Alaska Iways Architecture Update

Task 2 (Part 2 of 6):
Chapter 2: User Services

FINAL

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TABLE OF CONTENTS

LIST OF TABLES

2 USER SERVICES

2.1 Introduction

The Alaska Department of Transportation and Public Facilities (ADOT&PF) is continually looking at ways to improve the efficiency, safety, and reliability of Alaska's transportation system. This effort includes the application of advanced communications, control, and information processing technologies including computer hardware and software at locations throughout the state. When used together, technologies like these forms what is commonly referred to as an Intelligent Transportation System (ITS). To ensure that these relatively expensive technologies are implemented in an effective, coordinated, and cost-effective fashion the ADOT&PF developed the Alaska Statewide ITS or Iways Architecture. Iways is the state adopted label for ITS that stands for intelligence, integration, internet and information (the "I") for air, sea, and roadways (the "ways").

The following six chapters comprise the Alaska Iways Architecture.

- Chapter 1: User Needs
- Chapter 2: User Services
- Chapter 3: ITS Long-Range Vision
- Chapter 4: Operational Concept
- Chapter 5: Physical ITS Architecture
- Chapter 6: Implementation Plan

Each chapter correlates to one of the six main phases that were undertaken to develop Alaska's Iways Architecture. The process undertaken to develop Alaska's Iways Architecture began by identifying transportation user needs and concluded with the Implementation Plan.

In 2008, the Alaska Iways Architecture, including this User Services Chapter, was updated to capture new systems and needs that were not previously captured in the initial Alaska Iways Architecture development. This update ensures that the Alaska Iways Architecture remains an up-to-date, useful document that evolves with changes to transportation needs and infrastructure.

2.1.1 Purpose

The Alaska Iways Program is key in addressing Alaska's transportation challenges. To develop a plan that proves useful to ADOT&PF and its stakeholders, transportation user needs must be understood so the Alaska Iways Program can respond to them. Chapter 1 documents Alaska's transportation user needs that relate to operating and managing transportation systems in Alaska. Although these identified needs are summarized in this chapter, its primary purpose is to help move to the next step in the process - identifying ITS user services from the National ITS Architecture that can be deployed to meet the identified transportation user needs.

2.1.2 Chapter Organization

Section 2 summarizes the transportation user needs identified by ITS stakeholders in Alaska.

Section 3 identifies and describes National ITS Architecture User Services that respond to Alaska's transportation user needs identified in Section 2.

Section 4 identifies the role of user services in the Alaska Iways Architecture Program development.

Section 5 lists the sources used in developing this chapter.

Appendix A describes transportation user needs in Alaska for which ITS solutions are not necessarily applicable.

2.2 Summary of Transportation User Needs

Transportation user needs should be understood before needs are mapped to National ITS Architecture user services. Stakeholder interviews and workshops helped identify Alaska's transportation user needs, which were then classified into the following categories:

- ADOT&PF Operations and Management
- Transit Management and Operations
- Rail Operations
- Incident Management and Emergency Response
- Traveler Information
- Traveler Safety and Infrastructure Security
- Data Collection and Archiving
- Statewide Traffic Operations Center and Interaction with Other Agencies
- Network Services and Communication
- Traffic Management and Operations
- Commercial Vehicle Operations
- Institutional Coordination
- Airside Operations
- Port Operations and Security

With the exception of Institutional Coordination and Airside Operations, the categories listed above and the needs associated with each are described in greater detail in the following sections.

2.2.1 ADOT&PF Operations and Management

ITS related technology addresses the following types of internal ADOT&PF operations and management needs:

- Communications and networking
- Decision support systems
- Equipment enhancements

These needs are briefly discussed below. A more detailed and complete discussion of user needs can be found in Chapter 1 (User Needs).

Communications and Networking Needs

Communications and networking are critical for providing safe and efficient transportation operations and management. The identified transportation user needs related to communications and networking include:

- Inter-agency communications and integration
- Network efficiency
- Data and application sharing
- Communications reliability and security

Decision Support Needs

The ability to automatically collect and process large amounts of real-time data is key in providing safe and efficient transportation services because it helps determine where, when, and how operational strategies should be applied. This is generally referred to as decision support, and distinguishes ITS from traditional practices. Decision support needs that apply to transportation operations across the State are described below.

Weather Information

National Weather Service (NWS) data is not provided at the microclimate level, but would be useful in supporting operational decisions and providing travelers with detailed weather information.

Regional Transportation Asset Inventory

ADOT&PF needs an asset management system or other means to inventory regional transportation assets (e.g., traffic signals, signs, communications infrastructure, etc.). Such an inventory will provide quick identification of regional assets available to implement transportation management and operational strategies.

On-Board Pavement Temperature Detection

There is a need to measure pavement temperatures remotely, using equipment installed on a maintenance vehicle. This helps identify roads that need treatment, and the type and amount of chemicals to apply. On-board sensors could also be used to develop pavement temperature profiles for thermal roadway mapping.

Avalanche Prediction and Detection

Systems and sensors that detect and predict avalanches are desired to improve safety and mobility in mountain passes.

Bridge Scour Inspection and Detection

ADOT&PF needs to remotely monitor and assess damage caused to bridges as a result of bridge scour. Bridge scour results when sediments around bridge piers are washed away by water flow, particularly during high water events. The loss of sediments can weaken the bridge's foundation and ultimately cause its failure. Remotely monitoring the effects of bridge scour will reduce the cost and effort needed to conduct manual inspections of bridges across the state.

Automatic Vehicle Location and Computer Aided Dispatch

There is a need to integrate an automatic vehicle location (AVL) and a Computer-Aided Dispatch (CAD) system. This could enhance the communications system and make maintenance and emergency operations more efficient.

Environmental Event Detection and Infrastructure Monitoring

ADOT&PF and its emergency management partner agencies need to detect environmental events that have the ability to disrupt safety and mobility at locations throughout the state. The ability to sense seismic damage remotely is particularly important in pinpointing infrastructure that may be damaged and as a result ensuring traveler safety in remote areas. To further improve safety,

ADOT&PF and partner agencies need to implement systems and technologies that allow the agency to remotely monitor Alaska's critical infrastructure, including but not limited to roadways, bridges, tunnels, ports and pipelines. Monitoring infrastructure helps assess the condition of infrastructure and aids response when environmental events occur. Infrastructure monitoring also serves as a means to secure the State's infrastructure from other non-environmental events.

Integrated Geographic Information System Archive

A multi-agency GIS archive is desired to enable agencies to use and share existing GIS data.

Remote Video Monitoring

ADOT&PF and its partner agencies desire to deploy video cameras at strategic locations to remotely monitor field conditions and verify that ITS devices are working correctly. Cameras can be installed along the roadway and in mountain passes to monitor areas where avalanches frequently occur. By monitoring areas frequently impacted by avalanches or other natural events, operators can quickly determine the extent of damage caused by the natural event and determine the specific resources that need to be dispatched to clear the area. Similarly, cameras can be installed on a temporary basis near work zones to determine the impact that work zones have on nearby traffic.

Equipment Enhancements

Equipment improvements could be the best way to enhance operations and maintenance in several important areas. The transportation user needs addressed through equipment enhancements are discussed below.

Snow Plow In-Vehicle Guidance

Technologies need to be deployed to improve operator visibility of roadways so snow removal can be completed in a fast and safe manner.

Mobile Data Terminals

Communications platforms, similar to laptops, need to be installed within maintenance vehicles to allow field staff to quickly send and receive information from the field. Similar devices already exist in some emergency response vehicles; however, the number of devices currently installed in emergency vehicles is not considered sufficient. Therefore, consideration should be made to install mobile data terminals on maintenance vehicles as well as a larger number of emergency vehicles.

Bridge Deicing

Because ice often forms on bridge decks even when it does not form on adjacent roads, ADOT&PF maintenance personnel have expressed the need to quickly determine when conditions are favorable for bridge icing and to be able to implement strategies immediately to prevent icing.

Work Zone Safety Monitoring and Alerting

ADOT&PF staff cited the need for increased work zone safety. Enhanced work zone safety has the potential to benefit travelers, ADOT&PF maintenance staff, and contractors involved in construction and maintenance work.

Fog Detection and Alerting

Systems and sensors that detect fog and provide alerts to motorists are needed to improve traveler safety.

Snow Plow and Snow Blower Tracking and Monitoring

ADOT&PF desires to track and monitor snow removal vehicles to improve the efficiency of snow removal operations. Snow plow and snow blower monitoring and tracking allows operators to easily determine the roadways that are treated, giving them the ability to re-position equipment to treat roadways that still require treatment.

2.2.2 Transit Management and Operations

Transit operators identified fleet management and real-time traveler information as primary needs associated with transit operations. A global positioning system (GPS)-based Automated vehicle Location (AVL) system and an automatic passenger count (APC) system were also deemed useful.

Ridership Statistics Collection and Reporting

Systems are needed to gain a better understanding of transit ridership levels, using that information to make better informed decisions regarding the use and purchase of transit assets.

Transit Vehicle Tracking

AVL equipment needs to be installed on transit vehicles to track and locate them in real-time. Data received from this equipment can be used to determine deviations in transit schedules and routes, locate and replace damaged or severely delayed vehicles and analyze collected data to improve overall transit operations.

Transit Vehicle Estimated Arrival

Transit agency stakeholders have a desire to provide fixed route transit riders with estimated transit vehicle arrival times so they can make better decisions before they leave their points of origin or while they wait at transit stops. Similarly, a need exists to inform para-transit riders that a para-transit vehicle will arrive soon to pick them up, providing transit patrons time to get ready before a para-transit vehicle arrives at their location. This reduces delays and improves the efficiency of para-transit operations.

Transit Vehicle Based Roadside Monitoring

Stakeholders desire to enhance the functionality of video cameras installed on transit vehicles to enable operators to remotely monitor roadway and weather conditions outside equipped transit vehicles. Cameras with pan/tilt/zoom capabilities offer the ability to determine the extent and nature of incidents and based on these visual observations make more informed decisions regarding whether or not to implement temporary changes to fixed route operations.

Transit Vehicle Diagnostic Monitoring and Reporting

Transit agency stakeholders desire to monitor, collect and process vehicle diagnostic information to identify problems and implement corrective procedures in a more timely fashion. Specifically, stakeholders would like to collect real-time tire pressure and brake heat measurements.

2.2.3 Rail Operations

For rail operations, there is a need for improved safety at Highway-Rail Intersections (HRI) and improved railway surveillance. The Alaska Railroad Corporation would like to identify rockslides and avalanches, and determine track conditions automatically.

HRI safety is a primary concern in Alaska. The lack of power supply at many locations complicates the issue of HRI safety and poses a problem for implementing traditional strategies and ITS solutions.

2.2.4 Incident Management and Emergency Response

The transportation user needs related to incident management and emergency response include:

Incident Detection and Response

Given the long distances between Alaskan communities and the harsh physical environment, timely incident detection is crucial. Stranded motorists in remote areas also need to know that people are aware of their situation and help is on the way. There is also a need for enhanced coordination and data exchange between responders. Stakeholder need for incident management and emergency response extends to Alaska's waterways, where incidents like oil spills may occur.

Roadside Emergency Notification

To improve incident response Alaska's ITS stakeholders desire systems that allow motorists to report emergencies and request assistance from the roadside. Roadside call boxes were identified as a possible solution that satisfies this need.

In Vehicle Emergency Notification and Mayday Support

Similar to roadside devices mentioned above, stakeholders desire connections with in-vehicle emergency alerting systems that can be manually or automatically activated when motorists need assistance. Automated in-vehicle systems may be particularly beneficial for incident response when emergencies impair motorists' ability to manually summon help.

2.2.5 Traveler Information

Accurate and reliable traveler information can enhance transportation system safety and efficiency. The following transportation user needs relate to providing traveler information.

Weather Information

Multiple ADOT&PF divisions report a need for accurate weather information that can be integrated from statewide sources and then disseminated to travelers.

Alaska Marine Highway System (AMHS) Information

The AMHS has three main needs: (1) an automated reservation system; (2) the ability to track vessel locations, and (3) ability to provide travelers with real-time arrival/departure information.

Tourist-Related Information

Stakeholders stated the need to disseminate traveler information to tourists as a way to improve transportation system efficiency and level of service. This information includes: real-time ferry schedules, community festivals, lodging and restaurants (including directions), wildlife viewing, fishing and hunting information, and educational and cultural activities.

Statewide Traveler Information

Alaskan residents and visitors need improved and timely traveler information. Traveler's needs focus on road conditions and closures, construction and maintenance activities, incidents, and traffic congestion (in urban areas).

2.2.6 Traveler Safety and Infrastructure Security

In response to the events of September 11th, 2001, Alaska ITS stakeholders took steps to ensure the safety of travelers and security of infrastructure in Alaska. Due to Alaska's relative size, climate and low population density, ensuring traveler safety and securing Alaska's infrastructure can be

challenging when compared to other states. Therefore, quickly and accurately detecting incidents is a primary need.

In addressing the need of improved traveler safety, stakeholders have identified the implementation of mayday and/or automated crash notification systems as possible solutions. Additionally, a Computer Aided Dispatch (CAD) system could enhance emergency response operations and would give the state police and ADOT&PF a platform to exchange information and coordinate operations. Likewise, an AVL system could enhance the operation and management of Alaska's transportation systems. It would enable ADOT&PF to effectively manage their fleet of vehicles, and dispatch and track vehicles. This would reduce operating costs and response time, and enhance operational efficiency.

In addressing the need to secure Alaska's infrastructure stakeholders identified the possibility of stepping up security along Alaska's border with Canada to prevent the illegal entry of individuals and weapons into Alaska. Enhancing the security of critical infrastructure including but not limited to the Trans-Alaska Pipeline, the Valdez Port and Transportation Command Centers was also considered to be important.

2.2.7 Data Collection and Archiving

Operating agencies need accurate, reliable planning and operational data. Specific data collection and archiving needs are summarized below.

Data Coverage

Interviewees acknowledged the need for additional data collection and archiving. Additional data would be useful in supporting both operational (e.g., incident detection) and planning decisions. One identified need pertaining to this area is the need for additional traffic counts and classification data from remote areas of the state. The need for this additional data stems from the inability to collect data due to lack of power in many areas of the state. To adequately collect needed data, and expand coverage, the lack of power and communications must be addressed first.

Data Accuracy and Timeliness

The ability to provide decision support depends on the availability of accurate, real-time data on variables such as temperatures and pavement condition. However, ADOT&PF staff noted gaps in the existing data collection and transmission infrastructure. This need is particularly pronounced on mountain passes where road weather information is lacking.

Crash Data

Crash data are needed to identify and address high-accident locations. Currently, a timely and uniform method for collecting, processing, and distributing such data does not exist.

Origin-Destination Data

Adequate origin-destination data, needed for modeling purposes, is not currently available.

2.2.8 Statewide Traffic Operations Center and Multi-Agency Coordination

A Traffic Operations Center (TOC) provides the opportunity to coordinate and integrate transportation operations on regional and statewide levels. A TOC generally provides the following functions: control of field devices, point of data collection and processing, information dissemination to other stakeholders and the general public, and a mechanism to coordinate operations involving multiple stakeholders. Summarized below are identified transportation user needs as they relate to a statewide TOC and interagency coordination.

Integration and Coordination of Transportation Systems Operations

Interviewees noted a need to integrate communication between the ADOT&PF and other regional stakeholders. A statewide TOC would provide a common platform accessible by multiple agencies.

Traffic Signal Operations

Interviewees cited a need to notify operations staff of traffic signal malfunctions. Better communications between local law enforcement and ADOT&PF could help address this need.

2.2.9 Network Services and Communication

Although network services and communications needs are not ITS solutions, it is important to discuss them because communications are critical in providing ITS services. The identified transportation user needs related to network services and communications are summarized below.

Data Latency

Interviewees reported that latency (slow data movement) currently hampers their operational efficiency.

Coordinated LAN Usage

Better LAN use coordination was mentioned as a need in improving operational efficiency.

Power Source Reliability

Interviewees cited power outages, usually mechanical in nature, as an issue that needs to be addressed. Similarly, the lack of power in remote areas of the State is also a primary need. ADOT&PF, has recently installed four power modules to support RWIS operations in areas there is no direct power.

Coordinated Maintenance Operations

ADOT&PF maintenance staff cited a need to connect remote maintenance and operations sites in order to improve service and operational efficiency. Many existing ADOT&PF links to remote maintenance areas also need to be shared with other agencies.

Communications Gaps and Coverage

Gaps in cell phone and POTS coverage exist throughout the State of Alaska. These gaps in coverage make it difficult to communicate from remote areas of the state. It also makes it difficult to provide communications to key roadside infrastructure, like RWIS and DMS. Due to the lack of available communications, ADOT&PF as well as other state agencies must use any communications means available. This can be expensive and/or require significant resources searching for other effective communications alternatives. Consideration should be given to communications coverage throughout the state so communication can be improved and occur more effectively.

2.2.10 Traffic Management and Operations

Traffic management and operations needs can be divided into three groups. First, traffic signals need to be remotely operated and monitored to reduce the impacts of outages and malfunctions. Second, overall vehicle delay needs to be reduced with emphasis on providing more prompt and reliable transit service and emergency response. Last, systems and technologies are needed to improve data collection efforts and to gather and store information on deployed assets. Specific traffic management and operations needs identified by stakeholders are summarized below.

Traffic Signal System Control

ADOT&PF envisions a larger percentage of traffic signals operating under some form of centralized control. In addition, ADOT&PF envisions traffic signal systems that share information and data among each other and with other transportation systems. Data from traffic signal systems can augment data collected by traffic data and other monitoring systems.

Traffic Signal Priority for Transit

Stakeholders desire transit priority systems as a means to improve current transit operations and to promote transit use in cities throughout the state. Transit priority systems allow equipped transit vehicles to proceed through signalized intersections with little or no delay.

Traffic Signal Pre-emption for Emergency Response

Similar to traffic signal priority systems for transit, traffic signal pre-emption systems are desired to reduce emergency response times. Unlike traffic signal priority systems which reduce the time vehicles must wait at traffic signals, pre-emption systems pre-empt existing traffic signal timing patterns to give a green signal indication to emergency vehicles as they approach the intersection. This allows the emergency vehicle to proceed through the intersection without slowing or stopping.

Inventory of Traffic Signals

ADOT&PF and partner stakeholders envision a system that allows them to inventory and store information on traffic signals deployed throughout the State. Such a system will improve agency maintenance activities and day-to-day operations by allowing authorized individuals to view/download characteristics of a specific traffic signal, including but not limited to; equipment installation dates, a historical log of completed maintenance activities, and the names and contact information of individuals who've installed or maintained equipment. Such a system could exist within a more robust system that contains information on all transportation assets located in the state.

Automated Traffic Data Collection and Archival

The number of automated traffic data recorders deployed throughout the state is considered insufficient. Stakeholders want to deploy additional data recorders and would like to integrate the data collected by this equipment to develop a more comprehensive and robust set of traffic data. Synthesized traffic data may eventually be used as input into transportation planning and engineering processes and if provided on a real-time basis, to improve incident detection, notification and response. To satisfy this need, the lack of power in certain areas of the state must be first addressed.

2.2.11 Commercial Vehicle Operations

Commercial vehicles are significant users of Alaska's transportation system. The identified transportation user needs related to commercial vehicle operations are summarized below.

Credentials Administration

Currently, two separate agencies are responsible for maintaining different types of data for commercial vehicles. Commercial vehicles inspectors need a centralized data repository that contains or allows access to all state maintained information on commercial vehicles, including vehicle credentials and permitting, driver credentials, and information on carrier safety.

Electronic Screening

There is a need to increase the effectiveness of size/weight and safety enforcement by focusing staff resources on high-risk carriers, vehicles and drivers. This can be accomplished in part by providing a means for safe and legal vehicles to legally bypass open weigh stations.

On-line Permitting

A website that allows commercial vehicle operators to electronically submit and receive information on oversize and overweight permits is desired.

Enhanced Commercial Vehicle Enforcement

To enhance the enforcement of Commercial Vehicle Operations (CVO) and to make them safer, stakeholders want to implement wireless communication technologies and surveillance devices to reduce the total number of officers needed to enforce CVO laws. With the deployment of wireless technologies and surveillance devices, officers will be able to visually monitor activity that occurs at weigh stations from position located up stream of the weigh station. This provides officers the ability to cite drivers of violating vehicles without having to rapidly accelerate and/or travel at speeds in excess of the posted speed limit.

Freight Tracking and Monitoring

Commercial vehicles and the freight they haul need to be monitored and tracked to determine unauthorized breaches in cargo and deviations in routes. This will help reduce incident response times and maybe useful in detecting unplanned activity.

Enhanced Roadside Safety Inspection

Roadside CVO inspectors need to enter the results of safety inspections and access commercial vehicle safety, credential, and permitting information from the field. This information will help improve the effectiveness and efficiency of conducting safety inspections.

2.2.12 Institutional Coordination

Some of the transportation user needs associated with institutional coordination are summarized below.

Implementing a Transportation Operations Center (TOC)

A TOC would help integrate the operations of several transportation systems and provide a platform for integrating communication between ADOT&PF and regional stakeholders.

Traffic Signal Operation

Local police agencies need to be able to communicate with ADOT&PF or the Municipality of Anchorage when signals go on flash mode, to reduce response time, help reduce the impacts of traffic signal failure, and enhance the system's safety.

Communication between ADOT&PF and Visitor Associations and Tourism Groups

Communication could be improved to foster safer, more efficient travel.

WAN Usage

WAN usage needs to be improved. As the system currently operates, an agency with smaller or less critical communication needs than others can use a majority of the system capacity.

Agency Liaisons

Operations could be improved by bringing together designated liaisons from each involved agency to work together on institutional, technical and operational issues.

2.2.13 Airside Operations

The transportation user needs identified for airside operations relate to:

- Linking air travel schedules with other visitor-related services
- Providing certified weather stations to support flight operations, especially at remote airfields
- Identifying the presence of wildlife that wander onto runways

2.2.14 Port Operations and Security

The transportation user needs identified for ports operations relate to:

- Tracking vessels in and around ports and within shipping lanes
- Verifying vessel compliance with shipping plans
- Improving access control systems to manage people entering ports more effectively

2.3 Tracing Transportation User Needs to User Services

After transportation user needs were identified, user services to address these needs (as articulated in the National ITS Architecture) were identified for Alaska. However, given Alaska's uniqueness and diverse transportation user needs, some needs are not traceable to user services specified in the National ITS Architecture. In these situations, the project team defines unique user services that may, at some point, fit into the National ITS Architecture framework.

2.3.1 User Services Definition

User services are what ITS should do from the user's perspective. A broad range of users, including the traveling public and many types of system operators need to be considered. The U.S. Department of Transportation and ITS America have jointly defined 33 user services. The user services concept allows system or project definition to begin by establishing high-level services that need to be provided to address identified problems and needs. New or updated user services may be added to the National ITS Architecture in the future.

2.3.2 Correlating Transportation User Needs with User Services

Each user service identified on the following page was evaluated in the context of how it would potentially meet the transportation user needs identified by stakeholders in Alaska. Identification of user services is important as an initial step in helping stakeholders identify the high-level services that will address the region's transportation needs and goals.

For more information on the National ITS Architecture User Services see http://itsarch.iteris.com/itsarch/html/user/userserv.htm.

Table 2-1:
User Needs to User Service Correlation

Transportation Need Group	Transportation Need	Corresponding User Service(s)
ADOT&PF Operations and Management	Micro-climate level data	• Maintenance and Construction Operations
	Transportation Asset Inventory	• Archived Data
	On-Board Pavement Temperature Detection	• Maintenance and Construction Operations
	Avalanche Prediction and Detection	• Disaster Response and Evacuation
	Bridge Scour Inspection and Detection	• Maintenance and Construction Operations
	Maintenance Vehicle Location and Tracking	• Maintenance and Construction Operations
	Environmental Event Detection and Infrastructure Monitoring	• Maintenance and Construction Operations
	Remote Video Monitoring	• Traffic Control
	Snow Plow In-vehicle Guidance	• Vision Enhancement for Crash Avoidance
	Maintenance Vehicle On-board Data Terminals	• Maintenance and Construction Operations
	Bridge Deicing	• Maintenance and Construction Operations
	Work Zone Safety Monitoring and Alerting	• Maintenance and Construction Operations
	AMHS Automated Reservation System	• Pre-Trip Travel Information • Ride Matching and Reservation

Transportation Need Group	Transportation Need	Corresponding User Service(s)
	AMHS Automated Vessel Location and Tracking	• Public Transportation Management
	Fog Detection and Alerting	• Maintenance and Construction Operations
	Snow Plow Tracking and Monitoring	• Maintenance and Construction Operations
Transit Management and Operations	Ridership Statistics Collection and Reporting	• Electronic Payment Services
	Transit Vehicle Tracking	• Public Transportation Management
	Transit Vehicle Estimated Arrival	• Public Transportation Management
	Transit Vehicle Based Roadside Monitoring	• Public Travel Security
	Vehicle Diagnostic Monitoring and Reporting	• Public Transportation Management
Rail Operations	Highway-Rail Intersection Safety Improvement	• Highway-Rail Intersection
Incident Management and Emergency Response	Incident Detection and Response	• Incident Management • Emergency Vehicle Management • Emergency Notification and Personal Security • Hazardous Material Security and Incident Response
	Emergency Vehicle On-board Data Terminals	• Emergency Vehicle Management
	Roadside Emergency Notification	• Emergency Notification and Personal Security
	In-Vehicle Emergency Notification & Mayday Support	• Emergency Notification and Personal Security

Transportation Need Group	Transportation Need	Corresponding User Service(s)
Traveler Information	Traveler Information	• Pre-Trip Travel Information • En-Route Driver Information
	Traveler Information for Tourism	• Pre-Trip Travel Information • En-Route Driver Information • Traveler Services Information • Route Guidance
	Traveler Information for Commercial Vehicles	• Pre-Trip Travel Information • En-Route Driver Information
	Traveler Information for Public Transportation	• Pre-Trip Travel Information • En-Route Transit Information
Traveler Safety and Infrastructure Security	Agency Response Coordination and Plan Integration	• Disaster Response and Evacuation
	Data Collection and Archiving	• Archived Data
Data Collection and Archiving	Integrated Geographic Information System Archive	• Archived Data
	Inter-Agency Communication and Data Sharing Enhancements	• Pre-Trip Travel Information • En-Route Driver information • Archived Data • Travel Demand Management

Transportation Need Group	Transportation Need	Corresponding User Service(s)
Statewide TOC and Interaction with Other Agencies	Integrated Traffic Management and Operations Center	• Traffic Control
Traffic Management and Operations	Remote Traffic Signal System Control	• Traffic Control
	Traffic Signal Priority for Transit	• Traffic Control
	Traffic Signal Pre-emption for Emergency Response	• Traffic Control
	Inventory of Traffic Signals	• Traffic Control
	Traffic Station Sensor Deployment and Data Integration	• Traffic Control
Commercial Vehicle Operations	Electronic Screening	• Commercial Vehicle Electronic Clearance
	Enhanced CVO Enforcement	• Commercial Vehicle Electronic Clearance
	On-line Permitting	• Commercial Vehicle Administrative Processes
	Freight Tracking and Monitoring	• On-Board Safety and Security Monitoring • Freight Mobility
	Enhanced Roadside Safety Inspection	• Automated Roadside Safety Inspection
Port Operations and Security	Vessel Tracking and Monitoring	• On-Board Safety and Security Monitoring

2.3.3 Definition of Identified User Services

The user services that have been identified as being applicable in Alaska are described below. To meet Alaska's unique transportation needs, they have been adapted from the user services provided in the National ITS Architecture.

The National ITS Architecture organizes user services into eight user service bundles. These bundles provide a convenient way to discuss the range of requirements in a broad stakeholder area. The user service bundles as defined by the National ITS Architecture are listed below.

- Travel and Traffic Management
- Public Transportation Management
- Electronic Payment
- Commercial Vehicle Operations
- Emergency Management
- Advanced Vehicle Safety Systems
- Information Management
- Maintenance and Construction Management

National ITS Architecture User Services that satisfy Alaska's user needs are defined below by their respective user service bundle.

Travel and Traffic Management

National ITS Architecture User Services that fall within the Traveler and Traffic Management User Service Bundle include:

- Pre-Trip Travel Information
- En-Route Driver Information
- Route Guidance
- Ride Matching and Reservation
- Traveler Services Information
- Traffic Control
- Incident Management
- Travel Demand Management
- Highway-Rail Intersection

Each of the user services listed above are described in greater detail below.

Pre-Trip Travel Information

This user service helps travelers in making mode choices, travel time estimates, and route decisions prior to trip departure. This user service consists of four primary functions:

- Available services information
- Current situation information
- Prevailing weather and pavement conditions
- Multi-modal traveler information (e.g., marine, rail, and roadway traveler information)

This user service is applicable in supporting safe and efficient tourist and resident travel. Pre-trip traveler information is particularly critical in Alaska, where weather can be severe and extremely variable.

En-Route Driver Information

The En-Route Driver Information user service provides drivers with en-route information, which allows drivers to make alternative route choices based on traffic and weather conditions. This user service is comprised of two primary functions:

- Driver advisories that describe prevailing weather and pavement conditions
- In-vehicle signing

The En-Route Driver Information user service is equally critical as the Pre-Trip Traveler Information user service for ensuring the safety and efficiency of travel in Alaska. This is particularly important in Alaska, where many long trips through remote areas are made.

Route Guidance

The Route Guidance user service provides travelers with route guidance and directions to destinations selected by the traveler. This user service is particularly useful in supporting tourist-related travel in Alaska, where a majority of travelers are unfamiliar with the region they are visiting.

Ride Matching and Reservation

The Ride Matching and Reservation user service provides travelers the ability to make reservations in their homes, offices or other locations, and assists transportation providers with vehicle assignments and scheduling.

Traveler Services Information

The Traveler Service Information user service provides travelers with information related to services and facilities. This type of information may be accessed prior to embarking on a trip or after the traveler is underway. This user service provides the traveler with a "yellow pages" type of capability. It is particularly applicable to the large amount of tourist-related travel in Alaska.

Traffic Control

The Traffic Control user service provides the capability to manage traffic movement on streets and highways more efficiently. The primary functions of this user service that relate to transportation system operations in Alaska include:

- Optimization of traffic flow
- Traffic surveillance
- Traffic control
- Dissemination of information to travelers

Incident Management

The Incident Management user service provides functions to detect incidents, identify appropriate response actions, and support the initiation and ongoing coordination of those actions. Other functions supported by this user service include:

- Scheduling planned events that disrupt normal operations (e.g., maintenance activities)
- Initiating response actions
- Supporting coordination of response actions
- Predicting hazardous conditions

Travel Demand Management

The Travel Demand Management user service provides the functions needed to generate and communicate management and control strategies that support and facilitate the implementation of TDM programs, policies and regulations. It consists of two major functions:

- Increase efficiency of transportation system, and
- Provide wide variety of mobility options.

Highway-Rail Intersection

The Highway-Rail user service provides functions to control highway and rail traffic and enhance safety at highway-rail intersections. This is particularly applicable in Alaska, given the large number of rural highway-rail intersections. Further highlighting the importance of this user service is the fact that many of these rural highway-rail intersections have little (if any) control equipment installed. This user service supports two sub-services:

Public Transportation Management

As it relates to Alaska, functions provided by the Public Transportation Management user service include the following capabilities:

- Determining vehicle passenger loading counts by bus stop and trip segment
- Determining bus running times between time points
- Determining fare collection by fare category
- Real-time vehicle location reports
- Providing a function to automate the planning and scheduling of public transit operations
- Providing a personnel management function to facilitate the management of both driver and maintenance personnel
- Providing two-way voice communication between in-vehicle drivers and the central facility

Given Alaska's harsh weather conditions, it is important to effectively manage transit services and reduce passengers' exposure to weather while they wait for buses.

Public Transportation Management

The Public Transportation Management user service automates the operations, planning and management functions of public transit systems. It provides real-time computer analysis of vehicles and facilities to improve transit operations and maintenance. It monitors the location of transit vehicles, identifies deviations from the schedule, and offers potential solutions to dispatchers and operators. This service helps maintain transportation schedules and assures that transfer connections from vehicle to vehicle and between modes can be coupled with traffic control services to facilitate quick response to service delays. Information regarding passenger loading, vehicle running times, accumulated miles and hours and vehicle maintenance will help improve service and provide managers with a wealth of information on which to base decisions. Service schedulers will have timely data to adjust trips. Personnel management will be enhanced with the automatic recording and verification of operating and maintenance task performance. Security of transit personnel will be enhanced through providing access management of transit vehicles.

En-route Transit Information

The En-Route Transit Information user service provides information to travelers using public transportation after they begin their trips. Real-time, accurate transit service information will be available on-board the vehicle, at transit stations and bus stops to assist travelers in making informed decisions and itinerary modifications while a trip is underway.

Public Travel Security

The Public Travel Security user service creates a secure environment for public transportation patrons, operators, and support staff. It provides systems that monitor the environment in transit facilities, transit stations, parking lots, bus stops and on-board transit vehicles and generates alarms (either automatically or manually) when necessary. The service also provides systems that monitor key transit infrastructure (e.g., rail track, bridges, tunnels, bus guideways, etc.).

Electronic Payment

The Electronic Payment Services user service is the only user service within the Electronic Payment User Service Bundle. This user service is described below.

Electronic Payment Services

The Electronic Payment Services user service allows travelers to pay for transportation services by electronic means. Four functions are provided, which are, (1) Electronic Toll Collection, (2) Electronic Fare Collection, (3) Electronic Parking Payment, and (4) Electronic Payment Services Integration. Currently, only the Electronic Fare Collection function is applicable based on transportation user needs expressed by Alaska ITS stakeholders.

Commercial Vehicle Operations

National ITS Architecture User Services that fall within the Commercial Vehicle Operations User Service Bundle include:

- Commercial Vehicle Electronic Clearance
- Automated Roadside Safety Inspection
- On-Board Safety and Security Monitoring
- Commercial Vehicle Administrative Processes
- Hazardous Material Security and Incident Response
- Freight Mobility

Each of the user services listed above are described in greater detail below.

Commercial Vehicle Electronic Clearance

The Commercial Vehicle Electronic Clearance user service provides functions to automate the process of signaling interstate and intrastate motor carriers to stop for inspections. Inspections may include (but are not limited to) safety, credentials, and weight information. This user service includes fixed facilities that consist of structures and equipment at ports of entry, inspection stations, and weigh stations. Enhancing commercial vehicle operations efficiency is important in Alaska because residents primarily rely on the shipment of goods that are produced elsewhere.

Automated Roadside Safety Inspection

The Automated Roadside Safety Inspection user service provides functions to improve and automate roadside safety inspections. Implementing this user service in Alaska can help commercial vehicle inspection efficiency, which will be of mutual benefit to both ADOT&PF and motor carriers.

On-Board Safety and Security Monitoring

The On-Board Safety and Security Monitoring user service provides monitoring and warnings of safety and security problems within the commercial vehicle. The primary functions of this user service are to inform the driver, as soon as possible, of any problem detected, and to notify the carrier of detected safety problems. The functions provided by this user service also include notifying appropriate enforcement agencies. For security related issues, the commercial vehicle driver and authorized freight data users are informed of any problems related to freight container, trailer or commercial vehicle integrity. Implementation of this user service in Alaska would enhance motor carriers' and other transportation system users' safety.

Commercial Vehicle Administrative Processes

This user service consists of three primary functions:

- Electronic purchase of credentials
- Automated mileage and fuel reporting and auditing
- International border electronic clearance

The Commercial Vehicle Administrative Process user service would enhance commercial vehicle operations efficiency in Alaska.

Hazardous Material Security and Incident Response

The Hazardous Material Security and Incident Response user service includes the following functions:

- HAZMAT incident notification function
- Provision of an operational focal point for initiating appropriate responses
- Communications function
- HAZMAT security function

Implementation of this user service in Alaska could help protect the safety of residents, visitors, and the natural environment.

Freight Mobility

As it is for other travelers in Alaska, it is critical to provide commercial vehicle operators with current real-time traveler information. The Freight Mobility user service provides the capability to provide commercial drivers and dispatchers with real-time routing information in response to congestion, incidents, weather, and pavement conditions by tracking the location of vehicles. This user service also provides commercial vehicle operators, dispatchers and inter-modal transportation providers the ability to communicate in real-time.

Emergency Management

National ITS Architecture User Services that fall within the Emergency Management User Service Bundle include:

- Emergency Notification and Personal Security
- Emergency Vehicle Management

Both user services listed above are described below.

Emergency Notification and Personal Security

The Emergency Notification and Personal Security user service enables faster notification of travelers involved in accidents. This user service supports the following functions:

- The capability to manually initiate a distress signal to provide a first alert that an incident has occurred.
- Automatic collision notification that instantly transmits information on collision occurrences.

Implementation of this user service would be critical for improving the survival rate of crash victims in Alaska. It would also be effective for initiating emergency responses for tourists in remote areas, who may be unfamiliar with their surroundings.

Emergency Vehicle Management

Functions provided by the Emergency Vehicle Management user service include:

- Route guidance for emergency response vehicles.
- Signal priority for emergency response vehicles.

As in every metropolitan area, region, or state, it is critical to provide rapid response to vehicle crashes and other emergencies in Alaska.

Disaster Response and Evacuation

The Disaster Response and Evacuation user service provides effective, coordinated management of the surface transportation system during all types of disasters including natural disasters (avalanches, earthquakes, floods, severe storms, tsunamis, etc.), terrorist acts, and other catastrophic events (e.g., hazardous material spills). Two primary subservices are provided: (1) Disaster Response and (2) Evacuation Coordination. The Disaster Response Subservice provides support for planning, transportation management, resource sharing, and information coordination between transportation agencies and principal responding agencies (emergency management, public safety, and other allied agencies) to improve the effectiveness and safety of a disaster response. The Disaster Response Subservice consists of eight major functions:

- Coordinate response plans
- Monitor alert levels
- Detect and verify emergency
- Assess infrastructure status
- Coordinate response
- Critical service restoration
- Manage area transportation
- Disaster traveler information

The Evacuation Coordination (EC) Subservice efficiently manages an evacuation and provides evacuees with the information they need during evacuation and subsequent reentry to the evacuated area. The EC Subservice includes four additional major functions:

- Evacuation planning support
- Evacuation traveler information
- Evacuation transportation management
- Evacuation resource sharing

Advanced Vehicle Safety Systems

The Vision Enhancement for Crash Avoidance user service is the only user service within the Advanced Vehicle Safety Systems User Service Bundle that satisfies one of Alaska's user needs.

Vision Enhancement for Crash Avoidance

The Vision Enhancement for Crash Avoidance user service provides an enhanced vision system to help vehicle operators see pedestrians and hazardous situations when driving visibility is low. It is expected that this user service will help maintenance operators keep their vehicles on the roadway during snow storms when driving visibility is impaired.

Information Management

The Archived Data Function is the only user service within the Information Management User Service Bundle. This user service is described below.

Archived Data

The Archived Data Function user service provides functions associated with controlling, archiving and distributing ITS data. Specific functions provided by this user service include:

- Operational data control function to manage operations data integrity.
- Data import and verification function to acquire historical data from the operational data control function.
- Automatic data historical archive function to permanently archive the data.
- Data warehouse distribution function to integrate the planning, safety, operations, and research communities into ITS and process data for their use.
- An ITS Community Interface which provides the ITS common interface to all ITS users for data products specification and retrieval.

Through these functions this user service helps achieve the goal of achieving unambiguous interchange and reusing data and information throughout all functional areas of ADOT&PF and its stakeholders.

Maintenance and Construction Management

Maintenance and Construction Operations

The Maintenance and Construction Operations (MCO) user service provides the functions to monitor, operate, maintain, improve, and manage the physical condition of roadways, infrastructure, equipment, and other resources. The specific functions supported by this user service include:

- Monitor condition and track location of maintenance, construction, and specialized vehicle fleets.
- Monitor and forecast conditions to manage treatment of roadways during various travel conditions.
- Roadways operations support during work zone activities.
- Coordination of work plans and to communicate conditions.

REFERENCES

Alaska ITS/CVO Business Plan – Using Advanced Technology Enhance Public Safety and Improve Government and industry Efficiency. March 1999.

The National ITS Architecture. Version 5.1. Accessed March 20, 2006. http://www.iteris.com/itsarch/

APPENDIX A: OTHER TRANSPORTATION NEEDS

The focus of this effort to date has been to identify problems that ITS can address. Nonetheless, in the course of querying transportation system users and operators about their needs, one major non-ITS need was expressed in regards to aviation:

Travelers are much more dependent on aviation in Alaska than in any other state. The needs identified for airside operations are primarily infrastructure-related. For instance, only 25% of the airfields at regional airports are paved. Others lack lighted runways. In addition, the Federal Aviation Administration (FAA) requires that "certified" weather stations support flight operations. However, interviewees felt that some of these systems are not as accurate or reliable as needed to ensure safety.

The presence of wildlife is another serious problem in Alaskan aviation. Wildlife wandering onto runways can damage aircraft and cause catastrophic accidents. This problem is exacerbated by the fact that many of Alaska's airfields are unlit or poorly lit.

NOTE: It is also important to understand that the institutional issues identified through this process are not directly addressed by the National ITS Architecture. However, the process of developing architecture often addresses institutional issues. There are no user services that deal directly with institutional issues.