

Tahoe Gateway Counties ITS Strategic Deployment Plan

Working Paper #3 Market Packages and Performance Criteria

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1.0 INTRODUCTION

1.1 Project Background

The Tahoe Gateway Counties Region includes the counties of Sierra, Nevada, Placer and El Dorado, and encompasses approximately 5,500 square miles and nearly 450,000 people. Its combination of suburban, rural and recreational destination areas demonstrate the uniqueness of the region. Interstate 80 (I-80) traverses the middle of the study area, providing a major route for commuters, leisure travelers and the interstate and national transport of goods and services. US Highway 50 (US 50) traverses the southern portion of the study area and also provides a major route for commuters and leisure travelers, and to a lesser extent than I-80, the transport of goods and services. Several other state routes, county and local roads provide circulation within the study area as well as access to and from I-80 and US 50.

The projected growth within the study area, as well as the surrounding areas, will be substantial in the next decade and beyond. This growth has already begun, and will continue, to stress the transportation facilities and resources of the Tahoe Gateway Region beyond their capacity. Intelligent Transportation Systems (ITS) offer potential new solutions that require further evaluation.

It is clear that ITS will not solve all the transportation-related problems in the area, however, many applications have proven to help address similar challenges in regions across the country. The overall goal of the project will be to, in a coordinated and cooperative manner, develop a strategic deployment plan defining the potential ITS applications available to address the identified needs of the region.

1.2 Planning Process and Status

The ITS Planning process is much like any other transportation planning activity, except that the focus is on technology and technological solutions. One of the primary areas of emphasis within ITS planning is the extensive involvement and participation by the region's stakeholders. This is especially important to ensure inter-agency integration, address potential institutional issues early, and to provide the necessary education and awareness of advanced technology transportation solutions.

Using the federal ITS planning process as a guideline, the overall approach to achieving the region's goals will be to perform the following tasks:

- Task 1: Develop Initial Outreach Material
- Task 2: Develop Steering Committee
- Task 3: Define and Inventory Existing and Planned Transportation System and Current and Planned Technology Uses
- Task 4: Define Existing and Future Transportation-related Deficiencies and Opportunities (Working Paper #1 – June 2000)

- Task 5: Identify User Service Objectives and ITS Vision (Working Paper #2 – April 2001)
- **Task 6: Establish Performance Criteria (Working Paper #3)**
- **Task 7: Identify and Screen Market Packages (Working Paper #3)**
- Task 8: Develop ITS Market Package Plan
- Task 9: Identify and Analyze Functional Areas (Report #1)
- Task 10: Define Market Package Functional requirements and Develop a Regional Architecture
- Task 11: Identify and Screen Technology Options (Working Paper #4)
- Task 12: Develop Strategic Deployment Plan, Executive Summary, and Outreach Materials (Report #2)
- Task 13: Administrative Tasks

Working Paper #1 is an important reference document and provides the following information:

- Identified the stakeholder participants in the Tahoe Gateway County Region (Tasks 1 and 2)
- Documented the existing and planned transportation system (Task 3)
- Identified the current and planned technology uses (Task 3)
- Defined the transportation-related deficiencies and opportunities (Task 4)

Working Paper #2 provides much of the basis for Working Paper #3. It provides the following information:

- Defined the ITS Vision, goals and objectives (Task 5)
- Identified the User Services (Task 5)

The ITS Vision and the User Services lay the foundation for identifying Market Packages (Task 7) and establishing performance criteria (Task 6). The performance criteria will be mapped directly to the project's Market Packages. The ITS recommended by this plan will be measured against these performance criteria, and ultimately against the goals and objectives. The User Services and their priority are used in this document in the screening and selection of Market Packages (Task 7). The tasks bolded in the above project list indicate the focus of this Working Paper #3.

1.3 Contained in this Working Paper

This working paper contains the following Sections.

Section 1: Introduction

Provides an introduction to the study area, the project process, and the status of the project to date.

Section 2: Market Package Definition

Provides an overview of Market Packages and their relationship to the National ITS Architecture and this project.

Section 3: Market Package Selection

Maps the User Services (identified in Working Paper #2) to Market Packages, resulting in a list of Market Packages defined as near-, medium-, and long-term priorities for the Tahoe Gateway Region.

Section 4: Performance Criteria

Describes the process of mapping the Tahoe Gateway Region's ITS Market Packages to performance criteria.

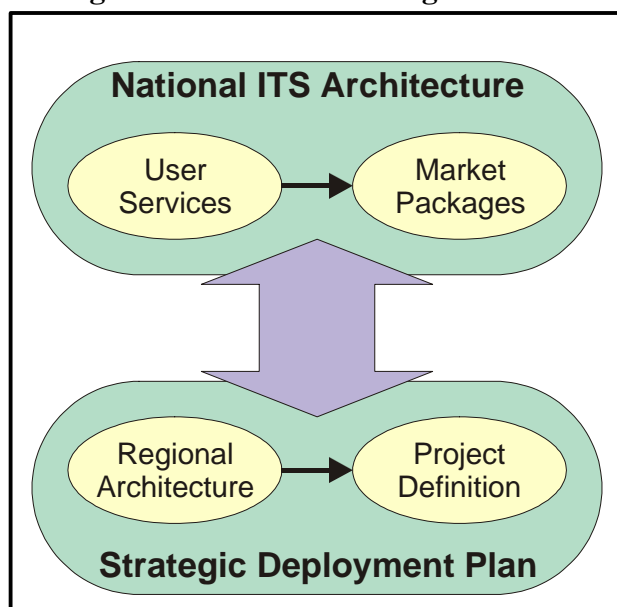
Section 5: Conclusion

Provides a discussion of the project accomplishments, the project's next steps and how it will use the information in this document.

2.0 DEFINING MARKET PACKAGES

This section serves to identify and screen the Market Packages applicable to the Tahoe Gateway Counties Intelligent Transportation System (ITS) Strategic Deployment Plan. As shown in Figure 2.1, Market Packages play an important role in linking the needs of transportation systems and users with the regional and national ITS architectures. This document identifies the high-, medium- and low-priority Market Packages for the Tahoe Gateway Counties. However, the prioritization is a guideline and not a prescription for deployment.

Figure – 2.1 – ITS Planning Process



User Services document the needed ITS functionality from the user's perspective. In the Tahoe Gateway Counties, the Committee that identified needs is comprised of transportation and transit management agencies throughout the region, public agency staff from adjacent regions, Native American communities, business interests and trade groups, and other special interest groups interested in transportation issues in and around the area. The User Services are documented in Working Paper #2, *ITS Vision and ITS User Services*.

The next logical step in the development of a Regional Architecture is to screen and select Market Packages. The identification and prioritization of Market Packages will be based in part on the previously selected User Services. It will also use other factors, including:

- Deployability
- Maturity of Technology
- Opportunity (“Early Winners”)
- Rural Considerations/Applications
- Other Market Packages

This document links the previously selected User Services with the Market Packages as defined in the National ITS Architecture, Version 3.0.

2.1 General Definition of Market Packages

Market Packages provide an accessible, deployment oriented perspective to the National ITS Architecture. They are tailored to fit, separately or in combination, real world transportation problems and needs. Market Packages bring together one or more Equipment Packages that must work together to deliver a given transportation service as well as the Architecture Flows that connect them to other important external systems. In other words, they identify the pieces of the Physical Architecture that are required to implement a particular transportation service. In short a market package is:

A series of relatively detailed groupings of subsystems, equipment packages, and data flow definitions which can be logically and incrementally deployed over-time to provide increasing capabilities and levels of integration.

A typical market package contains subsystems, equipment packages, architecture flows and supporting logical architecture elements. The National ITS Architecture currently defines 63 Market Packages that serve as models of what an agency or company might deploy to provide a given user service.

2.2 Additional Terminology Defined

The Market Package definition includes three concepts that require further definition for a complete understanding of Market Packages.

1) Subsystem –Each Subsystem is a cohesive set of functional definitions with required interfaces to other Subsystems. Subsystems are *functionally*, not physically, defined. There are 19 subsystems in the National ITS Architecture. They are grouped into four classes: Centers, Roadside, Vehicles, and Travelers.

Example – A regional implementation may include a single physical “brick and mortar” center that collocates the capabilities from several Subsystems. For instance, a single Transportation Management Center (TMC) may include Traffic Management Subsystem, Transit Management Subsystem, Emergency Management Subsystem, and Information Service Provider Subsystem functionalities. On the other hand, a single Subsystem may be replicated in many different physical “brick and mortar” TMCs in a complex metropolitan area system. For instance, multiple traffic management Subsystems may be implemented in a region reflecting distinct State freeway and local arterial management centers.

2) Equipment Package – A Market Package is implemented with a combination of interrelated equipment. An *Equipment Package* represents a set of equipment/capabilities that are likely to be purchased by an end-user as a component to an overall system. This equipment often resides in several different Subsystems within the Architecture Framework and may be operated by different stakeholders. Since Equipment Packages are both the most detailed elements of the

Physical Architecture and associated with specific Market Packages, there is clear traceability between the interface-oriented Architecture Framework and the deployment-oriented Market Packages.

Example – The Transit Vehicle Tracking Market Package includes vehicle location equipment in the Transit Vehicle Subsystem and a base station element in the Transit Management Subsystem. In this example, all Market Package elements are owned and operated by the same transit stakeholder. In other cases, the Market Package elements are owned and operated by different stakeholders. Many of the ATIS Market Packages require equipment in the Information Service Provider Subsystem that is owned and operated by a public or private information provider and equipment that is acquired and operated by the consumer as part of the Vehicle Subsystem or Personal Information Access Subsystem. Since equipment in different Subsystems may be purchased and operated by different end-users, these Subsystem-specific components may encounter varied deployment.

3) Architecture Flows – Architecture Flows are the information and data exchange between and among various Equipment Packages and Subsystems. The Architecture Flows allow for a coordinated overall system operation by following pre-defined interfaces between equipment and subsystems which may be deployed by different procuring and operating sectors.

To give a more visual understanding of a Market Package, Figure 2.2 shows a Market Package diagram, and Figure 2.3. is a Legend to assist in understanding the diagram. In general, only the most salient elements from the Architecture definition (e.g., directly involved Subsystems, system terminators, and the highest level data flows) are depicted in each graphic to ensure clarity.

Figure 2.2 – Market Package Diagram

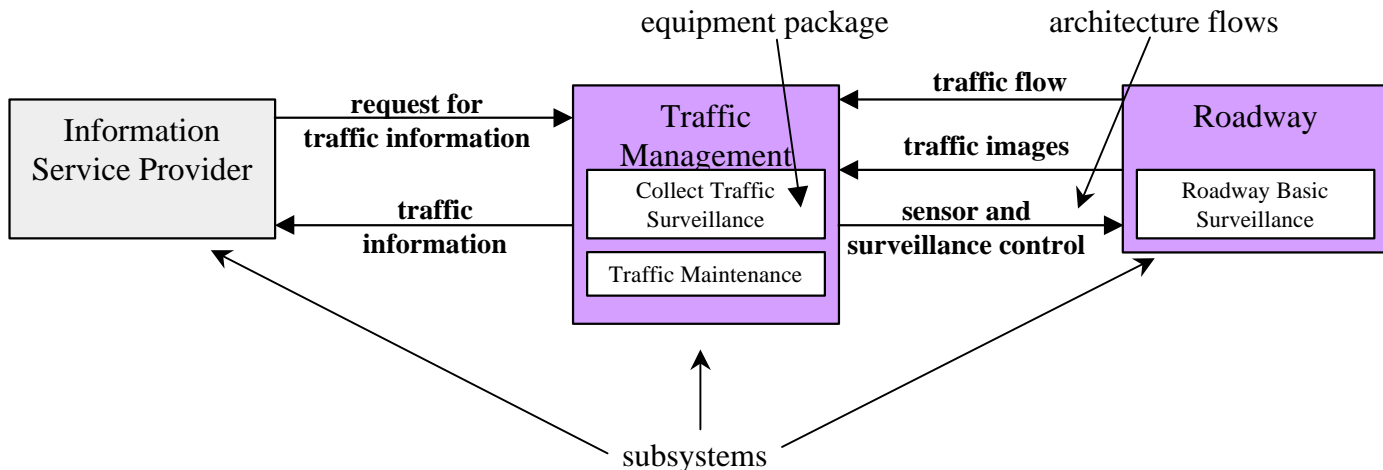
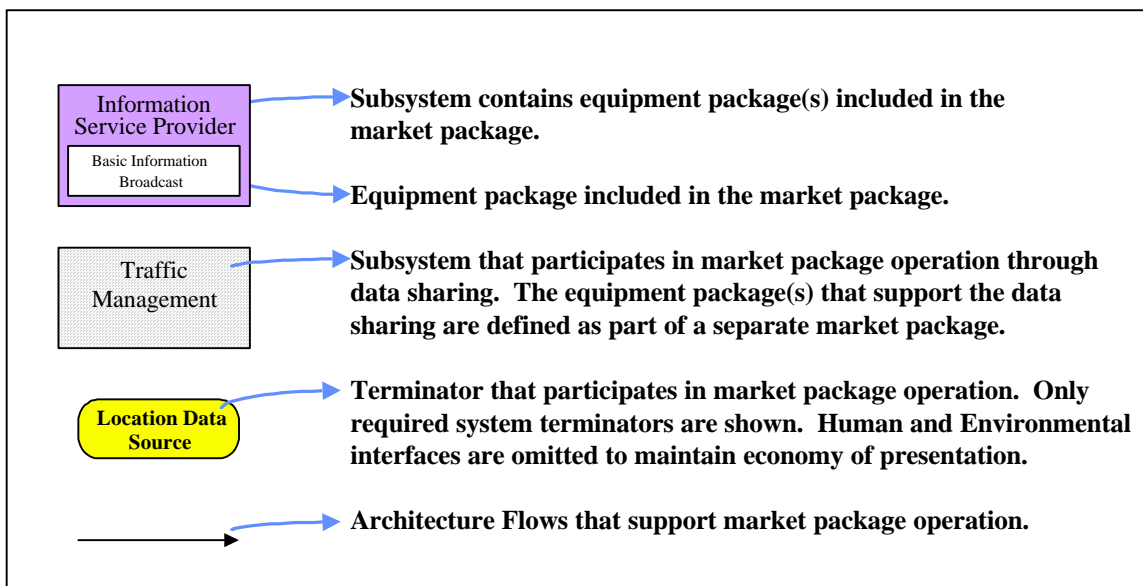


Figure 2.3 – Market Package Diagram Legend



2.3 Market Packages Summary

Market Packages are structured to segregate services that are likely to encounter technical or non-technical challenges from lower risk services. This approach allows the identification of a subset of Market Packages that are likely early deployments. Similarly, several Market Packages represent advanced products or services that are not technically feasible at this time, but may be possible in the future. Many of the Market Packages are designed to be incremental so more

advanced packages can be efficiently implemented by building on common elements deployed in the earlier packages.

The complete list of Market Packages from The National ITS Architecture version 3.0 is identified in Table 2.1. A complete description and diagram of each of these Market Packages is included in Appendix A.

Table 2.1 – List Of Market Packages

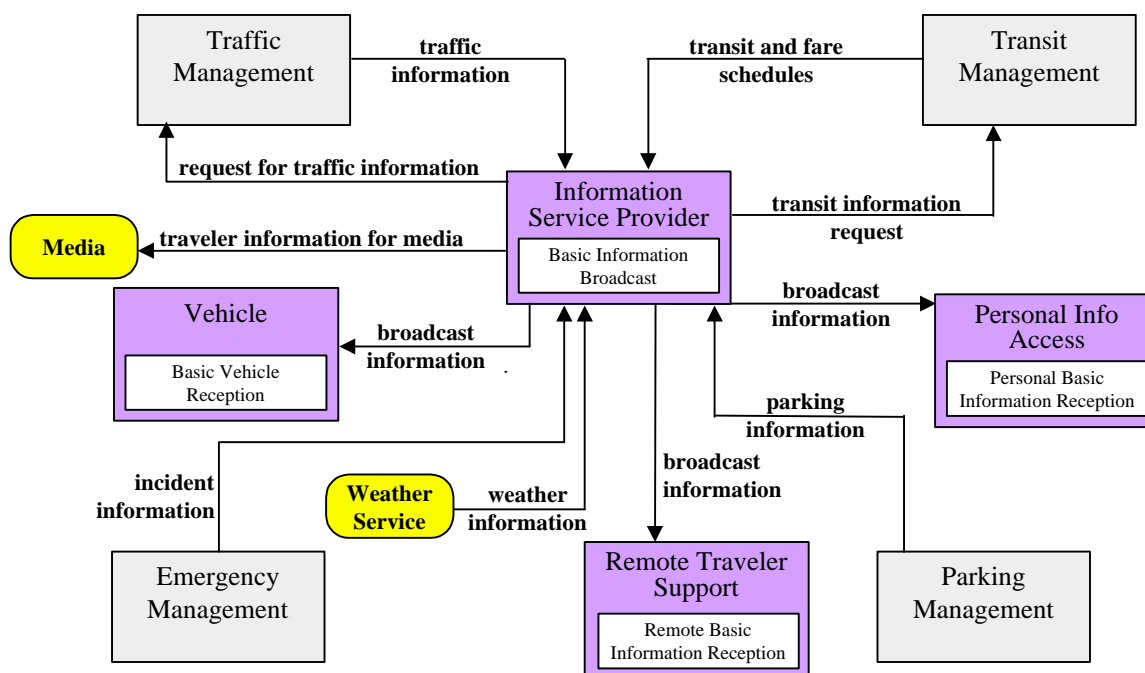
<u>Traffic Management (ATMS)</u>		<u>Advanced Vehicles (AVSS)</u>	
ATMS1	Network Surveillance	AVSS1	Vehicle Safety Monitoring
ATMS2	Probe Surveillance	AVSS2	Driver Safety Monitoring
ATMS3	Surface Street Control	AVSS3	Longitudinal Safety Warning
ATMS4	Freeway Control	AVSS4	Lateral Safety Warning
ATMS5	HOV Lane Management	AVSS5	Intersection Safety Warning
ATMS6	Traffic Information Dissemination	AVSS6	Pre-Crash Restraint Deployment
ATMS7	Regional Traffic Control	AVSS7	Driver Visibility Improvement
ATMS8	Incident Management System	AVSS8	Advanced Vehicle Longitudinal Control
ATMS9	Traffic Forecast and Demand Management	AVSS9	Advanced Vehicle Lateral Control
ATMS10	Electronic Toll Collection	AVSS10	Intersection Collision Avoidance
ATMS11	Emissions Monitoring and Management	AVSS11	Automated Highway System
ATMS12	Virtual TMC and Smart Probe Data		
ATMS13	Standard Railroad Grade Crossing	<u>Commercial Vehicles (CVO)</u>	
ATMS14	Advanced Railroad Grade Crossing	CVO1	Fleet Administration
ATMS15	Railroad Operations Coordination	CVO2	Freight Administration
ATMS16	Parking Facility Management	CVO3	Electronic Clearance
ATMS17	Reversible Lane Management	CVO4	CV Administrative Process
ATMS18	Road Weather Information System	CVO5	International Border Electronic Clearance
ATMS19	Regional Parking Management	CVO6	Weigh-In-Motion
		CVO7	Roadside CVO Safety
		CVO8	On-board CVO Safety
		CVO9	CVO Fleet Maintenance
		CVO10	HAZMAT Management
<u>Transit Management (APTS)</u>		<u>Emergency Management (EM)</u>	
APTS1	Transit Vehicle Tracking	EM1	Emergency Response
APTS2	Transit Fixed-Route Operations	EM2	Emergency Routing
APTS3	Demand Response Transit Operations	EM3	Mayday Support
APTS4	Transit Passenger and Fare Management		
APTS5	Transit Security	<u>ITS Planning</u>	
APTS6	Transit Maintenance	AD1	ITS Data Mart
APTS7	Multi-modal Coordination	AD2	ITS Data Warehouse
APTS8	Transit Traveler Information	AD3	ITS Virtual Data Warehouse
<u>Traveler Information (ATIS)</u>			
ATIS1	Broadcast Traveler Information		
ATIS2	Interactive Traveler Information		
ATIS3	Autonomous Route Guidance		
ATIS4	Dynamic Route Guidance		
ATIS5	ISP Based Route Guidance		
ATIS6	Integrated Transportation Management/Route Guidance		
ATIS7	Yellow Pages and Reservation		
ATIS8	Dynamic Ridesharing		
ATIS9	In Vehicle Signing		

From National ITS Architecture version 3.0

2.3.1 Example Market Package #1: Broadcast Traveler Information (ATIS1)

This market package provides the user with a basic set of ATIS services; its objective is early acceptance. It involves the collection of traffic conditions, advisories, general public transportation, toll and parking information, incident information, air quality and weather information, and the near real-time dissemination of this information over a wide area through existing infrastructures and low cost user equipment (e.g., FM subcarrier, cellular data broadcast). Different from the market package ATMS6--Traffic Information Dissemination--which provides the more basic HAR and DMS information capabilities, ATIS1 provides the more sophisticated digital broadcast service. Successful deployment of this market package relies on availability of real-time traveler information from roadway instrumentation, probe vehicles or other sources.

Figure 2.4 – Example Market Package #1 – ATIS1

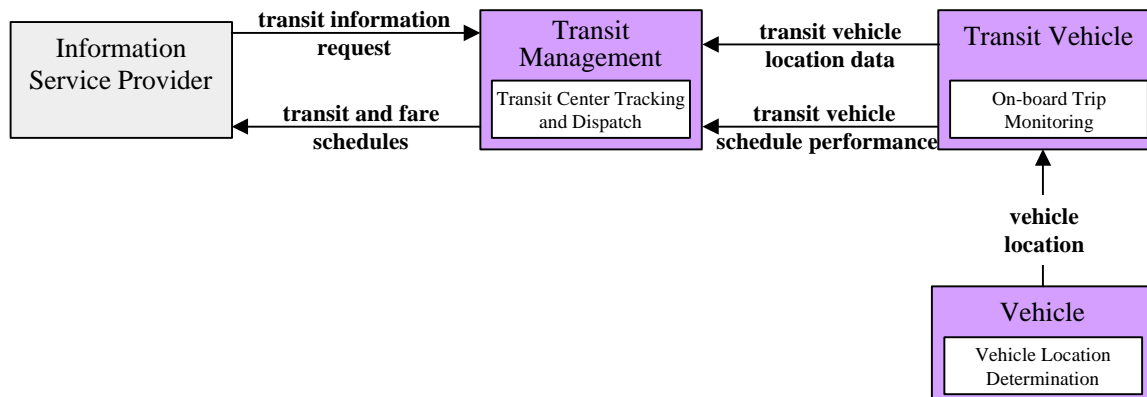


*Note: Graphic shows key market package elements. Some elements are omitted for clarity

2.3.2 Example Market Package #2: Transit Vehicle Tracking (APTS1)

This market package provides for an Automated Vehicle Location System to track the transit vehicle’s real time schedule adherence and updates the transit system’s schedule in real-time. Vehicle position may be determined either by the vehicle (e.g., through GPS) and relayed to the infrastructure or may be determined directly by the communications infrastructure. A two-way wireless communication link with the Transit Management Subsystem is used for relaying vehicle position and control measures. Fixed route transit systems may also employ beacons along the route to enable position determination and facilitate communications with each vehicle at fixed intervals. The Transit Management Subsystem processes this information, updates the transit schedule and makes real-time schedule information available to the Information Service Provider Subsystem via a wireline link.

Figure 2.5 – Example Market Package #2 – APTS1



*Note: Graphic shows key market package elements. Some elements are omitted for clarity

3.0 MARKET PACKAGE SELECTION

This section links the previously selected User Services with the selected Market Packages as defined in the National ITS Architecture, Version 3.0. In Section 3 of this document, the User Services are mapped to the Market Packages. Additionally, the Market Packages are prioritized based on the priority of the User Services they address, their strengths, weaknesses and the opportunities to deploy them in the Tahoe Gateway Counties.

3.1 User Services and Market Packages

The Market Packages are derived from the User Services identified as high-, medium- and low-priority in the Tahoe Gateway Counties. Frequently a single Market Package will address more than one User Service. Similarly, some User Services can only be fully addressed by employing several Market Packages. Table 3.1 shows the relationship between the Tahoe Gateways prioritized User Services and all Market Packages defined in the National Architecture, Version 3.0. This illustrates the one-to-one and many-to-many relationship that User Services and Market Packages have.

Not shown in Table 3.1 are several secondary relationships between the User Services and Market Packages. Some of these secondary relationships are direct technical connections and others are more by analogy than technology. For example, only one baseline relationship is identified between the Incident Management User Service and the ATIS Market Packages (ATIS4 – Dynamic Route Guidance). Emergency Services or Public Safety agencies involved in incident management often depend on the same traveler information outlets as the general public. However, those Emergency Services providers could subscribe to a Dynamic Route Guidance service provided by a private sector company to improve incident response times. Therefore, by analogy, implementation of any or all of the other ATIS Market Packages could create a relationship between the Incident Management User Service and the other ATIS Market Packages.

Table 3.1 – User Services Mapped to Market Packages

Pg 1

See file <US_MP Table 3.1.xls>

Pg 2

See file <US_MP Table 3.1.xls>

Pg 3

See file <US_MP Table 3.1.xls>

3.2 Market Package Prioritization

As with the User Services, the prioritization of Market Packages should be used as a general guide and not a prescription. The exercise of prioritizing the Market Packages brings structure to the planning process and gives focus to eventual project selection and deployment. Bearing this in mind, the Market Packages will only be grouped into “High”, “Medium” and “Low” priorities rather than attempting to establish a specific decreasing priority ranking for all applicable Market Packages. In other words, within the “High”, “Medium,” and “Low” priority categories, no Market Packages are assigned more importance than others.

Many of the Market Packages should be considered longer-term efforts because near-term deployment may represent an unacceptable risk. Near-term deployment feasibility is considered in this analysis of the Market Packages and those not technically feasible are ranked lower. Therefore the high, medium and low priorities can be translated into “near-term”, “medium-term” and “long-term” deployments.

In some cases an early opportunity to deploy a medium or long term technology in the Region, with relatively low risk, may present itself. Or, perhaps a technology may advance more quickly than was originally anticipated in the development of this Strategic Plan. Neither of these scenarios should preclude implementation of a medium or long-term technology before a near-term technology, if it was only the technological risk that prevented it from being a near-term Market Package.

An initial cut at prioritizing the Market Packages based strictly on the selection and prioritization of User Services was performed. While this approach provides direct linkage to the Region’s transportation related problems and needs and the accompanying User Services, it does not necessarily provide a realistic outlook for actual deployments. The final prioritization of the Market Packages includes other, more detailed analysis, that will provide a better opportunity for successful coherent ITS deployment in the Region. Table 3.2 shows the initial prioritization of Market Packages based solely on the selection and prioritization of the User Services.

Table 3.2 – Initial Prioritization of Market Packages

High Priority Market Packages		Medium Priority Market Packages	
ATMS1	Network Surveillance	APTS3	Demand Response Transit Operations
ATMS2	Probe Surveillance	APTS4	Transit Passenger and Fare Management
ATMS3	Surface Street Control	APTS5	Transit Security
ATMS4	Freeway Control	APTS6	Transit Maintenance
ATMS5	HOV Lane Management	CVO9	CVO Fleet Maintenance
ATMS6	Traffic Information Dissemination	Low Priority Market Packages	
ATMS7	Regional Traffic Control	ATMS10	Electronic Toll Collection
ATMS8	Incident Management System	ATMS13	Standard Railroad Grade Crossing
ATMS9	Traffic Forecast and Demand Management	ATMS14	Advanced Railroad Grade Crossing
ATMS11	Emissions Monitoring and Management	ATMS15	Railroad Operations Coordination
ATMS12	Virtual TMC and Smart Probe Data	ATMS16	Parking Facility Management
ATMS17	Reversible Lane Management	ATMS19	Regional Parking Management
ATMS18	Road Weather Information System	AVSS1	Vehicle Safety Monitoring
APTS1	Transit Vehicle Tracking	AVSS2	Driver Safety Monitoring
APTS2	Transit Fixed-Route Operations	AVSS3	Longitudinal Safety Warning
APTS7	Multi-modal Coordination	AVSS4	Lateral Safety Warning
APTS8	Transit Traveler Information	AVSS5	Intersection Safety Warning
ATIS1	Broadcast Traveler Information	AVSS6	Pre-crash Restraint Deployment
ATIS2	Interactive Traveler Information	AVSS7	Driver Visibility Improvement
ATIS3	Autonomous Route Guidance	AVSS8	Advanced Vehicle Longitudinal Control
ATIS4	Dynamic Route Guidance	AVSS9	Advanced Vehicle Lateral Control
ATIS5	ISP Based Route Guidance	AVSS10	Intersection Collision Avoidance
ATIS6	Integrated Transportation Management/Route Guidance	CVO2	Freight Administration
ATIS7	Yellow Pages and Reservation	CVO3	Electronic Clearance
ATIS8	Dynamic Ridesharing	CVO4	CV Administrative Processes
ATIS9	In-Vehicle Signing	CVO6	Weigh-In-Motion
CVO1	Fleet Administration	CVO7	Roadside CVO Safety
CVO10	HAZMAT Management	CVO8	On-board CVO Safety
EM1	Emergency Response		
EM2	Emergency Routing	Not Applicable	
EM3	Mayday Support	CVO5	International Border Electronic Clearance
AD1	ITS Data Mart		
AD2	ITS Data Warehouse		
AD3	ITS Virtual Data Warehouse		
AVSS11	Automated Highway System		

3.3 Other Considerations

Other considerations taken into account to assess strengths, weaknesses and opportunities in the screening, selection and prioritization of the Market Packages include the following:

- Deployability
- Maturity of Technology
- Opportunity (“Early Winners”)
- Rural Considerations/Applications
- Other Market Packages associated with emerging User Services

Table 3.3 shows an evaluation and scoring of the Market Packages based on the first three considerations; Deployability, Maturity of Technology and Opportunity. Based primarily on this subsequent analysis of strengths, weaknesses and opportunities, a final prioritization for each Market Package was determined. A discussion of the evaluation criteria used in Table 3.3 follows it.

3.3.1 Deployability, Maturity of Technology, Opportunity

The evaluation of Deployability, Maturity of Technology and Opportunity was performed and the results shown in Table 3.3. A score of 1 (low) through 5 (high) was assigned to each consideration for the Market Packages. The assigned scores are based on a combination of objective and subjective observations within the transportation engineering arena in general and the ITS field specifically. Additionally, the National ITS Architecture version 3.0 contains an analysis on Maturity of Technology that in most cases assisted in the assignment of scores across all three of the criteria listed in the table.

Deployability is a scoring of the technical feasibility of a project. It is based on the ease of deployment, the communications requirements and the amount of success achieved by other jurisdictions deploying the same Market Packages. A score of five implies an easily deployed Market Package that uses available communications. A score of one implies a complex system requiring significant infrastructure and communications.

Maturity of Technology scores the extent to which the technology associated with a particular Market Package is commonly available and proven through real world deployments. It is based on its track record of success and the maturity of the components that make it up. A score of five indicates a Market Package that has been successfully deployed many times and uses readily and widely available components. A score of one would indicate an experimental system with very little track record.

Opportunity scores the ability of a Market Package to be an “early winner” and the ability to quickly address the transportation needs. It is in part based on the stated needs of the Tahoe Gateway Counties

Table 3.3 – Market Package Evaluation Scoring

Market Packages Evaluation Scoring		Evaluation Criteria	Deployability	Maturity of Technology	Opportunity	Total Score	Initial Prioritization
Scale: 1 (Low) through 5 (High)							
MARKET PACKAGES – scored							
ATMS3	Surface Street Control		5	5	5	15	H
ATMS1	Network Surveillance		4	5	4	13	H
CVO6	Weigh-In-Motion		5	5	3	13	L
ATMS4	Freeway Control		4	5	3	12	H
APTS2	Transit Fixed-Route Operations		4	4	4	12	M
APTS8	Transit Traveler Information		4	4	4	12	H
ATIS1	Broadcast Traveler Information		4	4	4	12	H
AD1	ITS Data Mart		4	4	4	12	H
ATMS5	HOV Lane Management		4	3	4	11	H
ATMS6	Traffic Information Dissemination		3	4	4	11	H
ATMS13	Standard Railroad Grade Crossing		4	4	3	11	L
ATMS18	Road Weather Information System		3	5	3	11	H
ATIS3	Autonomous Route Guidance		4	4	3	11	H
ATIS7	Yellow Pages and Reservation		3	4	4	11	H
CVO1	Fleet Administration		4	4	3	11	H
CVO2	Freight Administration		3	5	3	11	L
CVO3	Electronic Clearance		3	4	4	11	L
EM2	Emergency Routing		3	4	4	11	H
EM1	Emergency Response		3	3	5	11	H
ATMS8	Incident Management System		3	3	4	10	H
APTS1	Transit Vehicle Tracking		3	4	3	10	H
ATIS2	Interactive Traveler Information		3	3	4	10	H
AVSS11	Automated Highway Systems		3	3	4	10	H
ATMS7	Regional Traffic Control		3	3	3	9	H
ATMS10	Electronic Toll Collection		3	4	2	9	L
ATMS17	Reversible Lane Management		4	4	1	9	H
APTS4	Transit Passenger and Fare Management		3	4	2	9	M
APTS6	Transit Maintenance		3	3	3	9	M
CVO9	CVO Fleet Maintenance		3	3	3	9	M
EM3	Mayday Support		3	3	3	9	H
AD2	ITS Data Warehouse		3	3	3	9	H
AD3	ITS Virtual Data Warehouse		3	3	3	9	H
ATMS2	Probe Surveillance		2	3	3	8	H
ATMS9	Traffic Forecast and Demand Management		3	3	2	8	H
ATMS12	Virtual TMC and Smart Probe Data		3	2	3	8	H

Market Packages Evaluation Scoring		Evaluation Criteria	Deployability	Maturity of Technology	Opportunity	Total Score	Initial Prioritization
Scale: 1 (Low) through 5 (High)							
MARKET PACKAGES – scored							
ATMS14	Advanced Railroad Grade Crossing		3	2	3	8	L
ATMS16	Parking Facility Management		3	3	2	8	L
ATIS4	Dynamic Route Guidance		3	3	2	8	H
APTS3	Demand Response Transit Operations		3	3	2	8	M
APTS5	Transit Security		3	3	2	8	M
AVSS1	Vehicle Safety Monitoring		2	5	1	8	L
CVO4	CV Administrative Processes		2	3	3	8	L
CVO5	International Border Electronic Clearance		2	3	3	8	L
APTS7	Multi-modal Coordination		3	2	2	7	H
ATIS8	Dynamic Ridesharing		2	3	2	7	H
CVO7	Roadside CVO Safety		2	3	2	7	L
AVSS3	Longitudinal Safety Warning		2	4	1	7	L
AVSS4	Lateral Safety Warning		2	4	1	7	L
AVSS6	Pre-crash Restrain Deployment		2	4	1	7	L
ATMS11	Emissions Monitoring and Management		2	2	2	6	M
ATMS15	Railroad Operations Coordination		2	2	2	6	L
ATMS19	Regional Parking Management		2	2	2	6	L
ATIS5	ISP Based Route Guidance		2	2	2	6	H
ATIS6	Integrated Transportation Management/Route Guidance		2	2	2	6	H
ATIS9	In Vehicle Signing		1	3	2	6	H
CVO8	On-board CVO Safety		2	2	2	6	L
CVO10	HAZMAT Management		2	2	2	6	H
AVSS7	Driver Visibility Improvement		2	2	2	6	L
AVSS2	Driver Safety Monitoring		1	1	1	3	L
AVSS5	Intersection Safety Warning		1	1	1	3	L
AVSS8	Advanced Vehicle Longitudinal Control		1	1	1	3	L
AVSS9	Advanced Vehicle Lateral Control		1	1	1	3	L
AVSS10	Intersection Collision Avoidance		1	1	1	3	L

3.3.2 Rural Considerations/Applications

In general, the needs of rural stakeholders are not substantially different from those of urban ones. However, different needs assume different priorities in the rural environment. The geography of rural areas also poses specific deployment challenges due to the variability and the large distances involved. The rural nature of the Tahoe Gateway Counties warrants mention of Rural ITS concepts and applications.

Table 3.4 lists 15 Market Packages that should be widely deployable in rural situations. They are suitable to the infrastructure and communications resources of rural areas, and they directly address many common rural transportation needs. The Market Packages that appear in this table are the ones that have received a "highly applicable" rating in one or more of the Rural ITS development tracks.

The "highly applicable" rating does not suggest that they should be high priorities in the Tahoe Gateway Counties, but it does provide some guidance as to which Packages may be more effectively deployed. The applicability will be considered as a factor during final prioritization of Market Packages.

Table 3.4 – Market Packages that are Highly Applicable to the Rural Development Tracks

Package		Initial Prioritization
APTS1	Transit Vehicle Tracking	H
APTS2	Transit Fixed-Route Operations	M
APTS3	Demand Response Transit Operations	M
APTS8	Transit Traveler Information	H
ATIS3	Autonomous Route Guidance	H
ATIS7	Yellow Pages and Reservation	H
ATIS9	In Vehicle Signing	H
ATMS12	Virtual TMC and Smart Probe Data	H
ATMS13	Standard Railroad Grade Crossing	L
ATMS14	Advanced Railroad Grade Crossing	L
ATMS15	Railroad Operations Coordination	L
ATMS18	Road Weather Information System	H
AVSS2	Driver Safety Monitoring	L
EM1	Emergency Response	H
EM3	Mayday Support	H

In addition to this list, the Automated Highway System (AHS) Market Package (AVSS 11) is highly applicable because Caltrans has already deployed some AHS technology in the Tahoe Gateway Region for evaluation purposes. The existing infrastructure makes additional deployment more feasible.

3.3.3 Other Market Packages Associated With the Emerging User Services

In Working Paper #2, *ITS Vision and User Services*, six emerging User Services were identified and included among those selected for the Tahoe Gateway Counties. Since these six User Services (Maintenance and Construction Operations, Disaster Response and Management, Safe Driving Enforcement, Environmental Weather Information Management, Intermodal Freight Management, Multi-jurisdictional Emergency Management) are emerging, the National Architecture developers have not yet completed the detailed work necessary for deployment. No Market Packages have been developed which respond directly to these six emerging User Services. While the MCO User Service is the primary focus of the next release of the National ITS Architecture (version 4.0), it is not ready for deployment at the time of completion of this document. The National ITS Architecture will be monitored for more information regarding the

MCO User Service. There is little information available from the National Architecture Team regarding the other five User Services.

3.4 Final Market Package Priority

Using Table 3.3, *Market Package Evaluation Scoring*, the Market Packages have been placed into High, Medium and Low priority categories. Based solely on Table 3.3, the Market Packages scoring ten (10) and above are rated High priority; the Market Packages scoring seven (7) through nine (9) inclusive are rated Medium priority; and the Market Packages scoring six (6) and lower are rated Low priority.

The other factors in this section were also used, particularly the mapping to User Services in order to establish a Market Package priority that balanced the Tahoe Gateway's needs with realistic expectations for deployment.

Ultimately, several of the initial High priority Market Packages were lowered to Medium or Low priority (Table 3.2, *Initial Prioritization of Market Packages*), primarily due to a lack of available technologies to deploy the given Market Package. More information regarding the movement of specific Market Packages or groups of Market Packages will be given in section 3.5. The grouping of Market Packages in Table 3.5 is the final prioritization of Market Packages. If a Market Package's priority has changed between Table 3.2 (the initial prioritization) and Table 3.5 (the final prioritization), the initial priority is shown in parentheses beside it.

Table 3.5 – Final Prioritization of Market Packages

High Priority Market Packages		Medium Priority Market Packages (cont'd.)	
ATMS1	Network Surveillance	APTS7	Multi-modal Coordination (H)
ATMS3	Surface Street Control	CVO9	CVO Fleet Maintenance
ATMS4	Freeway Control	ATIS4	Dynamic Route Guidance (H)
ATMS5	HOV Lane Management	ATIS5	ISP Based Route Guidance (H)
ATMS6	Traffic Information Dissemination	ATIS6	Integrated Transportation Management/Route Guidance (H)
ATMS7	Regional Traffic Control	ATIS8	Dynamic Ridesharing (H)
ATMS8	Incident Management System	CVO10	HAZMAT Management (H)
ATMS18	Road Weather Information System	AD2	ITS Data Warehouse (H)
APTS1	Transit Vehicle Tracking	AD3	ITS Virtual Data Warehouse (H)
APTS2	Transit Fixed-Route Operations		
APTS8	Transit Traveler Information	Low Priority Market Packages	
ATIS1	Broadcast Traveler Information	ATMS10	Electronic Toll Collection
ATIS2	Interactive Traveler Information	ATMS14	Advanced Railroad Grade Crossing
ATIS3	Autonomous Route Guidance	ATMS15	Railroad Operations Coordination
ATIS7	Yellow Pages and Reservation	ATMS16	Parking Facility Management
AVSS11	Automated Highway System	ATMS19	Regional Parking Management
CVO1	Fleet Administration	ATIS9	In-Vehicle Signing (H)
AD1	ITS Data Mart	AVSS1	Vehicle Safety Monitoring
EM1	Emergency Response	AVSS2	Driver Safety Monitoring
EM2	Emergency Routing	AVSS3	Longitudinal Safety Warning
EM3	Mayday Support	AVSS4	Lateral Safety Warning
		AVSS5	Intersection Safety Warning
Medium Priority Market Packages		AVSS6	Pre-Crash Restraint Deployment
ATMS2	Probe Surveillance (H)	AVSS7	Driver Visibility Improvement
ATMS9	Traffic Forecast and Demand Management (H)	AVSS8	Advanced Vehicle Longitudinal Control
ATMS11	Emissions Monitoring and Management (H)	AVSS9	Advanced Vehicle Lateral Control
ATMS12	Virtual TMC and Smart Probe Data (H)	AVSS10	Intersection Collision Avoidance
ATMS13	Standard Railroad Grade Crossing (L)	CVO2	Freight Administration
ATMS17	Reversible Lane Management (H)	CVO3	Electronic Clearance
APTS3	Demand Response Transit Operations	CVO4	CV Administrative Processes
APTS4	Transit Passenger and Fare Management	CVO6	Weigh-In-Motion
APTS5	Transit Security	CVO7	Roadside CVO Safety
APTS6	Transit Maintenance	CVO8	On-board CVO Safety

(*) = initial Market Package priority shown in Table 3.2

3.5 Findings

Because the Advanced Transportation Management (ATMS) Market Packages are typically the most straightforward and mature of the Market Packages, many of them initially considered High priorities remained there in the final Prioritization. ATMS5 (HOV Lane Management) and ATMS17 (Reversible Lane Management) were reduced in priority because of the current lack of HOV and reversible lanes in the Tahoe Gateway Counties. For the same reason, ATMS10 (Electronic Toll Collection) was lowered to Low priority. The other initial High priority ATMS packages were lowered based on their deployment, maturity and opportunity ranking.

Four ATIS packages that were initially High priorities were lowered to Medium. All were lowered because they are not highly applicable to the rural environment and because they are not strong candidates for deployment in the near-term. However, the packages are Medium priority and may become strong candidates in the next five to ten years. In Vehicle Signing was lowered from High to Low priority because is scored very low in Table 3, indicating that it is not ready for near-term deployment. In addition, this Package is likely to be an initiative from car manufacturers and car electronics developers.

Transit Market Packages scored highly in the Initial and Final prioritization. Of four APTS Market Packages initially ranked High priority, only APTS7 (Multi-Modal Coordination) was lowered to Medium. This was due to the fact that the technology it is based on is not mature enough to make it a near-term priority.

In general, the Advanced Vehicle Market Packages are not mature enough to deploy. There may be a future demand for these technologies, but they will likely initiate with the private sector and automotive manufacturers, particularly those that are in-vehicle.

The CVO10 (HAZMAT Management) was lowered from High to Medium priority in the final prioritization. It ranked Low in Table 3.2, but was moved to the Medium category because of the importance of controlling and managing the movement of hazardous materials in the Tahoe Gateway Counties, as expressed in stakeholder input earlier in the project regarding User Services.

Finally, despite Medium scores in Table 3.2, EM1 (Emergency Response) and EM3 (Mayday Support) were kept in the High priority category because of the strong need indicated for improved emergency response.

Table 3.5 is a first attempt at prioritizing the Market Packages, and it represents the consultant team's understanding of the needs in the Tahoe Gateway Counties. However, it is important to note that this list is flexible and subject to adjustment based on feedback from the stakeholders. There will be an opportunity to provide that feedback and adjust the list at the May 21, 2001 stakeholder meeting.

4.0 PERFORMANCE CRITERIA

Performance criteria use statistical evidence to determine progress toward specific defined goals and objectives. This includes both evidence of actual fact, such as measurement of travel time, and measurement of customer perception such as would be accomplished through a customer satisfaction survey. In transportation, the performance criteria will be used to measure the quality or level of service (e.g. timeliness, reliability, etc.) that is delivered. There are often good opportunities for collecting feedback from system users in “real time,” since the transportation service is often “consumed” at the same time it is “produced.” Evaluation using the performance criteria provides information to managers about how well services are being provided. Performance measures should reflect the satisfaction of the transportation service user, in addition to those concerns of the system owner or operator.

4.1 Purposes of Performance Criteria

The purpose of the performance criteria are several. The primary purpose is to identify specific types of data that can be used to set quantitative and qualitative goals for ITS deployment. They can also be used to evaluate the performance of a system and detect and correct problems. Performance criteria also provide data sets that can be used for system management and to help determine which future activities to undertake. Finally, they are the statistical evidence that can be used to demonstrate ITS effectiveness and document project accomplishments.

4.2 Performance Criteria Composition

A good performance criteria should have the following attributes:

- Is accepted by and meaningful to the customer
- Tells how well goals and objectives are being met
- Is simple, understandable, logical, and repeatable
- Shows a trend
- Is unambiguously defined
- Allows for economical data collection

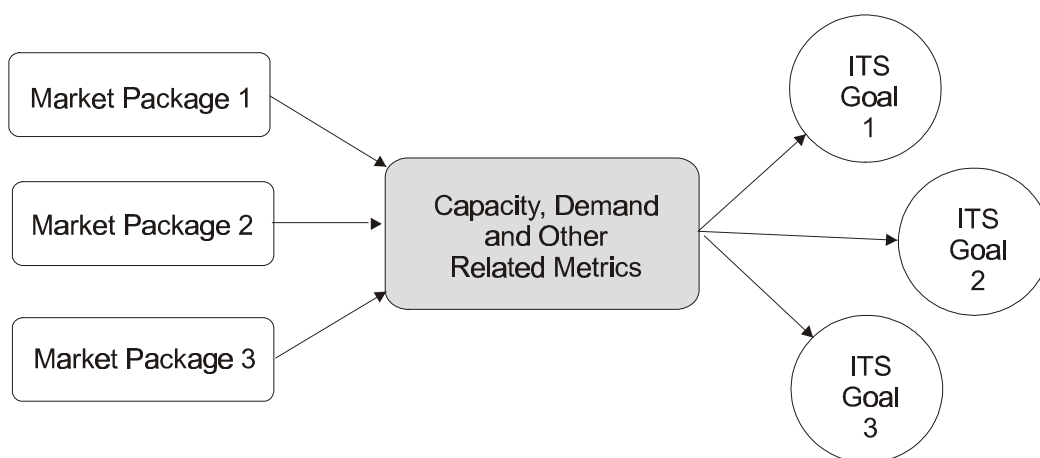
For example, travel time is a widely accepted performance criteria because it is a simple, clear criteria that is understandable and meaningful to the traveler and transportation professional. Travel times can be easily and inexpensively collected and the data can easily show a trend of increasing or decreasing travel time that can be correlated to the implementation of an ITS element.

4.3 Candidate Performance Criteria

Candidate performance criteria were identified from several sources, including the U.S. DOT guidance on ITS evaluation, shown in Table 4.1.

The guidance in the National ITS Architecture relates the direct linkage between Market Packages, transportation goals and objectives and evaluation measures. Figure 4.1 illustrates this relationship.

Figure 4.1 – Flow from Market Packages to ITS Goals



The objectives of the Tahoe Gateway ITS Strategic Plan are synonymous with the general goals of the national ITS plan. However, not all metrics identified in the National Program will be used for the Tahoe Gateway Counties and others have been added because of additional, region-specific objectives. Objectives specific to the Tahoe Gateway Region include support of regional transportation initiatives, support of coordinated ITS activities beyond the Tahoe Gateway boundaries, and active outreach to stakeholders.

Table 4.1 – National ITS Program Candidate Performance Measures

National ITS Goal	Related Metric
Increase Transportation System Efficiency and Capacity	Traffic flows/volumes/number of vehicles Lane carrying capacity Volume to capacity ratio Vehicle hours of delay Queue lengths Number of stops Incident-related capacity restrictions Average vehicle occupancy Use of transit and HOV modes Intermodal transfer time Infrastructure operating costs Vehicle operating costs
Enhance Mobility	Number of trips taken Individual travel time Individual travel time variability Congestion and incident-related delay Travel cost Vehicle miles traveled (VMT) Number of trip end opportunities Number of accidents Number of security incidents Exposure to accidents and incidents
Improve Safety	Number of incidents/accidents/injuries/fatalities Time between incident/notification/response/clearance Medical costs Property damage Insurance costs
Reduce energy consumption and environmental costs	Emissions Fuel consumed Vehicle fuel efficiency
Increase economic productivity	Travel time savings Operating cost savings Administrative and regulatory cost savings Manpower savings Vehicle maintenance and depreciation Information-gathering costs Integration of transportation systems
Create an environment for an ITS Market	ITS sector jobs ITS sector output ITS sector exports

Based on the transportation Market Packages selected for the Tahoe Gateway Region the following additional quantitative performance criteria were added:

- Commercial vehicle travel times
- Commercial vehicle permit and credential violations
- Transit Service Availability
- Timeliness and accuracy of traveler information
- Availability of traveler information

The following qualitative performance criteria were added:

- Ease of use of traveler information
- Availability and quality of planning data
- Knowledge of and perceived benefit of ITS by public and decision makers
- Perceived effectiveness of outreach efforts

4.4 Tahoe Gateway ITS Performance Criteria

Table 4.2 maps the National ITS Program Plan performance criteria and the region-specific performance criteria to the Market Packages selected for the Tahoe Gateway Counties. The table lists all criteria that can be used to assess the performance of each package, however, it should be noted that this should serve as a menu. From the “menu” any single or group of performance criteria can be used, and the final selection of which to use will depend heavily on the form of the actual deployments and the feasibility of collecting the data required by each.

Table 4.2 – Performance Criteria by Market Package

Market Packages	Performance Criteria
High Priority	
ATMS1 Network Surveillance	<ul style="list-style-type: none"> - time between incident/notification/response/ clearance - operating costs savings - information gathering costs
ATMS3 Surface Street Control	<ul style="list-style-type: none"> - traffic flows/volumes/number of vehicles - lane carrying capacity - volume to capacity ratio - vehicle hours of delay - queue lengths - number of stops - incident-related capacity restrictions - individual travel time - number of accidents - emissions - fuel consumed - travel time savings
ATMS4 Freeway Control	<ul style="list-style-type: none"> - traffic flows/volumes/number of vehicles - lane carrying capacity - volume to capacity ratio - vehicle hours of delay - queue lengths - incident-related capacity restrictions - individual travel time - number of accidents - emissions - fuel consumed - travel time savings

Market Packages	Performance Criteria
High Priority (cont'd)	
ATMS5 HOV Lane Management	<ul style="list-style-type: none"> - average vehicle occupancy - use of transit and HOV modes - individual travel time - vehicle miles traveled - emissions - fuel consumed
ATMS6 Traffic Information Dissemination	<ul style="list-style-type: none"> - vehicle hours of delay - individual travel time - exposure to accidents and incidents - timeliness and accuracy of traveler information - availability of traveler information
ATMS7 Regional Traffic Control	<ul style="list-style-type: none"> - traffic flows/volumes/number of vehicles - lane carrying capacity - volume to capacity ratio - vehicle hours of delay - queue lengths - incident-related capacity restrictions - infrastructure operating costs - individual travel time - number of accidents - emissions - fuel consumed - travel time savings - integration of transportation systems
ATMS8 Incident Management System	<ul style="list-style-type: none"> - incident-related capacity restrictions - congestion and incident-related delay - number of accidents - exposure to accidents and incidents - number of incidents/accidents/injuries/fatalities - time between incident/notification/response/ clearance - operating costs savings
ATMS18 Road Weather Information System	<ul style="list-style-type: none"> - Number of incidents/accidents/injuries/fatalities - Information gathering costs - Timeliness and accuracy of traveler information
APTS1 Transit Vehicle Tracking	<ul style="list-style-type: none"> - vehicle operating costs - individual travel time - travel time savings - operating cost savings - information-gathering costs - integration of transportation systems - transit service availability
APTS2 Transit Fixed-Route Operations	<ul style="list-style-type: none"> - use of transit and HOV modes - vehicle operating costs - number of trips taken - individual travel time - travel time savings - operating cost savings - manpower savings - vehicle maintenance and depreciation - integration of transportation systems - transit service availability

Market Packages	Performance Criteria
High Priority (cont'd)	
APTS8 Transit Traveler Information	<ul style="list-style-type: none"> - average vehicle occupancy - use of transit and HOV modes - number of trips taken - individual travel time - travel time savings - timeliness and accuracy of traveler information - availability of traveler information - ease of use of traveler information
ATIS1 Broadcast Traveler Information	<ul style="list-style-type: none"> - vehicle hours of delay - number of trips taken - individual travel time - congestion and incident-related delay - travel time savings - timeliness and accuracy of traveler information - availability of traveler information - ease of use of traveler information
ATIS2 Interactive Traveler Information	<ul style="list-style-type: none"> - vehicle hours of delay - number of trips taken - individual travel time - congestion and incident-related delay - travel time savings - timeliness and accuracy of traveler information - availability of traveler information - ease of use of traveler information
ATIS3 Autonomous Route Guidance	<ul style="list-style-type: none"> - vehicle hours of delay - individual travel time - travel time savings - timeliness and accuracy of traveler information
ATIS7 Yellow Pages and Reservation	<ul style="list-style-type: none"> - availability of traveler information - ease of use of traveler information
AVSS11 Automated Highway System	<ul style="list-style-type: none"> - infrastructure operating costs - vehicle operating costs - operating costs savings - vehicle maintenance and depreciation - integration of transportation systems
CVO1 Fleet Administration	<ul style="list-style-type: none"> - number of trips taken - travel cost - vehicle miles traveled - operating cost savings - manpower savings - commercial vehicle travel times
AD1 ITS Data Mart	<ul style="list-style-type: none"> - operating costs savings - information gathering costs - integration of transportation systems - timeliness and accuracy of traveler information
EM1 Emergency Response	<ul style="list-style-type: none"> - time between incident/notification/response/ clearance - medical costs - insurance costs
EM2 Emergency Routing	<ul style="list-style-type: none"> - time between incident/notification/response/ clearance - medical costs - insurance costs

Market Packages	Performance Criteria
High Priority (cont'd)	
EM3 Mayday Support	<ul style="list-style-type: none"> - time between incident/notification/response/ clearance - medical costs - insurance costs
Medium Priority	
ATMS2 Probe Surveillance	<ul style="list-style-type: none"> - operating costs savings - information-gathering costs
ATMS9 Traffic Forecast and Demand Management	<ul style="list-style-type: none"> - traffic flows/volumes/number of vehicles - vehicle hours of delay - number of trips taken - operating cost savings - information gathering costs - availability and quality of planning data
ATMS11 Emissions Monitoring and Management	<ul style="list-style-type: none"> - emissions - fuel consumed
ATMS12 Virtual TMC and Smart Probe Data	<ul style="list-style-type: none"> - congestion and incident-related delay - exposure to accidents and incidents - time between incident/notification/response/ clearance - operating costs savings - information gathering costs
ATMS13 Standard Railroad Grade Crossing	<ul style="list-style-type: none"> - number of incidents/accidents/injuries/fatalities - medical costs - property damage
ATMS17 Reversible Lane Management	<ul style="list-style-type: none"> - traffic flows/volumes/number of vehicles - vehicle hours of delay - individual travel time - emissions - fuel consumed - travel time savings
APTS3 Demand Response Transit Operations	<ul style="list-style-type: none"> - number of trips taken - individual travel time - operating cost savings - transit service availability
APTS4 Transit Passenger and Fare Management	<ul style="list-style-type: none"> - operating cost savings - administrative and regulatory cost savings - information gathering costs - availability and quality of planning data
APTS5 Transit Security	<ul style="list-style-type: none"> - number of security incidents - time between incident/notification/response/ clearance
APTS6 Transit Maintenance	<ul style="list-style-type: none"> - operating cost savings - vehicle maintenance and depreciation
APTS7 Multi-modal Coordination	<ul style="list-style-type: none"> - use of transit and HOV modes - intermodal transfer time - integration of transportation systems
CVO9 CVO Fleet Maintenance	<ul style="list-style-type: none"> - number of trips taken - operating cost savings - vehicle maintenance and depreciation - commercial vehicle permit and credential violations
ATIS4 Dynamic Route Guidance	<ul style="list-style-type: none"> - vehicle hours of delay - individual travel time - travel time savings - timeliness and accuracy of traveler information

Market Packages	Performance Criteria
Medium Priority (cont'd)	
ATIS5 ISP Based Route Guidance	<ul style="list-style-type: none"> - vehicle hours of delay - individual travel time - travel time savings - timeliness and accuracy of traveler information
ATIS6 Integrated Transportation Management/Route Guidance	<ul style="list-style-type: none"> - traffic flows/volumes/number of vehicles - volume to capacity ratio - vehicle hours of delay - queue lengths - number of stops - incident-related capacity restrictions - individual travel time - number of accidents - emissions - fuel consumed - travel time savings
ATIS8 Dynamic Ridesharing	<ul style="list-style-type: none"> - use of transit and HOV modes - vehicle miles traveled - emissions - fuel consumed
CVO10 HAZMAT Management	<ul style="list-style-type: none"> - medical costs - property damage
AD2 ITS Data Warehouse	<ul style="list-style-type: none"> - information gathering costs - timeliness and accuracy of traveler information - availability of traveler information
AD3 ITS Virtual Data Warehouse	<ul style="list-style-type: none"> - information gathering costs - timeliness and accuracy of traveler information - availability of traveler information
Low Priority	
ATMS10 Electronic Toll Collection	<ul style="list-style-type: none"> - individual travel time - travel time savings - operating costs savings - manpower savings
ATMS14 Advanced Railroad Grade Crossing	<ul style="list-style-type: none"> - number of incidents/accidents/injuries/fatalities - medical costs - property damage
ATMS15 Railroad Operations Coordination	<ul style="list-style-type: none"> - intermodal transfer time - operating cost savings
ATMS16 Parking Facility Management	<ul style="list-style-type: none"> - individual travel time
ATMS19 Regional Parking Management	<ul style="list-style-type: none"> - individual transfer time
ATIS9 In Vehicle Signing	<ul style="list-style-type: none"> - individual travel time - number of accidents - exposure to accidents and incidents
AVSS1 Vehicle Safety Monitoring	<ul style="list-style-type: none"> - number of incidents/accidents/injuries/fatalities - time between incident/notification/response/ clearance - medical costs - insurance costs
AVSS2 Driver Safety Monitoring	<ul style="list-style-type: none"> - number of incidents/accidents/injuries/fatalities - medical costs - property damage - insurance costs

Market Packages	Performance Criteria
Low Priority (cont'd)	
AVSS3 Longitudinal Safety Monitoring	<ul style="list-style-type: none"> - number of incidents/accidents/injuries/fatalities - medical costs - property damage - insurance costs
AVSS4 Lateral Safety Warning	<ul style="list-style-type: none"> - number of incidents/accidents/injuries/fatalities - medical costs - property damage - insurance costs
AVSS5 Intersection Safety Warning	<ul style="list-style-type: none"> - congestion and incident-related delay - number of incidents/accidents/injuries/fatalities - medical costs - insurance costs
AVSS6 Pre-Crash Restraint Deployment	<ul style="list-style-type: none"> - medical costs - insurance costs
AVSS7 Driver Visibility Improvement	<ul style="list-style-type: none"> - number of incidents/accidents/injuries/fatalities - medical costs - property damage - insurance costs
AVSS8 Advanced Vehicle Longitudinal Control	<ul style="list-style-type: none"> - number of incidents/accidents/injuries/fatalities - medical costs - property damage - insurance costs
AVSS9 Advanced Vehicle Lateral Control	<ul style="list-style-type: none"> - number of incidents/accidents/injuries/fatalities - medical costs - property damage - insurance costs
AVSS10 Intersection Collision Avoidance	<ul style="list-style-type: none"> - congestion and incident-related delay - number of incidents/accidents/injuries/fatalities - medical costs - insurance costs
CVO2 Freight Administration	<ul style="list-style-type: none"> - operating cost savings - manpower savings
CVO3 Electronic Clearance	<ul style="list-style-type: none"> - operating cost savings - manpower savings - commercial vehicle travel times
CVO4 CV Administrative Processes	<ul style="list-style-type: none"> - operating cost savings - manpower savings - commercial vehicle permit and credential violations
CVO6 Weigh-In-Motion	<ul style="list-style-type: none"> - individual travel time - travel time savings - operating cost savings - manpower savings
CVO7 Roadside CVO Safety	<ul style="list-style-type: none"> - number of incidents/accidents/injuries/fatalities - commercial vehicle permit and credential violations
CVO8 On-board CVO Safety	<ul style="list-style-type: none"> - number of incidents/accidents/injuries/fatalities - medical costs - property damage - insurance costs

5.0 CONCLUSION

The development of the Tahoe Gateway Counties ITS Strategic Deployment Plan is a process. Key elements of this process are the Working Papers that document the accomplishments and progress during the project activities. To date, the bolded tasks below have been accomplished and this document completes the third working paper.

- **Task 1: Develop Initial Outreach Material**
- **Task 2: Develop Steering Committee**
- **Task 3: Define and Inventory Existing and Planned Transportation System and Current and Planned Technology Uses**
- **Task 4: Define Existing and Future Transportation-related Deficiencies and Opportunities (Working Paper #1 – June 2000)**
- **Task 5: Identify User Service Objectives and ITS Vision (Working Paper #2 – April 2001)**
- **Task 6: Establish Performance Criteria**
- **Task 7: Identify and Screen Market Packages (Working Paper #3)**
- Task 8: Develop ITS Market Package Plan
- Task 9: Identify and Analyze Functional Areas (Report #1)
- Task 10: Define Market Package Functional requirements and Develop a Regional Architecture
- Task 11: Identify and Screen Technology Options (Working Paper #4)
- Task 12: Develop Strategic Deployment Plan, Executive Summary, and Outreach Materials (Report #2)
- Task 13: Administrative Tasks

Project stakeholders should have a thorough understanding of the existing transportation conditions, the regional transportation needs that relate to potential ITS solutions, the ITS User Services that address those needs, the performance criteria that can be used to assess progress toward regional ITS goals and objectives, and the Market Packages that are mapped to the selected User Services. The next step in the process is to develop a Market Package Plan. This will build upon both the performance criteria and the Market Package selection, by developing a strategy that ensures the effective application of them.

The Market Packages selected in this document are inter-related and are also dependent on external factors of the Tahoe Gateway Region, particularly the communications infrastructure and interaction of the jurisdictions. Additionally, the Market Packages provide different benefits and require varying levels of commitment, and are subject to different levels of market influence such as seasonal fluctuations in the need for weather information. It is the interaction of the various factors that effect Market Package priorities that are critical to the Market Package Plan.

Market Packages are simple, high-level descriptions of deployment-oriented elements of the ITS Architecture. The Market Package Plan will begin the analysis for various institutional, performance, benefits, cost and risk analyses and begin to develop a plan for the most effective process for planning their deployment.

LIST OF ACRONYMS

ADT	Average Daily Traffic
AADT	Annual Average Daily Traffic
ADMS	Archived Data Management Subsystem
AHS	Automated Highway System
ATIS	Advanced Traveler Information System
ATM	Asynchronous Transfer Mode
AVI	Automatic Vehicle Identification
AVL	Automatic Vehicle Location
CAATS	California Alliance for Advanced Transportation Systems
Caltrans	California Department of Transportation
CalACT	California Association for Coordinated Transportation
CCTV	Closed Circuit Television
CCJPA	Capitol Corridor Joint Powers Authority
CDF	California Department of Forestry
CDPD	Cellular Distributed Packet Data
CHP	California Highway Patrol
CMS	Changeable Message Sign
CNG	Compressed Natural Gas
CO	County
COATS	California/Oregon Advanced Transportation Systems
CTC	County Transportation Commission
CTSA	Consolidated Transportation Services Agency
CVISN	Commercial Vehicle Information Systems and Networks
CVO	Commercial Vehicle Operations
DMS	Dynamic Message Sign
DRM	Disaster Response and Management
DSL	Digital Subscriber Link
ED	El Dorado County
EB	East Bound
EDP	Early Deployment Plan
EMS	Emergency Medical Service
EMT	Emergency Medical Technician
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FM	Frequency Modulation
GCS	Gold County Stage
GIS	Geographic Information Systems
GPS	Geographic Positioning Satellites

HAR	Highway Advisory Radio
Hazmat	Hazardous Material
HOV	High Occupancy Vehicle
HRI	Highway Rail Intersection
Hwy	Highway
ICS	Incident Command System
ISP	Information Service Provider
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITS	Intelligent Transportation Systems
KP-RA	King Pin to Rear Axle
MCO	Maintenance and Construction Operations
MMA	Meyer, Mohaddes Associates
MOU	Memorandum of Understanding
MP	Mile Post
NAFTA	North American Free Trade Agreement
NB	North Bound
NDOT	Nevada Department of Transportation
NEV	Nevada County
NV	State of Nevada
NWS	National Weather Service
OES	Office of Emergency Services
Op.	Operational
PCT	Placer County Transit
PCTPA	Placer County Transportation Planning Agency
PLA	Placer County
RADAR	Roseville Area Dial-a-Ride
RM	Ramp Meter
Rte	Route
RTMC	Regional Transportation Management Center
RTP	Regional Transportation Plan
RWIS	Road Weather Information Systems
SACOG	Sacramento Area Council of Governments
SB	South Bound
SDE	Safe Driving Enforcement
SDP	Strategic Deployment Plan
SEMS	Standardized Emergency Management System
SOC	Satellite Operations Center
SR	State Route
STAA	Surface Transportation Assistance Act
STAGE	South Tahoe Area Ground Express
STIP	State Transportation Improvement Program
TART	Tahoe Area Regional Transit
TDM	Transportation Demand Management
TEA-21	Transportation Equity Act for the 21st Century

TI	Traveler Information
TMC	Transportation Management Center
TMS	Traffic Monitoring Station
TNT/TMA	Truckee North Tahoe Transportation Management Agency
TPA	Transportation Planning Agency
TRPA	Tahoe Regional Planning Agency
USDOT	United States Department of Transportation
USFS	United States Forest Service
VMS	Variable Message Sign
VMT	Vehicle Miles Traveled
WB	West Bound
WIM	Weigh-in-Motion
YATI	Yosemite Area Traveler Information