and radio reporters
- 6.2 Employers
- 6.3 MPOs

TABLE 2
INFORMATION ITEMS, CUSTOMERS AND OUTCOMES

Information Item	Customers[1]	Outcomes
Route-specific road surface condition – weather related	All customers	Improved safety, diverted traffic, less trip delay, fewer trips, less congestion, improved operations, improved customer service and satisfaction, time savings
Road surface construction/ops	All customers	Improved safety, diverted traffic, less trip delay, fewer trips, less congestion, improved operations, improved customer service and satisfaction, time savings, plus greater user satisfaction, convenience
Weight restrictions (weather-related, but different)	1.8, 2, 4, 5.1	Less damage to infrastructure, long-range financial savings, decreased trip delay and cost
Trip travel times/operating or actual speeds	1, 2, 3 (except 3, 4), 4, 6	Diversion to transit, on-time delivery, trip avoided or time of trip changed, fewer accidents
Congestion levels	1, 2, 3 (except 3, 4), 4, 5, 6	Diversion to transit, on-time delivery, trip avoided or time of trip changed, fewer accidents plus more uniform speeds, safety, efficiency, driver satisfaction
Incidents	1-6	Diversion to transit, on-time delivery, trip avoided or time of trip changed, fewer accidents plus more uniform speeds, safety, efficiency, driver satisfaction
Weather conditions (visibility, etc.)	All customers	Improved safety, diverted traffic, less trip delay, fewer trips, less congestion, improved operations, improved customer service and satisfaction, time savings
Posted detours	1-6	• Improved safety, diverted traffic, less trip delay, fewer trips, less congestion, improved operations, improved customer service and satisfaction, time savings, plus greater user satisfaction, convenience • Diversion to transit, on-time delivery, trip avoided or time of trip changed, fewer accidents
Closures/alternate routes	1-6	• Improved safety, diverted traffic, less trip delay, fewer trips, less congestion, improved operations, improved customer service and satisfaction, time savings, plus greater user satisfaction, convenience • Diversion to transit, on-time delivery, trip avoided or time of trip changed, fewer accidents
Tourist information: lodging and activities, gas stations, truck stops	1-6	Increased sales tax revenue, benefits local economy, increased user satisfaction and safety, similar for truck stops
Medical emergency facilities locations	All customers	• Improved safety, diverted traffic, less trip delay, fewer trips, less congestion, improved operations, improved customer service and satisfaction, time savings, plus greater user satisfaction, convenience • Diversion to transit, on-time delivery, trip avoided or time of trip changed, fewer accidents
Transit scheduling	1.2-1.4, 1.10-1.11, 6	System coordination, decreased congestion, improved ridership, less transit subsidy, fuel conservation
Park-and-ride locations	1.2-1.4, 1.10-1.11, 6	System coordination, decreased congestion, improved ridership, less transit subsidy, fuel conservation
Airport and parking information	1, 6	Increased user satisfaction
In-vehicle road guidance	All customers	Increased user satisfaction, improved operations efficiency
"Mayday"	3, 5, 6	Increased safety, improved emergency response
Parking available (metro area)	1 (except non-motorized)	Increased user satisfaction, improved operations efficiency
Event parking and information	1-4	Increased user satisfaction, improved operations efficiency

(1) References are to numbers shown in the list of ATIS customers in Table 1.

TABLE 3
EXPECTED OUTCOMES FROM TRAVELER/CUSTOMER INFORMATION

Information Item	Decreased Accidents	Improved Emergency Services	Decreased Congestion	Decreased Delay	Decreased Infrastructure Wear	Increased Tax Revenue	Increased Traveler Satisfaction
Route specific road condition – weather-related	✓	✓	✓	✓			✓
Road construction/ops	✓	✓	✓	✓			✓
Weight restrictions (weather-related)				✓	✓		
Trip travel times/operating or actual speeds		✓	✓	✓			✓
Congestion levels	✓	✓	✓	✓			✓
Incidents	✓	✓	✓	✓			✓
Weather conditions (visibility, etc.)	✓	✓	✓				✓
Posted detours		✓	✓	✓			✓
Closures/alternate routes		✓	✓	✓			✓
Tourist information: lodging and activities, gas stations, truck stops						✓	✓
Medical emergency facilities locations		✓					✓
Transit scheduling			✓	✓			✓
Park-and-ride locations			✓	✓			✓
Airport and parking information							✓
In-vehicle road guidance		✓		✓			✓
"Mayday"		✓					✓
Parking available (metro area)				✓			✓
Event parking and information				✓			✓

INFORMATION TIMING (WHEN), GEOGRAPHIC AREA (WHERE) AND DISSEMINATION METHODS (HOW)

To complete the description of ATIS services, it is critical to understand not only how frequently the information needs to be provided, but also how current it should be, at what point in the trip it should be available and where and how the customer will receive the information. A description of these elements is provided below.

INFORMATION TIMING (WHEN?)

A. Data Timing/Accuracy

- Current
  - Real-time
  - Delayed
- Periodic
- Forecasted

B. Trip-Related Timing

- Before the trip
- During the trip
- On-site/at-site
- At all times

GEOGRAPHIC AREA (WHERE?)

- Metro area
  - Spot
  - Small area
  - Corridor
  - Metrowide
- Other cities
- Sub-regions
- Rural areas
- Statewide
- Out of state

ATIS DISSEMINATION METHODS (HOW?)

- Phones/cellular phones
- Pagers
- Kiosks
- View-only monitors
- Fax
- Internet/websites/e-mail
- Intranet
- Commercial radio
- HAR
- TV/Cable TV
- VMS/CMS
- Mobile Data Terminals
- In-vehicle devices
- HAT
- Printed media
- Static roadway signs

4. ATIS VISION AND GOALS

Implementing and operating advanced traveler information systems encompasses the use of technology to improve the efficiency of operations and maintenance activities and to provide information to travelers when they need it (before or during the trip) so they can make informed decisions resulting in a safer, more efficient, economical and comfortable trip. Based on this definition of ATIS, the Wisconsin ATIS Advisory Group developed the following vision statement:

> **VISION STATEMENT**
>
> **TRAVELERS AND TRANSPORTATION OPERATORS IN WISCONSIN WILL HAVE THE INFORMATION THEY NEED TO HAVE A SAFE, EFFICIENT AND SATISFYING TRIP.**

Wisconsin's long-term vision for ATIS is that a mix of public- and private-sector entities will deliver accurate, consistent and reliable information to make travel safer and more efficient, and to increase user satisfaction. Timely and accessible information will be provided to as many users as possible, using the most appropriate technology. Travelers and operating agencies will use the information in conducting their daily business, work commutes and leisure travels. ATIS will address customer needs statewide, in coordination with adjacent states. To the extent practicable, ATIS will be self-sustaining. In the short term, ATIS will provide timely core information to core users at selected geographic locations, using available devices and technology.

GOALS

The vision developed for ATIS identifies three priority goals: (1) to make travel safer, (2) to make travel more efficient and (3) to increase customer satisfaction.

How can the ATIS goals of making travel safer and more efficient and increasing customer satisfaction be achieved within the context of the existing and planned roadway infrastructure?

1. Customer Safety

What information should be given to customers to improve their safety? Safety is compromised when unexpected conditions create impediments to travel, such as:

- Road/bridge restrictions
- Road/bridge closures
- Road/bridge work
- Hazardous weather conditions
- Hazardous road surface conditions
- Accidents/crashes

- Incidents
- Hidden accesses
- Unexpected or substandard roadway geometrics
- Slow-or -fast moving vehicles
- Emergency services locations
- Trains at at-grade railroad crossings

Lack of timely information about impediments to travel and unexpected conditions create situations or responses that can lead to accidents:

- Sudden stops/hard braking ("sea of red lights")
- Inability to deal with the condition (loss of control)
- Confusion about what to do
- Unsafe maneuvers (use of shoulders, U-turns, lane changing, passing in no-passing zones)

2. Transportation System Efficiency

What information should be given to customers to improve transportation system efficiency? System efficiency is affected by most of the factors that affect safety (listed above) as well as by other factors such as:

- Recurring congestion/delays
- Delays due to weather
- Accident or incident location
- Insufficient information about roadside amenities/facilities
- High volume of heavy commercial vehicles
- Trains at at-grade railroad crossings
- Transit/high-occupancy vehicles
- Road construction information
- Oversize/weight restrictions and routing information

Lack of timely information leads to system inefficiency (secondary crashes, delays, increased travel costs, increased vehicle-miles of travel, inefficient use of off-peak system capacity, over-reliance and overuse of the roadway system, under-utilization of alternate modes of transportation, and increased costs to businesses, consumers and, ultimately, to the economy).

3. Customer Satisfaction

What information should be given to customers to increase their satisfaction with the transportation system? Customer satisfaction is maximized when travel impediments and risks (in the form of improved safety and system efficiency) are minimized or eliminated. Customer satisfaction also increases when uncertainty about travel is reduced, by providing timely information such as:

- Estimated and predicted travel time
- Trip travel time reliability
- Park-and-ride locations
- Availability of parking
- Availability of spaces at rest stops
- Direction information
- Location of alternate routes
- Transit availability (buses, air, rail, etc.)
- Airport information
- Estimated transit arrival time (real-time or static schedule)
- Availability of tourist information (attractions/hotels/gasoline/eats)
- Assistance with trip planning
- Road conditions information

Lack of timely information leads customers to make unsafe and inefficient decisions about mode, time of travel, route choice and frequency of travel that can result in dissatisfaction and frustration. Timely information allows users to adjust their travel to best suit known conditions.

5. CURRENT AND PLANNED ATIS INITIATIVES

To determine the status of ATIS in Wisconsin, an inventory was completed of the major state projects that exist, are currently underway or are planned. This high-level inventory includes the review of information previously documented in project reports and was augmented by workshops and telephone interviews of key stakeholders involved with selected projects/programs.

To assess how customers are served by the traveler information systems, the following systems were analyzed according to various system attributes:

- Communication-Data System Infrastructure (CDSI)
- Gateway
- Monitor
- Integrated Corridor Operations Project (ICOP)
- Dane County Incident Management Systems
- Traffic Incident Management Enhancement (TIME)
- I-39 Corridor Study
- WisDOT Central office Transit Initiatives
- Wisconsin Road Conditions 800 Number
- R/WIS Program
- Foretell
- I-90/I-94 Highway Advisory Radio (HAR)
- Rest Area Traveler Information Monitors
- WisDOT Internet Home Page
- Madison Metro ITS Initiatives
- FleetOnline
- Lane closures

In particular, the inventory summary included in Table 4 documents the following attributes for each project in a tabular format:

- Users/customers of the system
- Traveler information provided
- Delivery or timing of the information, and the frequency in which the information is updated
- Geographic area in which the information is disseminated
- Method or type of devices by which the information is disseminated
- Data collected by the system
- Expected outcomes from disseminating the information
- Public sector partners involved with the project

Additionally, Appendix A – Detailed ATIS Inventories, shows the following details for each of the systems listed above:

- A textual overview of the system
- A block diagram of the system
- An architectural representation of the system including the high-level ITS "sausage" diagram and ITS architectural flow diagrams
- A tabulation of the system attributes

TABLE 4 - INVENTORY OF WISCONSIN PROJECTS WITH AN ATIS COMPONENT

Project Name	Users/ Customers	Traveler Information Provided	Delivery Timing / Frequency	Geographic Area	Dissemination Method/Device	What Data is Collected	Expected Outcomes	Public Sector Partners
Communication and Data Systems Infrastructure Project (CDSI)	Transportation, public safety and emergency agencies, and the general public	All member organizations will be given access to data and control flows available	24/7	Southeastern Wisconsin	Fiber, twisted pair, microwave, VHF, UHF, spread spectrum, Internet, etc.	N/A – Data Sharing System	Increased use of available information and control by coordinating agencies, increased communications system performance	Wis/DOT, all regional transportation, public safety, and emergency response agencies in the region
Gateway	Auto drivers, transit dispatchers, emergency dispatchers, transportation agencies	Road surface conditions, travel times, congestion, incidents, detours, road closures	Current, real-time, 24/7	Gary-Chicago-Milwaukee Corridor	Cell phones, kiosks, fax, Intranet, Internet, VMS/CMS, In-vehicle devices, TV	Traffic incident location and duration, travel times, ramp metering information, roadway maintenance and construction plans, VMS signage, CCTV, and transit information	Divert traffic, less trip delay, less congestion, improved operations/system coordination, greater user satisfaction/convenience	GCM priority corridor, IDOT, INDOT, Wis/DOT Monitor FTMS
Monitor	Auto drivers, emergency services, transportation agencies, TV, radio	Road surface conditions, travel times, congestion, incidents, detours, closures, park and ride locations, event parking and information	Current, real-time, before the trip, during the trip, the website is accessible at all times, during normal hours of TOC operation	Milwaukee	Phones, Internet, In-vehicle devices	Freeway volumes, lane occupancy, calculated travel times, incidents and data	Less trip delay, improved operations, improved customer satisfaction, greater user convenience, diversion to transit, improved emergency response, efficiency	Wis/DOT

TABLE 4 - INVENTORY OF WISCONSIN PROJECTS WITH AN ATIS COMPONENT (continued)

Project Name	Users/ Customers	Traveler Information Provided	Delivery Timing / Frequency	Geographic Area	Dissemination Method/Device	What Data is Collected	Expected Outcomes	Public Sector Partners
Integrated Corridor Operations Plan (ICOP)	Auto drivers, transit riders, traffic management centers, TV, radio	Congestion levels, closures/alternate routes, transit scheduling	Current, real-time, before the trip, during the trip, updated continuously	Southeastern Wisconsin	Kiosks, Internet, HAR, VMS/CMS	Speed and congestion levels, transit schedule information	Divert traffic, less trip delay, less congestion, improved operations/system coordination, improved customer satisfaction, greater user convenience	Wis/DOT TOC, City of Milwaukee EMS, Fire and Police, Milwaukee County, Mitchell Airport, City of Wauwatosa Fire, Police, and Public Works, Milwaukee Transit System
Dane County Incident Management Systems	Auto drivers, emergency services, transportation agencies	Incidents	Current, real-time, on-site/at-site, as incidents occur	Beltline and interstate system in Dane County	Fax	Length and duration of incidents	Improved safety, less trip delay, less congestion, improved operations, fewer accidents, improved emergency response	Wis/DOT District 1, State Patrol

TABLE 4 - INVENTORY OF WISCONSIN PROJECTS WITH AN ATIS COMPONENT (continued)

Project Name	Users/ Customers	Traveler Information Provided	Delivery Timing / Frequency	Geographic Area	Dissemination Method/Device	What Data is Collected	Expected Outcomes	Public Sector Partners
Southeastern Wisconsin Traffic Incident Management Enhancement Program (TIME)	Auto drivers, freight carriers, emergency services, transportation agencies, TV, radio	Travel times, congestion levels, incidents, closures/alternate routes, event parking and information	Current, real-time, before the trip, during the trip, on-site/at-site	Freeway system in southeastern Wisconsin	Phones, kiosks, view only monitors, Internet, commercial radio, HAR, VMS/CMS, in-vehicle devices, TV	Traffic and incident data	Improved safety, divert traffic, less trip delay, less congestion, improved operations/system coordination, greater user satisfaction, fewer accidents, improved emergency response	Wis/DOT, SE Wisconsin Regional Planning Commission, Wis. DNR, US/DOT, Milwaukee County, City of Glendale, Greenfield, Menomonee Falls, West Allis, Fond Du Lac, County of Walworth, Racine, and Washington
I-39 Corridor Study	Auto drivers, freight carriers, transportation agencies	Road surface conditions, weather conditions, closures/alternate routes	Real-time, before the trip, during the trip	I-39 corridor	Internet, commercial radio, HAR, VMS/CMS	Surface conditions, weather, incidents, construction	Less congestion, improved operations, time savings, greater user satisfaction	Wis/DOT, State Patrol District Office, County Highway Departments, City of Wisconsin Rapids, Portage County Visitors Bureau, Lincoln county EMS
Wis/DOT Central Office Transit Initiatives	Transit riders, paratransit riders and providers, transportation agencies	Road surface conditions, transit scheduling, in-vehicle road guidance	Current, real-time, before the trip, during the trip, 24/7	Cities, or regions, with transit or paratransit services	Phones, Internet, in-vehicle devices		Less trip delay, improved operations, improved customer service, improved user satisfaction, greater user convenience, diversion to transit, improved emergency response	Wis/DOT, MCTS, Madison Metro

TABLE 4 - INVENTORY OF WISCONSIN PROJECTS WITH AN ATIS COMPONENT (continued)

Project Name	Users/ Customers	Traveler Information Provided	Delivery Timing / Frequency	Geographic Area	Dissemination Method/Device	What Data is Collected	Expected Outcomes	Public Sector Partners
Wisconsin Road Conditions 800 Number	Auto drivers, freight carriers, emergency services, transportation agencies	Seasonal construction information, road closures, weight restrictions, winter road conditions	Construction data is provided in the summer and is provided on a per season basis. Winter data is updated 3 times per day	Statewide	Telephone	Driving conditions data, road restrictions and closure data	Increased traveler safety, less congestion, divert traffic,	Wis/DOT
Road/ Weather Information System (R/WIS) Program	Highway helpers, maintenance/operations	Road surface conditions, weather conditions, airport and parking information	Current, 24/7	52 locations throughout Wisconsin	Data is collected and updated every hour in the winter. Data is collected once every four hours in the summer	Wind speed, air temperature, pavement temperature, ground temperature, precipitation, chemical content in the pavement	Improvement of winter storm maintenance, reduce the amount of materials used to combat snow and ice build-up	Wis/DOT
Foretell	Auto drivers, freight carriers, fleet managers, transit and paratransit providers, emergency services, transportation agencies	Road surface conditions, weather conditions	Current, forecasted, before the trip, during the trip, updated hourly, forecasts provided 24 hours in advance	Statewide	Phones, cellular phones, pagers, fax, intranet, Internet	Precipitation, temperature, dew point, humidity, wind, radar, cloud thickness, pressure, precipitation accumulation, frozen accumulation, road surface conditions	Improved safety, less trip delay, improved operations/system coordination, change destination, improved customer service, greater user satisfaction, greater user convenience, change mode, long range financial savings	Wis/DOT, Iowa DOT, Missouri DOT, FHWA, NOAA

TABLE 4 - INVENTORY OF WISCONSIN PROJECTS WITH AN ATIS COMPONENT (continued)

Project Name	Users/ Customers	Traveler Information Provided	Delivery Timing / Frequency	Geographic Area	Dissemination Method/Device	What Data is Collected	Expected Outcomes	Public Sector Partners
I-90/I-94 Highway Advisory Radio (HAR)	Auto drivers, fleet managers, transit dispatching, emergency services, transportation agencies	Road surface conditions, detours, closures, alternate routes	Forecasted, during the trip, updated as needed	In spot areas along I-90 and I-94	HAR	Weather conditions, road conditions, closures, congestion, construction, hazards, events	Improved safety, less trip delay, less congestion, improved operations, change destination, improved customer service, greater user satisfaction, greater user convenience, improved emergency response	Wis/DOT, Federal Communications Commission
Rest Area Traveler Information Monitors	Auto drivers, maintenance/operations personnel	Road surface conditions, weather conditions	Delayed, forecasted, during the trip, radar is updated every 15 minutes, other weather information is updated every hour	19 rest areas and 8 traveler information center on various interstates in Wisconsin	View only monitors	Weather and roadway conditions information	Improved safety, improved customer service, greater user satisfaction/convenience, change route, fewer accidents	Wis/DOT, Department of Tourism, Department of Highway Operations

TABLE 4 - INVENTORY OF WISCONSIN PROJECTS WITH AN ATIS COMPONENT (continued)

Project Name	Users/ Customers	Traveler Information Provided	Delivery Timing / Frequency	Geographic Area	Dissemination Method/Device	What Data is Collected	Expected Outcomes	Public Sector Partners
Wis/DOT Internet Home Page	Auto drivers, freight carriers, tourism	Road surface conditions, travel times, congestion levels, incidents, weather conditions, detours, closures/alternate routes, transit scheduling	Current, real-time, forecasted, before the trip, during the trip, web site at all time, detour and construction updated weekly April-November, Lane and ramp closures updated weekly, congestion information updated once every minute	Lane and ramp closures, congestion, travel time information in the Milwaukee area, web site statewide,	Internet	Detour, construction, road conditions, travel times, congestion	Divert traffic less trip delay, less congestion, improved operations, change destination, improved customer service, greater user satisfaction, greater user convenience	Wis/DOT
Madison Metro ITS Initiatives	Transit riders, paratransit riders, transit and paratransit providers	Transit scheduling	Current, forecasted, before the trip, all data is static	Madison	Kiosks, Internet	Madison Metro schedules for all routes	Improved customer service, improved user satisfaction and convenience, improved transit ridership	Madison Metro
Fleet Online	Freight carriers, fleet managers	Road surface conditions, weight restrictions, travel times, congestion levels, incidents, weather conditions, detours, closures, in-vehicle road guidance, route specific and point-to-point travel information	Current, real-time, forecasted, before the trip, during the trip	GCM corridor	Cellular phones, pagers, Internet, in-vehicle devices	Speed, incident, event, construction, driving restrictions	Improved safety, improved operations, time savings, on-time delivery, fewer accidents	GCM Corridor Coalition, American Trucking Associations (ATA)

TABLE 4 - INVENTORY OF WISCONSIN PROJECTS WITH AN ATIS COMPONENT (continued)

Project Name	Users/ Customers	Traveler Information Provided	Delivery Timing / Frequency	Geographic Area	Dissemination Method/Device	What Data is Collected	Expected Outcomes	Public Sector Partners
Lane closures	Auto drivers, freight carriers, transportation agencies, fleet managers, TV, radio	Road surface conditions, detours, closures/alternate routes, delay at work zones	Current, real-time, before the trip, during the trip, at all times	Milwaukee (work zone delay information), Statewide (all other work zone information)	Phones, cellular phones, Internet, commercial radio, HAR, VMS/CMS, TV	Detours, work zone locations, alternate routes	Improved safety, divert traffic, less trip delay, less congestion, improved operations, improved customer service, greater user satisfaction/convenience	Wis/DOT Division of Districts, Office of Public Affairs, Department of Highway Operations, Department of Tourism

INFORMATION GAPS:

In developing the ATIS and ITS Architecture in Wisconsin, it is important to know where any information gaps exist. Information gaps are defined as areas where the correct types of data to match ATIS needs are not being collected, or the data is of insufficient quantity or quality to meet the needs of ATIS customers[1]. This ATIS inventory provides valuable data on when, where, how, why and to whom various traveler information types are being disseminated. As a result, the inventory was used as a guide in determining where the information gaps exist in Wisconsin. This gap analysis was used alongside other types of analysis (e.g., the vision, goals and objectives for traveler information in Wisconsin), to determine where WisDOT should focus its efforts in developing a comprehensive traveler information system.

[1] ITS America, U.S. Department of Transportation, ATIS Data Collection Guidelines Workshop – Problem Definition – *Show me the Data*, January 2000, p. 3.

6. ATIS DATA QUALITY STANDARDS

Data Quality Standards (DQSs) have been identified for each of the ATIS element groups identified by the Advisory Group and are included in this report. These DQSs can be used as a tool for comparing existing or planned ATIS systems to Wisconsin's vision, goals and objectives for ATIS. Secondarily, the DQSs can be used as a high-level planning tool for executives and policy makers when planning future ATIS projects. For the purposes of this discussion, the following definitions apply[2]:

- **Data** – Real-time/dynamic transportation related information that is used to support ATIS services
- **Quality** – The utility of data collected for traveler information services
- **Standards** – A guideline detailing recommendations on how something should be done, or goal that should be met in a particular situation

DQSs are reflected by two key concepts: data types and data attributes[3]. Data types are classes of data that are necessary to support traveler information systems. Data attributes are defined and measurable parameters for a given data type. The following data attributes have been defined for each of the ATIS groups identified by the Advisory Group:

- **Type of Information** – or data type, describes what traveler information is being collected/provided
- **Detail** – provides low-level details of the information type
- **Delay (Data Latency)** – defines the acceptable delay from the time the data is collected to the time it is disseminated to the traveler
- **Accuracy** – identifies the acceptable amount of error allowed within the data disseminated
- **Reliability –** describes the level of confidence the information provider should have in the data, or the level of verification that should be made by the information provider
- **Coverage** – defines the geographic scope for which the data is collected and disseminated
- **Convenience of Access –** identifies how conveniently the customer should be able to obtain the information

[2] ITS America, The United States Department of Transportation, Closing the Data Gap: Guidelines for Quality ATIS Data, April 2000.
[3] ITS America, The United States Department of Transportation, Closing the Data Gap: Guidelines for Quality ATIS Data, April 2000.

The following DQS analysis describes each of these data attributes for three quality levels: good, better and best. The "good" quality level represents the baseline data quality level; the "better" and "best" quality levels represent enhanced data quality levels. The baseline data quality level, or "good" data quality, represents attributes of the data that, at a minimum, are capable of supporting the given ATIS element. The enhanced data quality levels, or "better" and "best" data quality, represent improved quality of the amount or type of data being collected, which subsequently should improve the customer service aspect of traveler information and customer satisfaction. It should be noted that the definition of "good" data represents the current foundation for the quality of data the consumer expects. Over time, the definition of each DQS level will need to be modified as customers' demands change and as their expectation level increases. Refer to Appendix A for a complete listing of data quality standards for each information element group.

The next step in the process is to identify the information "gaps" in the quality, amount and type of data collected for ATIS in Wisconsin. Information gaps are defined as areas where certain types of information are not being given to travelers who need the information. By using the ATIS inventories of existing and planned ATIS projects in Wisconsin and the DQS sheets developed for each ATIS element, a comparison can be made to identify the ATIS "gaps" that exist in Wisconsin for the following categories:

- Customers served
- Traveler information provided
- Delivery/timing frequency
- Geographic area
- Dissemination method or device
- What data is collected
- Expected outcomes

When developing the ATIS and ITS Architecture in Wisconsin, it was important to know where any information gaps may exist in the state. Through the results of this analysis, the Advisory Group will be able to better determine where they need to focus their ATIS and ITS architecture efforts.

Table 5 provides an example of the data quality standards developed for road closure information in Wisconsin. Appendix B contains the data quality standards defined by the ATIS Advisory Group for traveler information elements that are currently addressable throughout Wisconsin.

Table 5: Closures/Alternate Routes & Posted Detours - Data Quality Levels

	Existing	Good	Better	Best
Type of Information	Road Construction, Detour Routes	Road Closures & Termini, Construction Only	Good + Detour Routes, Maintenance	Better + Travel Time Information on Alternative Routes
Detail	Reason, severity (# of lanes closed) location, time, speed limit in construction zone, weight and size restrictions	Reason, severity (# lanes closed) location, time, speed limit in construction zone, weight and size restrictions	Status, Current delay	Condition of alternate route, Predicted delay, Advice
Delay (Data Latency)	Weekly	< week	< day	< hour
Accuracy Location:	Between interchanges	Between interchanges	Between interchanges	Between interchanges
Time of Closure:	Range of hours	Range of hours	< hour	< hour
Delay:	Expected delays	Expect delays	Range of delays	Accurate delay
Reliability	Planned	Planned	Non-verified visually (maintenance)	Verified visual
Coverage	Interstates, U.S. Highways, Trunk, Highways	Interstate and major U.S. Highways (Backbone)	Good + Minor U.S. Highways, State Highways, Major arterials	Better + Additional arterials and County Highways
Convenience of Access	Phone, Internet, printed	Radio, newspaper, television, portable CMS and HAR	Internet, HAR, permanent CMS	PDA, pager, in vehicle devices, telephone

7. ATIS PUBLIC/PRIVATE SECTOR POLICY

ROLES AND RESPONSIBILITIES

Advanced Traveler Information Systems (ATIS) are unusual in that, unlike most other areas involving transportation policy, governmental agencies can be in direct competition with private-sector service providers. Because of this feature of ATIS, close attention must be paid to the desired roles and responsibilities of the public and private sectors, and to the economic implications of policies implemented by state agencies.

For the public sector, the goals of maximizing transportation safety and efficiency while minimizing travel times and costs guide the formulation of appropriate roles. Accountability for public sector organizations is generally centered on cost-effectiveness measures, with cost recovery regarded as either secondary or unimportant in evaluating ATIS programs.

Private sector businesses focus upon cost-revenue measures for determining the effectiveness of any system deployment. Common measures for effectiveness include net profit, return on investment and, to a lesser extent, market penetration. Because of these criteria, private sector ATIS systems all have a need to include a revenue-generating component as an integral part of the system.

These differing priorities need to be reconciled in the ATIS planning area, particularly if public/private partnerships are contemplated.

In general, the public sector has taken a leadership role where public safety is a primary concern. An analogy may be drawn between ATIS and emergency response systems. 911 call centers are usually operated by local or state agencies, with actual responders (police, fire, etc.) being operated by any one of a number of public entities. However, within this public-oriented framework, a number of private businesses operate. For example, the routing and management of 911 calls, private ambulance services and others operates together to provide the public with comprehensive and seamless service.

PUBLIC SECTOR ROLES

The public is uniquely positioned in respect to transportation services due to the level of ownership of transportation systems typically involved. Roads, signing, traffic control devices and the right-of-way upon which they are installed are usually controlled by one or more governmental agencies. Additionally, there is usually a management organization that monitors the usage and safety of roadways and plans for future needs. Given this intimate familiarity with the affected transportation systems and their operation, the public sector is ideally positioned for data collection efforts, both in terms of system operation (congestion, incident detection, road surface conditions, etc.) and as measures of effectiveness to determine if an ATIS system is meeting its policy objectives.

The public sector is typically less effective when considering flexibility and speed of implementation (time to market). This is largely attributable to the public sector's need for effectiveness measures and reporting accountability requirements. The overall effect of these characteristics is to make the public sector extremely effective in gathering and synthesizing information, but less effective in developing and delivering information-based services to travelers.

PRIVATE SECTOR ROLES

As noted above, the private sector typically uses a different set of measures to determine if a system has been successful. Ultimately, all private-sector ventures center around short- to mid-term profits, and all systems deployed must have positive returns. The private sector is generally somewhat averse to large capital outlays, making investments in large-scale surveillance and data-gathering networks unattractive. Also, private sector entities will be generally concerned with system performance (accuracy of information, changes in travel time, etc.) only in the context of user acceptance and hence market penetration, rather than as ends in themselves.

However, the driving concern for maximizing market penetration and profitability also causes the private sector to make its products as attractive as possible to the public. This can take the form of maximizing accuracy, improving ease of use, or any of a number of other methods, depending on how a product is positioned in the market. Generally, the private sector's focus on short- to mid-term profitability also drives rapid evolution of products and adoption of new automation technologies, although this focus can also discourage large investments in some cases.

The comparative positioning of public and private sectors in each of the areas discussed above is delineated in Table 6.

TABLE 6 COMPARATIVE POSITIONING OF PUBLIC AND PRIVATE SECTORS

	Criteria	Public Sector	Private Sector
A.	**Speed of Implementation**		
	• Ability to fast-track	+	+++
	• Accelerate data delivery process	+	++
	• Timely expansion of service	+	++
	• Introduce technological innovations	+	+++
B.	**Flexibility**		
	• Ability to offer multiple services (bundling)	+	+++
	• Address consumer-based market needs	+	+++
	• Address needs of non-traditional markets	+++	+
	• Provide baseline information	++	+
	• Disseminate information statewide	++	++
	• Disseminate information to all modes	++	+
C.	**Data quality**		
	• Accuracy	+	+
	• Reduce variability ("granularity")	++	++
	• Provision of real-time information	++	++
	• Reduce conflicting reports to users	++	+
D.	**Taxpayer Cost**		
	• Reduce public sector cost	+	+++
	• Generate self-sustaining revenue streams (e.g., for system operation and maintenance)	+	++
	• Information free of charge to users	++	+
E.	**System Compatibility**		
	• Promote standardization	++	+
	• Promote system integration	+++	+
	• Promote statewide coordination	+++	+
	• Coordination/integration among services	++	+
F.	**Jurisdictional Issues**		
	• Ability to link enforcement and emergency response	++	+
	• Responsive to public sector needs (e.g., traffic management)	++	+
	• Minimize interjurisdictional conflicts	+	++
	• Ability to overcome in-place processes	+	++
	• Promote free-market competition	+	+++
	• Elimination of data exclusivity issue	+	+

Relative Ability: (+) Low (++) Moderate (+++) High

ATIS BUSINESS MODELS[(1)]

Four general methods of public/private integration (business models) have been developed in the ATIS area. These should be regarded as basic descriptions of the types of relationships possible and not as explicit blueprints for partnerships. Indeed, one or all of these models may be employed by a public sector entity in dealing with private ATIS providers.

Model I – Public-Centered Operations

- Majority of ATIS process is in the public sector's control
- Assumes public sector has sufficient resources to control significant portion of ATIS operation, including data fusion
- Generates least revenues
- Greatest level of public control
- Greatest public expenditure
- Requires high level of technical expertise within public agency
- Allows business relationship with private sector to be very simple
- Data given freely to the public that reduces revenue potential and discourages the private sector from using its funds to expand the market
- Data given freely to the private sector that also collects additional data

Model II – Contracted Operations

- Data fusion contracted to private sector—public sector maintains some control
- Public sector gives data freely to private sector companies and to the general public
- Generates moderate revenues (from data fusion contract)
- Public sector can access technical skills of private sector while maintaining control over data fusion process
- Primary drawbacks are that, like the public-centered approach, it is costly to the public and the opportunity for private sector revenue generation is limited

Model III – Franchise Operations

- This approach leans more heavily on the private sector for the resources to build and operate ATIS
- The public sector does not do any data fusion

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(1) The information contained in this section is taken from the draft of the "ATIS Business Model Framework," prepared by the Washington State Transportation Center (TRAC), under sponsorship from ITS America and USDOT (1998).

- A single contracted private-sector firm (or small number of firms) takes over the data fusion and also collects much of its own data.
- The private sector data fusion provider agrees to give the fused data to the public sector free of charge, but can sell the fused data to other private-sector providers, as well as to customers.
- The public sector cuts back on the availability of free data
- The cost to the public sector is reduced considerably
- Provides opportunity for revenue sharing between the public and private sectors
- The public may have to pay for much of the information it was previously getting free
- The private sector has to rely on the private sector for the fused data it needs to enhance transportation system management
- Risks creating a monopoly if successful; risk to public sector if private sector goes out of business and needed fused data ceases to flow

Model IV – Private, Competitive Model (National Weather Service Model)

- The public sector makes data available to more than one company to provide data fusion service
- Data could be provided free of charge initially and for a fee later, as the market grows
- Companies add value and resell data to the public and to other information service providers
- Public-sector agencies purchase data from competing private-sector companies
- Fosters competition among private-sector companies that could result in lower-cost services, high level of consumer satisfaction, greater information dissemination and greater public access to information
- The market may not be large enough to sustain multiple companies and the revenue stream may be too small to achieve market growth and support new deployment
- Loss of competition could occur if one or more companies leave the market

Market Forms

One of the primary conclusions drawn from examining the above business models is that, at this time, no single business plan will work successfully to attain every desired outcome.

The model selected will strongly affect the nature of competition or “market form” for ATIS in the state. In general, there are four basic market forms that differ primarily in the number of firms competing in the market and the relative levels of production and price of goods available to consumers. Each of the four forms and its relationship to the business models are typically discussed when examining ATIS systems is outlined below.

1) Perfect competition

This is the "ideal" market form most commonly used in economic analysis. There are many firms in the market producing substitutable goods, consumers are able to affect the pricing of goods (firms are price takers), and resources are allocated efficiently on a cost/utility basis. Under perfect competition, there is little or no public-sector involvement in ATIS, the market (demand side) drives the type and quantity of products that can be marketed, and the internal cost structures of private firms determine whether those products can be produced and delivered. Resources are allocated to production efficiently, meaning that the cost of production (and delivery) is equal to the value derived by the consumer.

At first, perfect competition would appear to be the optimum solution for any market; however, there are many factors that must be considered before implementing policies to encourage competition in markets. Most importantly, there is the question of equity. For example, services may be offered that substantially enhance safety to travelers, but are so expensive to produce that they are priced out of the reach of lower-income residents in a state. In such a case, it may not be politically acceptable to allow the market to determine pricing levels. Another example could be that a service has been determined to be desirable in terms of enhancing overall system efficiency, but presents such large capital requirements that implementing it would not be within the acceptable risk limits of a private firm. Here, a state government may shoulder the cost of an infrastructure investment while partnering with a private firm that could market and deliver user services with greater efficiency.

2) Monopolistic competition

While the terms "monopolistic" and "competition" might seem to be contradictory, monopolistic competition is an extremely common market form. Typically, there are few (usually two) firms that supply nearly all of the products in a market. Although there are generally few or no barriers to entry, it is extremely difficult for small firms to become competitive. An interesting feature is that advertising is most effective in this market form, whereas under perfect competition consumers are presumed to have perfect information about products and advertising therefore has no effect. The soft drink market with competition between Coca-Cola and Pepsi is a good real-world example of monopolistic competition with advertising serving to differentiate substitutable products.

3) Oligopoly

Oligopoly is characterized by having a small number of firms producing similar (substitutable) products. Firms will actively work to maximize the extraction of positive economic rent or, in other words, charge prices greater than the utility received by consumers. Oligopoly behavior is generally driven by internal political concerns of participating firms and does not reflect the influence of the market well. The OPEC oil cartel is a good example of an oligopoly.

4) Monopoly

The monopoly is the most often discussed market form and the term carries connotations of consumer exploitation and market dominance. Indeed, the general rule is that monopolists will produce less of a given product and charge a higher price to consumers than would otherwise be seen under perfect competition. However, with appropriate planning and regulation, a monopoly market form may suit the policy objectives of the public sector.

From a governmental agency's standpoint, there are certain advantages in providing transportation data to a single private sector partner, thereby creating a monopoly on services derived from that data. These include a single point of contact for negotiation purposes, a closer relationship with the service provider, and the availability of products that might not otherwise be produced under competitive conditions.

RELATIONSHIP BETWEEN BUSINESS MODELS AND MARKET FORMS

Model I – Public-Centered Operation: A truly public-centered operation, in a sense, operates outside of the market. Goods and services are produced outside of the mix demanded by consumers, revenue generation is generally not a factor, and production levels are determined by political policy goals rather than the costs of production.

This model is best suited for specific ATIS projects with clear policy goals and services where direct cost recovery is either impossible or prohibitively difficult, or where extremely large capital costs present an insurmountable barrier to entry for private firms.

A system that dynamically redirects traffic using signs or other information devices in response to incidents to minimize delays on a given road segment is a good example of a service that has substantial infrastructure costs (surveillance, signs, communications), clear policy objectives (minimize delays) and for which cost recovery would be difficult to attempt (any motorists could be affected at any time, spot-charging impossible).

Model II – Contracted Operations: Contracted operations can have several outcomes for market form. If specific services are contracted exclusively to each of several vendors, a monopoly is created for each service. Alternately, if a vendor is chosen to administer the public data resources and individual firms are permitted to compete for access to those resources for production of ATIS services, a secondary market is created with the administering firm as a monopolist.

Contracted operations have the advantage of reducing the administrative burden of the public sector while still permitting competition in the market. However, if a secondary market is created with a private firm as a monopolist, the quantity of a desired good will generally be lower, and prices higher, as a result. Since the public sector will not be directly participating in these transactions, addressing market outcomes will be difficult and generally require contractual provisions to exist between the public entity and the administering firm in the primary market to protect firms competing for access to resources in the secondary market.

WisDOT could choose to implement a substantial infrastructure for traffic management purposes and then contract to a private sector firm to process the data into ATIS products, or into a form that would be usable to ATIS providers. This would leverage DOT investments in management hardware while permitting access to the resources of the private sector for creating consumer products.

Model III – Franchise Operations: Franchise operations are very similar to contracted operations, with the exception that multiple firms may be contracted for the provision of a single service. In this case, the resulting market form would likely be that of monopolistic competition, with several firms creating ATIS products based upon the same (or similar) public sector-generated information. Products under this scenario would likely be differentiated through marketing rather than fundamental differences in content or delivery.

Advantages of this approach include a degree of protection from the business concerns and stability of individual firms and creating price competition, which can benefit consumers. Also, since franchisees are generally required to provide any enhanced data back to the public sector agency, additional value can be captured at little to no cost. However, since firms will be competing on a cost (as opposed to differentiated product) basis, firms will be averse to any large capital investments, making it unlikely that substantial new data collection or processing facilities will be built.

An example of this model might be a public-private partnership in which a single firm is granted access to all DOT surveillance resources in exchange for creating additional surveillance assets. The franchised firm would then have exclusive rights to market products based on this data to the public.

Model IV – Private, Competitive Model: Here public-sector influence is minimized; ATIS services are produced when the revenue provided buy consumers is equal to cost plus "normal" profit (generally <10% for most analysis). Price to consumers is equal to or less than the utility derived by the use of the service. Ideally, perfect competition exists. Although resources are efficiently allocated by the market, the competitive model may be unacceptable for a number of reasons. First, there may be policy objectives which require services to be available to the public, but would be unprofitable for the private sector to provide; second, there may be equity issues regarding income or other factors which would make services unavailable to segments of the population; third, a competitive market may, over time, evolve into a non-competitive (monopolistic, oligopolistic, etc.) form, thus denying access to services to some consumers.

The private, competitive model is best suited to ATIS initiatives where there are several firms willing and able to provide the ATIS product, there is a well-established mechanism for cost recovery (payment) and the policy objectives of the public sector will be met without direct involvement.

This model could have the DOT making whatever resources it chooses (or no resources) available to private sector firms on a come-one-come-all basis with no differentiation between them. This has generally been the case for on-line businesses using the Internet for "virtual storefronts." The federal government carried the burden for constructing the framework of the network, but one commerce was permitted, business could use the bandwidth as they wished.

Choosing a Business Model

Several factors must be balanced in choosing a business model for ATIS deployment, and no single model will be ideal for accomplishing all of the objectives for all projects. Some of the criteria that should be considered are cost to the public agency, level of competition encouraged in the market, the diversity of products offered to the consumer and whether policy objectives are likely to be achieved. A summary of how each of the business models fulfils each of these criteria is shown below in Table 7.

TABLE 7 BUSINESS MODEL SELECTION CRITERIA

Model	Market Form	Cost	Competition	Prod Diversity	Objectives Met
Public-Centered Operation	N/A	High	Very Low	Low	High
Contracted Operations	Monopoly/ Oligopoly	Medium	Low	Low	High
Franchise Operations	Monopoly / M. Competition	Medium	Medium	Medium	Medium
Private, Competitive Model	Perfect Competition	Very Low	Very High	High	Low

These criteria should be assigned a priority when determining a business model. If for example, the goal of encouraging some competition in the ATIS market is somewhat important and some level of cost savings is desired by the public sector, the franchise operations model may be the best compromise. If, however, accomplishing a specific policy objective is the overriding priority, a public-centred operation may be the best solution. In all cases there will be trading of advantages and disadvantages, and the best solution should be chosen based on the demands and objectives of a specific ATIS initiative.

Wisconsin has a significant amount of transportation operations data available in some regions, i.e., Milwaukee area, and has statewide data available for certain types of traveler information, i.e., RWIS data. There will be a significant amount of work done in the near future to complete the build-out of the critical ITS systems that will provide the data collection for much of the ATIS systems in Wisconsin, i.e., I-94 interstate corridor monitoring. There is also the need to build an ATIS data portal to allow the private sector timely access to ATIS data. Until several of these efforts are completed, it is recommended that the majority of ATIS-related systems in Wisconsin be owned and operated by the public sector (i.e. WisDOT). When the data portal and supporting ATIS data is available, WisDOT will be positioned to encourage the private sector to increase its involvement and investment in ATIS systems in Wisconsin, primarily in the information dissemination areas. Therefore, determination of the appropriate business model for ATIS in Wisconsin should be made in two-three years once the critical components of the statewide ATIS data collection system and database have been implemented.

8. ATIS DEVELOPMENT GUIDELINES AND IMPLEMENTATION PLAN

ATIS GUIDING PRINCIPLES

In order to implement the ATIS plan, WisDOT and the public sector as a whole need to develop guiding principles for system development. A preliminary set of guiding principles is presented below. The validity of the policies and the following guiding principles should be reviewed periodically as traveler information systems are deployed in Wisconsin and benchmarked against national trends of ATIS.

The following guiding principles were developed to represent WisDOT's viewpoint of ATIS:

WisDOT's Role – WisDOT has a responsibility to ensure the provision of traveler information to the public, especially information that improves safety and reduces congestion.

Data/Information Quality and Availability – As with any product or service, the quality of the data/information as perceived by the customer plays a large role in determining success or failure. Since, in general, ATIS initiatives provide information as opposed to a physical product, it is the quality of the information itself that must be ensured. Five factors have been identified as determining information quality: accuracy, timeliness, consistency, level of detail and personalization. The guiding principles (safety and efficiency) for these factors are defined in Chapter 4.

Access to Public-Sector Data – In recognition of the `principle that data collected by the public sector is available to the anyone who requests it and that the data is being collected to the serve the public good, the public sector will make road condition, traffic and other roadway data readily available to private sector information service providers.

Operation and Maintenance of Traveler Information Systems – As ATIS systems are developed, steps must be taken to ensure that the systems will be operated and maintained properly to ensure data/information quality, timeliness and accuracy. It is imperative that the resources required to operate and maintain ATIS systems be clearly identified and allocated prior to ATIS system deployment. WisDOT should determine the resource impacts of operation and maintenance of ATIS in Wisconsin. Federal funds may also be available for some aspects of operations and maintenance of these systems.

Minimizing Redundancies – WisDOT should develop and/or support the development of ATIS systems that minimize redundancy in the collection of traveler information data. Other systems with data valuable to travelers should be integrated or linked to WisDOT's ATIS systems.

While redundant data collection should be minimized, it is acceptable to have multiple methods of disseminating the same traveler information to the end user. For example, incident information can reach the end user via radio/TV broadcasts, websites, kiosks, telephony systems, etc. Traveler information for Wisconsin could be obtained from multiple avenues, i.e., a traveler could get I-94 related information for southeastern Wisconsin through the Gateway system (which provides information along the GCM corridor), as well as through a Wisconsin statewide traveler information system.

Delivery Mechanisms – No data, regardless of its quality, can be effective in achieving desired outcomes if it is not presented in a manner that is accessible. Research has clearly shown that passive delivery mechanisms, such as radio broadcasts and roadside variable message signs, are strongly preferred. Methods of disseminating traveler information which require users to be highly proactive in obtaining data have a much lower level of preference. In recent studies by the University of North Dakota (UND), Center for Aeronautics, Regional Weather Information Center, cell phones have been shown to be a potentially important information delivery mechanism. Initially, travelers could call the ATIS for road condition information. Ultimately, travelers could subscribe to a private ISP to have personalized traffic or road condition alerts automatically delivered to their cell phones.

Initial indications are that private-sector deployments of kiosks to provide traveler information may be profitable. Traveler information is provided on the kiosks as a free service. Revenue streams are generated from advertising and from other for-a-fee services through the kiosk such as on-line banking, e-mail access, etc.

The delivery medium is an important determinant of the effectiveness of ATIS. The following factors should be considered:

- Location – Unless the information delivered is specific to one site, the delivery medium should either be portable or a fixed roadside sign.

- Interaction – Most users prefer information to be delivered in a passive manner requiring as little user intervention as possible.

- Technology – Using systems already in place (radio, pager, cell phone) is preferable to introducing new devices to the user. This is both because of the "comfort level" of the user and because of the scarcity of space within vehicles and the inconvenience of carrying additional personal devices.

System Integration – WisDOT ATIS systems should be integrated and linked to valuable traveler data systems maintained by others (e.g., R/WIS, TIME, Gateway). ATIS systems should also be integrated with other ITS systems such as Mayday, AVL and CAD. On a regional level, ATIS systems should be integrated into the Transportation Operation Centers. WisDOT should also build on the lessons learned in the GCM/Gateway to expand the links to other ATIS systems with adjacent states like Minnesota, Michigan and Iowa, as well as Canadian Provinces.

Cooperation and Coordination – The Districts and Central Office (DTIM and DTID) should cooperate and support each other's ATIS activities. This support will consist of, as a minimum, using a common ITS architecture, common communication and message standards and common center-to-center data standards. DTID should be the steward; assuring ongoing cooperation and coordination are implemented on every new initiative and expansion of existing initiatives. DTID should also provide stewardship in assuring interagency cooperation and coordination with State Patrol and agencies as the Office of Tourism, DNR, etc.

Special Events – WisDOT Districts should actively plan and assure effective operation of ATIS systems related to major planned special events that potentially have an adverse impact on traffic.

Customer Segmentation – WisDOT should ensure that appropriate ATIS data is available to specific customer groups that directly impact WisDOT's mission to improve safety and reduce congestion. For example, information about specific accident location would be very important to emergency services for route selection and improved response time. WisDOT may use operations resources to purchase dissemination of emergency traveler information through the media when necessary to assure the safety of traveling public or specific travelers that cannot be reached any other way.

Non-Traditional Stakeholders – The public sector needs to clearly identify potential users who, because they represent a small market segment, are difficult to reach by traditional means. If these groups are not adequately served by the private sector, the public sector may have to take on the responsibility for serving them.

ATIS Deployment Plan

WisDOT Statewide ITS Planning Guidelines identify statewide ITS solutions to address critical needs on Wisconsin's 1,550 miles of backbone highways and within its urbanized areas. The Guidelines provide a method for establishing the structure of WisDOT ITS planning on a statewide basis over a ten-year time frame (2001-2010).

The Guidelines focus on issues regarding safety and congestion, and concentrate on problems caused by:

- Unplanned incidents
- Special events
- Construction/work zones
- Seasonal congestion (vacations, holiday traffic)
- Capacity deficiencies
- Urban arterials' freeway relief routes capacity deficiencies
- Weather

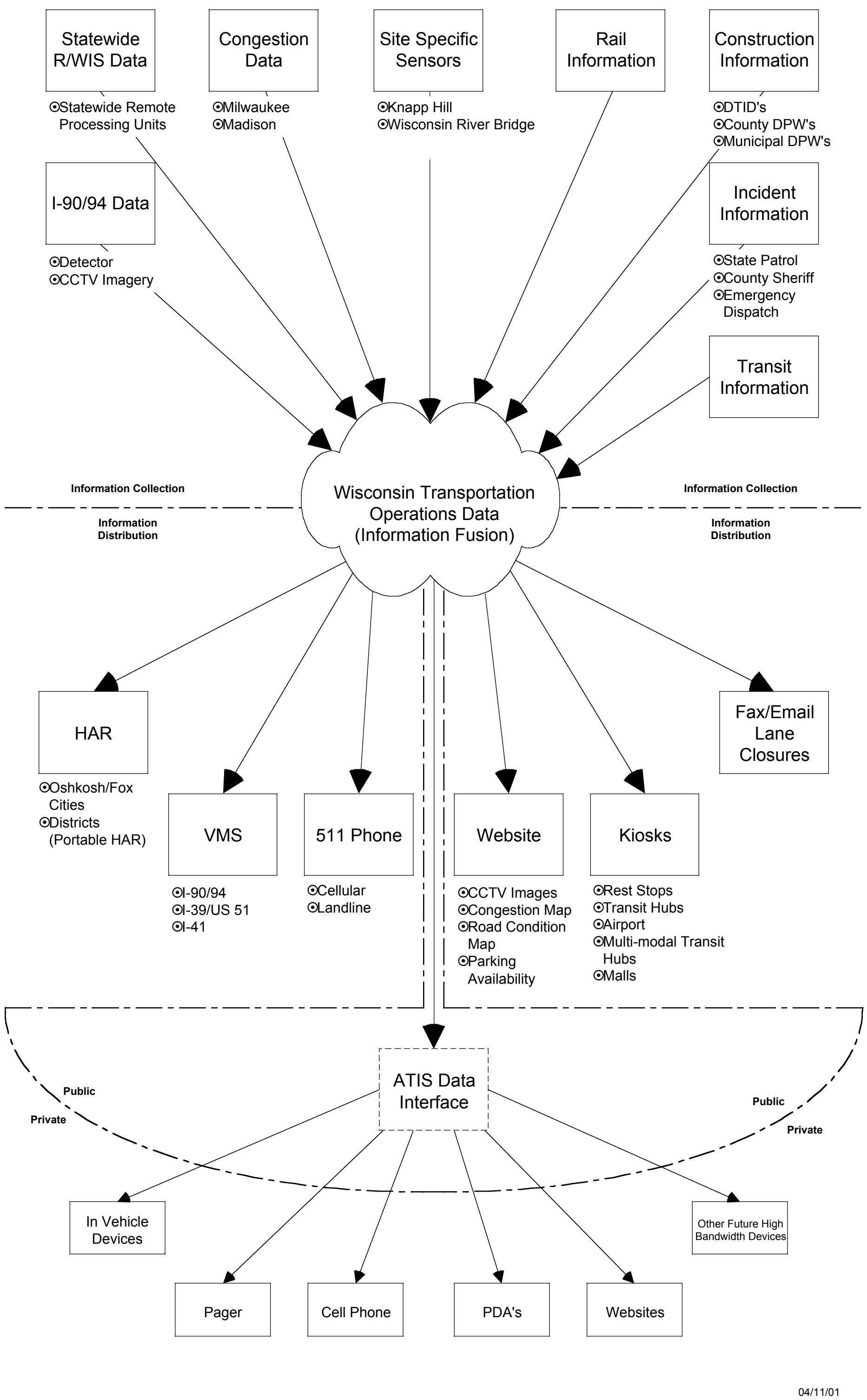
Many of the above problem areas have a direct relationship to traveler information, and can be mitigated via a good traveler information system. A Statewide ATIS systems approach requires that any element incorporated into the statewide ATIS system is part of a planned, coherent, integrated whole. WisDOT's approach to statewide ITS implementation depends on the desired long-range outcomes and statewide vision. Once again, the vision for ATIS in Wisconsin developed by the ATIS Advisory Group is:

> **"Travelers and transportation operators in Wisconsin will have the information they need to have a safe, efficient and satisfying trip."**

The work conducted on the Statewide ATIS project provided this vision, a summary of existing ATIS related projects, identified the need for expanded and improved traveler information systems, and defined the attributes of specific traveler information elements. The results of this work lead to the development of a model for the collection, fusion and dissemination of traveler information. See Figure 3:

Figure 3

WISDOT ADVANCED TRAVELER INFORMATION SYSTEMS
PROPOSED PROJECT INTER-RELATIONSHIP DEVELOPMENT DIAGRAM



DEVELOPMENT OF THE ATIS DEPLOYMENT PLAN

The main objective of this project was to develop a plan for integration and deployment of key components that would result in a truly integrated and statewide traveler information system.

The goal is to focus on the integration of existing traffic operations data and integrate this data into useful traveler information. Therefore, the Advisory Group chose to select projects that would provide "early winners," that is, to provide demonstratable results in a short timeframe. Therefore, the ATIS element maturity index was used to define traveler information systems that are very mature and can be modified, expanded or integrated with other data sources to produce these early winners.

The basic idea of developing the ATIS Selection Index was to create a simple, comparable measure of existing ATIS systems. The index represents: 1) the level of deployment already accomplished and the anticipated level of effort required to bring the element to the desired level of service (maturity); and 2) the priority assigned by the ATIS Advisory Committee to the element.

For each of these components, a numerical value of 1 to 5 was assigned, with 1 representing the lowest priority or lowest level of deployment. This scale was chosen for the ease with which it could be applied to subjective data, giving an obvious high-mid-low (5-3-1) ranking, as well as permitting an intermediate value. (2,4). This ranking provided both a standard method of describing the data, as well as sufficient flexibility to describe consensus-derived values.

The maturity index was assigned by SRF staff through a review of the systems included in the ATIS Inventory. Each existing system was analyzed to determine the following attributes:

A. Which ATIS information elements were addressed by the system?

B. How well developed was the data collection (sensors, data entry processes, etc.) apparatus of the system?

C. How well developed were the communication systems required by the system for collection and dissemination of information?

D. To what extent was raw data being processed into ATIS products?

A sample of the Maturity Index for WisDOT District One is shown on the following page. For some of the ATIS information elements, few or no deployment efforts had been made. In these cases, an overall Maturity was assigned, but the data available was insufficient to assign values to the individual components. This situation occurred primarily in the lower priority elements, as these had not yet received a significant commitment of resources.

Table 8: District 1 Maturity Index Sample

	Maturity			
What is the Travel-Related Information that is delivered?	**Data**	**Comm**	**Processing**	**Maturity Total**
Incidents	3	2	3	3
Route specific road surface condition-weather related	3	2	2	2
Road surface construction/ops	3	2	2	2
Closures/alternate routes	3	2	2	2
Posted detours	3	2	3	3
Congestion levels	3	3	3	3
Trip travel times/operating or actual speeds	3	3	3	3

Once the Maturity and Priority values were assigned to each of the ATIS Information Elements, they were multiplied together to obtain the Selection Index. The Selection Index scored the individual element on a scale of 1 to 25 (i.e., “1” priority and “1” maturity = total score of 1; “5” priority and “5” maturity = total score of 25). For example, the “Incident” ATIS Element was assigned a “High” priority by the committee and therefore received a “5” score.

Incorporating this into the Selection Index schema described above, “Incidents” receives an Index of 20, (high priority=5; mid-high maturity=4; 5 X 4=20), indicating that further work in this area is in keeping with the committee’s priorities and would yield results by building on an already established infrastructure of systems.

Table 9: District 1 Selection Index

		Maturity				
What is the Travel-Related Information that is Delivered?	**Priority Index**	**Data**	**Comm**	**Processing**	**Maturity Total**	**Selection Index**
Incidents	5	3	2	3	3	**15**
Route-specific road surface condition-weather related	5	3	2	2	2	**10**
Road surface construction/ops	5	3	2	2	2	**10**
Closures/alternate routes	5	3	2	2	2	**10**
Posted detours	5	3	2	3	3	**15**
Congestion levels	5	3	3	3	3	**15**
Trip travel times/operating or actual speeds	5	3	3	3	3	**15**
Weather conditions (visibility, etc.)	3	3			4	**12**
Tourist information: lodging and activities, gas stations, truck stops	3				2	**6**
Mayday	3				1	**3**
Event parking and information	3				1	**3**
Parking available (metro area)	3				1	**3**
Weight restrictions (weather related, but different)	1				3	**3**
Medical emergency facilities locations	1				2	**2**
Park and ride locations	1				4	**4**
Transit scheduling	1				4	**4**
Airport and parking information	1				2	**2**
In-vehicle road guidance	1				1	**1**

The Selection Indices were compiled for District One and District Two, and for the aggregate of Districts Three through Eight. The results are shown in the following three figures, with the Selection Index along the X-axis and the ATIS elements grouped vertically along the Y-axis by their priority score (high-medium-low). These figures clearly show the differing selection indices between the districts, due largely to the more mature levels of deployment in the Milwaukee (District Two) region.

Figure 4: District 1 Selection Index

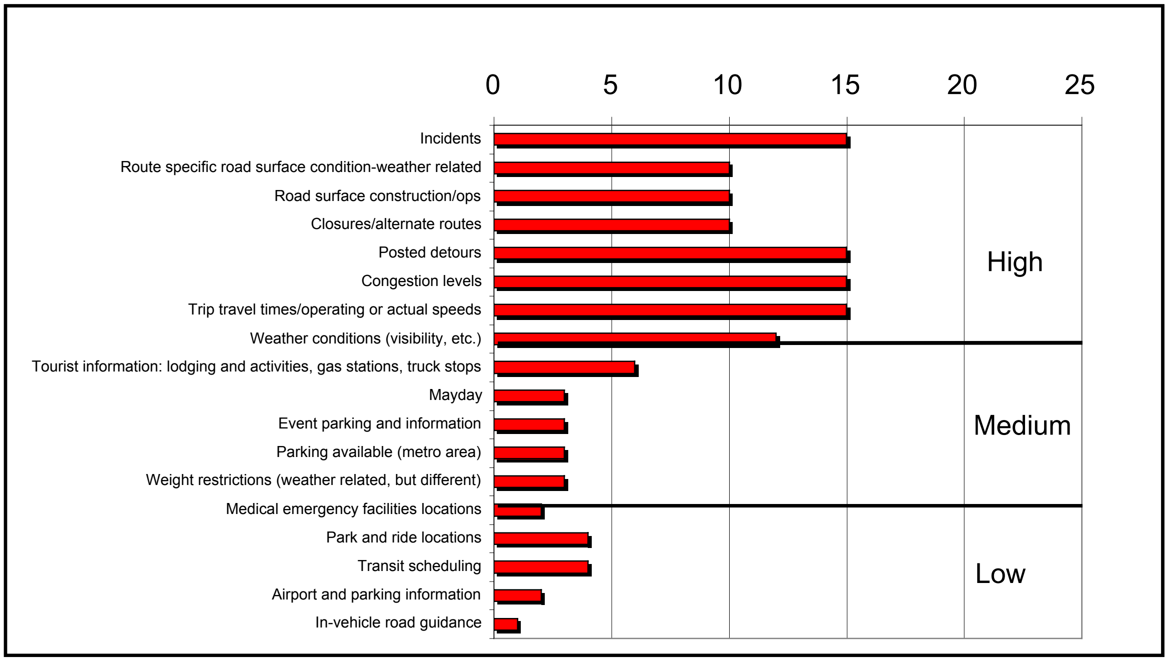


Figure 5: District 2 Selection Index

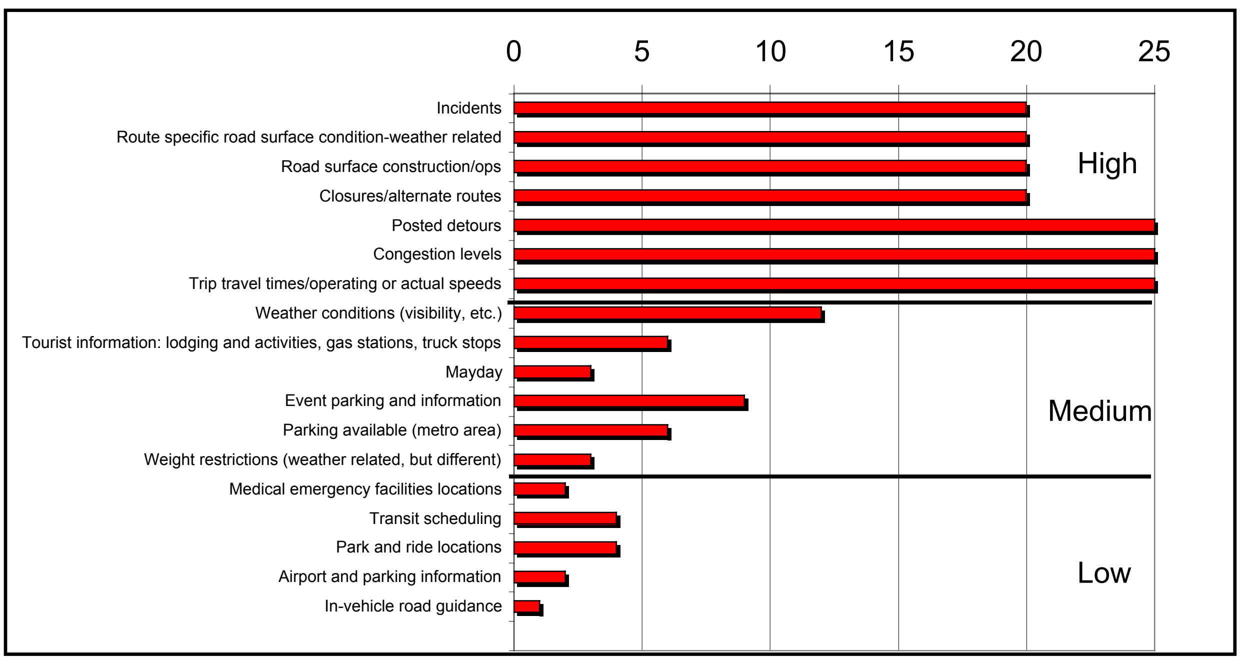
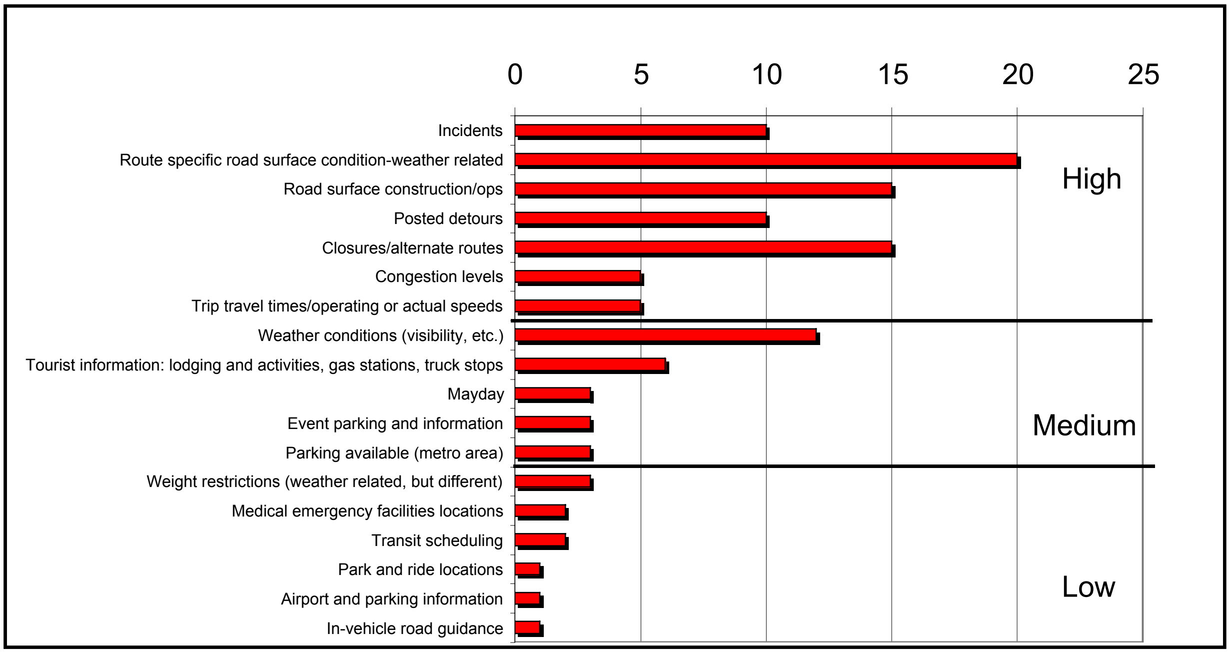


Figure 6: Districts 3-8 Selection Index



The advisory Group used the Maturity Index information to identify "early winner" projects for inclusion in the ATIS Deployment Plan.

The Advisory Group developed a list of ATIS projects that would "build out" the statewide traveler information system utilizing the transportation operations data that currently exists or is in planning stage. The concept of these proposed projects was then defined and documented and further prioritized according to the ability to provide traveler information in the near term.

Table 10 provides a listing of ATIS projects. These project concepts are defined below.

Table 10

Proposed Advanced Traveler Information Systems Statewide Projects, Costs, and Deployment Terms

	Project Description	Deployment Term			Total Costs	Responsible Division
		Short	Medium	Long		
1.0	ATIS Database Design		√		$150 k	DTIM
2.0	Synthesized Advanced Traveler Information Systems (ATIS) - Pilot Project	√	√	√	$200 k	DTID
2.1	Statewide Road Condition Data Collection and Information Integration	√			part of 2.0	DTID
2.2	Statewide Construction Information Data Collection and Integration	√			part of 2.0	DTID
2.3	Traffic Incident Information Collection and Integration	√			$200 k	DTID
2.4	Congestion Information Collection and Integration	√			part of 2.0	DTID
2.5	Parking Availability Information Collection and Integration		√	√	part of 2.0	DTID
3.0	Automated Daily Lane Closure Information (Automated Dissemination)		√		$ 130 k	
4.0	Highway Advisory Radio (HAR) and Telephone (HAT), Pilot Project		√		$100 k	
5.0	511 Abbreviated-Dial Traveler Information Number Conversion	√	√		$100 k	DTID
6.0	511 Weather Forecast Information System (ATWIS)	√			$ 145 k	
7.0	ATIS Information Kiosks (Pilot Project)		√		$ 100k	
8.0	Integration of TOC data across two districts (Pilot Project)		√		$ 75 k	
9.0	Statewide Communication Infrastructure System Needs Assessment	√			$150 k	DTID

ATIS DATABASE DESIGN - Development of an Advanced Statewide Traveler Information System for Wisconsin

A statewide traveler information system (ATIS) in Wisconsin implies an all-encompassing system that provides all types of travel related information to the user, a "one-stop shopping center" for traveler information. WisDOT and other agencies currently have a wealth of transportation operations data available today, and plans for deployment of new and expanded systems that will provide even more data. The next step in the evolution of ATIS in Wisconsin is to integrate this data into easy-to-use traveler information. One way to accomplish this vision requires the creation of an ATIS application database designed to accommodate all existing and future real-time and seasonal/static information regarding traveler information. This database could be either geographically centralized or distributed and would form the framework for information gathering, processing and distribution for Wisconsin's ATIS programs. The deployment of the database itself, along with various other statewide applications is discussed below.

This project evolved from the meetings and workshops held as a part of the statewide Advanced Traveler Information System and ITS architecture project.

The main goal of the project is to enhance highway safety and efficiency by providing travelers with integrated information such as congestion, construction and road condition information.

Short-term

The creation of a multi-purpose database requires careful planning to ensure that data can be reliably stored and accessed. In the short term, creating an extensible architecture to handle all of the present ATIS data elements and choosing the appropriate hardware/software platforms to fulfil the operational requirements defined during this planning phase should be undertaken. An Inventory and evaluation of existing DOT systems, platforms and data models should also be performed. An appropriate database design, operational concept, model database and prototype data entry/extraction toolkit should be created in this phase.

Mid-term

After the concept is proven and any necessary changes have been implemented, the data entry tools should be delivered to any entity that creates data of interest to travelers. These could include DOT district offices, county offices, municipalities, airports, law enforcement, tourism offices and others. Exploration of integration of these tools into existing reporting systems should also be investigated. To encourage private-sector participation in providing traveler information, a common data "portal" or gateway to permit outside entities to access the information stored in the WADI system could be implemented.

Long-term

Once information is reliably being entered and processed for delivery, advanced applications, such as real-time route guidance, wireless device integration, etc. can be explored. Also, integration into any existing DOT information management systems should be investigated to create as close to a true "single entry" model for data as possible.

The following information would be integrated into this statewide database:
- Statewide Road Condition Information
- Statewide Construction Information
- Incident Information
- Congestion Information
- Parking Availability Information

Benefits include increased safety on the routes served by the system, increased efficiency by consolidating traveler information, and reduced congestion due to people being better informed of road conditions, congestion, and construction zones.

It is anticipated that the request for proposal (RFP) for development of the ATIS database would be issued in 2003, with procurement and startup in 2004.

SYNTHESIZED ADVANCED TRAVELER INFORMATION SYSTEMS (ATIS) - PILOT PROJECT

Wisconsin is currently utilizing several methods for gathering and displaying construction, road condition, congestion, and traffic incident information. While this information is provided to travelers, it is done so on a corridor or regional basis. The intent of this pilot project (Phase I) is to demonstrate the feasibility and benefits of synthesizing existing transportation operations data collection and display efforts between multiple districts, with eventual expansion statewide.

This project evolved from district workshops held as a part of the statewide Advanced Traveler Information System and ITS architecture project.

The main goal of the project is to enhance highway safety and efficiency by providing travelers with integrated information such as congestion, construction, and road condition information.

As an example, the Gary-Chicago-Milwaukee (GCM) corridor project currently provides a good source of construction and other relevant traveler information to end-users. However, beyond, the corridor, this type of traveler information is sparse and inconsistent. Nonetheless, the approach taken by this project may have great relevance and application statewide. Additionally, road condition information is collected statewide but is displayed and provided through a different mechanism than GCM. The traveler desiring to obtain road condition and construction information for this area will need to access separate sources for information. Integrating traveler information from different projects and districts would greatly leverage the collection efforts of many of the current systems in place while consolidating and providing seamless dissemination of traveler information.

This pilot project would build on the current traveler information collection and dissemination approach adopted by several systems already in place in Wisconsin. As a result of traveler information mechanisms already adopted by projects such as Monitor and the GCM, a pilot project is recommended for integration between District 1 and a neighboring district to expand traveler information coverage and to demonstrate the feasibility of integrating current systems.

Phase II of the project will consider the integration of emergency services information that would coordinate with the deployment of the state patrol computer-aided dispatching (CAD) system. The primary focus is the integration of traffic incident data. Again, the potential integration of CAD with other traveler and transportation operations data would allow for improved incident management and public alert of incidents.

Benefits include increased safety on the routes served by the system, increased efficiency by consolidating traveler information and reduced congestion due to people being better informed of road conditions, congestion, and construction zones.

This project consists of two phases of deployment. In the near-term 2002 to 2004, it is anticipated that $200,000 would be required for integrating and consolidating construction, road condition and congestion information. Further, $200,000 would be required for integrating traffic incident information collection and integration (for 2004 to 2005).

Average annual on-going operations and maintenance (O&M) costs or services will depend on the system that will be deployed. Service would have to be bid via RFP. Funding would have to come from the ITS program. Any staff time would have to be funded by the ITS program.

It is anticipated that the RFP for this service would be issued in 2002, with procurement and startup in late 2002/early 2003.

AUTOMATED DAILY LANE CLOSURE INFORMATION COLLECTION AND INTEGRATION

Most jurisdictions that perform road maintenance and construction provide information regarding these operations to local media and other (chamber of commerce, etc.) organizations. This can be a cumbersome operation of typing a sheet(s) of information and then sending via fax to sometimes length lists of recipients.

This project evolved from discussions in the Advisory Group meetings as a part of the statewide Advanced Traveler Information System and ITS Architecture project.

The main goal of the project is to improve the quality, accuracy and frequency of construction and maintenance information and to move towards a standardized approach for reporting this information.

Short-term

Initially, creating a list of all agencies that receive this information and standardizing the descriptions of activity would lay the groundwork for automating this procedure.

Mid-term

As the reporting methods become standardized, a small database application would be provided to each entity with lane closure authority. The data would be entered into the application and stored on a central server. Customers (media, etc.) would then use a web interface to specify the jurisdictions for which they wish to receive information, and an automated fax or e-mail application would send the daily updates.

Benefits include improved reporting of road maintenance and construction information as well as a reduction in the effort required to collect this information.

Project implementation costs: Approximately $30,000 for Phase 1 of this project and $100,000 for implementation of Phase 2.

HIGHWAY ADVISORY RADIO (HAR) AND TELEPHONE (HAT), PILOT PROJECT

Tourism is a major industry in Wisconsin and the number of people attending the major events continues to increase each year. Methods for disseminating traveler information to event-goers, such as variable message signs, have been implemented in recent years. However, the amount of information and details about special events and the resulting traffic congestion that can be provided via variable message signs is limited by the number of words that can be displayed on the VMS in two or three message frames. This project will enhance information dissemination at these major attractions by implementing a localized highway advisory radio and telephone system that travelers can call to get detailed information on the event, traffic congestion, recommended travel routes, etc.

This project evolved from discussions in the Advisory Group meetings as a part of the statewide Advanced Traveler Information System and ITS Architecture project.

The main goal of the project is to enhance the quantity of quality of traveler information disseminated to drivers during major special events.

Short-term

Several mobile HAR systems are already in use in Wisconsin. Mobile systems are particularly useful for construction sites or special events. A fixed (permanent) system of HAR and HAT is proposed for areas where there are large numbers of information items that need to be communicated to travelers on a recurring basis. Examples of these might be high-tourism areas (Wisconsin Dells) or areas with significant congestion or high numbers of special events (Milwaukee).

Mid-term

If central data processing becomes available along with text-to-speech technology, the HAR and HAT system could also become a method of delivering real-time (incident, parking availability, etc.) data in areas where the HAR can accept real-time recording updates.

Benefits include reduced congestion due to people being better informed of road conditions, congestion, and special event detour routes, increased safety on the routes near the event, and an increase in customer satisfaction due to people being better informed of travel conditions.

Project implementation costs: Approximately $100,000.

511 ABBREVIATED-DIAL TRAVELER INFORMATION NUMBER CONVERSION

In July 2000, the Federal Communications Commission (FCC) released a directive allocating 511 for traveler and transportation information (similar to the 911 initiative). Since that time, the Federal Highway Administration (FHWA) has announced assistance to states for conversion programs that would support system design, conversion costs including software modifications and necessary hardware changes, and system testing activities.

This project evolved from district workshops held as a part of the statewide Advanced Traveler Information System and ITS architecture project.

The main goal of the project is to enhance highway safety and efficiency by providing travelers with integrated information such as congestion, construction, and road condition information.

This project proposes the initial investigations into the implementation of 511 statewide. It is suggested that this effort should be largely an administrative action where the DOT would coordinate with the local exchange carriers and wireless communications providers to “point” 511 to the lead number in the dial-in hunt group for Wisconsin’s existing 800 road condition number. This would provide an opportunity to resolve any issues with the telecommunications providers and evaluating the usability of the service while minimizing the commitment of DOT resources. The 511 occupation by WisDOT would act as a portal and enabler for potential public/private partnerships.

Additionally, this project will coordinate with the efforts of the proposed deployment of the 511 Weather Traveler Information project proposed by DTID Bureau of Highway Operations, Winter Maintenance Section. This system would allow for en-route access to weather information. While the program has been set up in other states to allow cellular phone users traveling to dial #SAFE for access to information, the project will investigate how this program could possibly feed into the conversion of 511.

Benefits include increased safety on the routes served by the system, increased efficiency by consolidating traveler information, and reduced congestion due to people being better informed of road conditions, congestion, and construction zones.

Project implementation costs: Anticipated deployment of the initial conversion to 511 is $100,000.

Average annual on-going operations and maintenance (O&M) costs or services will depend on the system to be deployed. Funding would have to come from the ITS program. Any staff time would have to be funded by the ITS program.

Other federal, state or public agency resources: FHWA is currently providing assistance through $50,000 in matching funds. Application process will be required.

Private sector resources: There is potential for private sector entry and subsidy of 511 system.

It is anticipated that the RFP for this service would be issued in 2002, with procurement and startup in late 2002/early 2003.

511 WEATHER FORECAST INFORMATION SYSTEM (ATWIS)

This project evolved from the I-90/94 and I-39 Corridor plans for enhanced traveler information, as well as the Advanced Traveler Information System plan. The main goal of the project is to enhance highway safety by alerting travelers to hazardous weather conditions on their routes of travel.

The approach to this project is to purchase a weather and road condition forecast service that would be integrated into the 511 system. There are at least two existing options. One would be similar to the Advanced Traveler Weather Information System (ATWIS) currently in operation in the Dakotas and Minnesota. This system enables users to use a cell phone to dial a number (in the Dakotas, it's #SAFE) anywhere in the state, enter the road, the milepost, and direction of travel. The system will then provide a verbal forecast for the next 50 miles in the direction of travel. The other existing option would be FORETELL, which envisions providing weather information to travelers as well. At this point, they have not fielded such a system.

This system is needed because there is currently no automated system in place to provide weather information to travelers. Users would access the information either from their vehicles or from home.

Deliverability will depend on the implementation of the 511 system statewide. However, it is anticipated that the RFP for this service would be issued in 2002, with procurement and startup in late 2002/early 2003, if the 511 system is operational by that time. The plan is that the weather forecast service would be one of the first 511 options implemented as an early winner. This service has already proved very successful in the Dakotas and Minnesota.

Benefits to the State would be in the form of increased safety on the routes served by the system and reduced congestion due to people being better informed of weather conditions.

Project implementation costs: Approximately $70,000 for telephony, $30,000 for voice recognition software, and $45,000 for programming and training. ($145,000 for implementation in FY02)

Average annual on-going operations and maintenance (O&M) costs or services: Approximately $130,000 per year. This is the cost for operation of the system by the service provider. Price would include generation of weather forecasts every 6 hours for every segment of roadway identified by the State. Service would have to be bid via RFP or documented for sole source procurement. Funding would have to come from the ITS program.

ATIS INFORMATION KIOSKS – PILOT PROJECT

This project includes the design and implementation of traveler information kiosks that would provide critical traveler information at key locations throughout Wisconsin.

This project evolved from discussions in the Advisory Group meetings as a part of the statewide Advanced Traveler Information System and ITS Architecture project.

The main goal of the project is to improve the accessibility to traveler information by providing additional means for information disseminations.

Kiosks are small, usually computerized devices that are located to provide relevant information to people in a given location. In some ways they are similar to electronic brochure racks. The first task associated with this project would be to develop a deployment plan that would identify the priority locations for kiosks and types of information to be provided. An initial deployment should target locations with high levels of motorist foot-traffic, such as rest areas along interstates. Kiosks may be stand-alone systems with data (construction information, transit information, special events, etc.) and updated periodically either by physically transferring data from removable storage media, or an on-demand dial-up system.

Once a small number of kiosks are in place, connecting them to a "live" network for on-demand transfer of information is a likely next step. As this is accomplished, real-time applications can be developed (such as parking availability, traffic, weather, etc.) and delivered from a centralized data source. Revenue could be generated to pay for kiosk operations by charging users for Internet access, i.e. $1 charge for 5 minutes.

If the kiosks prove to be a valuable distribution mechanism for information, then expansion of the system to other locations, such as airports, transit hubs, shopping malls, etc. should be considered.

Benefits of this project will be realized by the traveling public through improved access to transportation conditions information.

Project implementation costs: Approximately $100,000 including the deployment plan and implementation of kiosks at key locations throughout Wisconsin.

INTEGRATION OF TOC DATA ACROSS TWO DISTRICTS

This project includes the design and implementation plan for developing a communications network that will connect Wisconsin traffic operations and State Patrol communications centers across district boundaries. Establishing linkages between Districts 1, 2 and 3 would be the priority connections. Subsequently, the other districts would be incorporated.

This project evolved from discussions in the Advisory Group meetings as a part of the statewide Advanced Traveler Information System and ITS Architecture project.

The main goal of the project is to demonstrate the improvement in traffic operations and incident management by deploying inter-district communications as a pilot project.

The tasks and key objectives of the project would be:

Conduct a review of the current communications system plan for the Wisconsin ITS program in Districts 1, 2 and 3 focusing on TIME, TESCNET, and the GCM corridor. Opportunities for coordination of communications activities would be identified and coordinated across initiatives. Next, the inter-District and inter-program functional requirements would be identified and documented in accordance with the statewide and regional ITS architectures. In order to refine the communication network needs, workshops would be conducted with transportation and public safety stakeholders. Following this input, the technical and institutional alternatives for providing the backbone of an inter-district communications would be developed, evaluated and prioritized.

A strategic plan and implementation plan for the preferred communication network approach focusing on the deployment and integration of the high priority inter-district communication links would be prepared

Benefits of this project will be realized through efficiencies gained via improved information sharing and incident management coordination.

Project implementation costs: Approximately $75,000 for the study that would complete the initial phase of the project. Costs for deploying the communications network would be defined in the study.

STATEWIDE COMMUNICATION INFRASTRUCTURE NEEDS ASSESSMENT

Advanced Traveler Information Systems (ATIS) supports several strategies employed in recent years to alleviate traffic congestion and improve safety on the transportation network. ATIS aims to provide travelers with travel-related information to enable them to make informed travel decisions. These systems are in turn supported by communication subsystems and technologies.

This project evolved from district workshops held as a part of the statewide Advanced Traveler Information System and ITS architecture project, where lack of communications infrastructure was a common issue.

The main goal of the project is to determine the type and level of communications infrastructure support and integration required and available in Wisconsin for statewide ATIS projects.

This project will identify and assess communication needs for supporting the deployment of an ATIS at the statewide level. It will examine ATIS communications subsystem requirements at the state and county levels, pertaining to system functionality, performance, reliability and data security. It will also examine the existing communications infrastructure including communication media, geographic locations, and communications equipment, looking for opportunities for cost avoidance and cost sharing among state and county Public Safety and Transportation agencies. An assessment will be made to determine where spare capacity exists and is available for supporting ATIS requirements, and the project will make recommendations concerning shared communications standards, infrastructure, personnel, and facilities.

The approach to this project is to assess ATIS communications needs against communications services provided by the Traffic Operations and Emergency Services communications systems already present in many WisDOT Districts, used for public safety and transportation operations.

Where new communications infrastructure is required, the project will identify and recommend enhancements to the existing ATIS architecture.

The findings will be summarized in a document that will translate the identified and assessed needs into a physical realization of ITS communications architecture and recommended technology standards, together with proposed institutional agreements and memoranda of understanding among stakeholder agencies for communications resource sharing.

Benefits will accrue through cost avoidance, avoiding the generation and funding of redundant or overlapping Public Safety and Transportation communications projects throughout the state by assessing needs and by sharing resources. This project supports most of the other ATIS projects proposed for consideration, and so indirectly supports increased safety on the routes served by the system, increased efficiency by consolidating traveler information, and reduced congestion due to people being better informed of road conditions, congestion, and construction zones. Project costs are anticipated to be far less than those of a single redundant Emergency Management or Transportation communications system.

It is anticipated that $150,000 would be required for assessing ATIS communications infrastructure needs. No annual or ongoing costs or services are expected for this project. Funding would have to come from the ITS program. Any staff time would also have to be funded by the ITS program.

It is anticipated that the RFP for this service would be issued in 2001, with procurement and startup in early 2002.

9. RECOMMENDATIONS

This chapter contains recommendations to better coordinate the ATIS elements of project initiatives and operations in Wisconsin. They cover the short-term steps to coordinate current initiatives and organizational structure recommendations.

For most of the recommendations, the organization(s) accountable for acting on them are identified.

A. Implement Oversight of ITS Projects

Successful achievement of the ATIS vision requires an oversight group to provide direction on ATIS initiatives that require coordination with existing statewide systems as well as district systems. ATIS oversight should be integrated with oversight of the entire ITS program in Wisconsin through either DTIM or DTID.

B. Identify Staff Accountable for ATIS and ITS Coordination

Improving coordination among ATIS and ITS initiatives is required and will not come without cost. This oversight will require staff support as well as additional input from ITS technical working group(s). One person/position within WisDOT should be assigned the responsibility to serve as a single point of contact for managers and sponsors of ATIS projects and ITS projects with an ATIS component for identifying coordination opportunities and requirements. These responsibilities should reside with DTID.

C. Create an Ongoing ATIS Technical Group

An ongoing ATIS Technical Group should be formed. The purpose of this group is to provide technical advice for all projects involving ATIS elements and to provide a forum for face-to-face communications and coordination among the technical leaders of ITS projects. Key members of the ATIS Advisory Group that was assembled for the development of this plan would be ideal candidates for this group.

D. Conform to the ITS Guidelines and Project Development Process

Chapter 9 sets forth ITS Guidelines that must be adhered to when developing ATIS initiatives. Additional guidelines that should be followed to ensure a particular initiative fits within the statewide ATIS plan includes:

- Clarify its goal, objectives and scope
- Clarify the roles of public and private partners
- Ensure fit with WisDOT and state priorities
- Ensure fit with other initiatives
- Secure review by appropriate oversight groups

- Ensure conformance with laws, rules, policies, principles and standards
- Account for the operations and maintenance “tails” of the initiative
- Develop a thorough project plan
- Gain necessary approvals

E. Define Accessibility to Public Sector Data by the Private Sector

A policy needs to be developed to define whether or not WisDOT should charge private service providers for information WisDOT collects and provides them.

WisDOT currently collects traffic and road-related data in the Milwaukee area and has plans to collect vast amounts of data on key roadways throughout much of the state. As this data collection infrastructure is implemented, a statewide policy needs to be developed to address whether or not WisDOT should charge these service providers for data or develop quid pro quo arrangements. This policy would ensure that all private service providers are treated equally.

F. Continue Work on ATIS Policy Regarding Public/Private Sector Roles

The vision developed for ATIS identifies three priority goals: (1) make travel safer; (2) make travel more efficient; and (3) increase customer satisfaction. The public sector’s core responsibility for providing traveler information should reflect these goals.

The Wisconsin ATIS Advisory Group formulated the following policy regarding public/private sector roles. Further work on this policy needs to be conducted as components of the statewide traveler information system are deployed and as technology and market forces affect the dissemination and sale-ability of this information.

> WisDOT should encourage the development of the statewide ATIS and continue to provide traveler information to the public. As the key components of the statewide ATIS are developed and deployed (i.e., the traveler information portal), WisDOT should solicit the private sector to utilize this data to provide value-added traveler information. In cases where private markets cannot deliver that information, the state should fund development and operations. State-funded development and operations should be outsourced when that is the most effective and efficient way to deliver access to traveler information. The specific public/private business model should be defined in the context of the specific need or application and the desired outcomes. No single business model fits all needs.

10. NATIONAL ITS ARCHITECTURE OVERVIEW

The National ITS Architecture provides a common structure for the design of intelligent transportation systems. It is not a system design nor is it a design concept. What it does is define the framework around which multiple design approaches can be developed, each one specifically tailored to meet the individual needs of the user, while maintaining the benefits of a common architecture. The architecture defines the functions (e.g., gather traffic information or request a route) that must be performed to implement a given user service, the physical entities or subsystems where these functions reside (e.g., the roadside or the vehicle), the interfaces/information flows between the physical subsystems, and the communication requirements for the information flows (e.g., wireline or wireless). In addition, it identifies and specifies the requirements for the standards needed to support national and regional interoperability, as well as product standards needed to support economy of scale considerations in deployment.

The main goal of the Statewide ITS Architecture for the Wisconsin Department of Transportation is to provide a framework for the development of ITS systems in Wisconsin that will allow for the integration and interoperability of disparate systems. The secondary goal of development is to conform to the National ITS Architecture, developed by the United States Department of Transportation in 1998. This is critical to any architecture project due in part to the Transportation Efficiency Act for the 21st Century (TEA-21) requirement that all ITS projects funded through the Highway Trust Fund be in conformance with the National ITS Architecture and applicable standards. It is the ITS standards that specify how different technologies, products and components interconnect and interoperate among different systems to share information automatically. Since the enactment of TEA-21 FHWA and FTA have developed an additional ITS architecture and standards regulation and policy, respectively.

Specifically, regional architecture development was targeted through the new regulation and policy. § Policy 940.9 – Regional Architecture, states the following:

- The FHWA rule and FTA policy require that a region that is currently implementing ITS projects must develop a regional ITS architecture to guide their deployment by April 8, 2005.
- Regions without ITS will have to meet this requirement within four years of their first ITS project advancing to final design.
- The National ITS Architecture shall be used as a resource for developing the regional architecture.
- The regional ITS architecture shall be on a scale commensurate with the ITS investment in the region.

The two main components of the National ITS Architecture are the Logical and Physical Architecture. The Logical Architecture presents a functional view of the ITS user services[4].

[4] User services document what ITS should do from the user's perspective. The concept of user services allows system or project definition to begin by establishing the high level services that will be provided to address identified problems and needs.

While the Physical Architecture partitions the functions defined by the Logical Architecture into systems, and at a lower level, subsystems, based on the functional similarity of the process specifications and the location where the functions are being performed.

Logical Architecture

The Logical Architecture defines the functions or process specifications[5] that are required to perform ITS user services and the information or data flows[6] that need to be exchanged between these functions. The functional decomposition process begins by defining those elements that are inside the architecture, and those that are not. For example, travelers are external to the architecture, but the equipment that they use to obtain information is inside. In other words, the architecture defines the functions ITS must perform in support of a traveler's requirements, not the functions of the traveler.

ITS functions are depicted using data flow diagrams (see Figure 7 Simplified Top Level Data Flow Diagram). In a data flow diagram, circles represent functions that are broken down into lower levels of detail on subsequent diagrams. The lowest level of decomposition is a Process Specification, e.g., Detect Roadside Pollution Levels. This process detects pollution levels present in the environment and passes the pollution measurement data on to another process, Process Pollution Data, where it is combined with other such detected data.

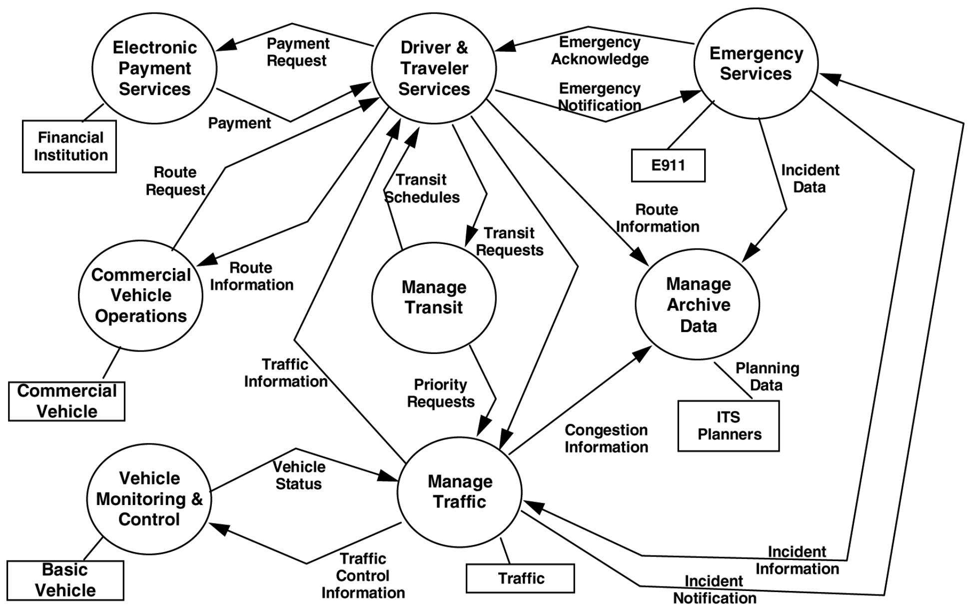


Figure 7: Simplified Top Level Data Flow Diagram

[5] The textual definition of the most detailed processes identified in the Logical Architecture. The specification includes an overview, a set of functional requirements, and a complete set of inputs and outputs.

[6] Information that is transferred between processes or between a process and a terminator in the Logical Architecture. Data flows are aggregated together to form higher-level Architecture Flows in the Physical Architecture.

The Logical Architecture is detail oriented and highly customizable to provide the information necessary for the implementation and deployment of specific project(s).

Physical Architecture

The Physical Architecture partitions the functions defined by the Logical Architecture into systems, and at a lower level, subsystems, based on the functional similarity of the process specifications and the location where the functions are being performed.

The Physical Architecture provides agencies with a physical representation (though not a detailed design) of the important ITS interfaces and major system components. The Physical Architecture identifies the physical subsystems and architecture flows between subsystems that will implement the processes and support the data flows of the ITS Logical Architecture. The physical architecture defines four systems (Traveler, Center, Roadside, and Vehicle) and nineteen subsystems. The specific choice of nineteen subsystems represents a lower level of partitioning of functions that is intended to capture all anticipated subsystem boundaries for the present, and 20 years into the future.

Example subsystems are the Traffic Management Subsystem, the Vehicle Subsystem, the Roadway Subsystem, and the Remote Traveler Support Subsystem. These correspond to existing (or future) things in the physical world; respectively, traffic operations centers, automobiles, roadside signal controllers, and informational kiosks. A top-level diagram of the physical architecture is shown below.

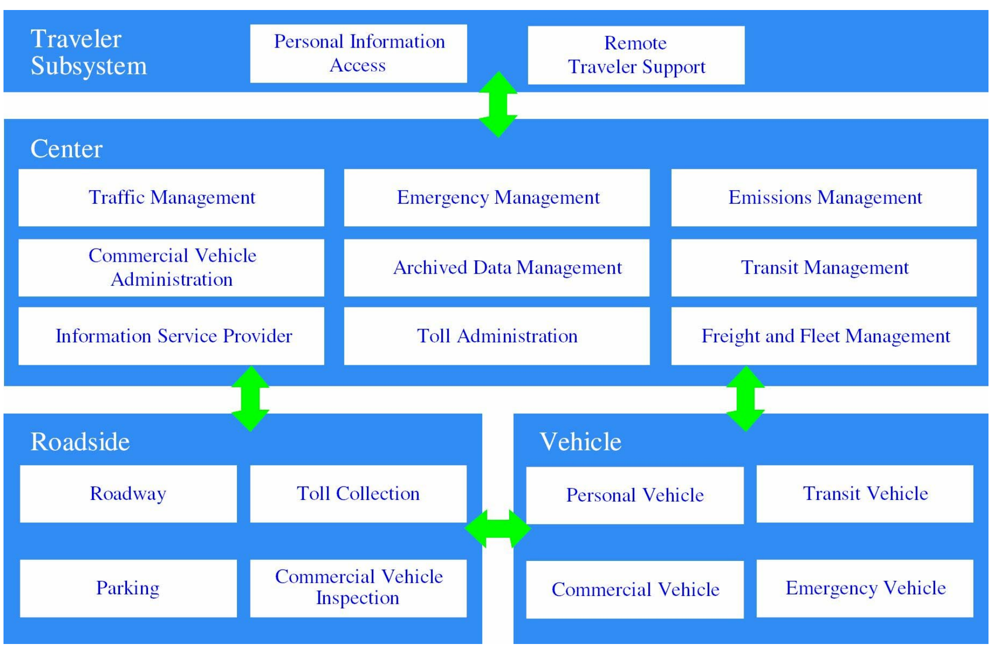


FIGURE 8: SYSTEM AND SUBSYSTEM INTERCONNECT DIAGRAM

- Subsystems - These perform transportation functions (e.g., collect data from the roadside, provide information to the public, perform route planning, etc.). Processes that are likely to be collected together under one physical agency, jurisdiction, or physical unit are grouped together into a subsystem. This grouping is done to optimize the overall expected performance of the resulting ITS deployments taking into consideration anticipated communication technologies, performance, risk, deployment, etc. A significant level of detail is available for each of these subsystems and their interfaces.

  - Center Subsystems - provide management, administration, and support functions for the transportation system. The center subsystems each communicate with other centers to enable coordination between modes and across jurisdictions within a region. The center subsystems also communicate with roadside, vehicle subsystems, and traveler subsystems to gather information and provide information and control that is coordinated by the center subsystems. The center subsystems are not physical "brick and mortar facilities.

    - Commercial Vehicle Administration - Sells credentials and administers taxes, keeps records of safety and credential check data, and participates in information exchange with other commercial vehicle administration subsystems and CVO Information Requesters.

    - Fleet and Freight Management - Monitors and coordinates vehicle fleets including coordination with inter-modal freight depots or shippers.

    - Toll Administration - Provides general payment administration capabilities to support electronic assessment of tolls and other transportation usage fees.

    - Transit Management - Collects operational data from transit vehicles and performs strategic and tactical planning for drivers and vehicles.

    - Emergency Management - Coordinates response to incidents, including those involving hazardous materials (HAZMAT).

    - Emissions Management - Collects and processes pollution data and provides demand management input to Traffic Management.

    - Archived Data Management - Collects, archives, manages, and distributes data generated from ITS sources for use in transportation administration, policy evaluation, safety, planning, performance monitoring, program assessment, operations, and research applications

    - Traffic Management - Processes traffic data and provides basic traffic and incident management services through the Roadside and other subsystems. The Traffic Management Subsystem may share traffic data with Information Service Providers. Different equipment packages provide a focus on surface streets or highways (freeways and interstates) or both. It also coordinates transit signal priority and emergency vehicle signal preemption.

- Information Service Provider - This subsystem may be deployed alone (to generally serve drivers and/or travelers) or be combined with Transit Management (to specifically benefit transit travelers), Traffic Management (to specifically benefit drivers and their passengers), Emergency Management (for emergency vehicle routing), Parking Management (for brokering parking reservations), and/or Commercial Vehicle Administration (for commercial vehicle routing) deployments. ISPs can collect and process transportation data from the aforementioned centers, and broadcast general information products (e.g., link times), or deliver personalized information products (e.g., personalized or optimized routing) in response to individual information requests. Because the ISP may know where certain vehicles are, it may use them as "probes" to help determine highway conditions, levels of congestion, and aid in the determination of travel or link times. This probe data may be shared with the Traffic Management Subsystem. The ISP is a key element of pre-trip travel information, infrastructure based route guidance, brokering demand-responsive transit and ridematching, and other traveler information services.

- Roadside Subsystems - These infrastructure subsystems provide the direct interface to the roadway network, vehicles traveling on the roadway network, and travelers in transit. Each of the roadway subsystems includes functions that require distribution to the roadside to support direct surveillance, information provision, and control plan execution. All roadside subsystems interface to one or more of the center subsystems that govern overall operation of the roadside subsystems. The roadside subsystems also generally include direct user interfaces to drivers and transit users and short-range interfaces to the Vehicle Subsystems to support operations.

  - Roadway - Provides traffic management surveillance, signals, and signage for traveler information. This subsystem also includes the devices at roadway intersections and multi-modal intersections to control traffic.
  - Toll Collection - Interacts with vehicle toll tags to collect tolls and identify violators.
  - Parking Management - Collects parking fees and manages parking lot occupancy/availability.
  - Commercial Vehicle Check - Collects credential and safety data from vehicle tags, determines conformance to requirements, posts results to the driver (and in some safety exception cases, the carrier), and records the results for the Commercial Vehicle Administration Subsystem.

- Vehicle Subsystems - These subsystems are all vehicle-based and share many general driver information, vehicle navigation, and advanced safety systems functions. The vehicle subsystems communicate with the roadside subsystems and center subsystems for provision of information to the driver. The Personal Vehicle Subsystem includes general traveler information and vehicle safety functions that are also applicable to the three fleet vehicle subsystems (Commercial Vehicle Subsystem, Emergency Vehicle Subsystem, and Transit Vehicle Subsystem). The fleet vehicle subsystems all include vehicle location and two-way communications functions that support efficient fleet operations.

Each of the three fleet vehicle subsystems also includes functions that support their specific service area.

- Vehicle - Functions that may be common across all vehicle types are located here (e.g. navigation, tolls, etc.) so that specific vehicle deployments may include aggregations of this subsystem with one of the other three specialized vehicle subsystems types. The Vehicle Subsystem includes the user services of the Advanced Vehicle Control and Safety Systems user services bundle.
- Transit Vehicle - Provides operational data to the Transit Management Center, receives transit network status, provides en-route traveler information to travelers, and provides passenger and driver security functions.
- Commercial Vehicle - Stores safety data, identification numbers (driver, vehicle, and carrier), last check event data, and supports in-vehicle signage for driver pass/pull-in messages.
- Emergency Vehicle - Provides vehicle and incident status to the Emergency Management Subsystem.

- Traveler Subsystems – Traveler Subsystems include the equipment that is typically owned and operated by the traveler. Though this equipment is often general purpose in nature and used for a variety of tasks, this equipment is specifically used for gaining access to traveler information within the scope of the ITS architecture. These subsystems interface to the information provider (one of the center subsystems, most commonly the Information Service Provider Subsystem) to access the traveler information. A range of service options and levels of equipment sophistication are considered and supported. Specific equipment included in this subsystem class include personal computers, telephones, personal digital assistants (PDAs), televisions, and any other communications-capable consumer products that can be used to supply information to the traveler.

    - Remote Traveler Support - Provides traveler information at public kiosks. This subsystem includes traveler security functions.
    - Personal Information Access - Provides traveler information and supports emergency requests for travelers using personal computers/telecommunication equipment at the home, office, or while on travel.

The Physical Architecture has a distinct graphical hierarchy that provides a layered effect to the level of detail. A diagram which depicts the nineteen subsystems for full representation of ITS and the basic communication channels between these subsystems is the “Sausage Diagram”. The "Sausage Diagram" is a top-level subsystem interconnect diagram, in which the communication links are the “sausages”. This diagram graphically displays the nineteen subsystems, which are grouped into the aforementioned categories based on their function and location, and the communications media interfaces (see Figure 9 for the generic “Sausage Diagram” provided by the National ITS Architecture).

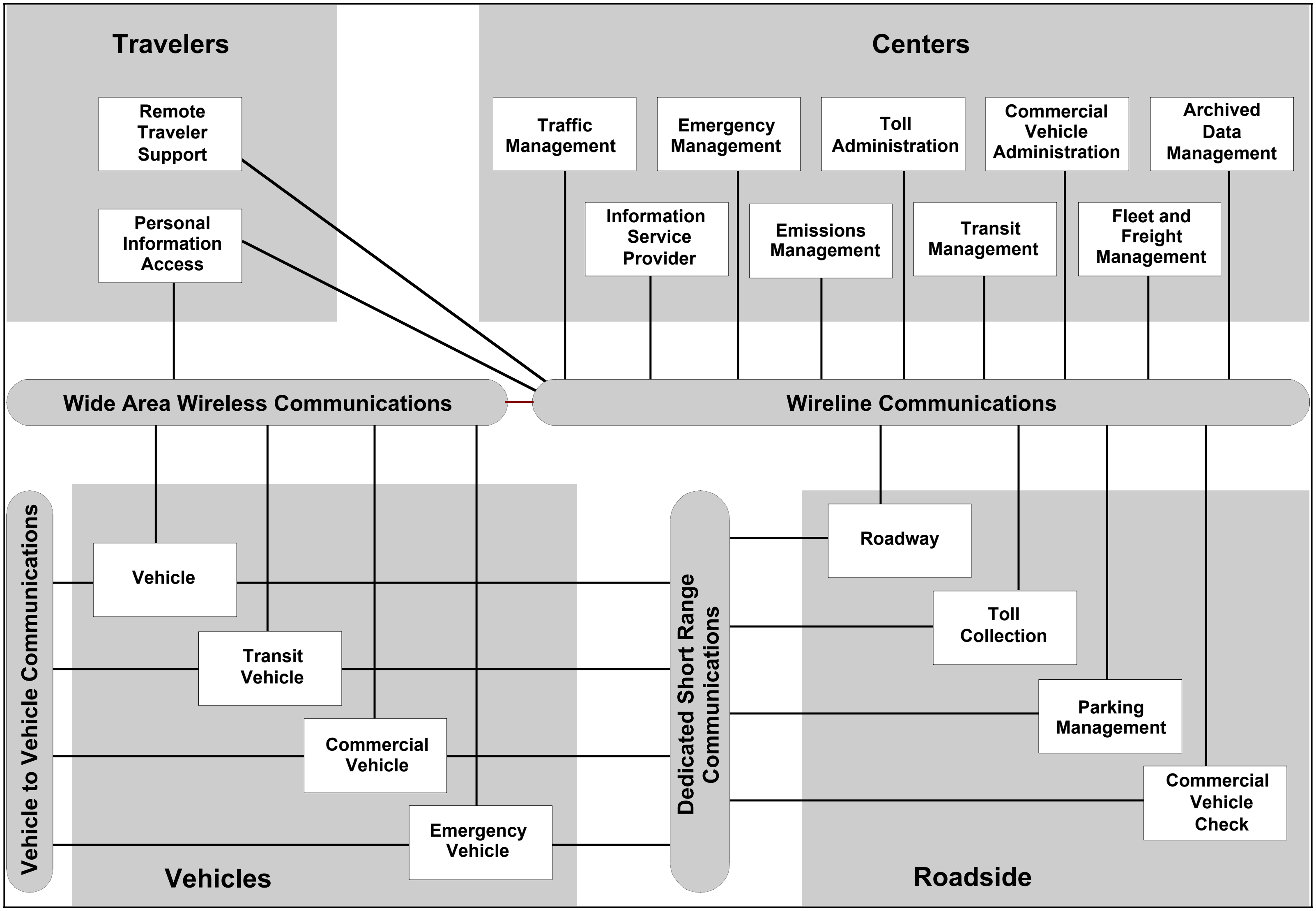


Figure 9: Generic National ITS Architecture "Sausage Diagram"

As seen in the figure shown above the National ITS Architecture identifies four communications media types to support the communications requirements between subsystems. They are wireline (fixed-to-fixed), wide area wireless (fixed-to-mobile), dedicated short-range (fixed-to-mobile) and vehicle-to-vehicle communications (mobile-to-mobile).

Another element of note within the Physical Architecture is the terminator. There are 60 terminators that define the boundary of the National ITS Architecture. The terminators represent the people, systems, and general environment that interface to ITS. The interfaces between terminators and the subsystems and processes within the National ITS Architecture are defined, but no functional requirements are allocated to terminators. It should be noted that architecture has no interconnections between terminators, only subsystems. The 60 terminators are bundled into four types:

- Environment – 7 terminators (environment, traffic, etc.)
- Humans – 19 terminators (driver, transit user, etc.)
- Systems – 26 terminators (event promoters, financial institution, etc.)
- Other Systems – 8 terminators (other vehicle, other emergency management, etc.)

One step down from the top-level architecture interconnect diagram ("Sausage Diagram") is a high-level interconnect diagram. The high-level interconnect diagram depicts the subsystem (and terminator) interactions. The level of detail here is slightly finer than the "Sausage Diagram"; here one can see the exact interconnects between the various subsystems. Figure 10 displays an example interconnect diagram.

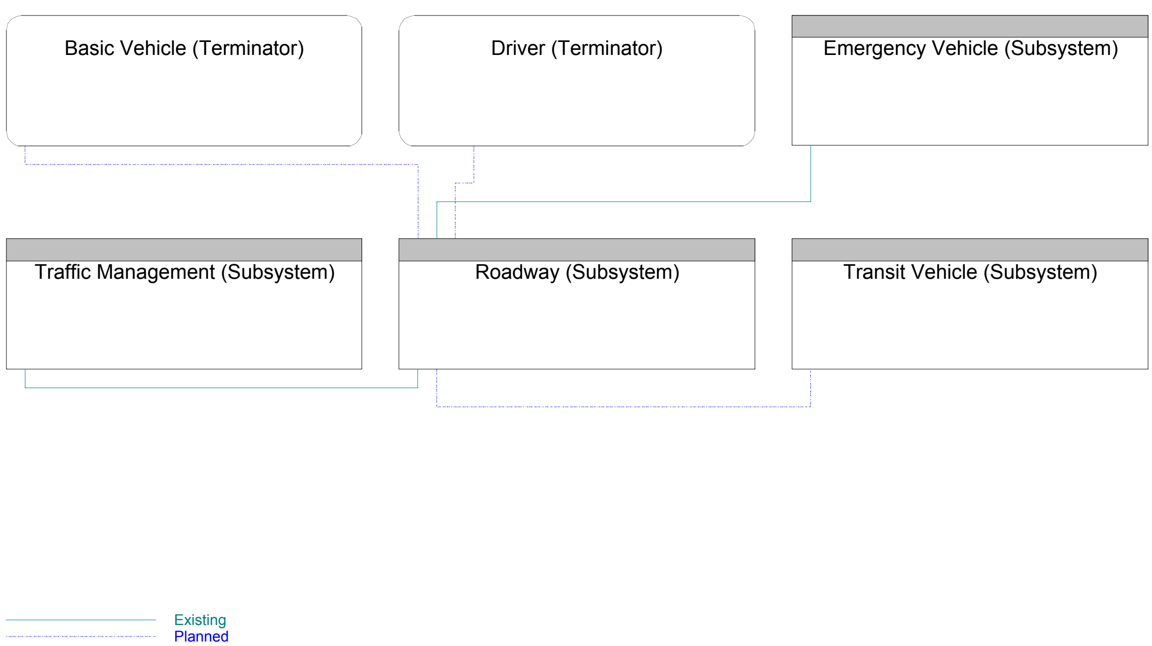


Figure 10: Example High-Level Interconnect Diagram (Roadway Subsystem)

This type of architecture detail lends itself to the overall system design process. The interconnections in this type of diagram tell the story of which subsystems communicate with one another and the environmental, human, and/or other type of system interaction that may be involved.

Another layer of detail is yet available for architecture depiction, the subsystem architecture flow diagram. This type of diagram depicts the subsystem to subsystem/terminator interaction or information sharing via architecture flows[7]. Architecture flows are a derivative of market packages[8]. Figure 11 displays an example Subsystem Architecture Flow Diagram.

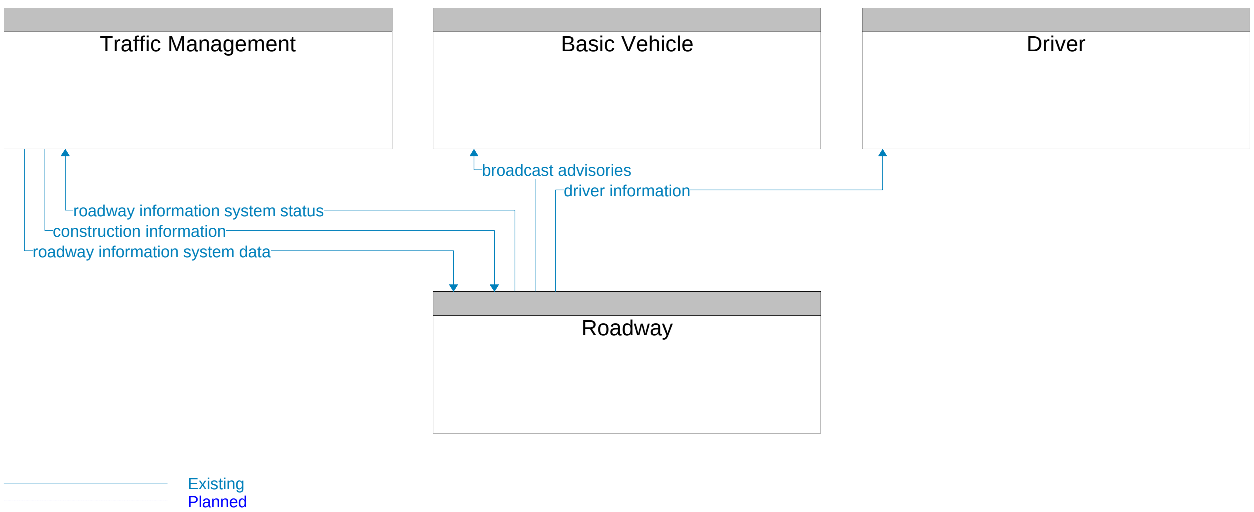


Figure 11: Example Subsystem Architecture Flow Diagram

[7] Information that is exchanged between subsystems and terminators in the Physical Architecture. Each architecture flow contains one or more data flows from the Logical Architecture. These architecture flows and their communication requirements define the interfaces which form the basis for much of the ongoing standards work in the ITS program.

[8] The market packages provide an accessible, deployment oriented perspective to the national architecture. They are tailored to fit - separately or in combination - real world transportation problems and needs. Market packages collect together one or more Equipment Packages that must work together to deliver a given transportation service and the Architecture Flows that connect them and other important external systems. In other words, they identify the pieces of the Physical Architecture that are required to implement a particular transportation service.

11. STATEWIDE ITS ARCHITECTURE DEVELOPMENT PROCESS

The first step in creating the Statewide ITS Architecture for Wisconsin was to develop a sound development process. The ITS Architecture approach approved by the Advisory Group is the implementation of a three-tiered Statewide architecture. The three-tiered architecture approach allows for flexibility in its development. One can start from the project level, the regional level, or the statewide level and move toward the other tiers to fill the three-tiered architecture.

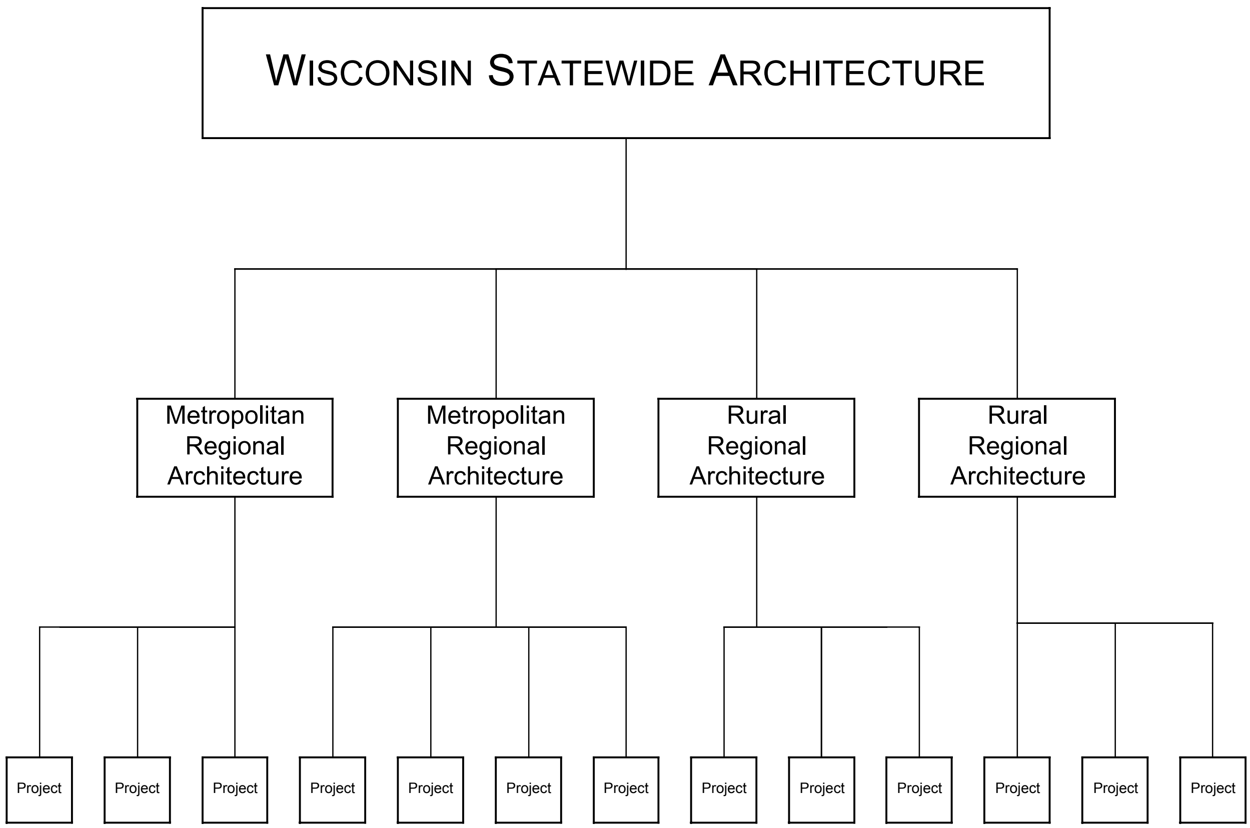


Figure 12: Three-Tiered Architecture Design Approach

Each "tier" of the architecture has a certain level of detail associated with it. The project level contains the most detail due to the fact that at this level the architecture outlines the intricate lines of communication and data exchanged between each subsystem and terminator. The regional level details the major functions that are being provided within a region and the high-level subsystem to subsystem/terminator interactions. The statewide level details only the major regional and statewide subsystem interactions and functions. Wisconsin is in the early stages for ITS deployment throughout the state, therefore, the regional level of the three-tiered architecture better lends itself as the starting point for the development of a statewide architecture.

The State was first divided into regions, which are defined by the Wisconsin Department of Transportation District boundaries. From these regions, metropolitan and rural regions were identified. Two methodologies were then applied: Metropolitan Regional Architectures and Rural Regional Architectures.

REGIONAL ARCHITECTURE

Metropolitan Regional Architectures

Metropolitan regional architectures refer to the regions that have a significant effort in place to develop a regional architecture and the population density great enough to qualify as a metropolitan region. Districts 1, 2 and 3 fall into this category and have already taken steps toward creation of their district's architectures. District 1 is in the process of creating a district wide regional architecture; District 2 already has architecture in place to provide for a district wide regional architecture; and District 3 is making strides toward developing a district wide regional architecture by creating a corridor architecture for USH 41 through District 3.

These efforts all require additional development for incorporation into the Wisconsin Statewide Architecture being developed under this effort. Therefore, the findings of these architectures will not be included into the Statewide ITS Architecture report at this time. It is our recommendation that WisDOT incorporate each of the three districts architecture information in the Statewide ITS Architecture as soon as it becomes available. In the case of District 3 where a significant portion of the district is not included in the corridor architecture work, further district outreach would be necessary to capture the issues and needs, existing technology and future desired deployments of the outlying counties within this district.

Rural Regional Architectures

Rural regional architectures refer to the regions that do not currently have a district wide effort ongoing to develop an architecture, yet have relative transportation user needs that could be served by various ITS deployments.

The first step necessary for development of the rural regional architectures was district outreach. The district outreach focus was three-fold; ITS education, existing ITS & ATIS system documentation, and regional architecture development. The education goal served to inform and familiarize the public sector on the benefits and purpose behind ITS implementation. The documentation of all existing ITS & ATIS systems aided in the development of the regional architecture. It is during the district outreach that the regional current uses of technology, various information sharing among entities, district issues and needs, and potential technology assessments information sets are obtained.

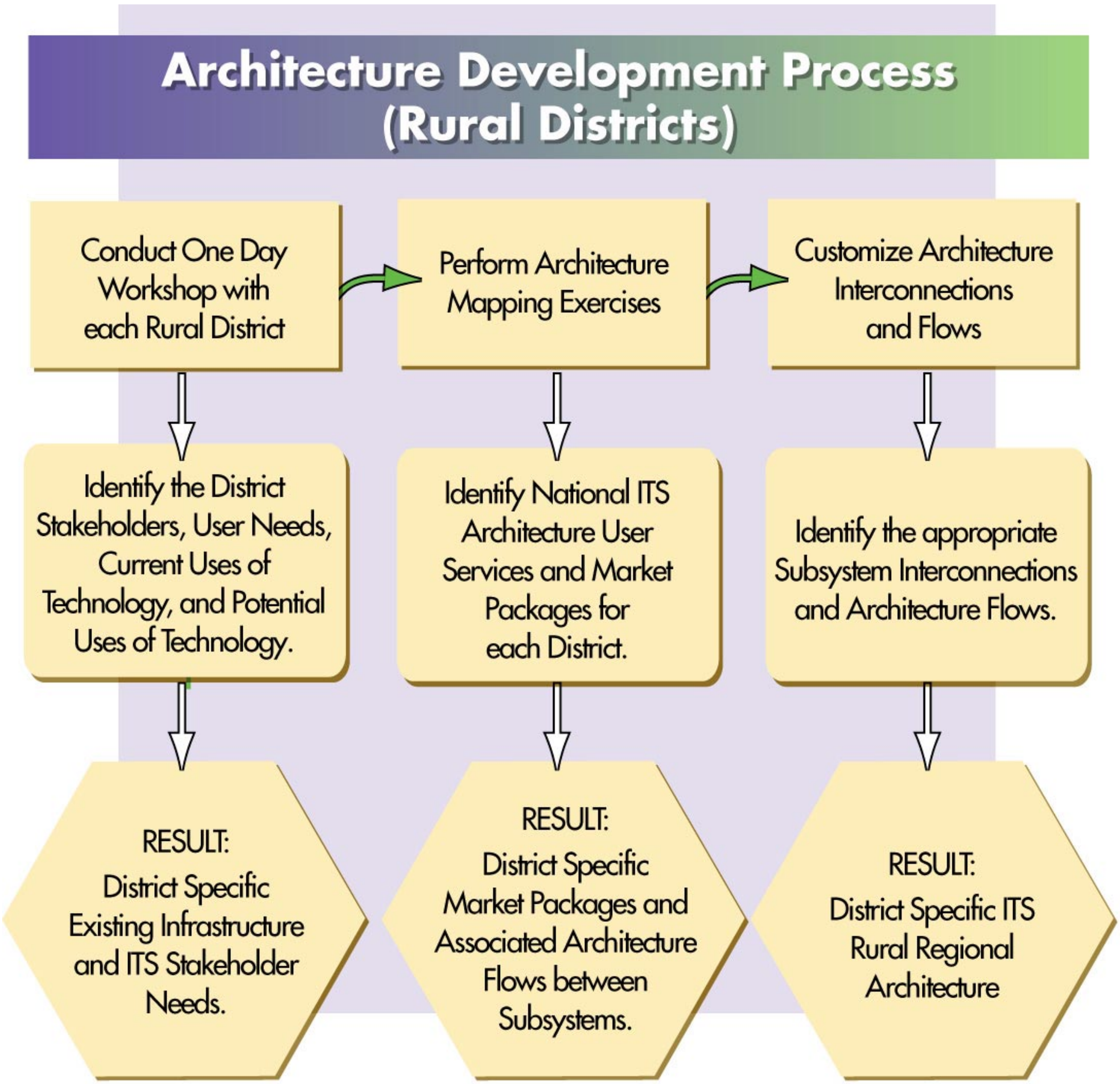
A one day workshop was held with each “rural” district (Districts 4, 5, 6, 7, and 8) and the appropriate stakeholder representatives to obtain all of the ITS & ATIS inventory information, as well as to document future or planned ITS initiatives. The workshop was divided into four discussion sections: current uses of technology, interagency cooperation and sharing of information, agency issues and needs, and potential technology assessment. Based on the information obtained via the workshop, the regional architectures were developed.

All of the information garnered from the four sections of the workshop was used to develop some aspect of the architecture. The current uses of technology section, together with the interagency cooperation and information sharing section of the workshop aid in the documentation of the existing conditions within the district. The agency issues and needs information is used to create the heart of the architecture, and the potential technology assessment is used to project future ITS implementations.

The agency issues and needs obtained from each workshop were summarized and ranked for level of importance. The top priority issues and needs were determined from this ranking exercise. It is the issues and needs of each district that allows us to apply aspects of the National ITS Architecture. The district specific issues and needs were mapped against user services from the National ITS Architecture. The result is a list of National ITS Architecture user services for each district; and it is this mapping exercise that allows us to start down the path of developing a regional architecture for each district and ultimately the State.

The list of user services were then mapped against all 63 National ITS Architecture market packages, according to the National ITS Architecture mapping of user services vs. market packages. Again this exercise results in an identifiable list of market packages tailored for each district. The market packages listed help to identify additional subsystems for interaction within the system architecture, implicitly state the equipment packages associated with the architecture, and explicitly state the architecture flows associated with each subsystem element. Having the market package selections and the subsystem and terminator elements input into the architecture, the subsystem to market package association and architecture interconnect and flow customization steps are the finishing touches to developing the district specific regional architecture. A graphical representation of this development process is illustrated in Figure 10-2.

FIGURE 13



Architecture Development Process (Rural Districts)
Conduct One Day Workshop with each Rural District
Perform Architecture Mapping Exercises
Customize Architecture Interconnections and Flows
Identify the District Stakeholders, User Needs, Current Uses of Technology, and Potential Uses of Technology.
Identify National ITS Architecture User Services and Market Packages for each District.
Identify the appropriate Subsystem Interconnections and Architecture Flows.
RESULT: District Specific Existing Infrastructure and ITS Stakeholder Needs.
RESULT: District Specific Market Packages and Associated Architecture Flows between Subsystems.
RESULT: District Specific ITS Rural Regional Architecture

STATEWIDE ARCHITECTURE

The statewide architecture for the State of Wisconsin was developed using the five regional architectures from Districts 4, 5, 6, 7 and 8. As regional architectures, each district has its own architecture contained within the district boundaries as identified by the Wisconsin Department of Transportation Districts 1-8.

For the statewide architecture, the goal was to create a seamless set of interconnections and an information-sharing network among the districts. Again, it should be noted that the detail experienced at the regional level will not be present at the statewide level. Each district has similar components in the way of system functionality. For example, the Wisconsin State Patrol operates and maintains dispatch centers throughout the State. Since the State Patrol dispatch centers main responsibilities are uniform throughout the State it is not necessary to separate out each State Patrol Emergency Management subsystem. There are similar examples with respect to local city department of pubic works, local city police and fire units, etc. In these examples one architecture element was created to represent these systems across the State.

In another instance, District 6 contains eight counties, each of which has county sheriffs associated with them. At the regional level, the county sheriffs are identified as separate entities operating individually (i.e., County of Dunn-Sheriff Department), yet at the statewide level, those same county sheriffs are represented as one element for each district, listed as "District 6 County Sheriffs." In these instances, the architecture elements translate from one district to the next with seamless interconnection and information sharing.

Where there are districts with distinct characteristics, those characteristics are carried over to the statewide level in their entirety. Such as Polk County maintenance vehicles; plow trucks are equipped with GPS, temperature sensor, pavement sensor, plow up/down, etc. The elements that represent this type of situation are carried over to the statewide level, as is, from the regional architecture.

The result is a statewide architecture representation that builds itself off of the regional level architecture development. The high-level presentation of the Statewide Architecture allows one to view the major statewide interconnections between subsystems and offers a view into the top-level functionality of ITS deployments across the State of Wisconsin.

12. REGIONAL ITS ARCHITECTURES

The Regional ITS Architectures provide a framework for ensuring institutional agreement and technical integration for the implementation of ITS projects throughout a particular region. The regional architecture represents an ongoing process for planning ITS integration in an area.

A region can be defined in a multitude of ways. A single metropolitan city, a collection of closely integrated cities, group of counties, a State or States, etc. are all examples of possible regions. Typically, the region definition is determined locally by those developing the architecture. In the case of the Wisconsin Statewide Architecture effort, the Advisory Group defined the regions for the State as those counties found within the predetermined Wisconsin Department of Transportation District boundaries.

The regional architecture provides a thorough description of the region, identifies the participating agencies and associated stakeholders, indicates high-level functional requirements, defines the interface requirements and information exchanges with planned and existing systems and subsystems, and identifies the appropriate ITS standards which support the regional and national interoperability of the architecture.

Each of the following subsections details regional architectures from the initial workshop through to the final product. Much of the core architecture information is appended to this document in order to keep each of the subsets at a manageable level.

District 4 Regional Architecture

The District 4 Regional Architecture covers the Wisconsin Department of Transportation defined district boundaries. This includes the counties of:

- Adams
- Green Lake
- Juneau
- Marathon
- Marquette
- Portage
- Waupaca
- Waushara
- Wood

The District 4 region has two interstate freeway segments that pass through it, I-90/94 and I-39/USH 51. Both of these roadways are viewed as major arteries for the movement of traffic through the State of Wisconsin. I-39/USH 51 traverses through the majority of the district, covering four of the nine counties in the district.

The District 4 region also has four sizable cities within its boundaries; they are: Marshfield, Stevens Point, Wausau and Wisconsin Rapids. Each with a population of approximately 20,000 or greater.

As was previously discussed, the most integral part and starting point to developing the District 4 Regional Architecture was the district outreach session. On January 18, 2001 an ITS Architecture Workshop was held at the Wisconsin Rapids District 4 WisDOT facility. In attendance at the meeting were key stakeholders from District 4. The crucial outcome of the architecture workshop session was the identification of the participating agencies and stakeholders, and the district issues and needs. The participating agencies and stakeholders were identified via those in attendance and their insight into current or existing technologies and the agencies responsible for the operation of these systems. The district user needs were identified via an issue and needs discussion session during the workshop.

The top priority user needs were gleaned from the overall listing of issues and needs identified, and are shown in Table 11.

Table 11: District 4 Top Priority User Needs

Category	Issues and Needs
Traffic Management	Road conditions due to weather (wet, snow, ice, etc.)
	Safety
Regional Traveler Information	Construction zone information (location, delays, accidents, etc.)
	Better road closure, advisory, and weather information
Public Transportation	Improved transit between cities and in rural areas
	Travel time/schedule adherence
	Improved transit for seniors, the disabled and others relying on public transportation within a city
Emergency Management	Lack of emergency response coordination
	Need for better dispatching procedures
	Lack of emergency vehicle tracking (AVL)
Other	Lack of communications infrastructure
	Operations and maintenance costs

Once the user needs are known the next step was to determine what National ITS Architecture user services could be applied to address the user needs.

The applicable National ITS Architecture user services are determined by mapping the user needs to the user services. This mapping exercise translates the district specific user needs into language that the National ITS Architecture can interpret and thus use to define the District 4 Regional Architecture.

There are 31 user services that have been defined by the National ITS Architecture. The user services will serve to document what ITS should do from the user's perspective. The user needs to user services mapping exercise was completed by placing a mark in the column whose user service could address the corresponding user need. The mapping exercise is presented in Table 12.

Table 12: District 4 User Needs to User Services Mapping Exercise

	National ITS Architecture – User Services																																					
Issues	**Travel and Traffic Management**	1.1 Pre-Trip Travel Information	1.2 En-Route Driver Information	1.3 Route Guidance	1.4 Ride Matching and Reservation	1.5 Traveler Service Information	1.6 Traffic Control	1.7 Incident Management	1.8 Travel Demand Management	1.9 Emissions Testing and Mitigation	1.10 Highway-Rail Intersection	**Public Transportation Management**	2.1 Public Transportation Management	2.2 En-Route Transit Information	2.3 Personalized Public Transit	2.4 Public Travel Security	**Electronic Payment**	3.1 Electronic Payment Service	**Commercial Vehicle Operations**	4.1 Commercial Vehicle Electronic Clearance	4.2 Automated Roadside Safety Inspection	4.3 On-Board Safety Monitoring	4.4 Commercial Vehicle Administrative Process	4.5 Hazardous Material Incident Response	4.6 Commercial Fleet Management	**Emergency Management**	5.1 Emergency Notification and Personal Security	5.2 Emergency Vehicle Management	**Advanced Vehicle Safety Systems**	6.1 Longitudinal Collision Avoidance	6.2 Lateral Collision Avoidance	6.3 Intersection Collision Avoidance	6.4 Vision Enhancement for Crash Avoidance	6.5 Safety Readiness	6.6 Pre-Crash Restraint Deployment	6.7 Automated Vehicle Operation	**Information Management**	7.1 Archived Data Function
Traffic Management																																						
Road conditions due to weather (wet, snow, ice, etc.)		•	•	•		•	•	•																														•
Safety		•	•				•	•			•					•					•	•		•			•			•	•	•	•	•	•	•		•
Regional Traveler Information																																						
Construction zone information (location, delays, accidents, etc.)		•	•	•		•	•	•																														•
Better road closure, advisory, and weather information		•	•	•		•	•	•																														
Public Transportation																																						
Improved transit between cities and in rural areas					•								•		•																							
Travel time/schedule adherence							•						•	•																								
Improved transit for seniors, the disabled and others relying on public transportation within a city					•								•		•																							
Emergency Management																																						
Lack of emergency response coordination							•	•																•			•	•										•
Need for better dispatching procedures								•																			•	•										•
Lack of emergency vehicle tracking (AVL)																												•										•
Other																																						
Lack of communications infrastructure		•	•			•	•	•					•														•	•										
Operations and maintenance costs						•	•	•																				•										•

The District 4 Regional Architecture user services can be identified according to the mapping priority. Those user services, which address a "significant" number of issues, were taken as the priority user services for further architecture development. Table 13 lists the user services that resulted from this mapping exercise.

Table 13: District 4 Regional Architecture User Services

User Service Bundle	User Service
1.0 Travel and Traffic Management	1.1 Pre-Trip Travel Information (5)
	1.2 En-Route Driver Information (5)
	1.3 Route Guidance (3)
	1.4 Ride Matching and Reservation (2)
	1.5 Traveler Service Information a (5)
	1.6 Traffic Control (8)
	1.7 Incident Management (8)
2.0 Public Transportation Management	2.1 Public Transportation Management (4)
	2.3 Personalized Public Transit (2)
5.0 Emergency Management	5.1 Emergency Notification and Personal Security (4)
	5.2 Emergency Vehicle Management (5)
7.0 Information Management	7.1 Archived Data Function (7)

*The number values that follow each User Service above represent the number of issues that were mapped to that particular User Service.

The definitions to the user services can be found on the National ITS Architecture CD-ROM, Version 3.0.

The next step for the development of the regional architecture is the market package selection. The market packages can now be identified using the user services from the previous step. The market packages are directly traceable to the user services and often include capabilities that span more than one user service. Conversely, a single user service sometimes includes a range of incremental capabilities that are segregated into separate market packages so that they may be considered separately from a deployment perspective. As a result, there is often a many-to-many relationship between the market packages and the user services.

There are 63 market packages defined by the National ITS Architecture. The District 4 Regional Architecture user services were mapped to these market packages according to the relationship between user services and market packages presented in Table 3-1 in the National ITS Architecture under the Market Package Document, Version 3.0. Table 14 presents the mapping exercise results.

Table 14: District 4 User Services to Market Packages Mapping Exercise

	National ITS Architecture – User Services																																					
National ITS Architecture Market Packages	**Travel and Traffic Management**	1.1 Pre-Trip Travel Information (5)	1.2 En-Route Driver Information (5)	1.3 Route Guidance (3)	1.4 Ride Matching and Reservation (2)	1.5 Traveler Service Information a (5)	1.6 Traffic Control (8)	1.7 Incident Management (8)	1.8 Travel Demand Management (0)	1.9 Emissions Testing and Mitigation (0)	1.10 Highway-Rail Intersection (1)	**Public Transportation Management**	2.1 Public Transportation Management (4)	2.2 En-Route Transit Information (1)	2.3 Personalized Public Transit (2)	2.4 Public Travel Security (1)	**Electronic Payment**	3.1 Electronic Payment Service (0)	**Commercial Vehicle Operations**	4.1 Commercial Vehicle Electronic Clearance (0)	4.2 Automated Roadside Safety Inspection (1)	4.3 On-Board Safety Monitoring (1)	4.4 Commercial Vehicle Administrative Process (0)	4.5 Hazardous Material Incident Response (2)	4.6 Commercial Fleet Management (0)	**Emergency Management**	5.1 Emergency Notification and Personal Security (4)	5.2 Emergency Vehicle Management (5)	**Advanced Vehicle Safety Systems**	6.1 Longitudinal Collision Avoidance (1)	6.2 Lateral Collision Avoidance (1)	6.3 Intersection Collision Avoidance (1)	6.4 Vision Enhancement for Crash Avoidance (1)	6.5 Safety Readiness (1)	6.6 Pre-Crash Restraint Deployment (1)	6.7 Automated Vehicle Operation (1)	**Information Management**	7.1 Archived Data Function (7)
Network Surveillance							•																															
Surface Street Control							•	•			•																											
Freeway Control							•	•																														
Traffic Information Dissemination							•				•																											
Regional Traffic Control							•																															
Incident Management System								•																														
Virtual TMC and Smart Probes			•				•	•																														
Road Weather Information System			•				•	•																														
Transit Vehicle Tracking													•	•	•	•																						
Transit Fixed-Route Operations													•	•																								
Demand Response Transit Operations													•	•	•																							
Broadcast Traveler Information		•	•											•																								
Interactive Traveler Information		•	•		•	•								•	•			•																				
Yellow Pages and Reservation		•	•		•	•								•				•																				
Dynamic Ridesharing		•	•	•	•				•					•	•			•																				
HAZMAT Management								•																	•	•												
Emergency Response																												•	•									
Emergency Routing								•																					•									
Mayday Support																												•	•									
ITS Data Warehouse																																						•

*** The number values that follow each User Service above represent the number of issues that were mapped to that particular User Service.**

The resulting market packages from the mapping exercise are all shown in Table 11-4 and summarized below in Table 15.

Table 15: District 4 Regional Architecture Market Packages

Category	Market Package
ATMS	Network Surveillance
	Surface Street Control
	Freeway Control
	Traffic Information Dissemination
	Regional Traffic Control
	Incident Management System
	Virtual TMC and Smart Probes
	Road Weather Information System
APTS	Transit Vehicle Tracking
	Transit Fixed-Route Operations
	Demand Response Transit Operations
ATIS	Broadcast Traveler Information
	Interactive Traveler Information
	Yellow Pages and Reservation
	Dynamic Ridesharing
CVO	HAZMAT Management
EMS	Emergency Response
	Emergency Routing
	Mayday Support
ADS	ITS Data Warehouse

The definitions to the market packages can be found on the National ITS Architecture CD-ROM, Version 3.0.

Based on the information input in the architecture thus far, the bulk of the development is complete. Up to this point the three main components of the architecture have been completed:

- Input the Architecture Elements and associated Stakeholder information. This represents the various subsystems of the architecture, the "who" and "what."
- Identify the appropriate market packages for the architecture based on the current uses of technology in the region and the potential technology assessment obtained from the workshop. Include with that the market packages identified from the agency issues and needs discussion.
- Associate the stated Architecture Elements with the market packages in such a way that outlines the interconnections that are necessary for system functionality.

The last step to complete the architecture is the customization of the architecture flows, or information exchanged among subsystems and terminators. The result of this process is the District 4 Regional Architecture. Figure 14 depicts the existing and proposed District 4 Regional Architecture "Sausage" Diagram. It should be noted that the diagram contains some subsystems that have existing components today, as well as, proposed components for the future. The diagram outlines at the top-level of the architecture, the interconnects between the various subsystems of the overall ITS System. In addition, the diagram lays the foundation for the four types of communications that may be used for data transfer.

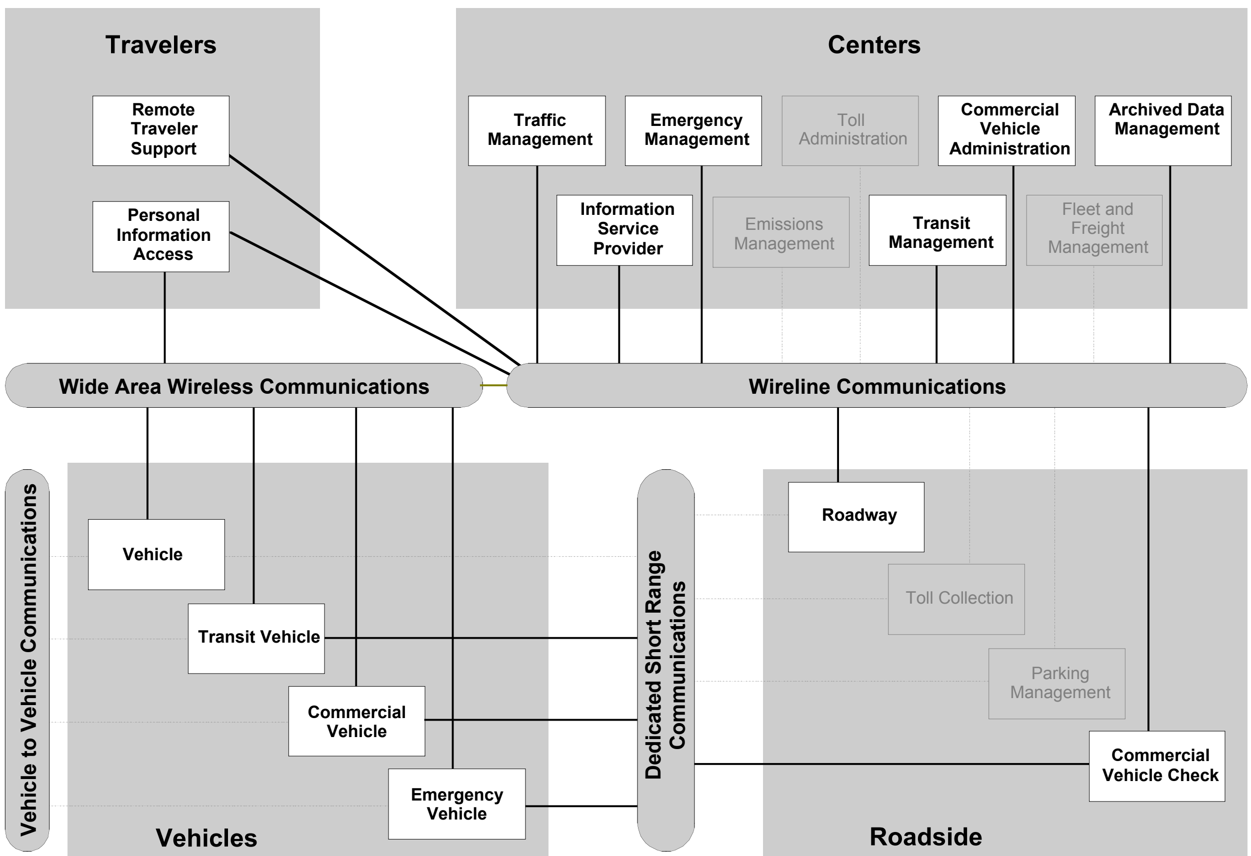


Figure 14: District 4 Regional Architecture Sausage Diagram

From this point the architecture moves to the next level of detail, high-level interconnections. The architecture high-level interconnections view allows one to look at, from a more "physical" perspective, the actual communications lines between subsystems. Architecture interconnections identify and classify connectivity between subsystems. The interconnections serve as the "communications highways" between subsystems. Often times the interconnections are identified according to communication type, here in the District 4 Regional Architecture and throughout the rest of this document the interconnections communications types are not identified, so as to allow for full customization of this area in the future based on existing infrastructure issues.

A sample Interconnect diagram from the District 4 Regional Architecture is shown below.

Figure 15: ADS Subsystem Interconnects Diagram
City of Wausau_Wausau Metropolitan Planning Commission

Following the high-level interconnections view is the architecture flow diagrams. This level of detail highlights the actual information exchange among subsystems and terminators. The architecture flows provide the user with an understanding of what is necessary to communicate in order for system functionality. Figure 16 displays a sample of the District 4 Regional Architecture Flow Diagrams.

All of the remaining graphical representations of the architecture are contained in the electronic database for the District 4 architecture. This includes the subsystem interconnects diagrams and corresponding architecture flow diagrams for specific subsystems.

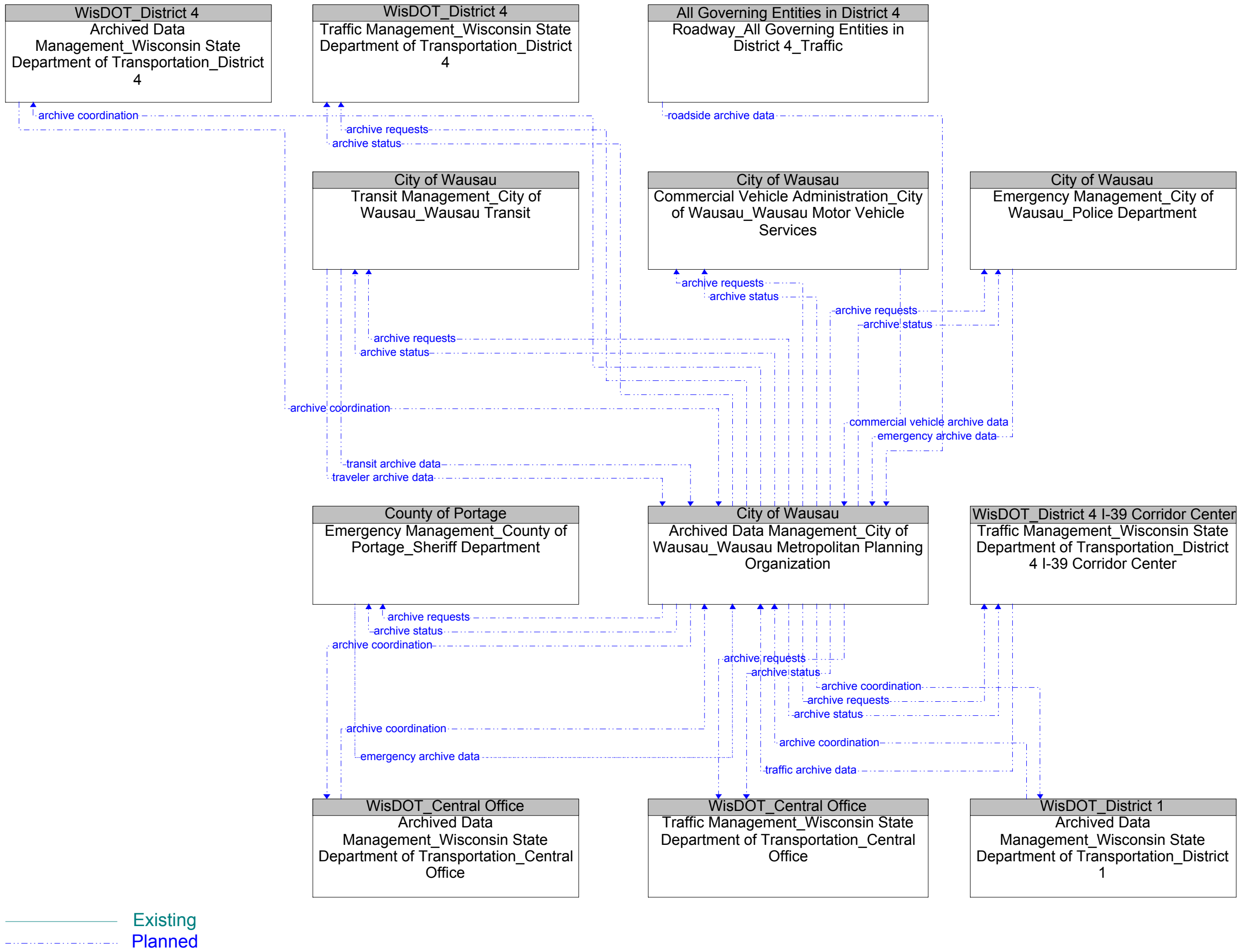


Figure 16: ADS Subsystem Architecture Flow Diagram
City of Wausau_Wausau Metropolitan Planning Commission

District 5 Regional Architecture

The District 5 Regional Architecture covers the Wisconsin Department of Transportation defined district boundaries. This includes the counties of:

- Buffalo
- Crawford
- Jackson
- LaCrosse
- Monroe
- Richland
- Trempealeau
- Vernon

The District 5 region has two interstate freeway segments that pass through it, I-94 through Monroe and Jackson Counties and I-90 through Monroe and LaCrosse Counties. Both of these roadways are viewed as major arteries for the movement of traffic through the State of Wisconsin.

There is one city in the district with a population greater than 10,000; the City of LaCrosse. LaCrosse has a population of approximately 50,000. As a result of this population disparity, the focus of much of their attention tends to fall on the City of LaCrosse, in the way of traffic management, emergency services, transit, etc. The remainder of the district tends to focus on emergency services and commercial vehicle issues, with minor traveler information components.

The District 5 Regional Architecture was developed by tailoring the National ITS Architecture, as appropriate, to meet the needs of the region. The regional needs were obtained at an ITS Architecture Workshop that was held March 22, 2001 at the LaCrosse City Hall. Together with the appropriate agencies and stakeholders a list of issues and needs were identified during the workshop. Table 16 summarizes the priority user needs from this discussion.

Table 16: District 5 Top Priority User Needs

Category	Issues and Needs
Traffic Management	Emergency response time/finding help
	Congestion (recurring and seasonal) – Event congestion
	Safety
	Dangerous hills and curves, reduced sight distances, etc.
Commercial Vehicle Operations	Lack of weigh-in motion
Emergency Management	Informational database in-vehicle
	Lack of emergency vehicle tracking

Having identified the subsystems that are to be part of the ITS System, the next step was to use the current uses of technology, for existing inventory information, and the identified issues and needs (or user needs) mapped to the "generic" architecture market packages.

This process consists of four steps: first, document the existing systems into the architecture; second, map the user needs to the National ITS Architecture user services; third, map the user services to the National ITS Architecture market packages; and fourth, customize the identified market packages and their subsystem/terminator interconnections to address the initial needs. Tables 17 and 19 show a summary table of the user services and the mapping exercise that was used to identify the user services.

Table 17: District 5 Regional Architecture User Services

User Service Bundle	User Service
1.0 Travel and Traffic Management	1.1 Pre-Trip Travel Information (2)
	1.2 En-Route Driver Information (3)
	1.6 Traffic Control (3)
	1.7 Incident Management (6)
4.0 Commercial Vehicle Operations	4.1 Commercial Vehicle Electronic Clearance (1)
	4.4 Commercial Vehicle Administration Process (1)
5.0 Emergency Management	5.1 Emergency Notification and Personal Security (2)
	5.2 Emergency Vehicle Management (3)
7.0 Information Management	7.1 Archived Data Function (5)

*The number values that follow each User Service above represent the number of issues that were mapped to that particular User Service.

Following the user services identification the market package determination can take place. There are 63 market packages defined by the National ITS Architecture. The District 5 Regional Architecture user services are mapped to the market packages according to the relationship between user services and market packages presented in Table 3-1 in the National ITS Architecture under the Market Package Document, Version 3.0. Tables 18 and 20 present the mapping exercise and a summary table of the market packages.

Table 18: District 5 Regional Architecture Market Packages

Category	Market Package
ATMS	Network Surveillance
	Surface Street Control
	Freeway Control
	Traffic Information Dissemination
	Regional Traffic Control
	Incident Management System
	Standard Railroad Grade Crossing
	Road Weather Information System
ATIS	Broadcast Traveler Information
CVO	Electronic Clearance
	CV Administrative Processes
	Weigh-In Motion
EMS	Emergency Response
	Emergency Routing
ADS	ITS Data Warehouse

Table 19: District 5 User Needs to User Services Mapping Exercise

	National ITS Architecture – User Services																																					
Issues	**Travel and Traffic Management**	1.1 Pre-Trip Travel Information	1.2 En-Route Driver Information	1.3 Route Guidance	1.4 Ride Matching and Reservation	1.5 Traveler Service Information	1.6 Traffic Control	1.7 Incident Management	1.8 Travel Demand Management	1.9 Emissions Testing and Mitigation	1.10 Highway-Rail Intersection	**Public Transportation Management**	2.1 Public Transportation Management	2.2 En-Route Transit Information	2.3 Personalized Public Transit	2.4 Public Travel Security	**Electronic Payment**	3.1 Electronic Payment Service	**Commercial Vehicle Operations**	4.1 Commercial Vehicle Electronic Clearance	4.2 Automated Roadside Safety Inspection	4.3 On-Board Safety Monitoring	4.4 Commercial Vehicle Administrative Process	4.5 Hazardous Material Incident Response	4.6 Commercial Fleet Management	**Emergency Management**	5.1 Emergency Notification and Personal Security	5.2 Emergency Vehicle Management	**Advanced Vehicle Safety Systems**	6.1 Longitudinal Collision Avoidance	6.2 Lateral Collision Avoidance	6.3 Intersection Collision Avoidance	6.4 Vision Enhancement for Crash Avoidance	6.5 Safety Readiness	6.6 Pre-Crash Restraint Deployment	6.7 Automated Vehicle Operation	**Information Management**	7.1 Archived Data Function
Traffic Management																																						
Emergency response time/finding help			•				•	•								•								•			•	•										
Congestion (recurring and seasonal) – Event congestion		•	•	•		•	•	•																														•
Safety		•	•				•	•			•					•					•	•		•			•			•	•	•	•	•	•	•		•
Dangerous hills and curves, reduced sight distances, etc.			•				•	•																									•					
Commercial Vehicle Operations																																						
Lack of weigh-in motion																				•			•															
Emergency Management																																						
Informational database in-vehicle								•																				•										•
Lack of emergency vehicle tracking																												•										•

Table 20: District 5 User Services to Market Packages Mapping Exercise

	National ITS Architecture – User Services																																					
National ITS Architecture Market Packages	**Travel and Traffic Management**	1.1 Pre-Trip Travel Information (2)	1.2 En-Route Driver Information (4)	1.3 Route Guidance (1)	1.4 Ride Matching and Reservation (0)	1.5 Traveler Service Information (1)	1.6 Traffic Control (4)	1.7 Incident Management (5)	1.8 Travel Demand Management (0)	1.9 Emissions Testing and Mitigation (0)	1.10 Highway-Rail Intersection (1)	**Public Transportation Management**	2.1 Public Transportation Management (0)	2.2 En-Route Transit Information (0)	2.3 Personalized Public Transit (0)	2.4 Public Travel Security (2)	**Electronic Payment**	3.1 Electronic Payment Service (0)	**Commercial Vehicle Operations**	4.1 Commercial Vehicle Electronic Clearance (1)	4.2 Automated Roadside Safety Inspection (1)	4.3 On-Board Safety Monitoring (1)	4.4 Commercial Vehicle Administrative Process (1)	4.5 Hazardous Material Incident Response (2)	4.6 Commercial Fleet Management (0)	**Emergency Management**	5.1 Emergency Notification and Personal Security (2)	5.2 Emergency Vehicle Management (3)	**Advanced Vehicle Safety Systems**	6.1 Longitudinal Collision Avoidance (1)	6.2 Lateral Collision Avoidance (1)	6.3 Intersection Collision Avoidance (1)	6.4 Vision Enhancement for Crash Avoidance (2)	6.5 Safety Readiness (1)	6.6 Pre-Crash Restraint Deployment (1)	6.7 Automated Vehicle Operation (1)	**Information Management**	7.1 Archived Data Function (4)
Network Surveillance							•																															
Surface Street Control							•	•			•																											
Freeway Control							•	•	•																													
Traffic Information Dissemination							•				•																											
Regional Traffic Control							•																															
Incident Management System								•																														
Road Weather Information System			•				•	•																														
Broadcast Traveler Information		•	•											•																								
Electronic Clearance																				•			•															
CV Administrative Processes																				•			•															
Weigh In Motion																				•																		
Emergency Response																											•	•										
Emergency Routing							•																					•										
Mayday Support																											•	•										
ITS Data Warehouse																																						•

*** The number values that follow each User Service above represent the number of issues that were mapped to that particular User Service.**

The fourth step of the architecture development process is to customize the market package and subsystem to subsystem/terminator interconnections so as to address the initial user needs identified. It is this final procedure that produces the District 5 specific Regional Architecture. Figure 17 to follow is the top-level interconnects diagram or "Sausage" Diagram for District 5. All other graphical representations for the District 5 Regional Architecture can be found in the electronic database for the District 5 architecture.

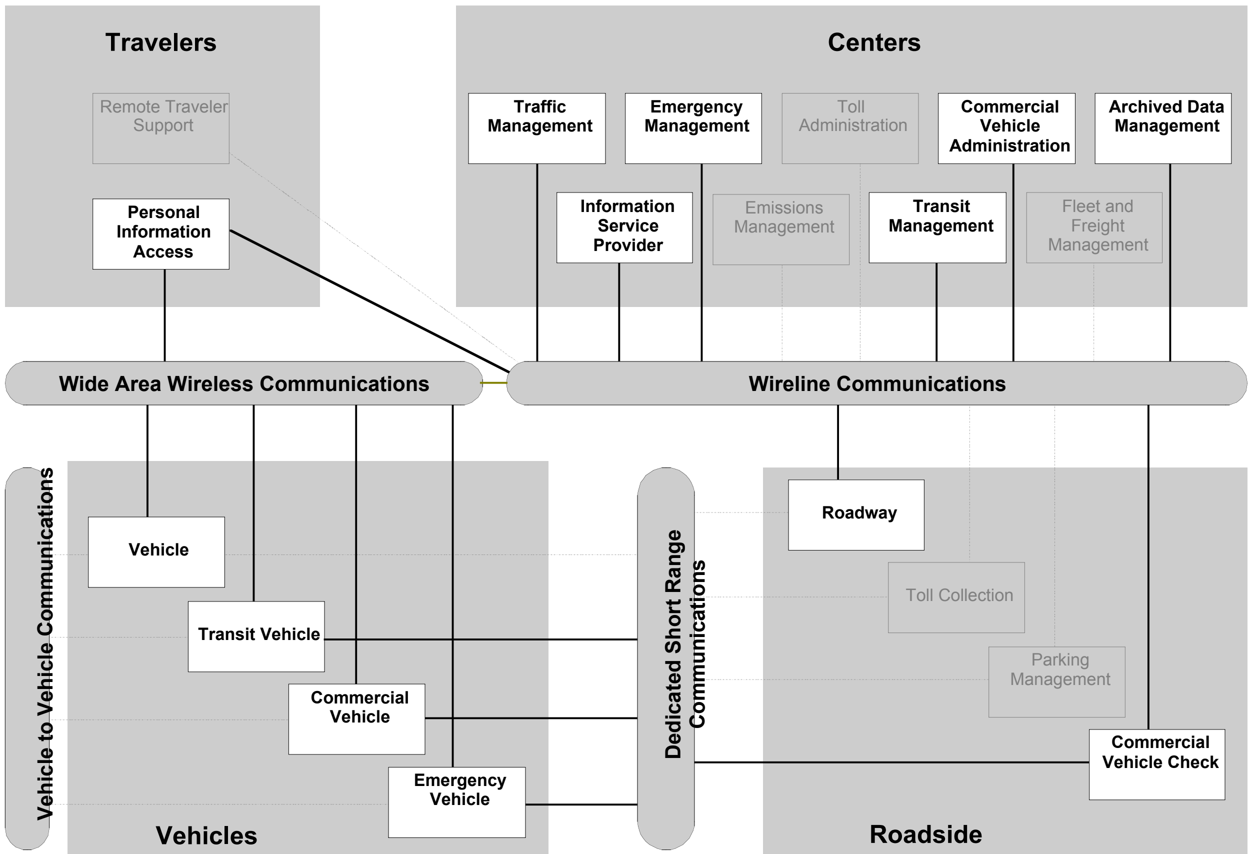


Figure 17: District 5 Regional Architecture Sausage Diagram

District 6 Regional Architecture

The District 6 Regional Architecture covers the Wisconsin Department of Transportation defined district boundaries. This includes the counties of:

- Chippewa
- Eau Claire
- St. Croix
- Clark
- Pepin
- Taylor
- Dunn
- Pierce

The District 6 region has three sections of major highway that are contained within its boundaries, approximately 80 miles of I-94, 26 miles of USH 53, and 55 miles of SH 29/73. Each of these major highways carry a substantial amount of through traffic in the State of Wisconsin.

In addition to having three major highways the region has a number of cities with significant population densities; Eau Claire, Chippewa Falls, Menomonie, and River Falls. Each has a population size larger than 10,000 people, with Eau Claire having a population of about 55,000.

The District 6 Regional Architecture was developed by tailoring the National ITS Architecture, as appropriate, to meet the needs of the region. The regional needs were obtained at an ITS Architecture Workshop that was held February 22, 2001 at the WisDOT District 6 facility in Eau Claire. Together with the appropriate agencies and stakeholders a list of issues and needs were identified during the workshop. Table 21 summarizes the priority user needs from this discussion.

Table 21: District 6 Top Priority User Needs

Category	Issues and Needs
Traffic Management	Road conditions due to weather (wet, snow, ice, etc.)
	Emergency response time/finding help
	Congestion (recurring and seasonal)
	Safety
	Dangerous hills and curves, reduced sight distances, etc.
Regional Traveler Information	Construction zone information (location, delays, accidents, etc.)
Public Transportation	Travel time/schedule adherence
Emergency Management	Informational database in-vehicle
	Lack of emergency vehicle tracking (AVL)
Other	Lack of transit vehicle tracking (AVL)

Having identified the subsystems that are to be part of the ITS System, the next step was to use the current uses of technology for existing inventory information and the identified issues and needs (or user needs) mapped to the "generic" architecture market packages.

This process consists of four steps: first, document the existing systems into the architecture; second, map the user needs to the National ITS Architecture user services; third, map the user services to the National ITS Architecture market packages; and fourth, customize the identified market packages and their subsystem/terminator interconnections to address the initial needs. Tables 22 and 24 show a summary table of the user services and the mapping exercise that was used to identify the user services.

Table 22: District 6 Regional Architecture User Services

User Service Bundle	User Service
1.0 Travel and Traffic Management	1.1 Pre-Trip Travel Information (5)
	1.2 En-Route Driver Information (6)
	1.5 Traveler Service Information (3)
	1.6 Traffic Control (7)
	1.7 Incident Management (8)
2.0 Public Transportation Management	2.1 Public Transportation Management (2)
	2.2 En-Route Transit Information (2)
4.0 Commercial Vehicle Operations	4.2 Automated Roadside Safety Inspection (1)
5.0 Emergency Management	5.1 Emergency Notification and Personal Security (2)
	5.2 Emergency Vehicle Management (3)
7.0 Information Management	7.1 Archived Data Function (6)

*The number values that follow each User Service above represent the number of issues that were mapped to that particular User Service.

Following the user services identification the market package determination can take place. There are 63 market packages defined by the National ITS Architecture. The District 6 Regional Architecture user services are mapped to the market packages according to the relationship between user services and market packages presented in Table 3-1 in the National ITS Architecture under the Market Package Document, Version 3.0. Tables 23 and 25 present the mapping exercise and a summary table of the market packages.

Table 23: District 6 Regional Architecture Market Packages

Category	Market Package
ATMS	Network Surveillance
	Probe Surveillance
	Surface Street Control
	Freeway Control
	Traffic Information Dissemination
	Regional Traffic Control
	Incident Management System
	Virtual TMC and Smart Probes
	Road Weather Information System
APTS	Transit Vehicle Tracking
	Transit Fixed-Route Operations
	Transit Traveler Information
ATIS	Broadcast Traveler Information
	Interactive Traveler Information
	Yellow Pages and Reservation
CVO	Electronic Clearance
	CV Administrative Processes
	Weigh-In Motion
	HAZMAT Management
EMS	Emergency Response
	Emergency Routing
	Mayday Support
ADS	ITS Data Warehouse

Table 24: District 6 User Needs to User Services Mapping Exercise

	National ITS Architecture – User Services																																					
Issues	**Travel and Traffic Management**	1.1 Pre-Trip Travel Information	1.2 En-Route Driver Information	1.3 Route Guidance	1.4 Ride Matching and Reservation	1.5 Traveler Service Information	1.6 Traffic Control	1.7 Incident Management	1.8 Travel Demand Management	1.9 Emissions Testing and Mitigation	1.10 Highway-Rail Intersection	**Public Transportation Management**	2.1 Public Transportation Management	2.2 En-Route Transit Information	2.3 Personalized Public Transit	2.4 Public Travel Security	**Electronic Payment**	3.1 Electronic Payment Service	**Commercial Vehicle Operations**	4.1 Commercial Vehicle Electronic Clearance	4.2 Automated Roadside Safety Inspection	4.3 On-Board Safety Monitoring	4.4 Commercial Vehicle Administrative Process	4.5 Hazardous Material Incident Response	4.6 Commercial Fleet Management	**Emergency Management**	5.1 Emergency Notification and Personal Security	5.2 Emergency Vehicle Management	**Advanced Vehicle Safety Systems**	6.1 Longitudinal Collision Avoidance	6.2 Lateral Collision Avoidance	6.3 Intersection Collision Avoidance	6.4 Vision Enhancement for Crash Avoidance	6.5 Safety Readiness	6.6 Pre-Crash Restraint Deployment	6.7 Automated Vehicle Operation	**Information Management**	7.1 Archived Data Function
Traffic Management																																						
Road conditions due to weather (wet, snow, ice, etc.)		•	•	•		•	•	•																														•
Emergency response time/finding help			•				•	•																•			•	•										
Congestion (recurring and seasonal)		•	•	•		•	•	•																														•
Safety		•	•				•	•			•					•					•	•		•			•			•	•	•	•	•	•	•		•
Dangerous hills and curves, reduced sight distances, etc.			•				•	•																									•					
Heavy Truck Usage		•	•	•			•													•	•	•	•	•	•													
Regional Traveler Information																																						
Construction zone information (location, delays, accidents, etc.)		•	•	•		•	•	•																														•
Public Transportation																																						
Travel time/schedule adherence							•						•	•																								
Emergency Management																																						
Informational database in-vehicle								•																				•										•
Lack of emergency vehicle tracking (AVL)																												•										•
Other																																						
Lack of transit vehicle tracking (AVL)													•	•																								

Table 25: District 6 User Services to Market Packages Mapping Exercise

	National ITS Architecture – User Services																																				
National ITS Architecture Market Packages	**Travel and Traffic Management**	1.1 Pre-Trip Travel Information (5)	1.2 En-Route Driver Information (7)	1.3 Route Guidance (4)	1.4 Ride Matching and Reservation (0)	1.5 Traveler Service Information (3)	1.6 Traffic Control (8)	1.7 Incident Management (7)	1.8 Travel Demand Management (0)	1.9 Emissions Testing and Mitigation (0)	1.10 Highway-Rail Intersection (1)	**Public Transportation Management**	2.1 Public Transportation Management (2)	2.2 En-Route Transit Information (2)	2.3 Personalized Public Transit (0)	2.4 Public Travel Security (1)	**Electronic Payment**	3.1 Electronic Payment Service (0)	**Commercial Vehicle Operations**	4.1 Commercial Vehicle Electronic Clearance (1)	4.2 Automated Roadside Safety Inspection (2)	4.3 On-Board Safety Monitoring (2)	4.4 Commercial Vehicle Administrative Process (1)	4.5 Hazardous Material Incident Response (3)	4.6 Commercial Fleet Management (1)	**Emergency Management**	5.1 Emergency Notification and Personal Security (2)	5.2 Emergency Vehicle Management (3)	**Advanced Vehicle Safety Systems**	6.1 Longitudinal Collision Avoidance (1)	6.2 Lateral Collision Avoidance (1)	6.3 Intersection Collision Avoidance (1)	6.4 Vision Enhancement for Crash Avoidance (2)	6.5 Safety Readiness (1)	6.6 Pre-Crash Restraint Deployment (1)	6.7 Automated Vehicle Operation (1)	**Information Management**	7.1 Archived Data Function (6)
Network Surveillance							•																															
Probe Surveillance							•																															
Surface Street Control							•	•			•																											
Freeway Control							•	•	•																													
Traffic Information Dissemination							•				•																											
Regional Traffic Control							•																															
Incident Management System								•																														
Virtual TMC and Smart Probes			•				•	•																														
Road Weather Information System			•				•	•																														
Transit Vehicle Tracking													•	•	•	•																						
Transit Fixed-Route Operations													•	•																								
Demand Response Transit Operations													•	•	•																							
Transit Traveler Information													•	•				•																				
Broadcast Traveler Information		•	•											•																								
Interactive Traveler Information		•	•		•	•								•	•			•																				
Yellow Pages and Reservation		•	•		•	•								•				•																				
Electronic Clearance																				•			•															
CV Administrative Processes																				•			•															
Weigh In Motion																				•																		
HAZMAT Management								•																•	•													
Emergency Response																											•	•										
Emergency Routing							•																					•										

*** The number values that follow each User Service above represent the number of issues that were mapped to that particular User Service.**

The fourth step of the architecture development process is to customize the market package and subsystem to subsystem/terminator interconnections so as to address the initial user needs identified. It is this final procedure that produces the District 6 specific Regional Architecture. Figure 18 to follow is the top-level interconnects diagram or "Sausage" diagram for District 6. All other graphical representations for the District 6 Regional Architecture can be found in the electronic database for the District 6 architecture.

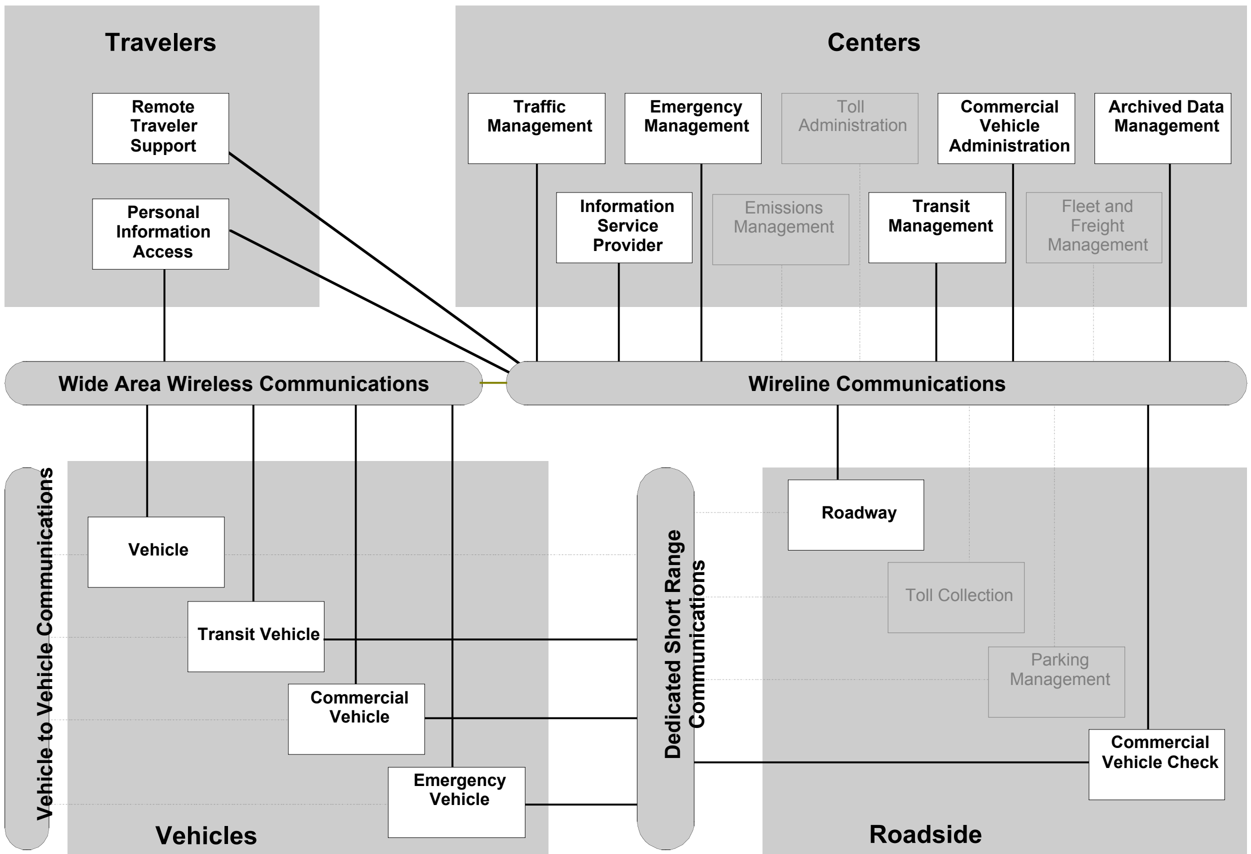


Figure 18: District 6 Regional Architecture Sausage Diagram

District 7 Regional Architecture

The District 7 Regional Architecture covers the Wisconsin Department of Transportation defined district boundaries. This includes the counties of:

- Florence
- Forest
- Iron
- Langlade
- Lincoln
- Oneida
- Price
- Vilas

In District 7, USH 51 runs north-south through the region, as does SH 13, and USH 8 east-west. The region contains a plethora of lakes, and a number of National Forest areas.

Rhinelander and Merrill are the largest cities in the region, each with a population of approximately 9,000.

The District 7 Regional Architecture was developed by tailoring the National ITS Architecture, as appropriate, to meet the needs of the region. The regional needs were obtained at an ITS Architecture Workshop that was held January 17, 2001 at the WisDOT District 7 facility in Rhinelander. Together with the appropriate agencies and stakeholders a list of issues and needs were identified during the workshop. Table 26 summarizes the priority user needs from this discussion.

Table 26: District 7 Top Priority User Needs

Category	Issues and Needs
Traffic Management	Weather and visibility conditions (fog, dust, snow, etc.)
	Road conditions due to weather (wet, snow, ice, etc.)
	Emergency response time/finding help
	Congestion (recurring and seasonal) – Event congestion
	Safety
Emergency Management	Lack of emergency response coordination
Other	Lack of communications infrastructure

Having identified the subsystems that are to be part of the ITS System, the next step was to use the current uses of technology for existing inventory information and the identified issues and needs (or user needs) mapped to the “generic” architecture market packages.

This process consists of four steps: first, document the existing systems into the architecture; second, map the user needs to the National ITS Architecture user services; third, map the user services to the National ITS Architecture market packages; and fourth, customize the identified market packages and their subsystem/terminator interconnections to address the initial needs.

Tables 27 and 29 show a summary table of the user services and the mapping exercise that was used to identify the user services.

Table 27: District 7 Regional Architecture User Services

User Service Bundle	User Service
1.0 Travel and Traffic Management	1.1 Pre-Trip Travel Information (5)
	1.2 En-Route Driver Information (6)
	1.5 Traveler Service Information (3)
	1.6 Traffic Control (5)
	1.7 Incident Management (7)
4.0 Commercial Vehicle Operations	4.5 Hazardous Material Incident Response (3)
5.0 Emergency Management	5.1 Emergency Notification and Personal Security (3)
7.0 Information Management	7.1 Archived Data Function (5)

*The number values that follow each User Service above represent the number of issues that were mapped to that particular User Service.

Following the user services identification the market package determination can take place. There are 63 market packages defined by the National ITS Architecture. The District 7 Regional Architecture user services are mapped to the market packages according to the relationship between user services and market packages presented in Table 3-1 in the National ITS Architecture under the Market Package Document, Version 3.0. Tables 28 and 30 present the mapping exercise and a summary table of the market packages.

Table 28: District 7 Regional Architecture Market Packages

Category	Market Package
ATMS	Network Surveillance
	Surface Street Control
	Freeway Control
	Traffic Information Dissemination
	Regional Traffic Control
	Incident Management System
	Road Weather Information System
APTS	Transit Vehicle Tracking
	Transit Fixed-Route Operations
	Transit Traveler Information
	Demand Response Transit Operations
ATIS	Broadcast Traveler Information
EM	Emergency Response
	Emergency Routing
CVO	Electronic Clearance
	Weigh-In-Motion
AD	ITS Data Warehouse

Table 29: District 7 User Needs to User Services Mapping Exercise

	National ITS Architecture – User Services																																					
Issues	**1. Travel and Traffic Management**	1.1 Pre-Trip Travel Information	1.2 En-Route Driver Information	1.3 Route Guidance	1.4 Ride Matching and Reservation	1.5 Traveler Service Information	1.6 Traffic Control	1.7 Incident Management	1.8 Travel Demand Management	1.9 Emissions Testing and Mitigation	1.10 Highway-Rail Intersection	**Public Transportation Management**	2.1 Public Transportation Management	2.2 En-Route Transit Information	2.3 Personalized Public Transit	2.4 Public Travel Security	**Electronic Payment**	3.1 Electronic Payment Service	**Commercial Vehicle Operations**	4.1 Commercial Vehicle Electronic Clearance	4.2 Automated Roadside Safety Inspection	4.3 On-Board Safety Monitoring	4.4 Commercial Vehicle Administrative Process	4.5 Hazardous Material Incident Response	4.6 Commercial Fleet Management	**Emergency Management**	5.1 Emergency Notification and Personal Security	5.2 Emergency Vehicle Management	**Advanced Vehicle Safety Systems**	6.1 Longitudinal Collision Avoidance	6.2 Lateral Collision Avoidance	6.3 Intersection Collision Avoidance	6.4 Vision Enhancement for Crash Avoidance	6.5 Safety Readiness	6.6 Pre-Crash Restraint Deployment	6.7 Automated Vehicle Operation	**Information Management**	7.1 Archived Data Function
Traffic Management																																						
Weather and visibility conditions (fog, dust, snow, etc.)		•	•	•		•		•																									•					•
Road conditions due to weather (wet, snow, ice, etc.)		•	•	•		•		•																														•
Emergency response time/finding help			•				•	•								•								•			•	•										
Congestion (recurring and seasonal) – Event congestion		•	•	•		•	•	•																														•
Safety		•	•				•	•			•					•					•	•		•			•			•	•	•	•	•	•	•		•
Emergency Management																																						
Lack of emergency response coordination							•	•																•			•	•										•
Other																																						
Lack of communications infrastructure		•	•				•	•																														

Table 30: District 7 User Services to Market Packages Mapping Exercise

National ITS Architecture Market Packages	National ITS Architecture – User Services																																					
	1. Travel and Traffic Management	1.1 Pre-Trip Travel Information (5)	1.2 En-Route Driver Information (6)	1.3 Route Guidance (3)	1.4 Ride Matching and Reservation (0)	1.5 Traveler Service Information (3)	1.6 Traffic Control (5)	1.7 Incident Management (7)	1.8 Travel Demand Management (0)	1.9 Emissions Testing and Mitigation (0)	1.10 Highway-Rail Intersection (1)	**Public Transportation Management**	2.1 Public Transportation Management (0)	2.2 En-Route Transit Information (0)	2.3 Personalized Public Transit (0)	2.4 Public Travel Security (2)	**Electronic Payment**	3.1 Electronic Payment Service (0)	**Commercial Vehicle Operations**	4.1 Commercial Vehicle Electronic Clearance (1)	4.2 Automated Roadside Safety Inspection (1)	4.3 On-Board Safety Monitoring (0)	4.4 Commercial Vehicle Administrative Process (0)	4.5 Hazardous Material Incident Response (3)	4.6 Commercial Fleet Management (0)	**Emergency Management**	5.1 Emergency Notification and Personal Security (3)	5.2 Emergency Vehicle Management (2)	**Advanced Vehicle Safety Systems**	6.1 Longitudinal Collision Avoidance (1)	6.2 Lateral Collision Avoidance (1)	6.3 Intersection Collision Avoidance (1)	6.4 Vision Enhancement for Crash Avoidance (2)	6.5 Safety Readiness (1)	6.6 Pre-Crash Restraint Deployment (1)	6.7 Automated Vehicle Operation (1)	**Information Management**	7.1 Archived Data Function (5)
Network Surveillance							•																															
Surface Street Control							•	•			•																											
Freeway Control							•	•	•																													
Traffic Information Dissemination							•				•																											
Regional Traffic Control							•																															
Incident Management System								•																														
Road Weather Information System			•				•	•																														
Transit Vehicle Tracking													•	•	•	•																						
Transit Fixed-Route Operations													•	•																								
Transit Traveler Information													•	•				•																				
Demand Response Transit Operations													•	•	•																							
Broadcast Traveler Information		•	•											•																								
Emergency Response																											•	•										
Emergency Routing								•																				•										
Electronic Clearance																				•			•															
Weigh-In-Motion																				•																		
ITS Data Warehouse																																						•

*** The number values that follow each User Service above represent the number of issues that were mapped to that particular User Service.**

The fourth step of the architecture development process is to customize the market package and subsystem to subsystem/terminator interconnections so as to address the initial user needs identified. It is this final procedure that produces the District 7 specific Regional Architecture. Figure 19 to follow is the top-level interconnects diagram or "Sausage" Diagram for District 7. All other graphical representations for the District 7 Regional Architecture can be found in the electronic database for the District 7 architecture.

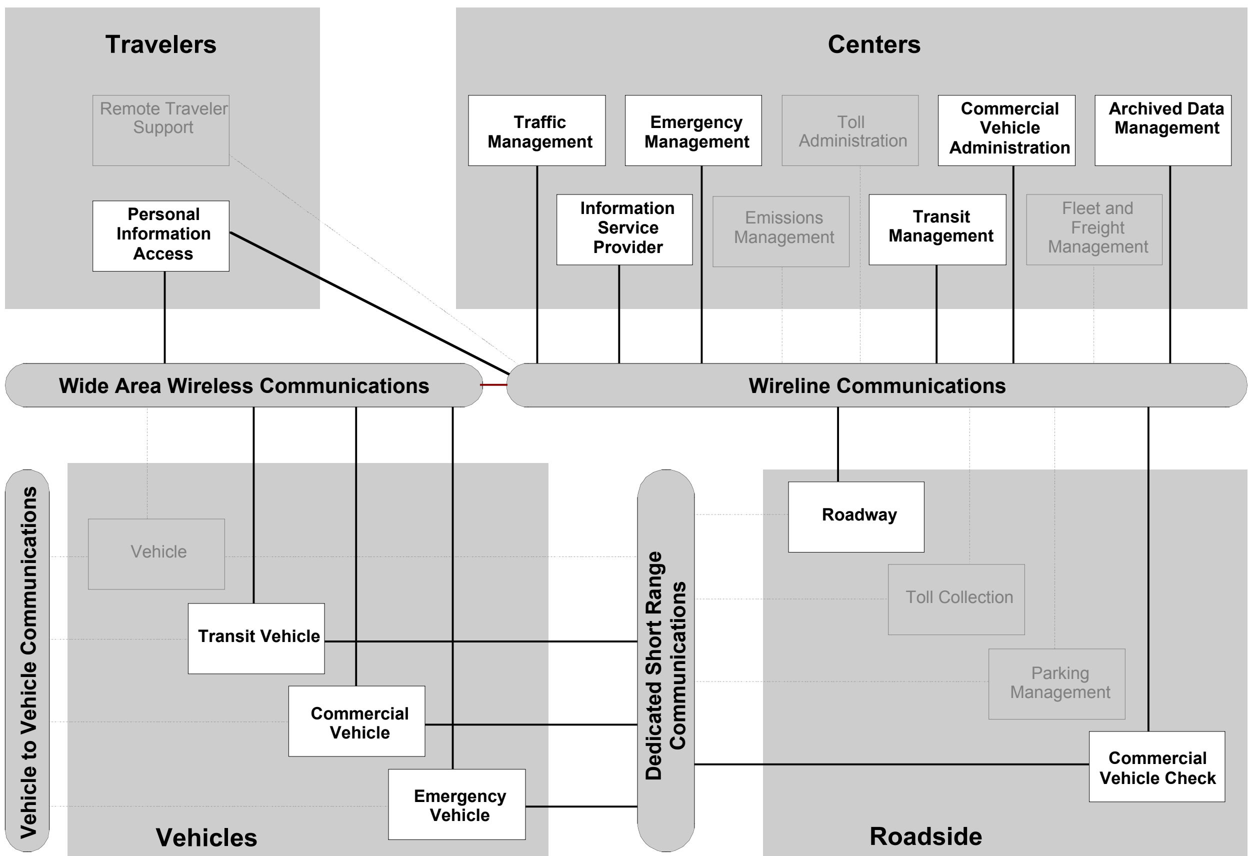


Figure 19: District 7 Regional Architecture Sausage Diagram

District 8 Regional Architecture

The District 8 Regional Architecture covers the Wisconsin Department of Transportation defined district boundaries. This includes the counties of:

- Ashland
- Barron
- Bayfield
- Burnett
- Douglas
- Polk
- Rusk
- Sawyer
- Washburn

The District 8 region has a number of major roadways classified as USH's, which run through the area. USH 53 runs north-south for approximately 100 miles from Superior to the southern border of Barron County. USH 2 runs east-west across the northern border of the region and USH 8 through the southern portion of the region.

District 8 has a few cities of 3,000 to 9,000, but is anchored by the City of Superior at around 28,000. The City of Superior shares its border the Minnesota City of Duluth. Much of District 8 is similar to that of the District 7 region, many lakes and large National Forests.

The District 8 Regional Architecture was developed by tailoring the National ITS Architecture, as appropriate, to meet the needs of the region. The regional needs were obtained at an ITS Architecture Workshop that was held February 23, 2001 at the Superior Public Library. Together with the appropriate agencies and stakeholders a list of issues and needs were identified during the workshop. It should be noted that representatives from the Minnesota Department of Transportation were in attendance at this workshop to the close proximity of Superior, WI and Duluth, MN, and the information sharing possibilities available to the two entities. The following table summarizes the priority user needs from this discussion.

Table 31: District 8 Top Priority User Needs

Category	Issues and Needs
Traffic Management	Weather and visibility conditions (fog, dust, snow)
	Road conditions due to weather (wet, snow, ice, etc.)
	Highway-railroad intersections
	Safety
	Lack of alternate routes
Regional Traveler Information	Construction zone information (location, delays, accidents, etc.)
	Better road closure, advisory, and weather information
Emergency Management	Lack of emergency response coordination
	Informational database in-vehicle

Having identified the subsystems that are to be part of the ITS System, the next step was to use the current uses of technology for existing inventory information and the identified issues and needs (or user needs) mapped to the “generic” architecture market packages.

This process consists of four steps: first, document the existing systems into the architecture; second, map the user needs to the National ITS Architecture user services; third, map the user services to the National ITS Architecture market packages; and fourth, customize the identified market packages and their subsystem/terminator interconnections to address the initial needs. Tables 32 and 34 show a summary table of the user services and the mapping exercise that was used to identify the user services.

Table 32: District 8 Regional Architecture User Services

User Service Bundle	User Service
1.0 Travel and Traffic Management	1.1 Pre-Trip Travel Information (7)
	1.2 En-Route Driver Information (7)
	1.3 Route Guidance (4)
	1.5 Traveler Service Information (4)
	1.6 Traffic Control (7)
	1.7 Incident Management (9)
	1.10 Highway-Rail Intersection (2)
5.0 Emergency Management	5.1 Emergency Notification and Personal Security (2)
	5.2 Emergency Vehicle Management (2)
7.0 Information Management	7.1 Archived Data Function (7)

*The number values that follow each User Service above represent the number of issues that were mapped to that particular User Service.

Following the user services identification the market package determination can take place. There are 63 market packages defined by the National ITS Architecture. The District 8 Regional Architecture user services are mapped to the market packages according to the relationship between user services and market packages presented in Table 3-1 in the National ITS Architecture under the Market Package Document, Version 3.0. Tables 33 and 35 present the mapping exercise and a summary table of the market packages.

Table 33: District 8 Regional Architecture Market Packages

Category	Market Package
ATMS	Network Surveillance
	Probe Surveillance
	Surface Street Control
	Freeway Control
	Traffic Information Dissemination
	Regional Traffic Control
	Incident Management System
	Virtual TMC and Smart Probes
	Road Weather Information System
ATIS	Broadcast Traveler Information
EM	Emergency Response
	Emergency Routing
	Mayday Support
AD	ITS Data Warehouse

Table 34: District 8 User Needs to User Services Mapping Exercise

	National ITS Architecture – User Services																																					
Issues	**Travel and Traffic Management**	1.1 Pre-Trip Travel Information	1.2 En-Route Driver Information	1.3 Route Guidance	1.4 Ride Matching and Reservation	1.5 Traveler Service Information	1.6 Traffic Control	1.7 Incident Management	1.8 Travel Demand Management	1.9 Emissions Testing and Mitigation	1.10 Highway-Rail Intersection	**Public Transportation Management**	2.1 Public Transportation Management	2.2 En-Route Transit Information	2.3 Personalized Public Transit	2.4 Public Travel Security	**Electronic Payment**	3.1 Electronic Payment Service	**Commercial Vehicle Operations**	4.1 Commercial Vehicle Electronic Clearance	4.2 Automated Roadside Safety Inspection	4.3 On-Board Safety Monitoring	4.4 Commercial Vehicle Administrative Process	4.5 Hazardous Material Incident Response	4.6 Commercial Fleet Management	**Emergency Management**	5.1 Emergency Notification and Personal Security	5.2 Emergency Vehicle Management	**Advanced Vehicle Safety Systems**	6.1 Longitudinal Collision Avoidance	6.2 Lateral Collision Avoidance	6.3 Intersection Collision Avoidance	6.4 Vision Enhancement for Crash Avoidance	6.5 Safety Readiness	6.6 Pre-Crash Restraint Deployment	6.7 Automated Vehicle Operation	**Information Management**	7.1 Archived Data Function
Traffic Management																																						
Weather and visibility conditions (fog, dust, snow)		•	•	•		•	•	•																									•					•
Road conditions due to weather (wet, snow, ice, etc.)		•	•	•		•	•	•																														•
Highway-railroad intersections											•																											
Safety		•	•				•	•			•					•					•	•		•			•			•	•	•	•	•	•	•		•
Lack of alternate routes		•	•	•			•	•																														
Regional Traveler Information																																						
Construction zone information (location, delays, accidents, etc.)		•	•	•		•	•	•																														•
Better road closure, advisory, and weather information		•	•	•		•	•	•																														•
Emergency Management																																						
Lack of emergency response coordination							•	•																•			•	•										•
Informational database in-vehicle								•																				•										•

Table 35: District 8 User Services to Market Packages Mapping Exercise

	National ITS Architecture – User Services																																					
National ITS Architecture Market Packages	**Travel and Traffic Management**	1.1 Pre-Trip Travel Information (6)	1.2 En-Route Driver Information (6)	1.3 Route Guidance (5)	1.4 Ride Matching and Reservation (0)	1.5 Traveler Service Information (4)	1.6 Traffic Control (7)	1.7 Incident Management (8)	1.8 Travel Demand Management (0)	1.9 Emissions Testing and Mitigation (0)	1.10 Highway-Rail Intersection (2)	**Public Transportation Management**	2.1 Public Transportation Management (0)	2.2 En-Route Transit Information (0)	2.3 Personalized Public Transit (0)	2.4 Public Travel Security (1)	**Electronic Payment**	3.1 Electronic Payment Service (0)	**Commercial Vehicle Operations**	4.1 Commercial Vehicle Electronic Clearance (0)	4.2 Automated Roadside Safety Inspection (1)	4.3 On-Board Safety Monitoring (1)	4.4 Commercial Vehicle Administrative Process (0)	4.5 Hazardous Material Incident Response (2)	4.6 Commercial Fleet Management (0)	**Emergency Management**	5.1 Emergency Notification and Personal Security 2)	5.2 Emergency Vehicle Management (2)	**Advanced Vehicle Safety Systems**	6.1 Longitudinal Collision Avoidance (1)	6.2 Lateral Collision Avoidance (1)	6.3 Intersection Collision Avoidance (1)	6.4 Vision Enhancement for Crash Avoidance (2)	6.5 Safety Readiness (1)	6.6 Pre-Crash Restraint Deployment (1)	6.7 Automated Vehicle Operation (1)	**Information Management**	7.1 Archived Data Function (7)
Network Surveillance							•																															
Probe Surveillance							•																															
Surface Street Control							•	•			•																											
Freeway Control							•	•	•																													
Traffic Information Dissemination							•				•																											
Regional Traffic Control							•																															
Incident Management System								•																														
Virtual TMC and Smart Probes			•				•	•																														
Road Weather Information System			•				•	•																														
Broadcast Traveler Information		•	•											•																								
Emergency Response																											•	•										
Emergency Routing							•																					•										
Mayday Support																											•	•										
ITS Data Warehouse																																						•

*** The number values that follow each User Service above represent the number of issues that were mapped to that particular User Service.**

The fourth step of the architecture development process is to customize the market package and subsystem to subsystem/terminator interconnections so as to address the initial user needs identified. It is this final procedure that produces the District 8 specific Regional Architecture. Figure 20 to follow is the top-level interconnects diagram or “Sausage” Diagram for District 8. All other graphical representations for the District 8 Regional Architecture can be found in the electronic database.

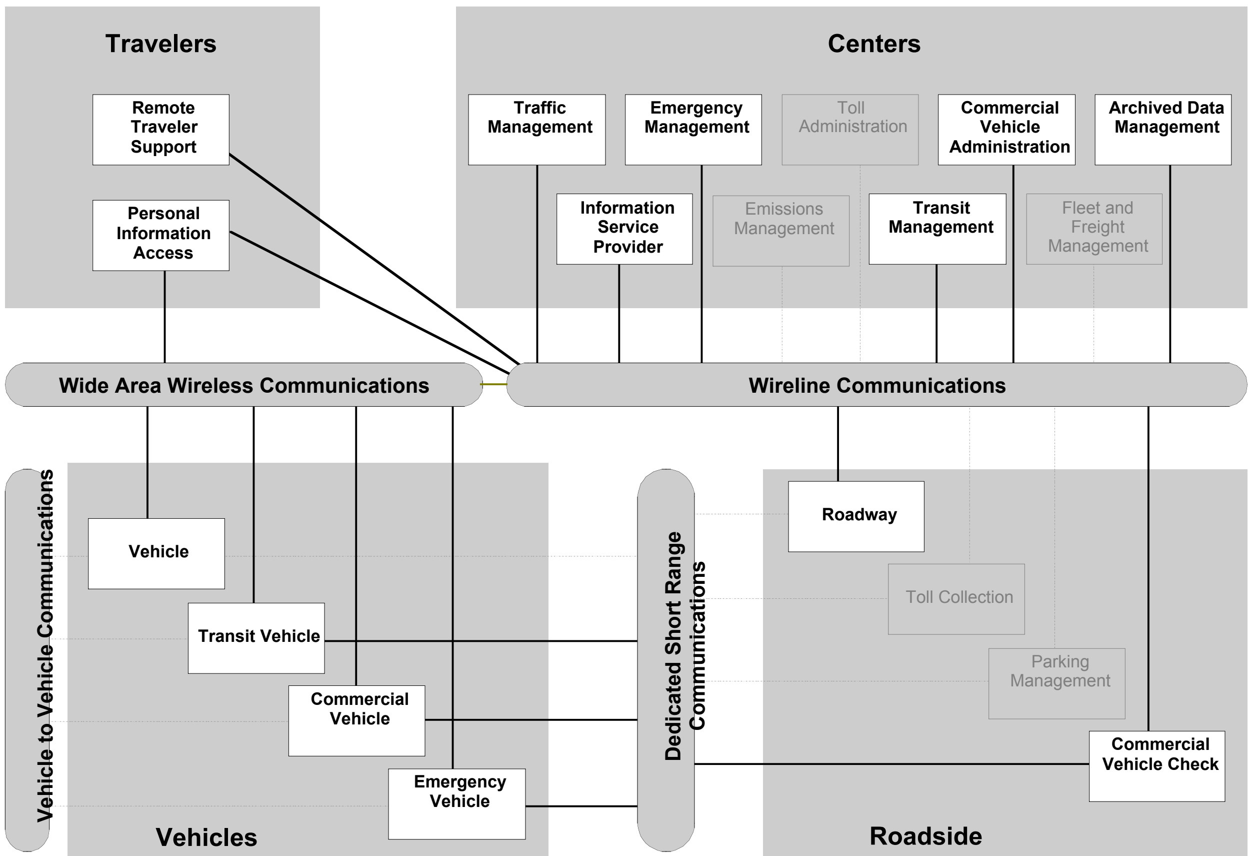


Figure 20: District 8 Regional Architecture Sausage Diagram

13. STATEWIDE ITS ARCHITECTURE

The Wisconsin Department of Transportation Statewide ITS Architecture is an open, modular ITS planning tool. This allows for the architecture to be further developed/enhanced in the future to include the other district architectures under development or any other necessary National ITS Architecture derived components (e.g., functional requirements, subsystems, market packages, architecture flows, etc.).

The Statewide ITS Architecture covers the entire state of Wisconsin. As was previously stated in section 10 of this document the statewide architecture for Wisconsin, under this effort, was developed using the five regional architectures from Districts 4, 5, 6, 7, and 8. Districts 1, 2, and 3 are currently in the process of development or require modifications to each of their respective architectures. That being said, the Statewide ITS Architecture is merely an extension of the regional architectures in conglomerate. Due to its open, modular nature the architecture will be able to receive the other district architectures upon completion, as well as, any additions that may be necessary in the future.

Since the Statewide Architecture was developed using the District Regional Architectures as its foundation, the user needs for this architecture are a direct reflection of each of the districts. Therefore, a summary of this information is not available at this level. The market packages for the Statewide Architecture, however, are summarized in Table 36 that follows.

Table 36: Wisconsin Statewide ITS Architecture Market Packages

Category	Market Package
ATMS	Network Surveillance
	Probe Surveillance
	Surface Street Control
	Freeway Control
	Traffic Information Dissemination
	Regional Traffic Control
	Incident Management System
	Virtual TMC and Smart Probes
	Road Weather Information System
APTS	Transit Vehicle Tracking
	Transit Fixed-Route Operations
APTS	Demand Response Transit Operations
	Transit Traveler Information
ATIS	Broadcast Traveler Information
	Interactive Traveler Information
	Yellow Pages and Reservation
	Dynamic Ridesharing
CVO	Electronic Clearance
	CV Administrative Processes
	Weigh-In Motion
	HAZMAT Management
EMS	Emergency Response
	Emergency Routing
	Mayday Support
ADS	ITS Data Warehouse

It should be noted that the market package summary from above is simply a collection of the market packages that were applied to the District Regional Architectures. Also, not every market package has a "Statewide" deployment option, meaning, each districts user needs did not map out to all of the market packages listed above. Some market package applications were unique to a specific district and as such are not eligible for "Statewide" deployment at this time.

With that said, there are a number of market packages that do transcend themselves across the entire State[9]. These market packages and their associated user services should be considered with all Statewide deployment opportunities. Table 37 summarizes these Statewide deployable market packages.

[9] Again, here the entire State represents WisDOT Districts 4, 5, 6, 7, and 8.

Table 37: Statewide Deployable ITS Architecture Market Packages

Category	Market Package
ATMS	Network Surveillance
	Surface Street Control
	Freeway Control
	Traffic Information Dissemination
	Regional Traffic Control
	Incident Management System
	Road Weather Information System
APTS	Transit Vehicle Tracking[10]
ATIS	Broadcast Traveler Information
EMS	Emergency Response
	Emergency Routing
ADS	ITS Data Warehouse

The same architecture development process was used when developing the Statewide ITS Architecture as with the District Regional Architectures: first, document the existing systems into the architecture; second, map the user needs to the National ITS Architecture user services; third, map the user services to the National ITS Architecture market packages; and fourth, customize the identified market packages and their subsystem/terminator interconnections to address the initial needs. However, in the case of the Statewide ITS Architecture steps one, two, and three were completed under the district developments.

The graphical presentation of the Statewide ITS Architecture is similar to that of the districts, yet at a higher level. Figure 21 is the top-level interconnects diagram or "Sausage" Diagram for the Statewide ITS Architecture.

All other graphical representations for the Statewide ITS Architecture can be found in the electronic database for the statewide architecture.

[10] Transit Vehicle Tracking market package is included here due to the Statewide Transit initiative to deploy GPS equipment in transit vehicles across the State. The market package was not highlighted throughout every district due to the lack of interest from the present stakeholder in this particular area.

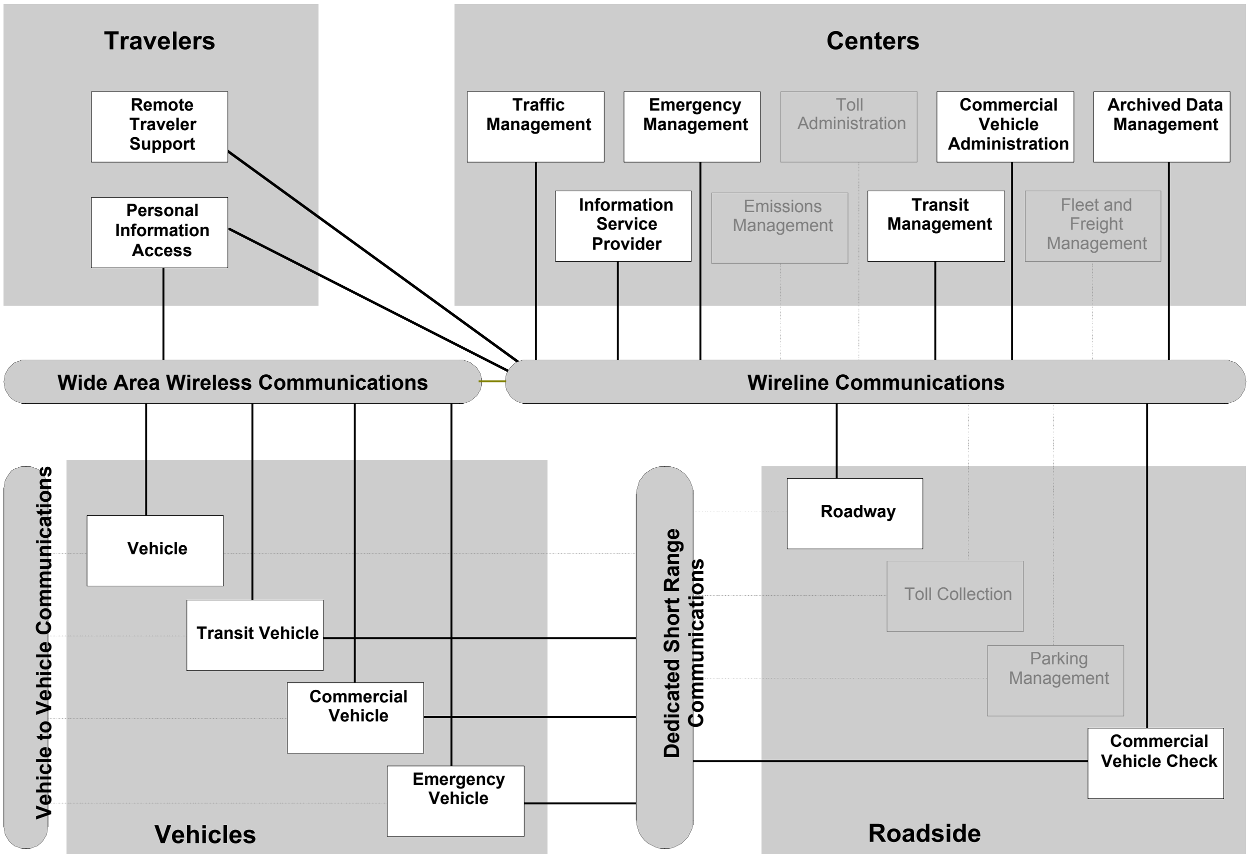


Figure 21: Statewide ITS Architecture Sausage Diagram

WisDOT Architecture Future Development Needs

The WisDOT Statewide ITS Architecture, as it stands, is a mirror image of each of the regional architectures developed under this effort. The theory behind its development was to create a "Statewide" architecture using regional architectures from each of the WisDOT Districts (1-8). This project accomplished the development of regional architectures for District 4-8.

The next step was to then incorporate the other three "Regional" architectures (Districts 1-3) under development as a separate effort. However, with the completion of this project these architectures were yet to be completed. Without the inclusion of Districts 1-3 the "Statewide" ITS Architecture is not thoroughly complete.

To this point the Statewide ITS Architecture has been developed through the element, or subsystem identification, and appropriate market package selection for Districts 4-8. The element and market package identification step is needed for Districts 1-3. Once this is complete the architecture may continue on with the task of building and customizing the statewide architecture. This is the most critical and important step to developing an architecture.

In addition, there are a number of items that are recommended for future development. These items are listed below:

1. Elaborate on the role of CVISN with respect to the Statewide ITS Architecture,
2. Further customize the rural regional architectures via continued district outreach,
   a. Customize the first iteration of market packages,
   b. Develop a sequence of ITS projects required for implementation,
3. Develop an operational concept for each district, identifying the roles and responsibilities of participating agencies and stakeholders for the regional and statewide architectures,
4. Outline any agreements required for operations, including at a minimum those affecting ITS projects interoperability,
5. Convert District 2 regional architecture to Turbo architecture database format,
6. Complete regional architecture development in District 3 (currently have a corridor architecture effort in-progress),
7. Update the Statewide ITS Architecture with the appropriate Operations and Maintenance subsystem information. This information will come from an updated version of the National ITS Architecture, currently under development.
8. Update the Statewide ITS Architecture with the addition of regional architectures from Districts 1, 2, and 3,
   a. Incorporate District 1, 2, and 3 regional architecture element and market package information into the database,
   b. Customize the Turbo architecture build by aligning the interconnections and architecture flows as appropriate for all subsystems and terminators,
   c. Present the statewide architecture customizations options to the districts.

A few of the future needs listed above are a direct reflection of the FHWA ITS Architecture and Standards conformity final rule requirements recently passed on April 8, 2001. The new requirements state that "a region that is currently implementing ITS projects must develop a regional ITS architecture to guide their deployment by April 8, 2005" or "within four years of their first ITS project advancing to final design." The following chart displays the components of § Policy 940.9 – Regional ITS Architecture Requirements that have been complete in the Wisconsin Statewide ITS Architecture.

940.9 Regional ITS Architecture Requirements

- [x] Develop a Regional Architecture, including;
  - [x] A description of the region;
  - [x] Identification of participating agencies and other stakeholders;
  - [ ] An operational concept that identifies the roles and responsibilities of participating agencies and stakeholders in the operation and implementation of the systems included in the regional ITS architecture;
  - [ ] Any agreements (existing or new) required for operations, including at a minimum those affecting ITS project interoperability, utilization of ITS related standards, and the operation of the projects identified in the regional ITS architecture;
  - [x] System functional requirements;
  - [x] Interface requirements and information exchanges with planned and existing systems and subsystems (for example, subsystems and architecture flows as defined in the National ITS Architecture);
  - [x] Identification of ITS standards supporting regional and national interoperability;
  - [ ] The sequence of projects required for implementation.
- [x] Develop and implement procedures and responsibilities for maintaining it, as needs evolve within the region.

14. STATEWIDE ITS ARCHITECTURE OPERATIONS AND MAINTENANCE

With the development of the Wisconsin Statewide ITS Architecture the Advisory Group held strong to the planning and implementation of procedures and responsibilities necessary for maintaining the architecture. Multiple discussion sessions were held to identify the appropriate DOT division to handle the maintenance of specific sections of the architecture or architecture processes.

The Bureau of Automation Services (BAS) was identified as a key component for any type of architecture maintenance. This is due to the technical nature of the databases involved. BAS would thus act as the architecture database "librarian" and is tasked with the responsibility to define/maintain the architecture repository.

As architecture updates arise the Division of Transportation Investment Management (DTIM), Division of Transportation Infrastructure Development (DTID) and BAS would be responsible for architecture technical support. In addition to the WisDOT entities identified, a support contract with a consultant may be necessary to provide the architecture expertise needed to oversee any updates made to the statewide architecture.

The approval process for any architecture updates should be developed by DTIM and the intact Advisory Group. Following the approval of the architecture updates, DTIM would also be available for securing the funding needed to move toward final design of the resulting ITS projects. Figure 22 displays the ITS project architecture development and approval process developed by the Advisory Group.

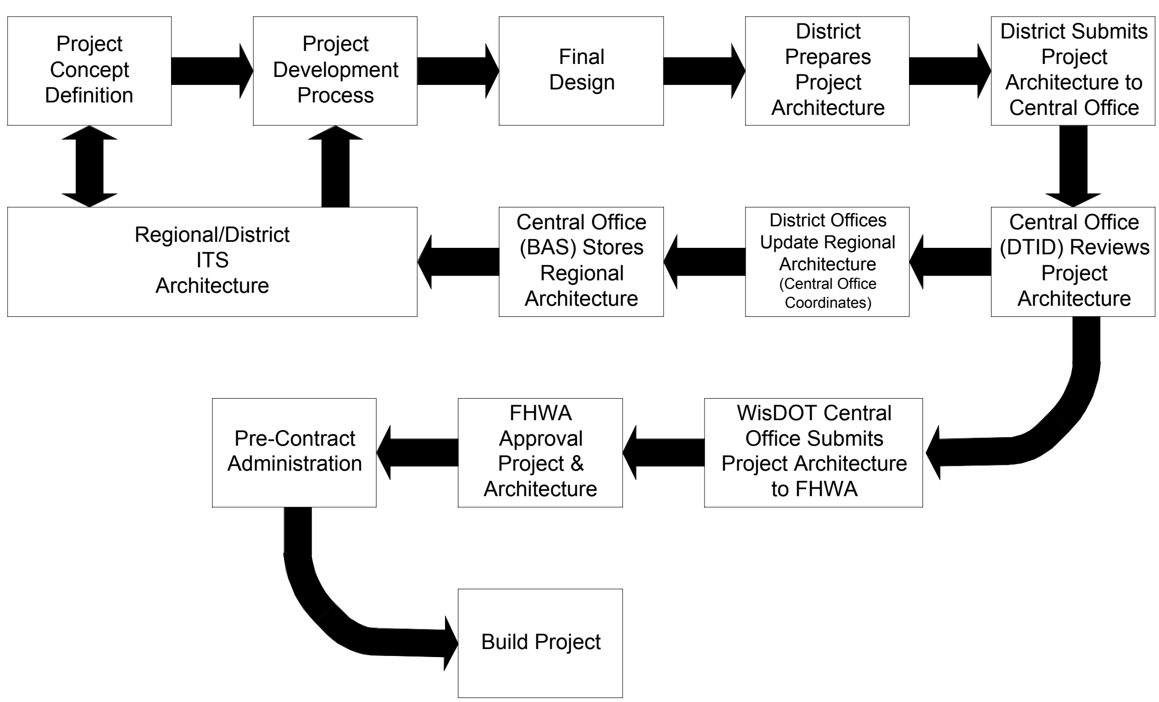


Figure 22: Wisconsin ITS Project Architecture Development & Approval Process

The above diagram lays out the development and approval process for ITS projects. As one can see the project concept and project development process are both a direct and/or indirect result of the existing regional architecture. As the project moves through the pipeline the guidance from WisDOT Central Office (CO) is evident along the way, either indirectly via the regional architecture influence or directly at the review stage. In the absence of a regional architecture the same WisDOT CO guidance is present when the time comes to develop the regional architecture using the project architectures, in that the project architectures were properly developed using CO to review and oversee their development.

Considering the processes involved with the development of ITS projects, it is recommended that the processes be incorporated into the WisDOT Facilities Design Manual. The appropriate WisDOT entity to oversee this would be DTID. DTID will be charged with the task of sculpting the above diagram and its processes into the FDM design standards and incorporating it into the manual.

APPENDIX A

Detailed ATIS Inventories

CDSI

Communication-Data System
Infrastructure

Wisconsin ATIS Inventory

Project Name: Communication-Data System Infrastructure (CDSI)

Agencies: Wisconsin DOT and all regional transportation, public safety, and emergency response agencies in the region

WisDOT Contact: John Corbin

End-user Groups: All those concerned with transportation, public safety, and emergency response, including the general public.

Project Scope: CDSI is concerned primarily with communications occurring between transportation, emergency service, and public safety providing organizations in southeastern Wisconsin. As such, it incorporates all flows in the entire Regional ITS Architecture and adds flows concerning law enforcement, fire, and medical organizations. The purpose of the project is to develop a more efficient infrastructure with higher performance and enhances functionality by providing a single central point of contact for organizations gathering or distributing data or control flows. A "Data Carousel" is being designed, upon which an organization can place data and control flows, removing other data and control flows according to pre-agreed "rules of engagement" with other organizations.

Data Collection: All transportation flows including voice can be accommodated, and some law enforcement and Public safety flows; organizations in the region will be encouraged to use the system.

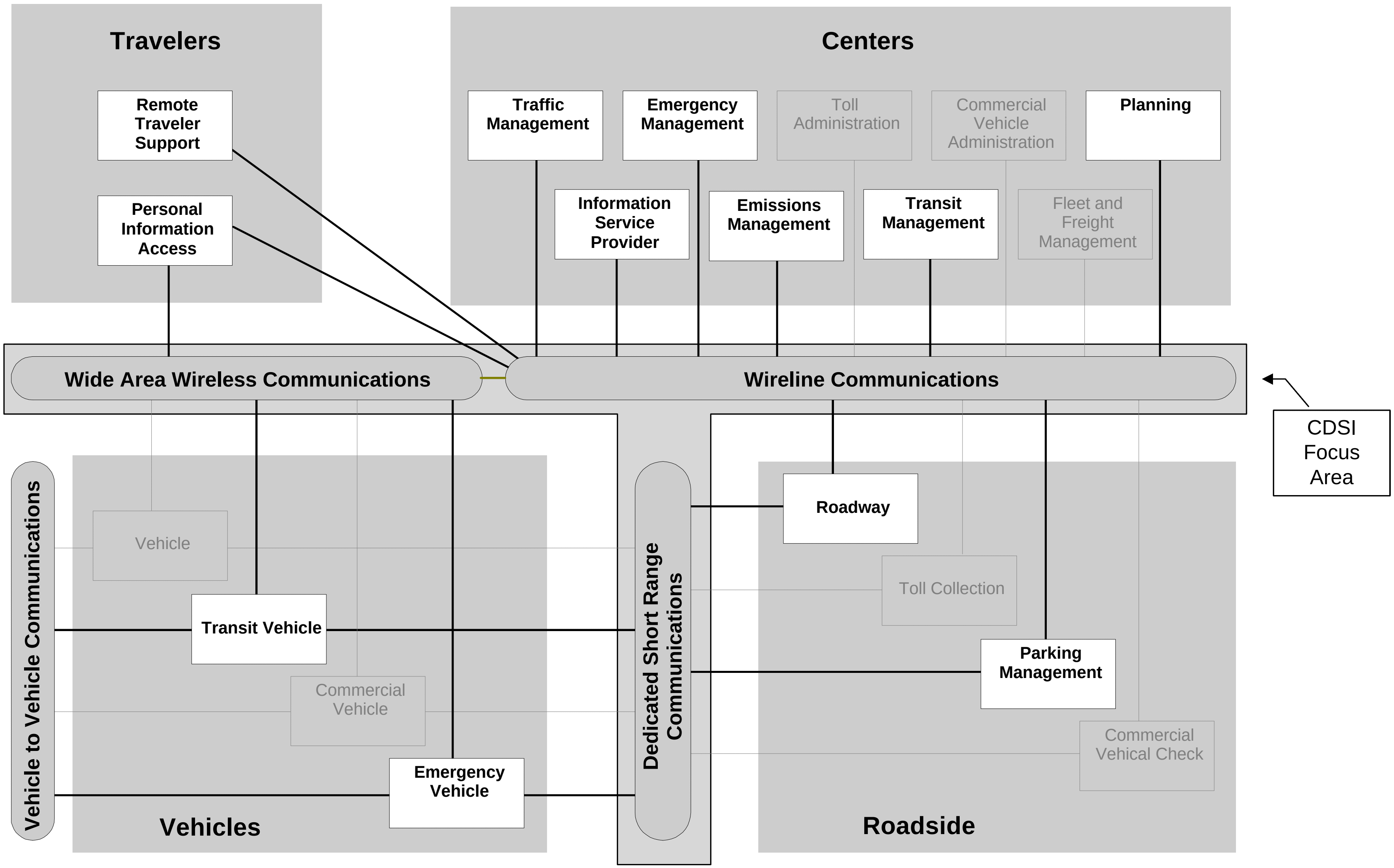
Delivery of Information: All member organizations will be given access to data and control flows available, consistent with the mediation of data and control access mentioned above, on a 24/7 basis.

Delivery Mechanisms: Fiber, twisted pair, microwave, VHH, UHF, spread spectrum, etc. One or more Internet connections will be available for users.

Desired Outcome:
Increased use of available information and control by coordinating agencies, coupled with increased communication system performance for all users.

Comments: Heterarchical communications infrastructure upgrade preserving data and control security and integrity.

CDSI
Subsystems Interconnect Diagram



Dane County
Incident Management

Wisconsin ATIS Inventory

Project Name: Dane County Incident Management

Agencies: WisDOT District 1, State Patrol

WisDOT Contact: Marc Hustad at HNTB

End-user Groups: WisDOT District 1 TMC, local media

Project Scope: The proposed Dane County Incident Management System is designed to reduce the impact of incidents on the Beltline and interstate system in Dane County. The system will include the installation of enhanced reference markers, and ramp meters, as well as the introduction of a service patrol. There are no immediate plans to release travel information directly to the public, but information will be provided to the local media.

Data Collection: The Incident Management System will include five CCTV cameras and fifty system detectors on the Beltline in Dane County. Incident information will be collected from the State Patrol and other agencies.

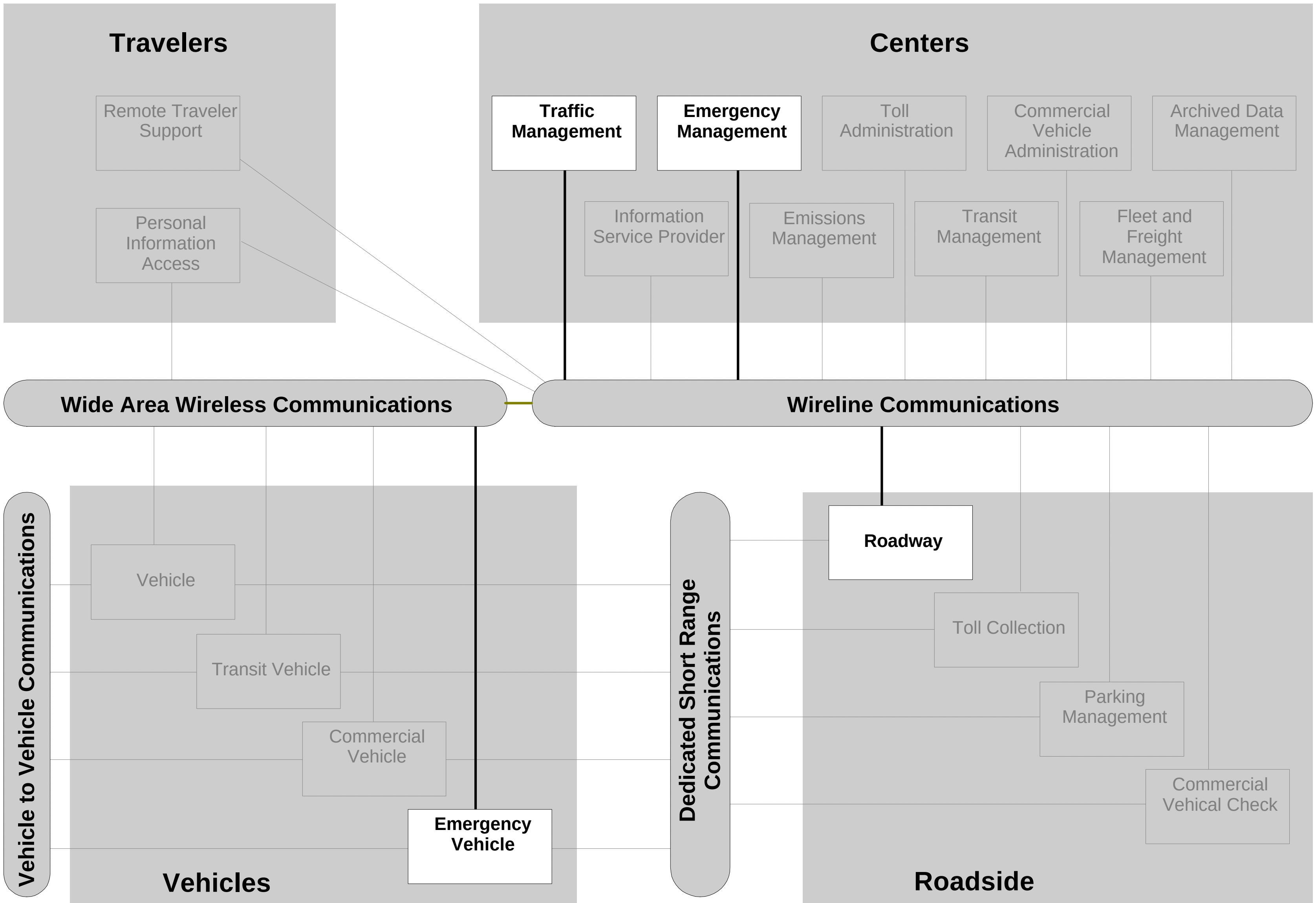
Delivery of Information: Information about incidents will be reported as they occur. Data from system detectors and cameras will be collected by District 1 continuously.

Delivery Mechanisms: A Traffic Alert Fax Form will also be introduced, which agencies will use to alert WisDOT and other agencies of the location and duration of incidents. While there is currently no plan to provide information to the public directly, the data from the system detectors may be used in the future to develop a system congestion map.

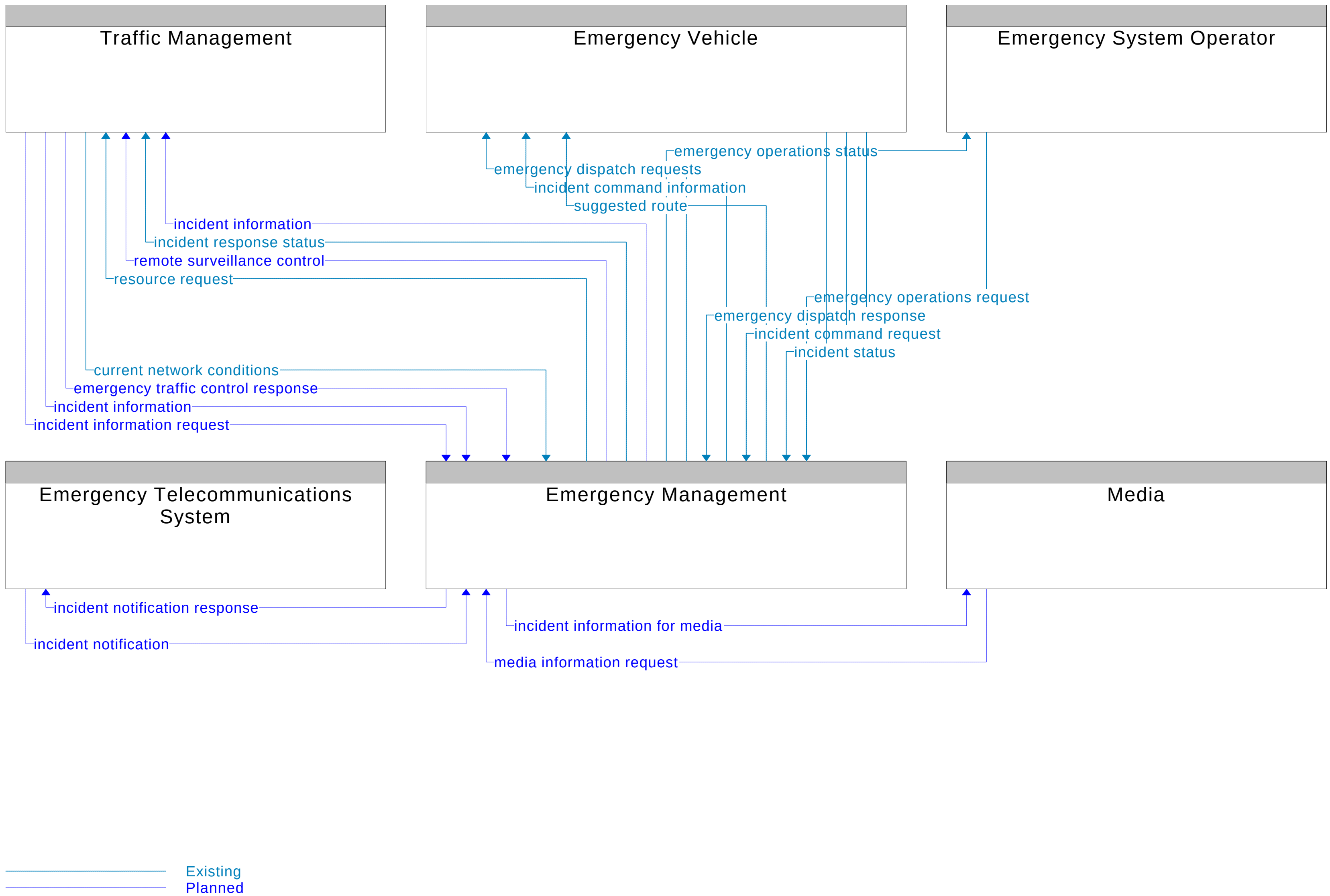
Desired Outcome: The system programs are intended to reduce incident related delay as well to increase safety and improve emergency response.

Comments:

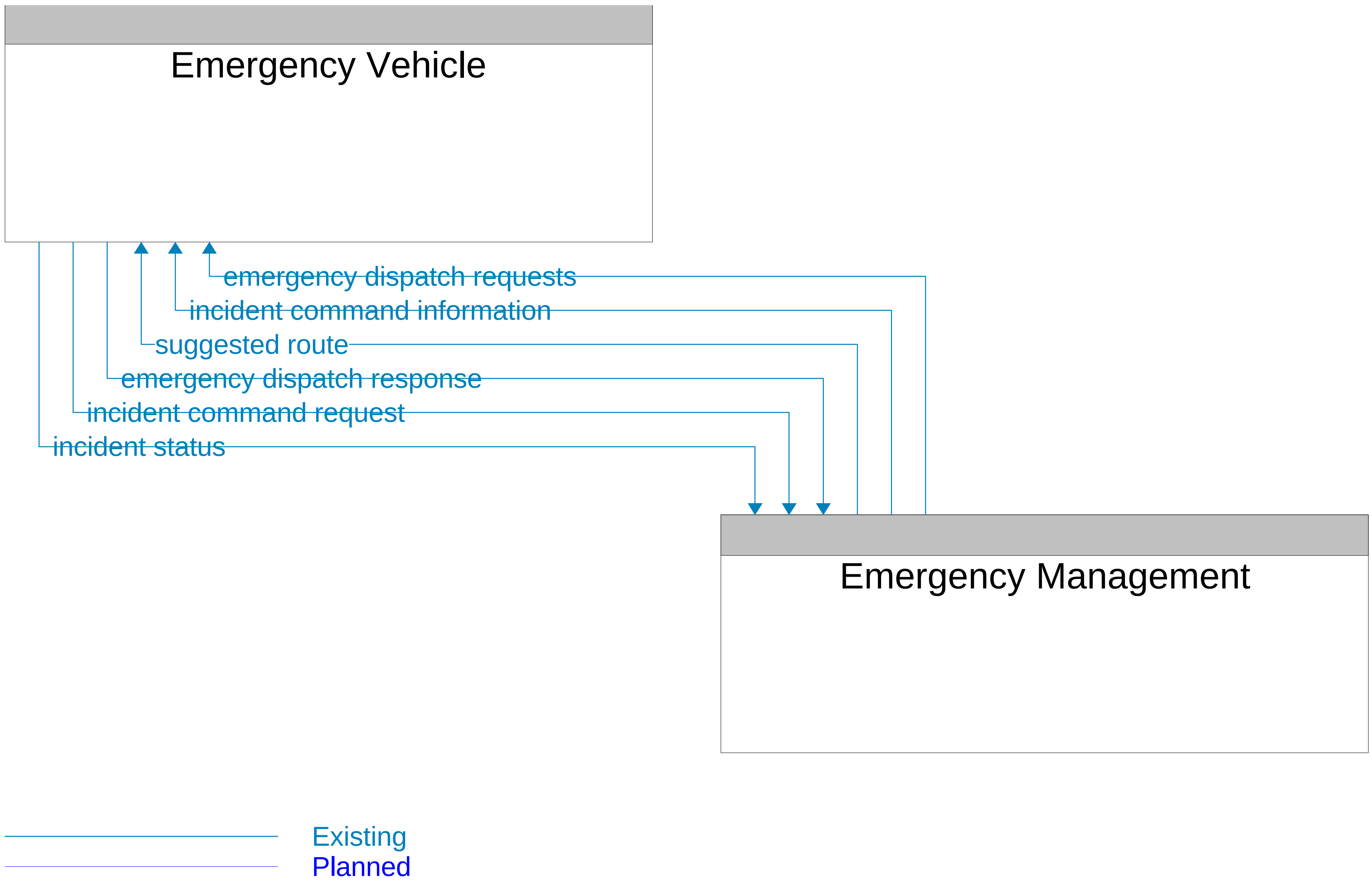
Dane County Incident Management
Subsystems Interconnect Diagram



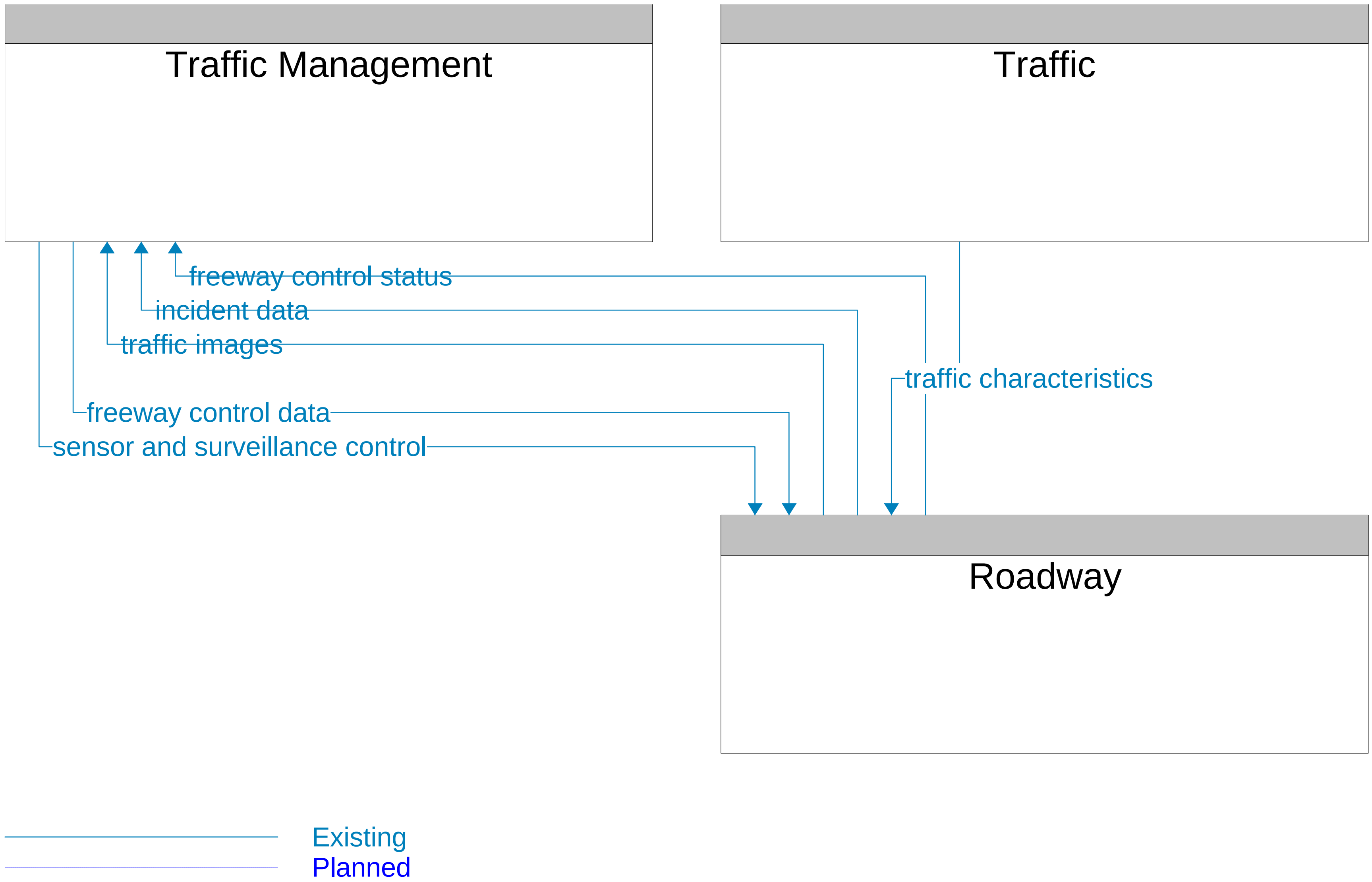
Dane County Incident Management
Architecture Flow Diagram for Emergency Management Subsystem



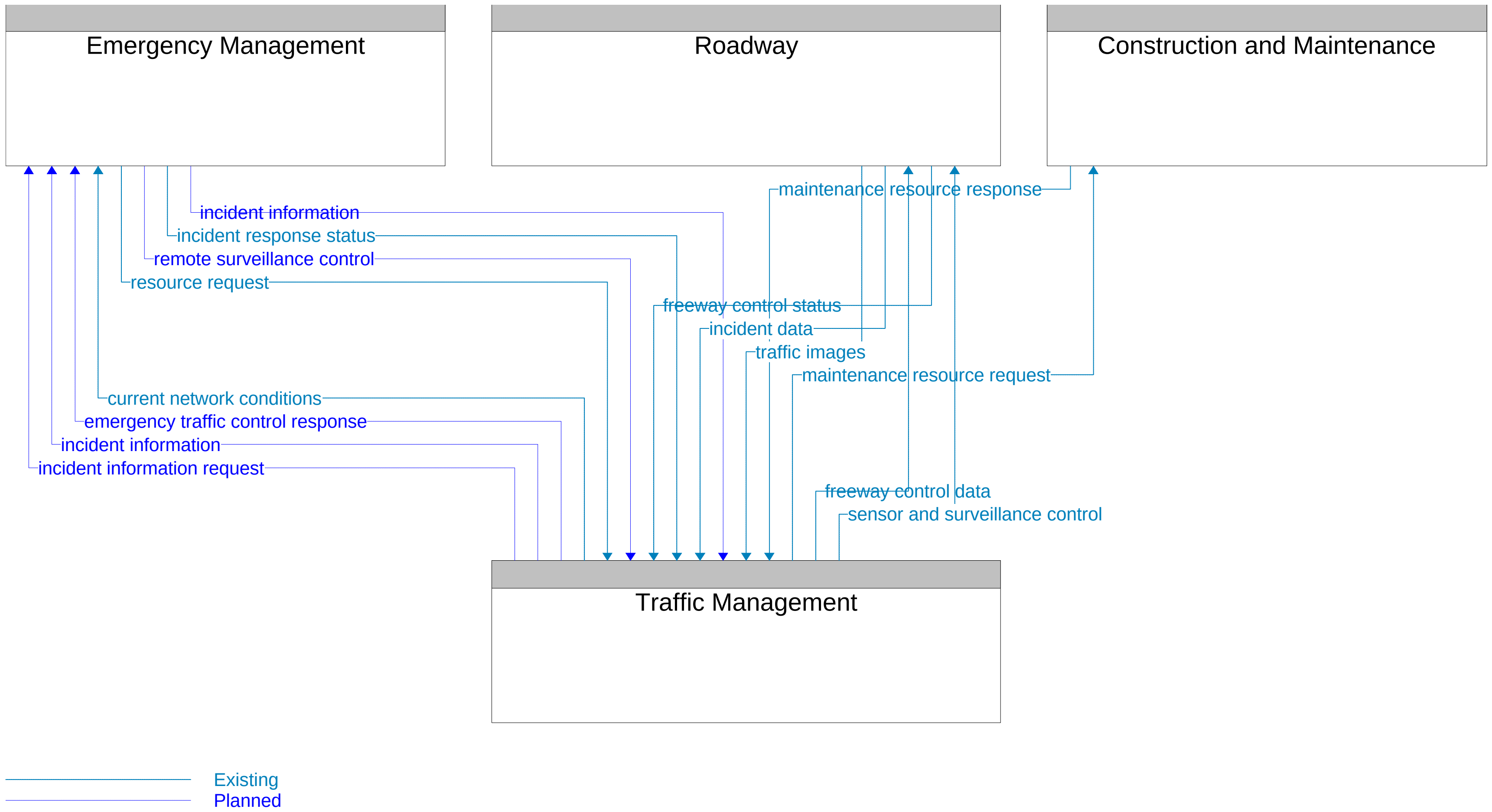
Dane County Incident Management
Architecture Flow Diagram for Emergency Vehicle Subsystem



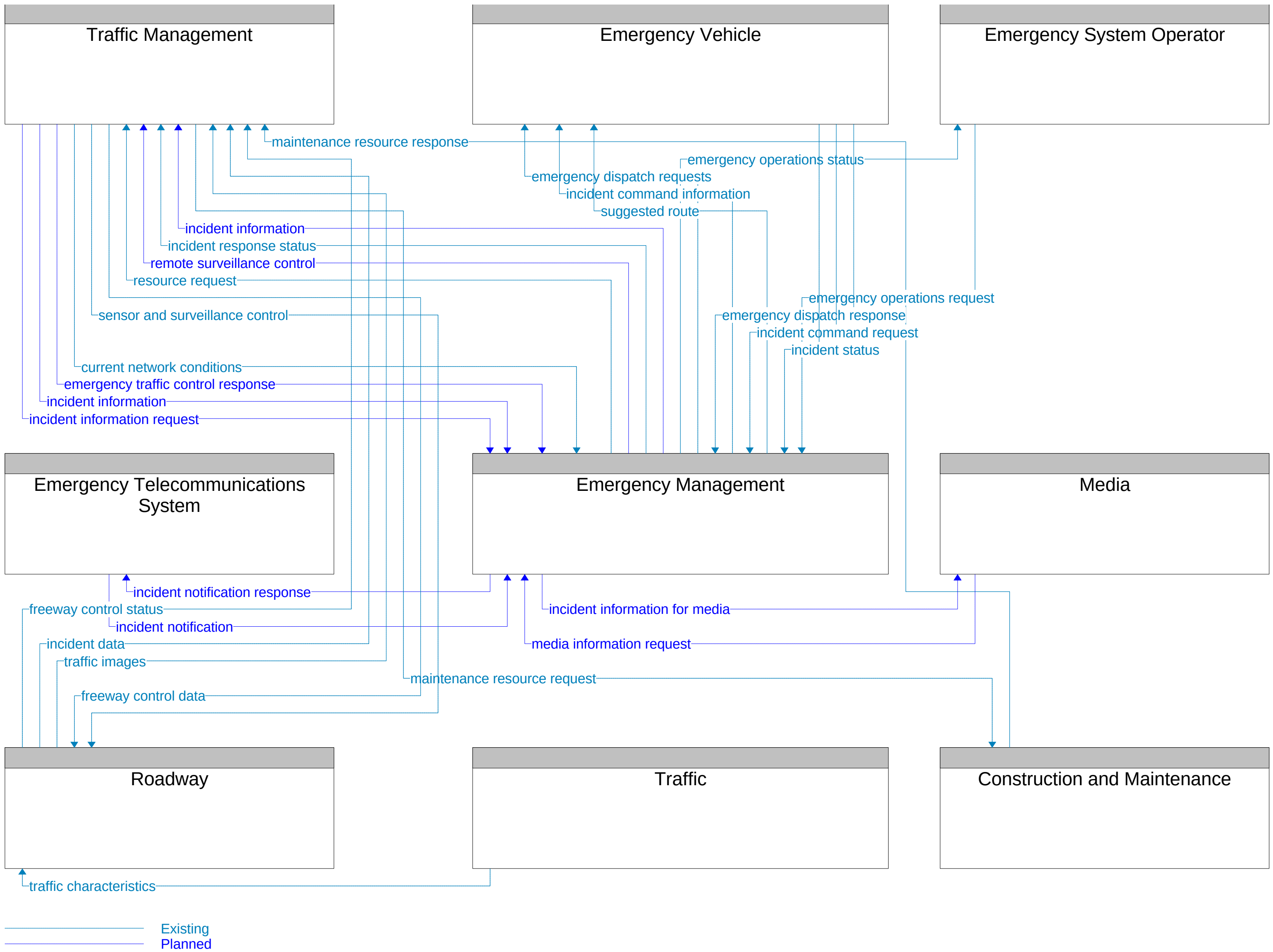
Dane County Incident Management
Architecture Flow Diagram for Roadway Subsystem



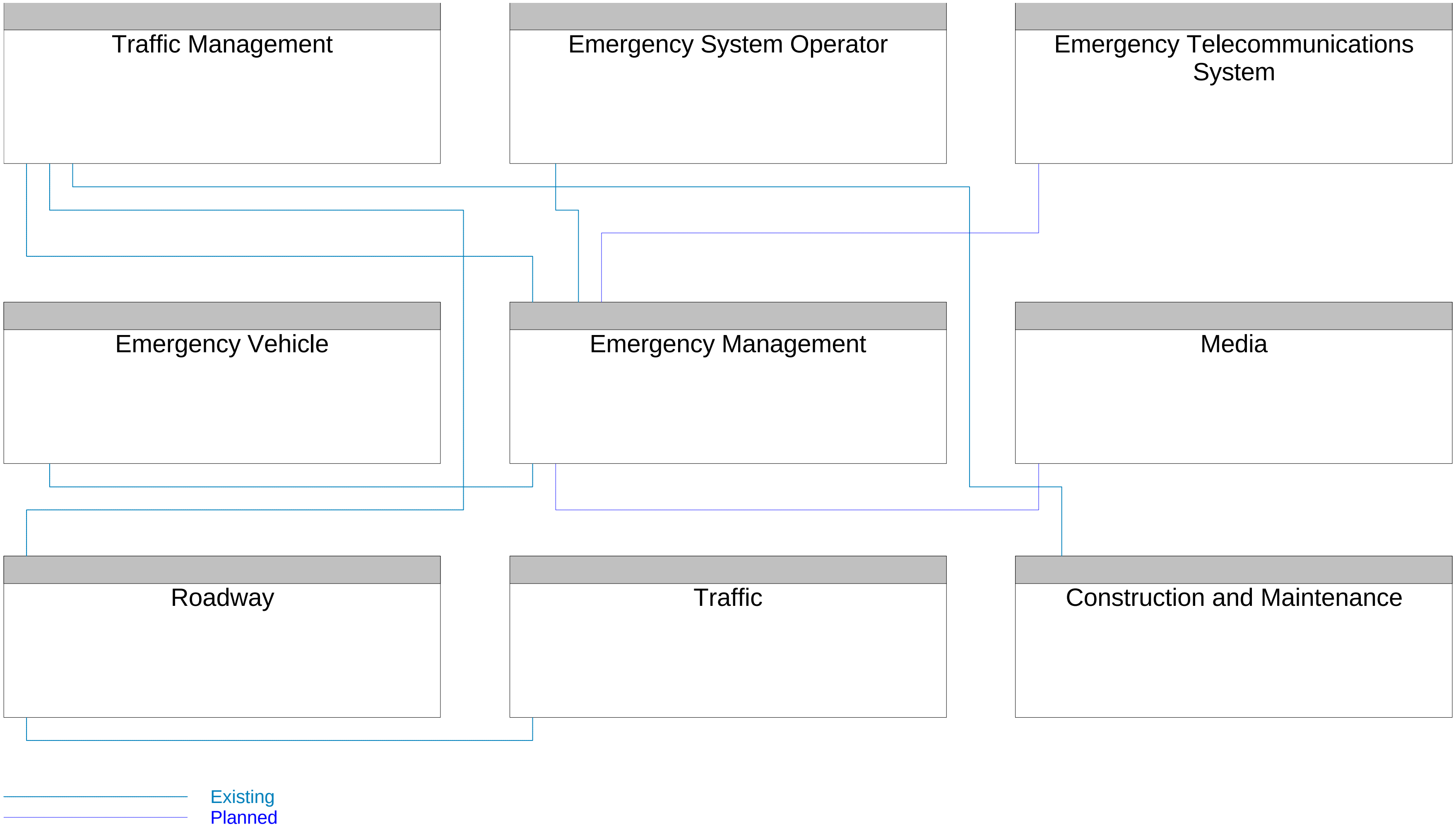
Dane County Incident Management
Architecture Flow Diagram for Traffic Management Subsystem



Dane County Incident Management
Overall Architecture Flow Diagram



Dane County Incident Management
Overall Architecture Interconnect Diagram



WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: Dane County Incident Management

1. What agencies are/were involved with the project? What was that agency's role?
WisDOT District 1, State Patrol

2. Who are the markets and customers for information services?

	By Mode		By Purpose	Transit & Paratransit Providers			
X	Auto Drivers		Telecommuters		Vehicle Drivers		Trip Planning
	Auto Passengers		Pedestrians		Reservations/scheduling		School Administration/School Bus Driver
	Transit Riders		Bicycle Riders		Dispatching		
	Paratransit Riders		Freight Carriers	Emergency Service Dispatchers (air and land)			
X	Commuters (work)		Seasonal/2nd Residence		Ambulance	X	State Patrol
X	Non-Work		Tourism		Police	X	Highway Helpers
	Recreation		Pass Through Traffic (trucks/autos)		Fire		Tow Truck Operators
Fleet Managers/Dispatchers				Agencies/Jurisdictions			
	Shippers		Delivery Fleets	X	Maintenance/Operations	X	State/County/City/Transit. Etc.
	Transit Dispatchers		Freight Carriers		Transit Operations		Traffic Management Centers
Other Users/Disseminators							
	Employers		New/TV and Radio Reports				
	MPOs, TMOs & ATPs						

Other

3. What is the travel-related information that is be delivered? What is the level of accuracy of the delivered information?

	Route specific road surface condition-weather related		Touris information: lodging and activities, gas stations, truck stops
	Road surface construction/ops		Medical emergency facilities locations
	Weight restrictions (weather related, but different)		Transit scheduling
	Trip travel times/operating or actual speeds		Park and ride locations
	Congestion levels		Airport and parking information
X	Incidents		In-vehicle road guidance
	Weather conditions (visibility, etc.)		Mayday
	Posted detours		Parking available (metro area)
	Closures/alternate routes		Event parking and information

Other

4. When (at what point before or during the trip) is the information be delivered?

Data Timing/Accuracy				Trip-Related Timing			
X	Current		Periodic		Before the trip	X	On-site/at-site
X	Real Time		Forecasted		During the trip		At all times
	Delayed						

Other

5. At what frequency is the information provided/updated?
Information about incidents will be provided by the state patrol and other agencies as they occur.

6. Where (in what geographic area) is the information delivered?

X	Metro Area		Other Cities
	Spot		Sub-regions
	Small area		Rural areas
X	Corridor		Statewide
	Metro-wide		Out of State

Other

WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: Dane County Incident Management

7. How (by what method) will the information be delivered ot the user?

	Phones		Internet/Websites/E-mail		Push System
	Cellular phones		Local commercial radio		Pull System
	Pagers		Highway Advisory Radio (HAR)		Broadcast System
	Kiosks		VMS/CMS		
	View only monitors		Mobile data terminals		
X	Fax		In-vehicle devices		
	Intranet		TV/Cable TV		

Other

8. Why is the information being provided? What is the desired outcome?

X	Improved Safety		Improved customer service		Decreased trip cost		Long range financial savings
	Divert traffic		Improved customer satisfaction		Diversion to transit		More uniform speeds
X	Less trip delay		Time savings		On-time delivery		Efficiency
	Fewer trips		Greater user satisfaction		Trip avoidance		Driver satisfaction
X	Less congestion		Greater user convenience		Change time of trip		Increased sales tax revenue
X	Improved operations		Less Damage to infrastructure	X	Fewer accidents		Benefits local economy
	System coordination		Improved transit ridership		Less transit subsidy		Fuel conservation
	Change destination		Change route		Change mode	X	Improved emergency response
	Compliance with laws						

Other

9. What data is collected?

Information about the length and duration of incidents

10. How is the data collected?

X	Automated data feed		Phone				
X	Fax		Mail				

Other

11. In what form is the collected data?

Five cameras and fifty system detectors will be installed in the fall of 2000. A traffic alert fax form has also been developed which the state patrol and other agencies will use to report the location and duration of incidents.

12. How is the data processed? What are the steps to convert the data to usable information?
The details of the data conversion process have not been finalized at this time.

13. Is the data/information customized to a specific user group? If so, what group?

There is no plan to provide information directly to travelers at the current time, although a system congestion map may be developed in the future using data from the system detectors. Images and information from the CCTV cameras will be shared with the media.

14. Other

15. High Level Block Diagram
The high level architecture has not been finalized at this time. The District 1 Preliminary Engineering and Architecture Project will begin at the end of May 2000.

16. Sausage Diagram
Available

17. Architecture Flow Diagram
Available

FleetOnline

Wisconsin ATIS Inventory

Project Name: FleetOnline

Agencies: Gary-Chicago- Milwaukee Corridor (GCM) Coalition, American Trucking Associations (ATA)

WisDOT Contact: Phil Decabooter

End-user Groups: Commercial Vehicle Operations including dispatchers and drivers

Project Scope:
In May, 1999, the Gary-Chicago-Milwaukee (GCM) Corridor formed a public private partnership with TranSmart Technologies and the American Trucking Associations' (ATA) Foundation to deploy a real-time traveler information system – FleetOnline - for Commercial Vehicle Operations (CVO). This system will provide commercial vehicle dispatchers and drivers with the information on congestion, incidents, weather, and routing that is necessary for safe, effective routing and dispatching.
The FleetOnline software system provides the commercial vehicle dispatchers with up-to-the minute real-time and predicted traveler information on the planned routes. The FleetOnline system allows users to choose the shortest route or alternative routes. It also measures and analyzes the costs of these routes. The FleetOnline system also provides driving restriction information on user's planned routes and provides alternative routes when some driving restrictions, such as over-height/over-weight or over-length/over-width, apply. Furthermore, it provides route specific, point-to-point warning on major incidents and constructions.
Data Collection: Speed, incident, event, construction and driving restriction data is received from the GCM Corridor Transportation Information Center Server.

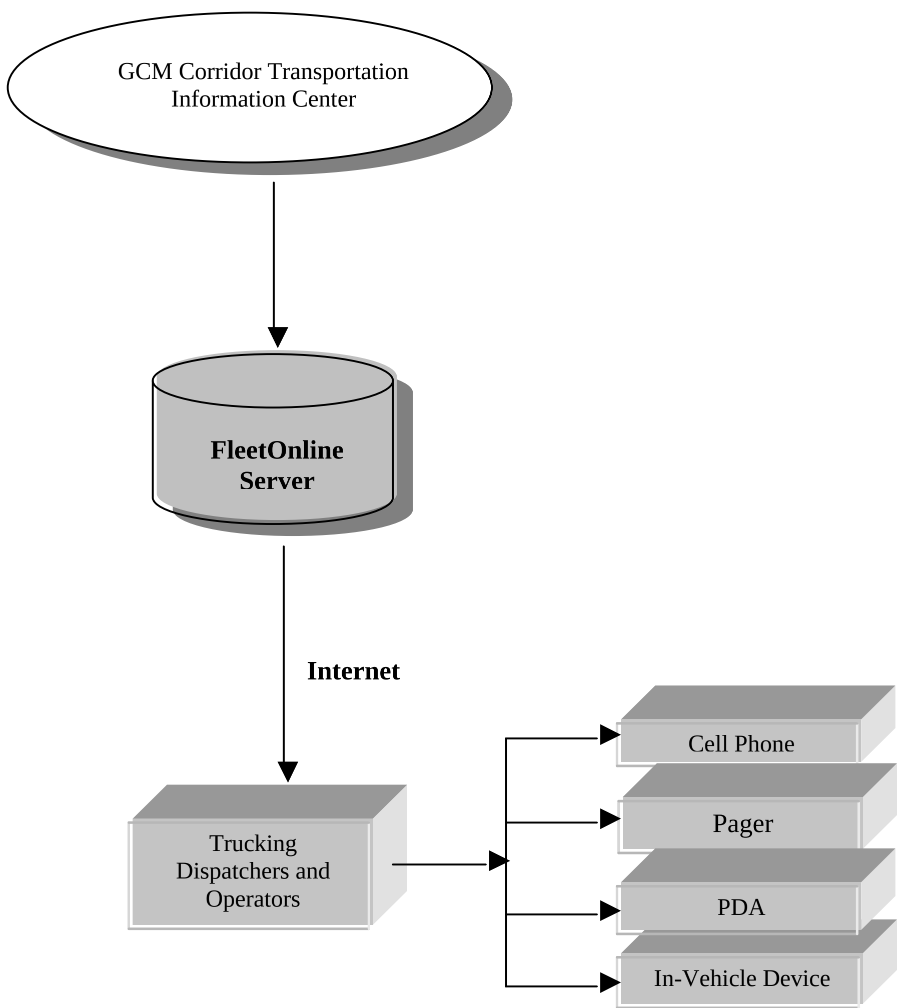
Delivery of Information: The system can be used prior to the trip for route planning and during the trip.

Delivery Mechanisms: Information is provided both through a web page system and a software system.While enroute, drivers can receive this customized information by email or from the dispatcher over his/her wireless communications in the vehicle.

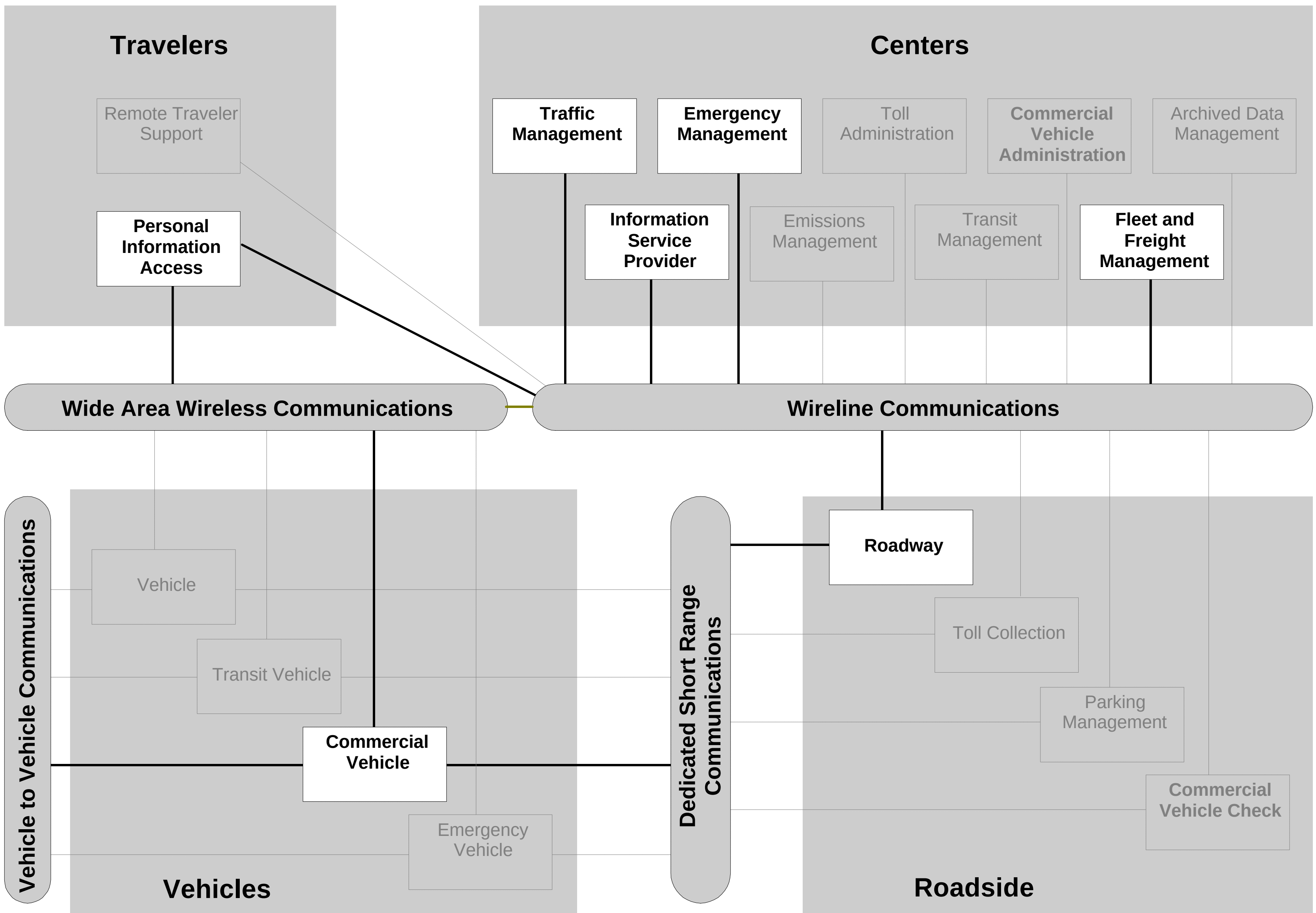
Desired Outcome: The objectives of this project are to enhance the safety and efficiency of motor carrier operations and to reduce traffic congestion by providing information that will improve carrier routing and dispatching.

Comments:

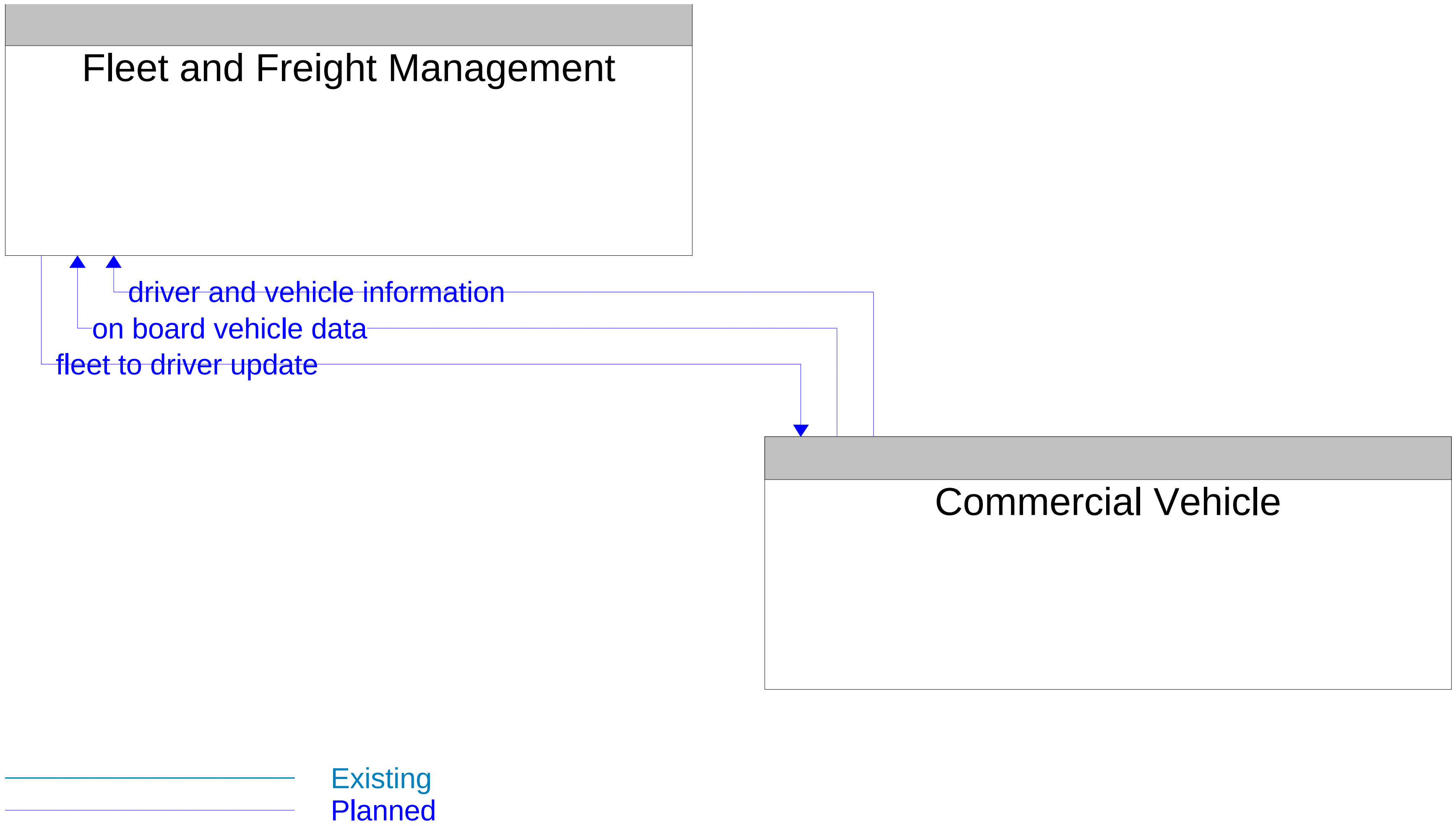
System Architecture of The FleetOnline System



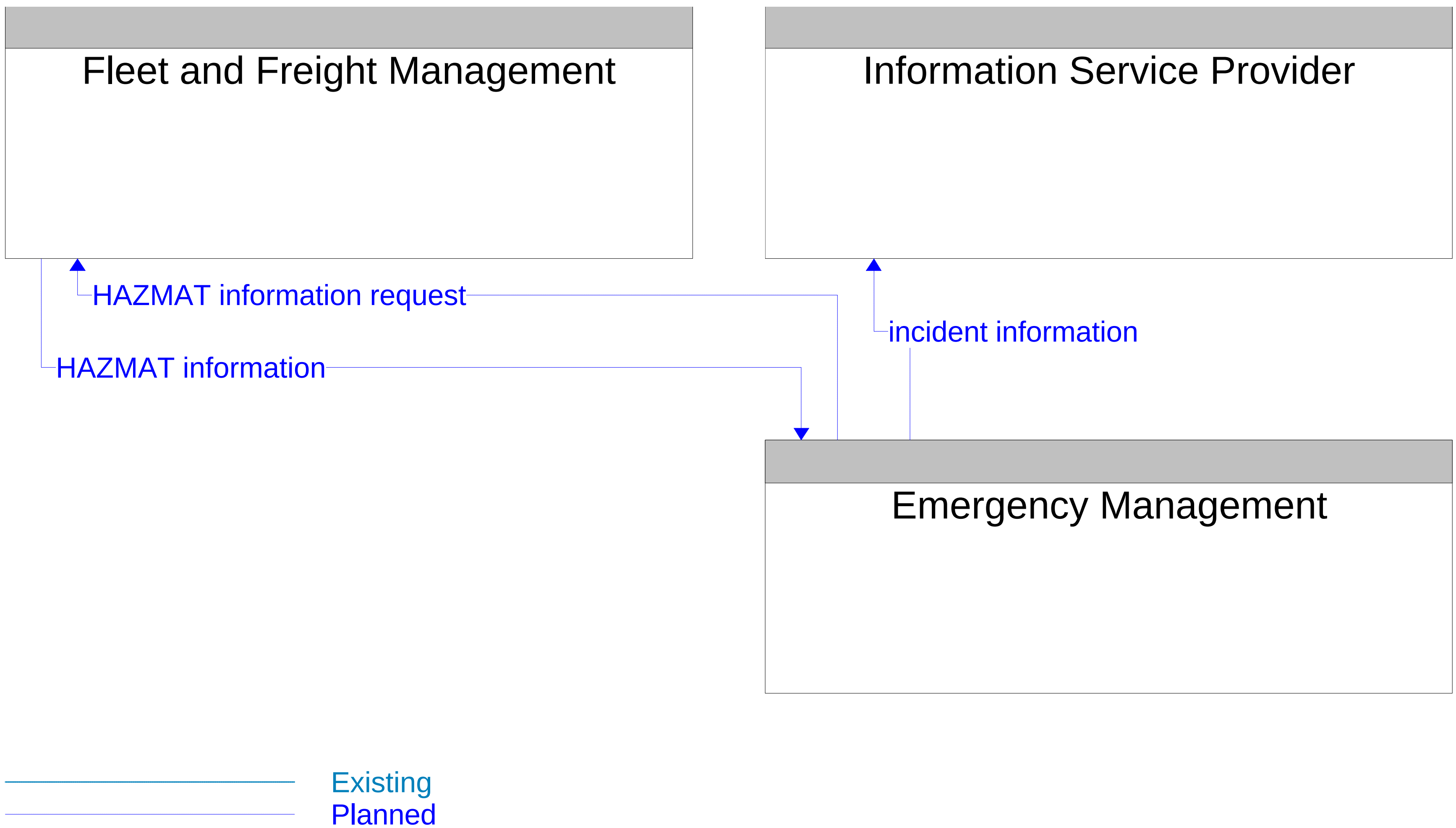
Fleet Online
Subsystem Interconnect Diagram



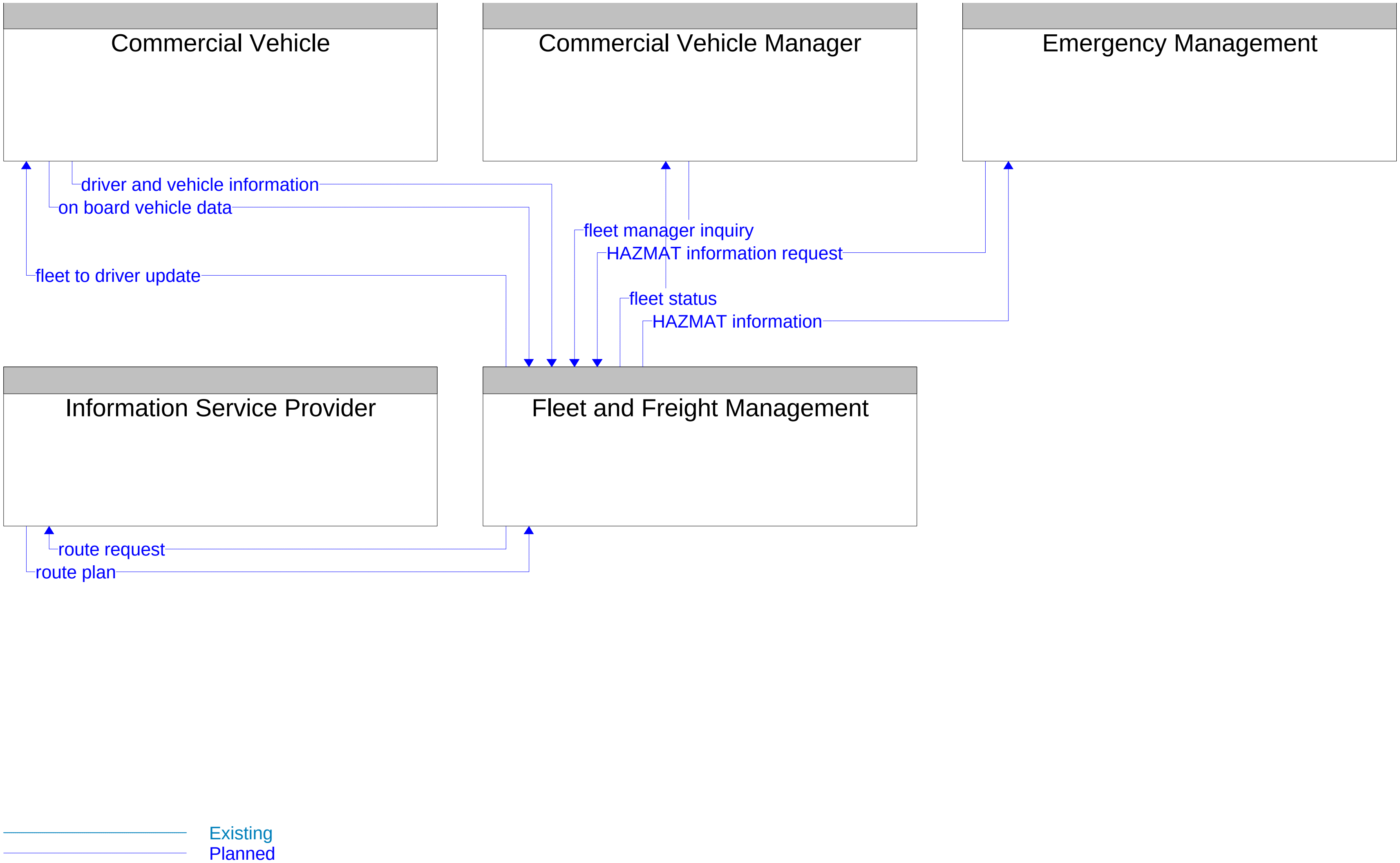
Fleet Online
Architecture Flow Diagram for Commercial Vehicle Subsystem



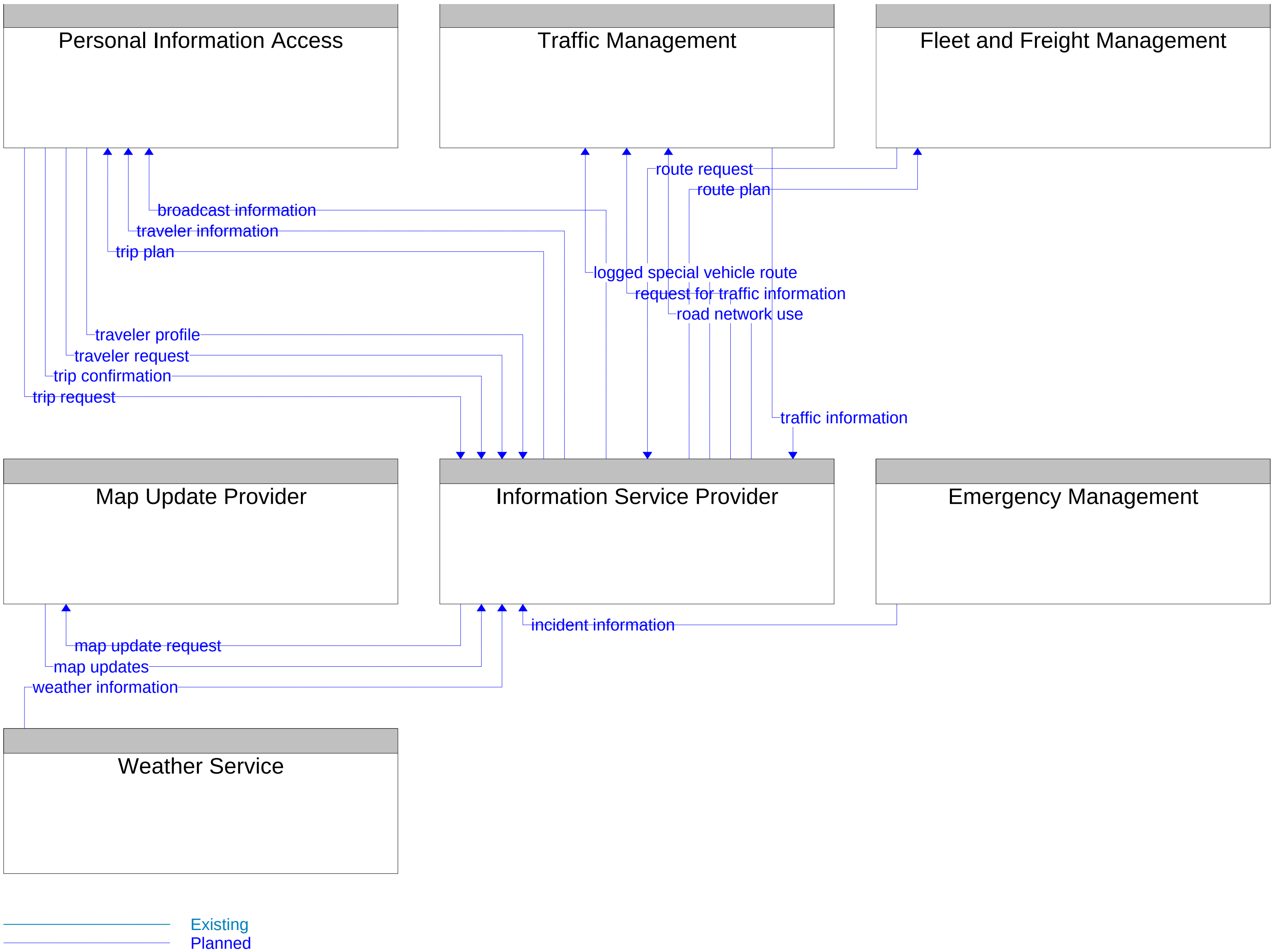
Fleet Online
Architecture Flow Diagram for Emergency Management Subsystem



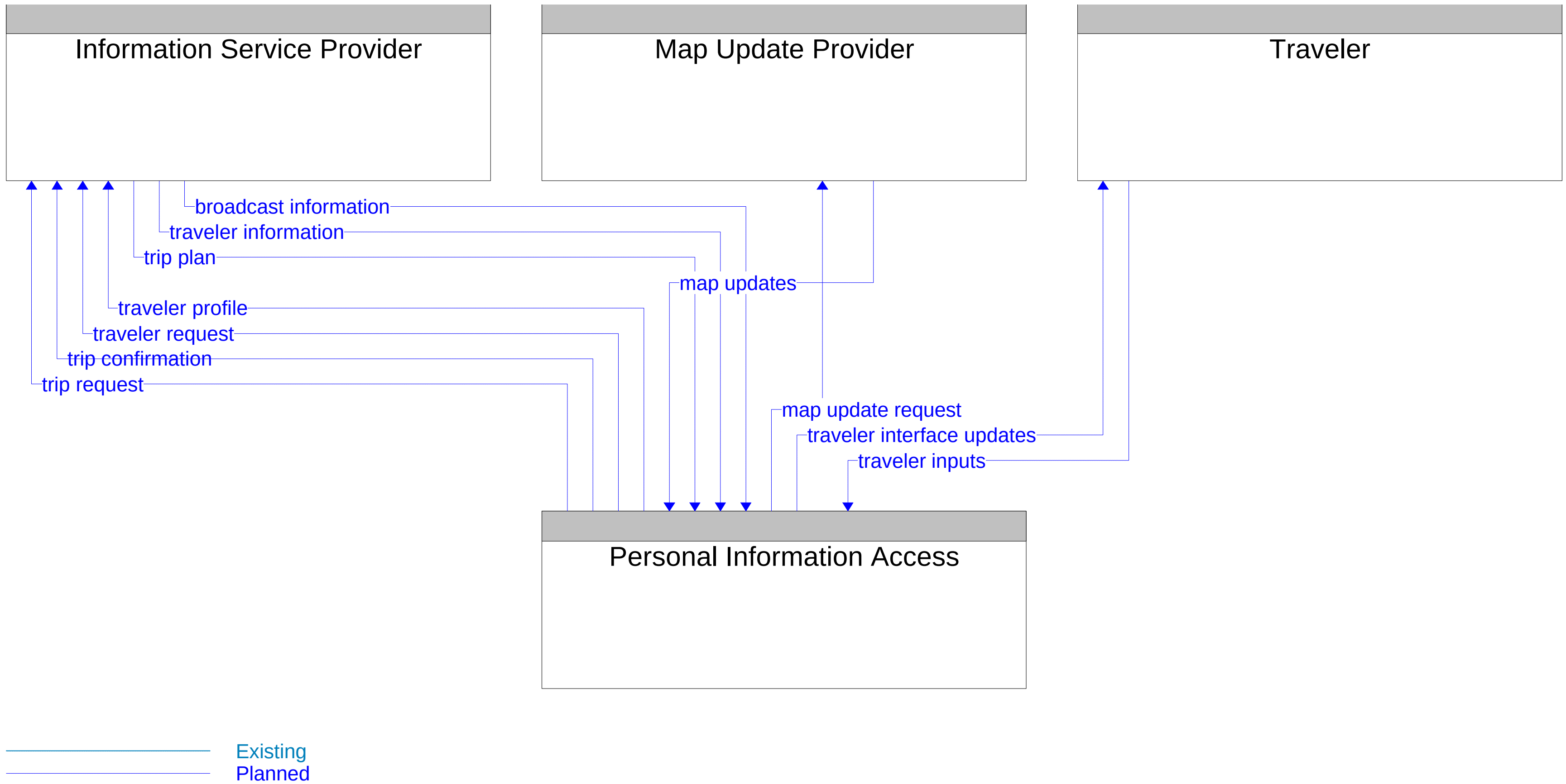
Fleet Online
Architecture Flow Diagram for Fleet and Freight Management Subsystem



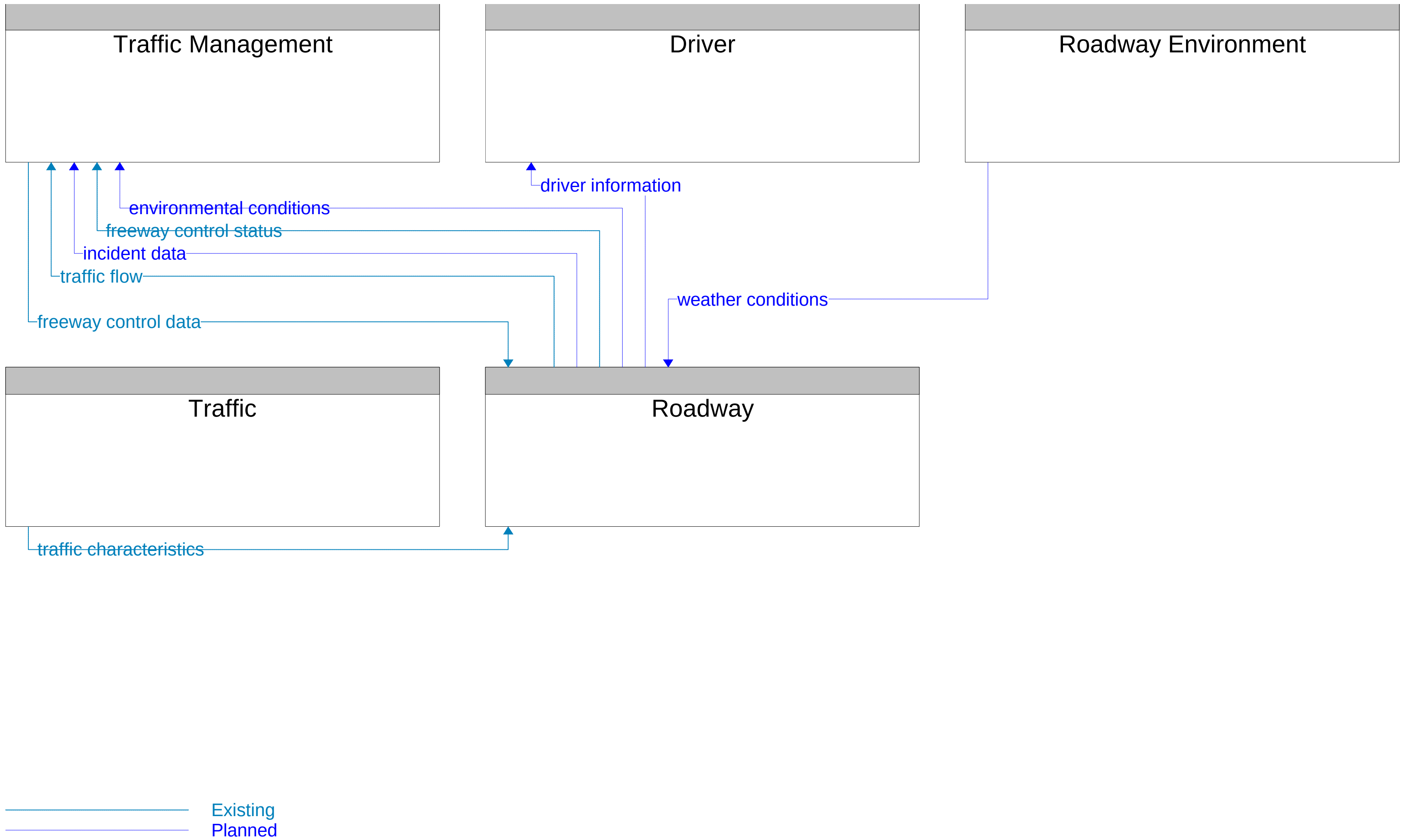
Fleet Online
Architecture Flow Diagram for Information Service Provider Subsystem



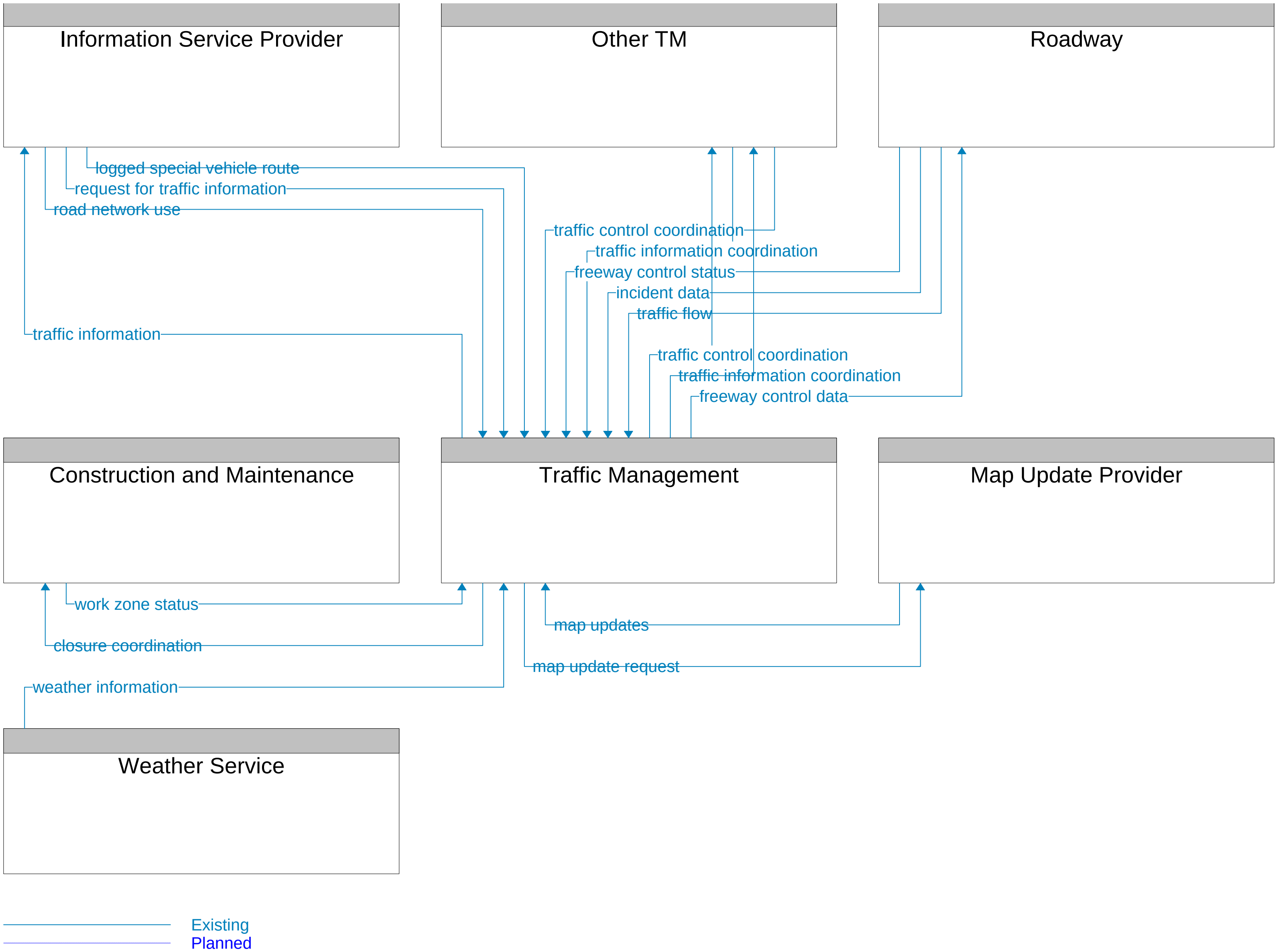
Fleet Online
Architecture Flow Diagram for Personal Information Access Subsystem



Fleet Online
Architecture Flow Diagram for Roadway Subsystem



Fleet Online
Architecture Flow Diagram for Traffic Management Subsystem



WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY

System: FleetOnline

1. What agencies are/were involved with the project? What was that agency's role?
GCM Corridor Coalition, American Trucking Associations Foundation

2. Who are the markets and customers for information services?

	By Mode		By Purpose	Transit & Paratransit Providers			
	Auto Drivers		Telecommuters		Vehicle Drivers		Trip Planning
	Auto Passengers		Pedestrians		Reservations/scheduling		School Administration/School Bus Driver
	Transit Riders		Bicycle Riders		Dispatching		
	Paratransit Riders	X	Freight Carriers	**Emergency Service Dispatchers (air and land)**			
	Commuters (work)		Seasonal/2nd Residence		Ambulance		State Patrol
	Non-Work		Tourism		Police		Highway Helpers
	Recreation		Pass Through Traffic (trucks/autos)		Fire		Tow Truck Operators
Fleet Managers/Dispatchers				**Agencies/Jurisdictions**			
X	Shippers	X	Delivery Fleets		Maintenance/Operations		State/County/City/Transit. Etc.
	Transit Dispatchers	X	Freight Carriers		Transit Operations		Traffic Management Centers
Other Users/Disseminators							
	Employers		New/TV and Radio Reports				
X	MPOs, TMOs & ATPs						

Other

3. What is the travel-related information that is be delivered? What is the level of accuracy of the delivered information?

X	Route specific road surface condition-weather related		Touris information: lodging and activities, gas stations, truck stops
X	Road surface construction/ops		Medical emergency facilities locations
X	Weight restrictions (weather related, but different)		Transit scheduling
X	Trip travel times/operating or actual speeds		Park and ride locations
X	Congestion levels		Airport and parking information
X	Incidents	X	In-vehicle road guidance
X	Weather conditions (visibility, etc.)		Mayday
X	Posted detours		Parking available (metro area)
X	Closures/alternate routes		Event parking and information

Other

4. When (at what point before or during the trip) is the information be delivered?

Data Timing/Accuracy				Trip-Related Timing			
X	Current		Periodic	X	Before the trip		On-site/at-site
X	Real Time	X	Forecasted	X	During the trip		At all times
	Delayed						

Other

5. At what frequency is the information provided/updated?
Drivers will receive customized real-time traveler information and warnings via their email.

6. Where (in what geographic area) is the information delivered?

X	Metro Area		Other Cities
	Spot		Sub-regions
	Small area		Rural areas
X	Corridor		Statewide
	Metro-wide		Out of State

Other

Initial Deployment is in the Chicago metropolitan area. It may be expanded to the entire GCM corridor.

WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY

System: FleetOnline

7. How (by what method) will the information be delivered ot the user?

	Phones	X	Internet/Websites/E-mail		Push System
X	Cellular phones		Local commercial radio		Pull System
X	Pagers		Highway Advisory Radio (HAR)		Broadcast System
	Kiosks		VMS/CMS		
	View only monitors		Mobile data terminals		
	Fax	X	In-vehicle devices		
	Intranet		TV/Cable TV		

Other

8. Why is the information being provided? What is the desired outcome?

X	Improved Safety		Improved customer service		Decreased trip cost		Long range financial savings
	Divert traffic		Improved customer satisfaction		Diversion to transit		More uniform speeds
	Less trip delay	X	Time savings	X	On-time delivery	X	Efficiency
	Fewer trips		Greater user satisfaction		Trip avoidance		Driver satisfaction
	Less congestion		Greater user convenience		Change time of trip		Increased sales tax revenue
X	Improved operations		Less Damage to infrastructure	X	Fewer accidents		Benefits local economy
	System coordination		Improved transit ridership		Less transit subsidy		Fuel conservation
	Change destination		Change route		Change mode		Improved emergency response
	Compliance with laws						

Other

9. What data is collected?
Speed, incident, event, construction and driving restriction data will be collected from the GCM Corridor Transportation Information Center Server. The FleetOnline Service will use this data to provide route specific and point-to-point travel information to the Trucking Dispatching Center through the internet.

10. How is the data collected?

X	Automated data feed		Phone				
	Fax		Mail				

Other

11. In what form is the collected data?
Information will be received continuously by the FleetOnline server from the GCM Corridor Transportation Information Center server.

12. How is the data processed? What are the steps to convert the data to usable information?
The FleetOnline Webpage System incorporates a CGI and Java Road Network, and a database of real-time, predictive and static traffic data.

13. Is the data/information customized to a specific user group? If so, what group?
Information is customized for commercial vehicle operations including vehicle dispatchers and drivers.

14. Other

15. High Level Block Diagram

16. Sausage Diagram
Available

17. Architecture Flow Diagram
Available

Foretell

Wisconsin ATIS Inventory

Project Name: Foretell

Agencies: Wisconsin DOT, Iowa DOT, Missouri DOT, the Federal Highway Administration, and the National Oceanic and Atmospheric Administration / National Weather Service

WisDOT Contact: Tom Martinelli

End-user Groups: General public, emergency services, Departments of Transportation, road maintenance personnel, school buses, school superintendents, etc.

Project Scope: Foretell is a commercially viable, self-sustaining, integrated, intelligent weather and transportation system which enhances safety, and facilitates travel throughout the upper Midwest. This system brings available weather data sources including satellites, radar, wind profilers, air-born platforms and surface sites including those of the National Weather Service, aviation, and conventional RWIS stations in participating states. Foretell permits users to obtain real-time information both pre-trip and while en-route through the use of the Internet, fax, email, pagers and dial-in telephone.

Data Collection:

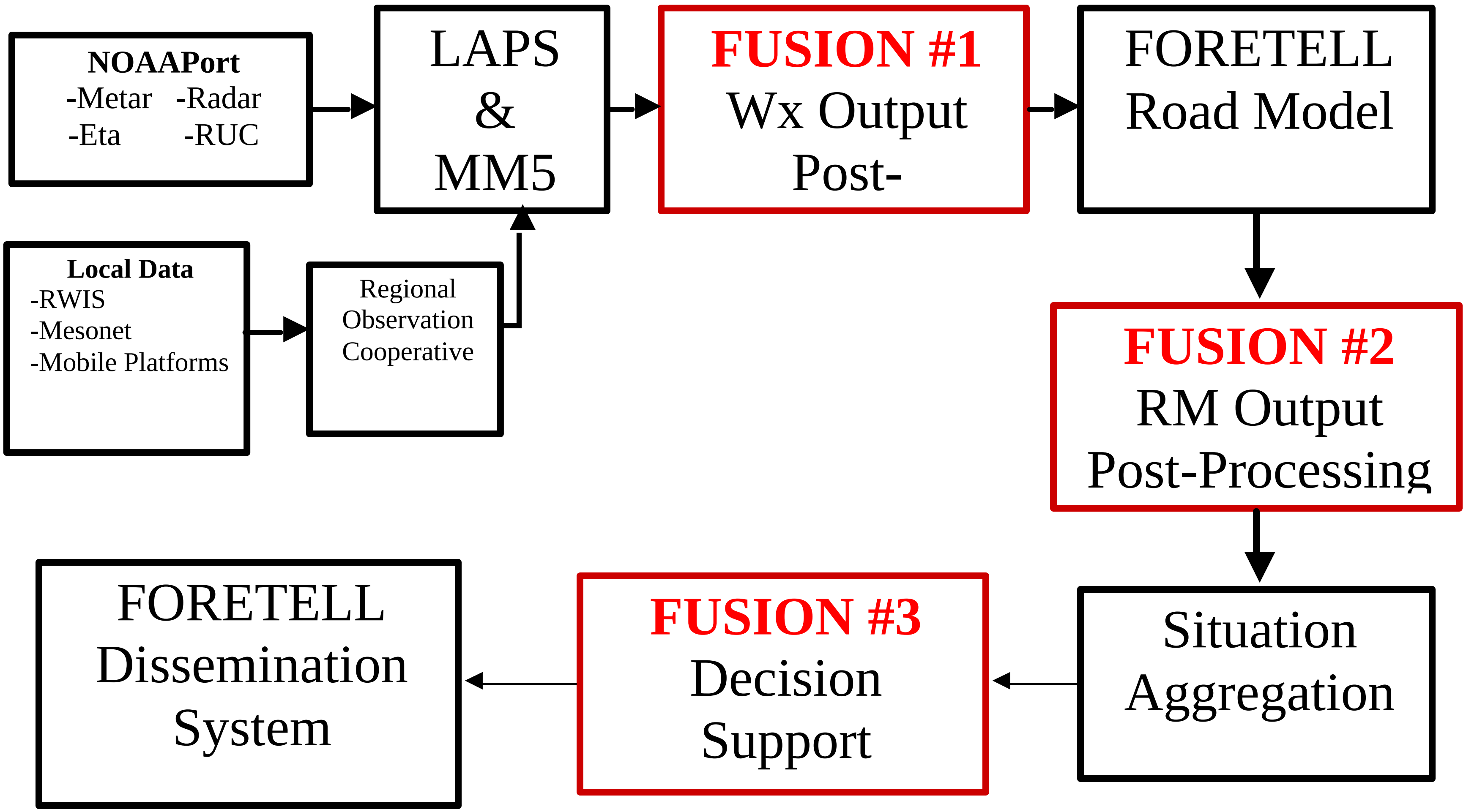
Foretell consists of weather and road data collection. Weather conditions include precipitation, temperature, dew point, humidity, wind, radar, cloud thickness, pressure, precipitation accumulation, and frozen accumulation. The road conditions are graded on a scale of good, fair, difficult, very difficult, hazardous, and very hazardous. These conditions are based on the road's temperature, dew point, pavement temperature, freeze point, and snow depth. Foretell is capable of alerting travelers of accidents, road closures, congestion, construction, danger, delay time, hazards, and events that may occur in route of the destination.

The weather data is collected from the National Weather Service in the form of an Eta model. This model collects data over a 40-kilometer area, which is given at a specific point. Taking this information that is updated every six hours and entering it into a MM5 model gives use more accurate information. A MM5 model is able to transform this information to a more precise area of 10-kilomters, which is updated every hour. The MM5 model is used for forecast predictions.

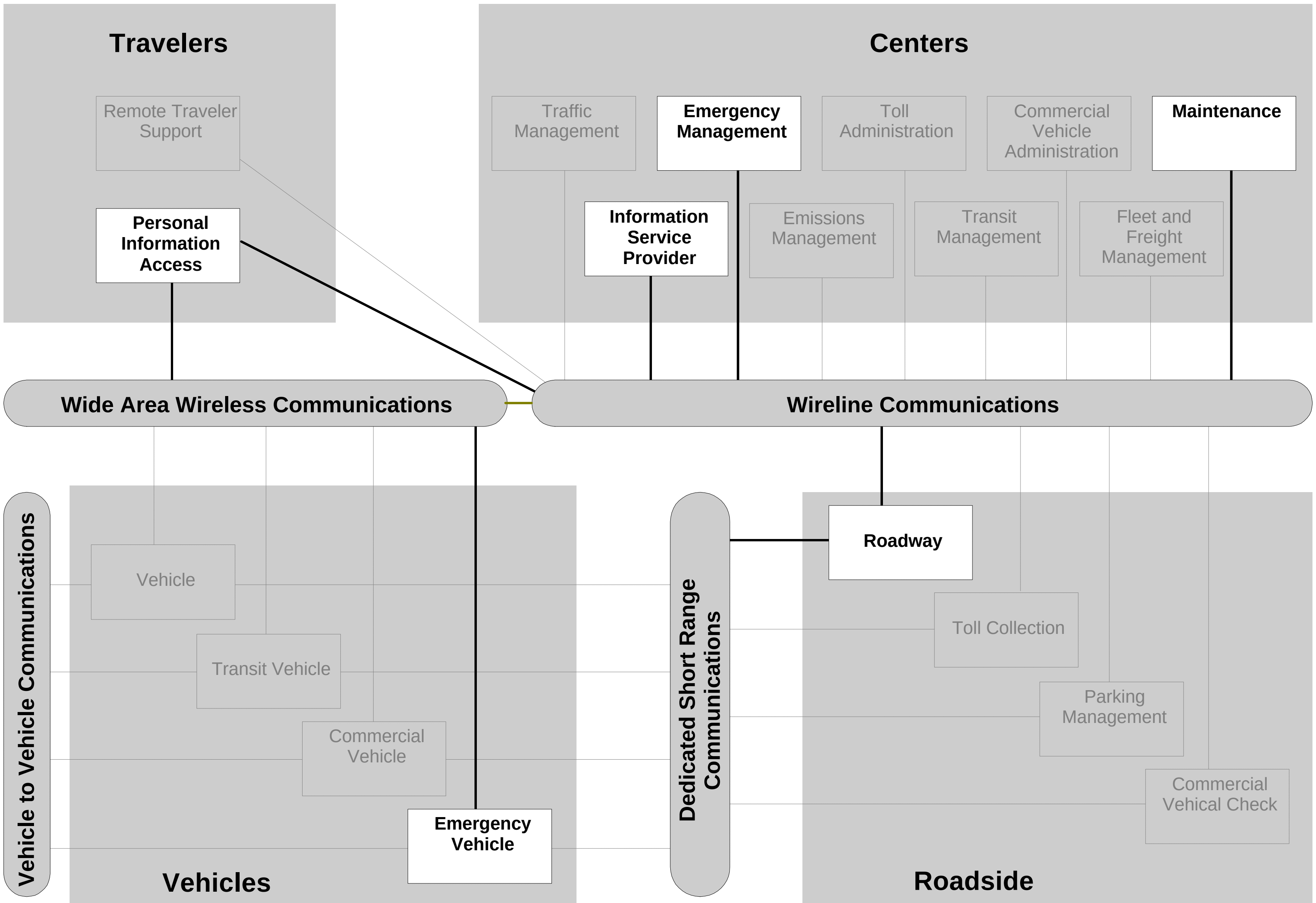
Most of the road condition reports are obtained through road weather information systems (RWIS), or reported and / or monitored by DOT or public safety personnel. The road conditions are determined by compiling weather data and using it in a heat-balance model. This model measures the temperature of the road based on the difference of heat coming in and leaving the system. The heat transfer is based on variables such as amount of snowfall or rainfall, base temperature, amount of sun, vehicle presence and dew point.

Delivery of Information:
The current data is updated every hour and forecasts are provided up to 24 hours ahead of the current time. Future enhancements may include extending the forecast to five, seven or even ten days.
Delivery Mechanisms:
Foretell provides users with weather conditions as well as road conditions for a given region. This informaiton will be accessible via the Internet, fax, email, pagers, and dial-in telephone.
Desired Outcome:
The desired outcome is to have all the necessary traveler information at one convenient location readily available to users.
Comments:
The Foretell Web site, once competed will be: http://www.foretell.com .

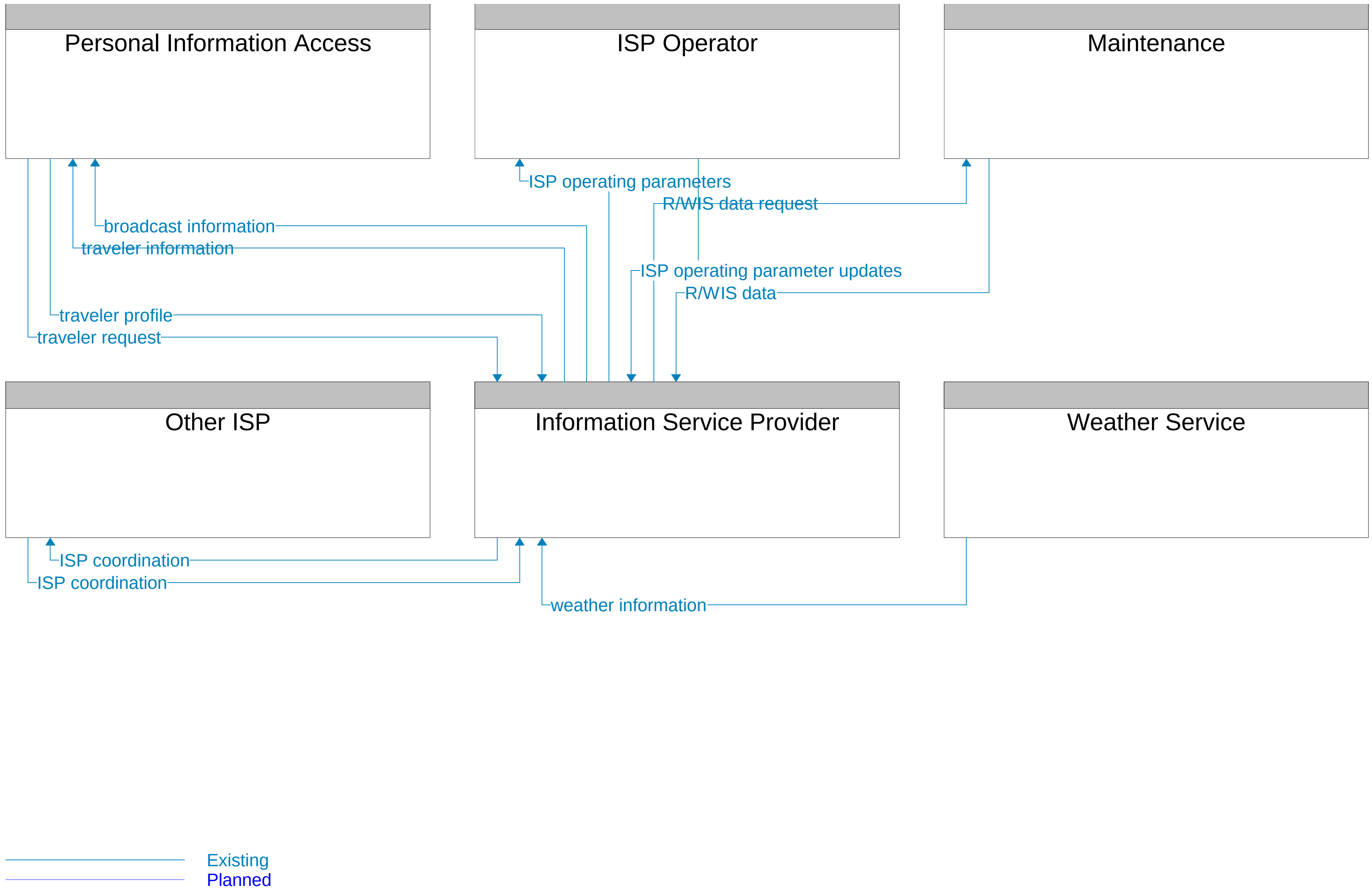
Foretell Block Diagram



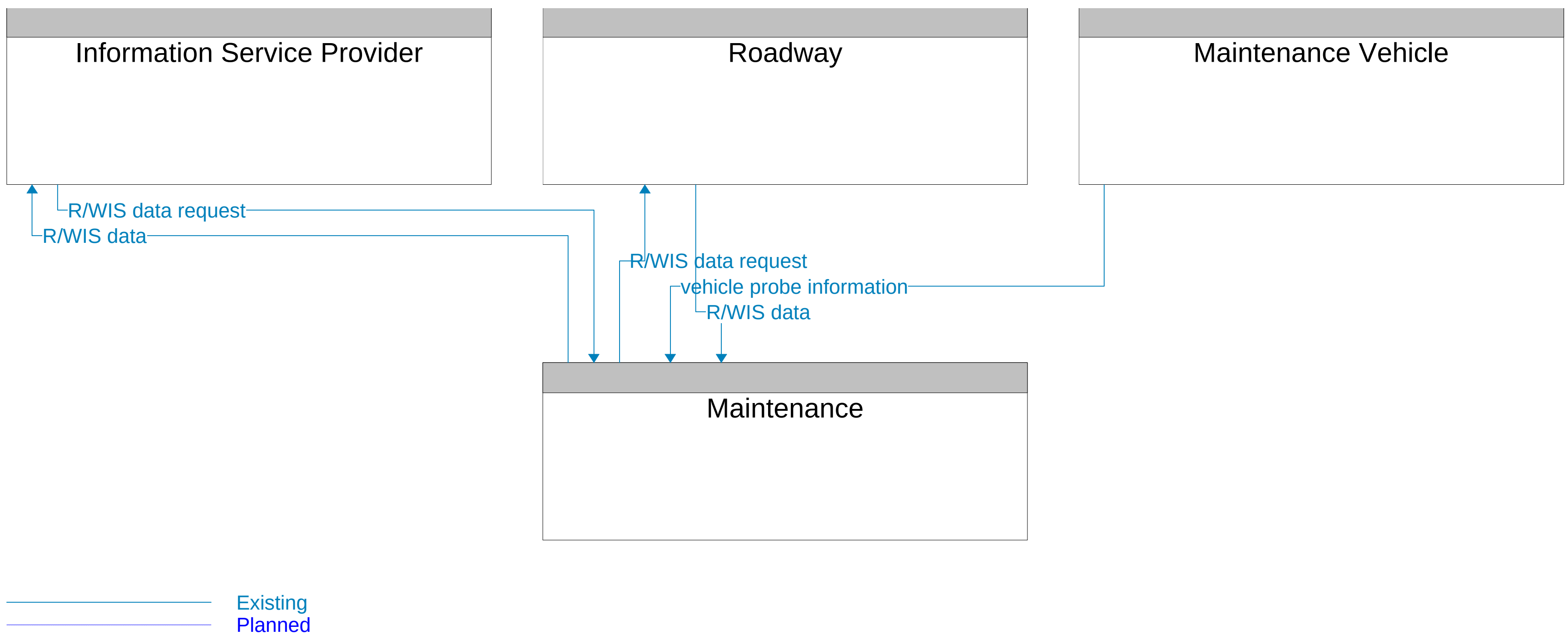
Foretell
Subsystems Interconnect Diagram



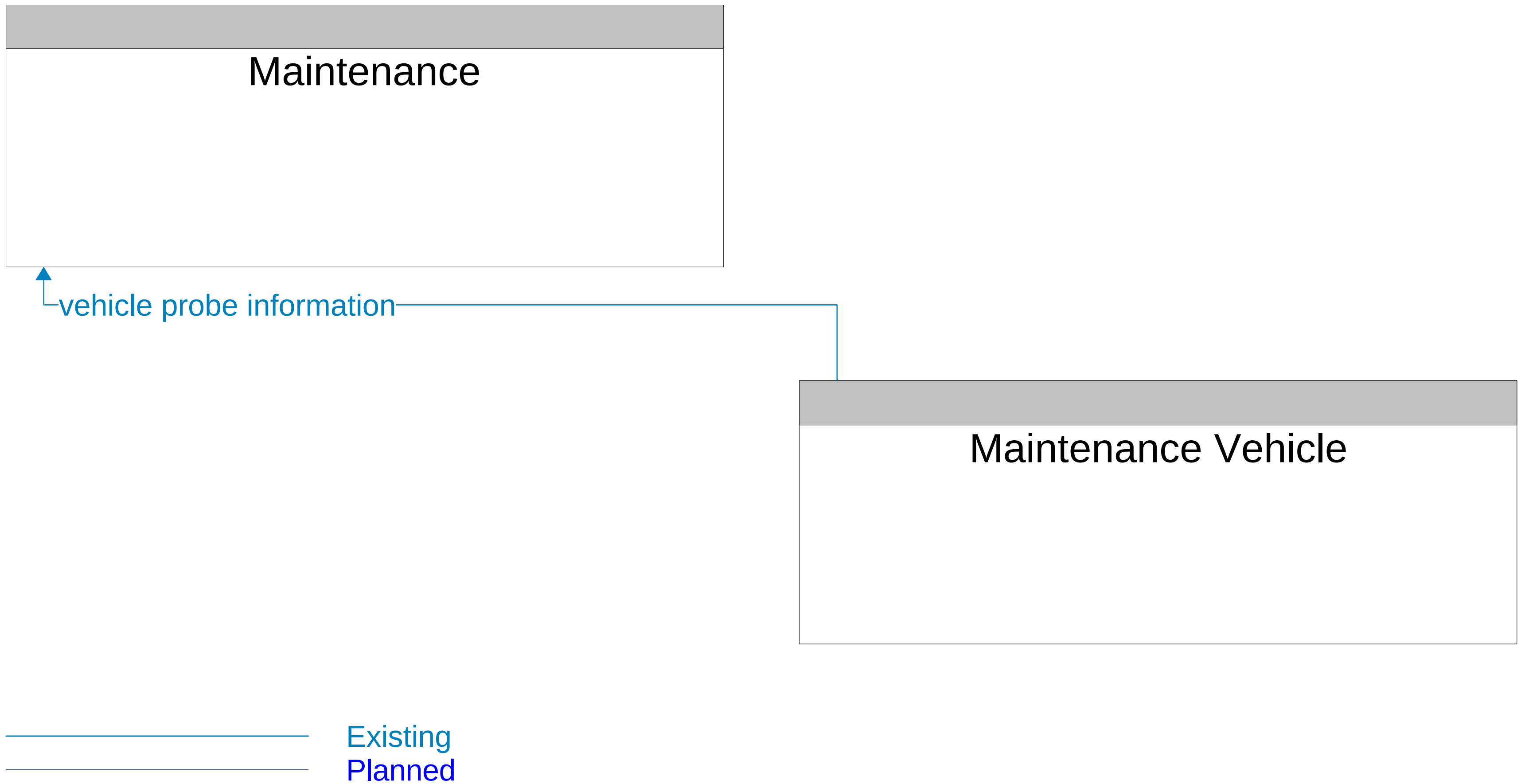
Foretell
Architecture Flow Diagram for Information Service Provider Subsystem



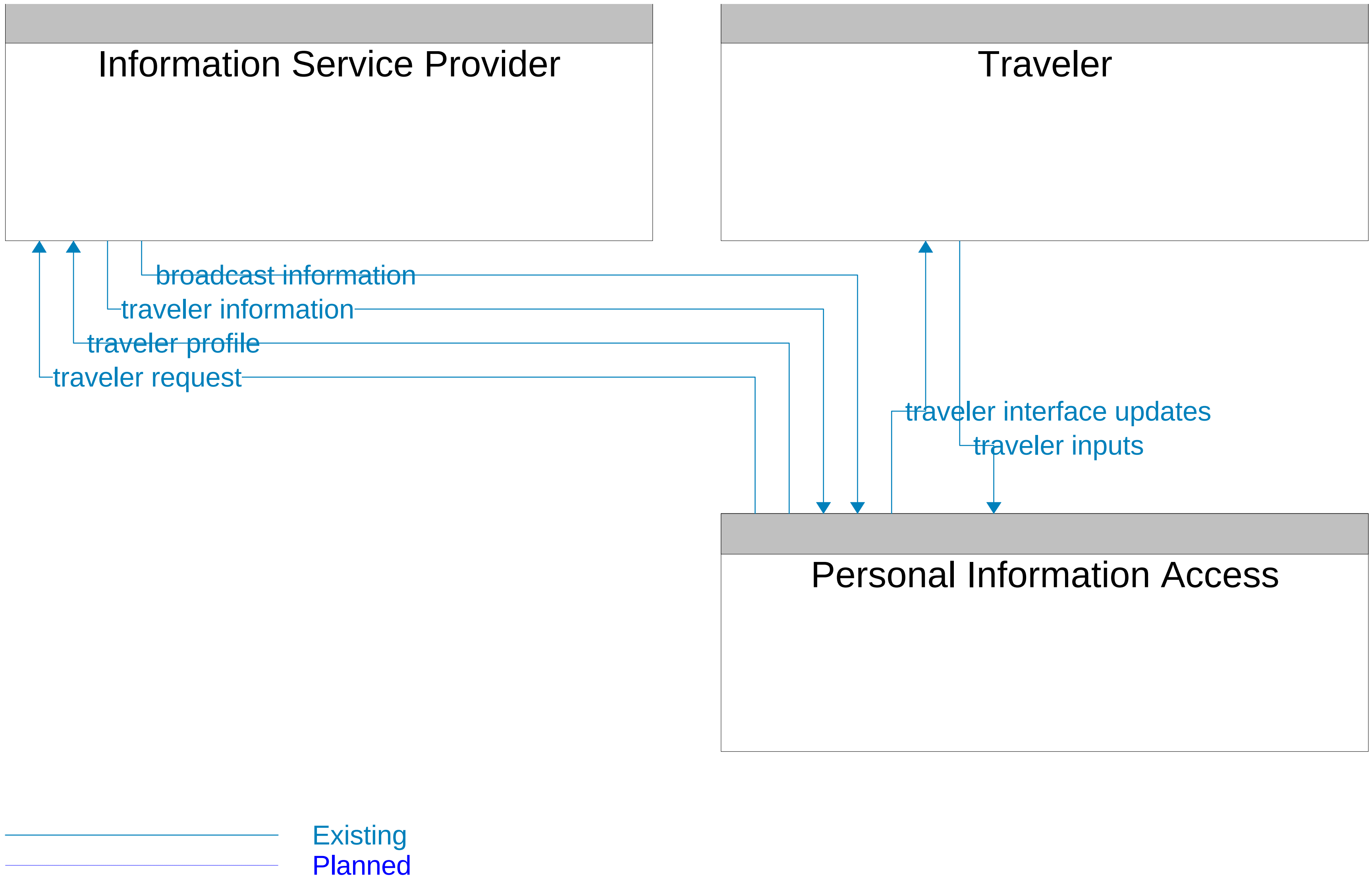
Foretell
Architecture Flow Diagram for Maintenance Subsystem



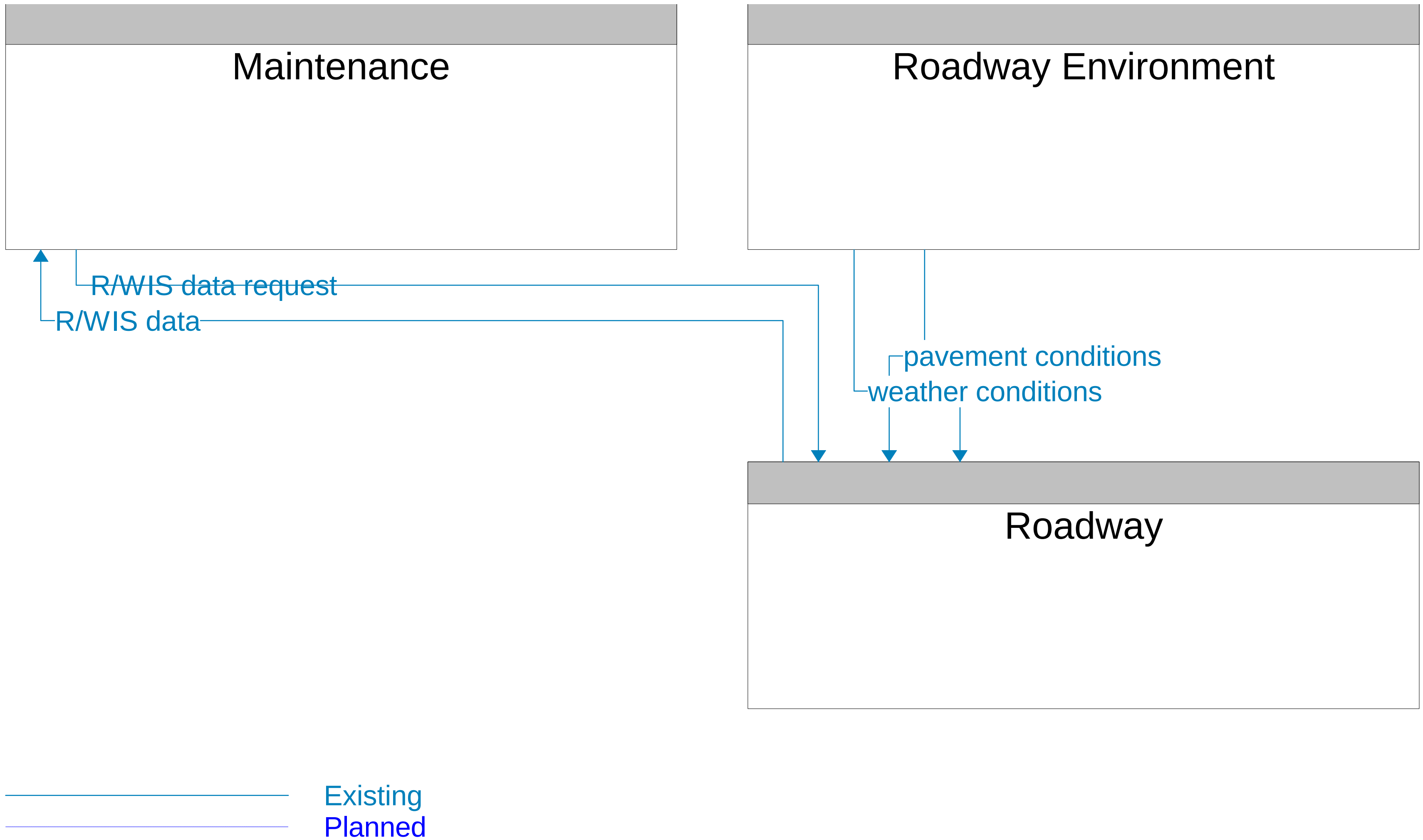
Foretell
Architecture Flow Diagram for Maintenance Vehicle Subsystem



Foretell
Architecture Flow Diagram for Personal Information Access Subsystem



Foretell
Architecture Flow Diagram for Roadway Subsystem



WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: Foretell

1. What agencies are/were involved with the project? What was that agency's role?

Wisconsin DOT. Oversee that the needs of Wisconsin were represented and considered in the development of the Foretell system.

2. Who are the markets and customers for information services?

	By Mode		By Purpose		Transit & Paratransit Providers		
X	Auto Drivers		Telecommuters	X	Vehicle Drivers	X	Trip Planning
X	Auto Passengers		Pedestrians	X	Reservations/scheduling	X	School Administration/School Bus Driver
	Transit Riders		Bicycle Riders	X	Dispatching		
	Paratransit Riders	X	Freight Carriers		**Emergency Service Dispatchers (air and land)**		
X	Commuters (work)	X	Seasonal/2nd Residence	X	Ambulance	X	State Patrol
	Non-Work	X	Tourism	X	Police	X	Highway Helpers
X	Recreation	X	Pass Through Traffic (trucks/autos)	X	Fire	X	Tow Truck Operators
	Fleet Managers/Dispatchers				**Agencies/Jurisdictions**		
X	Shippers	X	Delivery Fleets	X	Maintenance/Operations	X	State/County/City/Transit. Etc.
X	Dispatchers	X	Freight Carriers	X	Transit Operations	X	Traffic Management Centers
	Other Users/Disseminators						
X	Employers		New/TV and Radio Reports				
X	MPOs, TMOs & ATPs						

Other

3. What is the travel-related information that is be delivered? What is the level of accuracy of the delivered information?

X	Route specific road surface condition-weather related		Tourist information: lodging and activities, gas stations, truck stops
	Road surface construction/ops		Medical emergency facilities locations
	Weight restrictions (weather related, but different)		Transit scheduling
	Trip travel times/operating or actual speeds		Park and ride locations
	Congestion levels		Airport and parking information
	Incidents		In-vehicle road guidance
X	Weather conditions (visibility, etc.)		Mayday
	Posted detours		Parking available (metro area)
	Closures/alternate routes		Event parking and information

Other

Future enhancements to Foretell include integration with other ATIS initiatives, including providing non-surface related road situations reports.

4. When (at what point before or during the trip) is the information be delivered?

	Data Timing/Accuracy				Trip-Related Timing		
X	Current		Periodic	X	Before the trip		On-site/at-site
	Real Time	X	Forecasted	X	During the trip		At all times
	Delayed						

Other

5. At what frequency is the information provided/updated?

Current conditions information is updated hourly, and forecasts are provided for projected 24-hour periods. Future enhancements may include forecasts for five, seven and / or ten days.

6. Where (in what geographic area) is the information delivered?

X	Metro Area	X	Other Cities
	Spot	X	Sub-regions
	Small area	X	Rural areas
X	Corridor	X	Statewide
X	Metro-wide	X	Out of State

Other

7. How (by what method) will the information be delivered ot the user?

X	Phones	X	Internet/Websites/E-mail	X	Push System
X	Cellular phones		Local commercial radio		Pull System
X	Pagers		Highway Advisory Radio (HAR)		Broadcast System
	Kiosks		VMS/CMS		
	View only monitors		Mobile data terminals		
X	Fax		In-vehicle devices		
X	Intranet		TV/Cable TV		

Other:

The potential dissmenation mechanisms for the distribution of Foretell is unlimited. The information could potentially be delivered via all of the mechanisms mentioned above, depending on the desires of the DOT.

8. Why is the information being provided? What is the desired outcome?

X	Improved Safety	X	Improved customer service		Decreased trip cost	X	Long range financial savings
	Divert traffic	X	Improved customer satisfaction		Diversion to transit		More uniform speeds
X	Less trip delay		Time savings		On-time delivery	X	Efficiency
	Fewer trips	X	Greater user satisfaction	X	Trip avoidance	X	Driver satisfaction
	Less congestion	X	Greater user convenience	X	Change time of trip		Increased sales tax revenue
X	Improved operations		Less Damage to infrastructure	X	Fewer accidents		Benefits local economy
X	System coordination		Improved transit ridership		Less transit subsidy		Fuel conservation
X	Change destination	X	Change route	X	Change mode		Improved emergency response
	Compliance with laws						

Other

9. What data is collected?

Weather and road surface conditions such as precipitation, temperature, dw point, humidity, wind, radar, cloud thickness, pressure, precipitation accumulation, frozen accumulation.

10. How is the data collected?

X	Automated data feed		Phone				
	Fax		Mail				

Other:

The Foretell system automatically extracts data from numerous sources such as the National Weather Service, RWIS stations, and reports from DOT and DPS personnel.

11. In what form is the collected data?

Data is collected in "raw" format as defined by the systems from which it is extracted.

12. How is the data processed? What are the steps to convert the data to usable information?

The use of the developed algorithms assisted in converting the data to information that is can be understood by potential users. For example, the output of the MM5 algorithm was 1-hour forecasts.

13. Is the data/information customized to a specific user group? If so, what group?

A lengthy process was implemented to develop easily-recognized icons. Sources of input to develop "iconology" included the NWS and television formats. Icons were developed to be as close as possible to the MUTCD, European standards as well as other Web sites. It has been recognized that the use of icons and colors in standardized formats is not consistent across various regions.

14. Other

Foretell weather and surface condition information will eventually be available by visiting http://www.foretell.com .

15. High Level Block Diagram

16. Sausage Diagram

Available

17. Architecture Flow Diagram

Available

Gateway

Wisconsin ATIS Inventory

Project Name: Gateway	**Agencies:** Gary-Chicago-Milwaukee (GCM) Priority Corridor, Illinois Department of Transportation (IDOT), Indiana Department of Transportation (INDOT), WisDOT MONITOR FTMS
WisDOT Contact: David Zavattero ITS Program Manager, Illinois Department of Transportation (708) 705-4800	**End-user Groups:** Travelers and operating agencies in the GCM Corridor

Project Scope: The Gary-Chicago-Milwaukee (GCM) Corridor is one of the four corridors originally selected by the USDOT to receive priority funding under the ISTEA legislation for the deployment of ITS initiatives. The corridor is broadly identified by the sixteen urbanized counties in the states of Illinois, Indiana and Wisconsin. It includes all major freeways, airports, transit, commuter rail, intercity passenger and freight rail systems, ports and inter-modal transfer stations. The GCM Multi-Modal Traveler Information System (MMTIS) project involves a large number of Intelligent Transportation System tasks. The Gateway system is the central element of GCM MMTIS. The gateway system is an integrated information system that serves the information needs of operating agencies and travelers within the GCM corridor. The Gateway collects dynamic and static transportation data from the distributed transportation management systems throughout the Corridor through their respective regional hubs. The Gateway compiles and coordinates this data to create a corridor-wide source of transportation information. The Gateway collects, processes, distributes and presents this information directly to the various operating agencies and to travelers within the GCM Corridor.

Data Collection: The system currently receives raw data from the Illinois DOT Traffic Systems Center (TSC) and MONITOR once every minute. For the new system, information will be collected in each state's traffic management center (TMC), forwarded to the GCM Corridor Transportation Information Center (C-TIC) and the complete information sent back to the TMCs. Each state will be allowed to manage their own system.

Delivery of Information: The Gateway is to be designed to operate continuously 24 hours per day, 7 days a week in an unattended mode (i.e., all data acquisition, processing and dissemination are designed to be fully automated).

Current information available on the GCM Corridor home page includes maps of freeway conditions including congestion levels and construction for Southeastern Wisconsin and the I-94 corridor, and construction and expressway condition reports. There is also a link to the WisDOT home page. The new website will contain maps of conditions with clickable icons as well as text reports on travel times, VMS messages currently being displayed, and congestion and construction information.

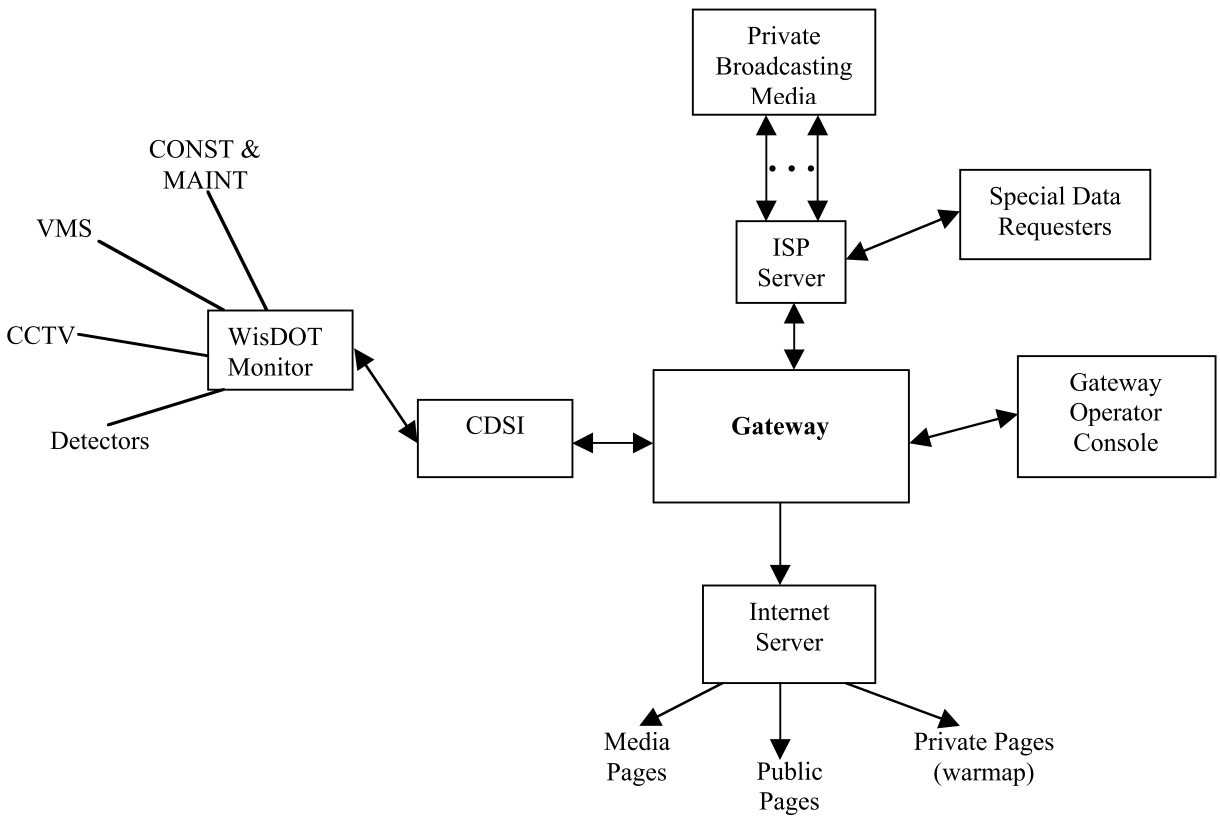
Delivery Mechanisms: -

- Private Broadcasting (ISPs): This entity includes the different media sources (Metro Networks and SmartRoute Systems, etc.) as well as public access for travel and trip information (including trip routing and scheduling) through kiosks located at public facilities within the Corridor, personal data devices or in-vehicle devices. Data flows from the Gateway to this entity would include: travel times; map display of congestion, construction and maintenance operations; VMS status and messages; transit schedules/real time operations.
- GCM Web Pages (Public Access, Private Access, ISP's): Data distribution, or outbound data flow from the Gateway, will occur through the GCM web pages during the initial phase. Three web pages will be maintained by a Gateway Web Server: one for public access, one for ISPs, and one for public agencies through a password protected access (warmap). The current public web site is at http://www.ai.eecs.uic.edu/GCM/gcm.html. A prototype of the new public web site (TravelInfo) can be found at http://hubble.eecs.uic.edu/.

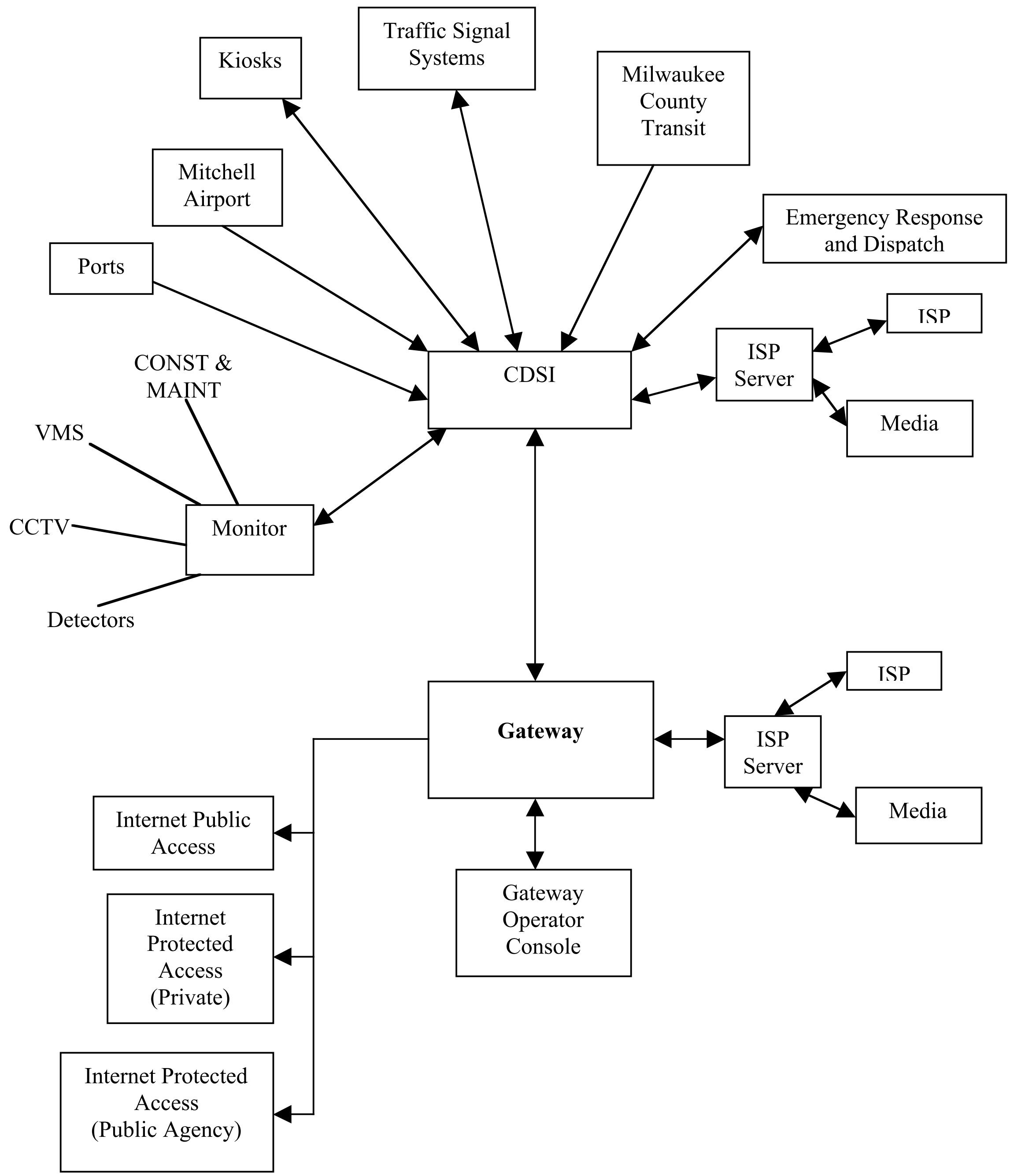
Desired Outcome:

- To increase traveler mobility and to reduce travel times and costs by making real time information available to interested parties.
- To facilitate the sharing of information between both private firms and public agencies involved

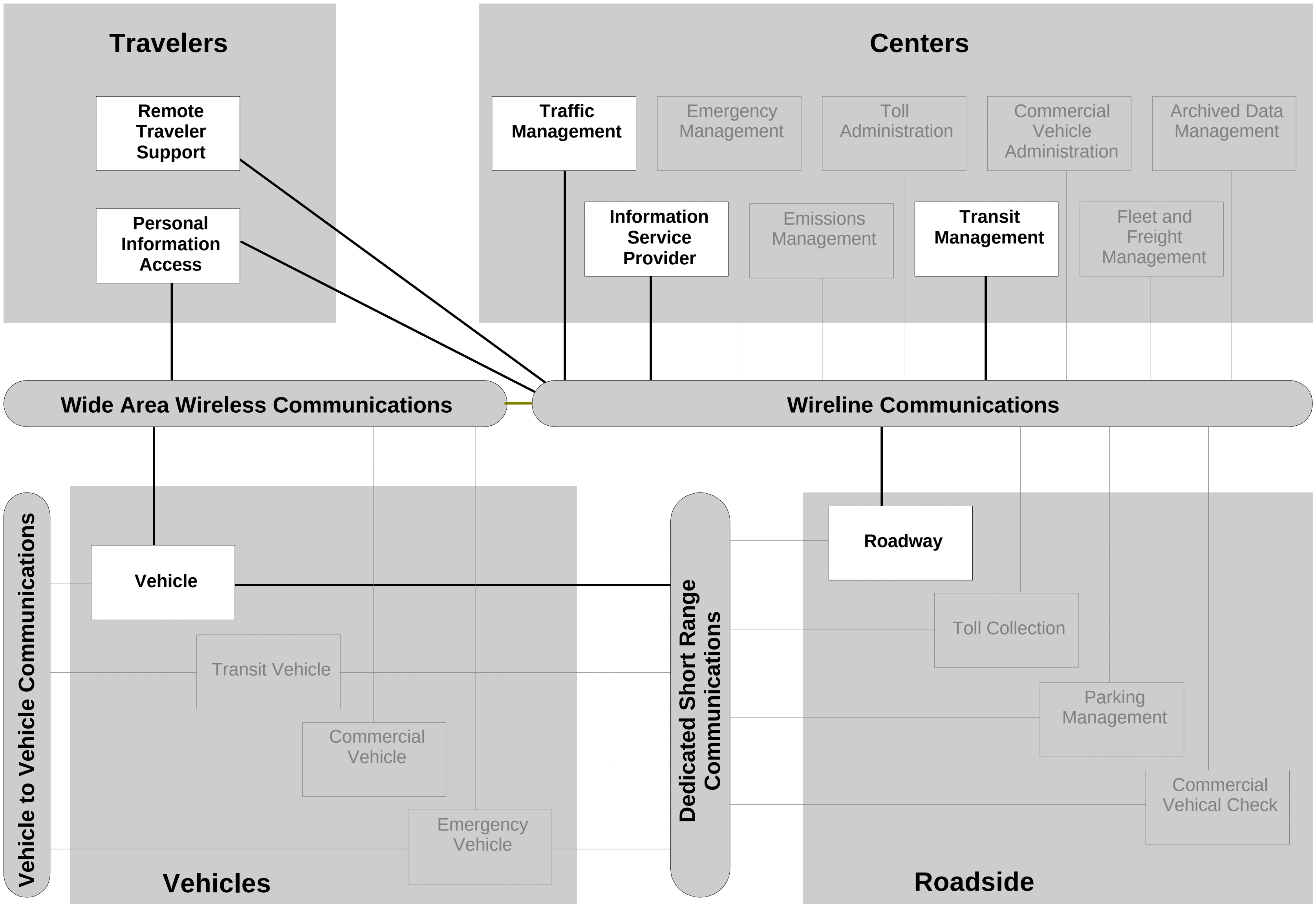
Comments:



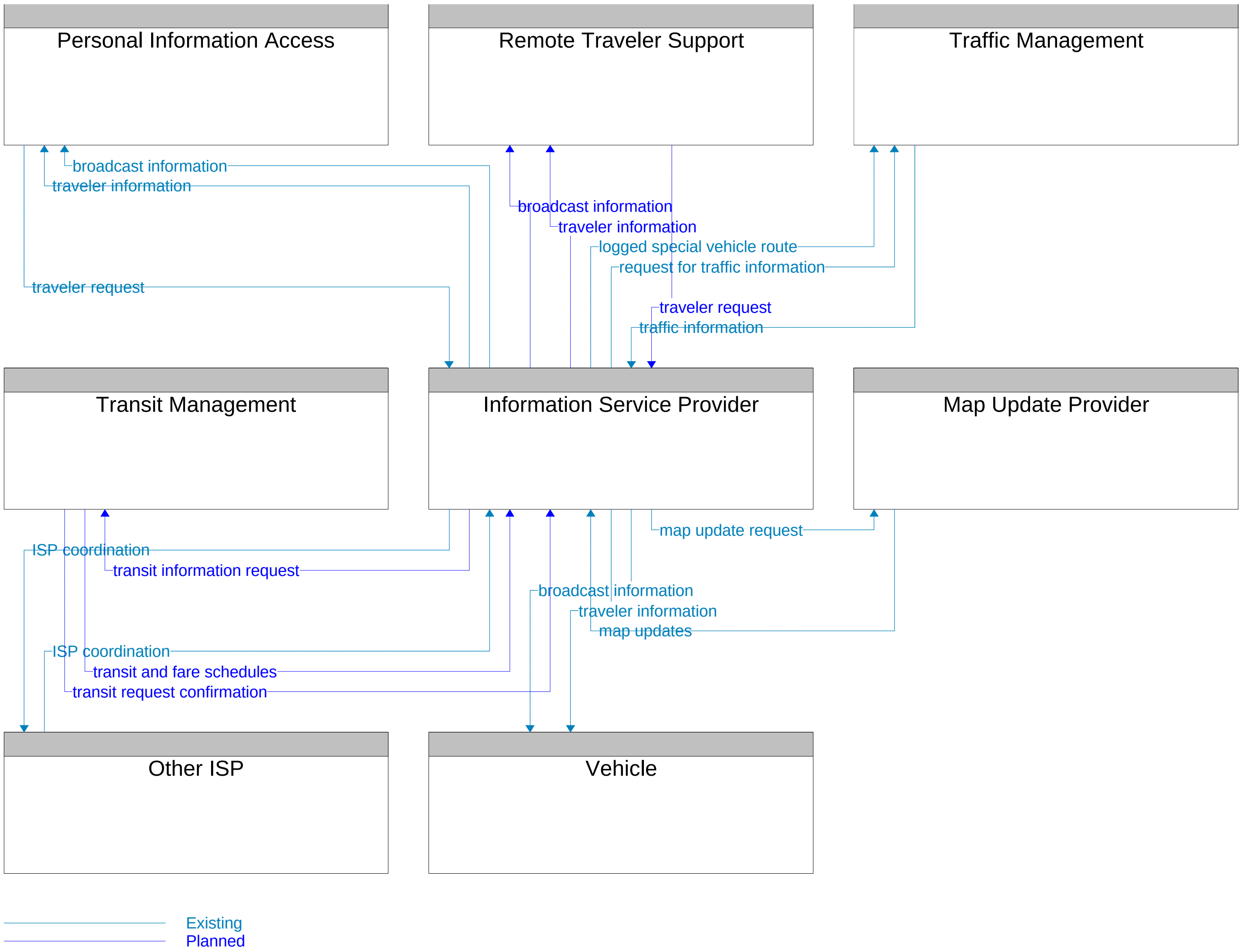
GATEWAY INITIAL PHASE
TIS Context Diagram: Wisconsin Hub


Kiosks
Traffic Signal Systems
Milwaukee County Transit
Mitchell Airport
Emergency Response and Dispatch
Ports
ISP
ISP Server
CDSI
Media
CONST & MAINT
VMS
CCTV
Monitor
Detectors
ISP
Gateway
ISP Server
Media
Internet Public Access
Gateway Operator Console
Internet Protected Access (Private)
Internet Protected Access (Public Agency)

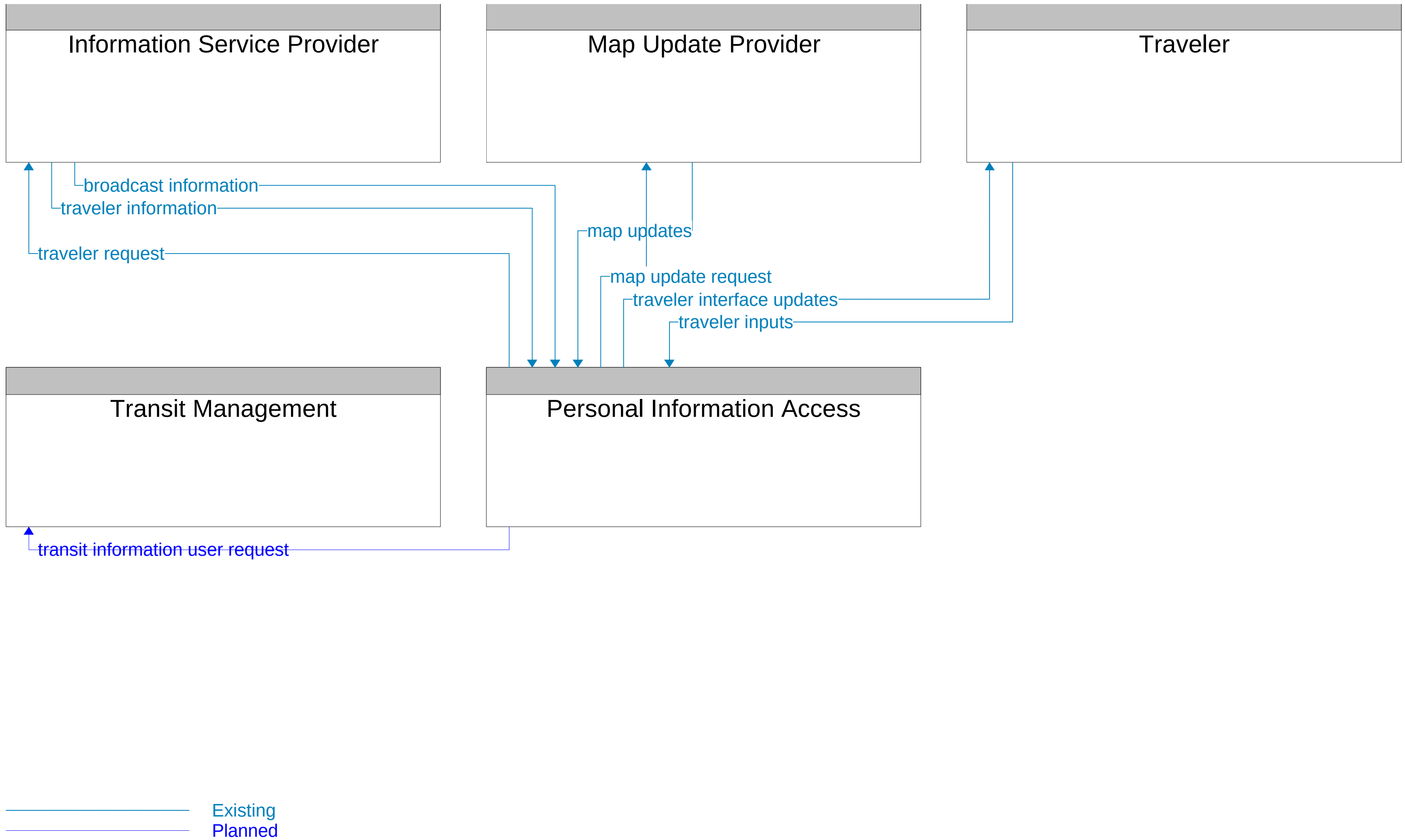
Gateway
Subsystem Interconnect Diagram



Gateway
Architecture Flow Diagram for Information Service Provider Subsystem

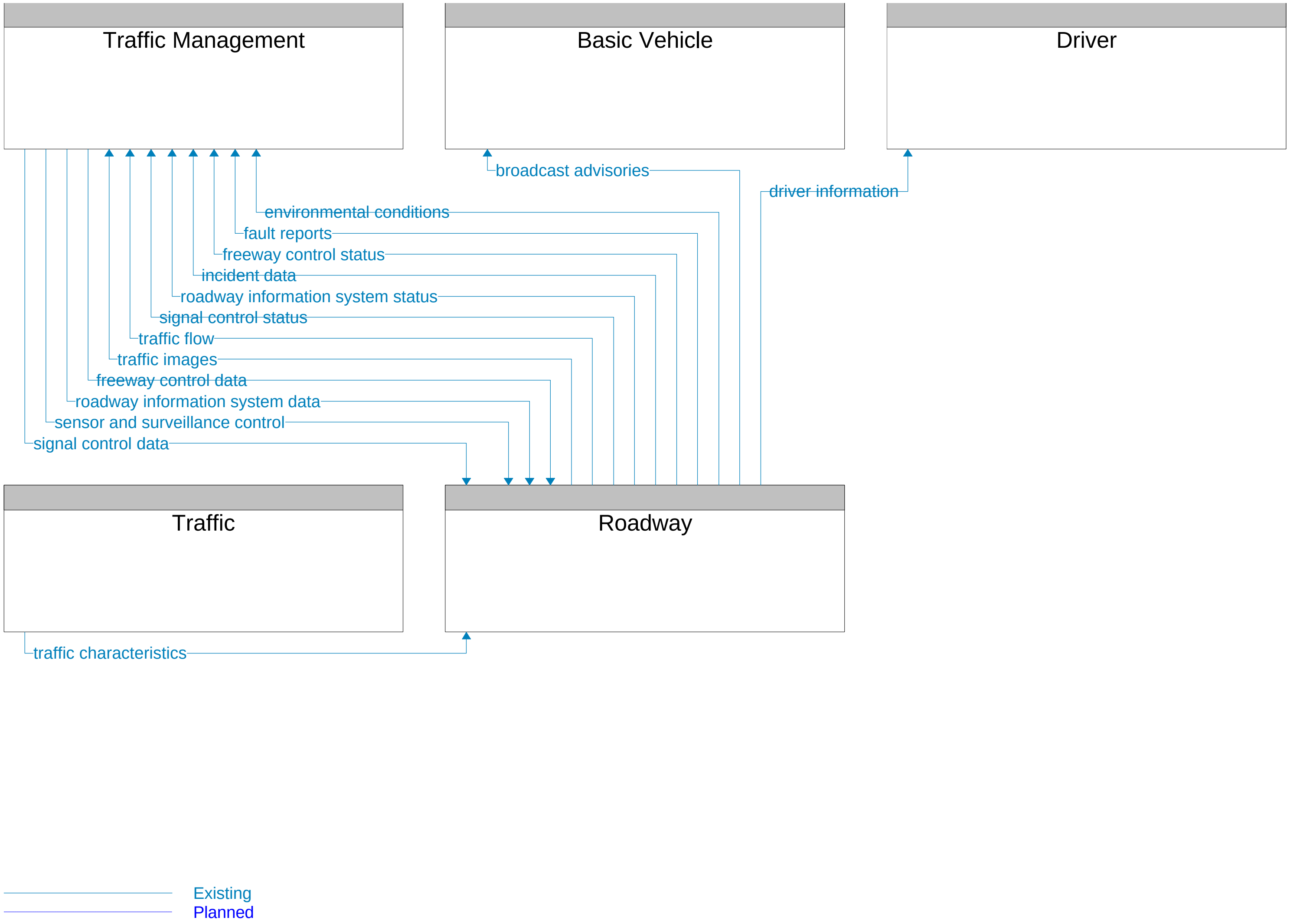


Gateway
Architecture Flow Diagram for Personal Information Access Subsystem

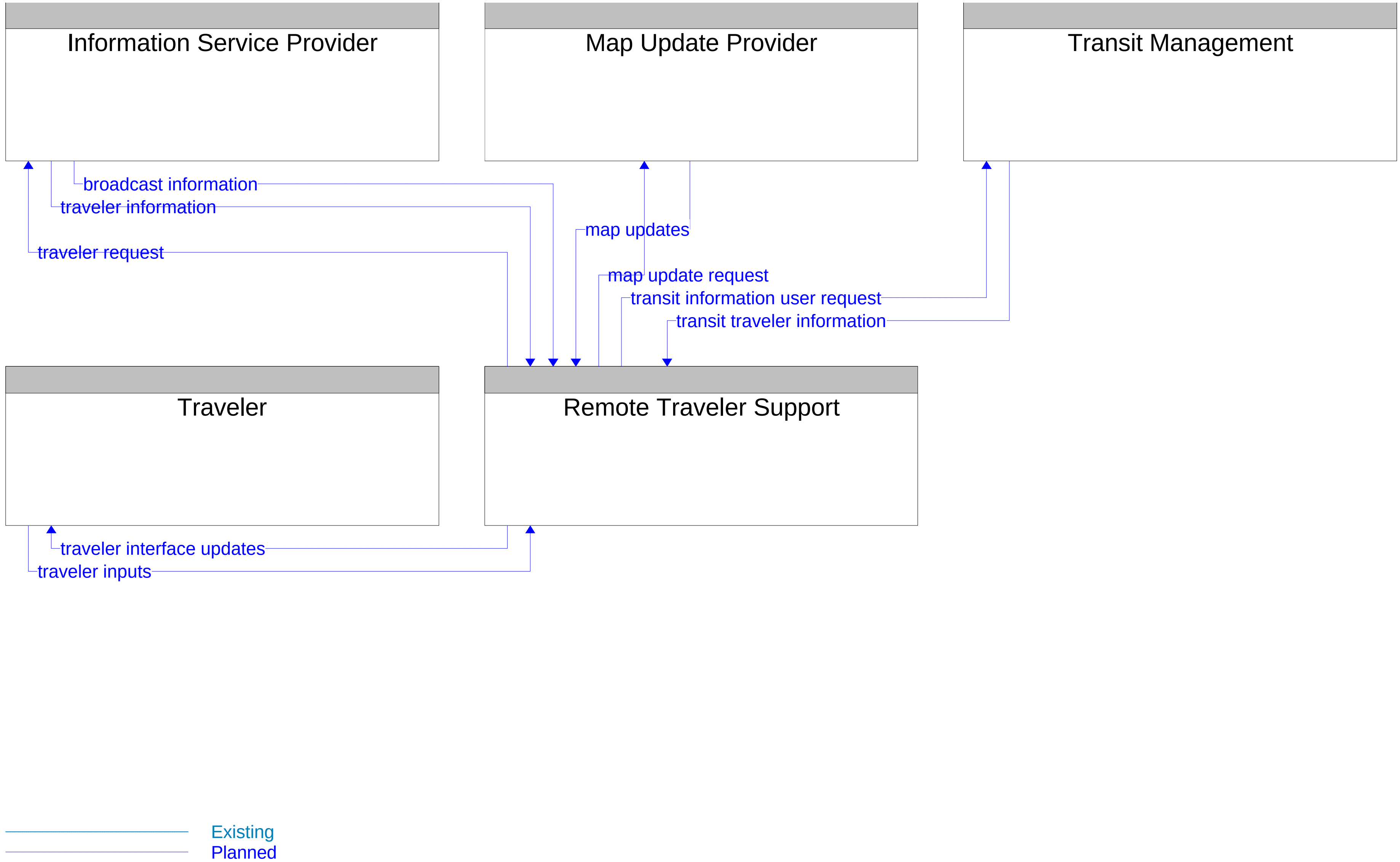


Gateway

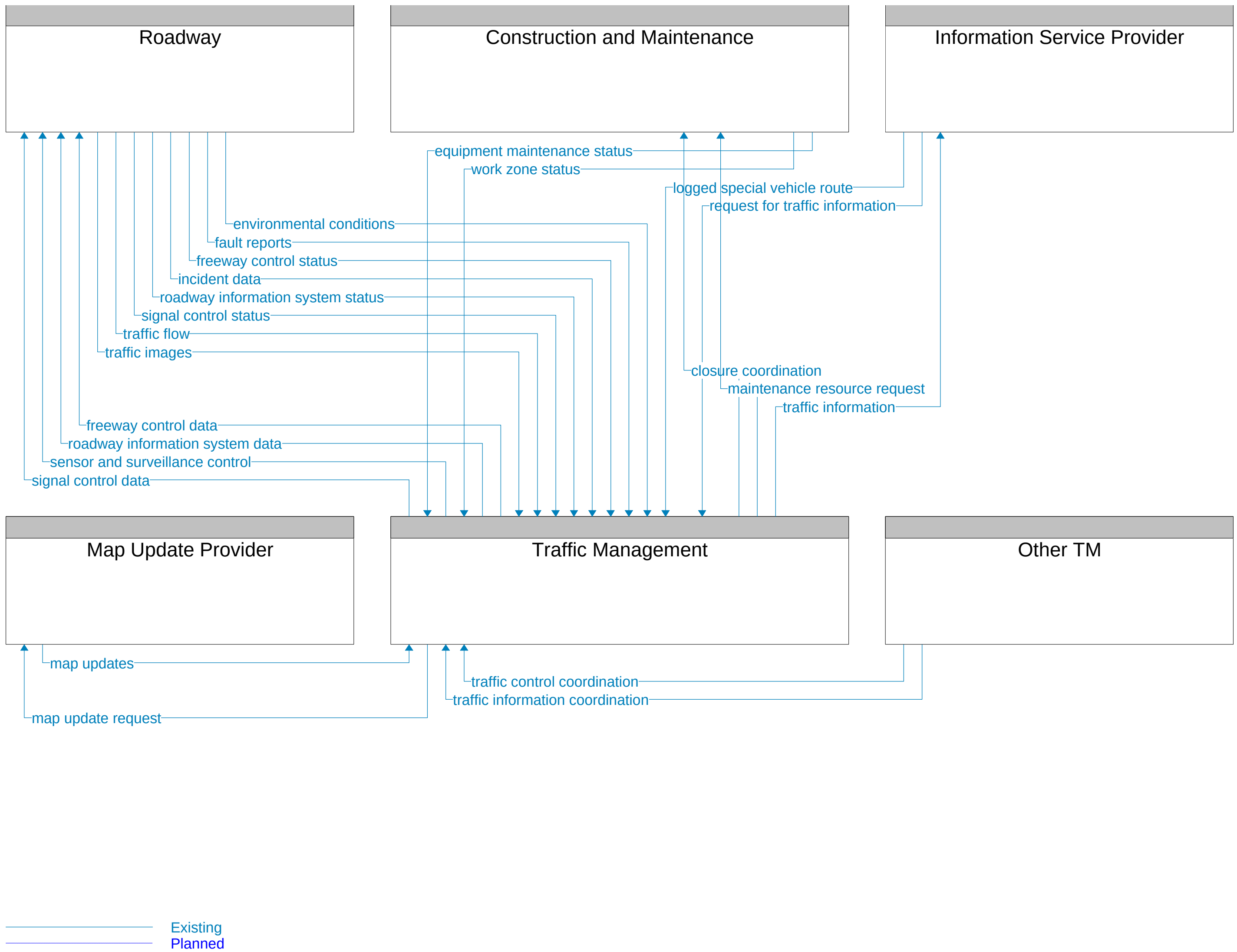
Architecture Flow Diagram for Roadway Subsystem



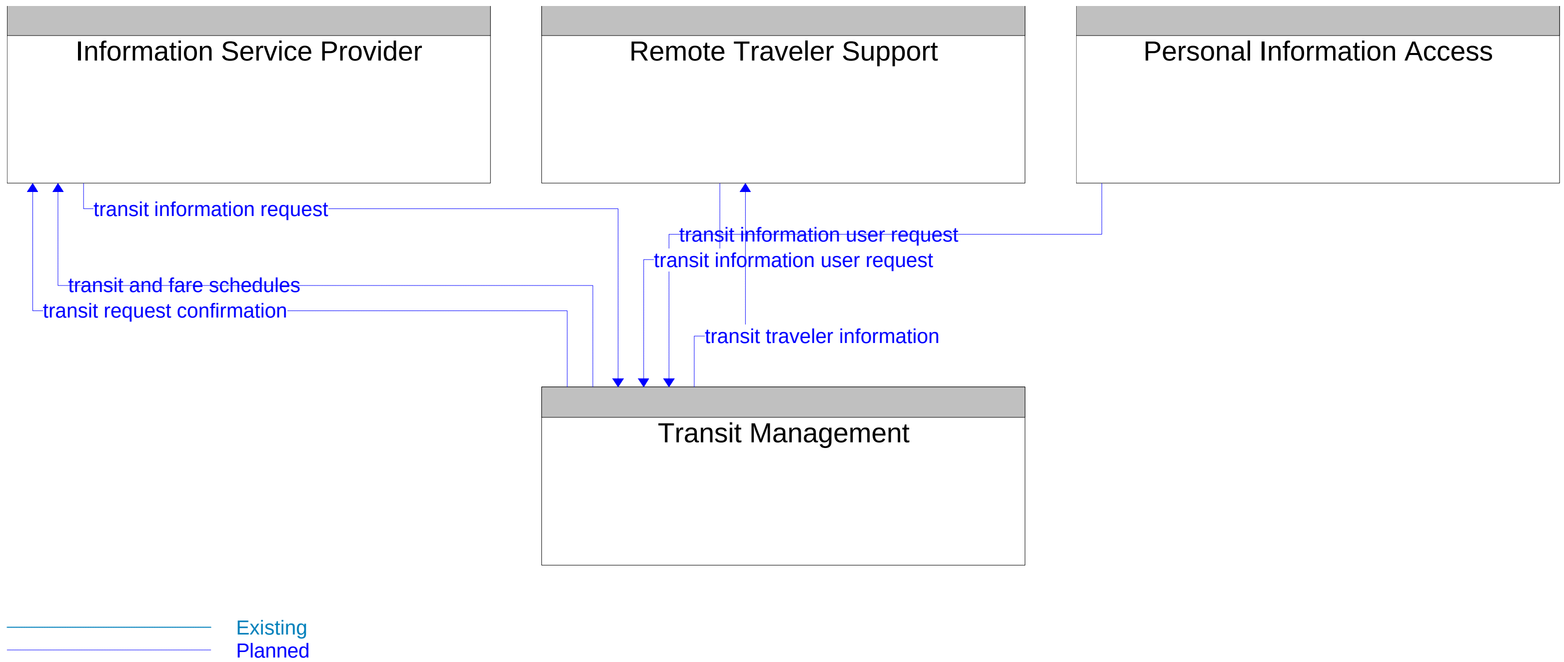
Gateway
Architecture Flow Diagram for Remote Traveler Support Subsystem



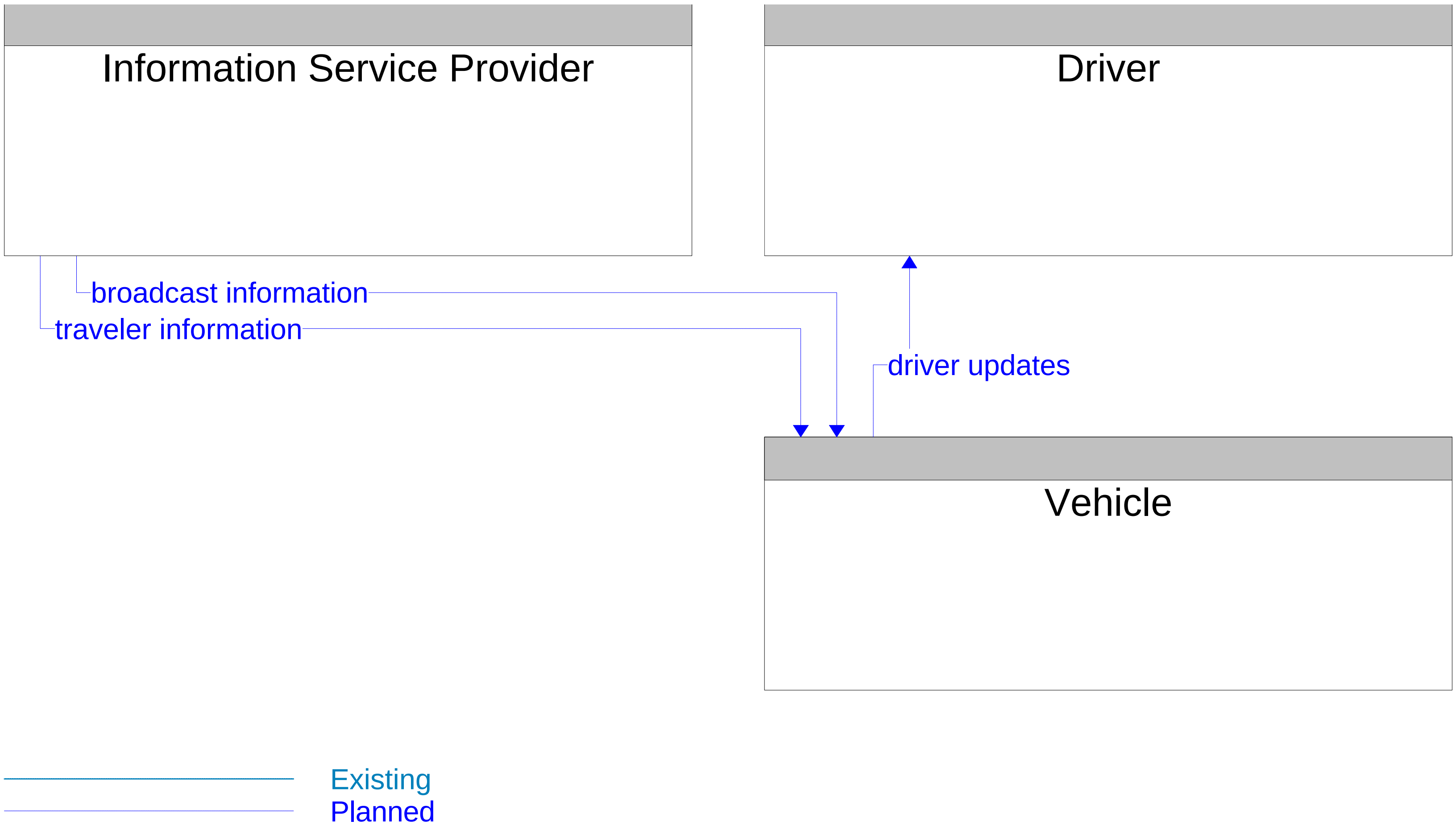
Gateway
Architecture Flow Diagram for Traffic Management Subsystem



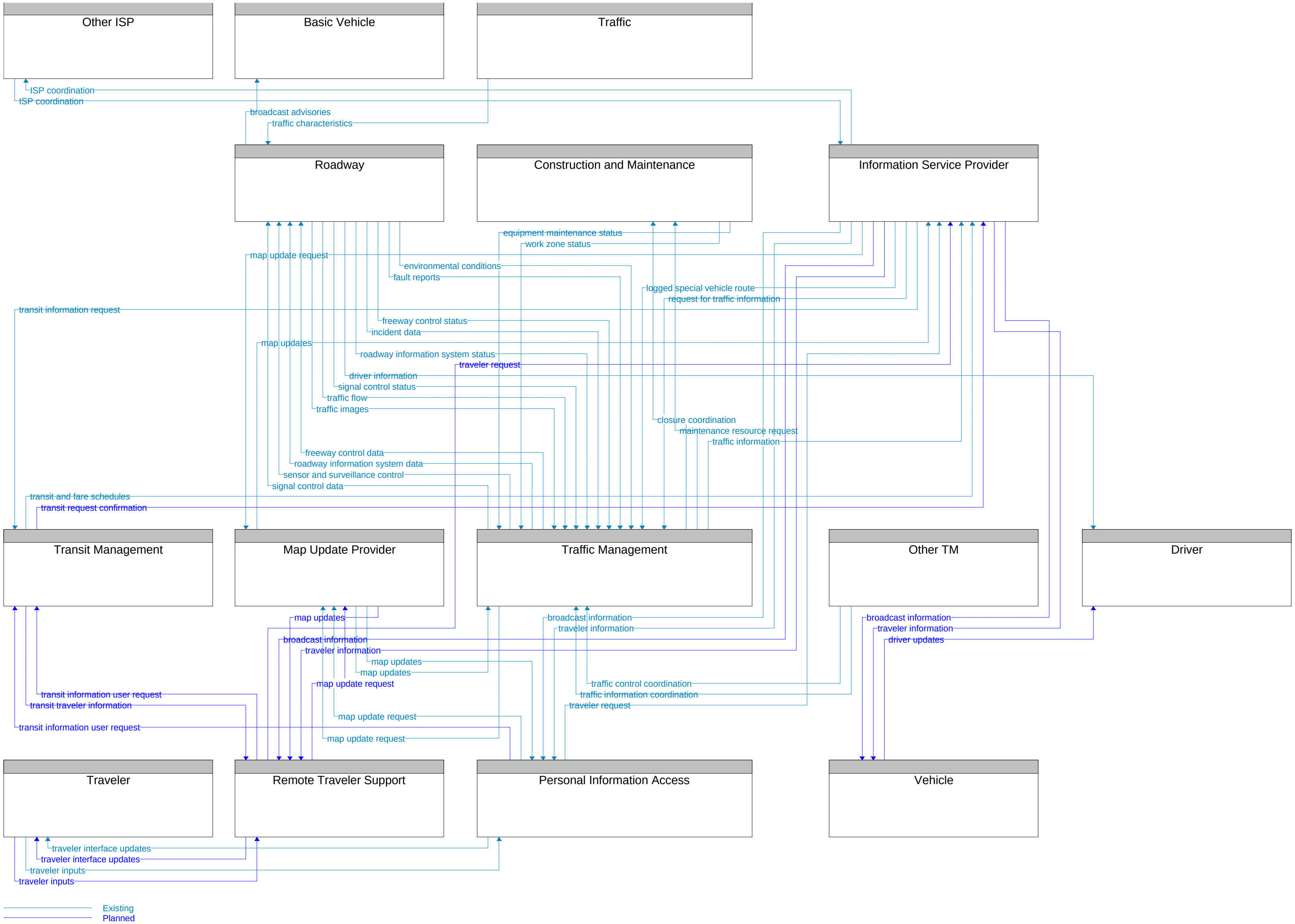
Gateway
Architecture Flow Diagram for Transit Management Subsystem



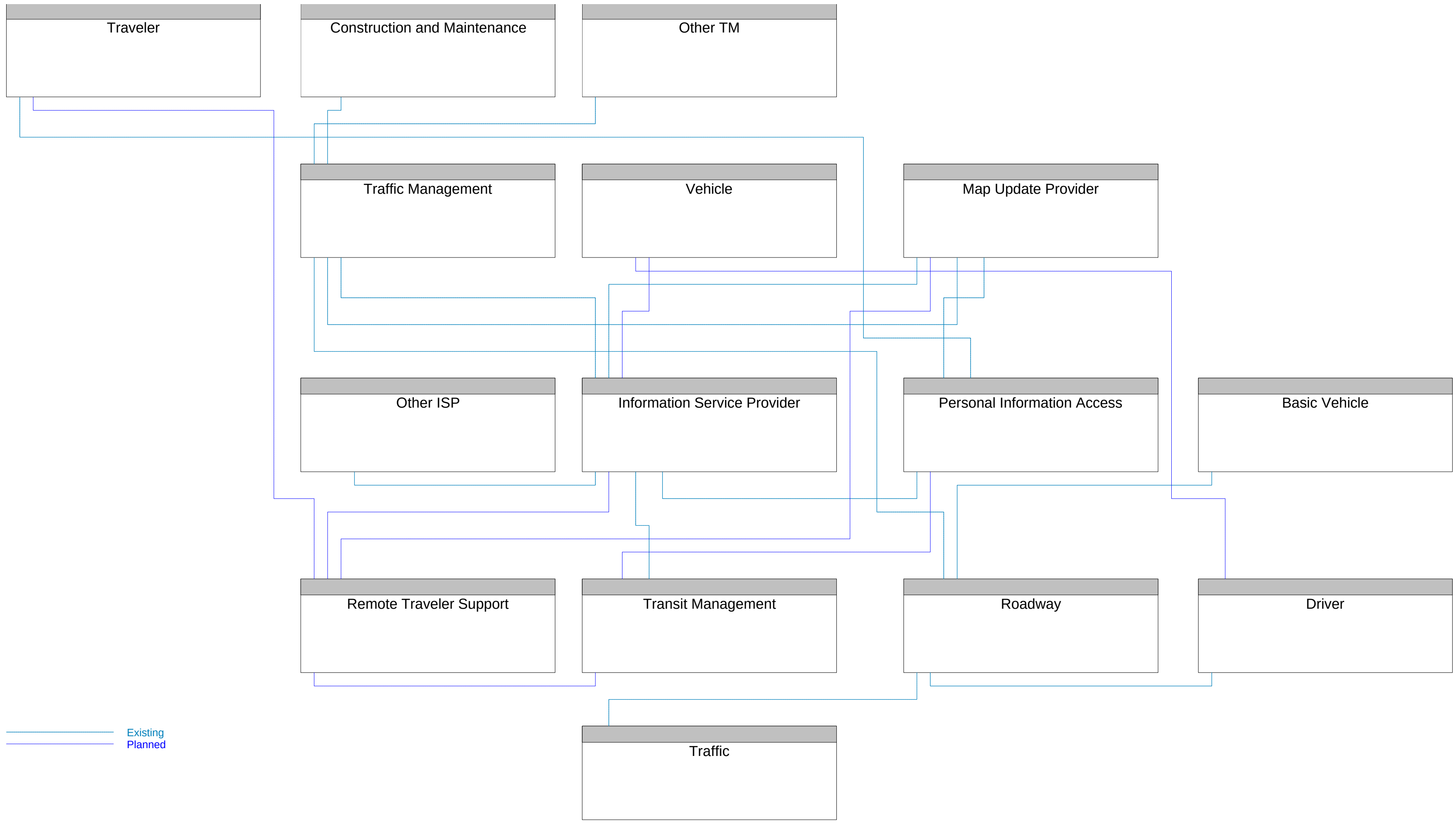
Gateway
Architecture Flow Diagram for Vehicle Subsystem



Gateway
Overall Architecture Flow Diagram



Gateway
Overall Architecture Interconnect Diagram



WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: Gateway

1. What agencies are/were involved with the project? What was that agency's role?
Wisconsin DOT MONITOR FTMS, Indiana DOT, Illinois DOT, Gary-Chicago-Milwaukee (GCM) Priority Corridor Coalition, Chicago Department of Transportation (CDOT), Illinois Transit Systems, Illinois State Police District 15, Illinois State Toll Highway Authority

2. Who are the markets and customers for information services?

	By Mode		By Purpose
X	Auto Drivers		Telecommuters
	Auto Passengers		Pedestrians
	Transit Riders		Bicycle Riders
	Paratransit Riders		Freight Carriers
X	Commuters (work)		Seasonal/2nd Residence
X	Non-Work		Tourism
	Recreation		Pass Through Traffic (trucks/autos)
Fleet Managers/Dispatchers			
	Shippers		Delivery Fleets
	Transit Dispatchers		Freight Carriers
Other Users/Disseminators			
	Employers		New/TV and Radio Reports
X	MPOs, TMOs & ATPs		

Transit & Paratransit Providers			
	Vehicle Drivers	X	Trip Planning
	Reservations/scheduling		School Administration/School Bus Driver
X	Dispatching		
Emergency Service Dispatchers (air and land)			
	Ambulance	X	State Patrol
X	Police	X	Highway Helpers
	Fire		Tow Truck Operators
Agencies/Jurisdictions			
X	Maintenance/Operations	X	State/County/City/Transit. Etc.
X	Transit Operations	X	Traffic Management Centers

Other

3. What is the travel-related information that is be delivered? What is the level of accuracy of the delivered information?

X	Route specific road surface condition-weather related		Tourist information: lodging and activities, gas stations, truck stops
X	Road surface construction/ops		Medical emergency facilities locations
	Weight restrictions (weather related, but different)		Transit scheduling
X	Trip travel times/operating or actual speeds		Park and ride locations
X	Congestion levels		Airport and parking information
X	Incidents		In-vehicle road guidance
	Weather conditions (visibility, etc.)		Mayday
X	Posted detours		Parking available (metro area)
X	Closures/alternate routes		Event parking and information

Other

4. When (at what point before or during the trip) is the information be delivered?

Data Timing/Accuracy				**Trip-Related Timing**			
X	Current		Periodic		Before the trip		On-site/at-site
X	Real Time		Forecasted		During the trip	X	At all times
	Delayed						

Other

5. At what frequency is the information provided/updated?
Gateway operates continuously 24 hours per day, 7 days a week. The system receives raw data once every minute.

6. Where (in what geographic area) is the information delivered?

X	Metro Area		Other Cities
	Spot		Sub-regions
	Small area		Rural areas
X	Corridor		Statewide
X	Metro-wide	X	Out of State

Other

WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: Gateway

7. How (by what method) will the information be delivered ot the user?

	Phones	X	Internet/Websites/E-mail		Push System
X	Cellular phones	X	Local commercial radio		Pull System
	Pagers		Highway Advisory Radio (HAR)		Broadcast System
X	Kiosks	X	VMS/CMS		
	View only monitors		Mobile data terminals		
X	Fax	X	In-vehicle devices		
X	Intranet	X	TV/Cable TV		

Other

8. Why is the information being provided? What is the desired outcome?

	Improved Safety		Improved customer service		Decreased trip cost		Long range financial savings
X	Divert traffic		Improved customer satisfaction		Diversion to transit		More uniform speeds
X	Less trip delay	X	Time savings		On-time delivery		Efficiency
	Fewer trips	X	Greater user satisfaction		Trip avoidance	X	Driver satisfaction
X	Less congestion	X	Greater user convenience		Change time of trip		Increased sales tax revenue
X	Improved operations		Less Damage to infrastructure		Fewer accidents		Benefits local economy
X	System coordination		Improved transit ridership		Less transit subsidy		Fuel conservation
X	Change destination	X	Change route		Change mode		Improved emergency response
	Compliance with laws						

Other

9. What data is collected?
During the initial phase data from the MONITOR will include traffic incident location and duration, travel times, ramp metering information and roadway maintenance and construction plans. During the ultimate phase data flows to Gateway will also include variable message signage, CCTV, and transit information.

10. How is the data collected?

X	Automated data feed	X	Phone				
X	Fax	X	Mail				

Other

11. In what form is the collected data?
The data acquisition components acquire data from several sources (e.g., the IDOT Traffic Systems Center [TSC], MONITOR, Surface Systems Incorporated [SSI] weather sensors, etc.) This data may arrive electronically and be automatically entered into the hub; by voice over the telephone; or in a hard copy format via fax or E-mail. Data that is not transferred electronically will need to be manually entered into the hub. The data may have to be requested or it may be sent automatically. In addition, the data may arrive on a regular basis (e.g., every minute) or randomly (e.g., a 911 call). Wherever possible, data is to be verified and validated at the source.

12. How is the data processed? What are the steps to convert the data to usable information?
When the data is sent to the data processing components, it will be stored using the GCM Location Referencing Message Specification (LRMS). Minimal data fusion will occur as it is intended that the providers of the data will perform data validation prior to transmission. Some data fusion will be necessary, however, in situations where the hub receives incident information on the same incident but from various Emergency Management Centers. Following data processing the data is transferred to the data dissemination components.

13. Is the data/information customized to a specific user group? If so, what group?
The Gateway and regional hub operator interfaces will be designed for PC literate high school/college co-op students with no specific experience in Unix, programming or traffic

14. Other

15. High Level Block Diagram

16. Sausage Diagram
Available

ICOP

Integrated Corridor
Operations Project

Wisconsin ATIS Inventory

Project Name: Integrated Corridor Operations Project (ICOP)

Agencies: WisDOT TOC and System Operations; City of Milwaukee EMS, Fire and Police; Milwaukee County; Mitchell Airport; City of Wauwatosa Fire, Police, and Public Works; Milwaukee Transit System

WisDOT Contact: John Corbin

End-user Groups: Drivers and transit users in the southeastern Wisconsin

Project Scope: The Integrated Corridor Operations Project (ICOP) began in 1996 and is a state and federally funded project designed to make travel safer, easier and more efficient in major transportation corridors in southeastern Wisconsin. Elements of the project are currently being implemented on the Highway 100 corridor in Milwaukee, including three information kiosks at a shopping mall which provide live CCTV images. Information about corridor traffic conditions is also provided to the public through the MONITOR web site and VMS. Implementation of the project on the official test site, Highway 38 near Mitchell airport, has been delayed. Kiosks providing multimodal traveler information at the airport are planned.

Data Collection: Information on traffic conditions is gathered from CCTV surveillance cameras at intersections along corridors, and by detectors. Transit schedule information will be provided by the Milwaukee Transit System.

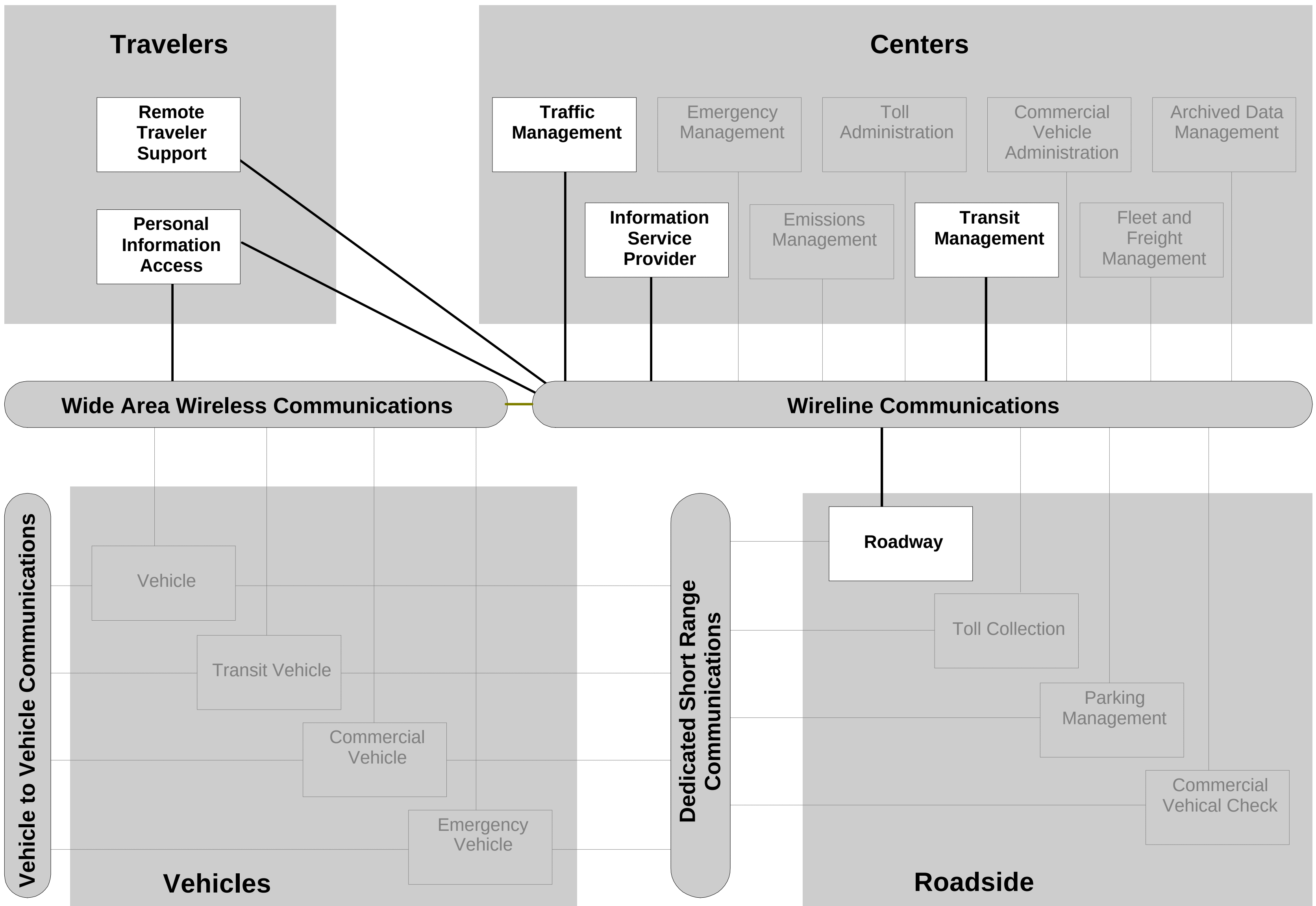
Delivery of Information: Real time information and images are provided to the MONITOR web site and to the kiosks. CCTV images and detector data is updated continuously.

Delivery Mechanisms: Real time corridor traffic information is provided through the MONITOR web site. Currently the information kiosks only receive live images from the CCTV cameras but a congestion map may be developed in the future. Dynamic trailblazer signs are used to direct travelers to the best location at which to access the corridor. VMS will also be used to provide travelers with information that they can use to choose the best route to their destination, including speeds along alternate corridors and freeway segments.

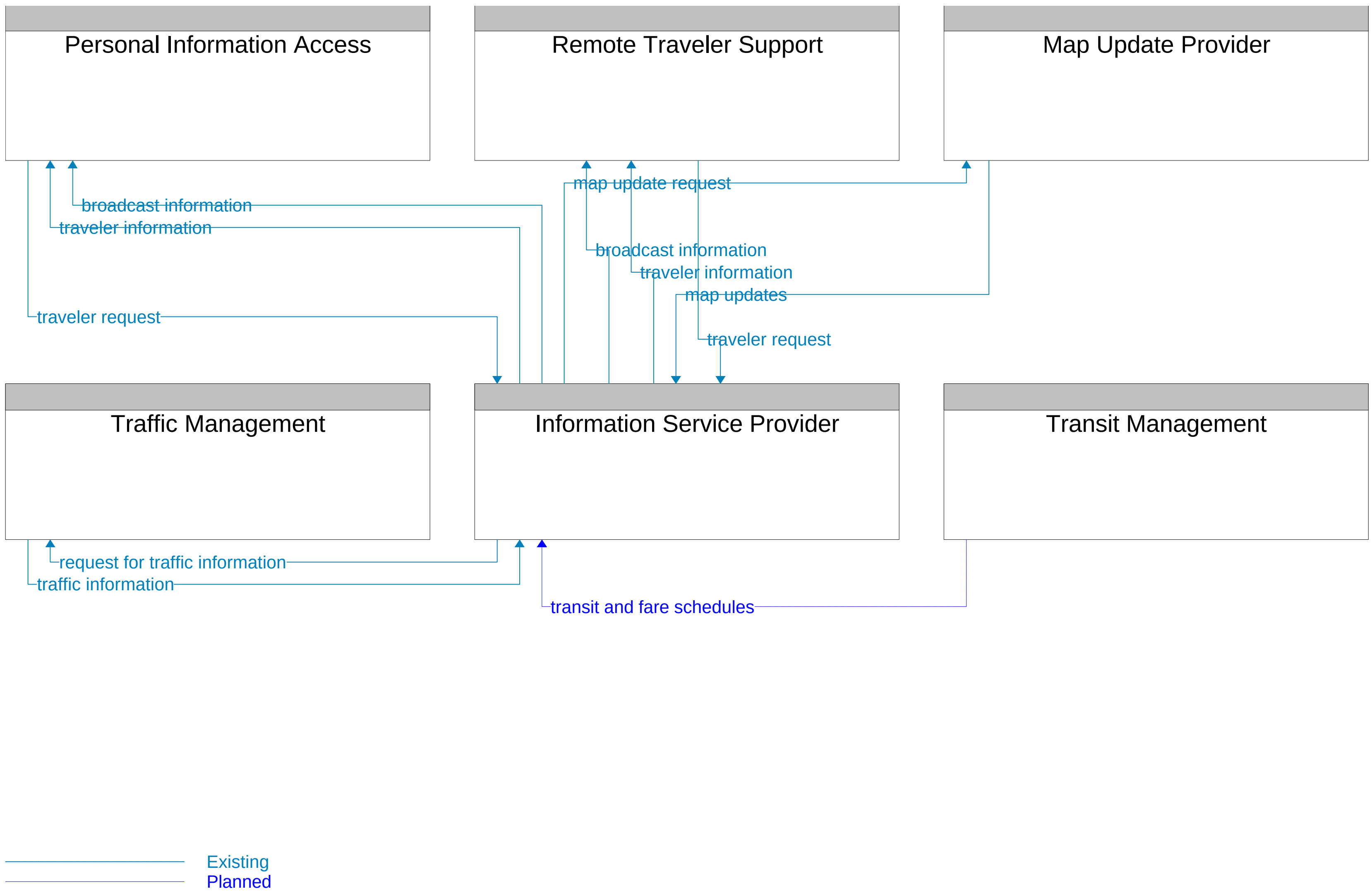
Desired Outcome: Increased safety and reduced travel time and congestion along major corridors and freeways. The goal is to provide drivers with information about traffic conditions along corridors in order to divert traffic from the freeway system when necessary.

Comments:

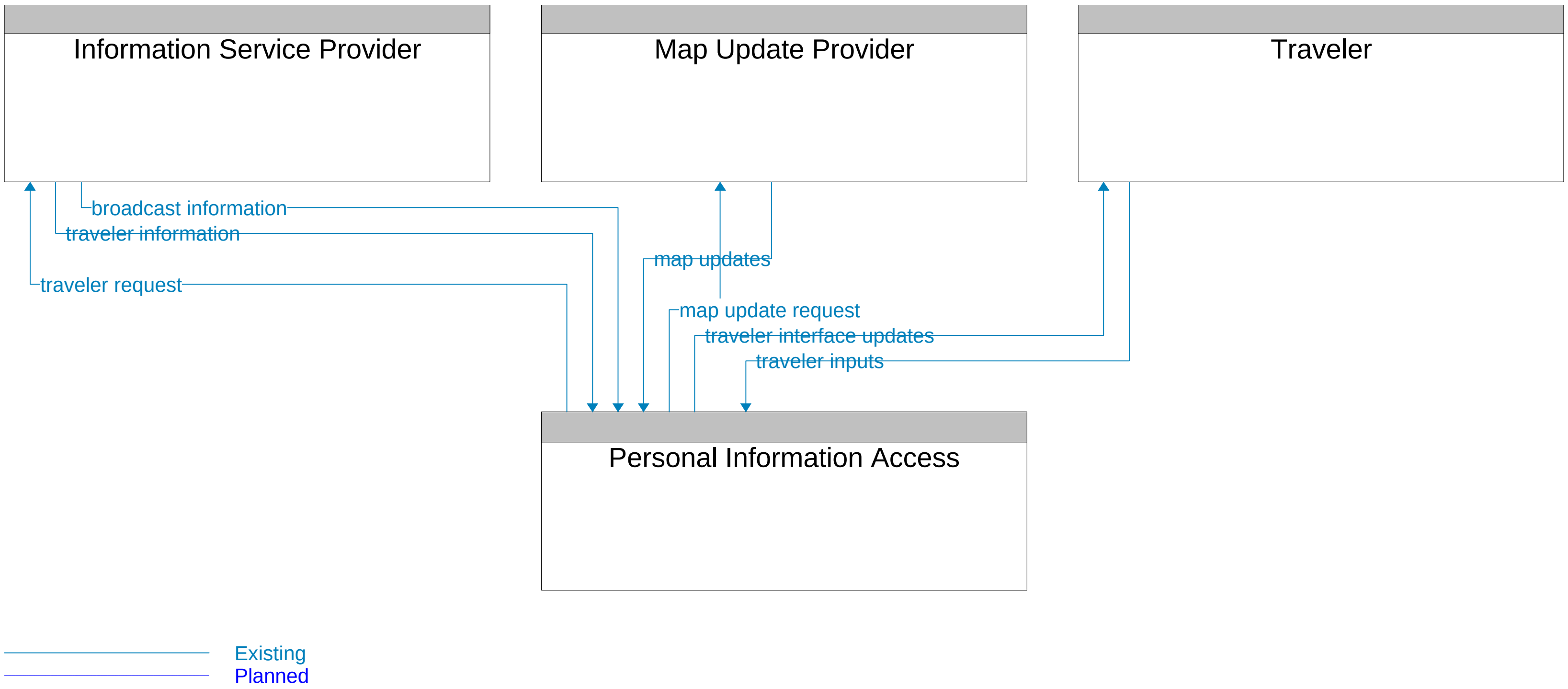
ICOP
Subsystem Interconnect Diagram



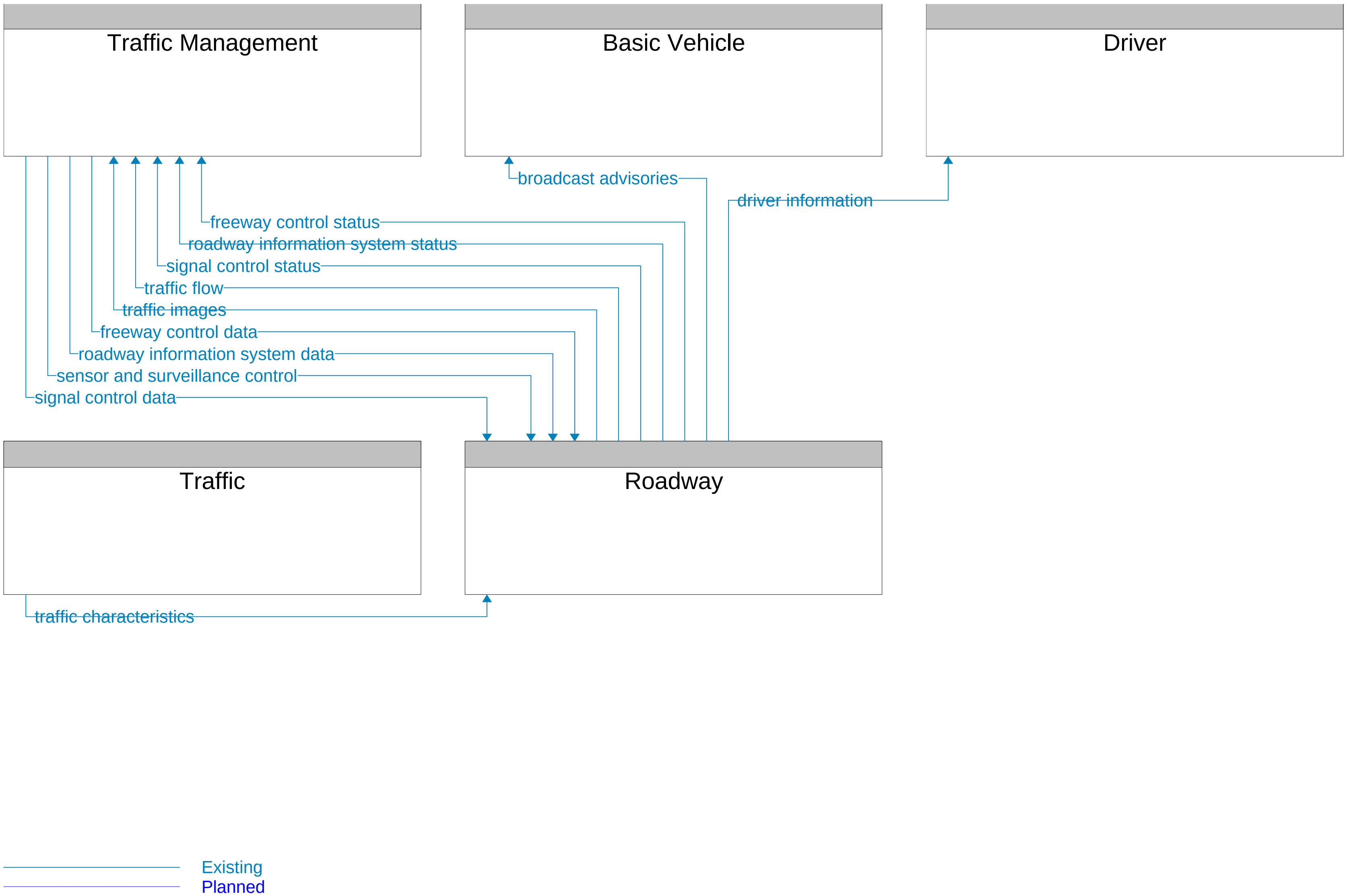
ICOP
Architecture Flow Diagram for Information Service Provider Subsystem



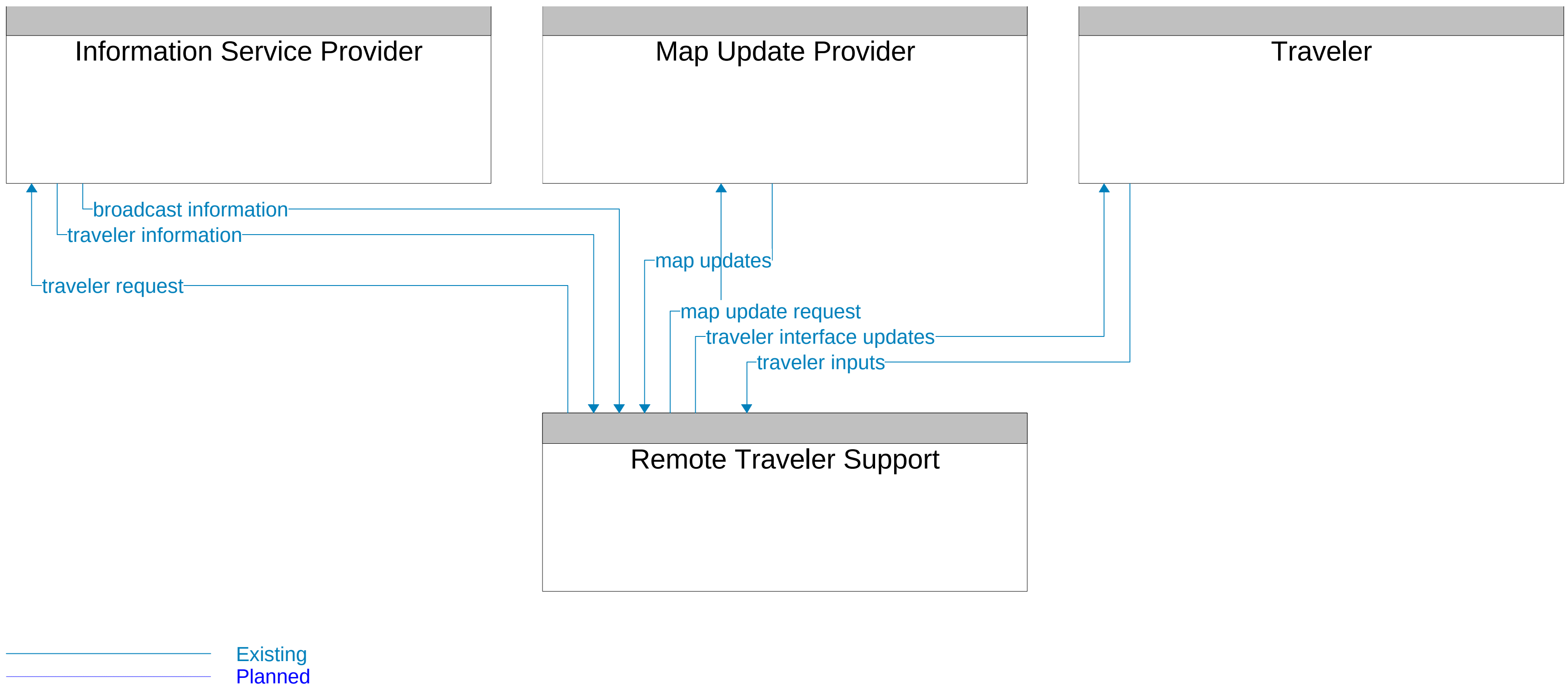
ICOP
Architecture Flow Diagram for Personal Information Access Subsystem



ICOP
Architecture Flow Diagram for Roadway Subsystem

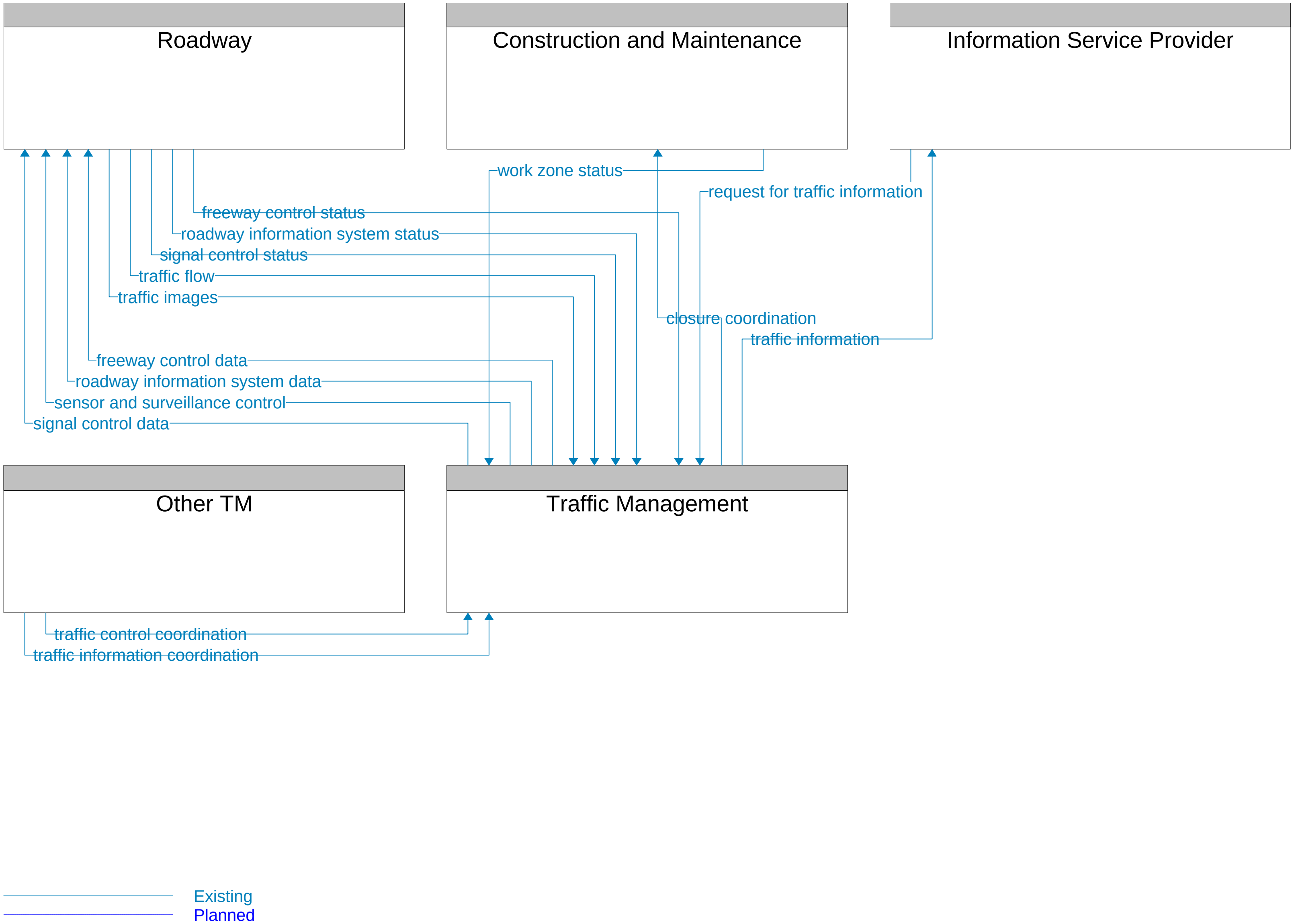


ICOP
Architecture Flow Diagram for Remote Traveler Support Subsystem

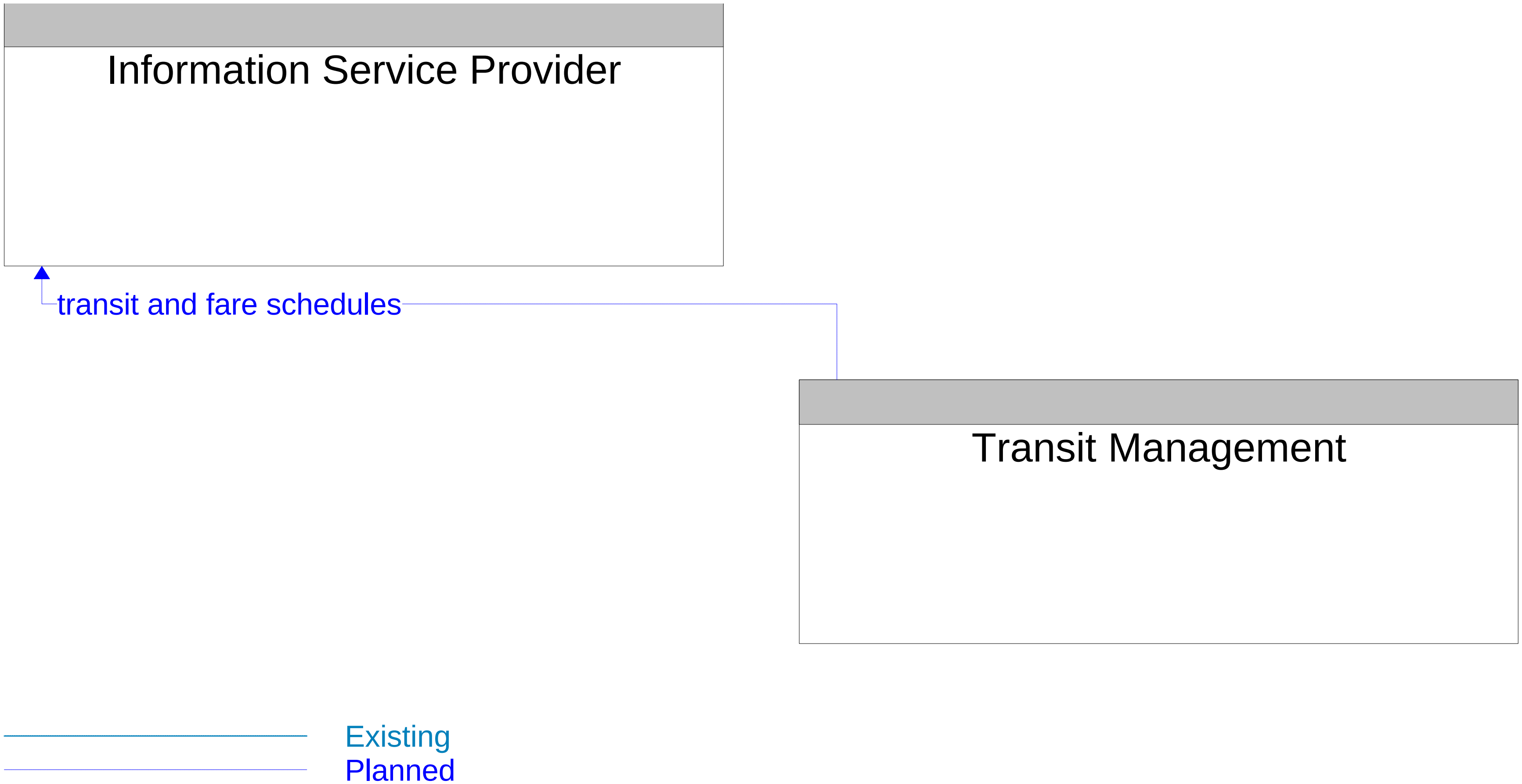


ICOP

Architecture Flow Diagram for Traffic Management Subsystem



ICOP
Architecture Flow Diagram for Transit Management Subsystem



WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: Integrated Corridor Operations Project (ICOP)

1. What agencies are/were involved with the project? What was that agency's role?
WisDot TOC and System Operations; City of Milwaukee; Mitchell International Airport; Milwaukee County; City of Wauwatosa Fire, Police, and EMS; Milwaukee Transit System

2. Who are the markets and customers for information services?

	By Mode		By Purpose	Transit & Paratransit Providers			
X	Auto Drivers		Telecommuters		Vehicle Drivers		Trip Planning
	Auto Passengers		Pedestrians		Reservations/scheduling		School Administration/School Bus Driver
X	Transit Riders		Bicycle Riders		Dispatching		
	Paratransit Riders		Freight Carriers	Emergency Service Dispatchers (air and land)			
X	Commuters (work)		Seasonal/2nd Residence		Ambulance		State Patrol
X	Non-Work		Tourism		Police		Highway Helpers
	Recreation	X	Pass Through Traffic (trucks/autos)		Fire		Tow Truck Operators
Fleet Managers/Dispatchers				Agencies/Jurisdictions			
	Shippers		Delivery Fleets		Maintenance/Operations		State/County/City/Transit. Etc.
	Transit Dispatchers		Freight Carriers		Transit Operations	X	Traffic Management Centers
Other Users/Disseminators							
	Employers	X	New/TV and Radio Reports				
	MPOs, TMOs & ATPs						

Other
Media will receive live feeds from the CCTV cameras.

3. What is the travel-related information that is be delivered? What is the level of accuracy of the delivered information?

	Route specific road surface condition-weather related		Tourist information: lodging and activities, gas stations, truck stops
	Road surface construction/ops		Medical emergency facilities locations
	Weight restrictions (weather related, but different)	X	Transit scheduling
	Trip travel times/operating or actual speeds		Park and ride locations
X	Congestion levels		Airport and parking information
	Incidents		In-vehicle road guidance
	Weather conditions (visibility, etc.)		Mayday
	Posted detours		Parking available (metro area)
X	Closures/alternate routes		Event parking and information

Other

4. When (at what point before or during the trip) is the information be delivered?

Data Timing/Accuracy				Trip-Related Timing			
X	Current		Periodic	X	Before the trip		On-site/at-site
X	Real Time		Forecasted	X	During the trip		At all times
	Delayed						

Other

5. At what frequency is the information provided/updated?
Information is updated continuously as data is received from detectors and CCTV cameras

6. Where (in what geographic area) is the information delivered?

X	Metro Area		Other Cities
	Spot		Sub-regions
	Small area		Rural areas
X	Corridor		Statewide
	Metro-wide		Out of State

Other

WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: Integrated Corridor Operations Project (ICOP)

7. How (by what method) will the information be delivered ot the user?

	Phones	X	Internet/Websites/E-mail		Push System
	Cellular phones		Local commercial radio		Pull System
	Pagers	X	Highway Advisory Radio (HAR)		Broadcast System
X	Kiosks	X	VMS/CMS		
	View only monitors		Mobile data terminals		
	Fax		In-vehicle devices		
	Intranet		TV/Cable TV		

Other

8. Why is the information being provided? What is the desired outcome?

	Improved Safety	X	Improved customer service		Decreased trip cost		Long range financial savings
X	Divert traffic	X	Improved customer satisfaction		Diversion to transit		More uniform speeds
X	Less trip delay	X	Time savings		On-time delivery		Efficiency
	Fewer trips	X	Greater user satisfaction		Trip avoidance		Driver satisfaction
X	Less congestion		Greater user convenience		Change time of trip		Increased sales tax revenue
X	Improved operations		Less Damage to infrastructure		Fewer accidents		Benefits local economy
X	System coordination		Improved transit ridership		Less transit subsidy		Fuel conservation
	Change destination	X	Change route		Change mode		Improved emergency response
	Compliance with laws						

Other

9. What data is collected?
Data on speed and congestion levels is gathered from CCTV cameras at intersections and detectors along the corridors. Transit schedule information would be provided by the Milwaukee Transit System.

10. How is the data collected?

X	Automated data feed		Phone				
	Fax		Mail				

Other

11. In what form is the collected data?
Raw data and images are collected from the detectors and from CCTV cameras.

12. How is the data processed? What are the steps to convert the data to usable information?
Video feeds from the CCTV cameras and detector data are provided to MONITOR for use on the MONITOR web site and for surveillance purposes. The use of VMS and Dynamic Trailblazer signs to divert traffic to alternate routes is based on this surveillance of conditions along the corridor.

13. Is the data/information customized to a specific user group? If so, what group?
Transit schedule information is targeted specifically at transit users.

14. Other

15. High Level Block Diagram

16. Sausage Diagram
Available

17. Architecture Flow Diagram
Available

I-39 Corridor Study

Wisconsin ATIS Inventory

Project Name: I-39 Corridor Study

Agencies: WisDOT; State Patrol District Office; County Highway Departments; City of Wisconsin Rapids; Portage County Visitors Bureau; Lincoln County EMS

WisDOT Contact:
Mark Nelson at BRW

End-user Groups: Drivers in the I-39 Corridor

Project Scope:
BRW is currently developing the I-39 ITS Strategic Deployment Plan. They have proposed the development of a Pavement Condition Reporting System that would collect weather from a Road Weather Information System and the state patrol. They have also proposed the installation of permanent Changeable Message Signs. The final document is not due until October 2000 so the recommendations described are preliminary.

Data Collection:
The Pavement Condition Reporting System would collect weather and surface condition information from a Road Weather Information System and from the state patrol.

Delivery of Information:
Information would be real time and could be used prior to and during the trip. The frequency at which information would be updated has not been determined at this time.

Delivery Mechanisms: Information would be delivered to the public through commercial radio, highway advisory radio, and potentially through a web site.

Desired Outcome: The desired outcome is improved operations and safety, and reduced congestion.

Comments: Since the study is not complete all recommendations are subject to change.

WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: 1-39 Corridor Study

1. What agencies are/were involved with the project? What was that agency's role?
WisDOT; State Patrol District Office; Lincoln, Marquette, and Marathon County Highway Departments; City of Wisconsin Rapids; County Visitors Bureau; Lincoln County EMS

2. Who are the markets and customers for information services?

	By Mode		By Purpose	Transit & Paratransit Providers			
X	Auto Drivers		Telecommuters		Vehicle Drivers		Trip Planning
	Auto Passengers		Pedestrians		Reservations/scheduling		School Administration/School Bus Driver
	Transit Riders		Bicycle Riders		Dispatching		
	Paratransit Riders	X	Freight Carriers	Emergency Service Dispatchers (air and land)			
	Commuters (work)		Seasonal/2nd Residence		Ambulance		State Patrol
	Non-Work		Tourism		Police		Highway Helpers
X	Recreation		Pass Through Traffic (trucks/autos)		Fire		Tow Truck Operators
Fleet Managers/Dispatchers				Agencies/Jurisdictions			
	Shippers		Delivery Fleets	X	Maintenance/Operations	X	State/County/City/Transit. Etc.
	Transit Dispatchers		Freight Carriers		Transit Operations	X	Traffic Management Centers
Other Users/Disseminators							
	Employers		New/TV and Radio Reports				
	MPOs, TMOs & ATPs						

Other

3. What is the travel-related information that is be delivered? What is the level of accuracy of the delivered information?

X	Route specific road surface condition-weather related		Touris information: lodging and activities, gas stations, truck stops
X	Road surface construction/ops		Medical emergency facilities locations
	Weight restrictions (weather related, but different)		Transit scheduling
	Trip travel times/operating or actual speeds		Park and ride locations
	Congestion levels		Airport and parking information
	Incidents		In-vehicle road guidance
X	Weather conditions (visibility, etc.)		Mayday
	Posted detours		Parking available (metro area)
X	Closures/alternate routes		Event parking and information

Other

4. When (at what point before or during the trip) is the information be delivered?

Data Timing/Accuracy				Trip-Related Timing			
	Current		Periodic	X	Before the trip		On-site/at-site
X	Real Time		Forecasted	X	During the trip		At all times
	Delayed						

Other

5. At what frequency is the information provided/updated?
The frequency that information will be provided has not yet been determined.

6. Where (in what geographic area) is the information delivered?

	Metro Area		Other Cities
	Spot		Sub-regions
	Small area		Rural areas
X	Corridor		Statewide
	Metro-wide		Out of State

Other

WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: I-39 Corridor Study

7. How (by what method) will the information be delivered ot the user?

	Phones	X	Internet/Websites/E-mail		Push System
	Cellular phones	X	Local commercial radio		Pull System
	Pagers	X	Highway Advisory Radio (HAR)		Broadcast System
	Kiosks	X	VMS/CMS		
	View only monitors		Mobile data terminals		
	Fax		In-vehicle devices		
	Intranet		TV/Cable TV		

Other

8. Why is the information being provided? What is the desired outcome?

	Improved Safety		Improved customer service		Decreased trip cost		Long range financial savings
	Divert traffic		Improved customer satisfaction		Diversion to transit		More uniform speeds
	Less trip delay	X	Time savings		On-time delivery		Efficiency
	Fewer trips	X	Greater user satisfaction		Trip avoidance		Driver satisfaction
X	Less congestion		Greater user convenience		Change time of trip		Increased sales tax revenue
X	Improved operations		Less Damage to infrastructure		Fewer accidents		Benefits local economy
	System coordination		Improved transit ridership		Less transit subsidy		Fuel conservation
	Change destination		Change route		Change mode		Improved emergency response
	Compliance with laws						

Other

9. What data is collected?
The proposed system would collect information about surface conditions, weather, incidents, and construction.

10. How is the data collected?

X	Automated data feed	X	Phone				
X	Fax		Mail				

Other

11. In what form is the collected data?
Not determined at this time

12. How is the data processed? What are the steps to convert the data to usable information?
Not determined at this time

13. Is the data/information customized to a specific user group? If so, what group?
Not determined at this time

14. Other

15. High Level Block Diagram
Not available currently

16. Sausage Diagram
Not available currently

17. Architecture Flow Diagram
Not available currently

I-90 / I-94 HAR

Wisconsin ATIS Inventory

Project Name: Highway Advisory Radio (HAR) as a part of the I-90/94 ITS Strategic Plan

Agencies: Wisconsin DOT, Federal Communications Commission

WisDOT Contact: Mark Nelson (BRW) Phil Decabooter (WisDOT)

End-user Groups: General public, emergency services, Departments of Transportation, road maintenance personnel.

Project Scope: Highway Advisory Radio (HAR) is a low-wattage temporary or permanent installation using AM radio frequencies to distribute traveler information such as construction, weather, and traffic advisories. Each installation area has a sign on the roadway that advises motorists which radio frequency they can tune in to receive the information

Data Collection: The maintenance division provides construction information for the HAR system. Wisconsin generally uses temporary HAR installations in construction areas depending on the extent of the construction taking place or the importance of the corridor. Permanent HAR installations are used primarily in urban areas, where traffic conditions change frequently. An exception to this is the installation of a permanent HAR in District 6, which will accommodate major construction projects for the area over the long-term. The data for the HAR is conveyed to the units via telephony in the form of a manual voice recording.

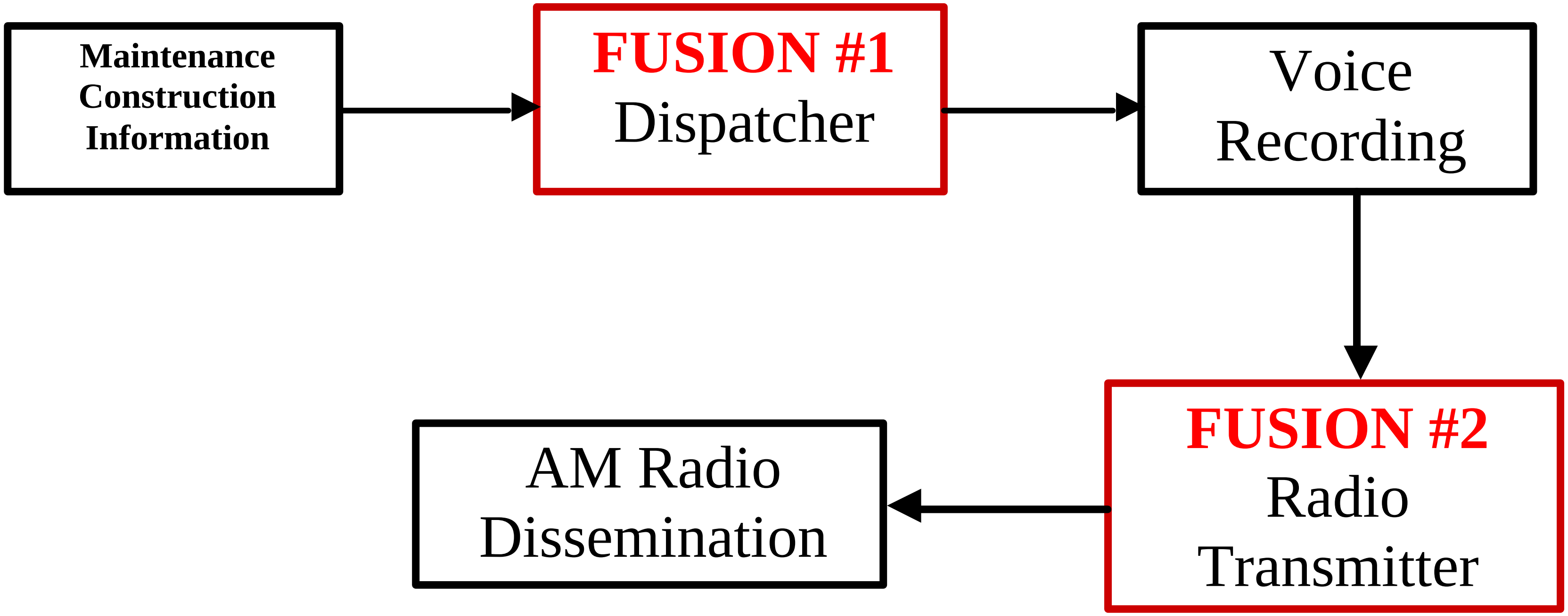
Delivery of Information: If conditions change during the progression of construction, the HAR recording will be updated as needed.

Delivery Mechanisms: Currently, construction information in Wisconsin is provided via the Internet or the 1-800-ROADWIS telephone number. These are primarily pre-trip methods of information. HAR provides up-to-date road conditions due to construction on the AM frequencies of 530 kHz or 1610 kHz.

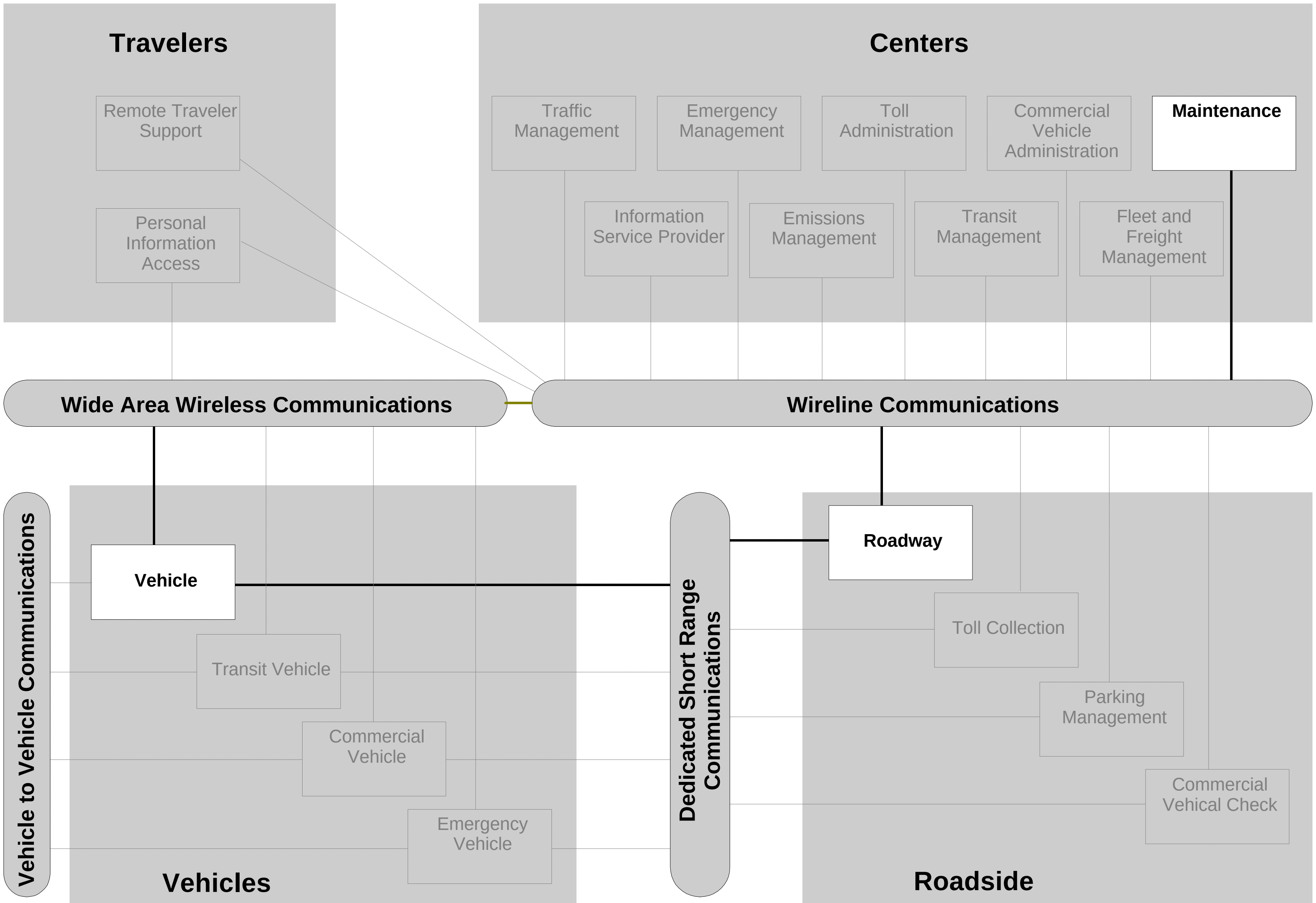
Desired Outcome: The desired outcome is to advise travelers of upcoming conditions during their trip. The intent is for the HAR installations to increase road worker and traveler safety and decrease traffic congestion due to planning of detours by travelers.

Comments: HAR, currently, is an economical and convenient means of getting traveler information to the user en-route.

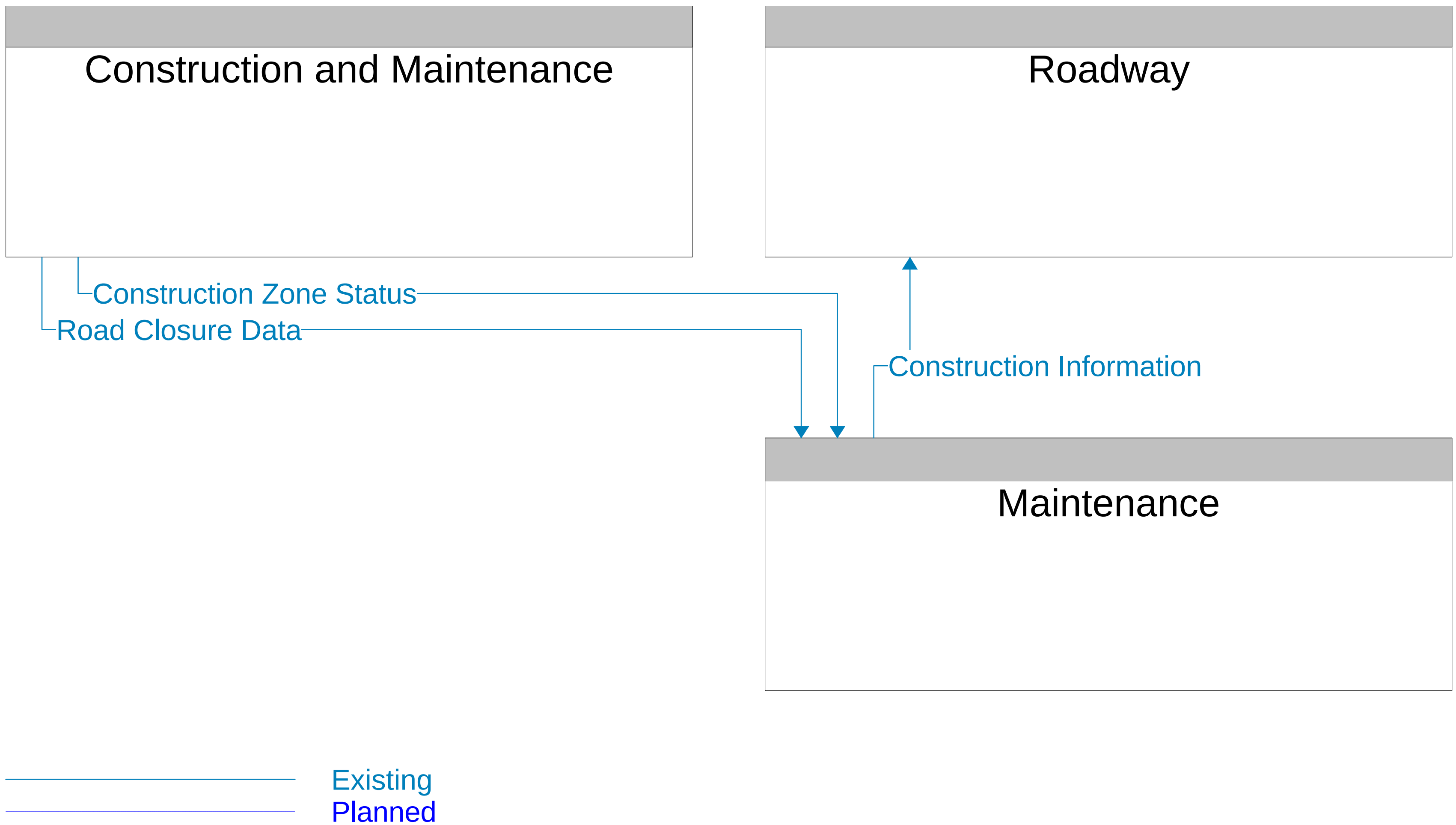
HAR Block Diagram



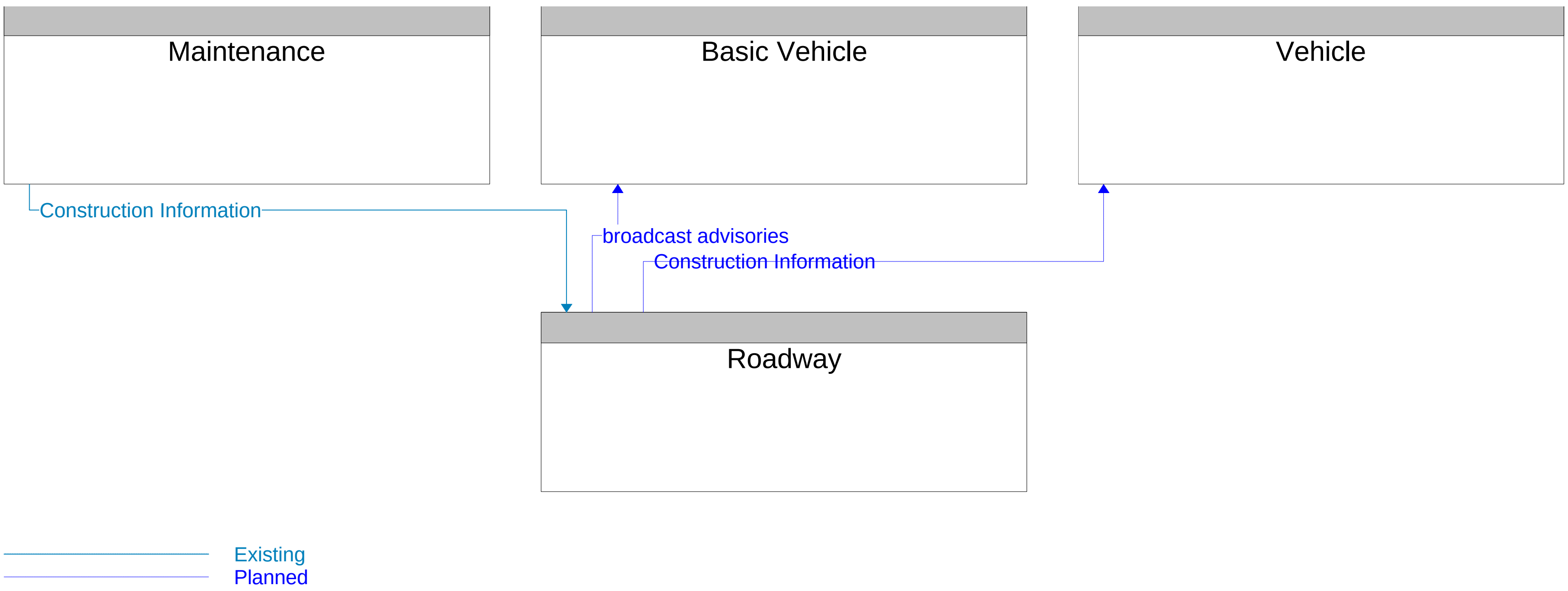
I90/I94 HAR
Subsystems Interconnect Diagram



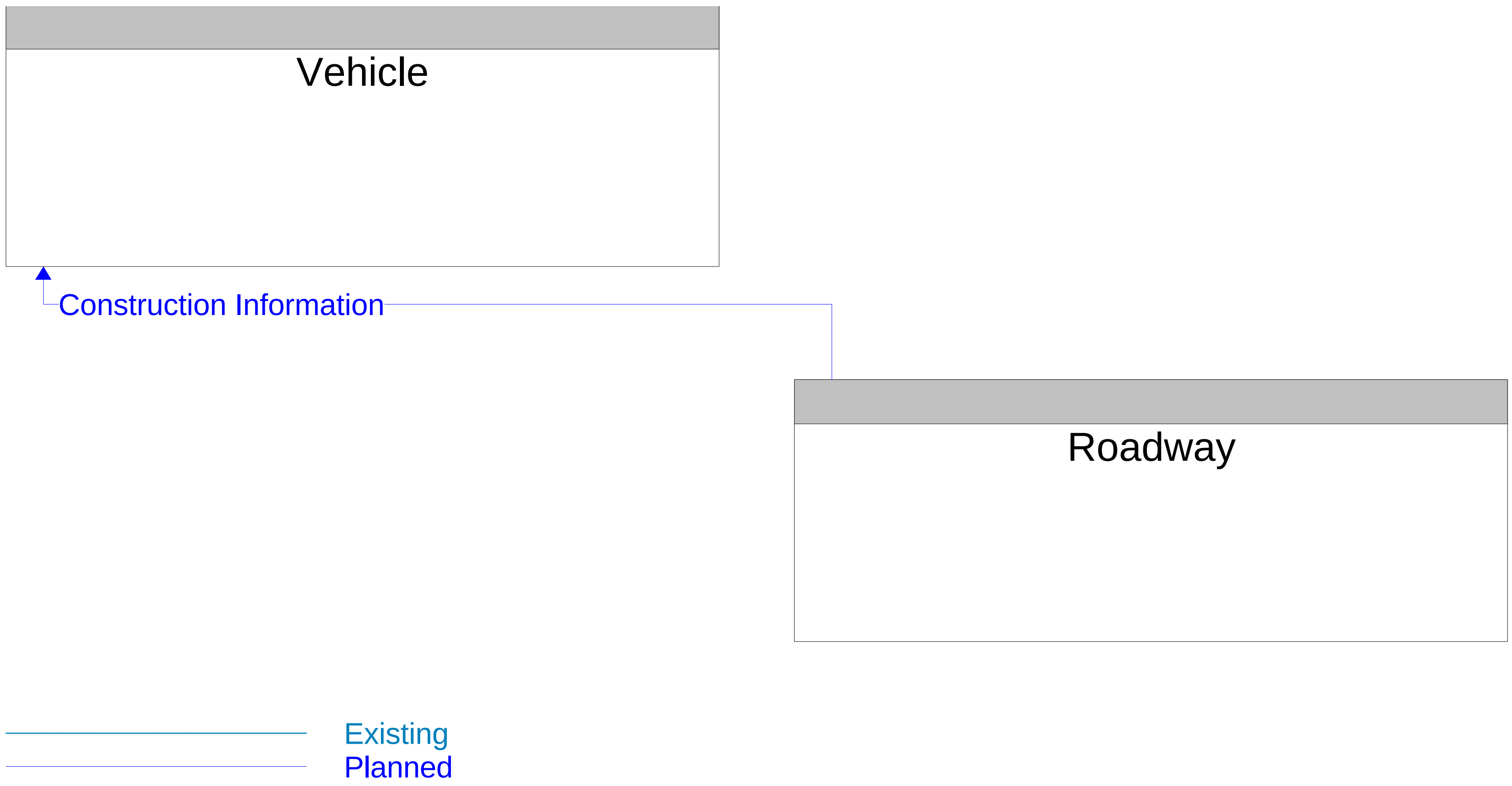
I90/I94 HAR
Architecture Flow Diagram for Maintenance Subsystem



I90/I94 HAR
Architecture Flow Diagram for Roadway Subsystem

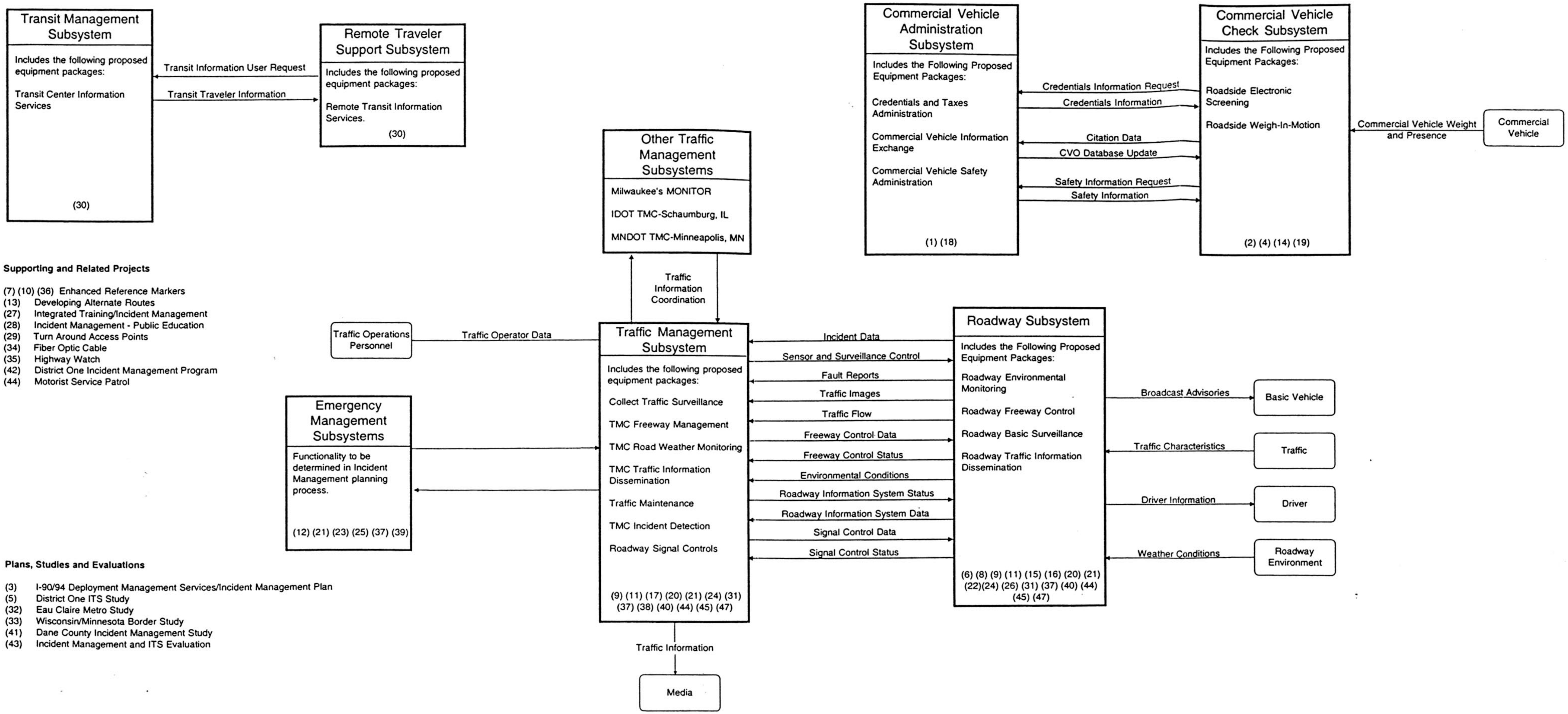


I90/I94 HAR
Architecture Flow Diagram for Vehicle Subsystem



April 7, 2000

Preliminary I-90/94 Corridor Regional Architecture: Identification of Subsystems and Dataflows



Supporting and Related Projects

(7) (10) (36) Enhanced Reference Markers
(13) Developing Alternate Routes
(27) Integrated Training/Incident Management
(28) Incident Management - Public Education
(29) Turn Around Access Points
(34) Fiber Optic Cable
(35) Highway Watch
(42) District One Incident Management Program
(44) Motorist Service Patrol

Plans, Studies and Evaluations

(3) I-90/94 Deployment Management Services/Incident Management Plan
(5) District One ITS Study
(32) Eau Claire Metro Study
(33) Wisconsin/Minnesota Border Study
(41) Dane County Incident Management Study
(43) Incident Management and ITS Evaluation

The architectural diagram illustrates the functionalities that will be either enabled or enhanced by existing, proposed and future projects of the I-90/94 ITS Corridor Program.

Existing Projects

1) Automated Oversize/Overweight Permit Routing System
2) Portable Weigh-in-Motion System
3) I-90/94 Deployment Management Services, Incident Management Plan Development
4) High Speed Weigh-in-Motion
5) District One Traffic Management Study
6) Portable Changeable Message Signs- District 1
7) Enhanced Reference Markers
8) Portable Changeable Message Signs
9) Corridor Traveler Information - District 6
   Portable and Permanent Highway Advisory Radio
   Upgrade Port at State Patrol
   Portable Changeable Message Signs

I-90/94 Proposed Priority Projects (FY 2001)

10) Enhanced Reference Markers
11) Vehicle Surveillance and Detection System
12) Integrated Communication System
13) Developing Alternate Routes
14) Smart Scales Facility
15) Automated Road Condition Warning System
16) RWIS/Internet Traveler Information System
17) Corridor Traffic Management Center Software Development

I-90/94 Proposed Projects (FY 2002-2005)

18) Connect to SAFER Database
19) Smart Scale Facility with WIM (2)
20) Additional Permanent CMS (6)
21) Pilot Automatic Rerouting System
22) Traffic Control Warning Devices
23) Cellular Call Origin Test Site
24) Portable Travel Time Reporting System (6)
25) Cellular Telephone Hotline Test Site,Operational Dispatch Center and Promotions
26) Bridge Anti-Icing
27) Integrated Training/Incident Management
28) Incident Management - Public Education
29) Turn Around Access Points
30) Automated Transit Schedule Test Site
31) Overheight Warnings at Bridges - Pilot Project

Other Prioritized Projects

32) Eau Claire Metro Study
33) Wisc/Minnesota Border Study
34) Fiber Optic Cable
35) Highway Watch

District One ITS Workplan FY00-FY05

36) Enhanced Reference Markers
37) ATMS/ATIS Development and Implementation
38) ATMS Center
39) Integrated Communication System
40) Pilot Ramp Meter
41) Dane County Incident Management Study
42) District One Incident Management Program
43) Incident Management and ITS Evaluation
44) Portable Changeable Message Signs
45) Traffic Signal System
46) Motorist Service Patrol
47) Crash Investigation Tools

WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: Highway Advisory Radio

1. What agencies are/were involved with the project? What was that agency's role?
Wisconsin DOT

2. Who are the markets and customers for information services?

	By Mode		**By Purpose**	**Transit & Paratransit Providers**			
X	Auto Drivers		Telecommuters		Vehicle Drivers		Trip Planning
	Auto Passengers		Pedestrians		Reservations/scheduling		School Administration/School Bus Driver
	Transit Riders		Bicycle Riders	X	Dispatching		
	Paratransit Riders	X	Freight Carriers	**Emergency Service Dispatchers (air and land)**			
X	Commuters (work)		Seasonal/2nd Residence	X	Ambulance		State Patrol
X	Non-Work	X	Tourism		Police		Highway Helpers
X	Recreation	X	Pass Through Traffic (trucks/autos)		Fire	X	Tow Truck Operators
Fleet Managers/Dispatchers				**Agencies/Jurisdictions**			
X	Shippers		Delivery Fleets		Maintenance/Operations	X	State/County/City/Transit. Etc.
X	Transit Dispatchers	X	Freight Carriers	X	Transit Operations		Traffic Management Centers
Other Users/Disseminators							
	Employers		New/TV and Radio Reports				
	MPOs, TMOs & ATPs						

Other

3. What is the travel-related information that is be delivered? What is the level of accuracy of the delivered information?

	Route specific road surface condition-weather related		Tourist information: lodging and activities, gas stations, truck stops
X	Road surface construction/ops		Medical emergency facilities locations
X	Weight restrictions (weather related, but different)		Transit scheduling
	Trip travel times/operating or actual speeds		Park and ride locations
	Congestion levels		Airport and parking information
	Incidents		In-vehicle road guidance
	Weather conditions (visibility, etc.)		Mayday
X	Posted detours		Parking available (metro area)
X	Closures/alternate routes		Event parking and information

Other

4. When (at what point before or during the trip) is the information be delivered?

Data Timing/Accuracy				**Trip-Related Timing**			
	Current		Periodic		Before the trip		On-site/at-site
	Real Time	X	Forecasted	X	During the trip		At all times
	Delayed						

Other

5. At what frequency is the information provided/updated?
The information is updated as needed during large construction projects if road conditions change as a result.

6. Where (in what geographic area) is the information delivered?

	Metro Area		Other Cities
X	Spot		Sub-regions
X	Small area		Rural areas
	Corridor		Statewide
	Metro-wide		Out of State

Other

7. How (by what method) will the information be delivered ot the user?

	Phones		Internet/Websites/E-mail		Push System
	Cellular phones		Local commercial radio		Pull System
	Pagers	X	Highway Advisory Radio (HAR)	X	Broadcast System
	Kiosks		VMS/CMS		
	View only monitors		Mobile data terminals		
	Fax		In-vehicle devices		
	Intranet		TV/Cable TV		

Other

Low-wattage temporary or permanent installation.

8. Why is the information being provided? What is the desired outcome?

X	Improved Safety	X	Improved customer service		Decreased trip cost		Long range financial savings
	Divert traffic	X	Improved customer satisfaction		Diversion to transit	X	More uniform speeds
X	Less trip delay	X	Time savings		On-time delivery	X	Efficiency
	Fewer trips	X	Greater user satisfaction	X	Trip avoidance	X	Driver satisfaction
X	Less congestion	X	Greater user convenience		Change time of trip		Increased sales tax revenue
X	Improved operations		Less Damage to infrastructure		Fewer accidents		Benefits local economy
	System coordination		Improved transit ridership		Less transit subsidy		Fuel conservation
X	Change destination	X	Change route		Change mode	X	Improved emergency response
	Compliance with laws						

Other

Provides information during the trip so users may adjust their plans accordingly.

9. What data is collected?
Precipitation, Pressure,Temperature, Dew Point, Humidity, Wind, Radar, Cloud Thickness, Precipitation Accumulation, Frozen Accumulation,Road Conditions, Road Temperature, Road Dewpoint, Road Pavement Temperature, Road Freeze Point, Road Snow Depth,Accidents, Road Closures, Congestion, Construction, Danger, Delay, Hazards, Events, and Information.

10. How is the data collected?

X	Automated data feed		Phone	X	Email		
X	Fax		Mail	X	Internet		

Other

11. In what form is the collected data?
The data is in raw form -- it is in paper form when read to the recording on the HAR.

12. How is the data processed? What are the steps to convert the data to usable information?

Data is registered from the construction site and then recorded onto the HAR by phone or other equipment.

13. Is the data/information customized to a specific user group? If so, what group?
The data is customized for any motorist using the road for travel. The data include lane widths for truck driver information.
It is catered to all users.

14. Other
Refer to 1-800-ROAD-WIS write-up for further info -- this is pre-trip traveler information.

15. High Level Block Diagram
Available

16. Sausage Diagram
Available

17. Architecture Flow Diagram
Available

Lane Closures

Wisconsin ATIS Inventory

Project Name: Lane Closure Information	**Agencies:** Wisconsin DOT, Division of Districts, Office of Public Affairs, Department of Highway Operations, Department of Tourism
WisDOT Contact: Barbara Underwood	**End-user Groups:** General public, Commercial Vehicle operators

Project Scope:
The Division of Districts within the Wisconsin Department of Transportation is responsible for collecting and disseminating construction and work zone information to travelers on a yearly basis. Additionally, the Wis/DOT Work Zone Safety Committee, which consists of members within Wis/DOT from various divisions, publishes a statewide campaign on a biannual basis.

Data Collection:
The Division of Districts Communication Manager collects information on the primary road construction projects from the District Communications Managers at the beginning of each construction season. This data collection method ensures consistency in the type of data that is collected and ultimately disseminated statewide. The type of data that is collected is on detours, major road construction projects and alternate routes.

Delivery of Information:
Each year the Division of Districts along with the Office of Public Affairs publishes 250,000 Travel-Easy brochures containing information on the primary road construction projects throughout the state. Through this brochure travelers are directed to the Wis/DOT Home Page and the 1-800-roadwis number that provide the same information.

The Work Zone Safety Committee produces a statewide campaign to disseminate this information on a biannual basis. During the first year of this campaign, television, cable television, and radio spots are run to inform travelers of work zone safety guidelines. At the beginning of the second year posters and other pin-ups are disseminated to the districts for display while the television, cable television, and radio spots continue to be run.

This year a local television station approached Wis/DOT about running an ad on work zone safety. The television station bought all of the air-time to talk about work zone safety and to provide viewers with the locations of several large construction projects throughout the state.

For very large projects, such as the highway 45 project in Milwaukee separate ad campaigns are developed to ensure the information reaches a large number of people.

The Office of Public Affairs develops a holiday information release on an annual basis. This informational release draws from the Travel-Easy brochure and tells what is going on around the state during Memorial Day, 4th of July, Labor Day, and Thanksgiving.

Delivery Mechanisms:
A couple thousand of the posters and other pin-ups are sent to the district offices for display in-house. Additionally, these posters and pin-ups are placed in rest areas, traveler information centers, and other locations that have a high potential of reaching travelers.

The Division of Districts is working very hard to do more of their traveler information dissemination through the Wis/DOT Home Page. They have developed a set of standards and guidelines for all of their print and electronic information to ensure consistency in formatting and content.

Television, cable television, and radio are also used to inform the public about construction projects, detours, and alternate routes.

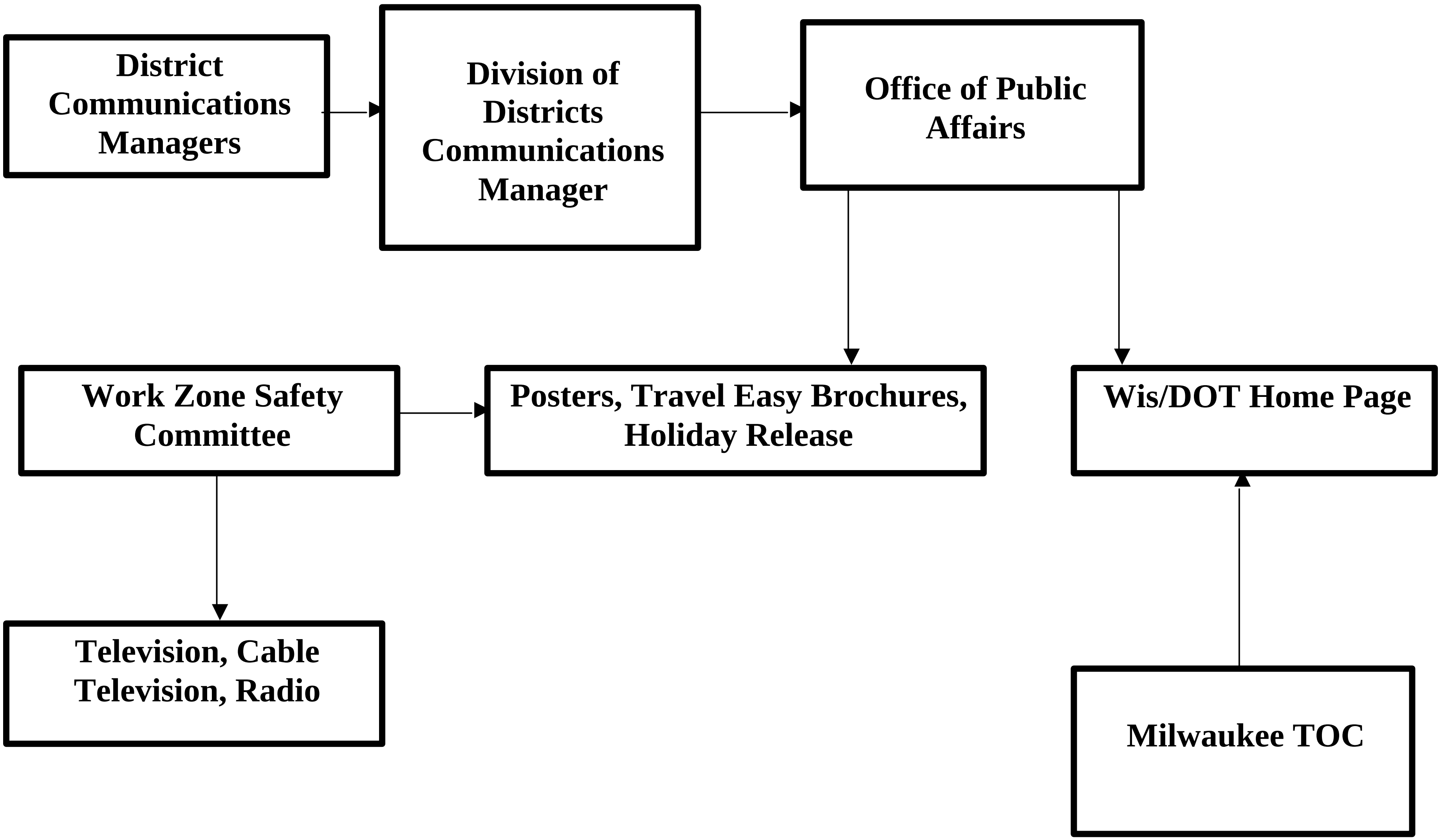
Finally, it should be noted that some districts use a HAR system and VMSs to disseminate information.

The Milwaukee TOC is connected to the Wis/DOT Home page and provides real-time delay information at work zones in the Milwaukee area.

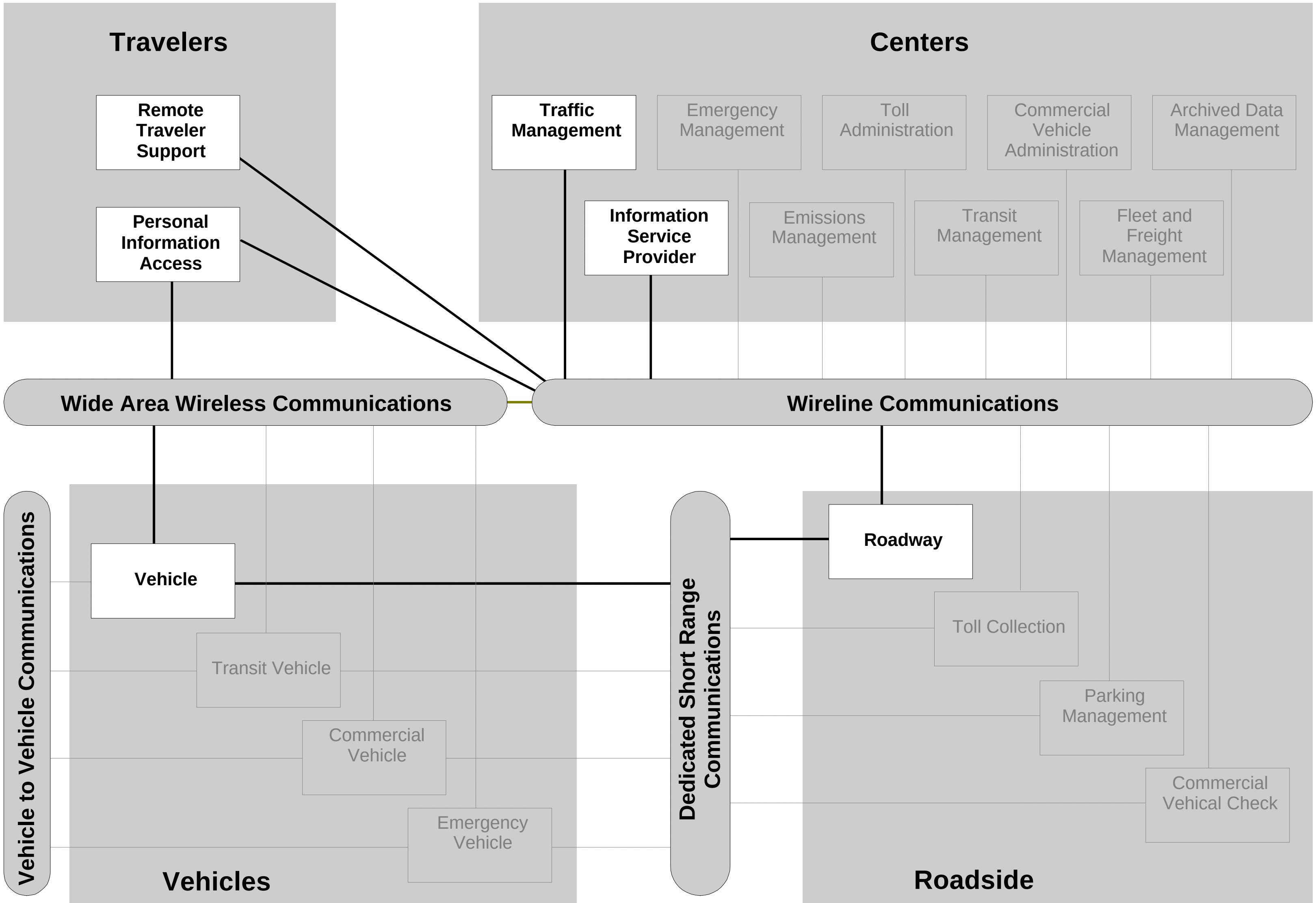
Desired Outcome:
Wis/DOT hopes to provide a safe work zone environment for travelers and construction workers throughout the State of Wisconsin. In addition, Wis/DOT desires to improve operations and lesson congestion in work zone areas by disseminating information and diverting a portion of the normal traffic.

Comments:
The Wis/DOT Home page address is www.dot.state.wi.us.

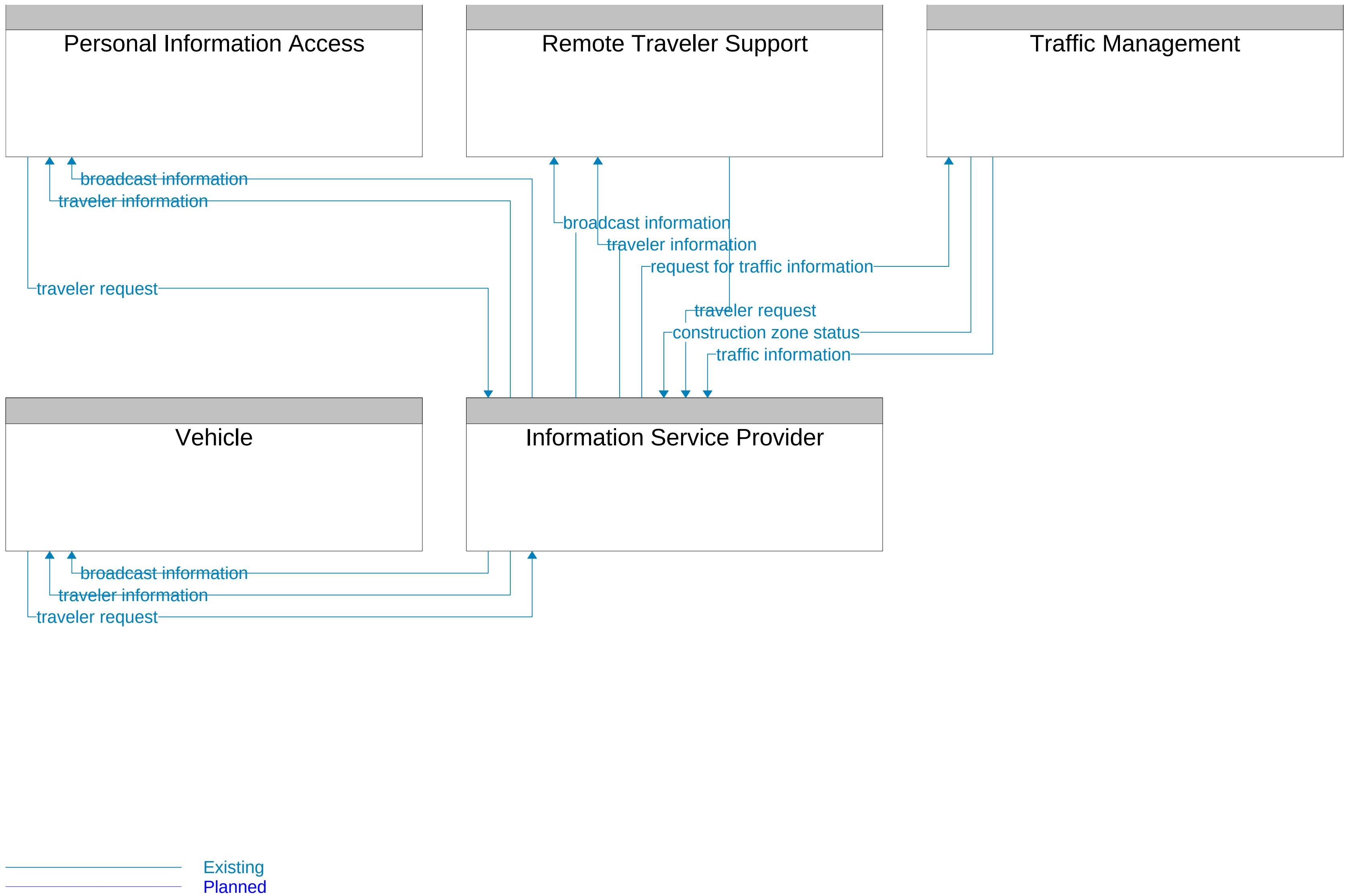
Lane Closure Information Block Diagram



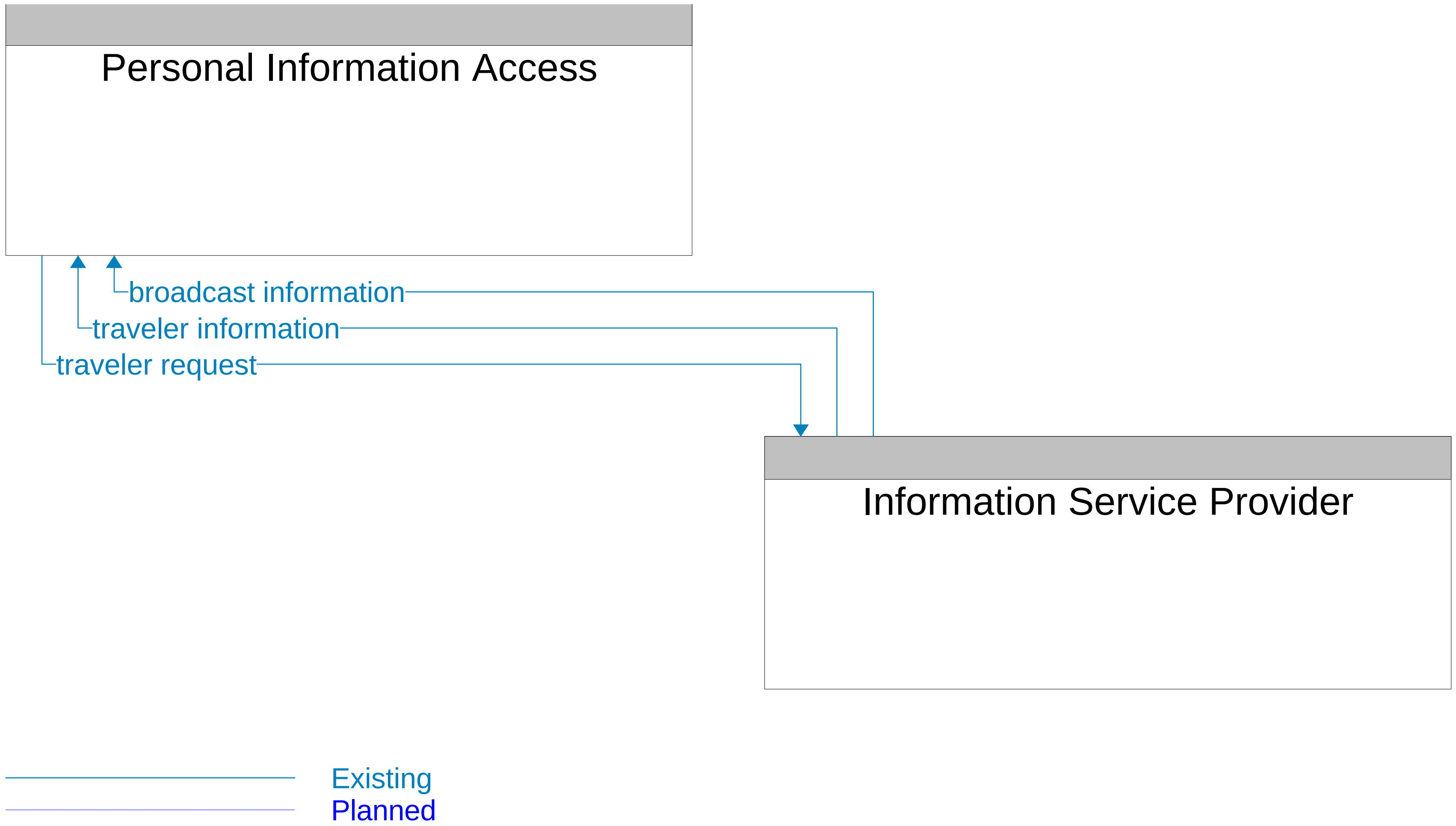
Lane Closures
Subsystems Interconnect Diagram



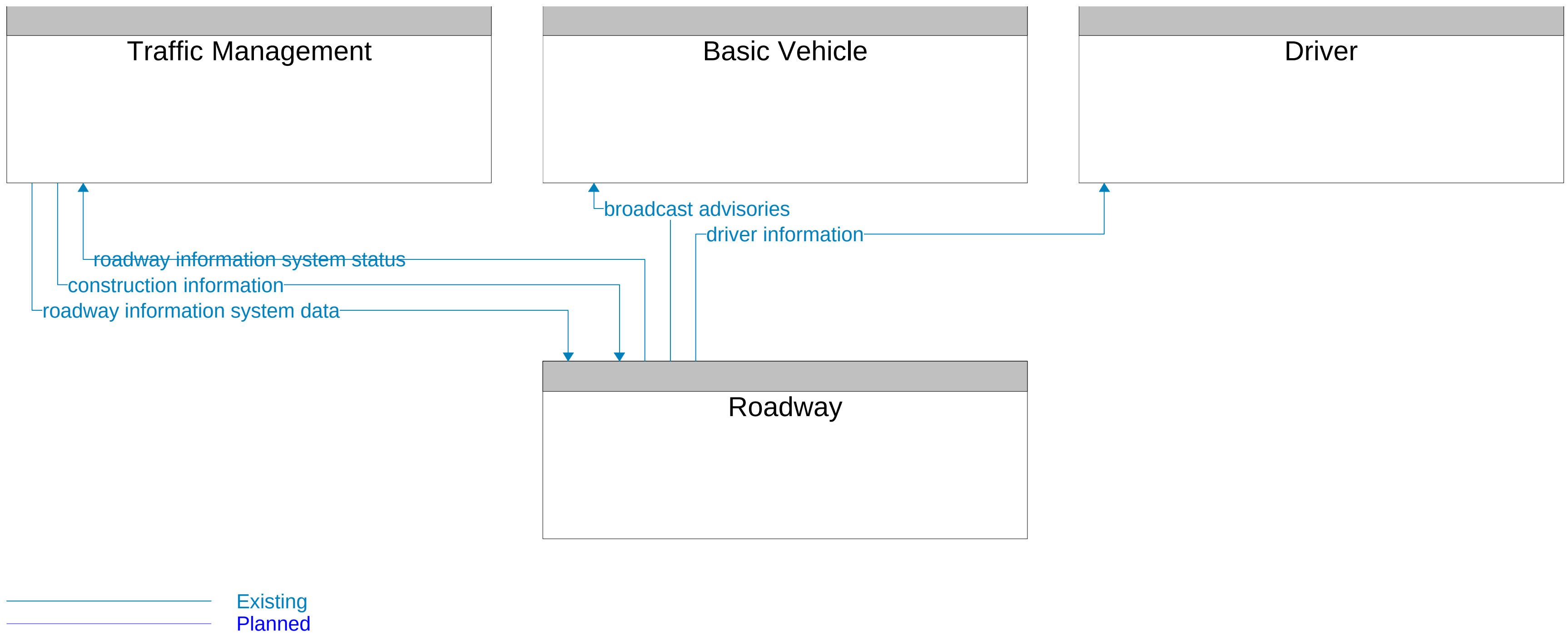
Lane Closures
Architecture Flow Diagram for Information Service Provider Subsystem



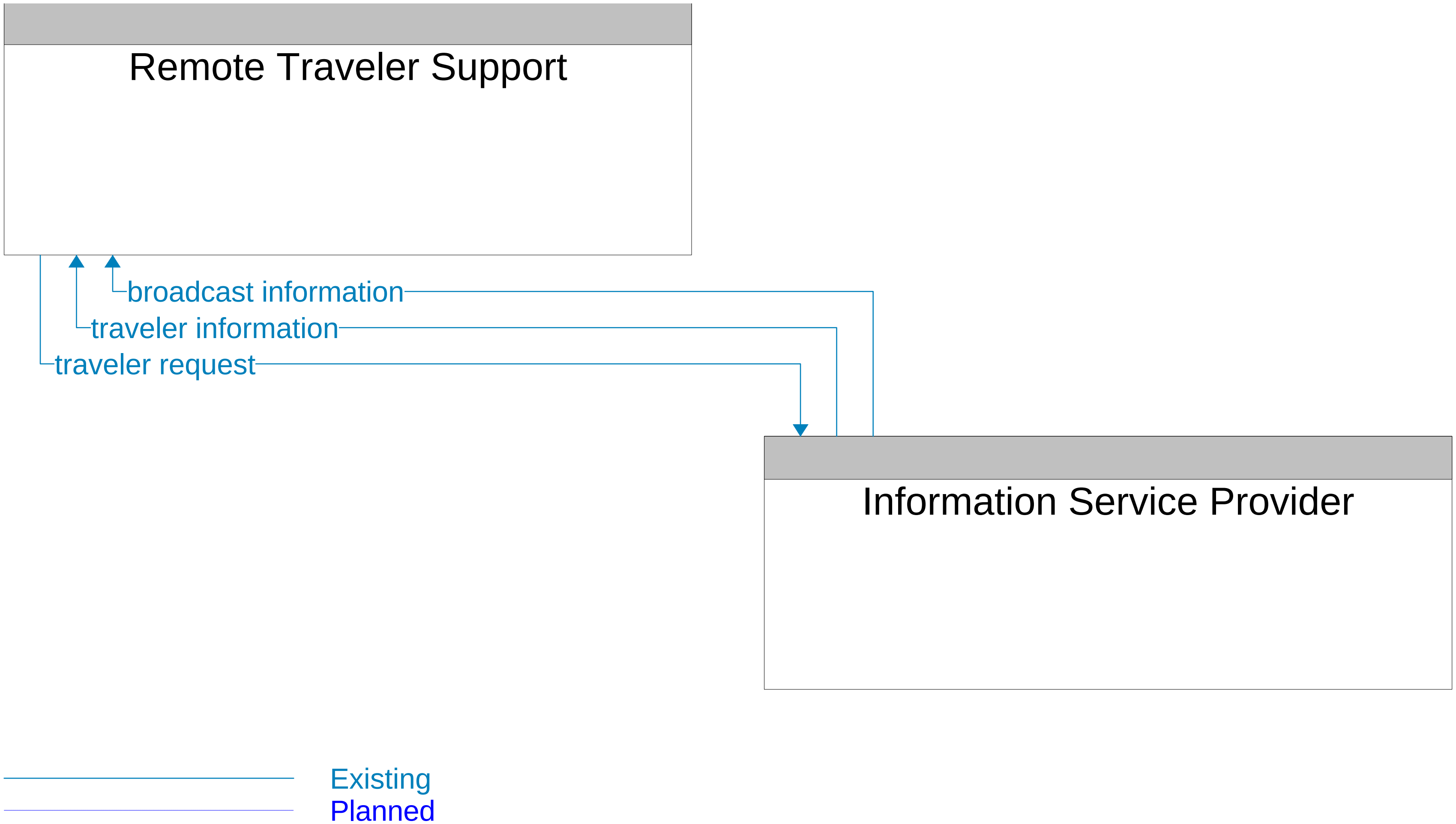
Lane Closures
Architecture Flow Diagram for Personal Information Access Subsystem



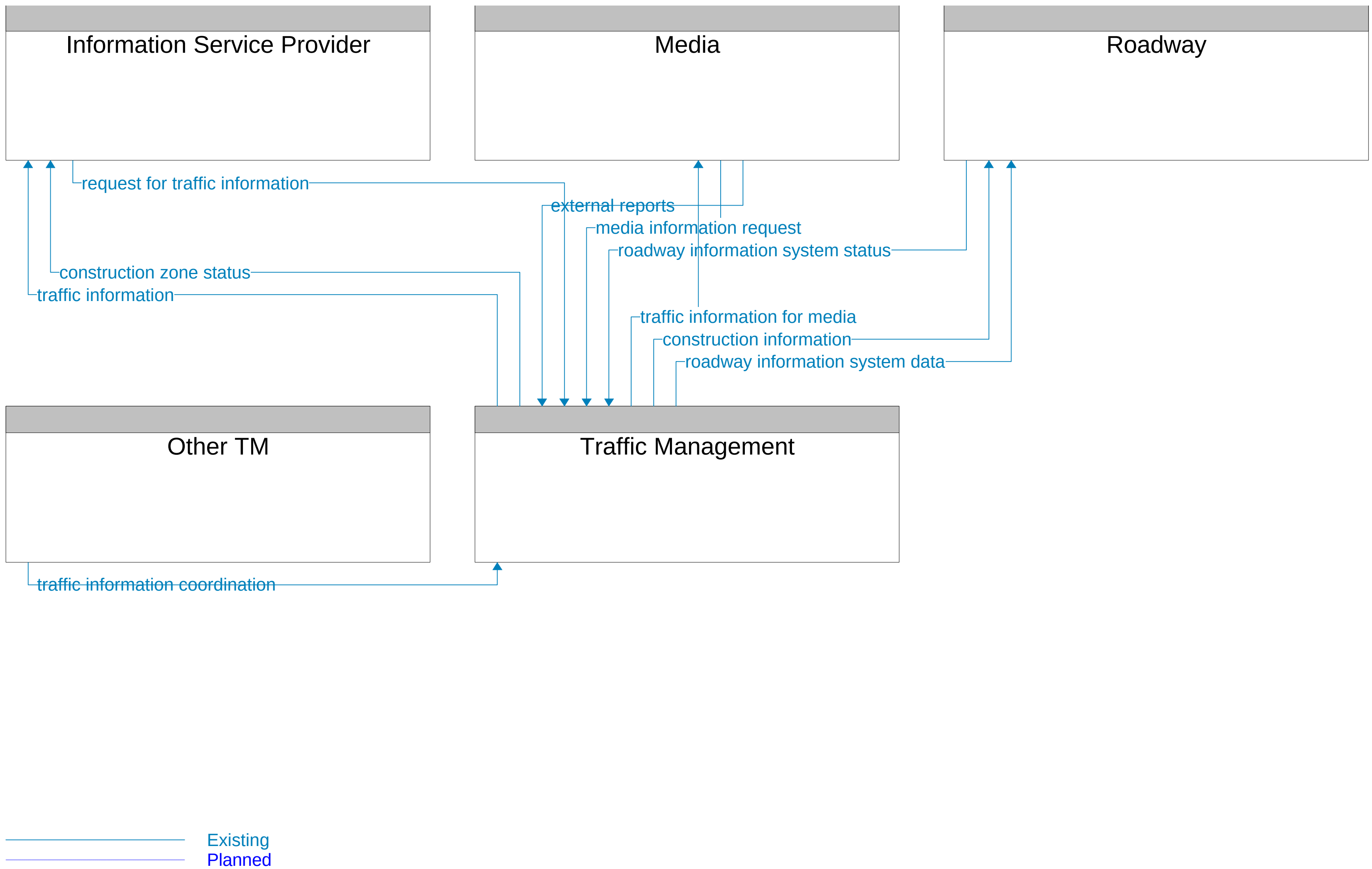
Lane Closures
Architecture Flow Diagram for Roadway Subsystem



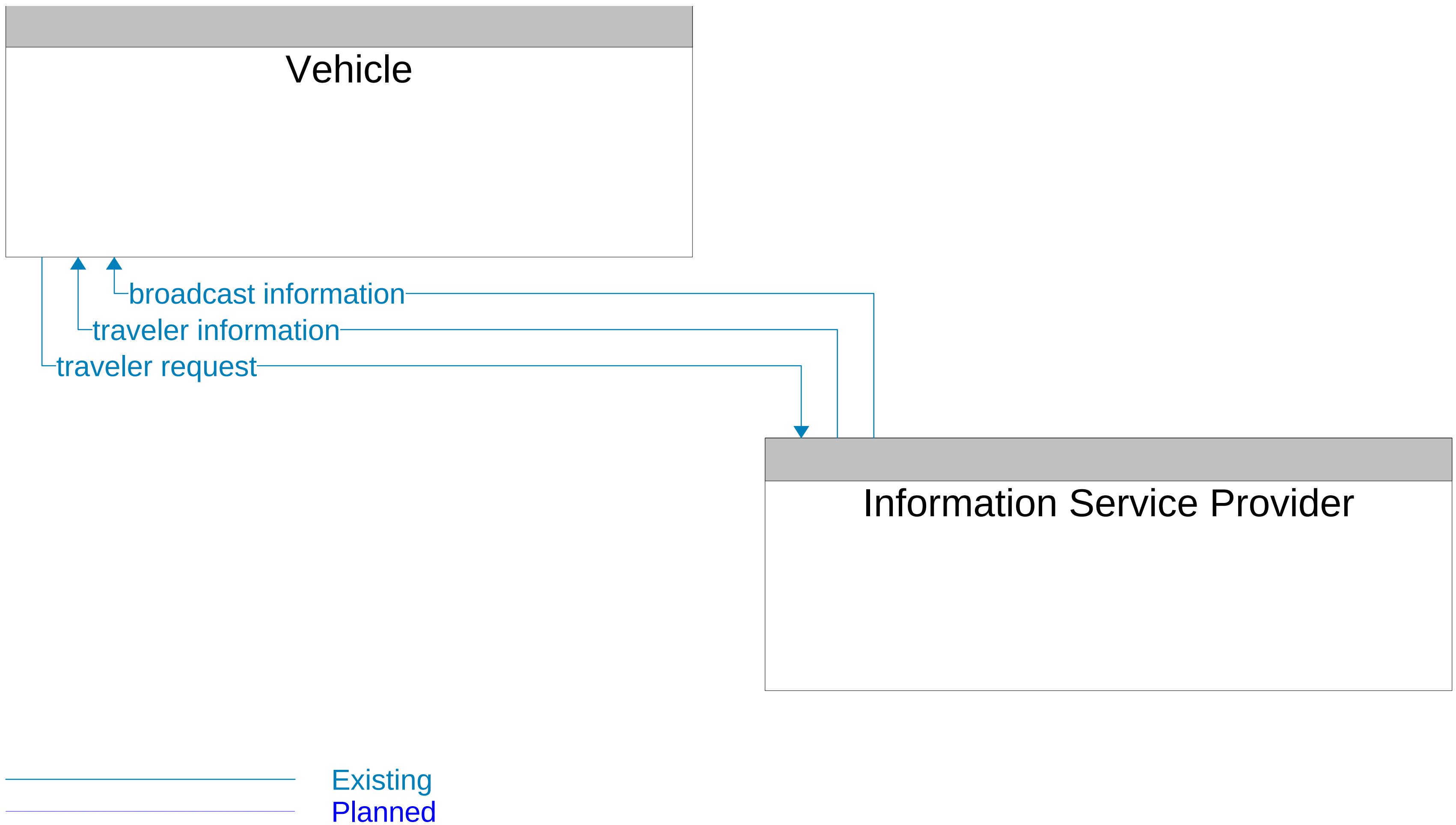
Lane Closures
Architecture Flow Diagram for Remote Traveler Support Subsystem



Lane Closures
Architecture Flow Diagram for Traffic Management Subsystem



Lane Closures
Architecture Flow Diagram for Vehicle Subsystem



WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: Lane Closure Information

1. What agencies are/were involved with the project? What was that agency's role?
Wis/DOT Department of Highway Operations, Wis/DOT Department of Tourism, Division of Districts, Public Affairs
2. Who are the markets and customers for information services?

	By Mode		**By Purpose**	**Transit & Paratransit Providers**			
X	Auto Drivers		Telecommuters		Vehicle Drivers		Trip Planning
X	Auto Passengers		Pedestrians		Reservations/scheduling		School Administration/School Bus Driver
	Transit Riders		Bicycle Riders		Dispatching		
	Paratransit Riders	X	Freight Carriers	**Emergency Service Dispatchers (air and land)**			
X	Commuters (work)	X	Seasonal/2nd Residence		Ambulance		State Patrol
X	Non-Work	X	Tourism		Police		Highway Helpers
X	Recreation	X	Pass Through Traffic (trucks/autos)		Fire		Tow Truck Operators
Fleet Managers/Dispatchers				**Agencies/Jurisdictions**			
	Shippers		Delivery Fleets	X	Maintenance/Operations		State/County/City/Transit. Etc.
X	Transit Dispatchers	X	Freight Carriers		Transit Operations	X	Traffic Management Centers
Other Users/Disseminators							
	Employers	X	New/TV and Radio Reports				
	MPOs, TMOs & ATPs						

Other

3. What is the travel-related information that is be delivered? What is the level of accuracy of the delivered information?

	Route specific road surface condition-weather related		Tourist information: lodging and activities, gas stations, truck stops
X	Road surface construction/ops		Medical emergency facilities locations
	Weight restrictions (weather related, but different)		Transit scheduling
	Trip travel times/operating or actual speeds		Park and ride locations
	Congestion levels		Airport and parking information
	Incidents		In-vehicle road guidance
	Weather conditions (visibility, etc.)		Mayday
X	Posted detours		Parking available (metro area)
X	Closures/alternate routes		Event parking and information

Other

4. When (at what point before or during the trip) is the information be delivered?

Data Timing/Accuracy				**Trip-Related Timing**			
X	Current		Periodic	X	Before the trip	X	On-site/at-site
	Real Time		Forecasted	X	During the trip	X	At all times
	Delayed						

Other

5. At what frequency is the information provided/updated?
Milwaukee TOC provides real-time delay in the Milwaukee area at work zones.

6. Where (in what geographic area) is the information delivered?

X	Metro Area		Other Cities
	Spot		Sub-regions
	Small area		Rural areas
	Corridor	X	Statewide
	Metro-wide		Out of State

Other

WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: Lane Closure Information

7. How (by what method) will the information be delivered ot the user?

X	Phones	X	Internet/Websites/E-mail		Push System
X	Cellular phones	X	Local commercial radio		Pull System
	Pagers	X	Highway Advisory Radio (HAR)		Broadcast System
	Kiosks	X	VMS/CMS		
	View only monitors		Mobile data terminals		
	Fax		In-vehicle devices		
	Intranet	X	TV/Cable TV		

Other

8. Why is the information being provided? What is the desired outcome?

X	Improved Safety	X	Improved customer service		Decreased trip cost		Long range financial savings
X	Divert traffic	X	Improved customer satisfaction		Diversion to transit		More uniform speeds
X	Less trip delay	X	Time savings		On-time delivery	X	Efficiency
	Fewer trips	X	Greater user satisfaction		Trip avoidance	X	Driver satisfaction
X	Less congestion	X	Greater user convenience		Change time of trip		Increased sales tax revenue
X	Improved operations		Less Damage to infrastructure	X	Fewer accidents		Benefits local economy
	System coordination		Improved transit ridership		Less transit subsidy		Fuel conservation
	Change destination	X	Change route		Change mode		Improved emergency response
	Compliance with laws						

Other

9. What data is collected?
Detours, work zones, alternate routes

10. How is the data collected?

	Automated data feed	X	Phone				
X	Fax		Mail				

Other

11. In what form is the collected data?
Value Added

12. How is the data processed? What are the steps to convert the data to usable information?
The data is combined and published in a public brochure, television ad, and radio ad.

13. Is the data/information customized to a specific user group? If so, what group?
Television, radio, publishing groups

14. Other

15. High Level Block Diagram
Available

16. Sausage Diagram
Available

17. Architecture Flow Diagram
Available

Madison Metro ITS Initiatives

Wisconsin ATIS Inventory

Project Name: Madison Metro ITS Related Initiatives

Agencies:
Madison Metro

WisDOT Contact: Dave Eveland at Madison Metro

End-user Groups: Transit Travelers and potential transit customers in the greater Madison area

Project Scope: Madison Metro's web site currently contains only copies of transit schedules. However, they plan to introduce an interactive schedule within the year that would allow users to determine their best route and departure time based on their origin and destination information. Real time information should also be available within two years. The Nettleship Group has begun a Needs Analysis for ITS projects that should be available by January 2001.

Data Collection:
Since the web site uses static schedule information no data collection is required.

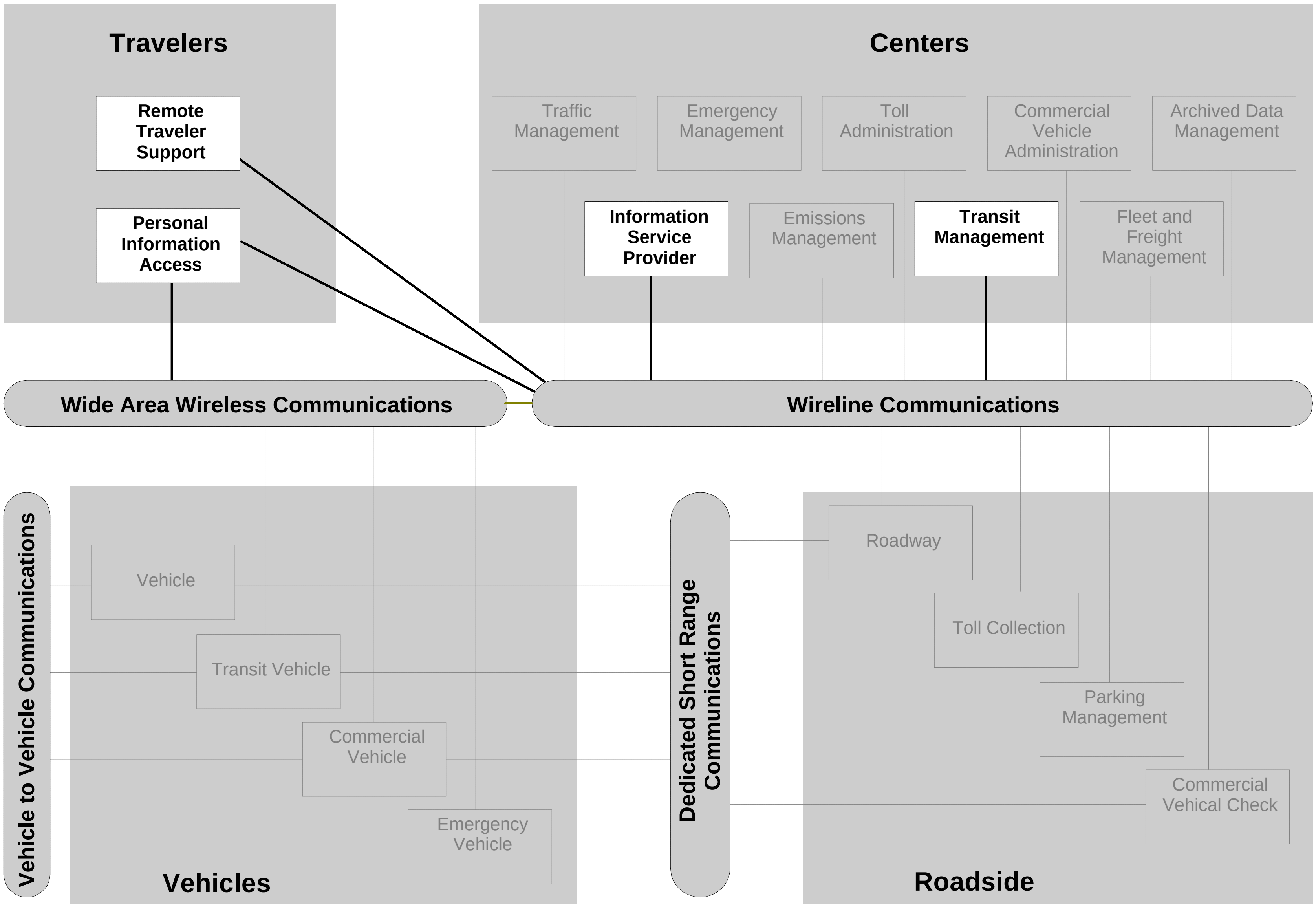
Delivery of Information: The interactive schedule will be available at all times but is primarily useful for trip planning purposes.

Delivery Mechanisms:
Information will be available on the web site and possibly through kiosks located in local shopping malls.

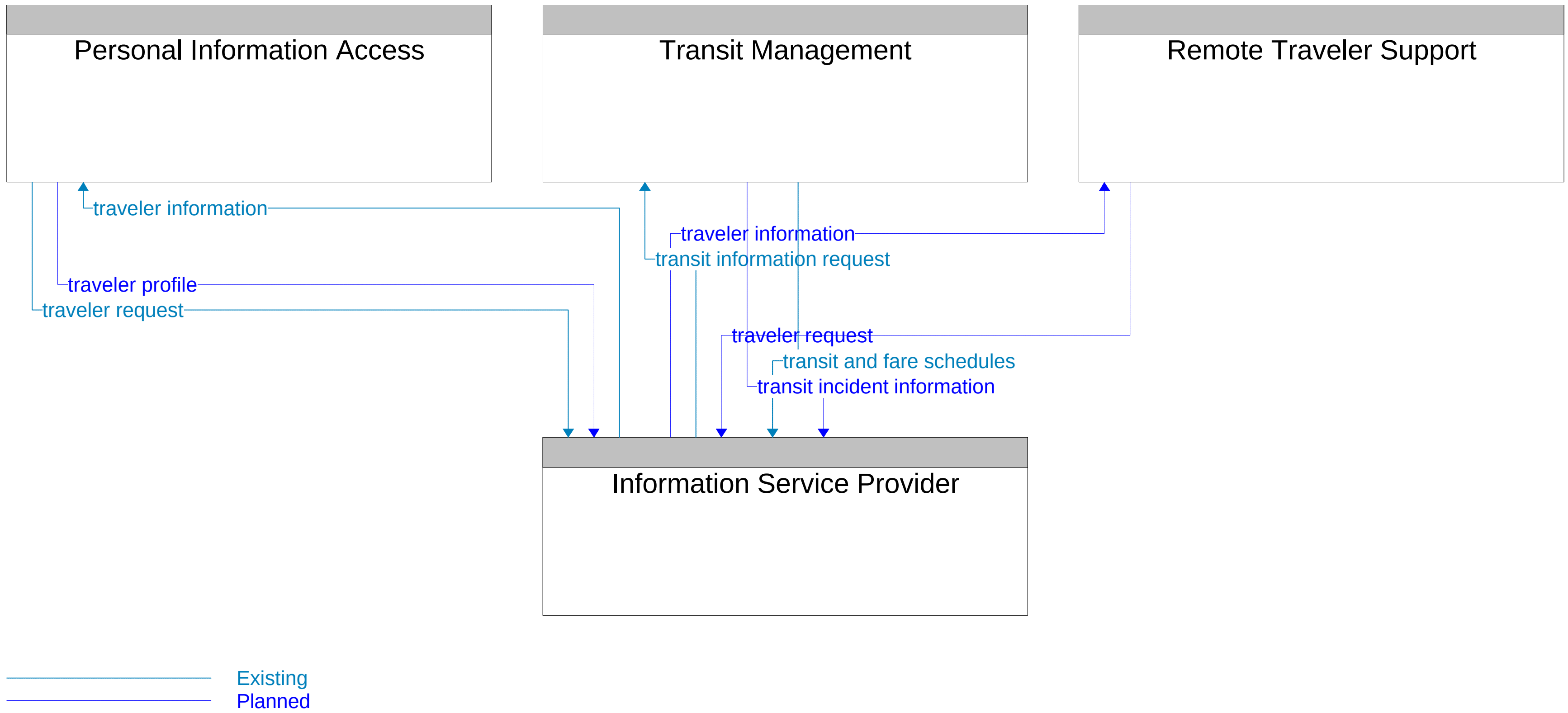
Desired Outcome:
Increased customer satisfaction and the attraction of potential transit customers.

Comments: The Madison Metro web site is available at: www.ci.madison.wi.us/metro

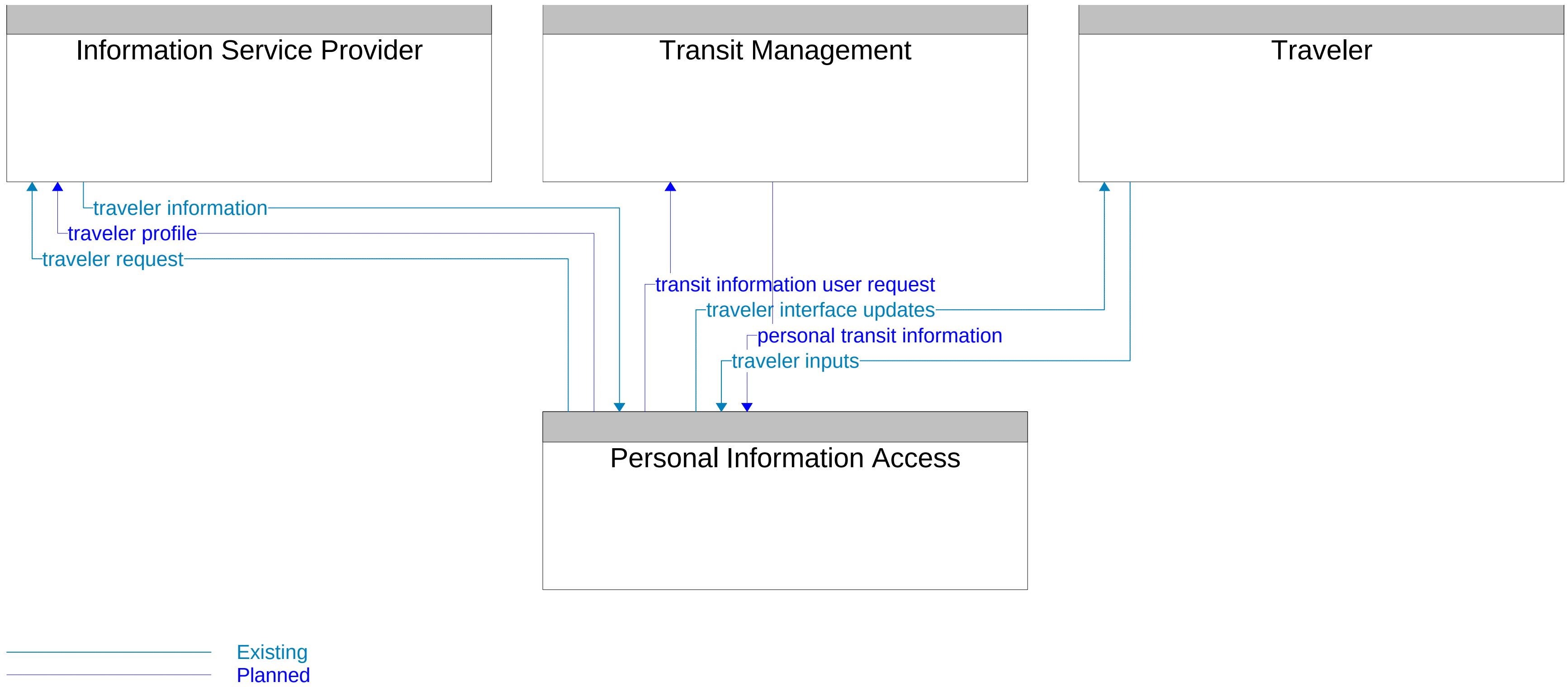
Madison Metro ITS Related Initiatives
Subsystem Interconnect Diagram



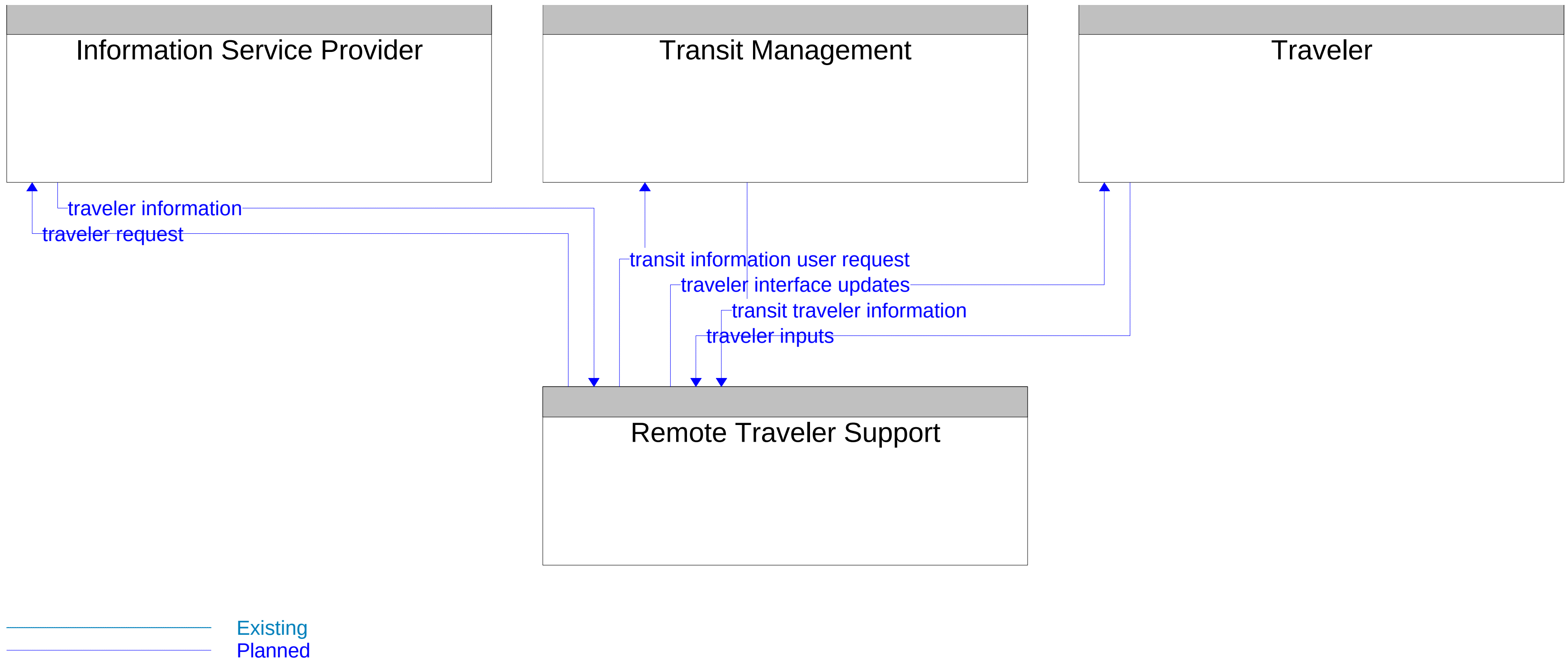
Madison Metro ITS Related Initiatives
Architecture Flow Diagram for Information Service Provider Subsystem



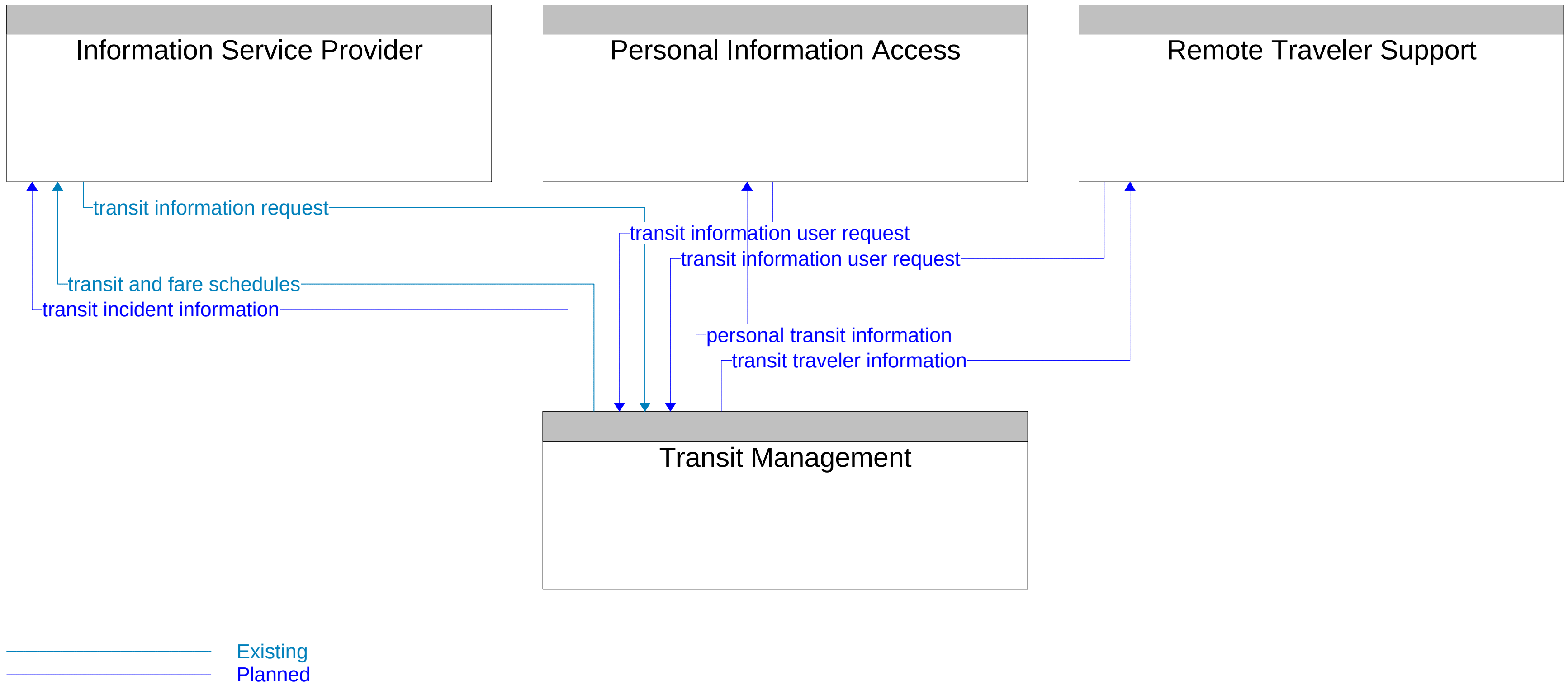
Madison Metro ITS Related Initiatives
Architecture Flow Diagram for Personal Information Access Subsystem



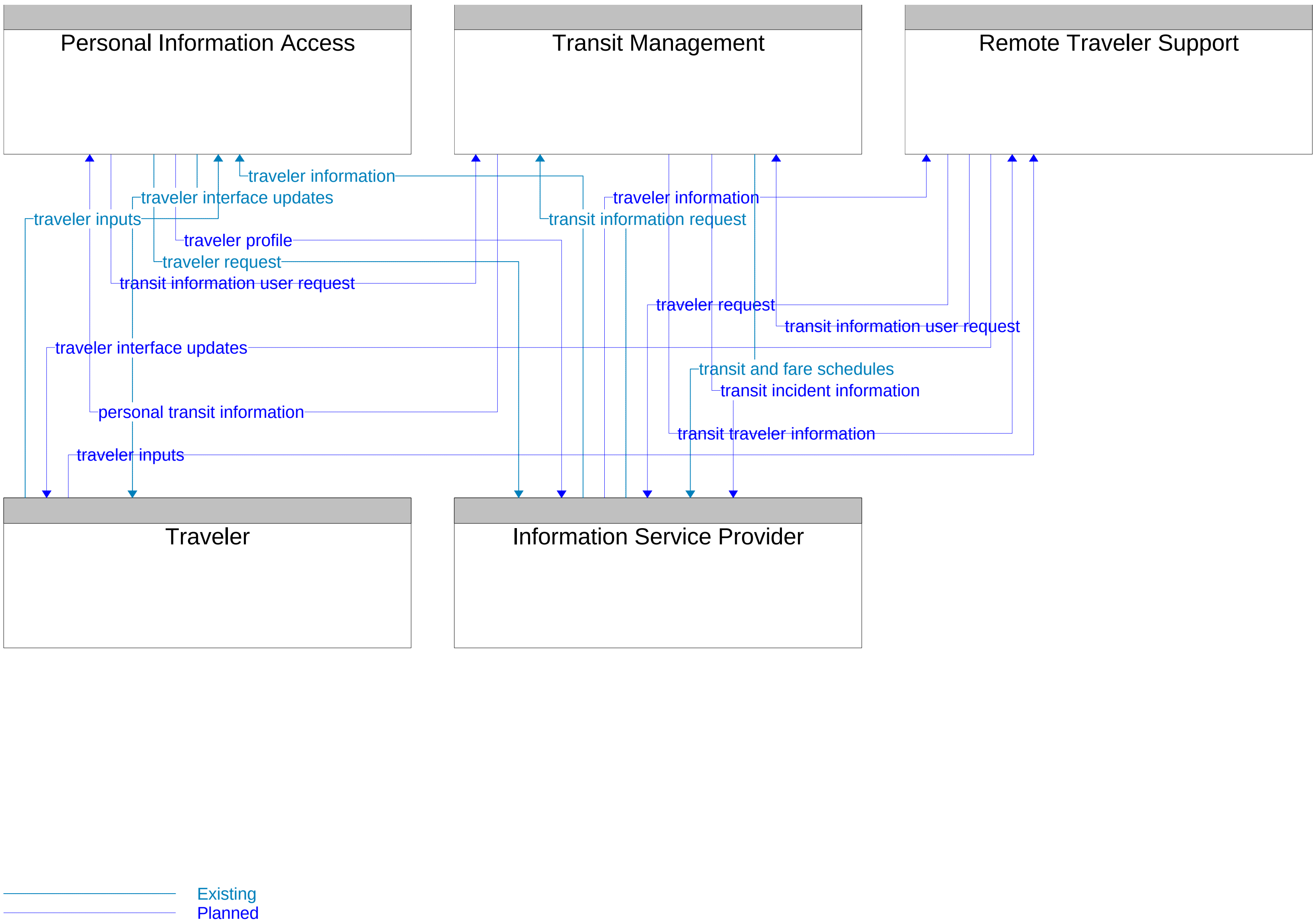
Madison Metro ITS Related Intitiatives
Architecture Flow Diagram for Remote Traveler Support Subsystem



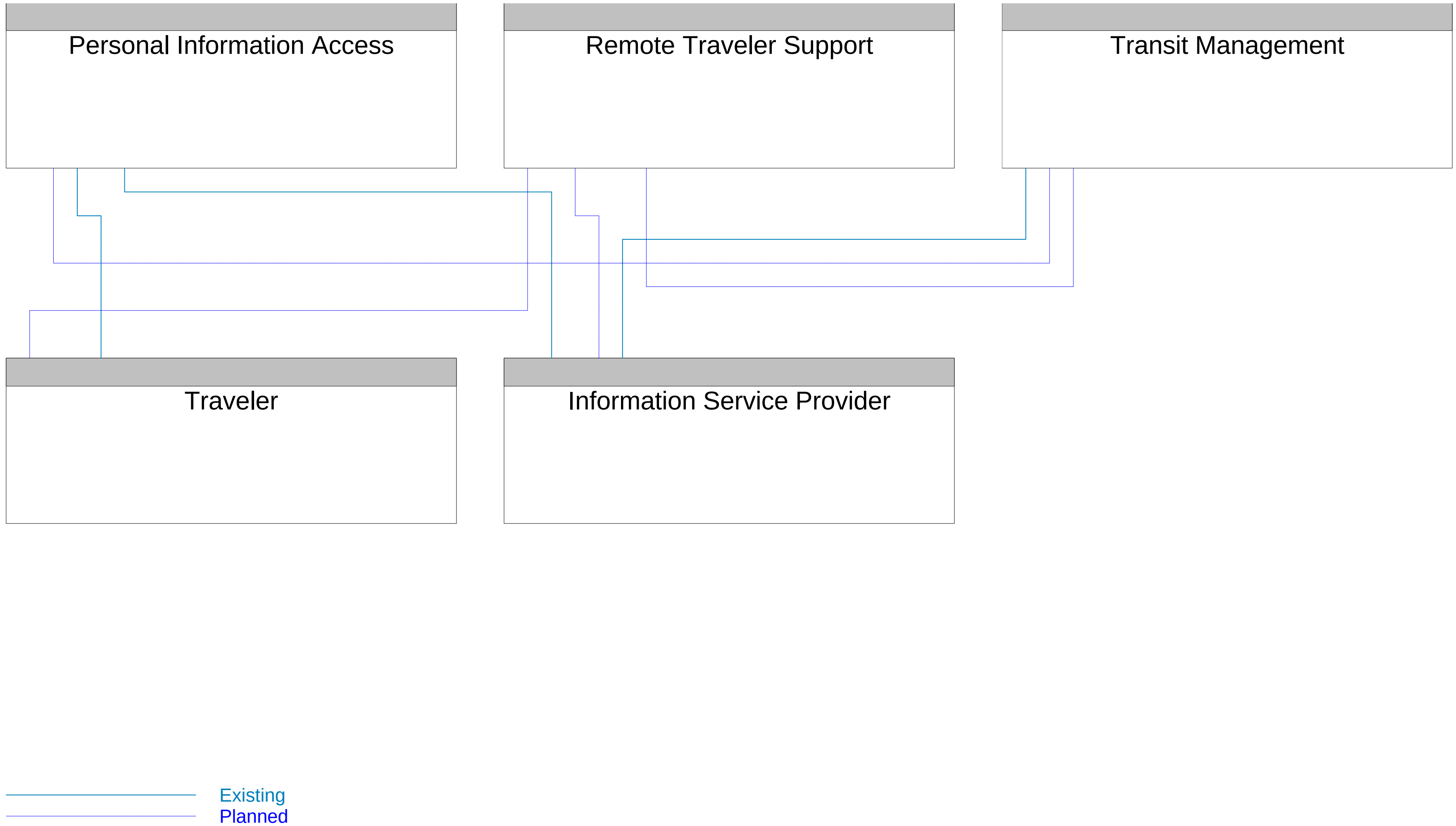
Madison Metro ITS Related Initiatives
Architecture Flow Diagram for Transit Management Subsystem



Madison Metro ITS Related Initiatives
Overall Architecture Flow Diagram



Madison Metro ITS Related Initiatives
Overall Architecture Interconnect Diagram



WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: Madison Metro ITS Related Initiatives

1. What agencies are/were involved with the project? What was that agency's role?
Madison Metro is the only agency currently involved.

2. Who are the markets and customers for information services?

	By Mode		**By Purpose**		**Transit & Paratransit Providers**		
	Auto Drivers		Telecommuters		Vehicle Drivers	X	Trip Planning
	Auto Passengers		Pedestrians		Reservations/scheduling		School Administration/School Bus Driver
X	Transit Riders		Bicycle Riders		Dispatching		
X	Paratransit Riders		Freight Carriers		**Emergency Service Dispatchers (air and land)**		
	Commuters (work)		Seasonal/2nd Residence		Ambulance		State Patrol
	Non-Work		Tourism		Police		Highway Helpers
	Recreation		Pass Through Traffic (trucks/autos)		Fire		Tow Truck Operators
Fleet Managers/Dispatchers					**Agencies/Jurisdictions**		
	Shippers		Delivery Fleets		Maintenance/Operations		State/County/City/Transit. Etc.
	Transit Dispatchers		Freight Carriers		Transit Operations		Traffic Management Centers
Other Users/Disseminators							
	Employers		New/TV and Radio Reports				
	MPOs, TMOs & ATPs						

Other

3. What is the travel-related information that is be delivered? What is the level of accuracy of the delivered information?

	Route specific road surface condition-weather related		Tourist information: lodging and activities, gas stations, truck stops
	Road surface construction/ops		Medical emergency facilities locations
	Weight restrictions (weather related, but different)	X	Transit scheduling
	Trip travel times/operating or actual speeds		Park and ride locations
	Congestion levels		Airport and parking information
	Incidents		In-vehicle road guidance
	Weather conditions (visibility, etc.)		Mayday
	Posted detours		Parking available (metro area)
	Closures/alternate routes		Event parking and information

Other

4. When (at what point before or during the trip) is the information be delivered?

Data Timing/Accuracy				**Trip-Related Timing**			
X	Current		Periodic	X	Before the trip		On-site/at-site
X	Real Time	X	Forecasted		During the trip		At all times
	Delayed						

Other

5. At what frequency is the information provided/updated?
Currently all information is static but real time information may be available within two years. Madison Metro plans to develop interactive schedules which would allow drivers to enter origin and destination information and receive information about routes and schedules.

6. Where (in what geographic area) is the information delivered?

X	Metro Area		Other Cities
	Spot		Sub-regions
	Small area		Rural areas
	Corridor		Statewide
X	Metro-wide		Out of State

Other

WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: Madison Metro ITS Related Initiatives

7. How (by what method) will the information be delivered ot the user?

	Phones	X	Internet/Websites/E-mail		Push System
	Cellular phones		Local commercial radio		Pull System
	Pagers		Highway Advisory Radio (HAR)		Broadcast System
X	Kiosks		VMS/CMS		
	View only monitors		Mobile data terminals		
	Fax		In-vehicle devices		
	Intranet		TV/Cable TV		

Other

8. Why is the information being provided? What is the desired outcome?

	Improved Safety	X	Improved customer service		Decreased trip cost		Long range financial savings
	Divert traffic	X	Improved customer satisfaction		Diversion to transit		More uniform speeds
	Less trip delay	X	Time savings		On-time delivery		Efficiency
	Fewer trips	X	Greater user satisfaction		Trip avoidance		Driver satisfaction
	Less congestion	X	Greater user convenience		Change time of trip		Increased sales tax revenue
	Improved operations		Less Damage to infrastructure		Fewer accidents		Benefits local economy
	System coordination	X	Improved transit ridership		Less transit subsidy		Fuel conservation
	Change destination		Change route		Change mode		Improved emergency response
	Compliance with laws						

Other

9. What data is collected?
Currently the only information on the web site is copies of Madison Metro schedules for all routes. Since schedule information is available directly through Madison Metro no additional data needs to be collected.

10. How is the data collected?

	Automated data feed		Phone				
	Fax		Mail				

Other

11. In what form is the collected data?
Not applicable

12. How is the data processed? What are the steps to convert the data to usable information?
Madison Metro plans to use the Trapeze program to develop the interactive scheduling.

13. Is the data/information customized to a specific user group? If so, what group?
Information is targeted at current and potential transit travelers in the greater Madison area.

14. Other
The Nettleship Group has recently begun work on a Needs Analysis for ITS projects for Madison Metro.

15. High Level Block Diagram
Not available

16. Sausage Diagram
Available

17. Architecture Flow Diagram
Available

MONITOR

Wisconsin ATIS Inventory

Project Name: MONITOR

Agencies: Wisconsin DOT

WisDOT Contact: John Corbin

End-user Groups: General public, emergency responders, WisDOT, road construction and maintenance personnel, local transportation agencies

Project Scope: MONITOR is Milwaukee's freeway traffic management system. It is managed and operated by the Wisconsin Department of Transportation. MONITOR is composed of a system of electronic detectors, ramp meters and overhead message signs, all linked by a common computer system. This system is enhanced by a series of CCTV cameras, dynamic trailblazers, and highway advisory radios. The system is designed to improve efficiency and safety on the freeway by reducing accidents and congestion. MONITOR currently covers approximately 60 freeway centerline miles.

Data Collection: Freeway traffic data is collected through cameras mounted on poles, detector loops in the pavement, and overhead microwave detectors on bridges. This information is continuously transmitted to a control center in downtown Milwaukee. The data is configured onto a map of the freeway system that is divided into links.

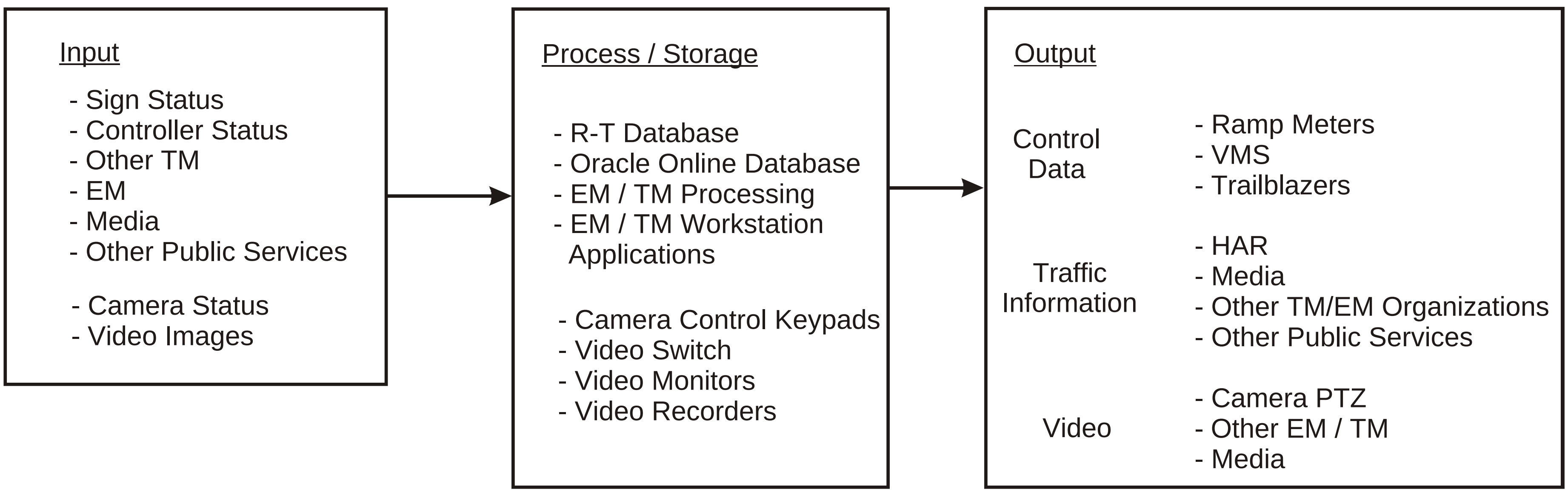
Delivery of Information: MONITOR provides real-time traffic information to motorists during their hours of operation 6 a.m. to 6 p.m., with extended operation during construction and special events. The MONITOR web site, with camera images and the system congestion map, is available at all times.

Delivery Mechanisms: MONITOR provides users with real-time traffic information, construction information, and special event information using variable message signs on the freeway and surface streets, highway advisory radio, dynamic trailblazer signs, an internet web site, and traffic information kiosks.

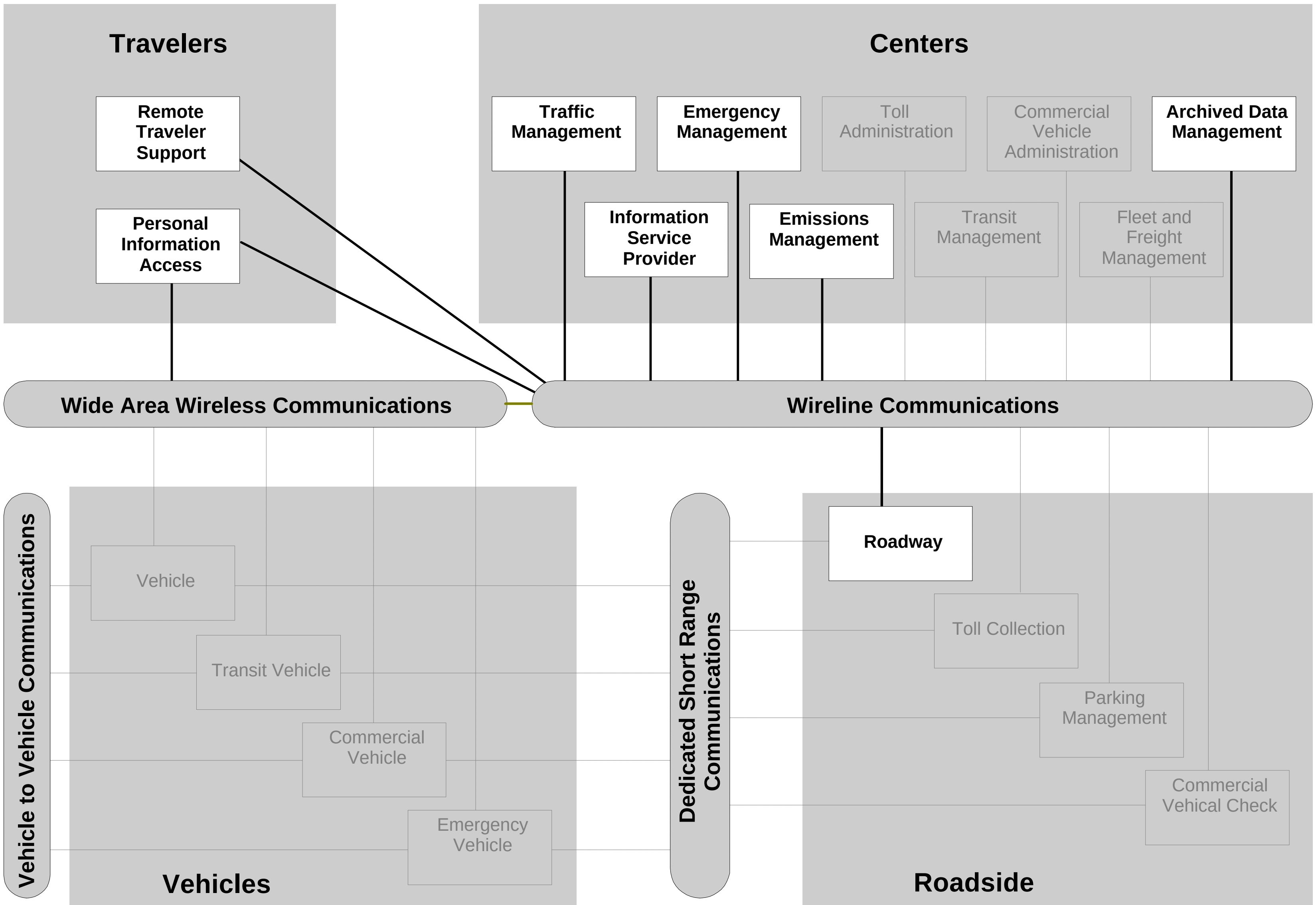
Desired Outcome: Long-range plans for MONITOR are to expand the network to 100 miles of southeastern Wisconsin freeways, including all 68 miles in Milwaukee County. Also, WisDOT is expanding interagency communications by providing camera images to several emergency management agencies and transportation agencies.

Comments: The MONITOR web site, with links to real-time traffic information in Southeastern Wisconsin, can be found at http://www.dot.state.wi.us/dtd/hdist2/monitor.html.

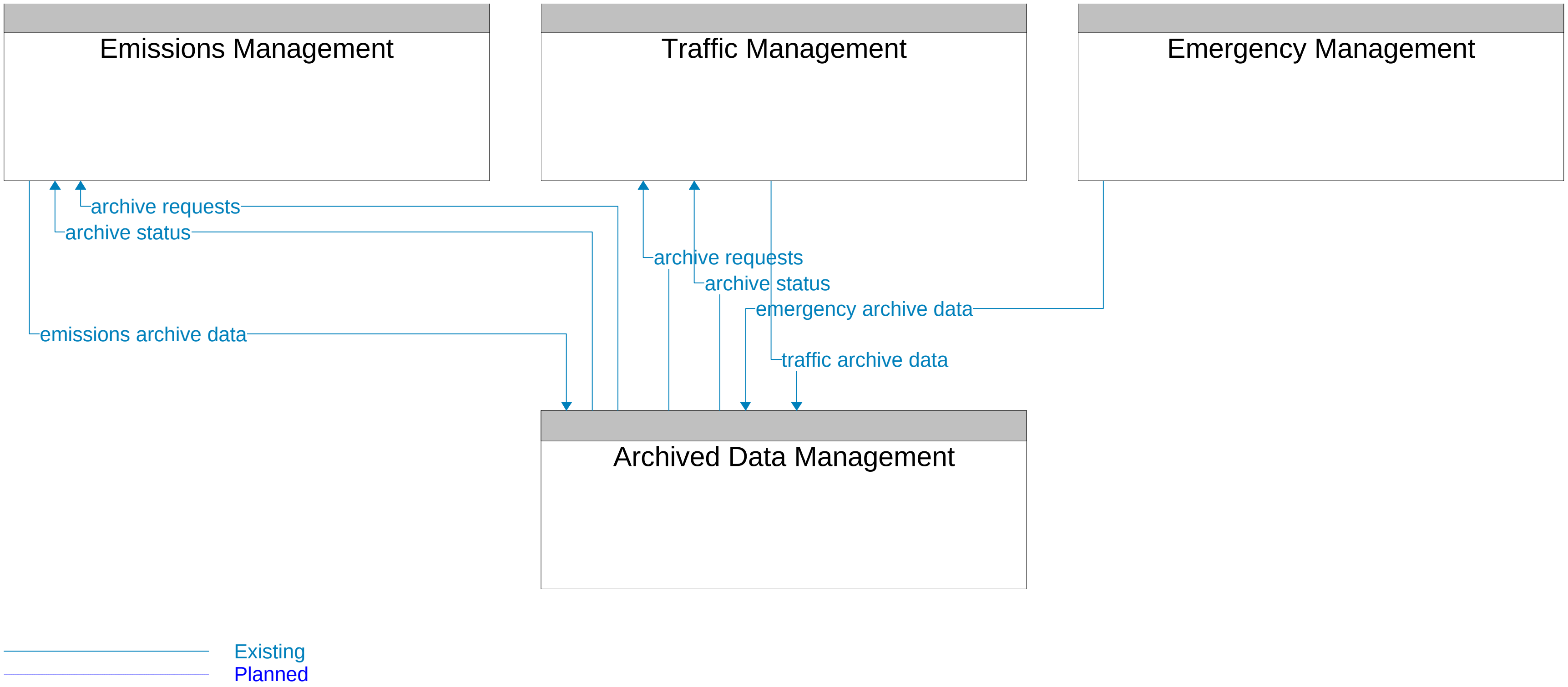
MONITOR Block Diagram



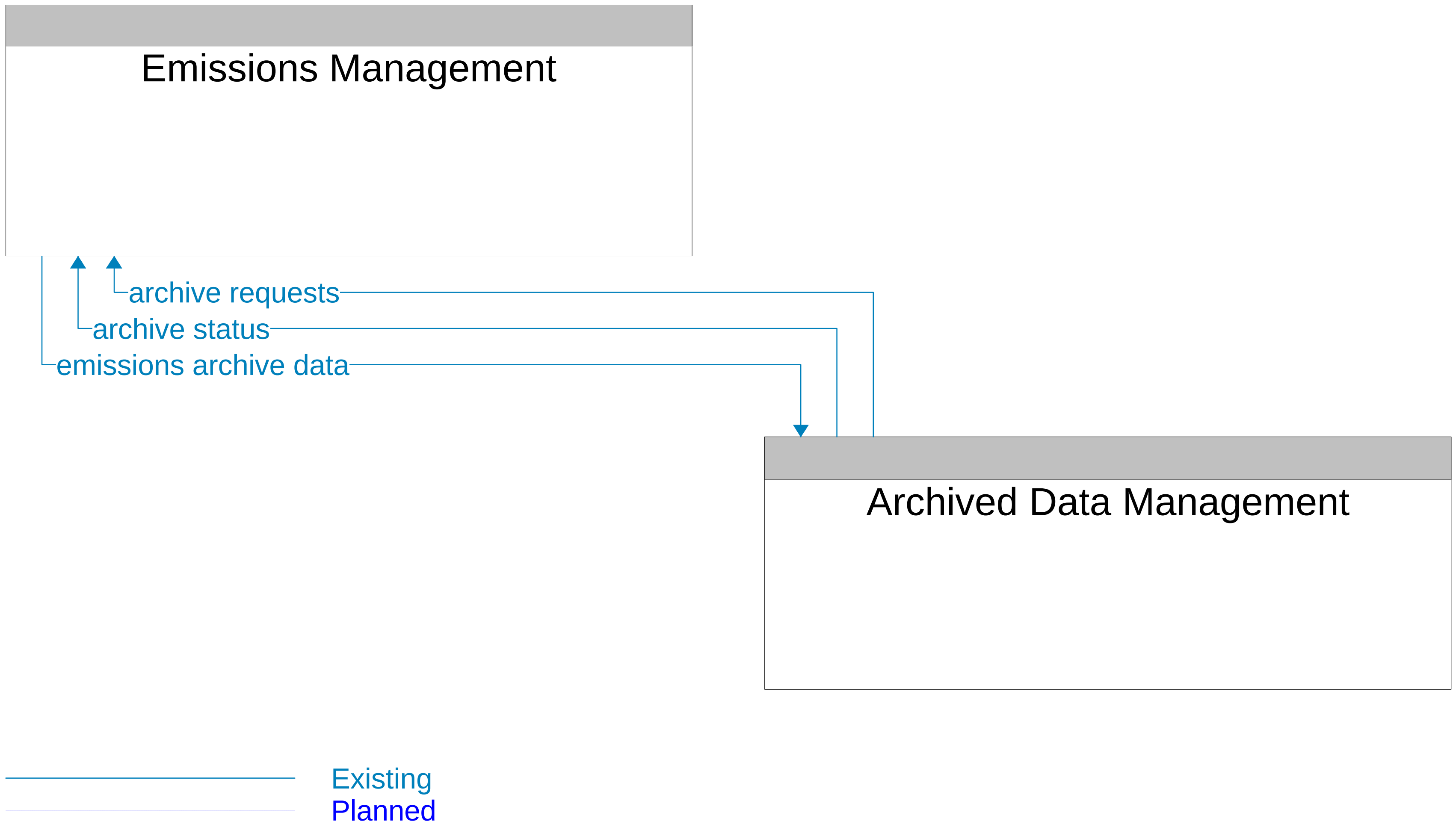
Monitor
Subsystems Interconnect Diagram



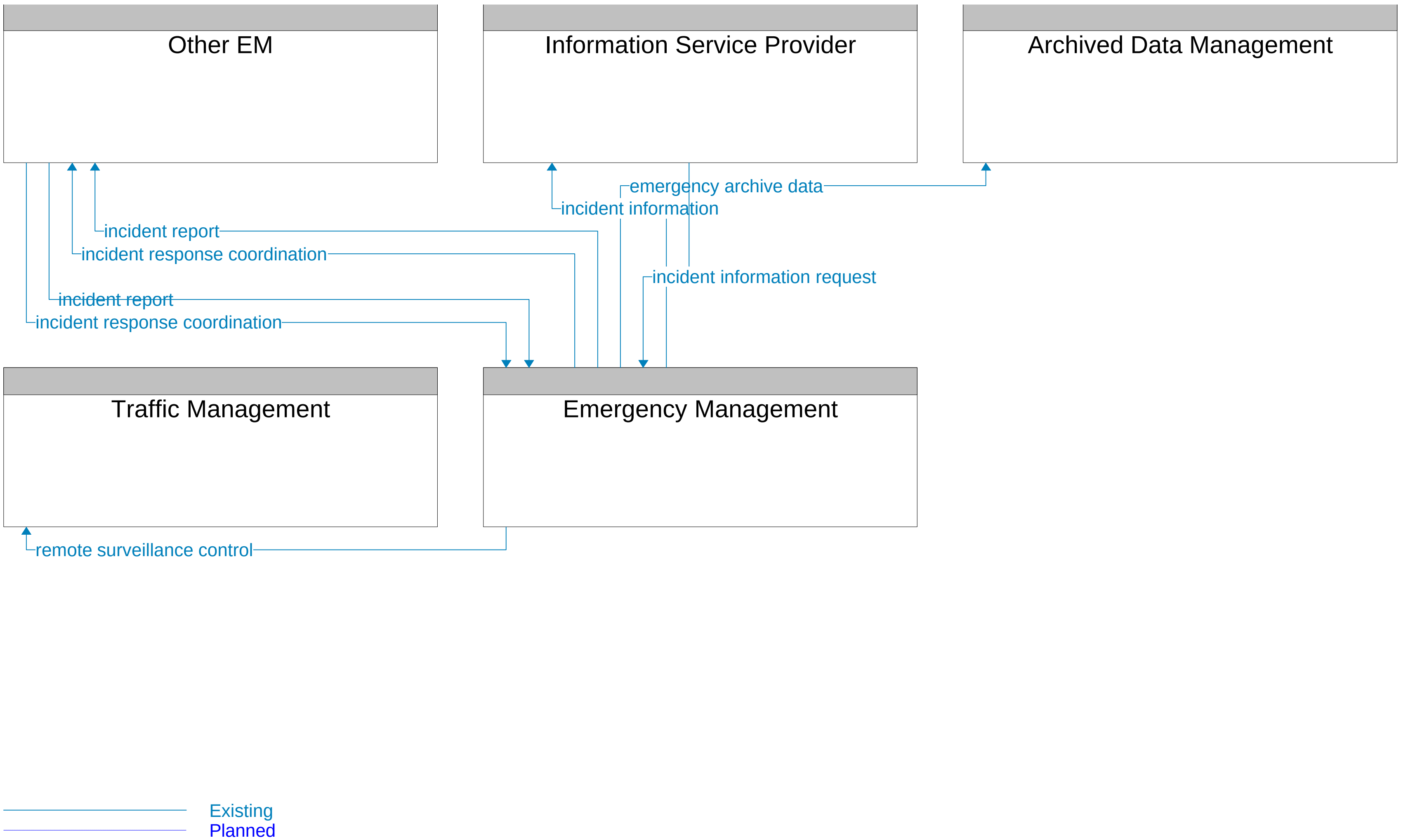
Monitor
Architecture Flow Diagram for Archived Data Management Subsystem



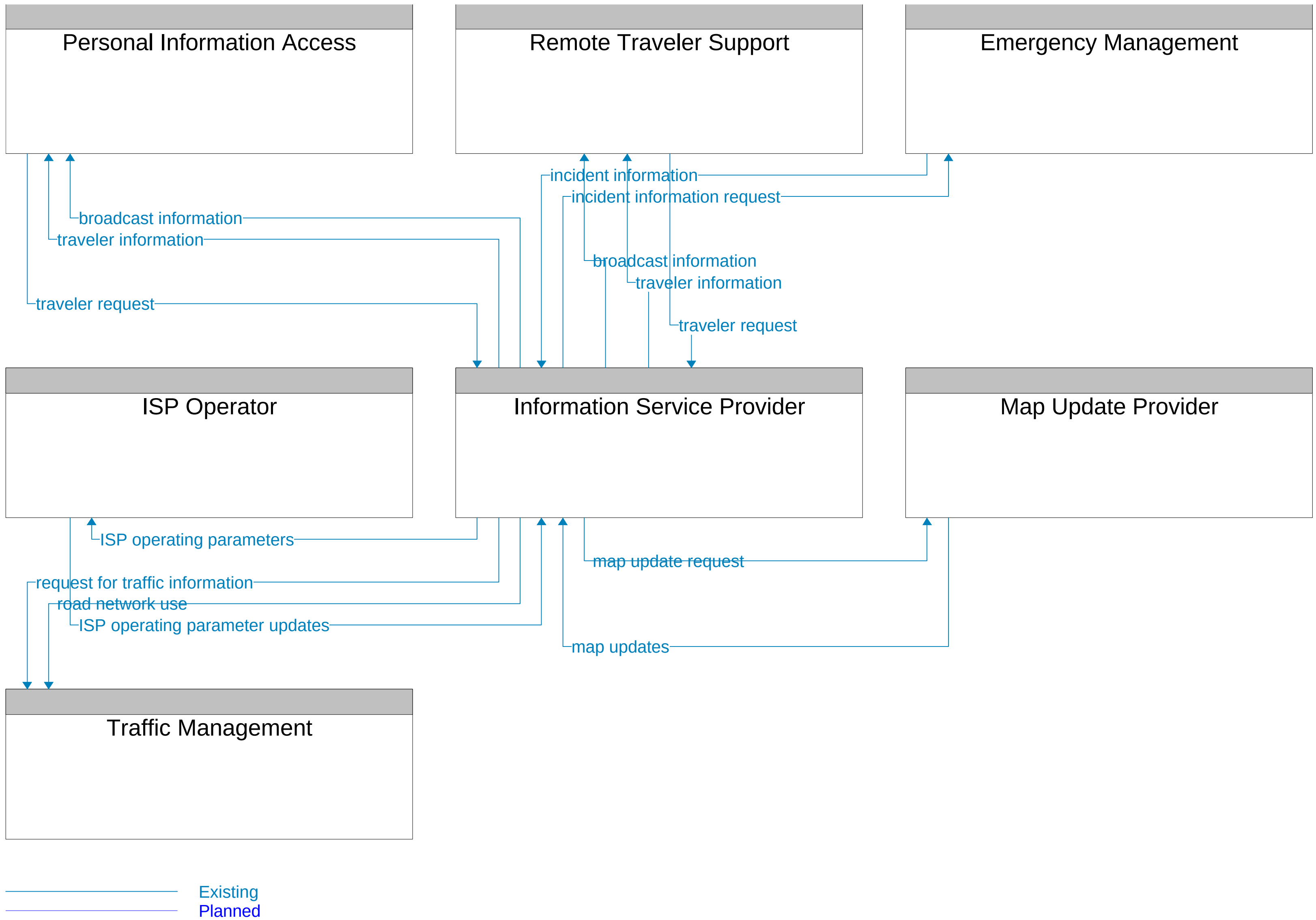
Monitor
Architecture Flow Diagram for Emissions Management Subsystem



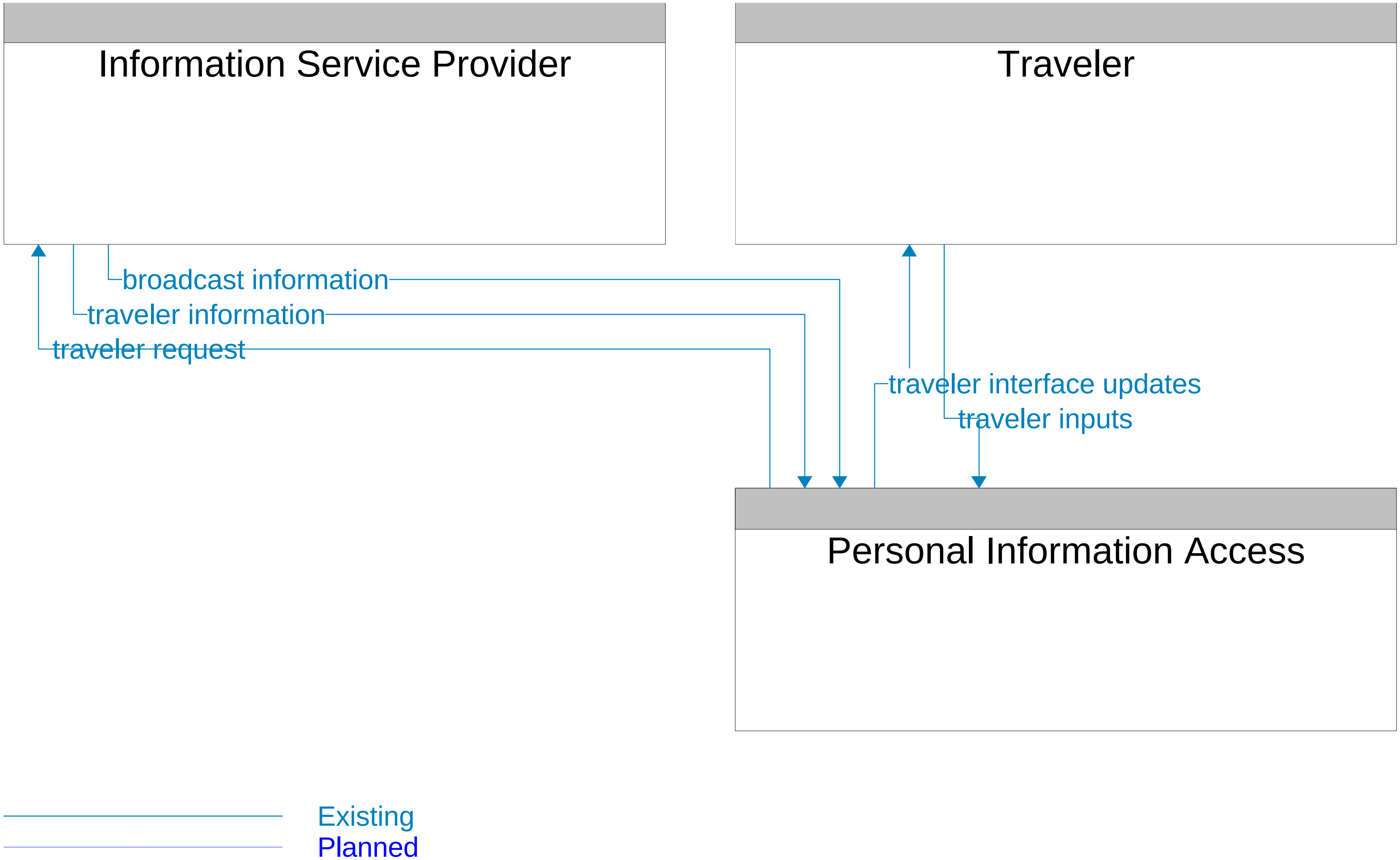
Monitor
Architecture Flow Diagram for Emergency Management Subsystem



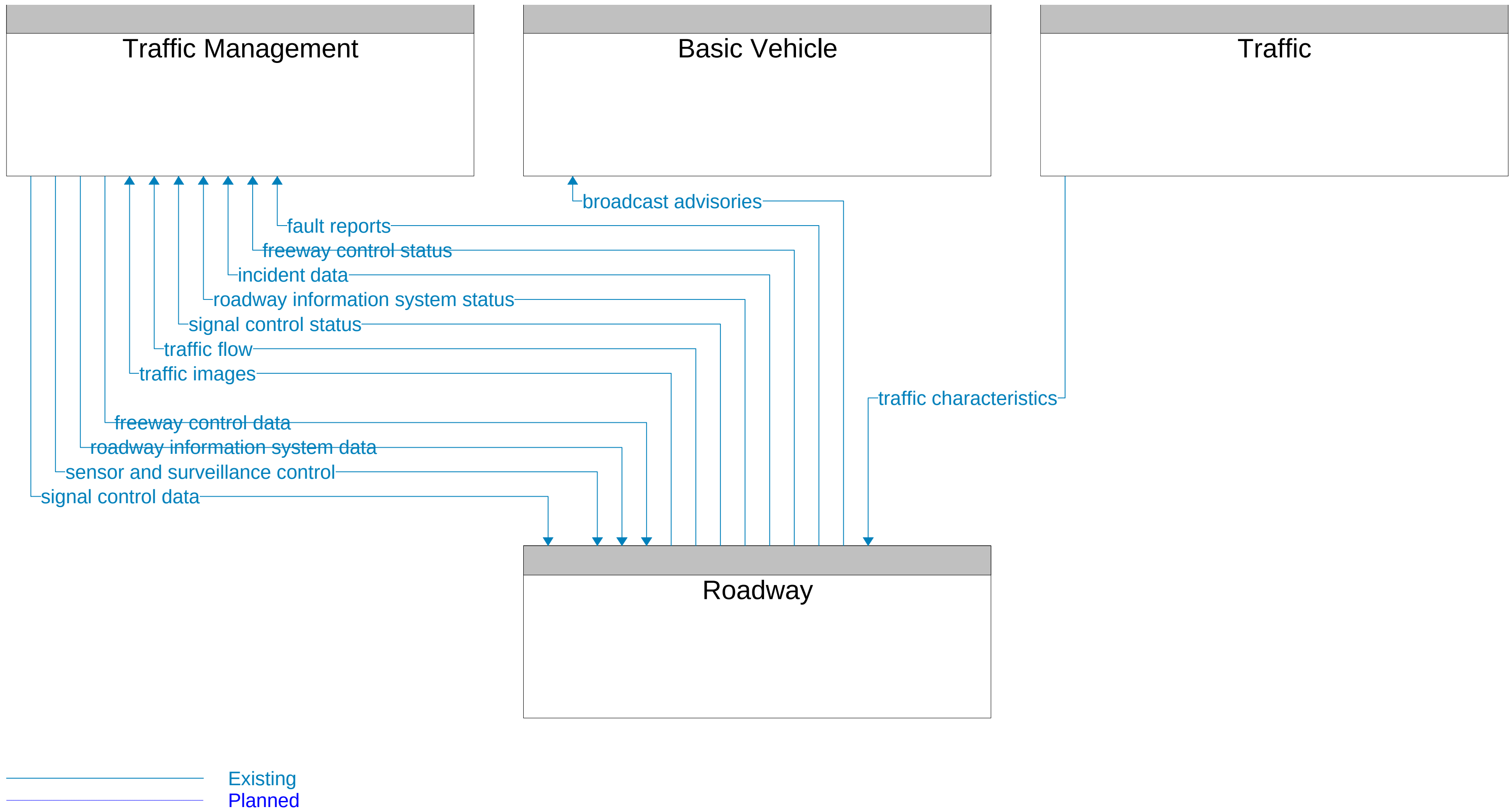
Monitor
Architecture Flow Diagram for Information Service Provider Subsystem



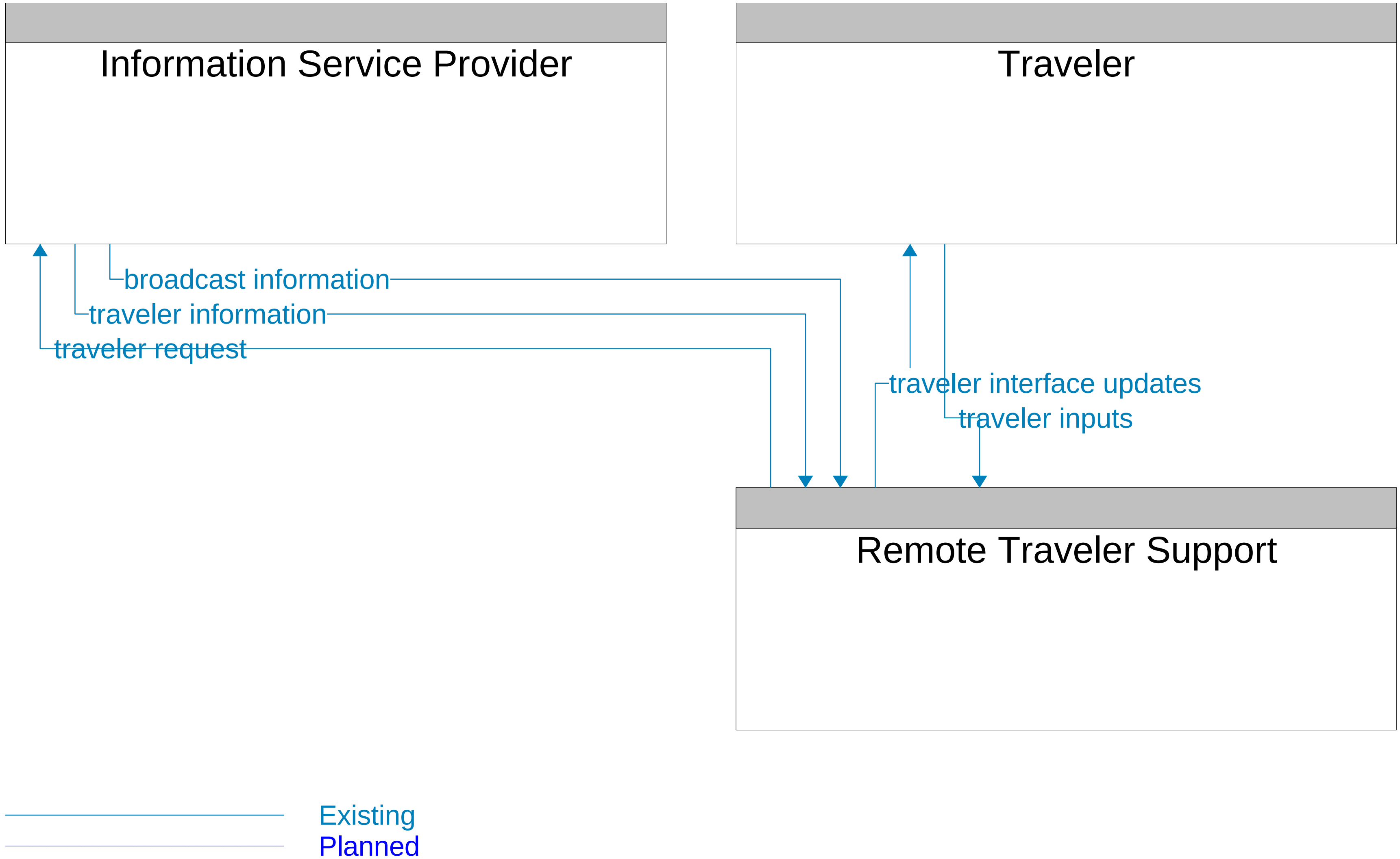
Monitor
Architecture Flow Diagram for Personal Information Access Subsystem



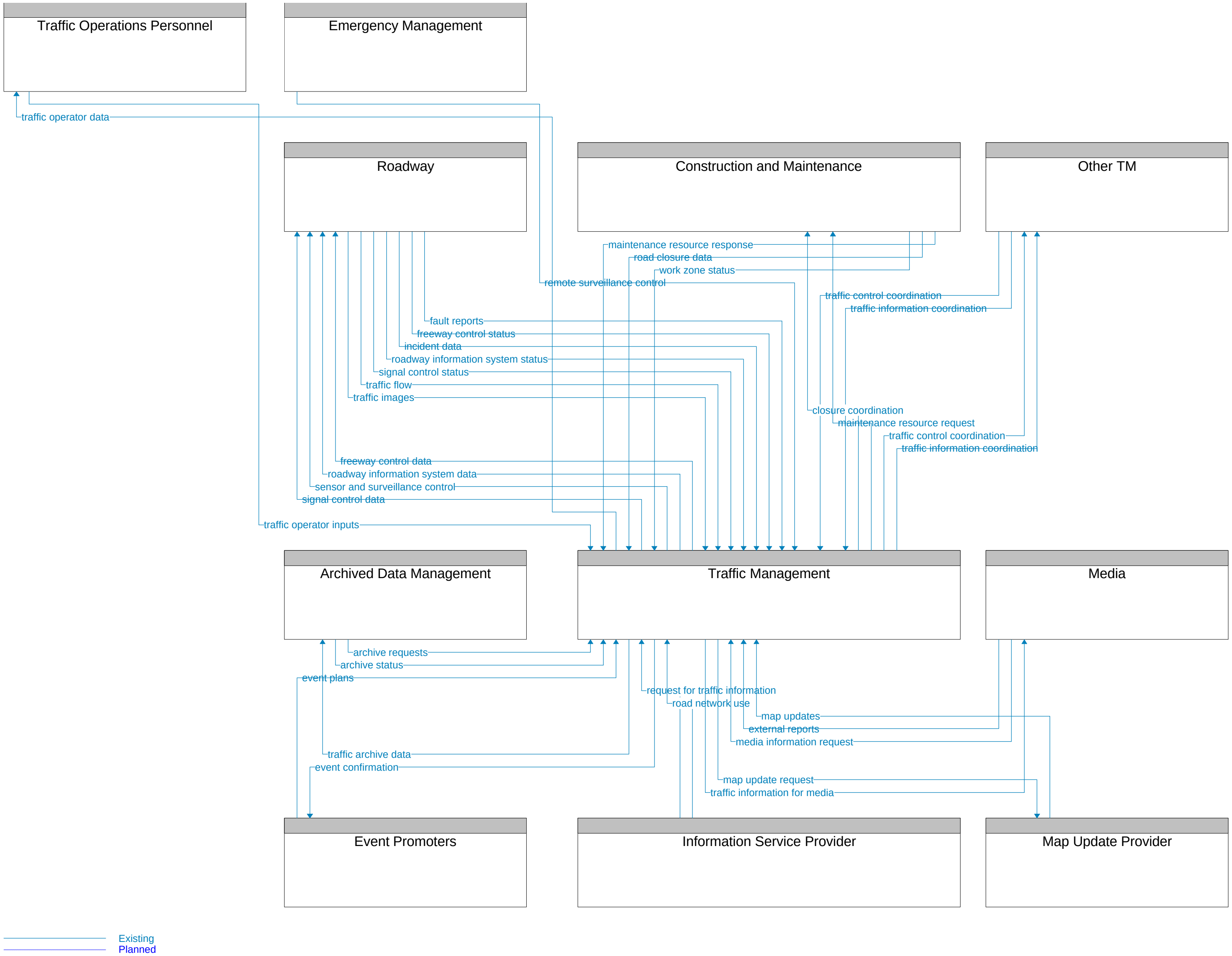
Monitor
Architecture Flow Diagram for Roadway Subsystem



Monitor
Architecture Flow Diagram for Remote Traveler Support Subsystem

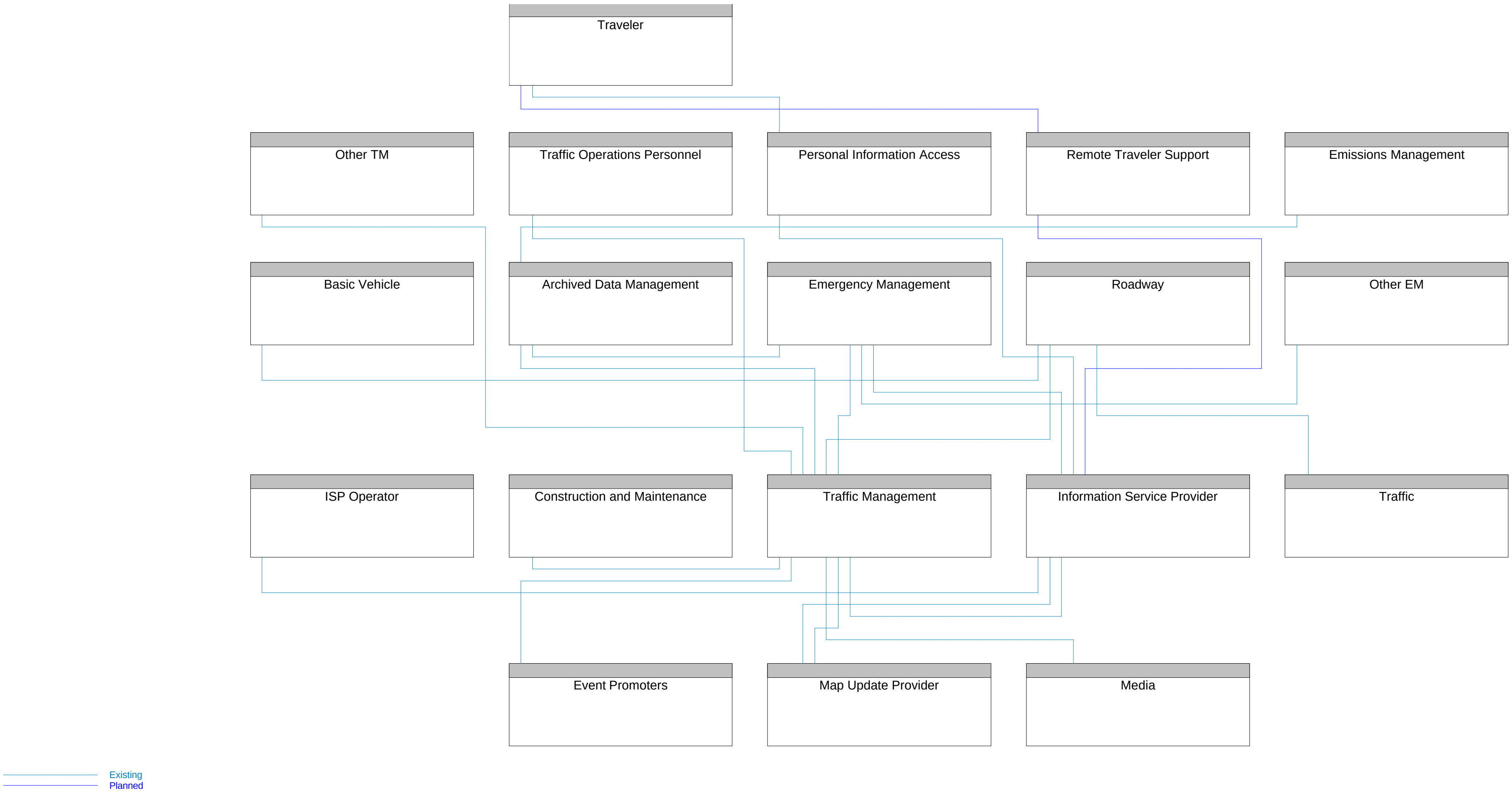


Monitor
Architecture Flow Diagram for Traffic Management Subsystem

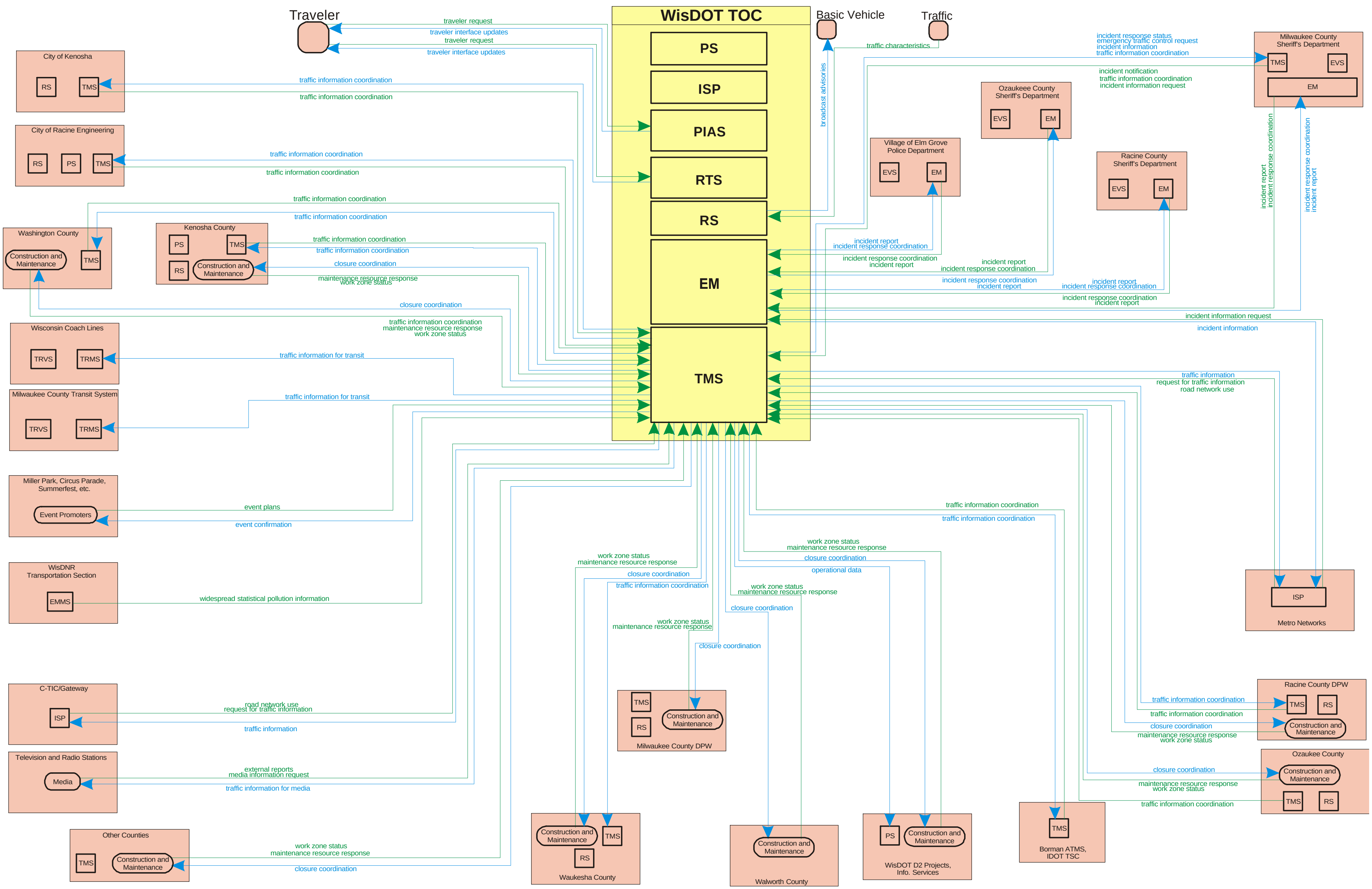


Monitor
Overall Architecture Flow Diagram

Monitor
Overall Architecture Interconnect Diagram



MONITOR High-Level Architecture Flow Diagram



WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: Wis/DOT Central Office Transit Initiatives

1. What agencies are/were involved with the project? What was that agency's role?
Wisconsin DOT, MCTS, Madison Metro

2. Who are the markets and customers for information services?

	By Mode		**By Purpose**	**Transit & Paratransit Providers**			
	Auto Drivers		Telecommuters	X	Vehicle Drivers	X	Trip Planning
	Auto Passengers		Pedestrians	X	Reservations/scheduling		School Administration/School Bus Driver
X	Transit Riders		Bicycle Riders	X	Dispatching		
X	Paratransit Riders		Freight Carriers	**Emergency Service Dispatchers (air and land)**			
X	Commuters (work)		Seasonal/2nd Residence		Ambulance		State Patrol
	Non-Work		Tourism		Police		Highway Helpers
	Recreation		Pass Through Traffic (trucks/autos)		Fire		Tow Truck Operators
Fleet Managers/Dispatchers				**Agencies/Jurisdictions**			
	Shippers		Delivery Fleets		Maintenance/Operations	X	State/County/City/Transit. Etc.
	Transit Dispatchers		Freight Carriers	X	Transit Operations	X	Traffic Management Centers
Other Users/Disseminators							
	Employers	X	New/TV and Radio Reports				
X	MPOs, TMOs & ATPs						

Other

3. What is the travel-related information that is be delivered? What is the level of accuracy of the delivered information?

X	Route specific road surface condition-weather related		Tourist information: lodging and activities, gas stations, truck stops
	Road surface construction/ops		Medical emergency facilities locations
	Weight restrictions (weather related, but different)	X	Transit scheduling
	Trip travel times/operating or actual speeds		Park and ride locations
	Congestion levels		Airport and parking information
	Incidents	X	In-vehicle road guidance
	Weather conditions (visibility, etc.)		Mayday
	Posted detours		Parking available (metro area)
	Closures/alternate routes		Event parking and information

Other

4. When (at what point before or during the trip) is the information be delivered?

Data Timing/Accuracy				**Trip-Related Timing**			
X	Current		Periodic	X	Before the trip	X	On-site/at-site
X	Real Time		Forecasted	X	During the trip	X	At all times
	Delayed						

Other

5. At what frequency is the information provided/updated?
The web site will be accessible at all times. In vehicle information will be provided during operation hours.
Telephone information will be available at all times.

6. Where (in what geographic area) is the information delivered?

X	Metro Area	X	Other Cities
	Spot		Sub-regions
	Small area	X	Rural areas
	Corridor	X	Statewide
	Metro-wide		Out of State

Other

WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: MONITOR

7. How (by what method) will the information be delivered to the user?

X	Phones	X	Internet/Websites/E-mail		Push System
	Cellular phones		Local commercial radio		Pull System
	Pagers		Highway Advisory Radio (HAR)		Broadcast System
	Kiosks		VMS/CMS		
	View only monitors		Mobile data terminals		
	Fax	X	In-vehicle devices		
	Intranet		TV/Cable TV		

Other

8. Why is the information being provided? What is the desired outcome?

	Improved Safety	X	Improved customer service		Decreased trip cost		Long range financial savings
	Divert traffic	X	Improved customer satisfaction	X	Diversion to transit		More uniform speeds
X	Less trip delay	X	Time savings		On-time delivery	X	Efficiency
	Fewer trips	X	Greater user satisfaction		Trip avoidance		Driver satisfaction
	Less congestion	X	Greater user convenience		Change time of trip		Increased sales tax revenue
X	Improved operations		Less Damage to infrastructure		Fewer accidents		Benefits local economy
	System coordination	X	Improved transit ridership	X	Less transit subsidy		Fuel conservation
	Change destination		Change route		Change mode	X	Improved emergency response
	Compliance with laws						

Other

9. What data is collected?
Not available

10. How is the data collected?

X	Automated data feed		Phone				
	Fax		Mail				

Other

11. In what form is the collected data?
Not available

12. How is the data processed? What are the steps to convert the data to usable information?
Not available

13. Is the data/information customized to a specific user group? If so, what group?
Not available

14. Other

15. High Level Block Diagram
Available

16. Sausage Diagram
Available

17. Architecture Flow Diagram
Available

Rest Area Traveler Information Monitors

Wisconsin ATIS Inventory

Project Name: Rest Area Traveler Information Monitors

Agencies: Wisconsin DOT, Department of Tourism, Department of Highway Operations

WisDOT Contact: Tom Lorfeld

End-user Groups: General public

Project Scope:
The rest area traveler information monitors, which display weather information and missing children information, have currently been deployed in 19 rest areas and 8 Traveler Information Centers on the various interstate roadways in Wisconsin. Four rest areas do not currently have monitors. Two of those rest areas are currently being rebuilt and will be equipped with monitors upon completion of the construction. The remaining two rest areas do not provide a direct line of site for the satellite communications, and as a result, Wis/DOT is researching alternative methods to transmit the data to those locations.

Data Collection:
Wis/DOT has a contract with Data Transmission Network (DTN) Inc. to receive weather information at the monitor sites. DTN does not produce the actual weather information, instead, they purchase the information from various vendors. As a result, DTN acts as a communications medium for the weather information and sends the value added information to each monitor site for display.

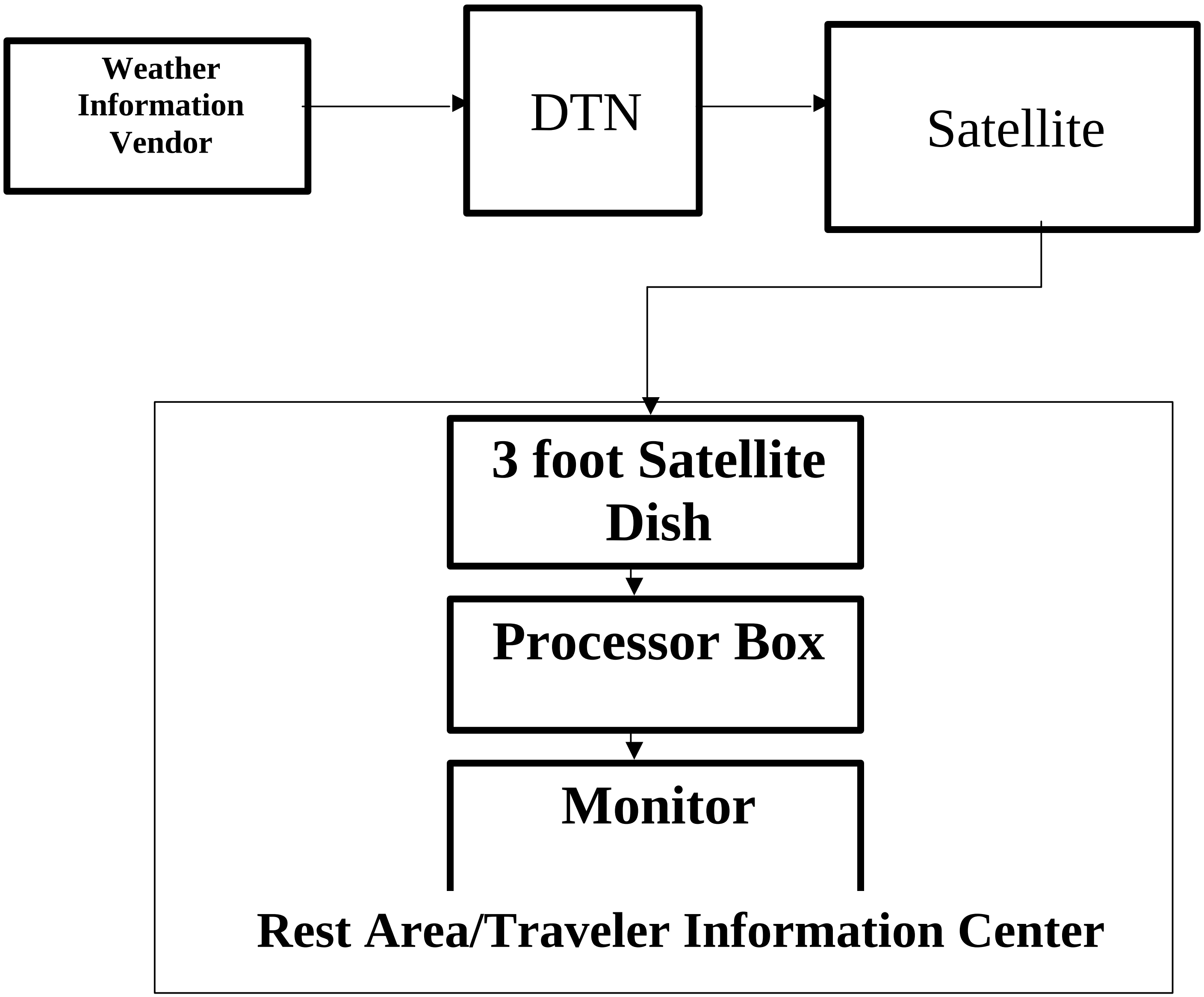
Delivery of Information:
The radar weather information that DTN transmits is updated every 15 minutes. However, the other weather information is primarily obtained from the National Weather Service (NWS). Because the NWS receives their weather information from airport weather sites, the information from the NWS is only updated every hour. Each monitor site displays weather information 24 hours a day, seven days a week.

The traveler information centers, which maintain a staff to assist travelers, have the flexibility to decide what weather information screens to display. There are twelve screens to chose from that cover Wisconsin, the Midwest, and the entire U.S. These centers also have the ability to zoom in on certain locations on any screen. The rest areas, which do not maintain a staff, are provided with a rigidly defined set of screens and associated views.

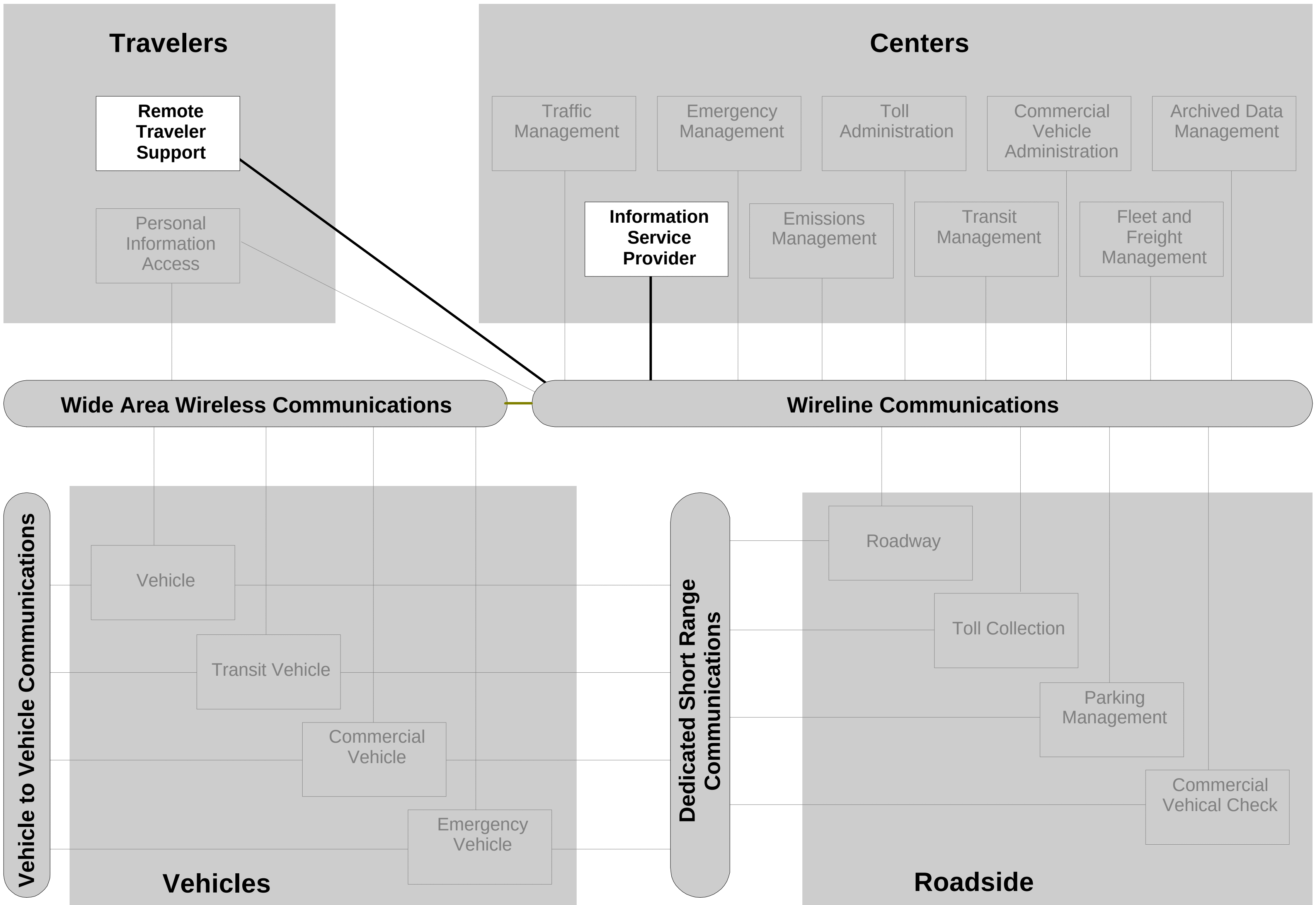
Delivery Mechanisms:
The weather information is displayed on monitors in the rest areas and traveler information centers. The monitors are either mounted on a 10-foot stand or inside the wall behind plexi glass. The traveler information centers have limited hours and are therefore closed at night. As a result, monitors at those locations are mounted on the 10-foot stands so they can be rotated outwards after hours so travelers can see the monitors from outside of the building.

Desired Outcome:
The primary purpose for displaying the weather information is to provide travelers with roadway conditions information, pavement temperature information, and storm information.

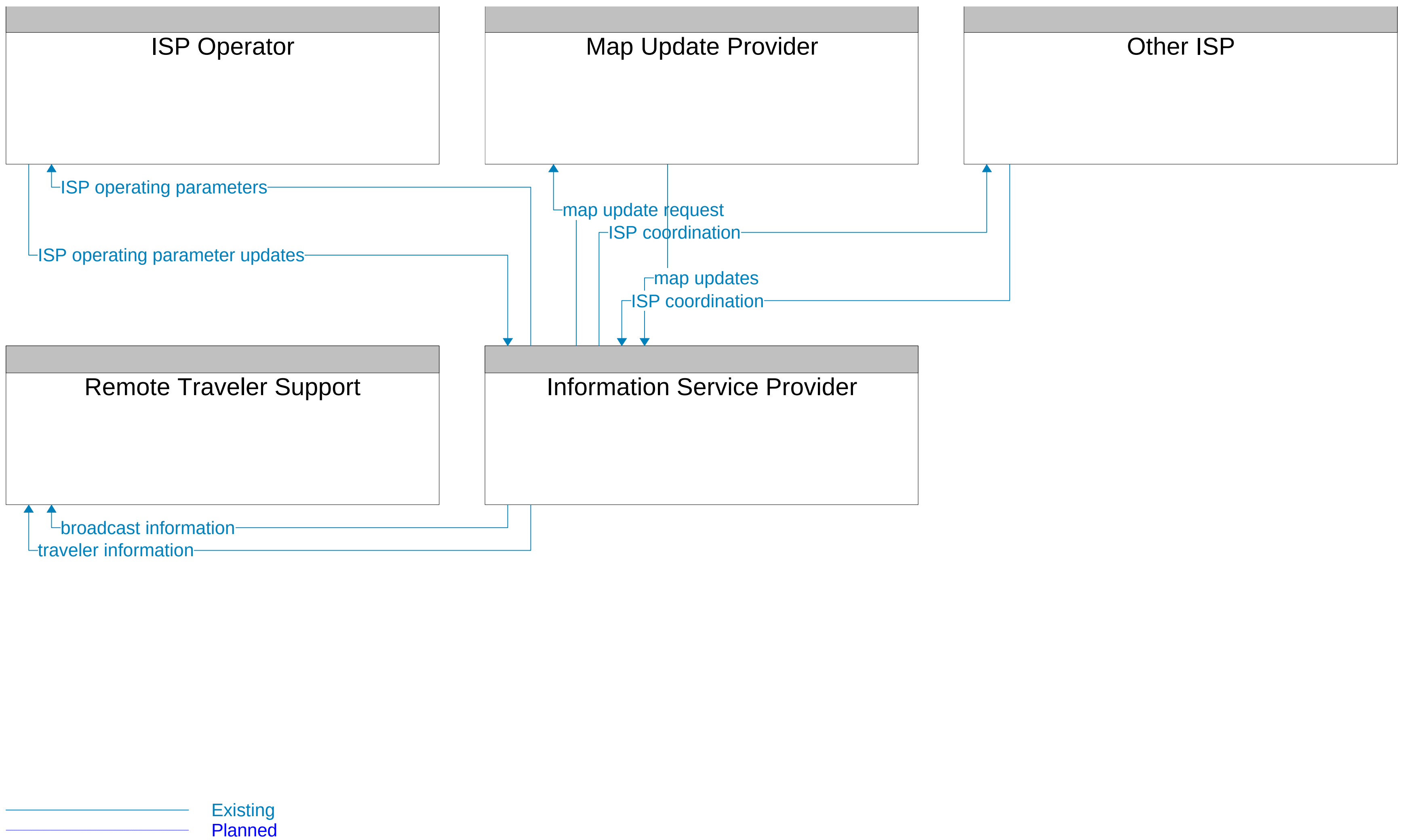
Rest Area Traveler Information Monitors Block Diagram



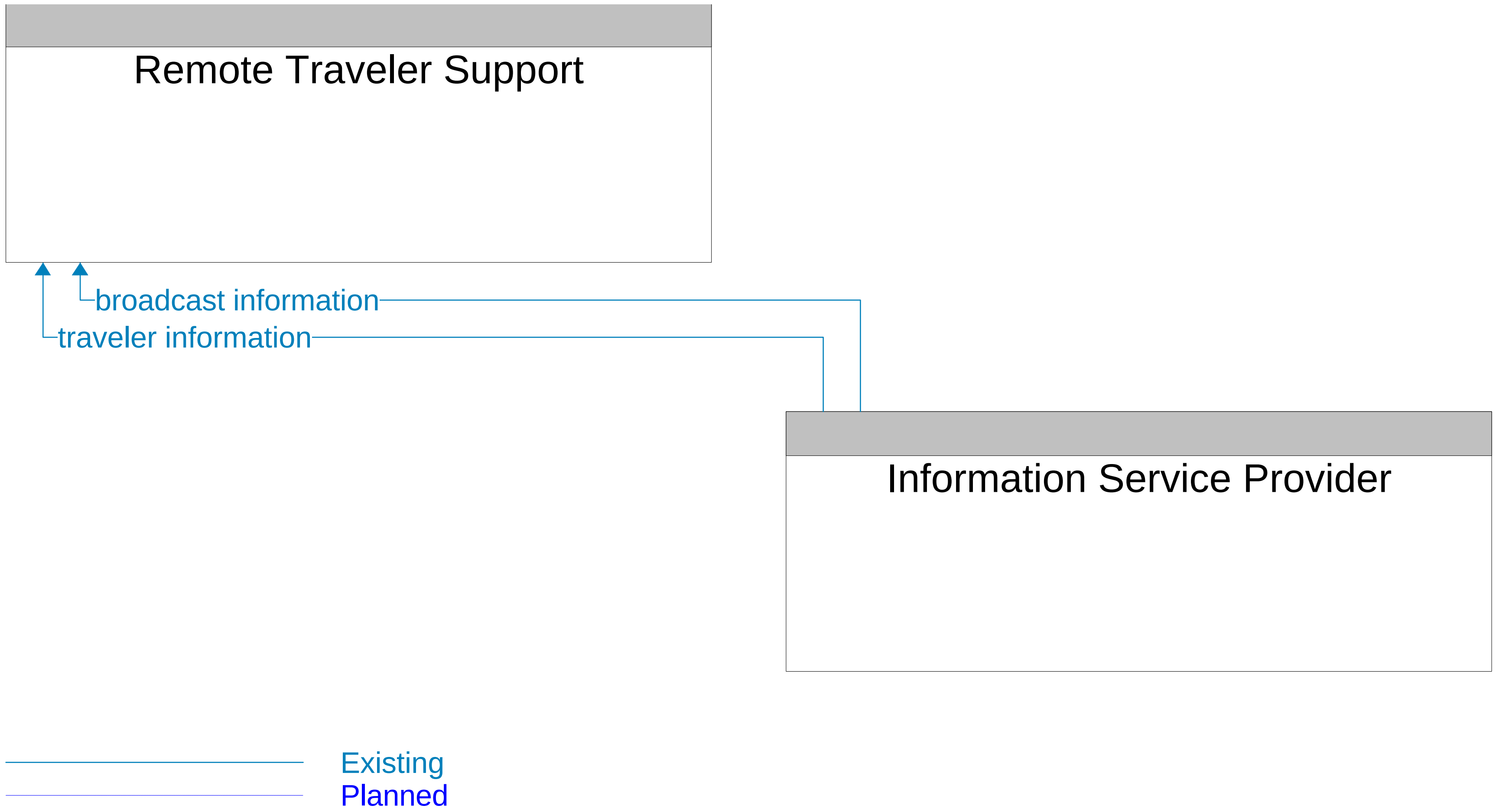
Rest Area Traveler Information Monitors
Subsystems Interconnect Diagram



Rest Area Traveler Information Monitors
Architecture Flow Diagram for Information Service Provider Subsystem



Rest Area Traveler Information Monitors
Architecture Flow Diagram for Remote Traveler Support Subsystem



WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: Rest Area Traveler Information Monitors

1. What agencies are/were involved with the project? What was that agency's role?
Wis/DOT Department of Highway Operations, Wis/DOT Department of Tourism.
2. Who are the markets and customers for information services?

	By Mode		**By Purpose**	**Transit & Paratransit Providers**			
X	Auto Drivers		Telecommuters		Vehicle Drivers		Trip Planning
X	Auto Passengers		Pedestrians		Reservations/scheduling		School Administration/School Bus Driver
	Transit Riders		Bicycle Riders		Dispatching		
	Paratransit Riders		Freight Carriers	**Emergency Service Dispatchers (air and land)**			
	Commuters (work)		Seasonal/2nd Residence		Ambulance		State Patrol
	Non-Work	X	Tourism		Police		Highway Helpers
X	Recreation		Pass Through Traffic (trucks/autos)		Fire		Tow Truck Operators
Fleet Managers/Dispatchers				**Agencies/Jurisdictions**			
	Shippers		Delivery Fleets	X	Maintenance/Operations		State/County/City/Transit. Etc.
	Transit Dispatchers		Freight Carriers		Transit Operations		Traffic Management Centers
Other Users/Disseminators							
	Employers		New/TV and Radio Reports				
	MPOs, TMOs & ATPs						

Other

3. What is the travel-related information that is be delivered? What is the level of accuracy of the delivered information?

X	Route specific road surface condition-weather related		Tourist information: lodging and activities, gas stations, truck stops
	Road surface construction/ops		Medical emergency facilities locations
	Weight restrictions (weather related, but different)		Transit scheduling
	Trip travel times/operating or actual speeds		Park and ride locations
	Congestion levels		Airport and parking information
	Incidents		In-vehicle road guidance
X	Weather conditions (visibility, etc.)		Mayday
	Posted detours		Parking available (metro area)
	Closures/alternate routes		Event parking and information

Other

Missing Children Information

4. When (at what point before or during the trip) is the information be delivered?

Data Timing/Accuracy				**Trip-Related Timing**			
	Current		Periodic		Before the trip		On-site/at-site
	Real Time	X	Forecasted	X	During the trip		At all times
X	Delayed						

Other

5. At what frequency is the information provided/updated?
Radar is updated every 15 minutes. The remaining weather information is updated every hour.

6. Where (in what geographic area) is the information delivered?

	Metro Area		Other Cities
	Spot		Sub-regions
	Small area		Rural areas
X	Corridor	X	Statewide
	Metro-wide		Out of State

Other

WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: Rest Area Traveler Information Monitors

7. How (by what method) will the information be delivered to the user?

	Phones		Internet/Websites/E-mail		Push System
	Cellular phones		Local commercial radio		Pull System
	Pagers		Highway Advisory Radio (HAR)		Broadcast System
	Kiosks		VMS/CMS		
X	View only monitors		Mobile data terminals		
	Fax		In-vehicle devices		
	Intranet		TV/Cable TV		

Other

8. Why is the information being provided? What is the desired outcome?

X	Improved Safety	X	Improved customer service		Decreased trip cost		Long range financial savings
	Divert traffic	X	Improved customer satisfaction		Diversion to transit		More uniform speeds
	Less trip delay		Time savings		On-time delivery		Efficiency
	Fewer trips	X	Greater user satisfaction		Trip avoidance		Driver satisfaction
	Less congestion	X	Greater user convenience		Change time of trip		Increased sales tax revenue
	Improved operations		Less Damage to infrastructure	X	Fewer accidents		Benefits local economy
	System coordination		Improved transit ridership		Less transit subsidy		Fuel conservation
	Change destination	X	Change route		Change mode		Improved emergency response
	Compliance with laws						

Other

9. What data is collected?
Weather information

10. How is the data collected?

X	Automated data feed		Phone				
	Fax		Mail				

Other

11. In what form is the collected data?
Value Added

12. How is the data processed? What are the steps to convert the data to usable information?
The data is sent via satellite transmission directly to the monitor sites

13. Is the data/information customized to a specific user group? If so, what group?
Travelers

14. Other

15. High Level Block Diagram
Available

16. Sausage Diagram
Available

17. Architecture Flow Diagram
Available

RWIS

Road Weather Information System

Wisconsin ATIS Inventory

Project Name: Road Weather Information System (RWIS)

Agencies: Wisconsin DOT

WisDOT Contact: Mike Adams

End-user Groups: Wisconsin Departments of Transportation maintenance personnel

Project Scope: RWIS is a system that collects road condition information, which is beneficial for upkeep of the roadway. The system is capable of collecting wind speed, air temperature, pavement temperature, ground temperature, precipitation, and chemical content in pavement. The data is obtainable through a pull system by telephone or DTN devices common in maintenance vehicles. Road maintenance crews use this data to help maintain the road more efficiently and economically by reducing materials and servicing the road in a timely manner.

Data Collection: In the state of Wisconsin, data is collected in 52 locations by sensors imbedded in the pavement. The sensors are able to pick up pulses to retrieve the data. The data is transmitted to one of the seven local processors where the pulses become encoded in a Remote Processing Unit (RPU). The RPU programs take the data from the seven stations and transfer it into a Central Processing Unit (CPU) program where the data can be read in ASCII format. From here, users are able receive updated road conditions.

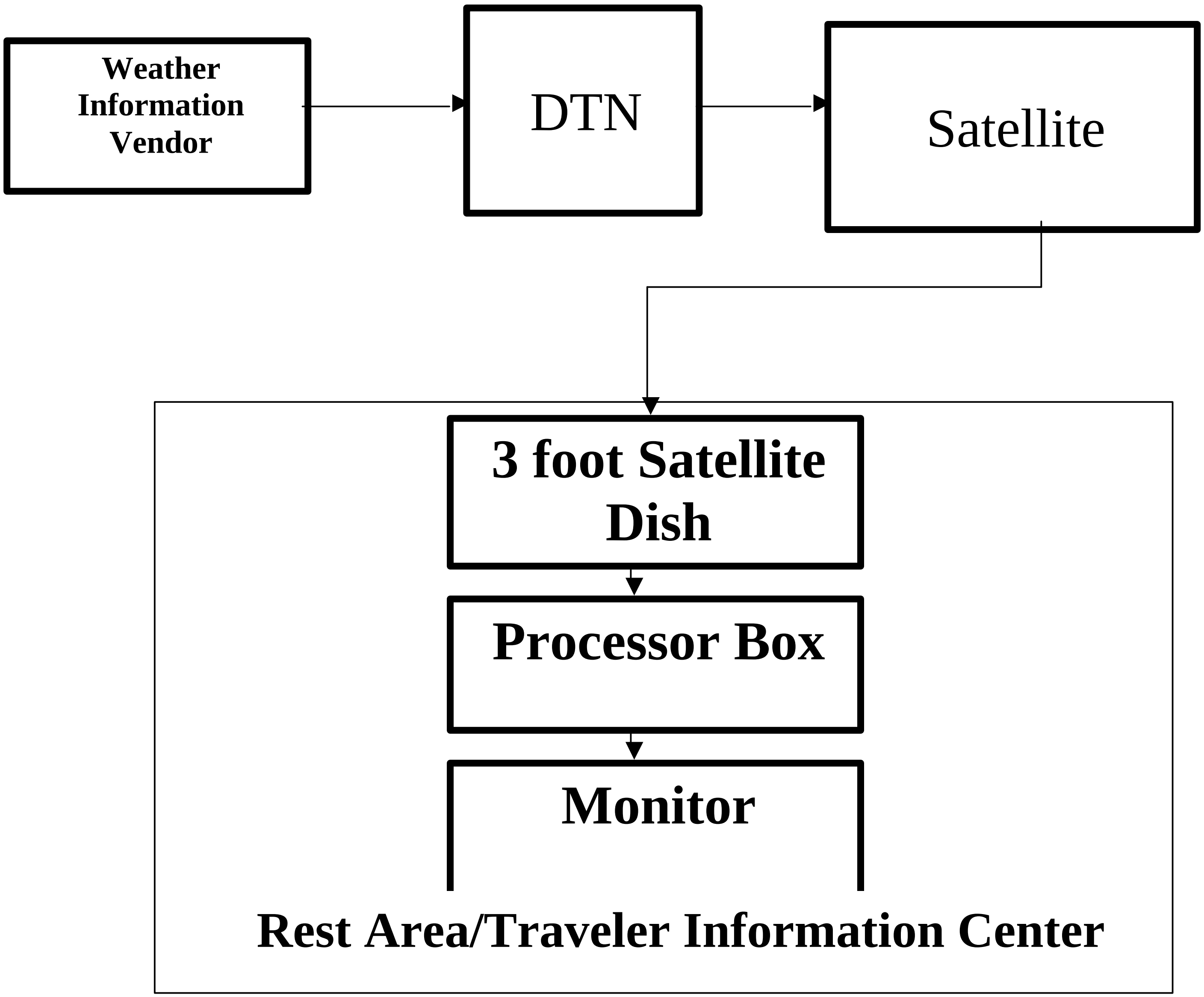
Delivery of Information: Throughout the winter season data is collected and updated every hour. In the summer data is retrieved once every four hours.

Delivery Mechanisms: RWIS provides users with road conditions through installed DTN systems or by use of telephone.

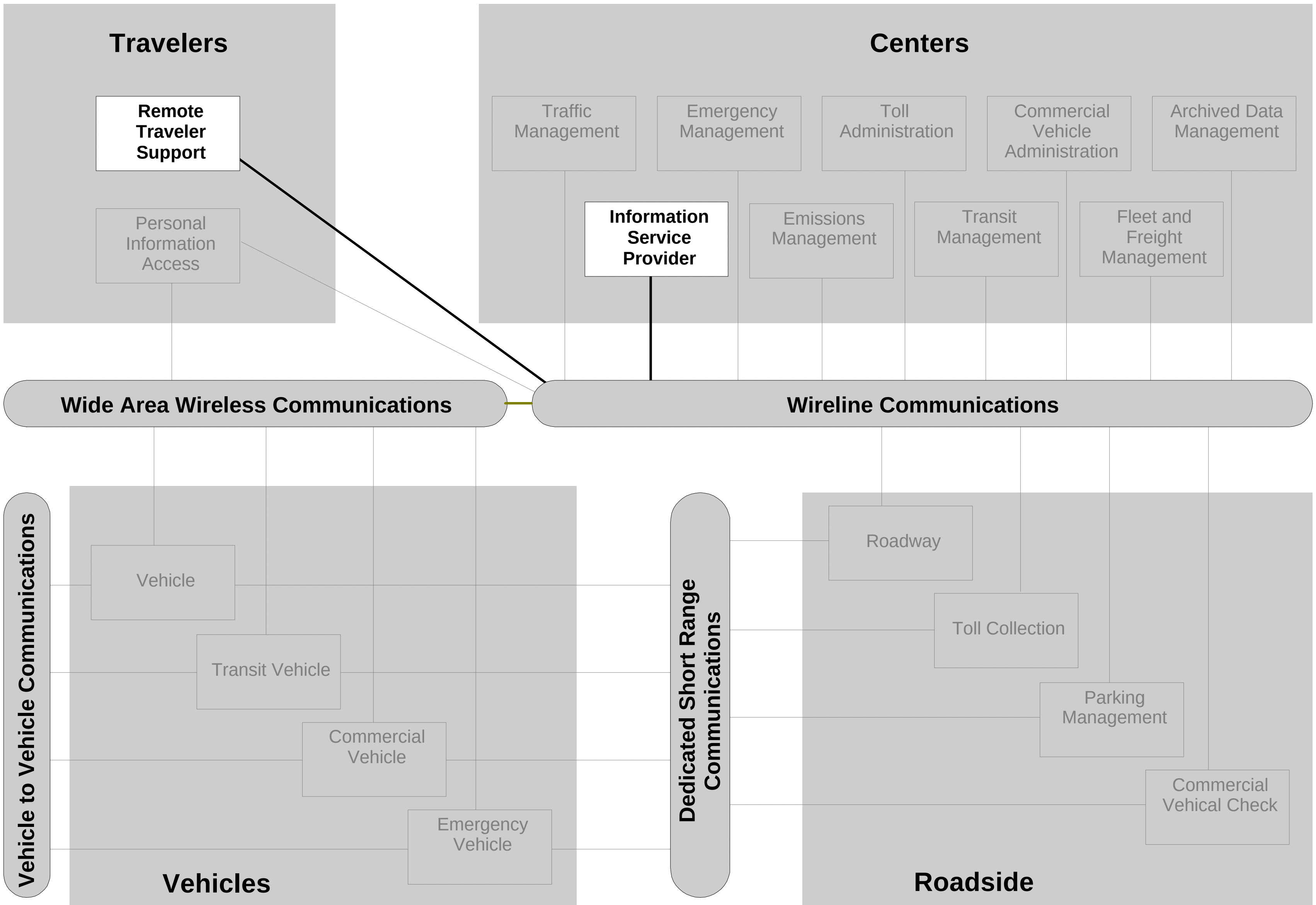
Desired Outcome: To improve winter storm maintenance on highways and at airports, by maintaining the roads in a timely manner, and cutting down the amount of materials used.

Comments: System was designed over 20 years ago, plans are to update and lean towards ITS applications.

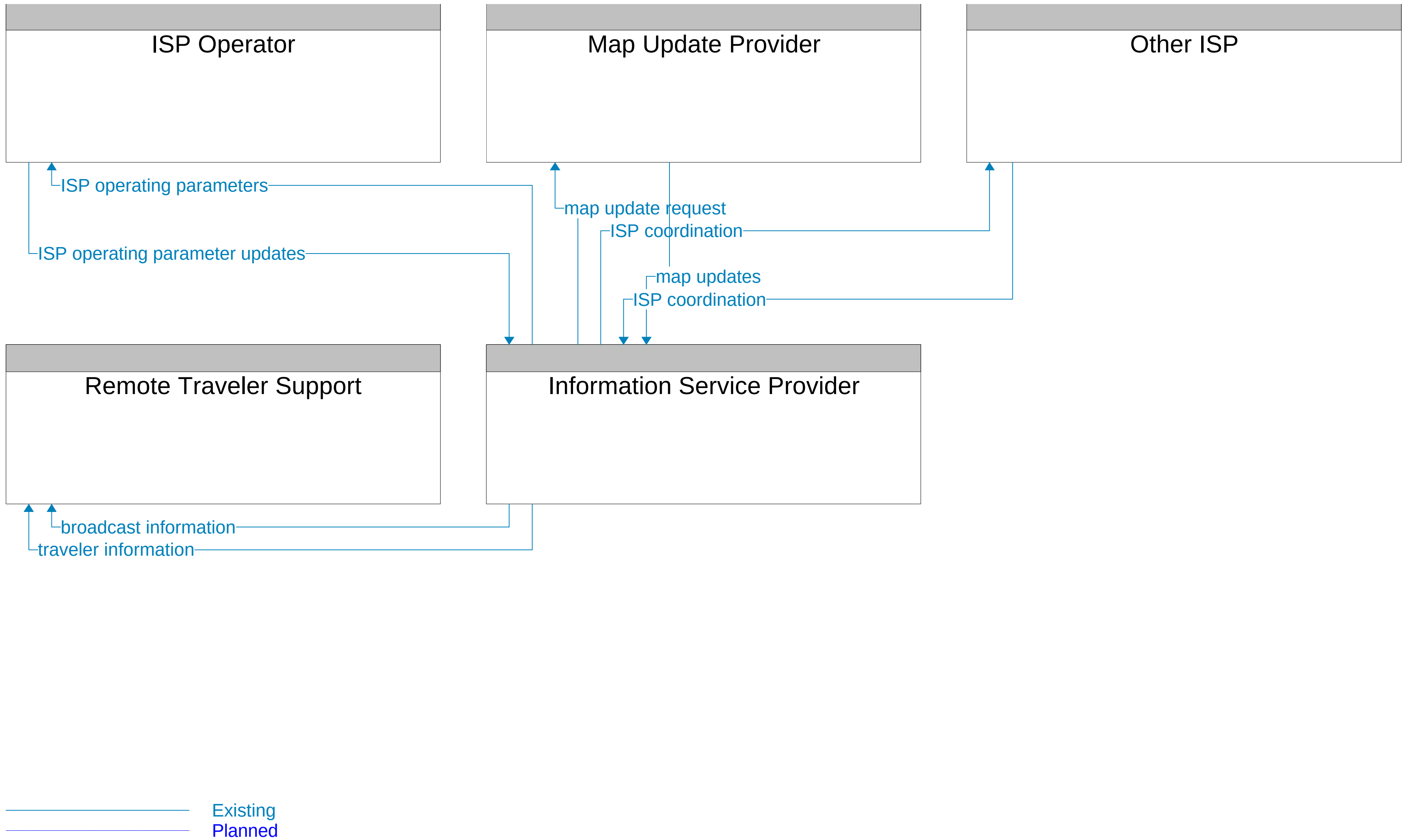
Rest Area Traveler Information Monitors Block Diagram



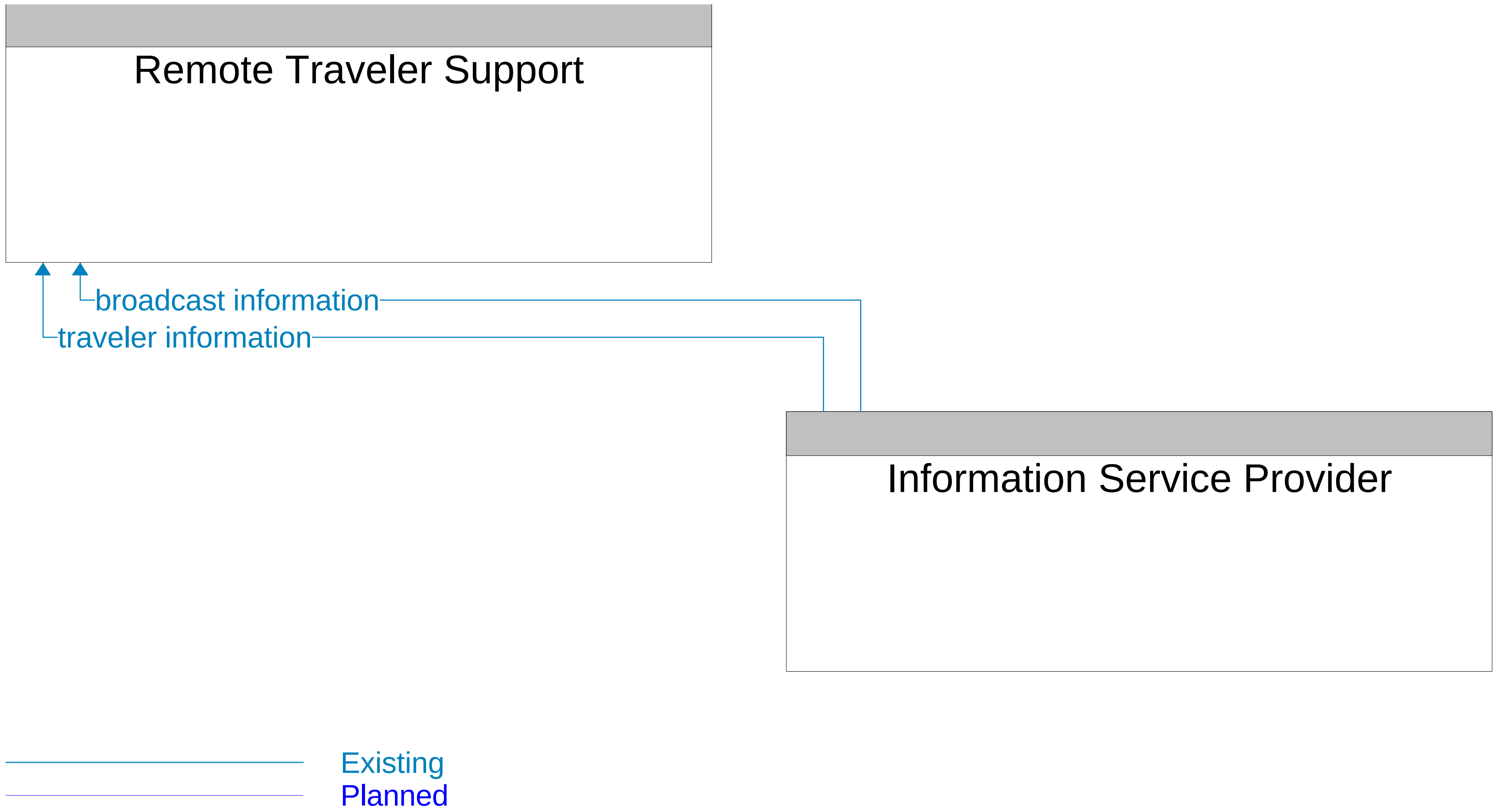
Rest Area Traveler Information Monitors
Subsystems Interconnect Diagram



Rest Area Traveler Information Monitors
Architecture Flow Diagram for Information Service Provider Subsystem



Rest Area Traveler Information Monitors
Architecture Flow Diagram for Remote Traveler Support Subsystem



WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: Road Weather Information Systems (RWIS)

1. What agencies are/were involved with the project? What was that agency's role?
WisDOT Road Maintenance

2. Who are the markets and customers for information services?

	By Mode		**By Purpose**		**Transit & Paratransit Providers**		
	Auto Drivers		Telecommuters		Vehicle Drivers		Trip Planning
	Auto Passengers		Pedestrians		Reservations/scheduling		School Administration/School Bus Driver
	Transit Riders		Bicycle Riders		Dispatching		
	Paratransit Riders		Freight Carriers		**Emergency Service Dispatchers (air and land)**		
	Commuters (work)		Seasonal/2nd Residence		Ambulance		State Patrol
	Non-Work		Tourism		Police	X	Highway Helpers
	Recreation		Pass Through Traffic (trucks/autos)		Fire		Tow Truck Operators
Fleet Managers/Dispatchers				**Agencies/Jurisdictions**			
	Shippers		Delivery Fleets	X	Maintenance/Operations		State/County/City/Transit. Etc.
	Transit Dispatchers		Freight Carriers		Transit Operations		Traffic Management Centers
Other Users/Disseminators							
	Employers		New/TV and Radio Reports				
	MPOs, TMOs & ATPs						

Other

3. What is the travel-related information that is be delivered? What is the level of accuracy of the delivered information?

X	Route specific road surface condition-weather related		Tourist information: lodging and activities, gas stations, truck stops
X	Road surface construction/ops		Medical emergency facilities locations
	Weight restrictions (weather related, but different)		Transit scheduling
	Trip travel times/operating or actual speeds		Park and ride locations
	Congestion levels	X	Airport and parking information
	Incidents		In-vehicle road guidance
X	Weather conditions (visibility, etc.)		Mayday
	Posted detours		Parking available (metro area)
	Closures/alternate routes		Event parking and information

Other

4. When (at what point before or during the trip) is the information be delivered?

Data Timing/Accuracy				**Trip-Related Timing**			
X	Current		Periodic		Before the trip		On-site/at-site
	Real Time		Forecasted		During the trip	X	At all times
	Delayed						

Other

5. At what frequency is the information provided/updated?
The system is updated hourly in the winter season and slowed to once every four hours in the summer.

6. Where (in what geographic area) is the information delivered?

	Metro Area		Other Cities
	Spot		Sub-regions
	Small area		Rural areas
	Corridor	X	Statewide
	Metro-wide		Out of State

Other

WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: Road Weather Information Systems (RWIS)

7. How (by what method) will the information be delivered to the user?

X	Phones		Internet/Websites/E-mail		Push System
X	Cellular phones		Local commercial radio	X	Pull System
	Pagers		Highway Advisory Radio (HAR)		Broadcast System
	Kiosks		VMS/CMS		
	View only monitors		Mobile data terminals		
	Fax	X	In-vehicle devices		
	Intranet		TV/Cable TV		

Other

8. Why is the information being provided? What is the desired outcome?

X	Improved Safety		Improved customer service		Decreased trip cost		Long range financial savings
	Divert traffic		Improved customer satisfaction		Diversion to transit		More uniform speeds
	Less trip delay		Time savings		On-time delivery	X	Efficiency
	Fewer trips		Greater user satisfaction		Trip avoidance		Driver satisfaction
	Less congestion		Greater user convenience		Change time of trip		Increased sales tax revenue
	Improved operations		Less Damage to infrastructure		Fewer accidents	X	Benefits local economy
	System coordination		Improved transit ridership		Less transit subsidy		Fuel conservation
	Change destination		Change route		Change mode		Improved emergency response
	Compliance with laws						

Other Informs road maintenance workers of road conditions, Decreases maintenance materials

9. What data is collected?
Air temperature, road surface temperature, ground temperature, wind speed, precipitation, dew point, chemical content in pavement

10. How is the data collected?

	Automated data feed		Phone				
	Fax		Mail				

Other

Sensors located in the pavement of the road.

11. In what form is the collected data?
The data is collected from 52 sensors state wide. These sensors pick up the data as pulses, which can then be used to obtain the desired information.

12. How is the data processed? What are the steps to convert the data to usable information?

Pulses from the sensors are transmitted to one of seven area around the state where they are decoded in a RPU (Remote Processing Unit) program. This data is then combined to a in a CPU program where the information becomes processed to ASCII format.

13. Is the data/information customized to a specific user group? If so, what group?
The information is currently used by the WISDOT road maintenance crews. Future plans include updating system for public use.

14. Other

15. High Level Block Diagram
Available

16. Sausage Diagram
Available

17. Architecture Flow Diagram
Available

TIME

Traffic Incident Management
Enhancement Program

Wisconsin ATIS Inventory

Project Name: Traffic Incident Management Enhancement Program (TIME)	**Agencies:** WisDOT; Southeast Wisconsin Regional Planning Commission; Wisconsin Department of Natural Resources; U.S.DOT; Milwaukee County EMS, Public Works, Sheriff and Transit; Wisconsin Towing Association, WTMJ Radio; Greater Milwaukee Convention and Visitors Bureau; City Engineering, Fire, Police and Public Works Departments for Glendale, Greenfield, Menomonee Falls, West Allis, and Fond du Lac; County Highway Commissioners and Sheriffs for Walworth, Racine, and Washington counties
WisDOT Contact: John Corbin	**End-user Groups:** Drivers in the southeastern Wisconsin, state and local agencies, law enforcement, tow companies, and emergency response teams

Project Scope: The Traffic Incident Management Program (TIME) is a multiagency effort to effectively handle, respond to and clear incidents to enable the freeway system in southeastern Wisconsin to operate efficiently.

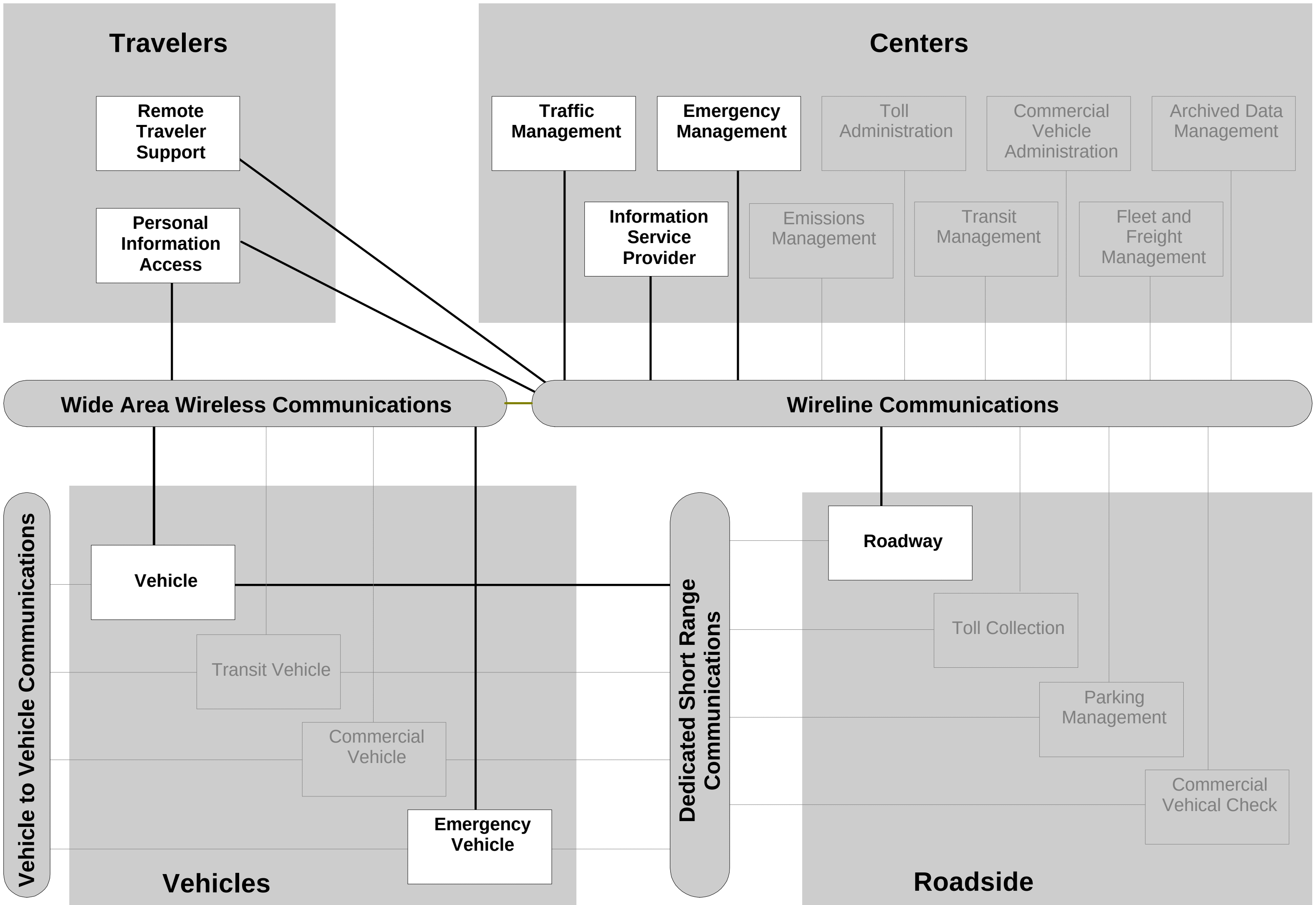
Data Collection: The program gathers information about incidents and traffic conditions from MONITOR including information from 39 CCTV cameras and traffic detectors. Information is also provided to MONITOR directly by the state patrol and sheriff departments.

Delivery of Information: Real time incident information is provided and updated by MONITOR and provided on the WisDOT (www.dot.state.wi.us) and GCM (www.ai.eecs.uic.edu/GCM/GCM.html) web sites. Information about incidents is also provided to the public using variable message signs, and the media including AM/FM radio stations, highway advisory radio, Travel Advisory Telephone, and Cable TV. Pre-trip Traveler Information using information kiosks and on-line displays at offices has also been proposed. TIME also includes programs designed to reduce the traffic impacts of planned events such as special events and construction including a special event database and a proposed Portable Traffic Management System.

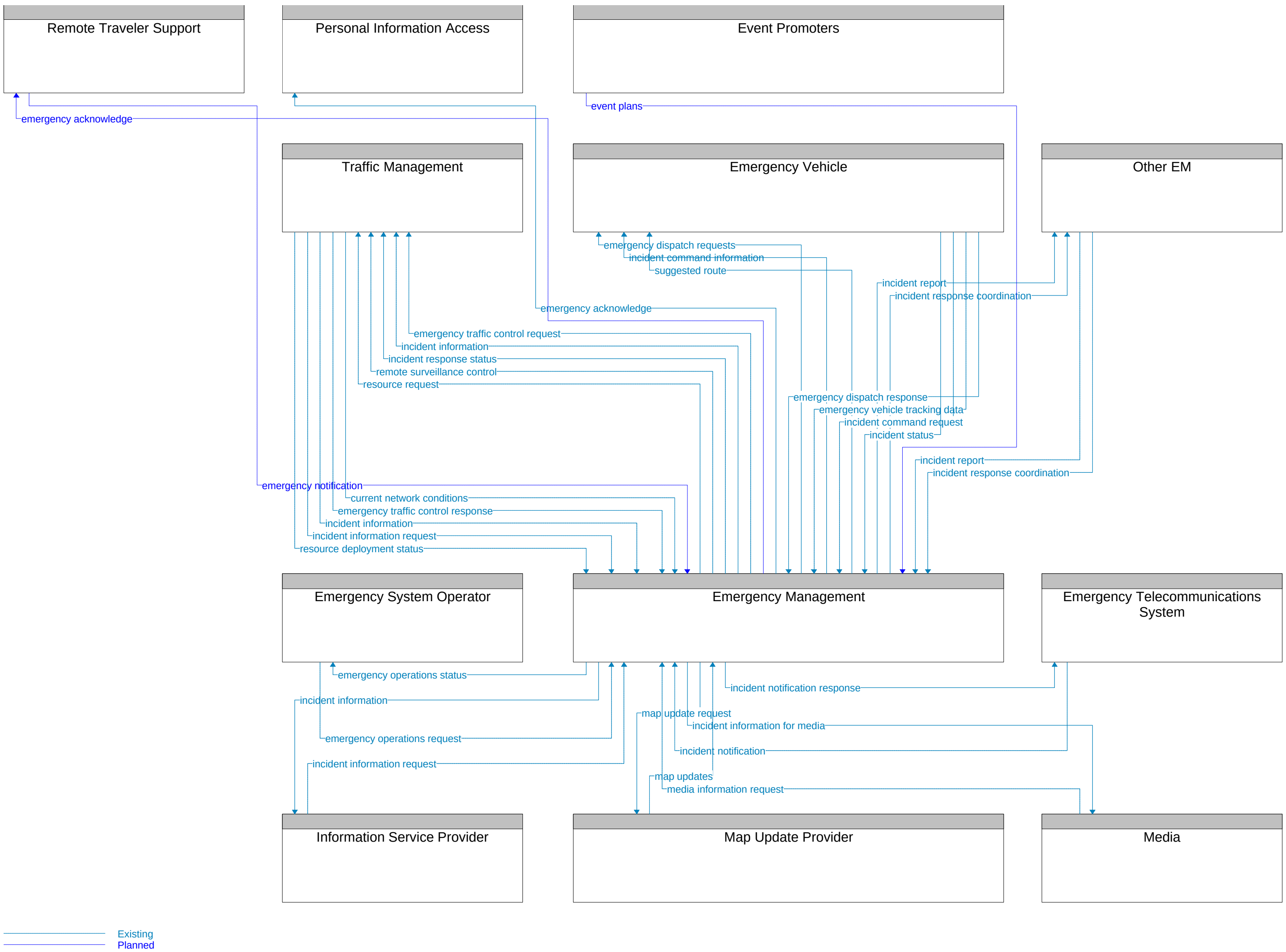
Delivery Mechanisms: A Traveler Information Internet site is planned that will allow users to access regional traveler and special event information possibly including: an interactive schedule of special events; directions from major origins and maps; anticipated construction delays; transit information; real-time traveler information and links to other relevant sites**.**
The TIME program also contains an outreach/education element designed to improve public education about TIME programs as well as how to avoid being involved in a crash and what to do if one occurs.

Desired Outcome:
The desired benefits of the TIME program are increased safety, decreased travel time, increased freeway efficiency and crash reduction.
Comments:
The TIME web site is found at http://www.wiincidentmanagement.org/ however, it currently contains no information and will be moved in the future.

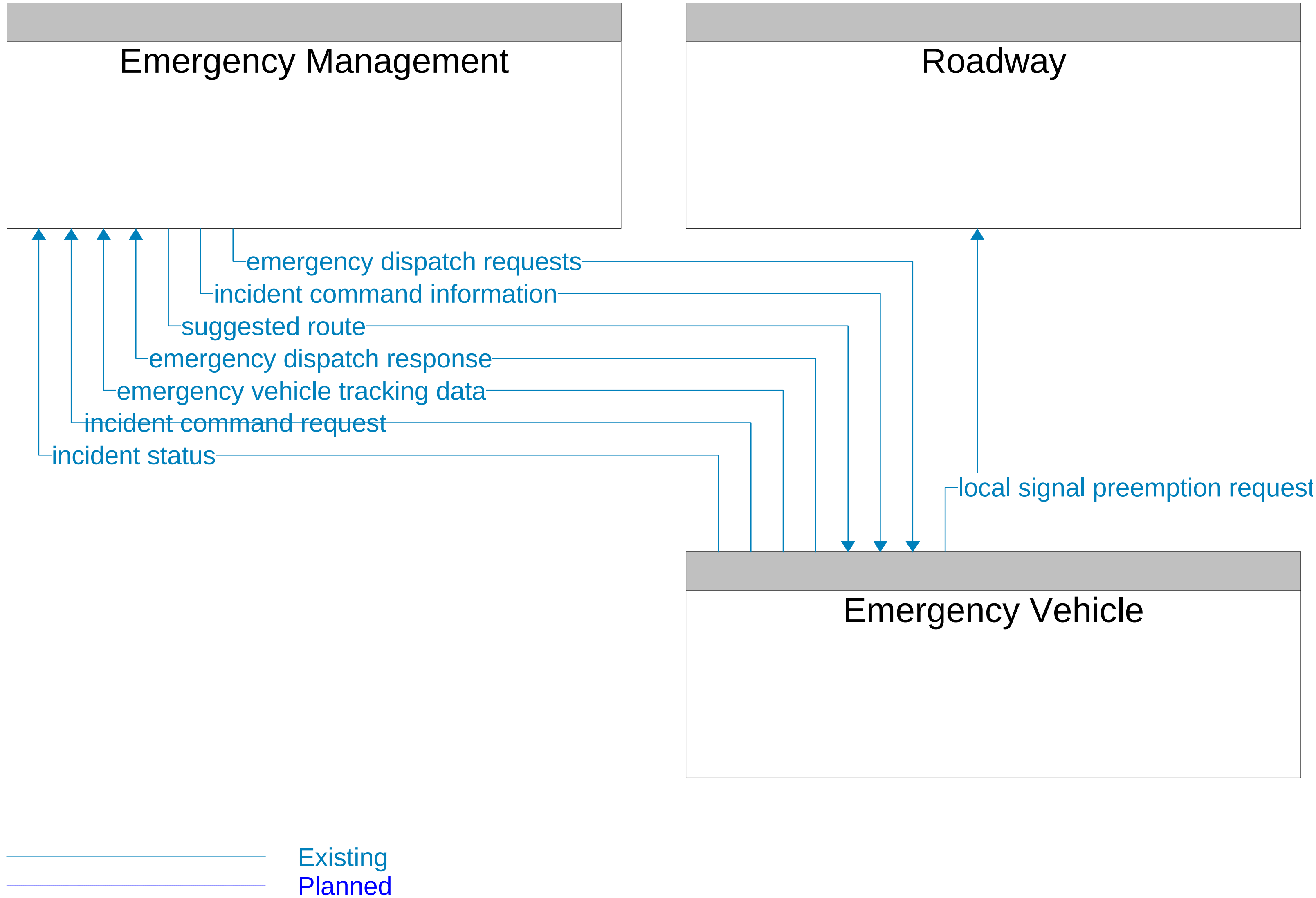
TIME
Subsystem Interconnect Diagram



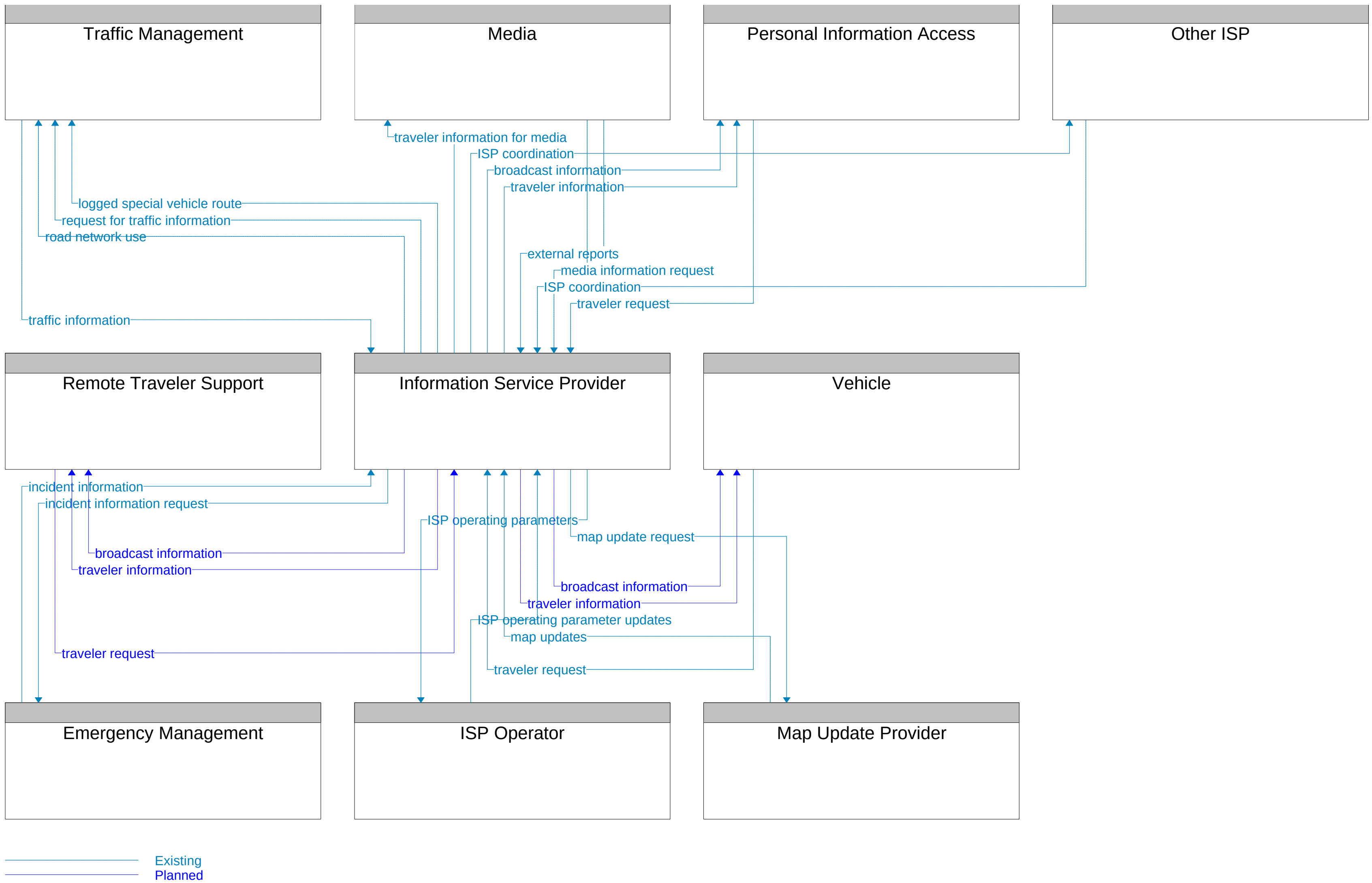
TIME
Architecture Flow Diagram for Emergency Management Subsystem



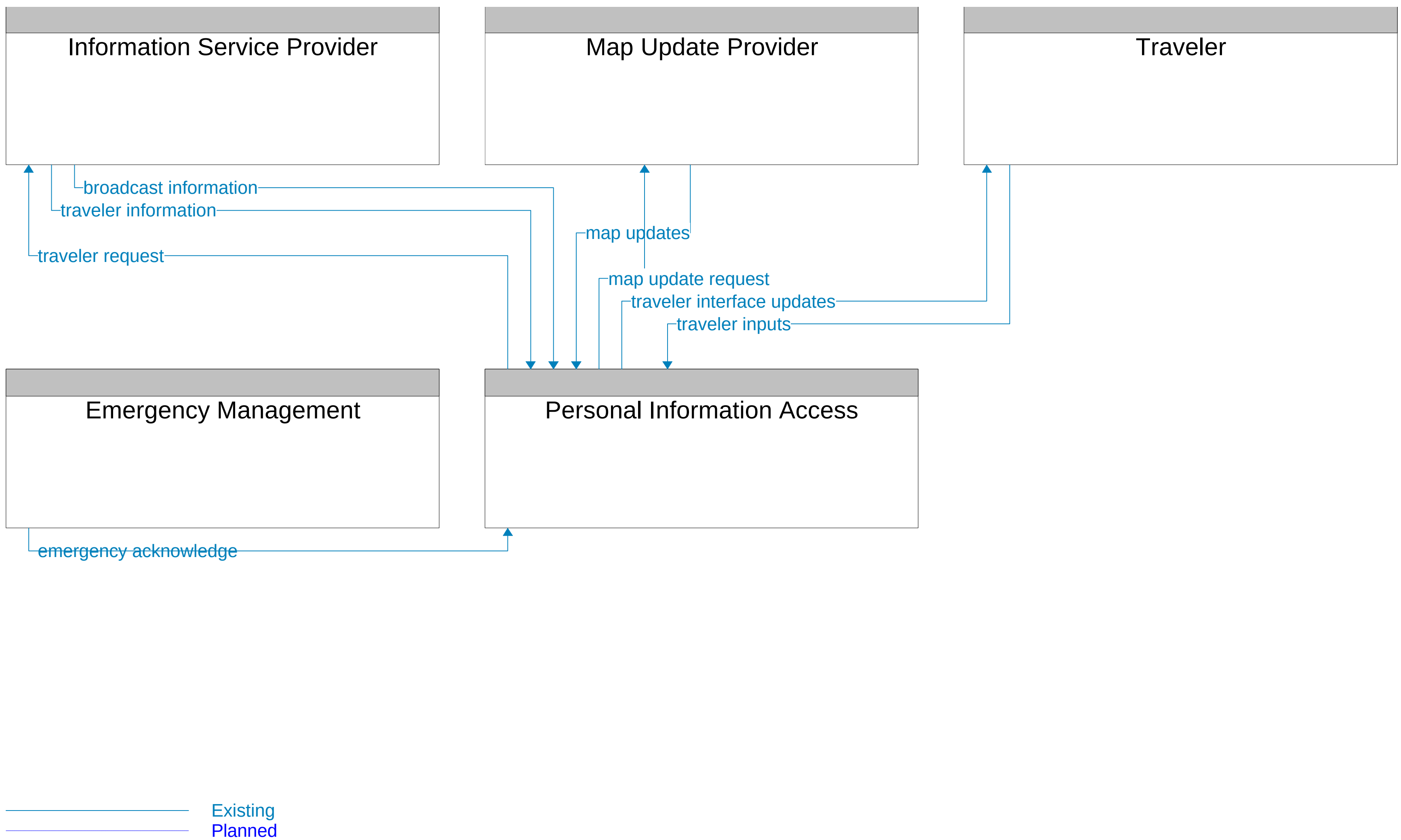
TIME
Architecture Flow Diagram for Emergency Vehicle Subsystem



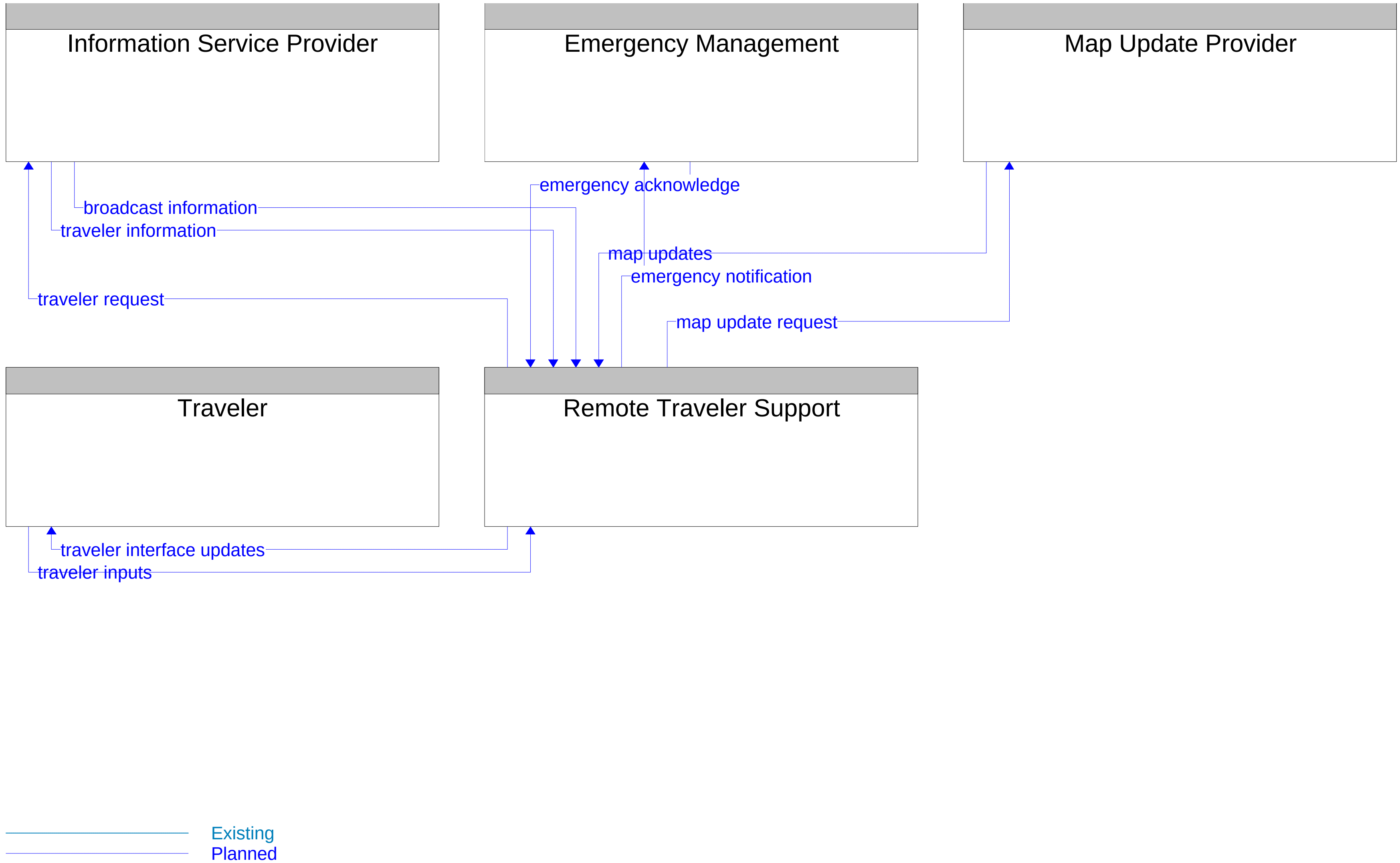
TIME
Architecture Flow Diagram for Information Service Provider Subsystem



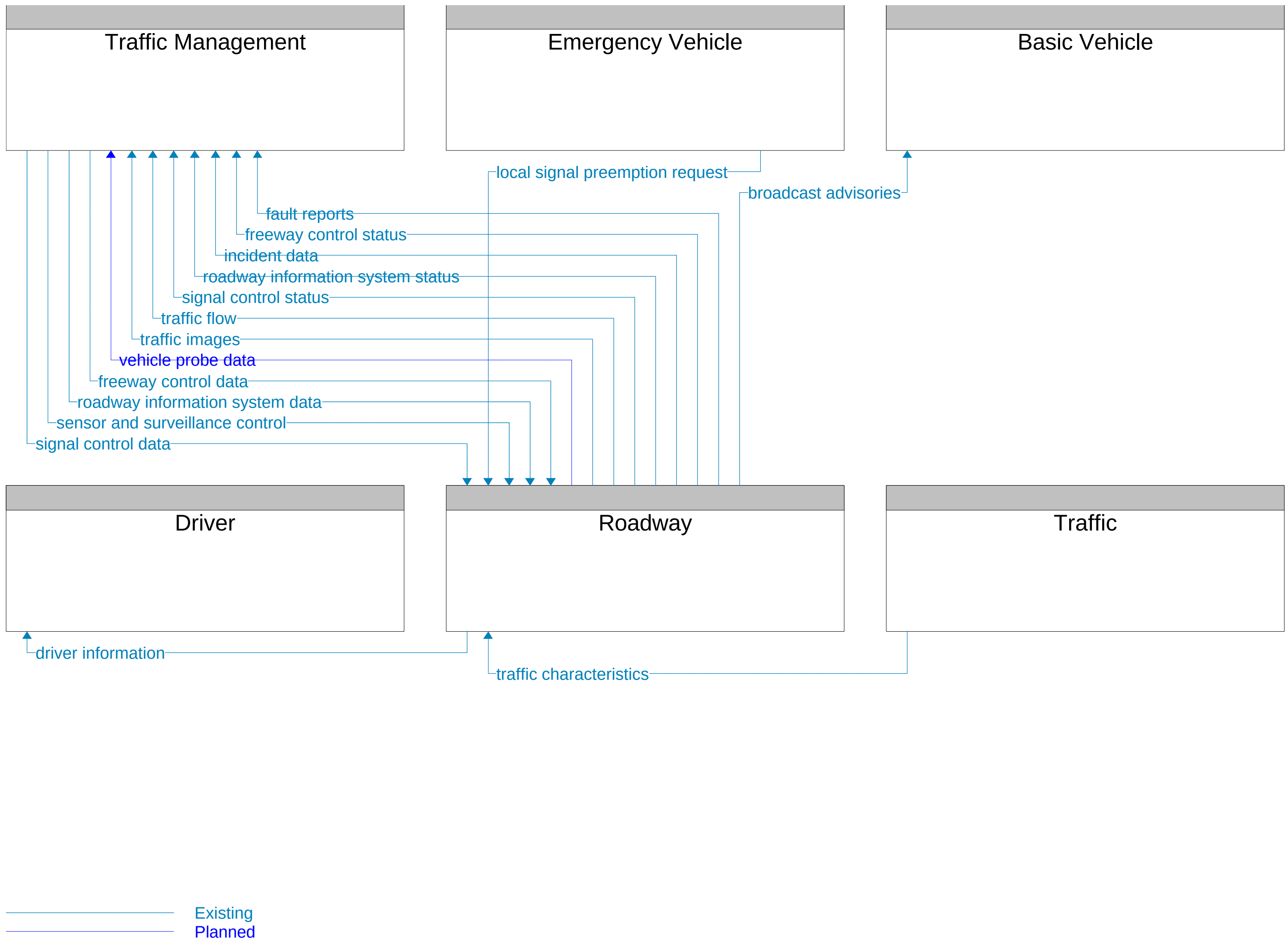
TIME
Architecture Flow Diagram for Personal Information Access Subsystem



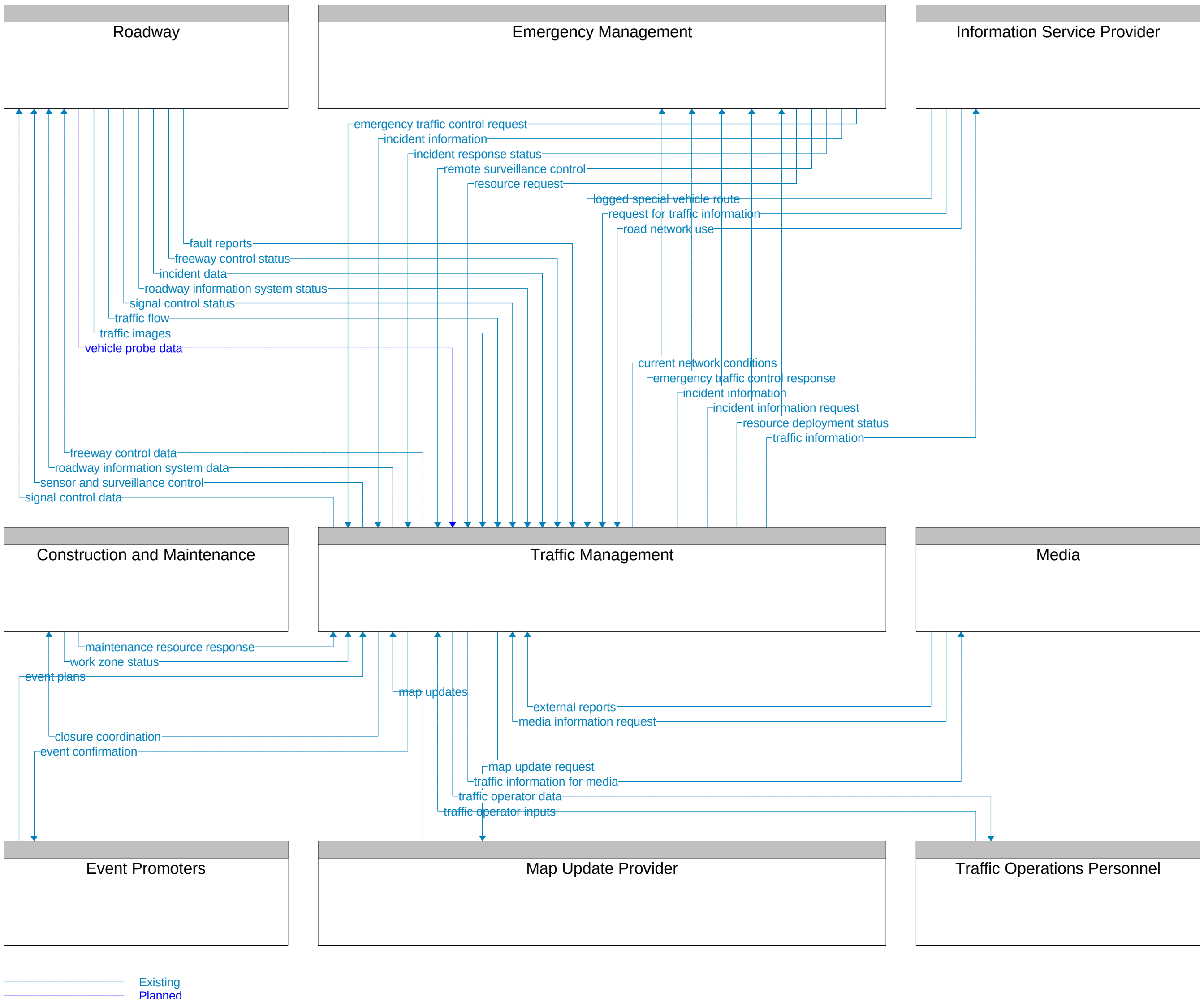
TIME
Architecture Flow Diagram for Remote Traveler Support Subsystem



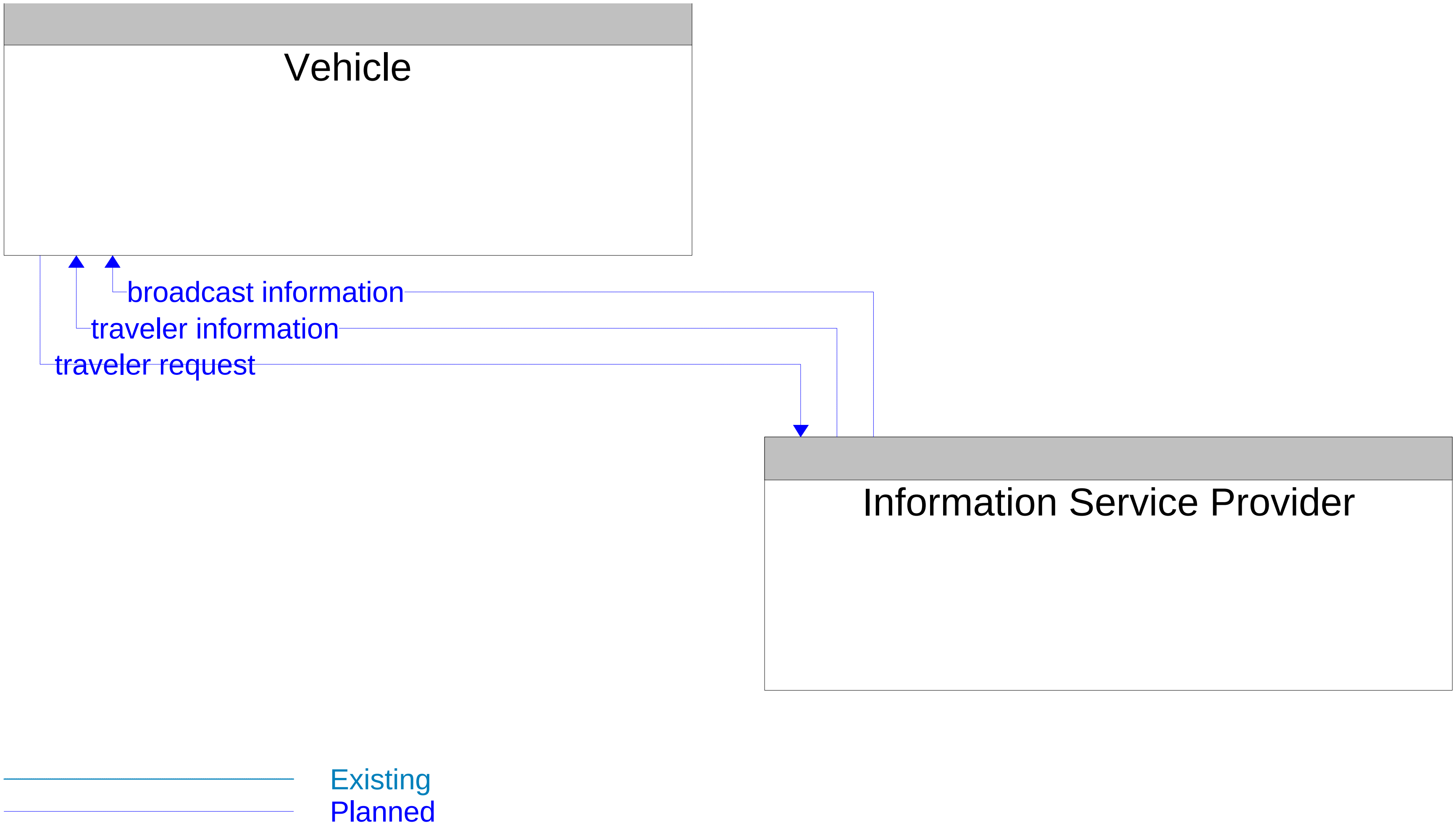
TIME
Architecture Flow Diagram for Roadway Subsystem



TIME
Architecture Flow Diagram for Traffic Management Subsystem



TIME
Architecture Flow Diagram for Vehicle Subsystem



WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: Southeastern Wisconsin Traffic Incident Management Enhancement Program (TIME)

1. What agencies are/were involved with the project? What was that agency's role?

WisDOT Freeway Operations, WisDOT District 2, Wisconsin Department of Natural Resources, Racine County Sheriff, Milwaukee County Sheriff, Waukesha Sheriff, Ozaukee Sheriff, Wisconsin Towing Association, AAA Wisconsin, Greater Milwaukee Convention and Visitors Bureau; Cities of Milwaukee, Menomonee Falls, Glendale, Brookfield, West Allis, Greenfield, and Wauwatosa.

2. Who are the markets and customers for information services?

	By Mode		By Purpose	Transit & Paratransit Providers			
X	Auto Drivers		Telecommuters	X	Vehicle Drivers		Trip Planning
	Auto Passengers		Pedestrians		Reservations/scheduling		School Administration/School Bus Driver
	Transit Riders		Bicycle Riders		Dispatching		
	Paratransit Riders	X	Freight Carriers	**Emergency Service Dispatchers (air and land)**			
X	Commuters (work)		Seasonal/2nd Residence	X	Ambulance	X	State Patrol
X	Non-Work		Tourism	X	Police	X	Highway Helpers
	Recreation	X	Pass Through Traffic (trucks/autos)	X	Fire	X	Tow Truck Operators
Fleet Managers/Dispatchers				**Agencies/Jurisdictions**			
	Shippers		Delivery Fleets	X	Maintenance/Operations	X	State/County/City/Transit. Etc.
	Transit Dispatchers		Freight Carriers		Transit Operations	X	Traffic Management Centers
Other Users/Disseminators							
	Employers	X	New/TV and Radio Reports				
	MPOs, TMOs & ATPs						

Other

3. What is the travel-related information that is be delivered? What is the level of accuracy of the delivered information?

	Route specific road surface condition-weather related		Touris information: lodging and activities, gas stations, truck stops
	Road surface construction/ops		Medical emergency facilities locations
	Weight restrictions (weather related, but different)		Transit scheduling
X	Trip travel times/operating or actual speeds		Park and ride locations
X	Congestion levels		Airport and parking information
X	Incidents		In-vehicle road guidance
	Weather conditions (visibility, etc.)		Mayday
	Posted detours		Parking available (metro area)
X	Closures/alternate routes	X	Event parking and information

Other

4. When (at what point before or during the trip) is the information be delivered?

Data Timing/Accuracy				Trip-Related Timing			
X	Current		Periodic	X	Before the trip	X	On-site/at-site
X	Real Time		Forecasted	X	During the trip		At all times
	Delayed						

Other

5. At what frequency is the information provided/updated?
Real time information is provided by MONITOR

6. Where (in what geographic area) is the information delivered?

X	Metro Area		Other Cities
	Spot		Sub-regions
	Small area		Rural areas
X	Corridor		Statewide
	Metro-wide		Out of State

Other

WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: Southeastern Wisconsin Traffic Incident Management Enhancement Program (TIME)

7. How (by what method) will the information be delivered ot the user?

X	Phones	X	Internet/Websites/E-mail		Push System
	Cellular phones	X	Local commercial radio		Pull System
	Pagers	X	Highway Advisory Radio (HAR)		Broadcast System
X	Kiosks	X	VMS/CMS		
X	View only monitors		Mobile data terminals		
	Fax	X	In-vehicle devices		
	Intranet	X	TV/Cable TV		

Other

8. Why is the information being provided? What is the desired outcome?

X	Improved Safety		Improved customer service		Decreased trip cost		Long range financial savings
X	Divert traffic		Improved customer satisfaction		Diversion to transit		More uniform speeds
X	Less trip delay	X	Time savings		On-time delivery		Efficiency
	Fewer trips	X	Greater user satisfaction		Trip avoidance		Driver satisfaction
X	Less congestion		Greater user convenience		Change time of trip		Increased sales tax revenue
X	Improved operations		Less Damage to infrastructure	X	Fewer accidents		Benefits local economy
X	System coordination		Improved transit ridership		Less transit subsidy		Fuel conservation
	Change destination	X	Change route		Change mode	X	Improved emergency response
	Compliance with laws						

Other

9. What data is collected?
Traffic and incident data is collected by MONITOR.

10. How is the data collected?

X	Automated data feed	X	Phone				
X	Fax		Mail				

Other

11. In what form is the collected data?

The location and duration of incidents and resulting congestion is determined by MONITOR using CCTV cameras and traffic detectors. Information about planned events that require traffic/incident management activities, such as construction and special events, is also collected and stored in a region wide Special Event Database.

12. How is the data processed? What are the steps to convert the data to usable information?

Once an incident is spotted by MONITOR the information is reported to the media, and CMS are used to inform drivers and divert traffic to alternate routes. Information is also received from and reported to the state patrol and relevent sheriff departments.

13. Is the data/information customized to a specific user group? If so, what group?
Traveler information is part of the Outreach/Education element of the TIME program, which is designed to improve driver education and public awareness.

14. Other

15. High Level Block Diagram
Not available

16. Sausage Diagram
Available

17. Architecture Flow Diagram
Available

WIS/DOT Central Office Transit Initiatives

Wisconsin ATIS Inventory

Project Name: Wis/DOT Central Office Transit Initiatives

Agencies: Wis/DOT, MCTS, Madison Metro

WisDOT Contact: Dixon Huber

End-user Groups: Transit Users, Transit Operators, Transit Dispatchers

Project Scope: A strategic plan for information technology and ITS for transit systems was developed to represent the strategic direction for IT/ITS of transit in Wisconsin. The underlying goal of this effort was to tie the business needs of transit in Wisconsin to a conceptual design for five to 10 years in the future. In order to gain buy-in from the transit community, the Transit IT Strategic Plan was presented to senior management within the Wisconsin Department of Transportation at a number of meetings towards the end of 1999. As a result, it was also adopted by the IT Advisory Committee in late 1999.

The strategic plan includes four phases. The timeline for each phase is as follows:

- Phase I, 2000-2001
- Phase II, 2002-2003
- Phase III, 2004-2005
- Phase IV, 2006-2008

Forty-six IT/ITS projects have been identified for implementation during phase I (2000-2001) of the strategic plan, 24 of which can be classified as ATIS projects. Of the 24 ATIS projects, the following three basic themes emerge:

- Planning, scheduling, and order taking
- Web based information distribution
- On-board systems

Phase II and Phase III exhibit identical themes, however, these phases include more detailed and complex add-ons to the phase I projects.

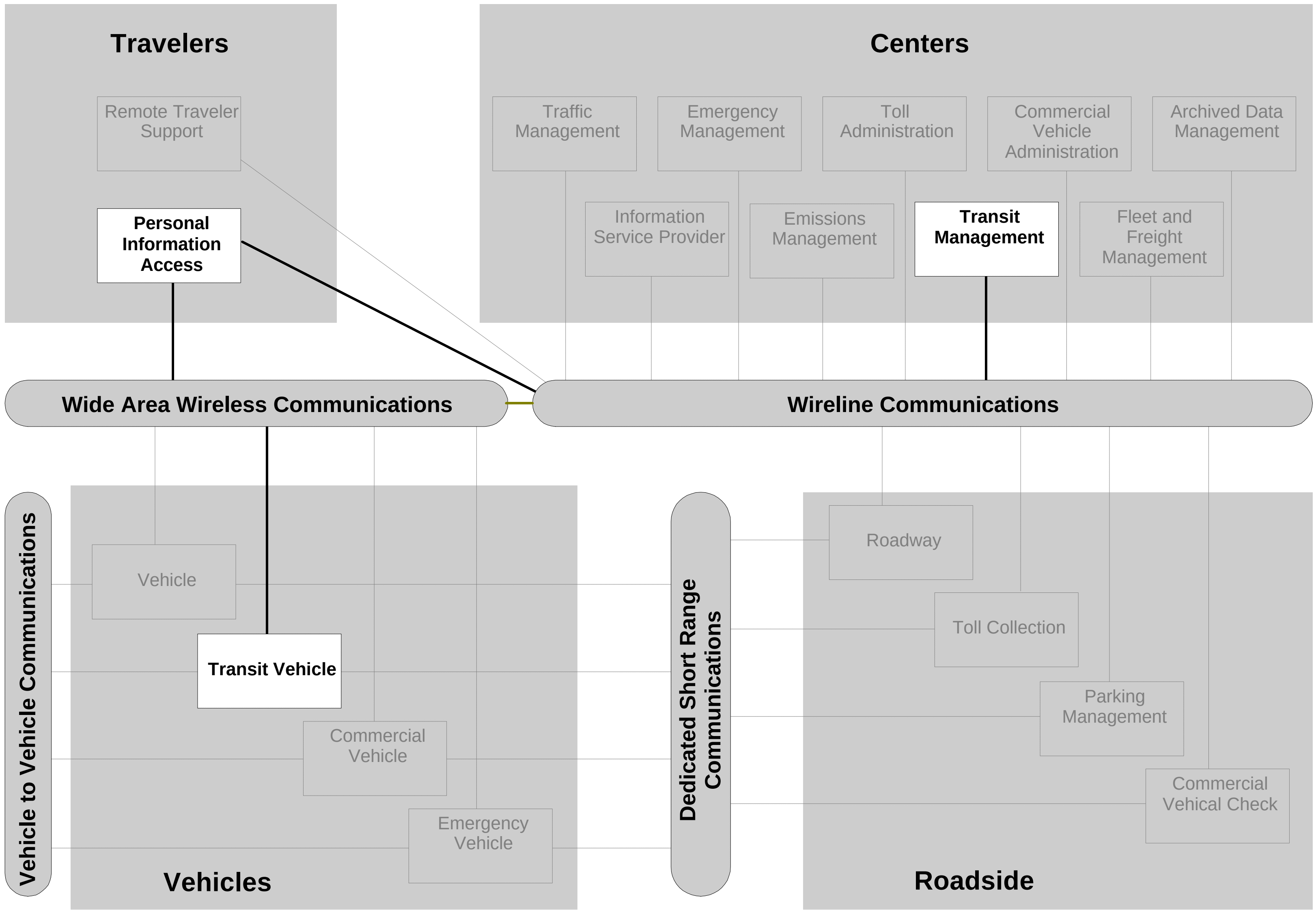
Because the phase I projects are just beginning to enter project definition stage, specific details are not yet available. As a result, the following descriptions are general project descriptions are provided.

Planning, scheduling, and order taking
The primary feature of these projects is to develop a strategy, and to ultimately implement the automation, upgrade and extension of transit planning and scheduling activities and facilities. Additionally, these projects will provide for the extendibility and integration of new technologies with existing technologies.
Web based information distribution
The goal of these projects will be to develop a web site on the internet for the dissemination of transit related traveler information to municipalities, transit service providers, the general public and other customers. These projects will involve the extension of the existing transit intranet, while at the same time implementing a integrated e-mail system and automated voice response system.
On-board systems
These projects will review the existing on-board traveler information system on the bus fleet, and will subsequently upgrade and extend the systems as needed. The on-board technologies that will likely be implemented include:

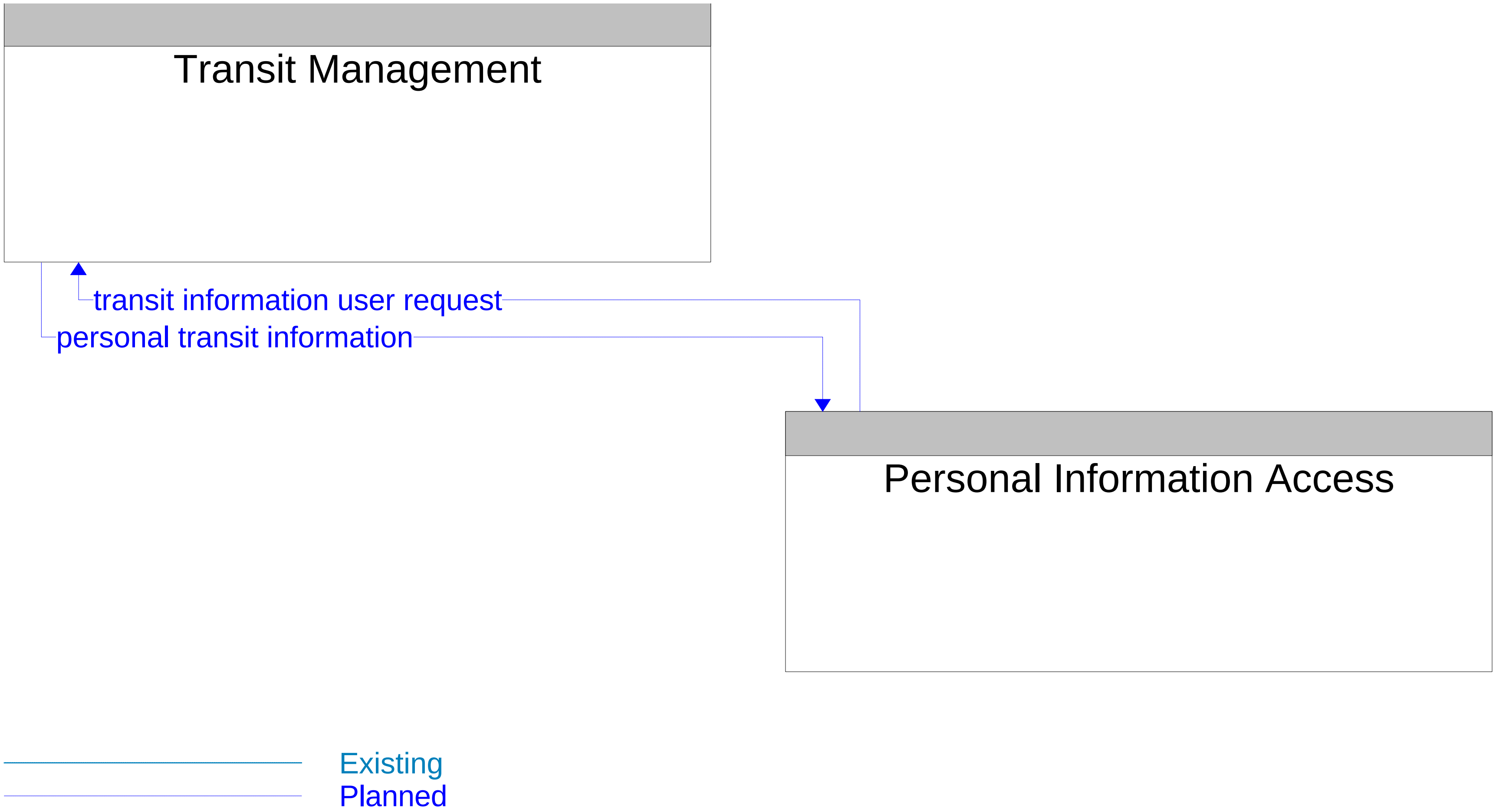
- Bus stop annunciators
- Automated passenger counting
- Automated fare box improvements
- Automated vehicle location technologies
- Emergency and exception notification technologies

Additionally, enterprise resource planning systems and technologies will be developed as part of these projects.

Central Office Transit Initiatives
Subsystems Interconnect Diagram

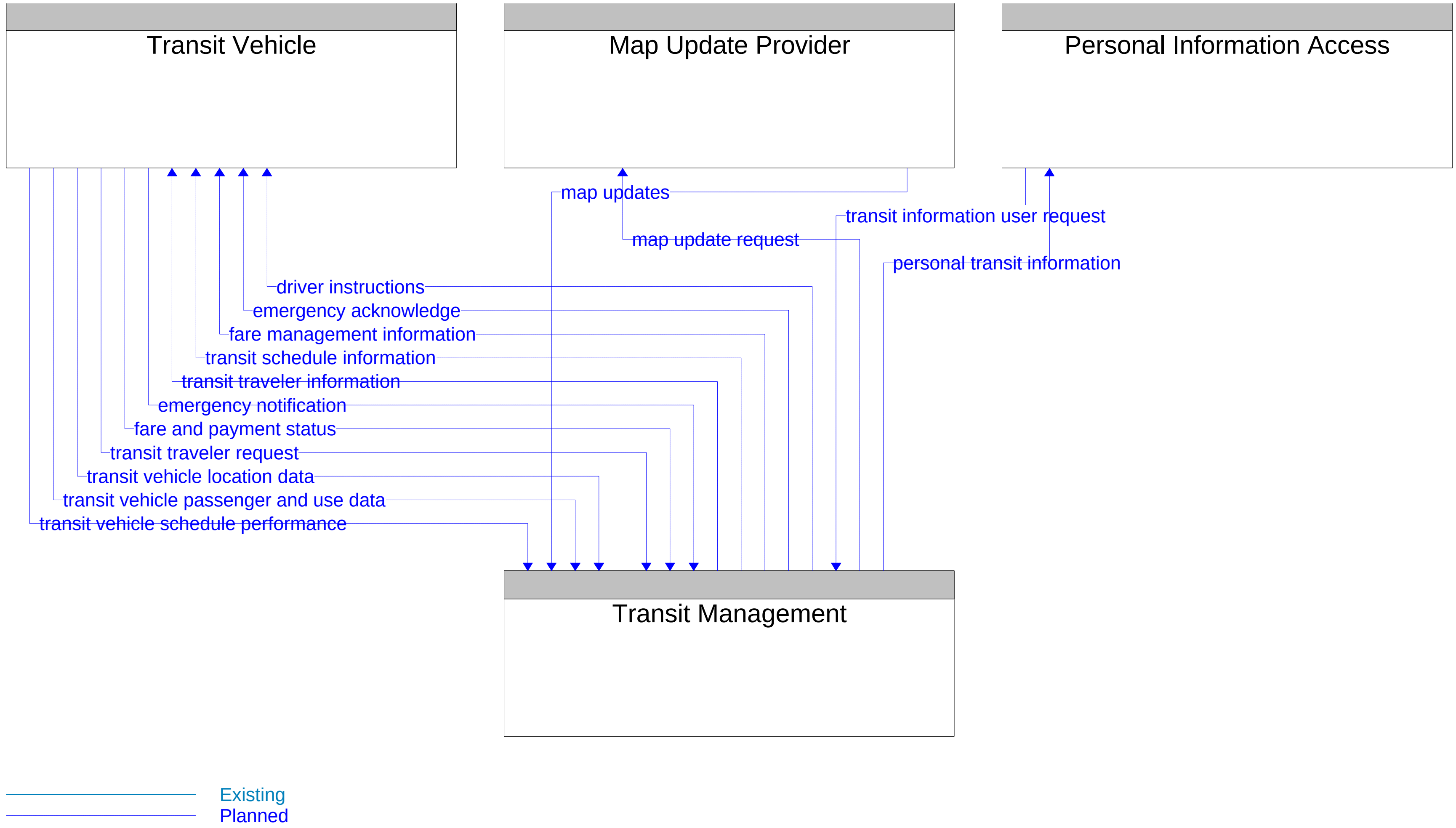


Central Office Transit Initiatives
Architecture Flow Diagram for Personal Information Access Subsystem

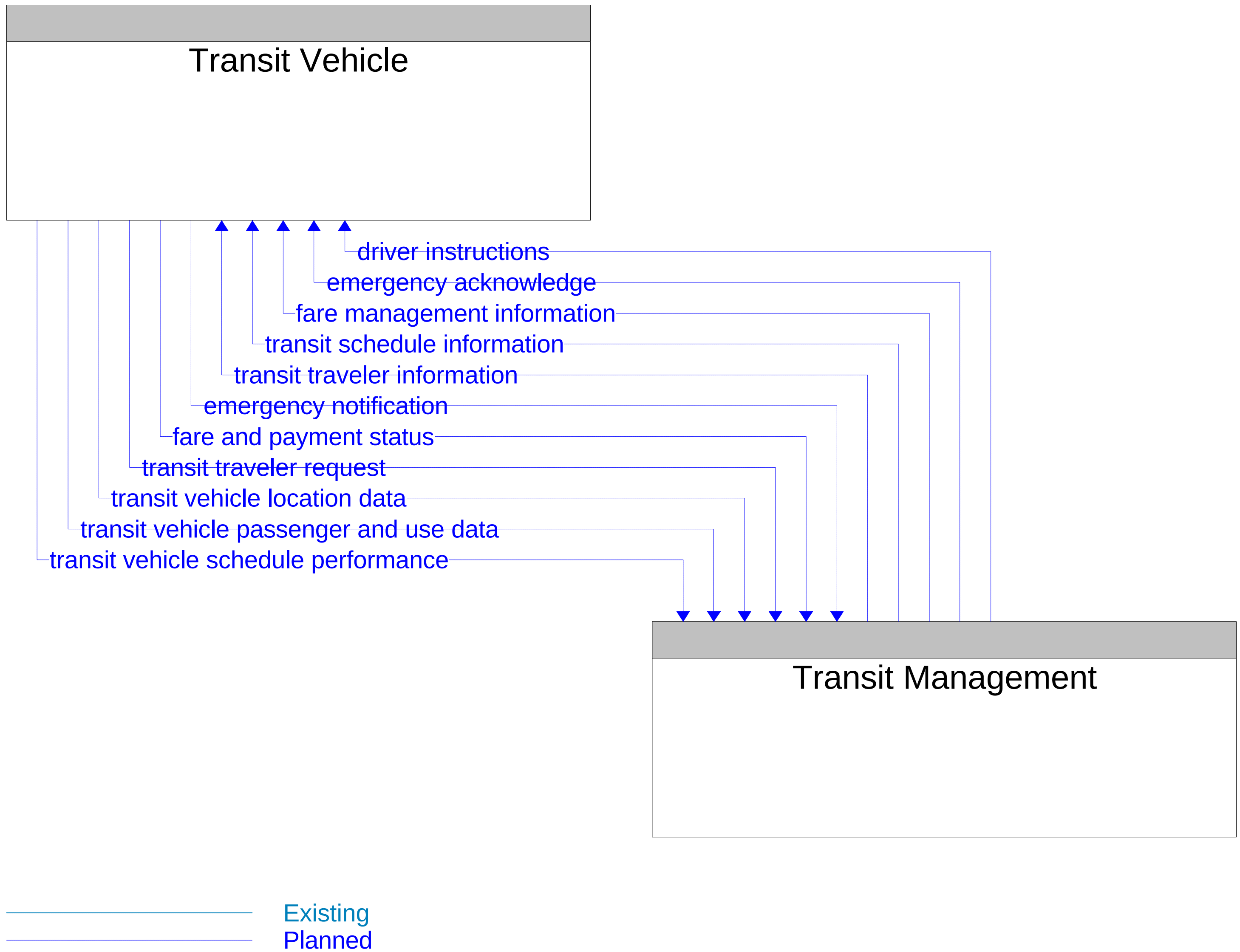


Central Office Transit Initiatives

Architecture Flow Diagram for Transit Management Subsystem



Central Office Transit Initiatives
Architecture Flow Diagram for Transit Vehicle Subsystem



WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: Wis/DOT Central Office Transit Initiatives

1. What agencies are/were involved with the project? What was that agency's role?
Wisconsin DOT, MCTS, Madison Metro

2. Who are the markets and customers for information services?

	By Mode		By Purpose	Transit & Paratransit Providers			
	Auto Drivers		Telecommuters	X	Vehicle Drivers	X	Trip Planning
	Auto Passengers		Pedestrians	X	Reservations/scheduling		School Administration/School Bus Driver
X	Transit Riders		Bicycle Riders	X	Dispatching		
X	Paratransit Riders		Freight Carriers	Emergency Service Dispatchers (air and land)			
X	Commuters (work)		Seasonal/2nd Residence		Ambulance		State Patrol
	Non-Work		Tourism		Police		Highway Helpers
	Recreation		Pass Through Traffic (trucks/autos)		Fire		Tow Truck Operators
Fleet Managers/Dispatchers				Agencies/Jurisdictions			
	Shippers		Delivery Fleets		Maintenance/Operations	X	State/County/City/Transit. Etc.
	Transit Dispatchers		Freight Carriers	X	Transit Operations	X	Traffic Management Centers
Other Users/Disseminators							
	Employers		New/TV and Radio Reports				
X	MPOs, TMOs & ATPs						

Other

3. What is the travel-related information that is be delivered? What is the level of accuracy of the delivered information?

X	Route specific road surface condition-weather related		Tourist information: lodging and activities, gas stations, truck stops
	Road surface construction/ops		Medical emergency facilities locations
	Weight restrictions (weather related, but different)	X	Transit scheduling
	Trip travel times/operating or actual speeds		Park and ride locations
	Congestion levels		Airport and parking information
	Incidents	X	In-vehicle road guidance
	Weather conditions (visibility, etc.)		Mayday
	Posted detours		Parking available (metro area)
	Closures/alternate routes		Event parking and information

Other

4. When (at what point before or during the trip) is the information be delivered?

Data Timing/Accuracy				Trip-Related Timing			
X	Current		Periodic	X	Before the trip	X	On-site/at-site
X	Real Time		Forecasted	X	During the trip	X	At all times
	Delayed						

Other

5. At what frequency is the information provided/updated?
The web site will be accessible at all times. In vehicle information will be provided during operation hours.
Telephone information will be available at all times.

6. Where (in what geographic area) is the information delivered?

X	Metro Area	X	Other Cities
	Spot		Sub-regions
	Small area	X	Rural areas
	Corridor	X	Statewide
	Metro-wide		Out of State

Other

WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: Wis/DOT Central Office Transit Initiatives

7. How (by what method) will the information be delivered ot the user?

X	Phones	X	Internet/Websites/E-mail		Push System
	Cellular phones		Local commercial radio		Pull System
	Pagers		Highway Advisory Radio (HAR)		Broadcast System
	Kiosks		VMS/CMS		
	View only monitors		Mobile data terminals		
	Fax	X	In-vehicle devices		
	Intranet		TV/Cable TV		

Other

8. Why is the information being provided? What is the desired outcome?

	Improved Safety	X	Improved customer service		Decreased trip cost		Long range financial savings
	Divert traffic	X	Improved customer satisfaction	X	Diversion to transit		More uniform speeds
X	Less trip delay	X	Time savings		On-time delivery	X	Efficiency
	Fewer trips	X	Greater user satisfaction		Trip avoidance		Driver satisfaction
	Less congestion	X	Greater user convenience		Change time of trip		Increased sales tax revenue
X	Improved operations		Less Damage to infrastructure		Fewer accidents		Benefits local economy
	System coordination	X	Improved transit ridership	X	Less transit subsidy		Fuel conservation
	Change destination		Change route		Change mode	X	Improved emergency response
	Compliance with laws						

Other

9. What data is collected?
Not available

10. How is the data collected?

X	Automated data feed		Phone				
	Fax		Mail				

Other

11. In what form is the collected data?
Not available

12. How is the data processed? What are the steps to convert the data to usable information?
Not available

13. Is the data/information customized to a specific user group? If so, what group?
Not available

14. Other

15. High Level Block Diagram
Not available

16. Sausage Diagram
Available

17. Architecture Flow Diagram
Available

WIS/DOT Internet
Home Page

Wisconsin ATIS Inventory

Project Name: WisDOT Internet Home Page

Agencies: WisDOT

WisDOT Contact:
Curtis Pulford

End-user Groups: Drivers in the state of Wisconsin, with an emphasis on the Milwaukee Metropolitan area.

Project Scope: The Wisconsin Department of Transportation Home Page provides information to the public about road conditions, and planned construction and detours. For the Milwaukee area real time congestion and travel time information is also available.

Data Collection:
Statewide Information:
- "Travel Easy" page with maps of major work zones for the year 2000
- Detour and Construction information updated weekly April-November
- Text Report with winter road conditions
- Phone number for road conditions report 1-800-ROADWIS
- Highway 45 Travelers Guide including a construction map, construction schedules, information for travel alternatives (bus, rideshare, etc.) and information for truckers.

For the Milwaukee area:
- Lane and ramp closures for the current week (text report)
- Links to 38 CCTV cameras
- Text report of current travel times
- Link to Monitor web page that has: real time congestion map (Gateway) and construction in GCM corridor (Gateway)

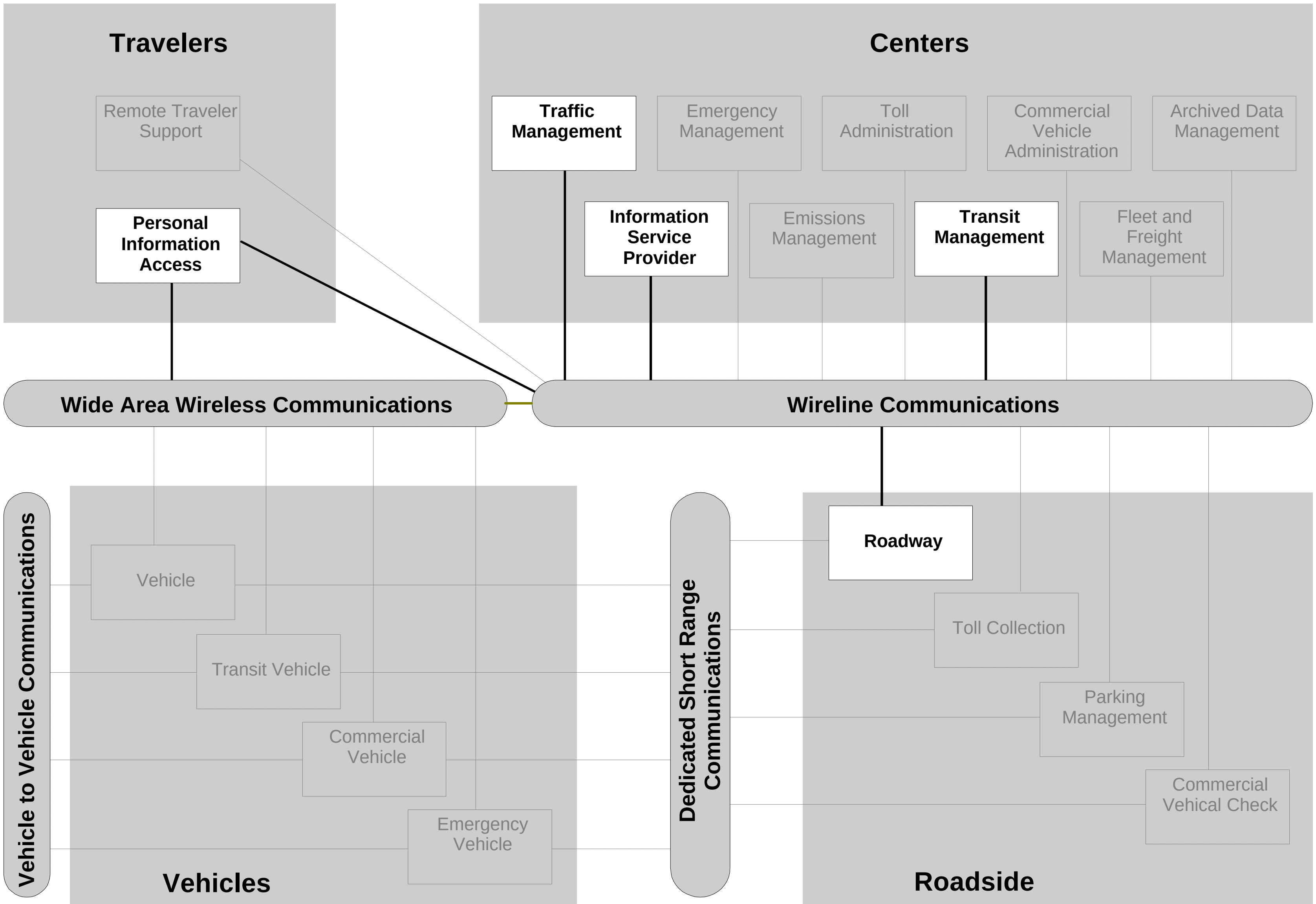
Delivery of Information: Information is available at all times but is primarily useful for trip planning before departure.

Delivery Mechanisms: Information is available only through the web site.

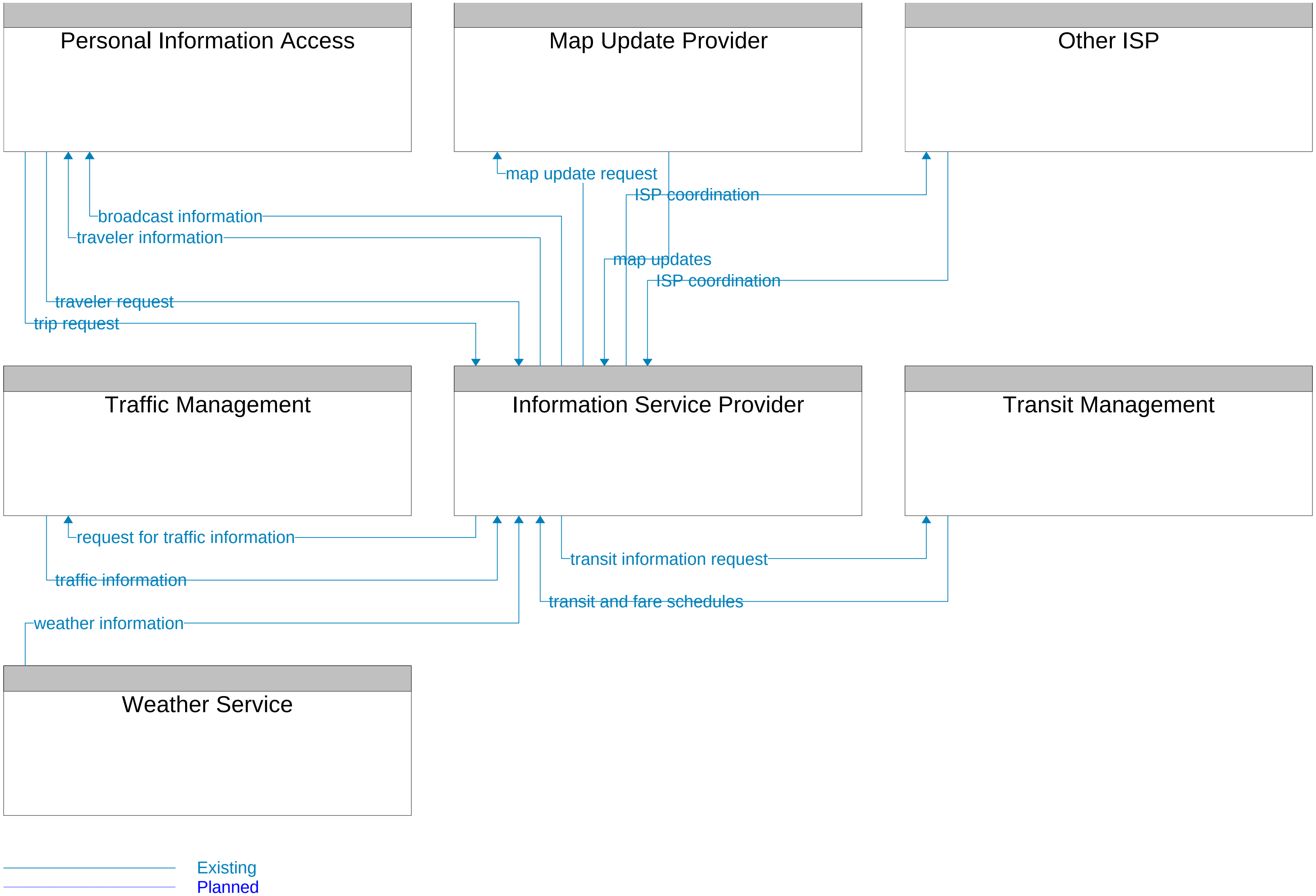
Desired Outcome: Traveler information is provided to the public to reduce travel times, and to increase safety and driver satisfaction.

Comments: The home page is available at www.dot.state.wi.us

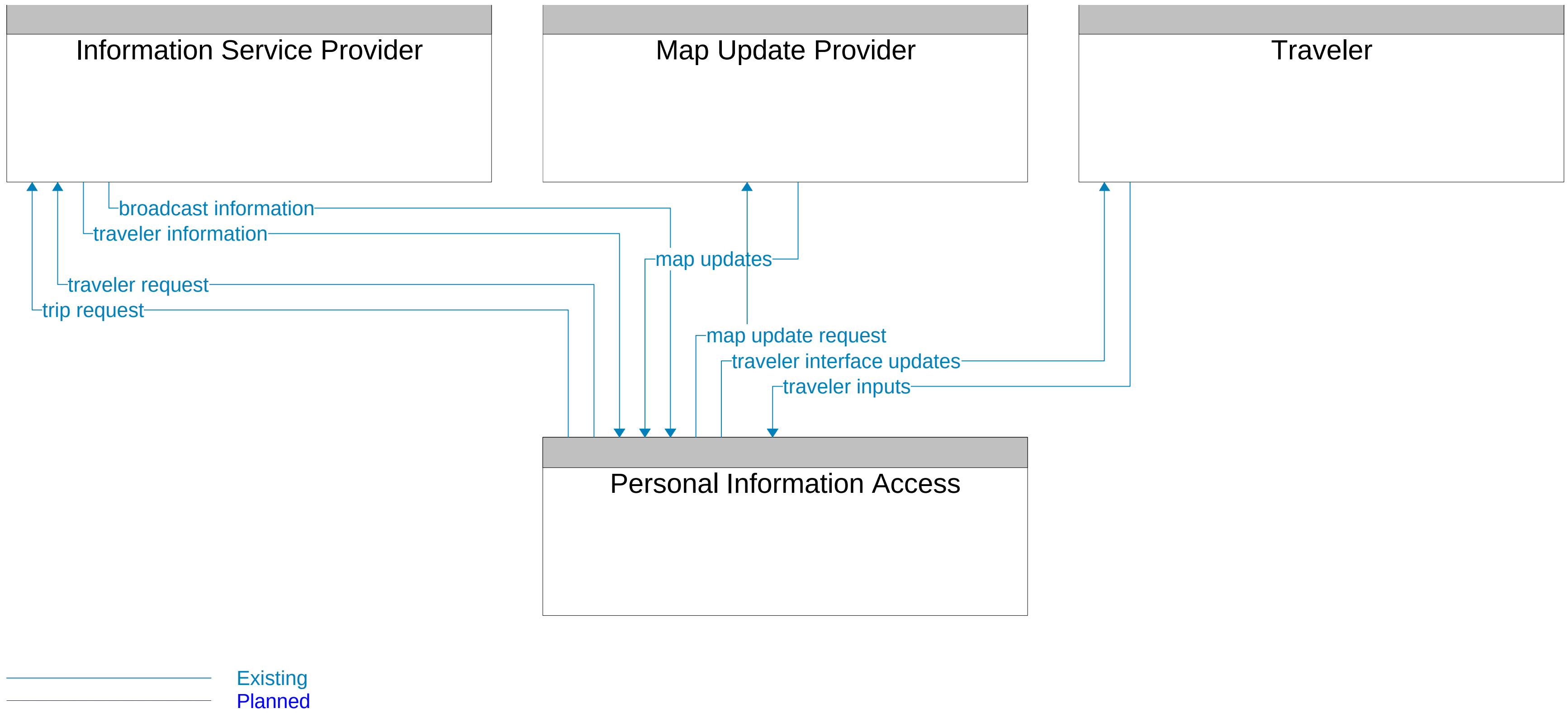
WisDOT Internet Home Page
Subsystem Interconnect Diagram



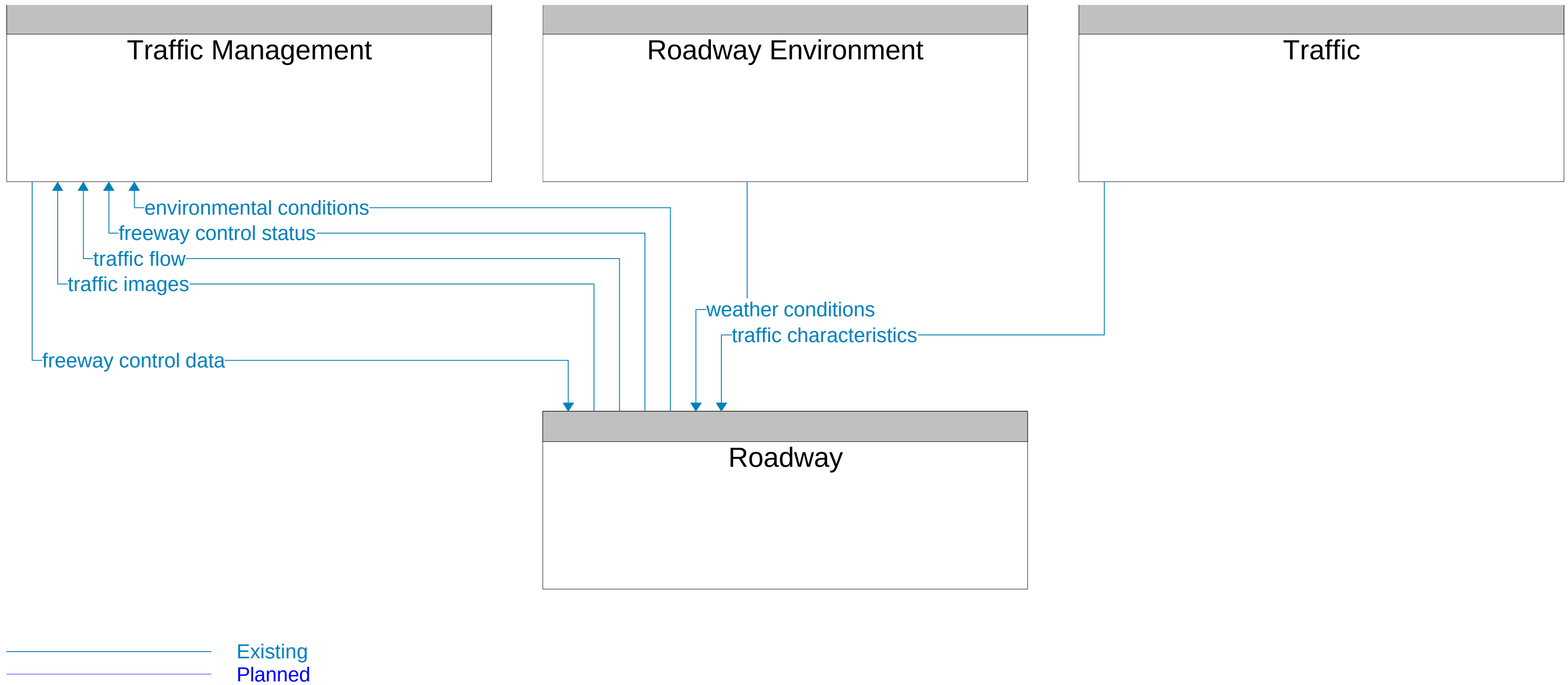
WisDOT Internet Home Page
Architecture Flow Diagram for Information Service Provider Subsystem



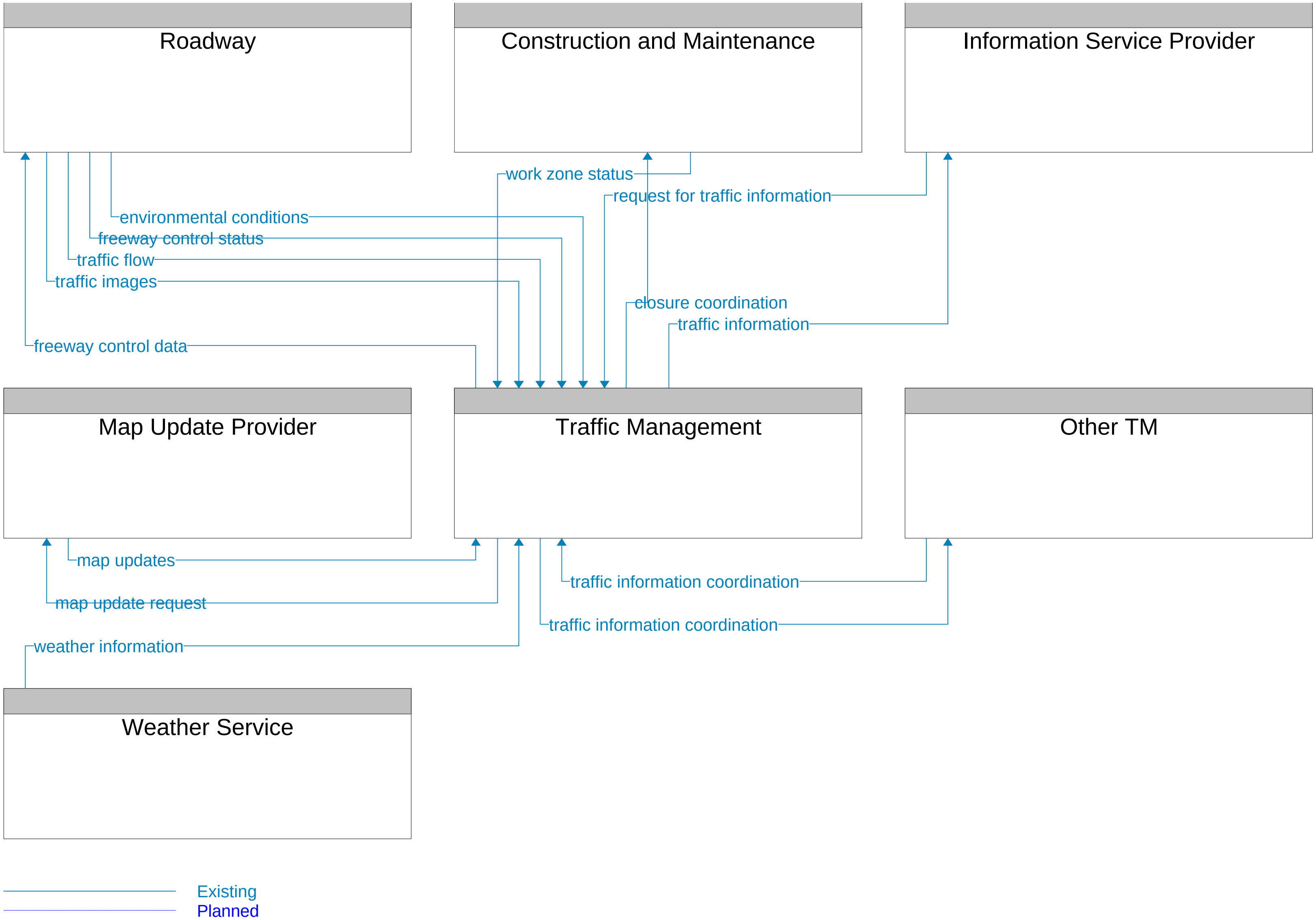
WisDOT Internet Home Page
Architecture Flow Diagram for Personal Information Access Subsystem



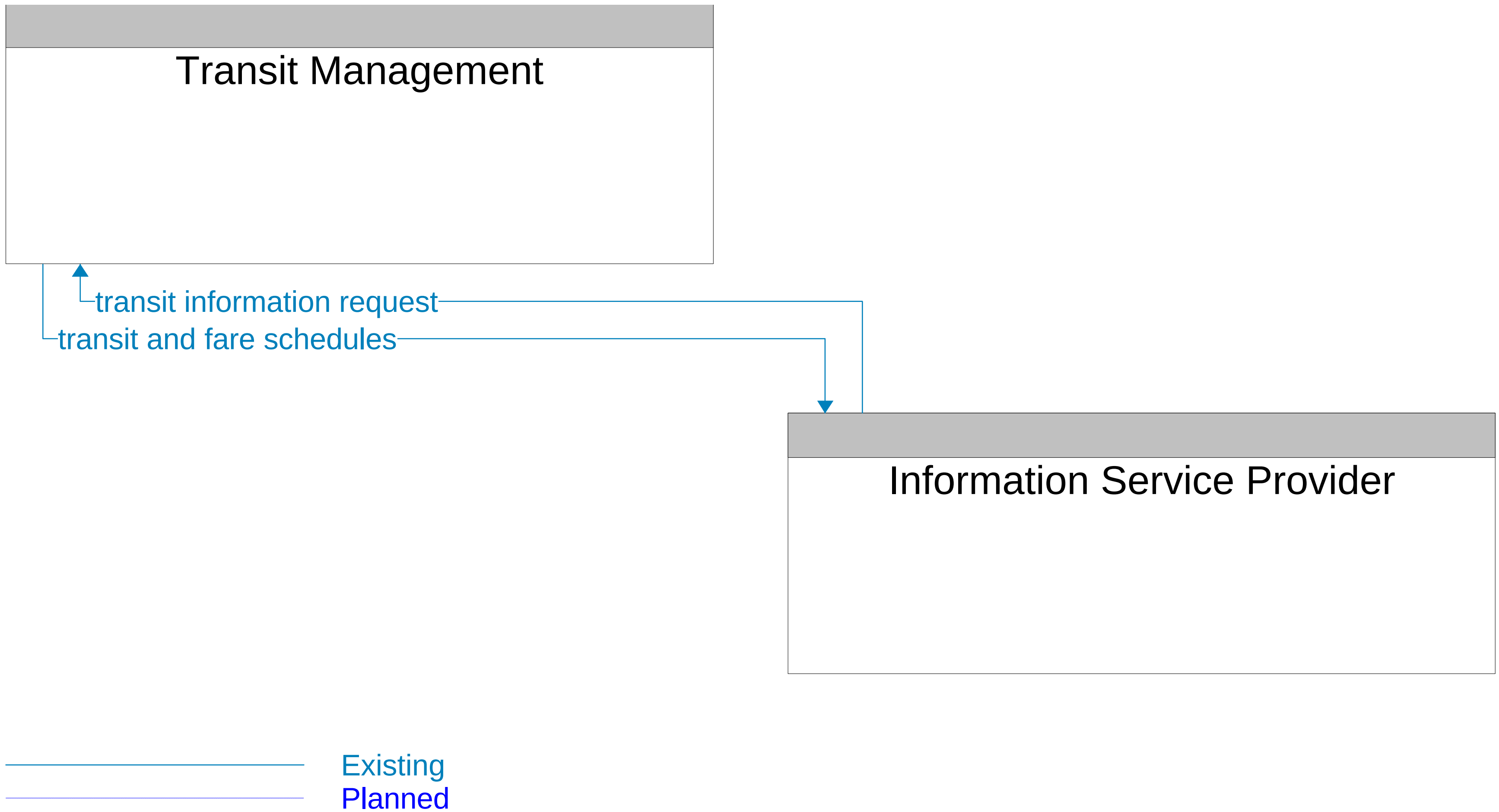
WisDOT Internet Home Page
Architecture Flow Diagram for Roadway Subsystem



WisDOT Internet Home Page
Architecture Flow Diagram for Traffic Management Subsystem



WisDOT Internet Home Page
Architecture Flow Diagram for Transit Management Subsystem



WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: WisDOT Internet Home Page

1. What agencies are/were involved with the project? What was that agency's role?
Wisconsin Department of Transportation

2. Who are the markets and customers for information services?

	By Mode		By Purpose		Transit & Paratransit Providers		
X	Auto Drivers		Telecommuters		Vehicle Drivers		Trip Planning
	Auto Passengers		Pedestrians		Reservations/scheduling		School Administration/School Bus Driver
	Transit Riders		Bicycle Riders		Dispatching		
	Paratransit Riders	X	Freight Carriers		**Emergency Service Dispatchers (air and land)**		
X	Commuters (work)		Seasonal/2nd Residence		Ambulance		State Patrol
X	Non-Work	X	Tourism		Police		Highway Helpers
X	Recreation	X	Pass Through Traffic (trucks/autos)		Fire		Tow Truck Operators
Fleet Managers/Dispatchers					**Agencies/Jurisdictions**		
	Shippers		Delivery Fleets		Maintenance/Operations		State/County/City/Transit. Etc.
	Transit Dispatchers		Freight Carriers		Transit Operations		Traffic Management Centers
Other Users/Disseminators							
	Employers		New/TV and Radio Reports				
	MPOs, TMOs & ATPs						

Other

3. What is the travel-related information that is be delivered? What is the level of accuracy of the delivered information?

X	Route specific road surface condition-weather related		Touris information: lodging and activities, gas stations, truck stops
X	Road surface construction/ops		Medical emergency facilities locations
	Weight restrictions (weather related, but different)	X	Transit scheduling
X	Trip travel times/operating or actual speeds		Park and ride locations
X	Congestion levels		Airport and parking information
X	Incidents		In-vehicle road guidance
X	Weather conditions (visibility, etc.)		Mayday
X	Posted detours		Parking available (metro area)
X	Closures/alternate routes		Event parking and information

Other

4. When (at what point before or during the trip) is the information be delivered?

Data Timing/Accuracy				**Trip-Related Timing**			
X	Current		Periodic	X	Before the trip		On-site/at-site
X	Real Time	X	Forecasted	X	During the trip	X	At all times
	Delayed						

Other

5. At what frequency is the information provided/updated?
The web site is available at all times. Detour and construction information is updated weekly April-Novemeber and as needed the rest of the year. Lane and ramp closure information for the Milwaukee area is provided weekly. Real time congestion information from the Gateway link is received once every minute.

6. Where (in what geographic area) is the information delivered?

X	Metro Area		Other Cities
	Spot		Sub-regions
	Small area		Rural areas
X	Corridor	X	Statewide
X	Metro-wide		Out of State

Other

WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: WisDOT Internet Home Page

7. How (by what method) will the information be delivered ot the user?

	Phones	X	Internet/Websites/E-mail		Push System
	Cellular phones		Local commercial radio		Pull System
	Pagers		Highway Advisory Radio (HAR)		Broadcast System
	Kiosks		VMS/CMS		
	View only monitors		Mobile data terminals		
	Fax		In-vehicle devices		
	Intranet		TV/Cable TV		

Other

8. Why is the information being provided? What is the desired outcome?

	Improved Safety	X	Improved customer service		Decreased trip cost		Long range financial savings
X	Divert traffic	X	Improved customer satisfaction		Diversion to transit		More uniform speeds
X	Less trip delay	X	Time savings		On-time delivery		Efficiency
	Fewer trips	X	Greater user satisfaction		Trip avoidance	X	Driver satisfaction
X	Less congestion	X	Greater user convenience		Change time of trip		Increased sales tax revenue
X	Improved operations		Less Damage to infrastructure		Fewer accidents		Benefits local economy
	System coordination		Improved transit ridership		Less transit subsidy		Fuel conservation
X	Change destination		Change route		Change mode		Improved emergency response
	Compliance with laws						

Other

9. What data is collected?
Detour, construction and road condition information is available for the entire state. Information about travel times, and congestion is available for the Milwaukee area only.

10. How is the data collected?

X	Automated data feed	X	Phone				
X	Fax		Mail				

Other

11. In what form is the collected data?
A real time congestion map and a report of current travel times is available through a link with Gateway. There are also links to 38 CCTV cameras in the Milwaukee area through MONITOR.

12. How is the data processed? What are the steps to convert the data to usable information?
Information on road closures and construction is available directly through WisDOT and does not require processing. Real time information for Milwaukee is processed by Gateway.

13. Is the data/information customized to a specific user group? If so, what group?
The majority of information is intended for drivers in the Milwuakee area but there is also a special Highway 45 Travelers Guide as well as a special section with information for commercial vehicle drivers.

14. Other

15. High Level Block Diagram
Not available

16. Sausage Diagram
Available

17. Architecture Flow Diagram
Available

1-800-ROAD-WIS

Wisconsin ATIS Inventory

Project Name: 1-800-ROAD-WIS road conditions telephone number.

Agencies: Wisconsin DOT.

WisDOT Contact: Tony Paulson

End-user Groups: General public, emergency services, freight carriers, tourists, commuters, maintenance, transit operators / drivers.

Project Scope: The Wisconsin Road Conditions 800-number is a telephony-based traveler information system that can be accessed at 1-800-ROAD-WIS (762-3947). This system currently provides:

- Seasonal construction information on interstate and state trunk highways. The system provides a voice recording of road closures, restricted lane widths or weight restrictions on specified sections of highways. An advisory board takes a compilation of all construction projects around the state and highlights 12-14 construction projects that are on main trunk highways.

- Winter road conditions on interstate and U.S. highways. The system provides a voice recording of driving conditions on specified sections of highway. The information is updated at least 4 times per day during the winter season using county sheriff reports and state patrol observations.

Data Collection: 1-800-ROAD-WIS consists of driving condition data during the wintertime and road restriction and closure information due to construction during the summertime.

Driving conditions are reported by state troopers. Conditions are radioed into a dispatch center in each district and then forwarded via email or Internet to District 1, where the information is compiled and recorded on the answering system. This data is updated at least 4 times per day.

Construction information is provided by each individual maintenance district, and compiled in the District 1 maintenance office. From the hundreds of construction projects, a few important ones are selected based on the type of road restriction involved. These few are recorded on the answering system and updated by the season.

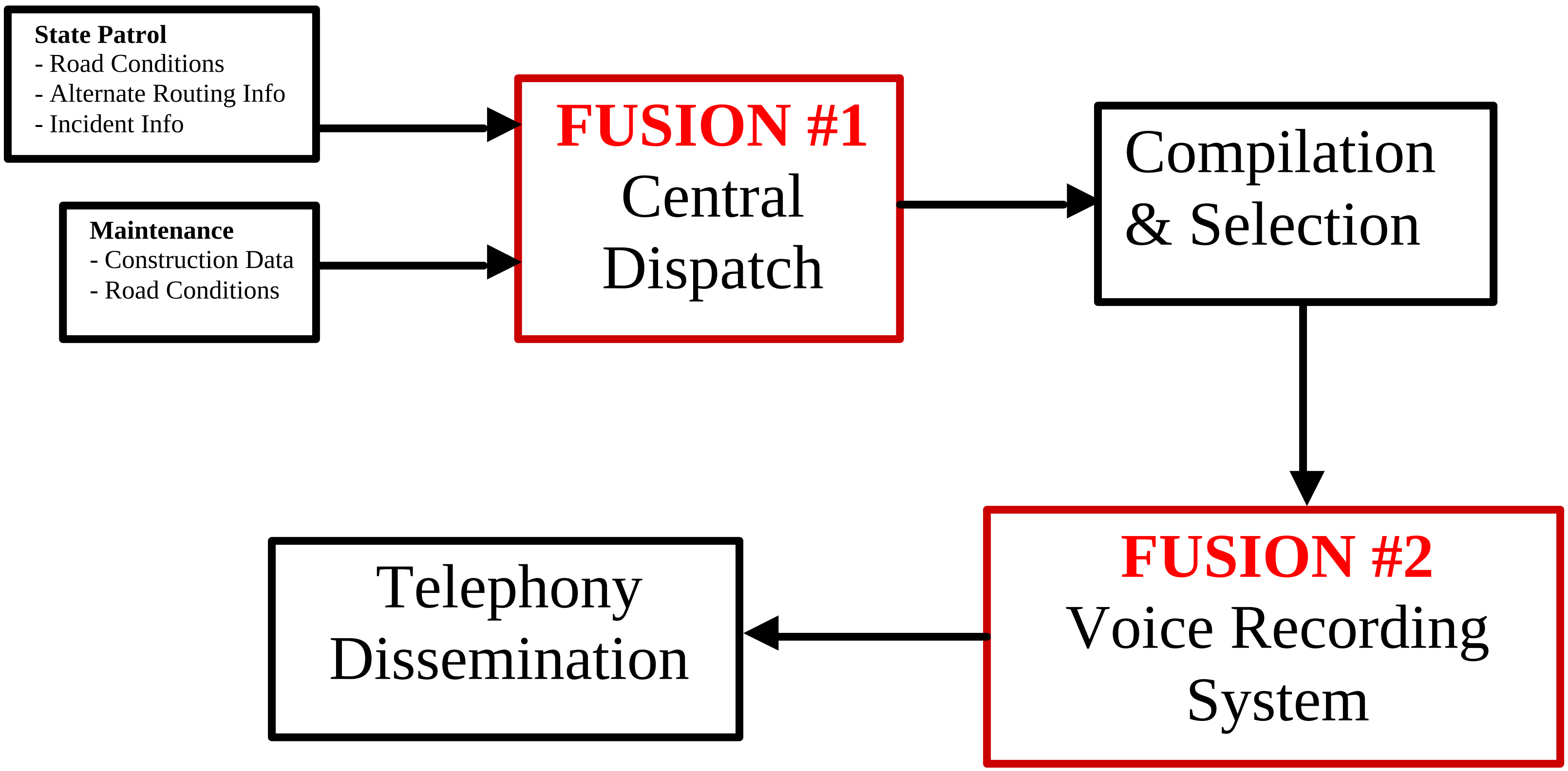
Delivery of Information: Construction data are provided during the summertime. All construction for state and interstate highways are provided for the season. Wintertime data is updated 3 times per day.

Delivery Mechanisms: The primary delivery medium for this system is by telephone. The system consists of two AEC (Automated Electronics Corporation) Messenger 612 automated answering systems with 24 phone lines per unit. The system plays the recording once and disconnects. During the winter season, the Road Report system averages approximately 55,000 calls/month. The Wisconsin State Patrol is primarily responsible for manually processing a majority of the data for the Road Report system.

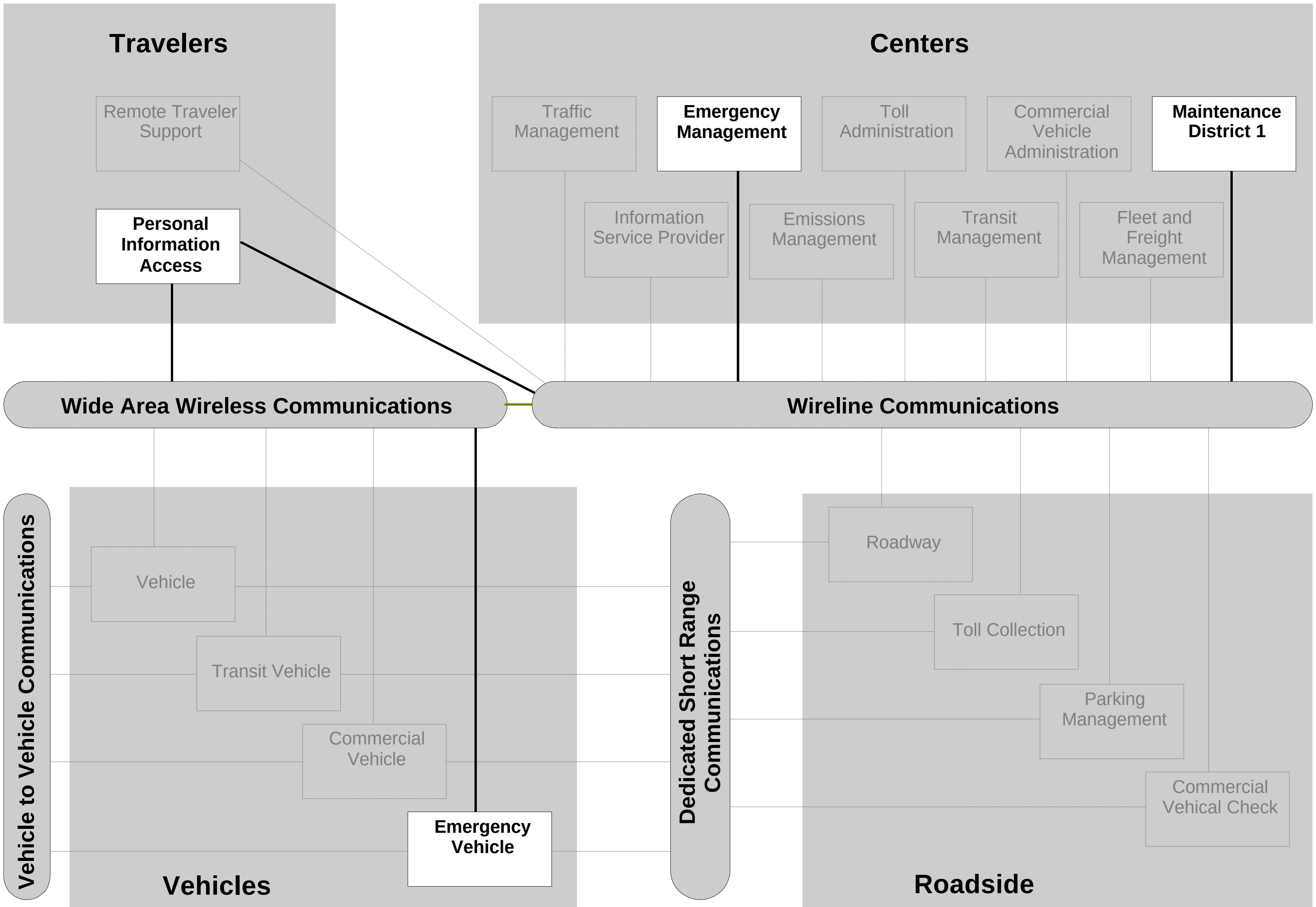
Desired Outcome: The desired outcome of the system is to increase traveler safety in inclement weather by providing information to deter or postpone trips. The construction information is provided to decrease congestion in construction zones, and provide information ahead of time so travelers can plan to take alternate routes.

Comments: This information is provided via the Internet on the WisDOT web site.
http://www.dot.state.wi.us/dsp/roadcond/current.html

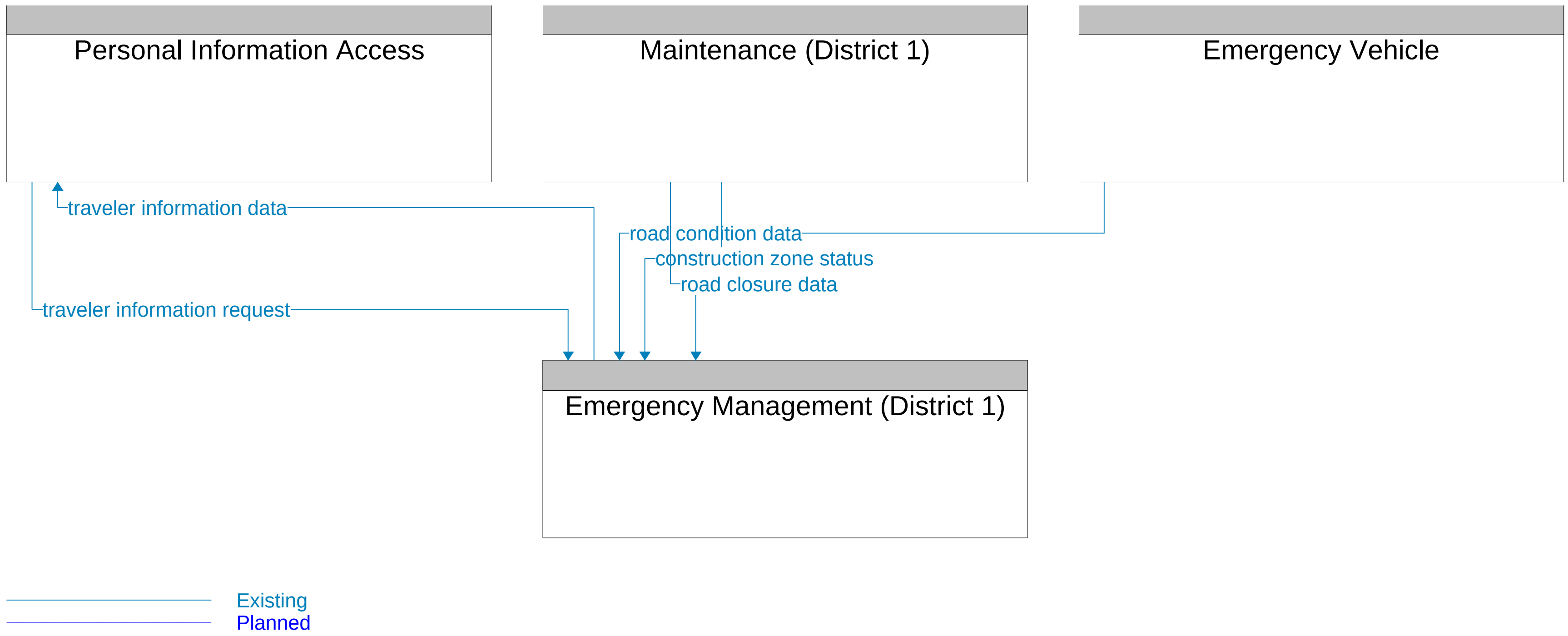
1-800-ROADWIS Block Diagram



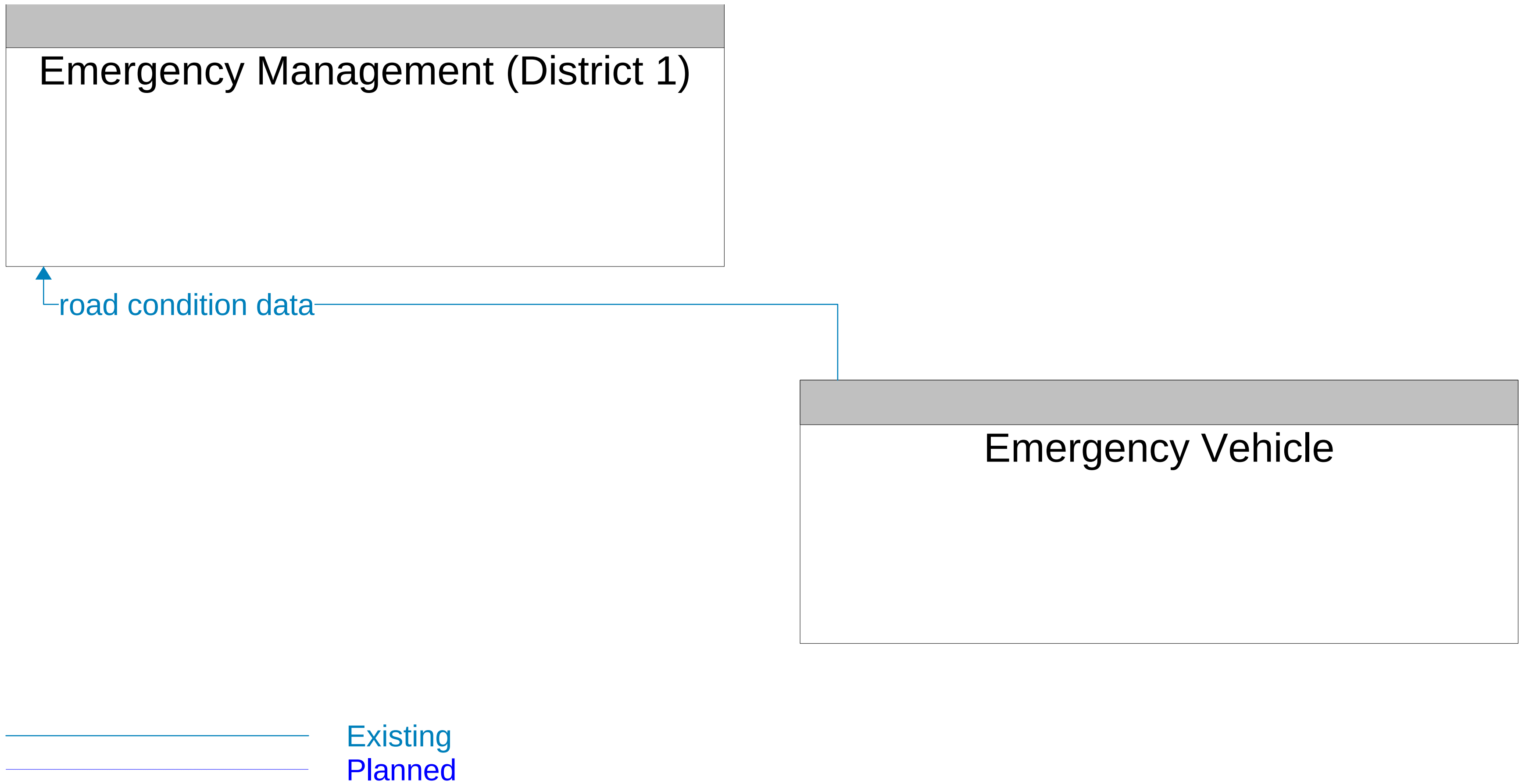
1-800-Road-Wis
Subsystems Interconnect Diagram



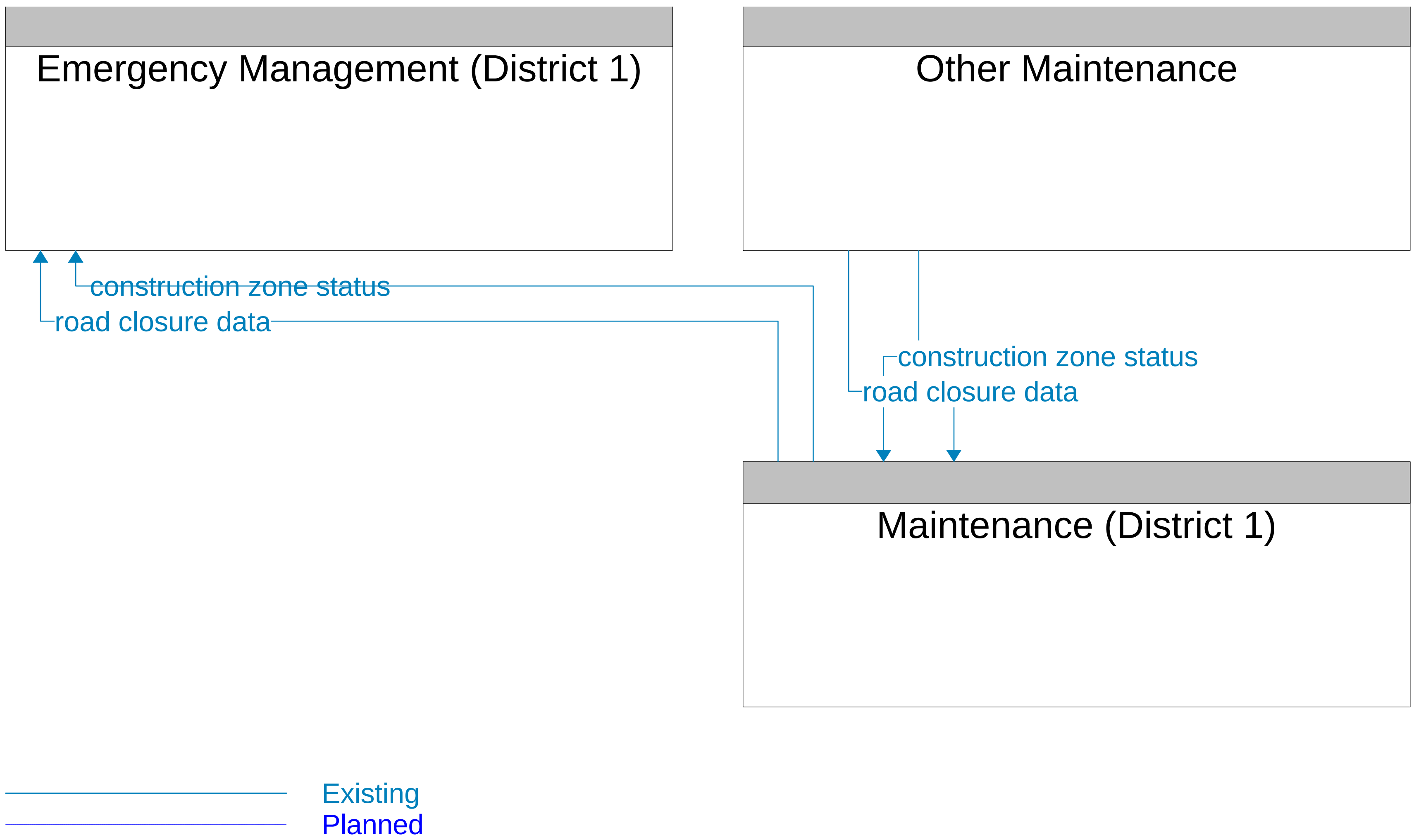
1-800-Road-Wis
Architecture Flow Diagram for Emergency Management Subsystem



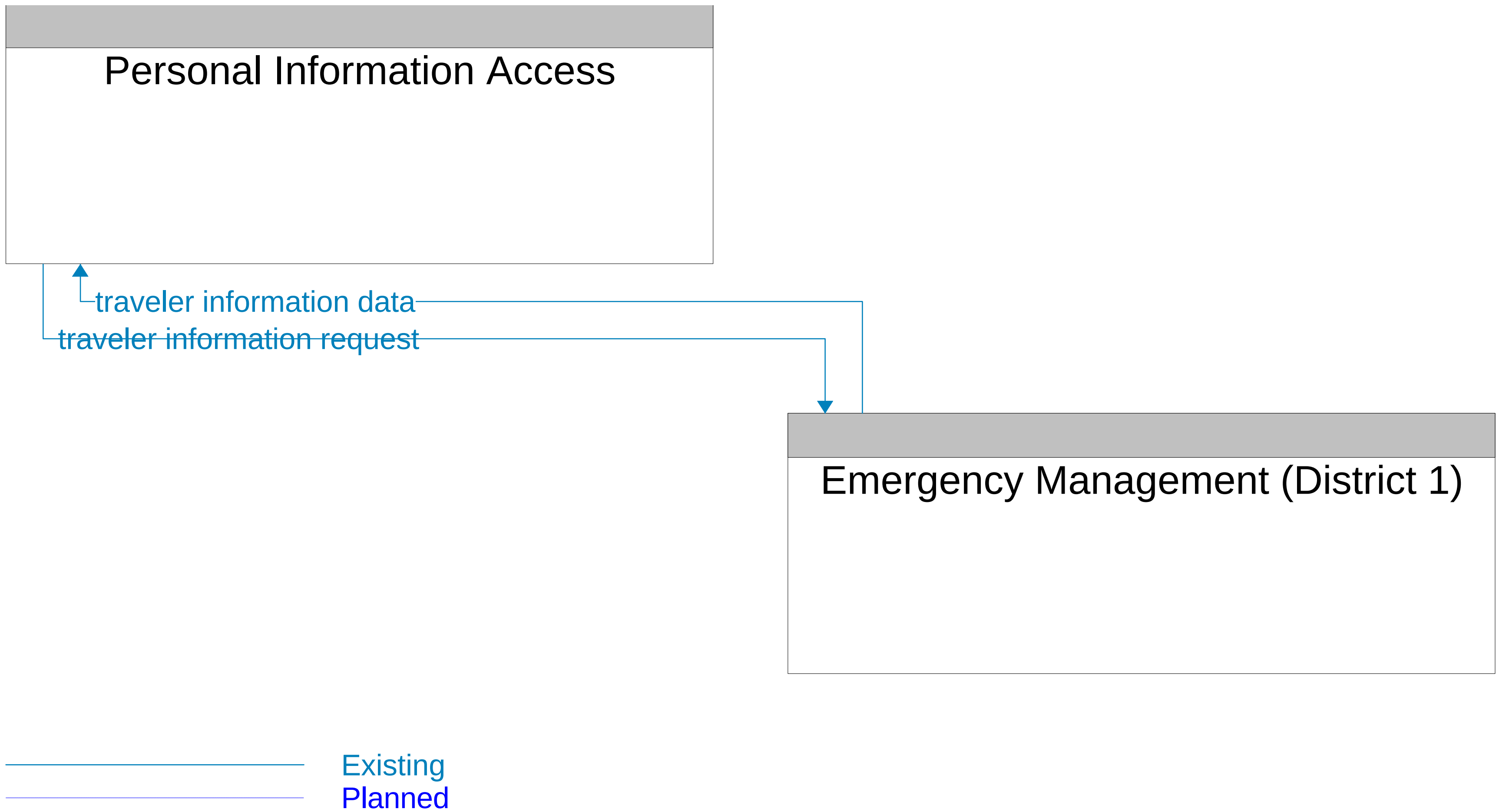
1-800-Road-Wis
Architecture Flow Diagram for Emergency Vehicle Subsystem



1-800-Road-Wis
Architecture Flow Diagram for Maintenance Subsystem



1-800-Road-Wis
Architecture Flow Diagram for Personal Information Access Subsystem



WISCONSIN STATEWIDE TRAVELER INFORMATION & ITS ARCHITECTURE
ATIS INVENTORY TEMPLATE

System: 1-800 ROADWIS Road Conditions Number

1. What agencies are/were involved with the project? What was that agency's role?
Wisconsin DOT, Iowa DOT, Missouri DOT, the Federal Highway Administration, and the National Oceanic and Atmospheric Administration/National Weather Service

2. Who are the markets and customers for information services?

	By Mode		By Purpose	Transit & Paratransit Providers			
X	Auto Drivers		Telecommuters	X	Vehicle Drivers	X	Trip Planning
X	Auto Passengers		Pedestrians	X	Reservations/scheduling	X	School Administration/School Bus Driver
	Transit Riders		Bicycle Riders	X	Dispatching		
	Paratransit Riders	X	Freight Carriers	**Emergency Service Dispatchers (air and land)**			
X	Commuters (work)	X	Seasonal/2nd Residence	X	Ambulance	X	State Patrol
X	Non-Work	X	Tourism	X	Police	X	Highway Helpers
X	Recreation	X	Pass Through Traffic (trucks/autos)	X	Fire	X	Tow Truck Operators
Fleet Managers/Dispatchers				**Agencies/Jurisdictions**			
	Shippers		Delivery Fleets	X	Maintenance/Operations	X	State/County/City/Transit. Etc.
X	Transit Dispatchers	X	Freight Carriers	X	Transit Operations		Traffic Management Centers
Other Users/Disseminators							
	Employers		New/TV and Radio Reports				
	MPOs, TMOs & ATPs						

Other

3. What is the travel-related information that is to be delivered? What is the level of accuracy of the delivered information?

X	Route specific road surface condition-weather related		Touris information: lodging and activities, gas stations, truck stops
X	Road surface construction/ops		Medical emergency facilities locations
	Weight restrictions (weather related, but different)		Transit scheduling
	Trip travel times/operating or actual speeds		Park and ride locations
	Congestion levels		Airport and parking information
	Incidents		In-vehicle road guidance
X	Weather conditions (visibility, etc.) [winter only]		Mayday
	Posted detours		Parking available (metro area)
X	Closures/alternate routes [summer only]		Event parking and information

Other

Closure information is accurate to main state and interstate routes during summertime.
Subjective pavement conditions provided by state patrol are described on the recording, such as icy or snowy conditions.

4. When (at what point before or during the trip) is the information be delivered?

Data Timing/Accuracy				Trip-Related Timing			
X	Current	X	Periodic	X	Before the trip		On-site/at-site
	Real Time		Forecasted	X	During the trip		At all times
	Delayed						

Other

Telephony-based system. The user can call it at any time they need the information.

5. At what frequency is the information provided/updated?
Summer - Selected construction projects are given one time for the season. No periods of time are provided.
Winter - Updated road conditions 3 times daily.

6. Where (in what geographic area) is the information delivered?

X	Metro Area		Other Cities
X	Spot		Sub-regions
	Small area	X	Rural areas
X	Corridor	X	Statewide
	Metro-wide		Out of State

Other

Construction information concentrates on state and interstate routes.
Weather conditions are updated for just interstate and U.S. trunk highways.

7. How (by what method) will the information be delivered ot the user?

X	Phones	X	Internet/Websites/E-mail	X	Push System
	Cellular phones		Local commercial radio		Pull System
	Pagers		Highway Advisory Radio (HAR)		Broadcast System
	Kiosks		VMS/CMS		
	View only monitors		Mobile data terminals		
	Fax		In-vehicle devices		
	Intranet		TV/Cable TV		

Other

Primarily delivered by telephone, but information is available on the internet as well.

8. Why is the information being provided? What is the desired outcome?

X	Improved Safety		Improved customer service		Decreased trip cost		Long range financial savings
X	Divert traffic	X	Improved customer satisfaction		Diversion to transit		More uniform speeds
X	Less trip delay	X	Time savings		On-time delivery	X	Efficiency
X	Fewer trips	X	Greater user satisfaction	X	Trip avoidance		Driver satisfaction
X	Less congestion	X	Greater user convenience		Change time of trip		Increased sales tax revenue
X	Improved operations		Less Damage to infrastructure	X	Fewer accidents		Benefits local economy
	System coordination		Improved transit ridership		Less transit subsidy		Fuel conservation
X	Change destination	X	Change route		Change mode	X	Improved emergency response
	Compliance with laws						

Other

Detours to alternate routes around construction. Deter trips in the winter.

9. What data is collected?

Subjective driving conditions provided by state troopers. The driving could be classified as snowy, icy, difficult, etc. or any other amount of descriptions. Maintenance provides sections of roads that either are closed or have some type of lane restriction. Lane widths are also given. It also advises of a detour route if available, but it does not detail the detour route.

10. How is the data collected?

	Automated data feed	X	Phone	X	DSRC		
	Fax		Mail				

Other

Collected primarily by radio, but it is also sent by in-squad computers.

11. In what form is the collected data?

Raw form of the data is voice or emailed data from State Troopers.

12. How is the data processed? What are the steps to convert the data to usable information?

Data from the ETA mode is thrown into a MM5 model where the data is broken up to a more presice area and is used. Data from the Road-Weather Information System detects the road conditions

13. Is the data/information customized to a specific user group? If so, what group?

The information can cater to all user groups. Freight haulers find it useful to have lane widths. Tourists or rural traverlers find the wintertime information useful. It is easy to use and only consists of a voice recording.

14. Other

15. High Level Block Diagram

16. Sausage Diagram

Available

17. Architecture Flow Diagram

Available

APPENDIX B

ATIS Data Quality Standards

District 1

Transit Scheduling
Park and Ride Locations

	Existing	Good	Better	Best
Type of Information	Routes on map, Schedule, Park-and-Ride location	Bus Routes, Stops, Scheduled Time Points, Parking & Ride Name + Cross-Street Locations	Interagency Coordination (transfer data) Good + Bus Delaying Information, Directions to Lot	Better + Bus Location, Bus Arrivals Times
Detail	Static messages and maps	Static messages and maps	Internet access, Dynamic messaging	Internet kiosks, GPS mapping
Delay (Data Latency)	NA	<10 minutes	<1 minute	Real time Auto location (GPS)
Accuracy	NA	10% error	5% error	<5% error
Reliability	Printed last update date	Printed last update date	Dispatcher backup	5 second updates
Coverage	Madison, Milwaukee	Major terminals, larger cities, Milwaukee major terminal	Kiosk to 10 mile ring	Every bus stop in 20 mile radius any city with bus system
Convenience of Access	Internet, phone	Bus company provide schedule	You call to get update, 1 minute to next bus, Internet	Dynamic scheduling for pickup, Wireless page

District 2

Incidents/Events Data Quality Levels

	Existing	Good	Better	Best
Type of Information	Crashes	Crashes, breakdowns, or other unplanned vehicle stoppages, planned or emergency roadway construction or maintenance disaster	Good + Special events, general road conditions, general weather conditions	Better + Traffic control device malfunctions
Detail	Location	Reason, location, severity, time	Good + Impact, Status	Better + Duration, Advice
Delay (Data Latency)	2 – 5 minutes	2-5 minutes	1-2 minutes	<1 minute
Accuracy		10-15% error	5-10% error	<5% error
Reliability	Verified	Verified, non-visual	Verified, visual	Not Applicable
Coverage	Freeways, U.S. highways, major principal arterials	All freeways and major principal arterials	Good + all principal arterials	Better + additional arterials
Convenience of Access	Internet, VMS			

District 2

Closures/Alternate Routes
Posted Detours

	Existing	Good	Better	Best
Type of Information	Road Construction, Detour Routes, Lane and Ramp Closures	Road Closures & Termini, Construction Only	Good + Detour Routes, Maintenance	Better + Travel Time Information on Alternative Routes
Detail	Ramp name, Specific Lane(s), Duration, Start and end time	Reason, severity (# lanes closed) location, time, speed limit in construction zone, weight and size restrictions	Status, Current delay	Condition of alternate route, Predicted delay, Advice
Delay (Data Latency)	Weekly	< week	< day	< hour
Accuracy Location:	Between interchanges	Between interchanges	Between interchanges	Between interchanges
Time of Closure:	Range of hours	Range of hours	< hour	< hour
Delay:	Expect delays	Expect delays	Range of delays	Accurate delay
Reliability	Planned	Planned	Non-verified visually (maintenance)	Verified visual
Coverage	Interstates, Trunk highways, U.S. highways, major freeways	Interstate and major U.S. Highways (Backbone)	Good + Minor U.S. Highways, State Highways, Major arterials	Better + Additional arterials and County Highways
Convenience of Access	Internet, HAR, radio, television, phone	Radio, newspaper, television, portable CMS and HAR	Internet, HAR, permanent CMS	PDA, pager, in vehicle devices, telephone

District 2

Traffic Sensor Data Quality Levels
Congestion Levels
Trip Travel Times/Operating Speeds

	Existing	Good	Better	Best
Type of Information - Freeways	Aggregated Section Data	Aggregated Point Data	Discrete Point Data, or Aggregated Section Data	Discrete Section Data
Type of Information – Principal Arterials	NA	Aggregated Section Data	Discrete Section Data	Not Applicable
Accuracy		10-15% error	5-10% error	<5% error
Reliability	Quantitative Description	Qualitative Description	Quantitative Description	Not Applicable
Delay (Data Latency)	Every 5 Minutes	2-5 minutes	1-2 minutes	<1 minute
Coverage	Freeways	Major freeways and principal arterials between major interchanges	All freeways and principal arterials between every interchange	Better + maximum .5 mile spacing with at least one sensor site between every interchange and between every signalized intersection/ interchange
Convenience of Access	Internet			

District 2

Event Parking and Information
Parking Availability (Metro Area)

	Existing	Good	Better	Best
Type of Information	Location On-site capacity	Parking for sporting event	Good + location	Better + directions
Detail	Good	Parking lot name	Good + alternate location	Better + space availability, expected fill time
Delay (Data Latency)	NA	5-10 minutes	1-5 minutes	<1 minute
Accuracy	NA	10-15% error	5-10% error	<5% error
Reliability	NA	Within 90% of actual	Within 95% of actual	Within 99% of actual
Coverage	Miller Park, Summerfest	Near event/airport	Metrowide	Statewide
Convenience of Access	Portable DMS	Information provided at event/airport	Information on VMS approaching event/airport	Pre-trip information available via internet, telephone, etc.

District 2

Transit Scheduling
Park and Ride Locations

	Existing	Good	Better	Best
Type of Information	Routes on map, Schedule, Park-and-Ride location	Bus Routes, Stops, Scheduled Time Points, Parking & Ride Name + Cross-Street Locations	Interagency Coordination (transfer data) Good + Bus Delaying Information, Directions to Lot	Better + Bus Location, Bus Arrivals Times
Detail	Static messages and maps	Static messages and maps	Internet access, Dynamic messaging	Internet kiosks, GPS mapping
Delay (Data Latency)	NA	<10 minutes	<1 minute	Real time Auto location (GPS)
Accuracy	NA	10% error	5% error	<5% error
Reliability	Printed last update date	Printed last update date	Dispatcher backup	5 second updates
Coverage	Madison, Milwaukee	Major terminals, larger cities, Milwaukee major terminal	Kiosk to 10 mile ring	Every bus stop in 20 mile radius any city with bus system
Convenience of Access	Internet, phone	Bus company provide schedule	You call to get update, 1 minute to next bus, Internet	Dynamic scheduling for pickup, Wireless page

Statewide

Closures/Alternate Routes
Posted Detours

	Existing	Good	Better	Best
Type of Information	Road Construction, Detour Routes	Road Closures & Termini, Construction Only	Good + Detour Routes, Maintenance	Better + Travel Time Information on Alternative Routes
Detail	Reason, severity (# of lanes closed) location, time, speed limit in construction zone, weight and size restrictions	Reason, severity (# lanes closed) location, time, speed limit in construction zone, weight and size restrictions	Status, Current delay	Condition of alternate route, Predicted delay, Advice
Delay (Data Latency)	Weekly	< week	< day	< hour
Accuracy Location:	Between interchanges	Between interchanges	Between interchanges	Between interchanges
Time of Closure:	Range of hours	Range of hours	< hour	< hour
Delay:	Expected delays	Expect delays	Range of delays	Accurate delay
Reliability	Planned	Planned	Non-verified visually (maintenance)	Verified visual
Coverage	Interstates, U.S. Highways, Trunk, Highways	Interstate and major U.S. Highways (Backbone)	Good + Minor U.S. Highways, State Highways, Major arterials	Better + Additional arterials and County Highways
Convenience of Access	Phone, Internet, printed	Radio, newspaper, television, portable CMS and HAR	Internet, HAR, permanent CMS	PDA, pager, in vehicle devices, telephone

Statewide
Route Specific Road Surface Conditions – Weather Related
Road Surface Construction/Operations

	Existing	Good	Better	Best
Type of Information	Road Condition Report in the Winter, Road Construction in the Summer	Current Status Information (Surface/Road Construction)	Good + Effects	Better + Route End Points, Corrective Action
Detail	Slippery Spots, Slippery Stretches, Good Winter Driving Conditions, Snow Covered and Slippery, Ice Covered and Hazardous Road/Lane Closures, Detours, Work Zones	Wet or Dry, Frozen, Termini, Predictable Unique Conditions	Lane closures, Duration, Operating Speed	Alternate Route, Estimated Delay
Delay (Data Latency) Weather:	4-6 Hour Delay	15-30 Minutes	5-15 Minutes	< 2 Minutes
Construction:	Weekly	30 Minutes	5-25 Minutes	< 2 Minutes
Accuracy		15-25% Error	5% Error	< 5% Error
Reliability Weather:	State Patrol Visual Reports	Predicted, State Patrol	Spot Sensors, Bridges	Automated Sensor System, Vehicle Probes, Continuous Reporting
Construction:	Planned According to Construction (DT10) Schedule	Planned	Visual On-Site Verification	NA
Coverage Weather:	Corridor 2020 Highways, Federal and State Highways	Bridges,	Freeways and	All Freeways,
Construction:	Corridor 2020 Highways, Federal and State Highways	Freeways, Bridges on Freeways	Principal Arterials	all Principal Arterials and County Trunk Highways
Convenience of Access	Printed, Internet, Phone, Pre-trip, During Trip	Pre-Trip, Internet, TV, Printed Media	During Trip, Radio, VMS, HAR, HAT	In-Vehicle Wireless

Statewide

Weather Conditions (visibility, etc.)

	Existing	Good	Better	Best
Type of Information	Precipitation areas, Precipitation type, Wind, Temperature, Sky Condition	Precipitation Type Rain, Dust Snow, Wind Sleet, Hail	Good + Visibility (fog, etc), Temperature	Better + Hazard Warning, Frozen accumulation, Rate of precipitation
Detail	General area – Radar maps at rest areas around Wisconsin	Location – Extent Time – size/rate Intensity	General area affected and advice, accumulation	Advice-location Specific (requested) Predicted route conditions
Delay (Data Latency)	Radar => 20 minute delay, 1 hour delay, current conditions, no prediction	Current conditions ≤ 30 hours	General prediction ≤ 10 min - 1 hour ahead	Here now – 8 hours ahead
Accuracy		80+%	90+%	95+%
Reliability	Computer generated graphics, same vendor generated and National Weather Service	Sensor-based weather map	Video-confirmation	95+%, person on site
Coverage	Regional	Statewide-national	Regional	County (Microscale)
Convenience of Access	TV monitors in Wisconsin rest areas	Radio, kiosks, telephone, newspapers	TV, HAR, HAT, pagers, cell phones	Internet, on demand PDA

Statewide

Tourist Information (lodging, activities, gas stations, truck stops)

	Existing	Good	Better	Best
Type of Information	Blue signs – lodging, food, gas Brown signs – fuel	Lodging, Gas Station, Restaurant Locations, Rest Stops	Good + Shopping Locations, Repair Shops	Better + Entertainment (e.g. County Fairs) Locations
Detail	Where, Distance	Where, Distance	Cost, Number of Rooms (etc) Available, Hours of operation	Real-Time Availability
Delay (Data Latency)	Monthly - Annually	Monthly – Annually	Daily – Weekly	Real-Time – >1 hour
Accuracy	Lodging – yes/no vacancy, Rest stop locations	Lodging – yes/no vacancy, Rest stop locations	Lodging - % vacancy, Rest stops - # of miles from freeway	Lodging - # of available rooms and by type, Rest stops – directions
Reliability	+95%	+95%	85-90%	+95%
Coverage	U.S. Highways as appropriate	Pre-trip/targeted tourist areas/freeways (e.g. Dells)	Good + Statewide freeways /principal arterials	En-route, all roads and towns (comprehensive)
Convenience of Access	Static roadside signs, Internet	Telephone, blue tourist signs, yellow pages, radio	Cellular, Land-line Internet, Dynamic signs	On-Board Systems (Internet)

Statewide

Weight Restrictions

	Existing	Good	Better	Best
Type of Information	Yellow static signs	Route Name & Restrictions Data	Good + End Points	Better + Alternate Route
Detail	Route, roadway speed limit	Speed limit, roadway classification, major cities along roadway	Restrictions before/after end points	Restrictions on alternate routes, length of alternate route, directions, ETA
Delay (Data Latency)	Seasonal	< week	< day	< hour
Accuracy	1-5%	5-10% error	1-5% error	0% error
Reliability	95%	90%	95%	100%
Coverage	Good + minor principal arterials, bridges	Interstates, major principal arterials	Good + minor principal arterials	Better + all county highways
Convenience of Access	Static signs, phone	Phone	Internet	E-mail, pager

Statewide

Medical Emergency Facilities Locations

	Existing	Good	Better	Best
Type of Information	Facility location marked on appropriate roadways	Facility Locations Marked on Major Highways	Good + Marked On Arterials	Real - Time Operator Guidance to Facility
Detail	< Good	City, phone number	Good + directions, services offered	Better + call ahead notice, best route (work zone avoidance, etc.)
Delay (Data Latency)	NA	NA	5-10 minutes	< 5 minutes
Accuracy	< 5% error	5% error	< 5% error	NA
Reliability	100%	100%	NA	NA
Coverage	All facilities statewide within city limits	Metro areas > 100,000 people	Good + cities > 50,000 people	All facilities statewide
Convenience of Access	Roadside signage	Roadside signage	Good + telephone, Internet	Better + in-vehicle device

Statewide

Airport and Parking Information

	Existing	Good	Better	Best
Type of Information	Directions	Airline gate location information & parking information	Good + directions to parking for each airline	Better + parking ramp availability
Detail	<Good	Rates, alternate parking locations, general airport conditions (snowed in, most flights delayed, etc.)	Alternative directions if no parking is available, estimated time to arrive	Advice on which deck contains the most available spaces, real-time flight information, check in options (curb side, at gate, etc.)
Delay (Data Latency)	NA	10-15 minutes	5-10 minutes	< 5 minutes
Accuracy	NA	20% error	10-20% error	< 10% error
Reliability	NA	90%	95%	>95%
Coverage	Statewide, ends at freeway spur that goes to the airport	Within 5 miles of the airport, major airports	Within 10 miles of the airport, all airports	Within 20 miles of the airport
Convenience of Access	Static signs	phone	Internet	E-mail, in-vehicle

APPENDIX C

ATIS Stakeholder Roles

INCIDENTS

	Data Collection	Data Processing	Information Distribution

Statewide	▪ State Patrol collects information, although not on a real-time basis.
	▪ D7 has a Critical Incident Response Team (CIRT) that responds to and collects information on incidents in the D7 boundaries.
	▪ There is internal data collection via the CAD system.
		▪ State Patrol, internal fax or teletype that is manually handled.
		▪ No data collection is done thereafter.
			▪ *Various media outlets for public distribution.*
			▪ *Desire distribution to the public.*
			  ▪ *Organization information sharing*
			  ▪ *Public information may need to be "generic".*
			▪ *Three tiers:*
			  ▪ *Emergency responders (State Patrol and Co. Sheriffs)*
			  ▪ *Traffic Management*
			  ▪ *Public: En-route, Pre-trip*

District 1	▪ Some areas are collecting data and sharing via CAD system.	▪ Collected data is processed in-house. ▪ *Would desire to have this data processing done by the private sector.*	▪ *D1 - may desire to have the private sector distribute the data*
District 2	▪ Internal data collection via CAD system (sheriff, local PD and state patrol) ▪ TIME and MONITOR ▪ *Real time sharing of traffic and incident information with emergency services and TOC*	▪ Information is processed manually by operating personnel (sheriff, PD and state patrol) ▪ *MONITOR - State Patrol, Sheriff, PD*	▪ D2 - distributes information to the public via VMSs ▪ *D2 provides incident info to the media via email notification (non-sensitive data)*

Key: XXXX - Currently; *XXXX - Desired*

Stakeholder Roles in ATIS by ATIS Element

ROUTE SPECIFIC ROAD SURFACE CONDITIONS - WEATHER RELATED

	Data Collection	Data Processing	Information Distribution
Statewide	▪ State Patrol collects information, from District maintenance. ▪ R/WIS stations collect information (WisDOT) ▪ National Weather Service collects the weather data ▪ County Highway Dept. provides road conditions info ▪ *Smart Snowplow data could be harnesses and displayed on a color coded map stating conditions*	▪ State Patrol processes all of their data collected. **Desire processing integration between State Patrol and SSI* ▪ SSI handles data processing ▪ Foretell ▪ County Sheriff and State Patrol process manually	▪ State Patrol - Web and 1800-ROAD-WIS ▪ DTN distributes to: ▪ State Patrol ▪ Media ▪ Kiosks ▪ Maintenance ▪ Foretell - Internet, e-mail, pagers, telephone
District 1	▪ State Patrol collects information, from District maintenance. ▪ R/WIS stations collect information (WisDOT) ▪ National Weather Service collects the weather data ▪ County Highway Dept. provides road conditions info ▪ *Smart Snowplow data could be harnesses and displayed on a color coded map stating conditions*	▪ State Patrol processes all of their data collected. ▪ SSI handles data processing ▪ Foretell ▪ County Sheriff and the State Patrol process manually	▪ State Patrol - Web and 1800-ROAD-WIS ▪ DTN distributes to: ▪ State Patrol ▪ Media ▪ Kiosks ▪ Maintenance ▪ Foretell - Internet, e-mail, pagers, telephone
District 2	▪ State Patrol collects information, from District maintenance. ▪ R/WIS stations collect information (WisDOT) ▪ National Weather Service collects the weather data ▪ County Highway Dept. provides road conditions info ▪ *Smart Snowplow data could be harnesses and displayed on a color coded map stating conditions*	▪ State Patrol processes all of their data collected. ▪ SSI handles data processing ▪ Foretell ▪ County Sheriff and the State Patrol process manually	▪ State Patrol - Web and 1800-ROAD-WIS ▪ DTN distributes to: ▪ State Patrol ▪ Media ▪ Kiosks ▪ Maintenance ▪ Foretell - Internet, e-mail, pagers, telephone

Key: XXXX - Currently; *XXXX - Desired*

ROAD SURFACE CONSTRUCTION/OPERATIONS

	Data Collection	Data Processing	Information Distribution
Statewide	▪ Field managers may call in to District ▪ District project managers call in construction status to WisDOT CO	▪ Integrated process (centralized) - WisDOT	▪ Distributed to each district, state patrol, etc. and put on the web on a seasonal basis for the public via CDSI/others ▪ 800 Number
District 1	▪ Project manager provides a construction and maintenance update 1/wk (D1)	▪ D1 processes the update manually	▪ Information is distributed to the media (radio and news) ▪ 800 Number
District 2	▪ Project managers provide an update 2/wk (D2) ▪ *WisDOT D2 has a research project in the works for March/April 2001 for real time construction zone management and traffic (Kenosha - TTIPS, Travel Time Information Prediction System)*	▪ D2 via GATEWAY/MONITOR, ICOP ▪ *D2*	▪ Sent to the media (radio and news) ▪ Distributed to the public as advisory information via PVMS ▪ 800 Number ▪ Fleet Online

Key: XXXX - Currently; *XXXX - Desired*

Stakeholder Roles in ATIS by ATIS Element

CLOSURES/ALTERNATE ROUTES

	Data Collection	Data Processing	Information Distribution
Statewide	▪ Project manager provides a construction and maintenance update 1/wk	▪ WisDOT district office processes the information manually	▪ Information is distributed to the media (radio and news) ▪ Wis/DOT web site and 800 number
District 1	▪ Project manager provides a construction and maintenance update 1/wk	▪ WisDOT district office processes the information manually	▪ Information is distributed to the media (radio and news) ▪ Wis/DOT web site and 800 number
District 2	▪ Project manager provides a construction and maintenance update 1/wk ▪ City of Milwaukee compiles a list of all construction ops in the city	▪ WisDOT district office processes the information manually ▪ City of Milwaukee puts the construction ops data into a format fit for distribution	▪ Information is distributed to the media (radio and news) ▪ Wis/DOT web site and 800 number ▪ City of Milwaukee distributes the bulletin to the media, WisDOT, and County levels

Key: XXXX - Currently; *XXXX - Desired*

Stakeholder Roles in ATIS by ATIS Element

POSTED DETOURS

	Data Collection	Data Processing	Information Distribution
Statewide	▪ Project Manager provides a weekly construction and maintenance update to the local District office	▪ District processes the information manaully	▪ Information is distributed to the local media (news and radio), based on the size and significance of the job ▪ *Method of communicating advanced information to the motorist en-route on Interstate and backbone highways (VMS, kiosks, or portable HAR for construction zones)*
District 1	▪ Project Manager provides a weekly construction and maintenance update	▪ District processes the information manaully	▪ Information is distributed to the local media (news and radio) ▪ *Method of communicating advanced information to the motorist en-route on Interstate and backbone highways (VMS, pagers, e-mail, kiosks, etc.)* ▪ *Would like to share information with the emergency management services*
District 2	▪ Project Manager provides a weekly construction and maintenance update to the TOC via fax	▪ District processes the information manaully, and enters the information into the database	▪ Provide faxes out to the media: radio, TV, newspaper ▪ Email distribution to: local governments, sheriff's dept. dept. of tourism ▪ Will indicate road/ramp closures on VMSs using preprogrammed s/w and have the ability to conduct dynamic trailblazing on HWY 45

Key: XXXX - Currently; *XXXX - Desired*

Stakeholder Roles in ATIS by ATIS Element

TRIP TRAVEL TIMES/OPERATING OR ACTUAL SPEEDS

	Data Collection	Data Processing	Information Distribution
Statewide	▪ Nothing currently underway.	▪ Nothing currently underway.	▪ Nothing currently underway.
District 1	▪ Nothing currently underway. *Do have a pilot project on the Beltline that will be operational in Summer 2001, expansion of this type is hopeful for the interstate and backbone system.	▪ Nothing currently underway. * The Beltline projects information will be collected and stored automatically into a database. The information will be used to develop ramp meter timings.	▪ *Nothing currently underway.* ** Would like to use the info to inform motorists en-route and pre-trip of traffic conditions using VMS, internet, kiosks, etc. Also would like to communicate this info. to maintenance and EMS for improved operations*
District 2	▪ Wis/DOT MONITORvehicle detectors on freeway ▪ *TT data on parallel arterials* ▪ *License plate reader technology to track vehicles through a corridor and deduce TT's*	▪ MONITOR/GATEWAY System ▪ *WisDOT would process the data*	▪ Media: TV and radio ▪ Wis/DOT Web site and GCM web site (actual speed info) ▪ VMS TT dissemination at major interchanges ▪ *HAR, 511, Advisory Telephone, Arterial TT VMSs*

Key: XXXX - Currently; *XXXX - Desired*

Stakeholder Roles in ATIS by ATIS Element

CONGESTION LEVELS

	Data Collection	Data Processing	Information Distribution
Statewide	▪ Nothing in the way of real-time congestion level monitoring	▪ Nothing currently underway	▪ Nothing currently underway
District 1	▪ Planning detectors that only collect volume data * Will have detector stations on the Beltline that collect density, hope to expand to other major corridors	▪ Volume data is stored in a database for post-processing. * Density data will be stored automatically in the same database fashion	*▪ Nothing currently underway.* ** Would like to use the info to inform motorists en-route and pre-trip of traffic conditions using VMS, internet, kiosks, etc. Also would like to communicate this info. to maintenance and EMS for improved operations*
District 2	▪ Wis/DOT District Office operates: - Ramp Meters - Mainline Detectors - CCTV	▪ Wis/DOT District Office in conjunction with GCM/Gateway	▪ Wis/DOT District Office operates: - Website - VMS along the highway - GCM website

Key: XXXX - Currently; *XXXX - Desired*

Stakeholder Roles in ATIS by ATIS Element

WEATHER CONDITIONS (visibility, etc.)

	Data Collection	Data Processing	Information Distribution
Statewide	▪ WisDOT RWIS stations collect information from remote locations ▪ National Weather Service collects data at airports ▪ WisDOT cameras collect video images ▪ FORETELL	▪ WisDOT responsible for processing and integrating data ▪ Data readily available. WisDOT reponsible for integration ▪ WisDOT ▪ FORETELL	WisDOT, NWS data via ▪ Internet ▪ Rest area weather monitors ▪ Kiosks ▪ Highway advisory radio ▪ DTN ▪ Internet, e-mail, pagers, AM/FM subcarrier
District 1	▪ WisDOT RWIS stations collect information from remote locations ▪ National Weather Service collects data at airports ▪ WisDOT cameras collect video images ▪ FORETELL	▪ WisDOT responsible for processing and integrating data ▪ Data readily available. WisDOT reponsible for integration ▪ WisDOT ▪ FORETELL	WisDOT, NWS data via ▪ Internet ▪ Rest area weather monitors ▪ Kiosks ▪ Highway advisory radio ▪ Internet ▪ Internet, e-mail, pagers, AM/FM subcarrier
District 2	▪ WisDOT RWIS stations collect information from remote locations ▪ National Weather Service collects data at airports ▪ WisDOT cameras collect video images ▪ FORETELL ▪ *Would like to be able to collect river level information for EMS purposes* ▪ *Fog detection, both location and severity*	▪ WisDOT responsible for processing and integrating data ▪ Data readily available. WisDOT reponsible for integration ▪ WisDOT ▪ FORETELL	WisDOT, NWS data via ▪ Internet ▪ Rest area weather monitors ▪ Kiosks ▪ Highway advisory radio ▪ Internet ▪ Internet, e-mail, pagers, AM/FM subcarrier

Key: XXXX - Currently; *XXXX - Desired*

Stakeholder Roles in ATIS by ATIS Element

TOURIST INFORMATION

	Data Collection	Data Processing	Information Distribution
Statewide	▪ Wisconsin Department of Tourism	▪ Wisconsin Department of Tourism	▪ Wisconsin Department of Tourism web site (travelwisconsin.com)
District 1	▪ Nothing currently	▪ Nothing Currently	▪ *Nothing currently underway, in the way of travel time or kiosk type yellow page information.* ** Would like to provide travelers (tourists) road conditions, travel time, detours/ alternate route information via VMS, internet, kiosks, broadcast advisories,or etc.*
District 2	▪ Wisconsin Department of Tourism has a road construction map that they maintain, with the information coming from the D2	▪ Wisconsin Department of Tourism maintains	▪ Tourist website "ONMILWAUKEE.COM" has links to the Monitor website

Key: XXXX - Currently; *XXXX - Desired*

Stakeholder Roles in ATIS by ATIS Element

MAYDAY

	Data Collection	Data Processing	Information Distribution
Statewide			
District 1	▪ D1: Nothing currently	▪ D1: Nothing Currently	▪ D1: Nothing currently ** Some type of Private Emergency Telecommunications coordination may be needed in the future.*
District 2	▪ D2: Nothing currently	▪ D2: Nothing currently	▪ D2: Nothing currently ▪ *Some type of emergency telecom operators coordination; Milwaukee Co. EMS would be a prime candidate to spear head the initial surg of cooperation*

Key: XXXX - Currently; *XXXX - Desired*

Stakeholder Roles in ATIS by ATIS Element

EVENT PARKING AND INFORMATION

	Data Collection	Data Processing	Information Distribution
Statewide			
District 1	▪ Notified by event staff in cases of conventions.	▪ Put up proper exit information onto portable VMSs	▪ Use Portable VMSs to direct traffic appropriately. ▪ *Supplement current efforts with items such as static VMS, pre-trip information obtained from detector data, en-route infomation postings via radio or HAR.*
District 2	▪ TIME (from MONITOR)	▪ TIME (multi-agency): - WisDOT - various EMS	▪ Have a website planned, and a VMS and HAR combination system to inform drivers of event parking.

Key: XXXX - Currently; *XXXX - Desired*

Stakeholder Roles in ATIS by ATIS Element

PARKING AVAILABILITY

	Data Collection	Data Processing	Information Distribution
Statewide			
District 1	▪ D1: Nothing currently	▪ D1: Nothing Currently	▪ D1: Nothing currently underway.
District 2	▪ *City of Milwaukee to collect data regarding parking facilities*	▪ *City of Milwaukee wtih coordination with D2*	▪ *City of Milwaukee would provide blankout signing at the facilities, MONITOR then receives messages regarding status and updates VMSs in the field with parking availibility information for en-route travelers. Kiosks are proposes at park 'n' ride lots.*

Key: XXXX - Currently; *XXXX - Desired*

Stakeholder Roles in ATIS by ATIS Element

WEIGHT RESTRICTIONS

	Data Collection	Data Processing	Information Distribution
Statewide			
District 1			
District 2	Fleet on-line (GCM corridor) from WisDOT	Fleet on-line/GATEWAY	Fleet on-line web site

Key: XXXX - Currently; *XXXX - Desired*

Stakeholder Roles in ATIS by ATIS Element

MEDICAL EMERGENCY FACILITIES LOCATIONS

	Data Collection	Data Processing	Information Distribution
Statewide			▪ "Stakeholder":Static hospital signs on Interstate and Backbone highways
District 1			▪ "Stakeholder":Static hospital signs on Interstate and Backbone highways
District 2			▪ "Stakeholder":Static hospital signs on Interstate and Backbone highways ▪ *EMS: 1) current real-time hospital information, ER capacity; 2) # of beds open; 3) level of activation of emergency facilities, open/closed*

Key: XXXX - Currently; *XXXX - Desired*

Stakeholder Roles in ATIS by ATIS Element

PARK AND RIDE LOCATIONS

	Data Collection	Data Processing	Information Distribution
Statewide			
District 1	▪ D1: Nothing currently ▪ Local Municipalities: may collect some type of regular spot count data to evaluate the usage. ▪ *Desire to automate this function* ▪ *COTI projects 2000-2008 may address*	▪ D1: Nothing Currently ▪ Local Municipalities: the usage data may be stored observed and filed appropriately. ▪ *With automation in-place, the need for an archive system may be necessary.* ▪ *COTI projects 2000-2008 may address*	▪ D1: Nothing currently ▪ Local municipalities: Park and ride signs are posted on the highways to point out locations. ▪ *Would like to post the information obtained from an automated system to the internet, and distribute through various other methods.* ▪ COTI projects 2000-2008 may address
District 2	▪ D2: Manual observation of lots for capacity/ video surveillance (monthly basis) ▪ *D2: Automated vehicle counting systems (machine vision detection system?)*	▪ D2: Manual observation ▪ *D2: MONITOR would process*	▪ D2: VMS routing along freeway for special events, and static signing for locations ▪ *D2: VMS message output to drivers*

Key: XXXX - Currently; *XXXX - Desired*

Stakeholder Roles in ATIS by ATIS Element

TRANSIT SCHEDULING

	Data Collection	Data Processing	Information Distribution
Statewide			
District 1	▪ D1: Nothing currently ▪ Madison Transit Authority: may collect ridership information based on spot check data ▪ *Could implement a onboard passenger monitoring system for counting.*	▪ D1: Nothing Currently ▪ Madison Transit Authority: post-processes data manaully for scheduling optimization. ▪ *Implement an automated data collection system s/w*	▪ D1: Nothing currently underway. ▪ Madison Transit Authority: may provide internet based scheduling information.
District 2	▪ AVL on Milwaukee Co. transit buses ▪ *High speed rail ATIS integration w/ other transportation components*	▪ Milwaukee Co. transit processes information for in-house monitoring and optimization	▪ *Kiosks at park 'n' ride lots and bus stops* *- Provide current transit trip time* *- Provide current transit wait time or where the bus is or when it will arrive at that particular stop*

Key: XXXX - Currently; *XXXX - Desired*

Stakeholder Roles in ATIS by ATIS Element

AIRPORT AND PARKING INFORMATION

	Data Collection	Data Processing	Information Distribution
Statewide	▪ Individual Airport- ▪ Typically lot locations and any closure/ construction info.	▪ Individual airport determines format and data to be distributed	▪ Individual Airport- ▪ Typically via a dial-up number or web site
District 1	▪ Individual Airport- ▪ Typically lot locations and any closure/ construction info.	▪ Individual Airport- ▪ Typically lot locations and any closure/ construction info.	▪ Individual Airport- ▪ Typically via a dial-up number or web site
District 2	▪ Individual Airport- ▪ Typically lot locations and any closure/ construction info.	▪ Individual Airport- ▪ Typically lot locations and any closure/ construction info.	▪ Individual Airport- ▪ Typically via a dial-up number or web site ▪ HAR at Milwaukee airport providing parking lot information ▪ *Integrated Corridor Operations (ICOP) in progress to provide multi-modal kiosk information at Airports* ▪ *Real-time traffic info, taxi, transit, events* ▪ *Web link to a customized feed from MONITOR*

Key: XXXX - Currently; *XXXX - Desired*

Stakeholder Roles in ATIS by ATIS Element

IN-VEHICLE ROAD GUIDANCE

	Data Collection	Data Processing	Information Distribution
Statewide	▪ *Smart Snowplows which have sensor s on-board to detect lane deviations, etc. (Polk Co, Trempealeau Co, to name a few have plows equipped with intelligent sesory equipment. However not specifically lane deviation sensors.*	▪ *Data processed by on-board computer systems and situation rectified*	▪ *Provide audible or sensory warning to driver in-vehicle*
District 1	▪ *Smart Snowplows which have sensor s on-board to detect lane deviations, etc.*	▪ *Data processed by on-board computer systems and situation rectified*	▪ *Provide audible or sensory warning to driver in-vehicle*
District 2	▪ *Smart Snowplows which have sensor s on-board to detect lane deviations, etc.*	▪ *Data processed by on-board computer systems and situation rectified*	▪ *Provide audible or sensory warning to driver in-vehicle*

Key: XXXX - Currently; *XXXX - Desired*

Stakeholder Roles in ATIS by ATIS Element

APPENDIX D

District Architecture Workshop Results

MEETING MINUTES
WISCONSIN RAPIDS, WI

January 18, 2001
8:30 a.m. to 4:30 p.m.

Attendees:

Larry Lansing – River City Cab
Marilee Evenson – Wheels of Independence / River City Cab
Susan Lemke – City of Stevens Point Transit
William Goodness – Wood County Board
Jerome Nash – Wood County Board
Roger Zebro – Plover Police Department
Anna Wisner – WisDOT Central Office Operations
Dennis Lawrence – NCWRPC
Darryl Landeau – NCWRPC
John Verhyen – State Patrol HF-Madison
Ronald Fregien – Town of Rome
Todd Polum – WisDOT D4
Bruce Fredrickson – WisDOT D4
Maura Ducharme – WisDOT Planning/ITS
Bridget Barrett – TranSmart Technologies
Connie Li – TranSmart Technologies
Hau To – Castle Rock Consultants
Brian Scott – SRF Consulting Group, Inc.
Craig Vaughn – SRF Consulting Group, Inc.

1. Introductions:

Brian Scott kicked off the meeting by giving a brief overview of the project and the final product that will result from the workshop on a statewide basis. It was noted that a study was performed to assess the ITS needs of the I-39 corridor. However, it was recognized that the study did not fully investigate the needs of District 4 (D4) as a whole, including towns and cities not within close proximity of the I-39 corridor. Aside from the D4 representatives, no one else at the workshop participated in the I-39 corridor study.

2. Agenda and Intelligent Transportation Systems Overview:

Hau To presented an overview of ITS with emphasis on rural areas. A copy of the presentation is attached.

3. Discussion of Current Uses of Technologies within Local Agencies

Craig Vaughn led the discussion providing a brief description of what types of information was desired under this topic as well as covering what may or may not constitute a current use of technology. A worksheet was distributed to help facilitate the discussion and to help document the various current uses of technologies by each agency.

Each participating agency discussed technology-driven initiatives currently in place or planned for the near future. The discussion highlights are listed below:

City of Plover - Police Department

- They do not feel there are very many dispatching issues. Portage County receives all 9-1-1 calls. They dispatch for all of the cities in the area except for the City of Stevens Point. Fire department in Stevens Point dispatches for all non-emergency calls and the police department dispatches for emergency calls. Both the county and the city have enhanced 9-1-1. They typically sort out jurisdictional issues after the fact.
- Portage County went through a renumbering of fire numbers and have enhanced 9-1-1 which will map location of homes.

Wisconsin State Patrol

- Interested in working with municipalities and counties.
- Statewide mobile data program (state put in backbone, no infringements or requirements for county participation resulting in less cooperative nature).
- The mobile data program is a way to access information, administrative messaging. For example, any terminal on the system can talk with one another. This takes pressure off of human dispatching. Eighty-five (85) local agencies have at least one data system on the mobile data backbone. The cost is typically $6000-$7000 to equip a vehicle. The counties and locals are paying for their in-vehicle mobile data units.
- The Wisconsin State Patrol does not currently have CAD, but are working on this. The CAD system that will be implemented will likely be based on the backbone technology concept, providing universal access. The state will maintain the backbone with no county or local fund sharing.

Wood County Board

- The county is heavy into highway construction and bridge construction. It also handles permitting (weight limits, safety), and highway maintenance (state trunk) – snow removal, patching and repairing- using a 10 to 20 year plan.

- Wood County is putting up 5 towers for radio system for law enforcement, highway department, some dead spots - interest from other firms to rent space.
- Emergency response location – when fire dept. is dispatched, they have card file with directions to address. The police have GPS in squads or if they need flight for life, coordinates can be provided to them.

<u>City of Wisconsin Rapids - River City Cab</u>

- City streets, keep in communications with the city
- The city uses loop detectors, but does not provide signal coordination
- River City Cab receives notification of expected road closures a week or two in advance.
- There is some preemption at railroad crossings (at grade at major intersection in the middle of town) Highway 13 / 34 /54.
- Most signals have loop detectors and actuated. This is standard across the state of Wisconsin.
- The city takes care of plowing roads.
- Notification of construction projects is passed on to local media, radio, and posted on portable message signs.
- It was noted that as a part of the I-39 plan, there was a proposed project to study signal coordination.
- District provides time-based coordination (no closed loop systems).

<u>WisDOT District 4</u>

- D4 performs traffic counting.
- D4 has use of 6 portable message signs.
- A number of RWIS stations are located within the district.
- There is signal pre-emption.
- Working on implementing in City of Marshfield (reconstructing STH 13) signal preemption.
- There are also weigh-in-motion facilities and automatic electronic clearance.
- D4 partially handles single permits and the counties handle annual permits. This is typically done over the phone. For example, the town of Rome receives calls from DOT central office. The city of Plover is notified of a large move with a call or teletype message.

<u>Town of Rome</u>

- Technologies that assist in emergency / incident response include point-to-point and Whisper - the statewide broadcasting network.
- Town of Rome has six mobile data units.
- Only communication with D4 is in the situation of major road building. For example, D4 provides outline on how to erect warning signs.
- D4 meeting outlining utilities and all of construction performed in region as part of the 6-year program.

- There are only two traffic lights in the entire Adams County.
- State of Wisconsin has a system that will go into effect this year for rating every road (on a scale of 1 to 10, 10 being a brand new road). System will provide priority for repairing roadway.
- Road condition within Adams County is kept in electronic format (PASER).

Stevens Point Transit

- The transit agency operates five fixed routes and two paratransit routes for special needs. They operate Monday to Friday and require 24-hour notice. They have 11 drivers on staff in addition to an operations supervisor and manager. They utilize two-way radio for dispatching.
- Wisconsin DOT project in place for transit systems – it will take 5-10 years to complete. The goal is to have all transit systems on the same information technology (IT) level. They are starting with getting agencies computerized, implementing AVL, beginning maintenance programs, and enhancing scheduling. The statewide communication for filing forms with WisDOT began two years ago.
- In Portage County, Stevens Point Transit is the only public system. However, the City of Plover has a courtesy cab.
- School bus systems privately / publicly owned.
- There is also a taxi system in the city - Checker Yellow Cab - and privately operated buses such as Point Tours.
- Interfaith system
- They participate in the Portage Special Transit Coordinating Committee.
- There are some services to rural areas (Village of Whiting, Park Ridge) – special needs handled by Department of Aging.
- Wapaca County has a cab system.
- Wisconsin Veterans Home provides rides for clients.
- Department of Human Services is very coordinated and provides volunteer driver programs.
- WATS – Wausau as public transit fixed-route system, recently added paratransit.
- There is also a Headstart program that provides transportation for children in Washara, Wapaca, Marquette and other counties.
- The IT committee that was formed has decided on vendor for CAD, AVL, GPS, maintenance scheduling projects. The five largest share rides will be involved including West Bend, Portage, Wisconsin Rapids, Watertown, and Beaver Dam.

River City Cab

- This is a shared-ride taxi system for Rural Counties – sponsored through the DOT.
- Routed for efficiency and demand response.

North Central Wisconsin Planning Commission

- The commission consists of 10 counties including Marathon, Wood, Adams, and Portage.
- It is a volunteer association and does not provide project support, just the transportation planning elements.
- They would like to update the regional transportation plan, originally performed in 1981 to bring in new areas and avenues of thinking.
- They would also like to expand transportation program that historically consisted of pavement management, bike facility planning, emergency planning, and emergency response.
- They work with extremely rural areas where transportation needs are not being addressed.

TranSmart

They were involved in the I-39 corridor technology assessment. They are sitting in to learn more about the needs of the region.

4. Discussion on Interagency Cooperation and Sharing of Information

Hau led the discussion on interagency cooperation and sharing of information. The purpose of this was to identify what types of data agencies provide to others (e.g., other agencies, traveling public), what types of data they use to perform their jobs, and with which agencies they would like to cooperate / coordinate in which they have not historically done in the past. The following are the highlights of the discussion:

Town of Rome

- From a construction and maintenance standpoint Rome provides advisory information to the public, via radio and news for incidents disasters.

Wood County Board

- They provide a transit service on a demand-response basis.
- The county Web site provides information regarding the paratransit service.
- The service consists of seven or eight buses that operate in Wisconsin Rapids and Marshfield extend to the rural areas.
- They do not have the scheduling information set up for computer data entry/
- They have a weather information service provider that provides weather information to the patrol supervisor.
- Road closures, the salting and sanding of roads, and weather information is phoned over to other agencies. Weather information is provided to local media also on a demand basis.

- Incident management is coordinated through the County Sheriff and local police departments. They do not have any type of portable VMS or other types of advanced roadway warning units.
- They have two hospitals located in Wood County, one of the largest located in Marshfield (north) the other hospital being in the south of the county.
- County emergency services have dedicated lines into the hospital emergency rooms. Emergency management facilities in each county have a data repository (electronic), then all information is sent to the state.
- Radio contacts with the fire and police in Wood County is sometimes a challenge because each would like to maintain their own type of communications structure.
- Wood County transit service providers state that it would be helpful to them to have more information sharing in the area of construction.

Wisconsin State Patrol
- They see state patrol handout for information
- Stated that the amount of information shared is too great to discuss in the group.
- They have point-to-point in-place to communicate from dispatch to vehicle.
- They have a common channel that is used to communicate across the state with all county, city, village and township entities (whisper channel).
- They stated that if the desire to coordinate and share information is there from any county and city, the door is open.
- Their focus is on highway safety.
- The state patrol provides 24-hour coverage on any highway or interstate within Wisconsin.

River City Transit
- The driver or vehicle and the transit center communicate via voice line.
- The transit management center has only voice communication with no automation.
- There is some intra-city transit service provided by Point Tours (private service).
- They operate about 23 vehicles and coordinate their transit operations around incidents.
- Stevens Point Transit provides a Web site with information regarding schedules, bus routes, fares, and general information. They are still working on improving the site that should be complete in the near future.

WisDOT D4
- Major incidents are coordinated with local EMS and state patrol.
- A communications manager provides critical incident information to media outlets.

5. Discussion on Agency Issues and Needs

Hau led the discussion providing some background into what types of issues and needs may result from this discussion. Again, a worksheet was used to facilitate the discussion and to obtain the information needed to develop the architecture. The notes to follow are only an excerpt of the complete listing of agency issues and needs.

The group expressed their desire to have their issues and needs clearly delineated from the other regions in Wisconsin. They felt that they had unique needs that define this particular region. The following is a summary of the expressed needs for the region:

- Safety issues relating to decreasing accident fatalities rate, transit, and improving the overall traveler experience for the highway user.
- Lack of alternate routes. There are no or few parallel routes with the same capacity as highway thoroughfares. Highways 12 and 16 have been permanently assigned as alternate routes.
- Response to accidents is critical, the quicker the response, the better chance of having free flow.
- Staffing, training and funding of technology related project
- Road conditions due to weather.
- Dangerous curves, reduced sight distances, pavement markings.
- Improved transit between cities and rural areas - for example, there are transfer points between Plover and Stevens Point but nothing other than that for other types of riders.

cc:

Project Team
Advisory Group
Workshop Attendees

MEETING MINUTES
LACROSSE, WI

March 22, 2001
8:30 a.m. to 2:30 p.m.

Attendees:
- John Verhyen – State Patrol HF-Madison
- Scott Lindemann – State Patrol-D5
- Andrew Noack – Ho-Chunk Nation Planning
- Keith Lee – LaCrosse Municipal Transit
- Jay Loeffler – LaCrosse Emergency Dispatch
- Tom Jacobs – LaCrosse Police Department
- Keith Back – LaCrosse County Highway Department
- Brian Scott – SRF Consulting Group, Inc.
- Craig Vaughn – SRF Consulting Group, Inc.

1. Introductions:

Brian Scott kicked off the meeting by giving a brief overview of the project and the final product that will result from the workshop on a statewide basis. Introductions were made around the table.

2. Agenda and Intelligent Transportation Systems Overview:

Brian presented an overview of ITS with emphasis on rural areas. A copy of the presentation is attached.

3. Discussion of Current Uses of Technologies within Local Agencies

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Each participating agency discussed technology-driven initiatives currently in place or planned for the near future. The discussion highlights are listed below:

LaCrosse Dispatch - Jay Loeffler

- Emergency Vehicle Preemption (EVP) is in use throughout the County, yet only on ambulance and fire vehicles. The city PD is not equipped with EVP.
- Mayday calls began coming in from On-Star facilities within the last 6 months; getting 3-4 calls per week. On-Star emergency telecom operator calls LaCrosse Dispatch Center and asks that the appropriate personnel be dispatched to the vehicle location to determine the problem. The location accuracy provided by On-Star is fantastic. Some calls coming in from cars on a dealer's lot – false calls.
- County sheriffs dispatch local Police Departments
- County E911 calls State Patrol if needed
- State Patrol does not receive 911 calls
- County on 150 MHz frequency – agency to agency frequency – limited in range. Not a point to point call in the literal sense, it is a broadcast signal that is sent out to any and everyone within the range and picked up by the intended party when heard.
- STATE PATROL on 800 MHz systems
- In early stages of planning for Mobile Data Terminals (MDTs) for all Emergency Management Services (EMS) vehicles in LaCrosse County (Police, Sheriff)
- Highway dept. has access to DOT – District 5 (D5) Variable Message Signs (VMS).

Ho-Chunk Nation Planning Organization – Andrew Noack

- Operate Casinos – they bring a lot of traffic onto highways as a "tourist" or "special event" draw
- Three Casino sites (Nicousa-Wood County, Black River Falls, Wisconsin Dells-major Casino)
- Use Ho-Chunk owned PVMS for major traffic generating events to direct traffic into area as well as out of area. The Portable Variable Message Signs (PVMS) are placed on the Hwy 12 corridor. Also rely on County agencies to help direct traffic with other PVMS.
- Ho-Chunk Casino in the Dells – on Hwy 12 (In District 1 - highways)
- Have a website www.ho-chunk.com
- Also use a lot of brochures for advertisement at rest stops and convenience stores.

LaCrosse Municipal Transit– Keith Lee

- No transit ITS equipment in use today. However, they do use surveillance cameras on the buses and record the footage in case of an incident. This seems to help as a deterrent to bad behavior
- Operate a fixed route system – City of LaCrosse
- Paratransit component is contracted out to Laidlaw (private sector provider) – they cover a big geographic area.
- Dial a ride – Monroe and LaCrosse County each have a minibus system. Onalaska/LaCrosse have a coordinated system.

- Have 800 MHz trunked radios on buses for dispatching/communications. This is a shared system for all public agencies in the county. Each agency has their own talk-group.

LaCrosse Police Department - Tom Jacobs

- Coordination done through dispatch center
- EVP – for Fire Department.
- Signal coordination – working on this
- Loop detectors – traffic actuated signals.

WI State Patrol - Scott Lindemann

- PVMS and Highway Advisory Radio (HAR)
- Try to use PVMS with cellular connections whenever possible. Change messages w/ cell phones according to traffic on scene. Call into dispatch to have them call sign to change the PVMS message.
- Weigh-In Motion – looking at for West Salem scale on I-90
- Using Mobile Data Computers (MDCs)
- Field testing MDCs to issue traffic tickets in 2 counties – beta testing
- Involved with emergency service coordination
- Possibility to use PVMS for "Airfest" on French Island – limited access to site and have a lot of traffic backup – would be nice to put VMS in MN to direct traffic.
- Also possible use of PVMS for "OctoberFest"

LaCrosse County Highway Dept. – Keith Back

- Loop detectors for traffic in County – most signals in City of LaCrosse – use traffic actuated signals
- I-90 – pavement condition sensors along I-90 at the border
- EVP – Fire department
- City of LaCrosse plows snow in the City
- Counties in district plow county roads – routes are set within counties. Good coordination between counties.
- Maintenance supervisors use radio to communicate and coordinate weather information and snowplowing methods
- District has one Global Positioning System (GPS) equipped truck (Trempealeau County).

State Patrol – Statewide - John Verhyen

- License plate reader – tied into scale database.
- MDCs in all STATE PATROL cars in D5
- Have an earmark request to do 12-20 additional sites in state for MDCs. These additional MDCs would bring on those counties or cities not currently participating in the State Patrol sponsored MDC Network project.

4. Discussion on Interagency Cooperation and Sharing of Information

The purpose of this was to identify what types of data agencies provide to others (e.g., other agencies, traveling public), what types of data they use to perform their jobs, and with which agencies they would like to cooperate / coordinate in which they have not historically done in the past. The following items are not a complete listing of items discussed, yet merely the highlights of the discussion:

<u>WI State Patrol - Scott Lindemann</u>

- District STATE PATROL is responsible for 24/7 coverage throughout the district
- Use and provide weather and environmental conditions – via voice and MDC systems
- Call the County highway department to advise and request maintenance
- Use Intellicast and the Weather Channel from the web to get weather information
- Provide and use traffic flow information. Provide from an observation perspective in the field and use the information received from outside sources to manage certain situations
- Incident data – report incidents and disseminate to other counties/cities for traffic re-routing, i.e. crash that is going to close freeway – done via voice communication sometimes landline phone, sometimes cell phone
- Respond to media requests, do not call media to pass on information. Do call Ann Grayson – D5 DOT information officer with incident information as necessary
- Use MDTs between cars for communication
- Communication to vehicles is voice radio and MDCs
- Have some vehicles equipped with cameras in car and microphone on troopers

<u>LaCrosse County Highway Department – Keith Back</u>

- Provide construction advisories
- Use roadway detectors and on-site personnel to get status of traffic
- Incidents reports – use accident reports from an area to determine if they need to react
- Signals for County are standalone, no dial-up modem connection
- City signals – interconnected but there is no dial-up capability

<u>LaCrosse Police Department - Tom Jacobs</u>

- Does contact media (radio, TV, newspaper) by broadcast fax to inform public of traffic tie-ups due to accidents.
- Would like Automatic Vehicle Location (AVL) equipment on vehicles for management and safety reasons.
- City has 800 MHz trunked system – can talk to anyone on system.
- County is on a different system.

<u>LaCrosse Municipal Transit – Keith Lee</u>

- Counties and D5 DOT coordinate road closures – traffic information coordination between agencies – radio
- Do provide traffic information via radio contact, if requested.

State Patrol – Statewide - John Verhyen

- CIRT Team application (from D7) may be a good initiative in D5.

LaCrosse Dispatch - Jay Loeffler

- Have templates prepared so that they can fill in the pertinent information on template and fax out to media.
- Currently fax out information daily to media on what is going on in the area.
- Will be looking into using email to get information to media.
- Have a paging system. Sends out a voice message to media.

WI State Patrol - Scott Lindemann

- Send out road advisory information in winter months – use the TIME system in Madison to distribute statewide
- STATE PATROL gives info to D1 communication center and they distribute statewide and also put on the internet.

Ho-Chunk Nation Planning Organization – Andrew Noack

- Use and provide traveler information for media and construction information
- Pull information from other sources (DOT, etc) and put on their own website.
- Use DOT information when designing projects to get good geometric designs
- Ho-chunk used to provide fixed-route and dial-a-ride transit service in Black River Falls area, sec. 5311 funded program. Recently terminated program. Collected ridership and fare data for archive purposes.
- All Casinos provide transit service from specified cities to the casinos. LaCrosse, Eau Claire, Sparta; Black River falls – hotels to casino

LaCrosse Dispatch - Jay Loeffler

- Stated that the roads throughout Wisconsin very rarely close due to weather, regardless of roadway classification.
- Interstate in WI will never close – state policy
- Between Campbell and West Salem – is an area that sometimes conditions exist in that merit closing the roadway, however not typically an option.

LaCrosse Municipal Transit – Keith Lee

- Voice – phone information to customers, phone reservation for paratransit service.
- In future, this will probably be integrated with the internet.
- Website with schedules and fares – managed by the UW LaCrosse
- Have cameras on buses – front and facing out watching the door and windows. Also have a microphone– has helped with problems. On-board video recorder. Only look at tapes if requested by driver or rider. Driver does not have access to tape recorder.
- University – provides "safe-ride" bus from bars to campus
- Madison, WI also has a similar system

Archiving data

- DOT has crash data system – STATE PATROL provides data into system
- 911 calls are digitally recorded and saved for 120 days.

Commercial Vehicle Operations (CVO)

- Have a facility at mile post 10 on I-90 – weigh station, inspection
- Share info with the Division of Motor Vehicles (DMV) – license information
- STATE PATROL personnel are at the weigh scales – they too conduct inspections and enforcement of trucks, school buses, etc.
- DMV tests and issue licenses
- STATE PATROL inspects every school bus once/year, plus do spot checks.

5. Discussion on Agency Issues and Needs

This discussion began by providing the group with background into what types of issues and needs may result from this discussion. Again, a worksheet was used to facilitate the discussion and to obtain the information needed to develop the architecture. The notes to follow are only an excerpt of the complete listing of agency issues and needs.

State Patrol – Statewide - John Verhyen

- Traffic Mgmt – safety
- Emergency response time – loss of conveyance of accurate information
- Lack of communications infrastructure – coverage, fiber, microwave technology
- Lack of emergency vehicle tracking – coming but a lot of education needed
- Mayday system coordination – up an coming technology, so STATE PATROL needs to stay abreast of technology
- Institutional communications
- Operations and maintenance cost

Ho-Chunk Nation Planning Organization – Andrew Noack

- Congestion – better roadside directions
- Regional traveler information – tourism information, marketing people are also working on this.

LaCrosse Municipal Transit – Keith Lee

- Traffic Mgmt – safety
- Emergency Response time – finding helping – direct connection to Sheriff and Police is great
- Weather, visibility
- Lack of traffic signal coordination during rush hour

- Highway Rail Intersection (HRI) – trains blocking intersections for 45 min. to an hour, phone call to operator only gets to a recording. Kids crawling under trains when stopped. Not a lot of problems with crashes recently. Not a major delay problem since LaCrosse has a lot of alternate routes. Sparta – has 70 trains per day (Canadian Pacific). Do have overpasses so its not a congestion problem.

<u>LaCrosse Dispatch - Jay Loeffler</u>

- Communications Infrastructure
- MDTs
- Emergency Response on freeways and arterials – lot of cell phone calls from MN and other areas where caller does not know where they are.
- Weather / visibility conditions
- Lack of Emergency Vehicle tracking – spend a lot of time trying to figure out which vehicle is closer to incident.
- Mayday – concern about quality of data – are Mayday emergency telecom operators well trained? Could be a lot of growing pains with Mayday calls. Police Department depends on county 911 dispatch center.

<u>LaCrosse Police Department - Tom Jacobs</u>

- Safety
- Lack of communication infrastructure for MDT
- MDCs
- Congestion – movement to get another N-S corridor in the LaCrosse area. Big issue for Emergency Vehicle
- AVL for Emergency Vehicles
- Better tourist information for special events; or better special event information coordination.

<u>WI State Patrol - Scott Lindemann</u>

- Safety
- Dangerous hills & curves
- Lack of proper equipment facilities at weigh stations – need a pole building with a pit that allows inspectors to see underside of vehicles
- Lack of maintenance funds
- Lack of emergency vehicle tracking – keeping track of vehicles and troopers for safety reasons

<u>LaCrosse County Highway Department – Keith Back</u>

- Safety
- Dangerous hills/curves
- Road conditions- weather
- Highway Rail Intersections
- Road closure information

6. Potential Technology Assessment Discussion

The purpose of this section is to identify the possible or potential ITS technology types that the group sees would best address the issues and needs that they have, and in addition, build on the current uses of technology throughout the district and state. The listing which follows is not indicative of things that are going to be implemented, yet only a recommendation of areas of interest or need.

LaCrosse County Highway Dept. – Keith Back

- More pavement condition Sensors – add to high traveled areas, other than I-90. Use this for snow maintenance Operations.
- More loop detection
- Additional PVMS units for maintenance of roadways
- Some type of remote traveler information system – cell phone based, pre-trip internet based, etc.
- Closed Circuit Television (CCTV) Camera system in the city limits for traffic and incident monitoring.

State Patrol - Scott Lindemann

- Emergency Facility Coordination between departments
- Mayday operations coordination efforts for future management of mayday calls
- Continued growth of weigh-in motion equipment at roadside stations
- Increased AVL for emergency vehicles
- Automated CVO clearance

LaCrosse Police Department - Tom Jacobs

- MDCs
- AVL system
- CCTV – public safety and traffic surveillance
- Signal coordination
- PVMSs

LaCrosse Dispatch - Jay Loeffler

- MDT/MDC
- Emergency Facility Coordination
- RWIS information access– get a lot of calls/inquiries about current conditions
- Remote traveler information – cell calls have gone up 40% in past few years – need to get more information out so that people do not call 911
- VMSs for incident information use to travelers en-route
- Multi-jurisdictional traffic coordination

Transit – LaCrosse Municipal Transit – Keith Lee

- AVL for bus fleet
- Transit priority at critical intersections
- Signal coordination
- Automated load monitoring system for complete management of facilities usage

Ho-Chunk Nation Planning Organization – Andrew Noack

- PVMSs
- Kiosks at various locations with all types of tourist and special event information

State Patrol – Statewide - John Verhyen

- Multi-jurisdictional traffic coordination
- Emergency Facility coordination
- MDC

Border issues:

- Mutual aid agreements between LaCrosse/LeCresent for police and fire
- Initiative to get legislation to allow cross border coordination – mutual aid across state lines
- Hurley/Ironwood – have an MOU in place with Michigan to share radio systems. 800 MHz & VHF radios for both sets of troopers to allow for communication between each other and others in their respective organizations.
- Good communication with Mn/DOT Rochester office

cc:

Project Team
Advisory Group
Workshop Attendees

MEETING MINUTES
EAU CLAIRE, WI

February 22, 2001
8:30 a.m. to 3:30 p.m.

Attendees:

Steve Schofield – Pepin County
Mike Kuchenbecker – Clark County
Doug Notbolm – Wisconsin State Patrol
Gwen Van Den Heuval – Eau Claire Transit
Bill Kern – Dunn County
Greg Helgeson – Wisconsin Department of Transportation District 6
Pam McInnis – Eau Claire Police Department
Ed Mishefske – Chippewa Falls Fire Department
Bruce Fuerbringer – Eau Claire Police Department
Hau To - Castle Rock Consultants
Craig Vaughn – SRF
Brian Scott - SRF

1. Introductions:

Craig Vaughn, SRF Consulting Group, kicked off the meeting by giving a brief overview of the project and the final product that will result from the workshop on a statewide basis. Introductions were conducted around the table to start the workshop.

2. Agenda and Intelligent Transportation Systems Overview:

Hau To presented an overview of ITS with emphasis on rural areas. A copy of the presentation is attached.

3. Discussion of Current Uses of Technologies within Local Agencies

Craig Vaughn led the discussion providing a brief description of what types of information was desired under this topic as well as covering what may or may not constitute a current use of technology. A worksheet was distributed to help facilitate the discussion and to help document the various current uses of technologies by each agency. Each participating agency discussed technology-driven initiatives currently in place or planned for the near future. The discussion highlights are listed below:

Dunn County

- TM – signals, portable VMS, RWIS - these are mostly owned and provided by the DOT
- Use signs mostly on Interstate
- Would like to post highway condition information on message signs during the winter
- Messages are inputted into signs in the field
- Also uses RWIS and DTN weather service for weather information
- Coordination of traffic issues is with the DOT
- Snowplowing – superintendent – handles scheduling and callouts of crews
- Voice communication used for coordinating plow operations
- Incident on interstate – very frequently the county is called to move portable VMS to interstates
- Have infrared sensors on plows
- City maintains all signals: one signal is county owned; four signals are city owned
- Have one portable VMS
- RWIS – have satellite connection to DTN
  - Receive updates two times/day
  - Have one sensor site in county (don't connect to this site very often)
  - Many (9 or 10) snowplows have on-board pavement temperature sensors – air temperature and pavement temperatures with dashboard readout
- Have not done quantifiable studies to prove improved snow / salting operations; drivers really like because it helps them decide when to salt, how much, etc.
- Feel that there is a savings in material usage
- Not sure that more elaborate systems would be cost effective
- Supervisors do use radio communications between plow drivers to get pavement temperature at different areas of county
- More information is better, but need to be cost effective
- Linking county pavement temperature information from infrared sensors would be good - share information from county to county
- Counties are moving into more and more GIS systems

Pepin County

- Counties monitor Sheriff frequencies and vice versa for radio traffic and weather / storm movement
- Place RWIS information at county shops
- Have a direct radio link to Sheriff's Department during storm
- Non-emergencies are relayed to Sheriff's Office and e-mailed, or otherwise communicated to company
- Small county – no Interstate and no equipment, no signals

Clark County

- On-board sensors – more accurate than DTN & SSI
- Delays in RWIS data transmission from sensors to RPUs to central processor to display results in old information being transmitted to counties; they highly value the on-board sensor information because it's more timely and accurate
- WisDOT is trying to get uniformity across county boundaries
- Counties try to coordinate/communicate with neighboring counties; could be done more (more communication)
- Mostly done by phone – superintendent cell phones
- State Patrol calls counties to pass weather information between counties

WisDOT – D6

- Do keep some VMS in DOT shop
- Knapp Hill (Dunn County) deployed to notify of icy conditions has resulted in fewer accidents
  - State Patrol controls signs
  - This is the first year at this deployment
  - Laptop PC from State Patrol dispatch to VMS
- DOT putting in trailblazing signs for alternate routing US 12 and US 53
  - being implemented now (flip-down signs)
  - signs are at tope of ramps and trailblazed
- Planning to implement HAR at Hudson this year
  - took over Department of Tourism license
  - State Patrol will control
  - Interstate signs w/ wig-wag flashers (tune to 530 AM when flashing)
- Signals
  - have 62 signals – fixed time systems (some actuation)
  - mostly in Eau Claire and Chippewa Falls
  - US 12, 53, 124
  - Putting in more signals in rural areas
- Need to look into adaptive signal systems that can be more responsive to deal with occasional high volumes
- VMS
- Slow-speed WIM
- Have EVP on most WisDOT signals in Eau Claire
  - WisDOT installs
  - Emergency services/locals funds and maintains
  - Opticom
- Not much coordination with Minnesota
- I-94 into Hudson will be the first four miles
- Most cross district communication and coordination will be focused along I-94
- Staffing of any future TMD is an issue – not WisDOT relies on State Patrol

- Focus of Traffic Management Today
  - Incident Management
  - Special Events
  - Snow fighting
- Any major incident along I-94 affects counties and cities

<u>Wisconsin Department of Transportation - State Patrol</u>

- Have DTN; use to determine staffing levels
- Lots of communication and coordination with counties and cities
- Three hours is the typical maximum road closure for I-94
- Freeway closure due to weather; not done today
- Not too excited about gatearms for freeway closures because not willing to strand motorists
- WIM at two scales
- Working on in-line WIM – won't have to pull off freeway for weighing
- Working on Pre-Pass (electronic clearance); will still have to pull through site
- DOT owns site
- State Patrol staffs site
- Enforcement information is entered into system from WIM site
- Have a MDC network for State Patrol
- Counties also have MDCs – network is the same as State Patrol
  - Pierce
  - Clark will be coming
- Some cities on same network
- State Patrol is doing "gap-filling" measures now - this is basically a "statewide" system
- Better incident command structure for incidents along I-94; arose out of BRW I-94 study
- Truck parking areas – big issue for plowing snow
  - rest areas and truck parking areas get full and truckers park on freeway ramps and then County snowplows cannot plow ramps

<u>City Of Eau Claire Transit</u>

- Fleet maintenance software (head-end only)
- Nothing for technology today

<u>City Of Eau Claire Police Department</u>

- Eau Claire Sheriff calls county shops when bridges are getting slippery, sometimes sends e-mails to notify.
- TIME – nationwide network – RWIS
- Had DTN – now want to "weather tap" (internet system)
  - closer to real-time information

- TIME – point-to-point law enforcement system (County – County) for high-speed chases, etc.
- Use portable VMS – especially in Oakwood Mall area
- Cell 911 – now the counties get ANI (cell phone number); most of these calls get transferred to State Patrol
- Have MDCs and CAD system in Eau Claire County
  - Most other counties do not have MDCs
  - Many other counties have Cads
  - These CADs are not integrated
- Recent collision between ONSTAR equipped vehicle and CVO vehicle – worked well – ONSTAR service provider called Chippewa Falls Emergency Services and they responded

<u>Chippewa Falls Emergency Services</u>

- City - EVP:
  (1) push button at fire station to turn signals green for main route
  (2) EVP on signals between Chippewa Falls and Eau Claire (hospital)
  - upgrading EVP equipment to allow EVP preemption for ambulances
- Two PSAPs in County
  - communication and coordination is good
- HAZMAT
  - Respond to HAZMAT for 14 counties
  - Have MDT w/ HAZMAT data
  - Have weather information combined to topology to determine where the HAZMAT plume will go; overlay weather information (wine, temperature, etc.) onto Tiger Files to predict plume movement.
  - Have on-board FAX machines, cell phones, remote access to hazardous material databases
  - No AVL today; in planning states as part of CARS
  - Good communication between Emergency Services agencies

4. Interagency Cooperation and Sharing

Hau led the discussion on interagency coordination and information sharing. A worksheet was provided to workshop attendees to fill out, and to facilitate the discussion. The following is a summary of the results:

<u>Roadway Information</u>

- Road and weather information is collected from RWIS stations in various counties. The information is collected and maintained by WisDOT, but county agencies have access to the information.
- Traffic characteristics are recorded and maintained by WisDOT Central Office
- Signal pre-emption is used by some of the local agencies for emergency vehicles

Emergency Information

- For HazMat situations, calls are routed via Madison then routed appropriately to the proper response personnel. Response types are provided site information remotely, respond with equipped personnel, or respond with a full CAT.
- Fax is used as a main communication media for field information relay.
- Most emergency data is shared using phone, radio or fax and not by automated means

Traffic Management

- Information flows from county perspective were mainly incident information coordination and closure coordination
- State Patrol – closure coordination, traffic information, roadway information system data, etc. the MDC network is still in the development stages as far as the exact use and purposes.
- Police department for Eau Claire provides press releases via fax – the media typically calls in and requests information from the 911 communication center
- State Patrol also provides information via fax to all local media outlets whether its radio or TV. The State Patrol provides a contact person to handle any questions that may come up regarding the incident.
- Media outlets may have some type of connection to the roadway conditions information.
- The event related information is relayed ahead of using telephone to the city or county agencies.
- Local agencies and the DOT issue roadway and heavy load permits. Some require notification of city or county agencies – an example is with an escorted load.

CVO

- Doug from State Patrol has a lot of information regarding the CVO information flows. See Doug's worksheet for further information. – Craig to fill in.

- Doug mentioned that the ISP is an under used service

5. Probable Agency Issues and Needs

Craig led the discussion on agency issues and needs. The following is a summary of the discussion:

Eau Claire Police Department

- Lack of emergency vehicle tracking is #1 – AVL would help
- EMS response time / finding help – out in county it's a lot longer
- Getting assistance in rural areas
- Cellular phone issue – don't have any idea where they are

Eau Claire County

- Other – operations and maintenance costs
- Safety – offering more info to motorists, construction zones – better decisions thereby enhancing safety
- Congestion – should not plan construction on Fridays and Sundays
- On the list, but not as high of priority were regional traveler and construction zone information

Chippewa Falls Fire Department

- Safety
- Lack of communications infrastructure / institutional communication – install of Mark 1 would help to resolve some of these issues
- Mayday coordination
- Better road closure, advisory, and weather information

State Patrol

- Safety – DOT and state patrol – engineering, enforcement of existing laws and regulations, education – need to focus message on education
- Emergency response time – locating incidents and sending help
- Lack of signal coordination – need to improve beltway – seems to be a better way to time lights in Eau Claire – HWY 53 is main corridor
- Also of concern, but not as pressing are better road closure, advisory, and weather information; unfamiliar users – a lot of county events, major regional shopping complex, better way to educate or mark locations; congestion – some problem areas in Hudson, 88000 ADT at the bridge; also a problem on HWY 53

Clark County

- Highway operations and maintenance costs
- Safety – some geometric design
- Better notification of road conditions, better education so drivers can drive sensibly, educational tool mostly
- Bottom of list – traveler info, better road closure, advisory information
- Middle of the list - winter weather road conditions
- Above medium is heavy traffic usage – deterioration of roadway

- Some communities are looking at alternative routes for trucks that carry HazMAT, routes are dictated by that individual community

Pepin County

- County roads – operations and maintenance costs
- Road conditions due to weather
- Safety
- Bottom of the list is construction zone information, better road closure, and lack of road condition information

Eau Claire Transit

- On time performance – schedule performance
- Statistics / automated data collection
- Better communications with customers – would like to see interactive kiosks
- Further down on the list are internal accident investigation program; improved transit connectivity; and road conditions – working well in the city, housed with streets department – transit drivers are the eyes

- Eau Claire is only fixed route system
- Chippewa has shared-ride is public transit

Dunn County

- Safety
- Geometrics – string of fatal accidents
- Road conditions, area want to keep progressing
- Bottom on the list are heavy truck usage and construction zone information and safety – still have problems

Eau Claire Fire Department

- the more trucks, the more serious the accident – high trauma and fatality rates
- road conditions – take action to put equipment on vehicle – clear roads helps

There is also general concern heavy truck – heavy lumber industry, heavy loads – ripping apart roads

5. Potential Technology Assessment

Hau led the discussion on potential technology deployments in the Eau Claire region. The following is the summary of the discussion:

- VMS system along the interstate. See a need for about 7 permanent signs.
- CCTV coverage inside from Hudson to the St. Croix River. Possible fiber use with this application.

- Knapp Hill is the problem area that could use the deployment of CCTV and VMS at this location to address the issues at this location. Both Dunn County and State Patrol expressed interest in the deployment of these technologies at this location and others.
- 53 over the Eau Claire River, and three other river crossings (I-94, 121). Possible bridge de-icing system deployment opportunity at these locations.
- AVL is a high priority for transit, state currently is looking into deployment.
- Electronic fare boxes for transit vehicles to limit abuse of system – Eau Claire currently operates 24 vehicles
- Kiosk traveler information for transit
- AVL for all emergency vehicles
- Enhanced 911 for cellular calls

Eau Claire County Highway

- VMS system
- Upgrade of the vehicle preemption equipment, fire department, volunteer fire departments, more or less the less privileged departments that
- AVL for emergency vehicles District wide.
- AVL for the snow plow vehicles

Eau Claire Fire Department

- EMS Signal Preemption for the fire vehicles, within the cities – Madison, Farewell Streets
- MDTs for the fire vehicles along with the data network to support these PCs
- Some of the EVP equipping would come in the form of upgrading the vehicles with the equipment necessary to use the existing infrastructure.

MEETING MINUTES
RHINELANDER, WI

January 17, 2001
8:30 a.m. to 3:30 p.m.

Attendees:

John Burkhardt – WisDOT D7
John Keiffer – WisDOT D7
David Zoesch – City of Park Falls, DPW
Todd Hintz – City of Park Falls, PD
Rich Grenfell – City of Merrill, Transit
Harry Hardy – WisDOT D7, Planning
Brian Gaber – WisDOT D7, Roads-Design
Jeff Hess – WisDOT D7, Planning
Maura Ducharme – Wis/DOT Planning/ITS
Hau To – Castle Rock Consulting
Brian Scott – SRF Consulting Group, Inc.
Craig Vaughn – SRF Consulting Group, Inc.

1. Introductions:

Brian Scott kicked off the meeting by giving a brief overview of the project and the final product that will result from the workshop on a statewide basis. Existing District 7 initiatives were reported by Jack Kieffer, Brian Gaber, and Harry Hardy. These include:

- Critical Incident Response Team (CIRT). CIRT is utilized for incidents four hours or longer in duration. CIRT is equipped with:
  - VMS boards,
  - Trailer,
  - Barricades
  - Portable traffic signals, and
  - Speed boards.

  District 7 (D7 maintains a schedule for use of VMS. Also, D7 installed a phone line in the Lincoln County dispatch center to allow them to change message signs. CIRT operates 24 hours/day, 7 days/week with five staff on-call. CIRT has one pager that is passed around to personnel on call. CIRT has also performed outreach to sheriff's and state patrol agencies within their district and has disseminated a laminated information card to these agencies.

- RWIS with video verification. Brian Gaber mentioned that there are three new RWIS stations within the district that have been procured using non-state ITS funds. These were installed as a result of the inconsistency and reliability of existing weather stations sited in a critical area in the "snow belt" region. They were also successful in obtaining eight laptop computers for county highway superintendents to assist in remote control of field devices. County Highway Superintendents can use laptops to access RWIS sites to get information from home, office, or via vehicle using cell phone modems. These laptop computers were also retained through non-state ITS funds.

- Traffic signal system. District 7 is deploying this in Eagle River on Hwy 45 as part of reconstruction. It will take a year or two to become fully operational.

Furthermore, D7 has expressed great interest in procuring permanent message signs and an anti-icing system, and has applied for funding. However, they have not been able to obtain state funding.

Maura will provide the SRF team with the architecture for CIRT and RWIS. The project architectures were required to receive initial federal funding for these projects.

2. Agenda and Intelligent Transportation Systems Overview:

Hau To presented an overview of ITS with emphasis on rural areas. A copy of the presentation is attached.

3. Discussion of Current Uses of Technologies within Local Agencies

Craig Vaughn led the discussion providing a brief description of what types of information was desired under this topic as well as covering what may or may not constitute a current use of technology. A worksheet was distributed to help facilitate the discussion and to help document the various current uses of technologies by each agency.

Each participating agency discussed technology-driven initiatives currently in place or planned for the near future. A few of the discussion highlights are listed below:

<u>City of Merrill Transit</u>

- Working on a transit link with Wausau Transit, as an entertainment and work concept shuttle service (future).

- AVL is being researched locally for their transit fleet (currently at the early stages) outside of a statewide initiative that has been launched to research AVL for all transit across the state.
- Merrill Transits operates on a demand-response ("deviated check"). As an example, users can call ahead to schedule a pick-up. However, others use the service on a daily basis for getting to and from school.
- 30% elderly, 20% ADA and 50% student represent the demographics of their riders.
- Merrill Transit has no future plans to extend service to the rural areas. However, Langlade County provides paratransit service that can be utilized by the general public.
- Schedule and fare information is provided on Merrill Transit's Web site.
- All transit facilities statewide are connected through email system, similar to a bulletin board group.
- Merrill Transit tested the FleetMate system, however, it was too costly and did not have enough growth support.
- D7 also felt that there are many older rural residents that perhaps should not be driving. Expanding some type of transit to these areas would be good from a safety standpoint, but the system would be costly.

<u>Park Falls, Police Department</u>

- Ambulance and Fire agencies are equipped with signal preemption for the two or so signals in town. Police vehicles are not yet equipped.
- They are interested in deploying mobile data terminals for use in their police vehicles.
- All police vehicles are currently equipped with cellular phone communications and radio systems.
- The county sheriff's department typically dispatches 9-1-1 calls for small towns and cities.

<u>Park Fall, Department of Public Works</u>

- Hwy 13 and Hwy 182 run through town.
- There is also growing traffic due to WeatherShield's growth.
- The city provides it's own maintenance operations.
- County maintenance operations provides maintenance services for other cities with coordination through D7. There are some issues with which jurisdiction (county vs. city) should be plowing, sanding, or salting. Nonetheless, communication is fairly good.
- The are sees an influx of traffic in the winter months due to snowmobile tourism. They are also starting to see the tourism move toward the summer months as well with cabin activity.
- City is looking at re-timing and re-designing their signalized intersection (conventional solution to traffic problem).

- Townships like Minocqua (Population 2200) are seeing a population increase of about 15000 in some of the winter and summer months for weekends at a time again due to tourism draws.
- The Park Falls Economic Developer should be contacted to provide tourism and other perspective. The SRF team will contact the Park Falls Economic Developer.

WisDOT D7

- CIRT contacts the media using fax or phone regarding traveler information to the public.
- Traveler information is provided to travelers en-route through portable VMS for special events, construction, and incident management.
- D7 would like permanent VMS installations in Lincoln and Oneida Counties.
- As mentioned before, DY has access to portable traffic signals, signs, and other technologies as part of the CIRT equipment package.
- Three RWIS stations have been placed at strategic locations in D7 as part of a pilot project. This system is funded by D7 and is operated independent of the statewide RWIS system. These weather stations have cameras on them as well.
- D7 has also implemented a laptop database accessing system allowing for remote control of the CIRT VMS and other field equipment.
- Signals are also scattered throughout the district and actuated using loop detectors. However, they are stand-alone signals with no interconnection and coordination. D7 would like to see an interconnection and coordination among those signals within relatively close proximity to one another.
- There will be preemption capabilities on new Rhinelander traffic signal system.

4. Discussion on Interagency Cooperation and Sharing of Information

Hau led the discussion on interagency cooperation and sharing of information. The purpose of this was to identify what types of data agencies provide to others (e.g., other agencies, traveling public), what types of data they use to perform their jobs, and with which agencies they would like to cooperate / coordinate in which they have not historically done in the past.   The following are some of the highlights of the discussion:

District 7 DOT

- In general, weather, road condition, and incident management were common data elements that needed to shared or exchanged.
- The primary concern is to provide travelers a seamless travel experience and to facilitate operations by data sharing. Travelers should experience similar road conditions (e.g., if they are traveling from point A to point B across county, city or district boundaries during the winter, the entire roadway segment should be plowed).

- Need to look at sharing of information and deployment of technologies as a cost-sharing partnership so that one agency is not paying for all of the costs. For example, data provided from weather stations benefit state, county and local agencies.
- Data currently obtained from RWIS network is not adequate for D7, especially in areas that experience serious lake effect snow.
- Pavement data is currently provided to counties.
- No travel advisories provided by the DOT, but to the media.
- Road condition information is currently available through 1-800-ROADWIS.
- There is awareness that a Madison newspaper provides road reports (not automatically inputted) on-line.
- State Patrol reports road condition and weather information.
- D7 would like to see construction projects on the Internet shared statewide (e.g., kiosks, MDTs).
- Speed and occupancy data are collected, and is included in the statewide traffic counting system – D7 is implementing three new real-time counters, not be stored or shared, traffic loops.
- Statewide coordination between districts is needed - for example, if a traveler is heading southbound on TH51 in D7, there needs to be a mechanism in place to notify travelers en-route of potential problems as they approach District 4.
- D7 is in process of outreach program working with local college and eight county area agencies (e.g., EMS, law enforcement, Park Falls Police, Public service). only few agencies are involved, want everyone to be involved).
- CIRT is constrained to act on highway system. For any major incident, all local agencies will be involved in that region. There is equipment sharing and radio emergency frequencies are known. However, there is a need to develop a formal regional incident plan.
- Coordination is a difficult as a whole, still in the infancy
- DOT is a resource for local communities.
- Would like to have more outreach to local communities, specifically those that are unincorporated.

<u>City of Park Falls</u>

- State Patrol is setting up own towers to talk with county sheriff's.
- For example, if an incident involving bank robbers occurs, and the chase covers multi-jurisdictions, agencies need to be able to speak with one another. Communication is a big issue.
- In dealing with another district, specifically regarding detours, there is a need for communication with other districts. The main point of contact in other districts would be helpful.
- Police would like increased coordination with commercial vehicle traffic, if only on a "for your information" basis. Also, it would also be useful if there was increased coordination with tourism so they better assist citizens.

- PWD provides advisories to local radio stations.

<u>City of Merrill Transit</u>

- Merrill Transit – on call for evacuations, large fires, corporate disasters
- There is two-way radio communication direct to EMS.

5. Discussion on Agency Issues and Needs

Craig Vaughn led the discussion providing some background into what types of issues and needs may result from this discussion. Again, a worksheet was used to facilitate the discussion and to obtain the information needed to develop the architecture. The notes to follow are only an excerpt of the complete listing of agency issues and needs.

- Permanent and mobile VMS deployments for incident management and traveler information
- Traveler service locations
- TOC and possibly Virtual TOC
- Kiosk deployments for traveler information en-route/ pre-trip at strategic locations throughout the state (statewide deployment)
- Maintenance operations management concerns – snowplow and salt/sand crews including product distribution.

cc:

Project Team
Advisory Group
Workshop Attendees

MEETING MINUTES
SUPERIOR, WI

February, 23 2001
8:30 a.m. to 1:30 p.m.

Attendees:

George Palo – Polk County
Roberta Dwyer – Mn/DOT
Lorraine Kramer – Mn/DOT
Thomas Trianoski – Superior Police Department
Jan Victorson – Bayfield County Emergency Management
Marc Bowker – WisDOT District 8
Greg Mattson – WisDOT District 8
Tad Matheson – Superior Fire Department
Hau To – Castle Rock Consultants
Craig Vaughn – SRF Consulting
Brian Scott – SRF Consulting
Maura DuCharme – WisDOT Central Office via Telephone

1. Introductions:

Craig Vaughn, SRF Consulting Group, kicked off the meeting by giving a brief overview of the project and the final product that will result from the workshop on a statewide basis. Introductions were conducted around the table to start the workshop.

2. Agenda and Intelligent Transportation Systems Overview:

Hau To presented an overview of ITS with emphasis on rural areas. A copy of the presentation is attached.

3. Discussion of Current Uses of Technologies within Local Agencies

Craig Vaughn led the discussion providing a brief description of what types of information was desired under this topic as well as covering what may or may not constitute a current use of technology. A worksheet was distributed to help facilitate the discussion and to help document the various current uses of technologies by each agency.

Each participating agency discussed technology-driven initiatives currently in place or planned for the near future. The discussion highlights are listed below:

TAD M. – NORTH 8 CORNERS – HAZMAT AND SUPERIOR

- EVP – pushbutton system
- Common communication center
    - Cell phones #
    - Pager #
- The closest county to incident responds first and gets more incident information, then communicates back to HAZMAT and other E.M. centers.
- Local incident manager <–> communication center <–> other E.M. communication center
- City of Superior handles 911 dispatch for county, city, etc. out of the "Communication Center" located in Superior
- Polk County - County Sheriff department handles 911 dispatch for all cities.

BAYFIELD COUNTY

- No stoplights
- Twenty-nine cities
- All E.M. are town-based
- Have county-wide communication center
- Have a "phone bar"
- Talk about need for EVP type warning light to warn traffic that trucks are about to leave the fire station
- Cell 911 – some calls come in from Minnesota (bounce across Lake Superior)
- Problem with routing of 911 calls
- 911 calls get directed to the county dispatch center where the tower is located
- Need public education that 911 cell calls don't give location of caller
- Minnesota has recently worked out a way to transfer 911 calls
- Building the county system now
- No 911 system
- Working toward enhanced 911 and rural addressing

POLK COUNTY

- Representing county commissioners in the 8th District and local law enforcement
- CCTV on concept vehicle in Barron County (one of eight concept vehicles)
    - Used for backing-up
- Signal coordination – four lights in Polk County
- Loop detectors at Highway 8 signal and some in Barron County
- RWIS - in each county

- Snowplows
- Counties have a few portable VMSs
- RWIS – using Foretell on daily basis
  - Impressed with accuracy of modeling
  - Also use DTN
- Have talked about installing kiosks in casinos and major gathering areas
- 911 location information is a problem
  - Education
  - Better identification system
- AVL – have used in two different counties
  - (Snowplows) – valuable
  - cost concerns, technical concerns
- Fleet maintenance program – monitoring and maintenance scheduling
- Overweight trucks – problem with trucks that travel very heavy (i.e. logging trucks)
  - One scale in Polk County
  - Transmit date to office computer (RF)
- EVP – have on Highway 8 stoplight
  - Emitters on ambulance vehicles
- In-vehicle MDT's – looking at with sheriff vehicle
- Concept vehicle
  - Gathering weather data
  - Pavement and air temperature
  - Plow up/down
  - Spreader on/off
  - Spread rate
  - Voice activated plows
  - Eight counties with concept vehicle (Barron, Manitowoc, Columbia, etc.)

DOUGLAS COUNTY

- Twenty-seven offices each with squad cars
  - 16 marked
  - 11 unmarked
  - 1 portable VMS radar board – small
  - 1 portable VMS (City has)
- Twenty-three MDT's – tied into S.P. network
  - Technology is obsolete – Electrocom is out of business now
- Superior has MDC's
- No signal pre-empt emitters

TAD – SUPERIOR COUNTY

- GIS system - Arcview
  - Sewers, hydrants, etc. – use for HAZMAT response analysis
- Emergency vehicle routing – would be good to have
  - GIS system that would plot out best path to take to incident
  - Also need to incorporate roads that are plowed – many roads are not plowed (typically)
  - Dynamic Emergency Response
- Issue
  - Immediate public warning of severe weather – many people cannot receive this
  - Currently receive from radio (from Douglas County)
  - Point-to-point
  - Area-wide warning – AWOS
  - TTY

MARK/GREG – WISDOT

- Loop detectors
  - For signal activation
  - For volume counts – no direct access, manual download
- Two PVMS
  - For hazardous responses
  - Now are permanently mounted by Ashland (Highway 2)
  - Also have flip-down signs to close Highway 2
- Want to install gate-arms for closing Highway 2 – arms, cameras, CCTV
- One end in Ashland County and one in Bayfield County
  - Less than 1-mile stretch of Highway 2
- Weather
  - Use DTN's
  - Statewide weather information on Internet (from S.P.)
- There are monitors located at rest stops with DTN information displayed
  - Looking at providing more information at rest stop
- One EVP in Polk County – Opticom
- Duluth-Superior Transit (Duluth Transit Authority)
  - One bus funded by both cities
- BART -Bay Area Rapid Transit
  - Bayfield County
  - Ashland County
- Most counties have Dial-A-Ride system

JOINT PROJECTS BETWEEN MINNESOTA AND WISCONSIN

- Drum VMS 1984/85
  - Both sides of Blatnik Bridge
- Controlled by Douglas County and Superior County. Joint dispatch center.
- Upgraded under TOCC
- Have money earmarked for ITS in Douglas County – want to integrate with Duluth VMS and control
- Douglas/Superior County joint dispatch center – 911 Center
- WisDOT looking at doing a virtual TOC – same as Mn/DOT
- Would make system available for viewing at counties – via Internet
- HAR – was some, never used
  - Local COC had one – don't use (was for travel information)
- Joint MN/WI meeting to discuss how to deal with large tourist events (i.e., Birkenbiner)
  - Highway 243
  - Highway 8
  - Highway 70
- Mn/DOT goal is to spread out traffic among possible options
  - Wisconsin needs to do something like this
- Media connections
  - Not a good system – not well organized
  - Press releases/fax
  - Needs improvement in this area

4. Discussion on Agency Issues and Needs

This section was juggled to accommodate the group. Many of the attendees had to leave early to attend other commitments, thus the section on agency issues and needs was moved forward. Craig led the discussion, using another worksheet to facilitate the discussion. The worksheet contained a list of probable agency issues and needs, everyone was instructed to select those issues that were reflective of their views as well as add any others that were not shown on the worksheet. The following are comments that were recorded as part of this discussion.

<u>Bayfield County Emergency Management</u>

- Improve emergency response – public safety across the board, coordination between highway depts. and communications center
- Integration of information – e.g., GIS and other systems, all public agencies should use same mapping system – between state and local agencies
- County to county communication – land-line, point-to-point, mutual aide performed on radio frequency / coordination
- 8. cellular piece – information technology for lost folks on snowmobiles
- Tracking down lost travelers is an issue – requires lots of resources
- Cellular coverage is varied – routinely cannot communicate in certain areas of the state
- Radios – repeater station to abandon in Spooner as a result of cost and outdated technology

- Infrastructure does not support number of tourists who come to this area
- Major downtime is spring and fall
- Lack of alternative routing (wild land fire – evacuations) – there may not be two ways out
- Most of construction is performed under traffic as a result of lack of alternative routes
- Local communities would be adverse to detours

Superior Fire Department

- Informational database – routes,
- Improve emergency response
- Safety – accident – worry about traffic control
- Road conditions – as weather declines - do get some information, but would like more

Douglas County

- Lack of alternative routes – '92 incident that shut down the entire city
- Weather visibility / conditions – areas or fog are an issue
- Further down on the list are lack of emergency vehicle tracking and lack of dispatching procedures – Duluth PD, Carlton, Bayfield, State Patrol – e.g., everyone tends to use different language – 10 codes are different from agency to agency

WisDOT District 8

- Traffic management – everything – weather and visibility (dramatic changes as a result of the lake) – some areas are susceptible to fog
- Lack of alternative routes
- unfamiliar tourists
- Lack of pavement markings (inconsistencies)

WisDOT District 8

- Weather conditions – traffic management and traveler information are the same thing, getting information to the general public is a huge issue
- Safety – at grade intersections
- Lack of alternative routes
- Icy bridges – Bong Bridge black ice near Hammond
- Bruce near Highway 8 – looking at de-icing, but waiting
- Further down on the list is congestion – recurring and seasonal;

Mn/DOT – Border crossing perspective

- Border-crossing: weather and visibility on the bridges, have signs, but probably not perfect coordination in place, when conditions diminish need to turn on signs

- Better information dissemination
- Construction zone information
- Mn/DOT's big concern is to make sure that information is up-to-date
- Lots of requests from travelers and ask Mn/DOT for information – could share information between Minnesota / Wisconsin
- Wisconsin has weekly construction map that gets updated – coordination with permits –
- Mn/DOT sends out weekly mailing – goes out to all permit holders / weather dictates changes
- Concern with permit holders – will ask Mn/DOT about construction in WisDOT, coordination with moves

In general another concern mentioned was the issue with railroad crossings – blocked intersections – sometimes alternative routes may take longer – problem with backed up vehicles at railroad intersections.

5. Discussion on Potential Technology Assessment

Hau To, Castle Rock Consultants, led the discussion providing. Again, a worksheet was used to facilitate the discussion and to obtain the information needed to develop the architecture. The notes to follow are only an excerpt of the complete listing potential technologies that could be deployed in order to address some of the issues that were identified.

<u>Greg Mattson – District 8</u>

- Covered his section should be on tape, no notes taken.

<u>Roberta Dwyer and Lorraine – Mn/DOT</u>

From the joint effort between Mn/DOT and WisDOT perspective:

- Mn/DOT boarder crossing technology possibilities are CCTV images sharing and RWIS information sharing across the boarders. VMS and CCTV combo system deployments that are shared by both agencies.
- HAR system sharing across the various bridges that are in place, with the communication tower placed on the Duluth side of the lake and both transmission pieces on both sides.

<u>WisDOT District 8</u>

- Permanent VMS installations throughout the district, in town for the bridges, Hwy 8 crossing, Bayfield/Ashland County Hwy 2 issue.
- Automatic Gate-arm closure system for the Hwy 2 section in Bayfield/Ashland
- Getting the necessary information out to the public via kiosks, internet, type push systems for getting this information to the public. The yellow page information may be an option as an attachment but again not necessary.

- Fog detection in certain situations may be necessary, but not a high priority.
- RWIS stations are being used to identify problem areas where fog may a concern

Superior Fire Department

- Mentioned the train detection opportunity at a few crossings that pose problems for emergency response time to incidents.
- This opportunity may relate to the Moorhead train detection project currently underway in Minnesota.
- The train situation in Superior would not allow for accurate train detection because the problem often exists due to the train yard switching cars and causing intermittent intersection interruption.
- Identified MDTs as number one technology for deployment and having that tied back to a central database repository.
- Emergency vehicle signal preemption #2.
- Emergency AVL for fire engines #3.
- Mayday system coordination #10
- Interagency coordination #9

cc:

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