Northwest Arkansas Regional ITS Architecture

Final Report

Prepared for the:

Northwest Arkansas Regional Planning Commission
and the
Arkansas Department of Transportation

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF INITIALS, ACRONYMS, AND ABBREVIATIONS

ARC-IT	Architecture Reference for Cooperative and Intelligent Transportation
ArDOT	Arkansas Department of Transportation
APC	Automated Passenger Counting
AVL	Automated Vehicle Location
BIL	Bipartisan Infrastructure Law
CAD	Computer Aided Dispatch
CCTV	Closed-circuit Television
CVISN	Commercial Vehicle Information Systems and Networks
CVO	Commercial Vehicle Operations
DSRC	Dedicated Short Range Communication
DMS	Dynamic Message Sign
EMS	Emergency Medical Services
EOC	Emergency Operations Center
FAST Act	Fixing America's Surface Transportation Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HAZMAT	Hazardous Materials
ITS	Intelligent Transportation System
MPO	Metropolitan Planning Organization
MTP	Metropolitan Transportation Plan
NWARPC	Northwest Arkansas Regional Planning Commission
ORT	Ozark Regional Transit
RAD-IT	Regional Architecture Development for Intelligent Transportation

SAFETEA-LU   Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users

SDO   Standards Development Organization

TEA-21   Transportation Equity Act for the 21st Century

TIP   Transportation Improvement Plan

TMC   Transportation Management Center

TSMO   Transportation Systems Management and Operations

TOC   Traffic Operations Center

USDOT   United States Department of Transportation

EXECUTIVE SUMMARY

INTRODUCTION

Development of a regional Intelligent Transportation System (ITS) architecture is one of the most important steps in planning for and implementing ITS in a region. ITS architectures provide a framework for implementing ITS projects, encouraging interoperability and resource sharing among agencies, identifying applicable standards to apply to projects, and allowing for cohesive long-range planning among regional stakeholders.

ITS is the application of electronic technologies and communications to increase the safety and efficiency of the transportation system. The ITS architecture allows stakeholders to plan for what they want their system to look like in the long-term and then break the system into smaller pieces that can be implemented over time as funding permits.

In order to be eligible for funding of ITS projects from the Federal Highway Administration (FHWA) or the Federal Transit Administration (FTA), regions must show that their projects conform to their regional ITS architecture. This requirement became effective in April 2005 as part of 23 CFR Part 940.

The Northwest Arkansas Region is defined by the boundaries of the Northwest Arkansas Regional Planning Commission (NWARPC), as shown by the dark line in the map. The region encompasses 1,836 square miles in northwest Arkansas. It is contained within Benton and Washington Counties, and the major cities in the area include Fayetteville, Springdale, Rogers, and Bentonville. The rapidly growing area had a population of roughly 530,000 in 2020 and is expected to reach one million residents by 2045, reflecting an annual average growth rate of 2.5%. The current employment in the region is roughly 250,000 and has grown at a rate of 3.5% over the past five years
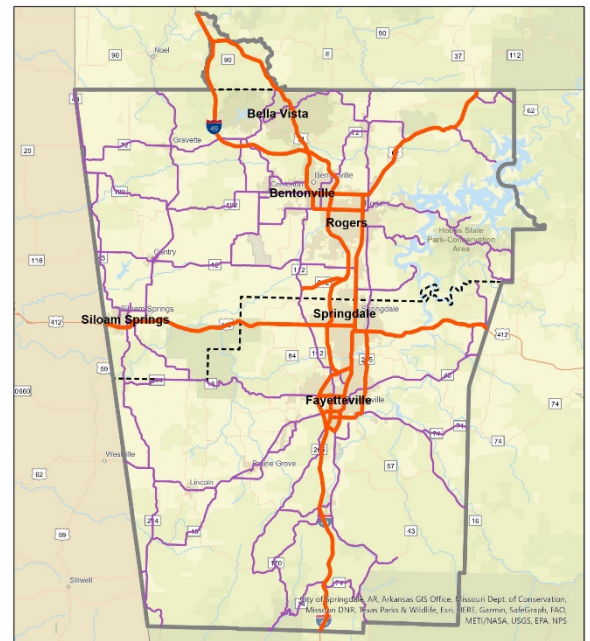
Northwest Arkansas Regional Planning Commission MPA Boundary

NORTHWEST ARKANSAS PROJECT APPROACH

The Northwest Arkansas ITS Architecture was developed under the leadership of the Arkansas Department of Transportation (ARDOT) and NWARPC using a consensus-based approach with input from stakeholder agencies throughout the region. Seven tasks were used to develop the plan.

Task 1 – Organize Stakeholder Group

Task 2 – Conduct Strategic Planning Interviews with Stakeholders

Task 3 – Conduct an ITS System Inventory

Task 4 – ITS Architecture Workshop and ITS Architecture Development

Task 5 – Develop Strategies and Action Items

Task 6 – Develop ITS Implementation Plan

Task 7 – Develop Overall ITS Architecture and Deployment Plan and Executive Summary

NORTHWEST ARKANSAS ITS PRIORITIES AND ACTION ITEMS

To guide the development of the Regional ITS Architecture, the study team developed statements regarding vision, mission, goals, and objectives for the ITS program. These statements were used to identify the high-priority strategies and action items that will be advanced to address mobility and other needs in Northwest Arkansas, and meet the strategic goals and objectives for ITS defined in the ITS Architecture Strategic Planning Workshop. These high-priority strategies are listed below with a summary of suggested action items to form the basis for the update of the Regional ITS Architecture and Deployment Plan.

Strategy 1: Improve the efficiency, effectiveness, and safety of regional traffic management.

Action Items

1. Identify the equipment and software used by each jurisdiction within the region to determine compatibility and interoperability.
2. Identify the additional traffic management functions desired collectively in the region and for each jurisdiction.
3. Initiate a regional strategy to develop a fiber optic communication and signal systems connectivity plan.
4. Initiate a regional discussion of the desirability of achieving signal controller consistency in the region over time as a means of supporting coordinated timing between the cities.

Strategy 2: Collect, store, and share more travel-related information to improve operations and traveler information for users of all modes.

Action Items

1. Identify the additional data desired for traffic management functions collectively in the region and for each jurisdiction, and identify priorities for collecting, storing, and sharing the data.
2. Initiate a regional program for logging, displaying, and tracking planned lane or road closures for maintenance, construction, or special events.

Strategy 3: Improve the regional emergency response to traffic incidents, major storms, and other emergency situations.

Action Items

1. Formulate a regional strategy among the agencies involved for improving emergency response.
2. Identify the data, communications, and protocols necessary to improve regional emergency response and the ITS elements necessary to support it.

Strategy 4: Use ITS to improve access to and safe use of alternative modes of transportation, and to reduce motor vehicle emission and vehicle miles of travel.

Action Items

1. Organize a regional committee to identify opportunities to improve the access to and safe use of alternative modes of transportation, and to promote demand-management strategies.
2. Identify ITS elements that can be employed to improve the access to and safe use of alternative modes of transportation, and prioritize the potential ITS applications.
3. Identify and pursue potential funding sources for ITS elements that can be employed to improve the access to and safe use of alternative modes of transportation.

Strategy 5: Increase regional collaboration on ITS development and applications.

Action Items

1. Continue to use NWARPC and its committees to promote coordination between the various stakeholders in Northwest Arkansas, including, but not limited to, ArDOT, NWARPC, cities, counties, transit authorities, and private sector companies.
2. Include ITS in planning, programming, design, construction, and maintenance processes.
3. Develop a communication framework for the region's stakeholders to facilitate input on ITS strategies.
4. Integrate ITS champions into the regional and local decision-making bodies.
5. Encourage data and information sharing between the region's stakeholders.

NORTHWEST ARKANSAS ITS PROJECTS

A list of recommended high-priority ITS projects for the Northwest Arkansas Region was developed through input from stakeholders during the architecture process. Stakeholders grouped projects into timeframes for deployment based on priority, dependence on other projects, technology, and feasibility. Below is a summary of the high-priority projects recommended for deployment in the short term (next five years).

Traffic Management

- Northwest Arkansas Regional Operations Committee and Future Joint Regional Traffic Management Center
- ArDOT I-49 Road Network Surveillance and Infrastructure Security Monitoring Expansion
- City of Fayetteville Queue Detectors for I-49 Exit Ramps
- Municipal and County TOC and Traffic Signal System Deployment and Enhancement
- Municipal and County CCTV Camera Deployment
- Municipal and County Real-Time Transportation Information Website Enhancements
- Standard Railroad Grade Crossing Coordination
- Municipal Speed Warning Systems
- ArDOT, County and Municipal Road Closure Management Systems
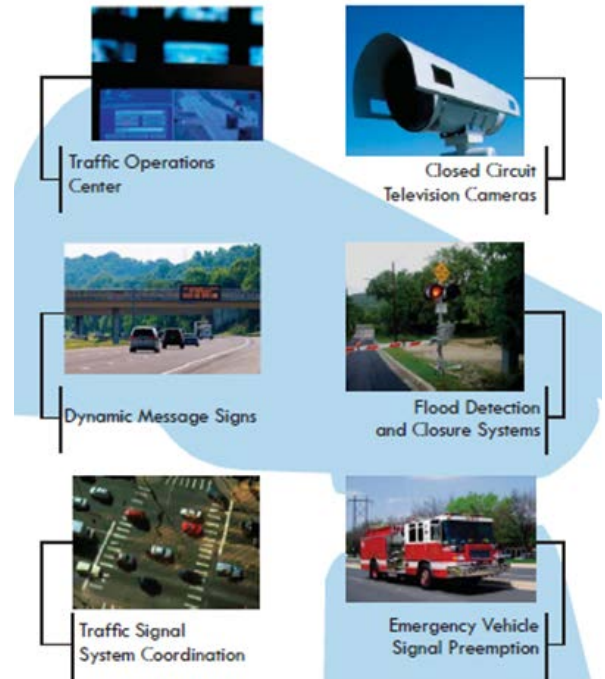
- ArDOT I-49 DMS Deployment Expansion
- ArDOT, County and Municipal Portable DMS Expansion
- Municipal and County DMS Deployment

Public Safety

- Benton County Coordinated Dispatch
- Washington County Coordinated Dispatch
- Municipal and County Traffic/Public Safety Video Sharing
- Northwest Arkansas Regional Mutual Aid Agreements
- Municipal and County Emergency Vehicle Traffic Signal Preemption

Maintenance and Construction Management

- ArDOT, County, and Municipal Maintenance and Construction Activity Coordination System
- ArDOT County and Municipal Road Weather Data Collection Systems
- ArDOT, County and Municipal Low Water Crossing Flood Detection and Road
- ArDOT Anti-icing Systems

Public Transportation Management

- Transit Passenger Counting

- Transit Asset Management and Maintenance Scheduling System
- Transit Personalized Interactive Traveler Information

Traveler Information

- Expansion of IDrive Arkansas to include Arterial Data from Cities and Counties
- Municipal and County Real-Time Transportation Information Website Enhancements

- Municipal and County Real-Time Transportation Information Website Enhancements
- Northwest Arkansas Media Liaison and Coordination
- Northwest Arkansas Regional Traveler Information Website
- Mobility as a Service App

Information Management

- Northwest Arkansas Regional Data Warehouse
- Northwest Arkansas Online Performance Dashboard

To satisfy the ITS Mission statement "Develop a world-class ITS system within the Northwest Arkansas Region that will support a safe, reliable, and efficient transportation network," the Northwest Arkansas Regional ITS Architecture encourages continuous refinement of the list of ITS projects for implementation and updating the architecture regularly to include new projects. It also recommends continuous monitoring of emerging technologies that could support new ITS applications. The monitoring and consideration of the following emerging technologies is encouraged:

- Pedestrian and Bicyclist Detection, Notification, and Warnings
- Weather and Flood Warning Systems
- End-of-Queue Warning System
- Signal Infrastructure-to-Vehicle Communications
- Roadway Design, Infrastructure, and Maintenance to Support Safe Automated and Autonomous Vehicle Operations
- Advanced Video-based Data Collection
- Automated Traffic Signal Performance Monitoring (ATSPM)
- Unmanned Aerial Vehicles (Drones) for Data Collection

NORTHWEST ARKANSAS REGIONAL STAKEHOLDERS

The success of the Northwest Arkansas Regional ITS Architecture is due in large part to the collaboration and participation of the stakeholders representing the communities of the Northwest Arkansas Region. The development of the original Northwest Arkansas Regional ITS Architecture included input from a broad range of public and private agencies throughout the region. A smaller group of stakeholders were included in the update to determine what changes in the architecture were needed. The following stakeholder agencies have participated in the current Northwest Arkansas Region project workshops or provided input to the study team:

- ArDOT;
- Benton County;
- City of Bentonville;
- City of Fayetteville;
- City of Lowell;
- City of Rogers;
- City of Siloam Springs;

- City of Springdale;
- Northwest Arkansas Regional Airport;
- Northwest Arkansas Regional Planning Commission;
- Ozark Regional Transit;
- Razorback Transit; and
- Washington County.

NORTHWEST ARKANSAS REGIONAL ITS ARCHITECTURE USE AND MAINTENANCE

Use and maintenance of the Northwest Arkansas Regional ITS Architecture and ITS Deployment Plan will be important to preserve the plan's role as a guide for the implementation of ITS in the Northwest Arkansas Region. Stakeholders in the region developed the following guidelines to address use of the ITS Architecture for project deployment and maintenance of the ITS Architecture to reflect changing needs and priorities.

ITS Architecture Use

To ensure eligibility for the use of federal transportation funding on regional ITS projects, projects will be compared to the applicable ITS service packages as they are developed. Any discrepancies between the planned project and the architecture will be resolved either by modifying the project or the service package(s). Changes to the service packages will be documented on an Architecture Maintenance Documentation Form. All change forms will be retained by NWARPC until the next plan update.

ITS Architecture Maintenance

NWARPC will have the responsibility to maintain the Regional ITS Architecture., Under NWARPC's leadership, the stakeholder group will review the project tables in the Regional ITS Architecture annually. The tables will be updated to reflect changes in the project status, prioritization, or the addition of new projects. Every five years, prior to the Metropolitan Transportation Plan update, the Regional ITS Architecture Plan will undergo a complete update. During the complete update, Architecture Maintenance Documentation Forms and project table modifications will be incorporated. In addition, any new stakeholders or elements in the region will be included and any changes made to the National ITS Architecture will be evaluated for their impact on the Regional ITS Architecture.

1   INTRODUCTION

1.1 PROJECT OVERVIEW

Development of a regional Intelligent Transportation System (ITS) architecture is one of the most important steps in planning for and implementing ITS in a region. ITS architectures provide a framework for implementing ITS projects, encourage interoperability and resource sharing among agencies, identify applicable standards to apply to projects, and allow for cohesive long-range planning among regional stakeholders. The ITS architecture allows stakeholders to plan for what they want their system to look like in the long-term and then break out the system into smaller pieces that can be implemented in the short-term.

ITS architectures satisfy the conformity requirements first established in the Transportation Equity Act for the 21st Century (TEA-21) highway bill and continued in the Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU) bill passed in 2005. In response to Section 5206(e) of TEA-21, the Federal Highway Administration (FHWA) issued a final rule and the Federal Transit Administration (FTA) issued a final policy that required regions implementing any ITS project to have an ITS architecture in place by April 2005. After that date, any ITS projects were required to demonstrate conformance with their regional ITS architecture in order to be eligible for funding from FHWA or FTA. Regions that had not yet deployed ITS were given four years to develop an ITS architecture after their first ITS project proceeded to final design.

In September 2006, the Northwest Arkansas Regional Planning Commission (NWARPC) and the Arkansas Department of Transportation (ArDOT) initiated a process with area stakeholders to begin the development of the first Regional ITS Architecture in Northwest Arkansas. The plan was completed in the spring of 2007 and

focused on a 20-year vision of ITS in the Northwest Arkansas Region. This document represents an update of the 2007 Regional ITS Architecture and draws heavily from that document.

The Northwest Arkansas Regional ITS Architecture has been developed independently of the Arkansas Statewide ITS Architecture. The goal of the original Statewide Architecture, completed in 2014, was to document ITS that will be deployed on a statewide basis, while the scope of the Northwest Arkansas Regional ITS Architecture focused on the Northwest Arkansas Region in greater detail. When the Statewide ITS Architecture is updated, any additional ITS services included in the Northwest Arkansas Regional ITS Architecture that are not already in the statewide plan will be incorporated into the Statewide ITS Architecture.

The 2023 Northwest Regional ITS Architecture was developed with significant input from local, state, and federal officials. A series of four stakeholder meetings and a workshop were held to solicit input and ensure that the plans reflected the unique needs of the region. Copies of the draft reports were sent to all stakeholders, and the project website allowed stakeholders to submit comments directly to the project team. The Regional ITS Architecture and Deployment Plan developed reflects an accurate snapshot of existing ITS deployments and future ITS plans in the region. Needs and priorities of the region will change over time, and, in order to remain effective, this plan should be periodically reviewed and updated.

1.2 DOCUMENT OVERVIEW

1.2.1 Report Sections

The Northwest Arkansas Regional ITS Architecture report is organized into eleven key sections:

Section 1 – Introduction

This section provides an overview of the National ITS Architecture requirements, the Northwest Arkansas Regional ITS Architecture, and the key features and stakeholders in the Northwest Arkansas Region.

Section 2 – Regional ITS Architecture Development Process

This section provides an overview of the key steps involved in developing the ITS architecture for the Northwest Arkansas Region. It includes a discussion of stakeholder involvement, architecture workshops, and the architecture development process. This section also presents the results of a strategic framework for ITS Deployment in Northwest Arkansas. The strategic framework identified statements of vision, mission, goals, and objectives.

Section 3 – ITS Inventory for Northwest Arkansas

The section provides an update of the ITS inventory for the Northwest Arkansas Region. The update was achieved through interviews with key stakeholders and through dialogue with key stakeholders in the Transportation Systems Management and Operations (TSMO) and ITS Workshop, and in meetings of the TSMO and ITS committee.

Section 4 – Regional Needs, Priority ITS Strategies and Action Items

This section contains an update of regional ITS needs as identified by the regional stakeholders and identifies the service packages that could potentially address those needs. The section also provides a summary of strategies for addressing the ITS needs and the action items needed to implement the strategies.

Section 5 – Customization of the National ITS Architecture to Northwest Arkansas

This section describes how the National ITS Architecture is customized to meet the ITS vision for the region. The priorities for the service packages that were selected for the region are identified in this section and interconnects are presented for the high-priority service packages, including diagrams showing the relationships of the key subsystems and elements in the region, system interfaces, and the physical subsystem architecture flows.

Section 6 – Application of the Regional ITS Architecture

Functional requirements and standards that apply to the region, as indicated by the Regional ITS Architecture, are presented in this section. Operational concepts identifying stakeholder roles and responsibilities have been prepared and potential agreements to support the sharing of data and resources have been identified. The section also includes information on how the region anticipates deploying ITS to achieve their vision.

Section 7 - Regional ITS Architecture Service Package Implementation and Recommended High-Priority Projects

This section identifies the high-priority ITS projects recommended for implementation within five years of completion of the Regional ITS Architecture. The section also identifies emerging technologies that should be monitored and given future consideration for inclusion in the architecture.

Section 8 - Funding of ITS Projects

This section contains a summary of potential federal, state, regional and local funding sources that might be available for implementation, operation, or maintenance of the ITS elements of the Northwest Arkansas Regional ITS Architecture.

Section 9 – Maintaining the Regional ITS Architecture

A maintenance plan has been developed for the Northwest Arkansas Regional ITS Architecture and is included in this section. The plan outlines the procedure for updating the ITS Architecture and its Deployment Plan over time.

1.2.2   Report Appendices

The Northwest Arkansas Regional ITS Architecture contains 13 appendices that contain technical material related to the architecture.

The development of a Regional ITS Architecture is supported by two software tools and an associated database developed by the U.S. Department of Transportation. ARC-IT – The Architecture Reference for Cooperative and Intelligent Transportation – is a guidance document that provides a common basis for planners and engineers to conceive, design, and implement systems using a common language as a basis for delivering ITS, but does not mandate any particular implementation. ARC-IT describes the elements of a Regional ITS Architecture and how to use the Regional ITS Architecture. RAD-IT – the Regional Architecture Development for Intelligent Transportation – is the tool used to create the Regional ITS Architecture. The appendices for this document are available to provide the very detailed results of the application of ARC-IT and RAD-IT. The first appendix, **Appendix A: National ITS Architecture Glossary**, provides a glossary of the specialized terminology used in ARC-IT and RAD-IT.

The appendices for this document are as follows:

- Appendix A: National ITS Architecture Glossary
- Appendix B: Northwest Arkansas Stakeholder Agencies and Contacts
- Appendix C: Northwest Arkansas Stakeholder Descriptions

- Appendix D: Northwest Arkansas Regional ITS Inventory
- Appendix E: Service Package Descriptions
- Appendix F: Northwest Arkansas ITS Needs and Corresponding Service Packages
- Appendix G: Northwest Arkansas Customized Service Packages
- Appendix H: Northwest Arkansas ITS Element Functions
- Appendix I: Northwest Arkansas Applicable ITS Standards
- Appendix J: Northwest Arkansas Stakeholder Roles and Responsibilities
- Appendix K: Northwest Arkansas Recommended High-Priority ITS Projects
- Appendix L: Potential Federal Funding Sources for the Northwest Arkansas ITS Architecture
- Appendix M: Architecture Maintenance Documentation Form

1.3 THE NORTHWEST ARKANSAS REGION

1.3.1 Geographic and General Overview

The Northwest Arkansas Metropolitan Planning Area encompasses the total geographic area of Benton and Washington Counties in the northwest part of Arkansas and a portion of McDonald County in Missouri. Benton County borders the states of Oklahoma and Missouri, while Washington County borders solely with Oklahoma. Benton and Washington Counties are the second and third most populated counties in Arkansas. The rapidly growing area had a population of roughly 530,000 in 2020 and is expected to reach 1 million residents by 2045, reflecting an annual average growth rate of 2.5%. The current employment in the region is roughly 250,000 and has grown at a rate of 3.5% over the past five years. The nearest major cities to the region include Little Rock (Arkansas), Tulsa (Oklahoma), and Springfield (Missouri). Figure 1 illustrates the approximate population distribution for cities in Benton and Washington Counties.
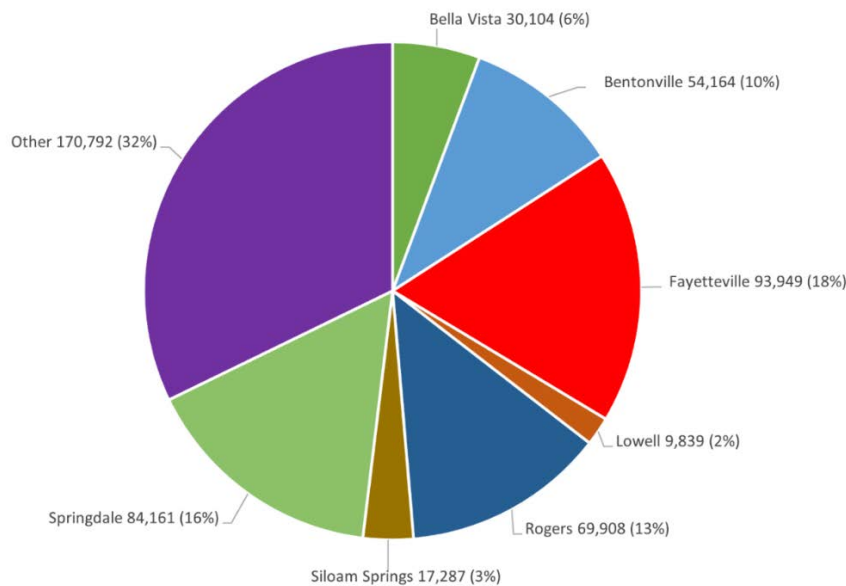
Figure 1: Northwest Arkansas Region Approximate Population Distribution (2020 Census)

Major employers include the University of Arkansas in Fayetteville and Walmart in Bentonville. Other major companies headquartered in the region include J.B. Hunt, Superior Industries, Tyson Foods and George's. The Milken Institute ranked the metropolitan area of Fayetteville, Springdale, and Rogers in eighth place for "The Nation's Top-Performing Metropolitan Area for Job Creation." The presence of Walmart, the largest retailer and

second largest corporation in the world, has and continues to generate an influx of Walmart vendors into the region. The University of Arkansas has a student body of approximately 30,000, accounting for almost one-third of the population of Fayetteville. John Brown University in Siloam Springs has a smaller student body of roughly 1,600, but also accounts for a large portion of the town's population.

Crystal Bridges Museum of American Art, the Ozark National Forest, and the University of Arkansas are some of the local attractions that foster a tourist population in the region. The University of Arkansas Razorback Stadium has a seating capacity of 72,000 and the Bud Walton Arena has a seating capacity of 19,200. Both facilities present a transportation challenge during special events that the University and the City of Fayetteville have to manage.

The Northwest Arkansas Regional Airport offers an average of 30 flights in and out daily, with direct service to 15 destinations including New York, Chicago, Dallas, Houston, Denver, Los Angeles, and Washington, D.C. The airport itself is in Benton County, west of I-49.

The meteorological climate in the region is fairly mild, although average winter snowfall is around nine inches each year. In addition to snow and ice, other natural hazards in the region including severe storms, tornadoes, landslides, and flooding, as documented by the FEMA website.

The Northwest Arkansas Region is defined by the boundaries of the NWARPC as shown by the dark line and includes all of Benton and Washington Counties. The region encompasses 1,836 square miles in Northwest Arkansas. Figure 2 shows the boundaries of the Northwest Arkansas Region.

Figure 2: Northwest Arkansas Regional Planning Commission MPA Boundary

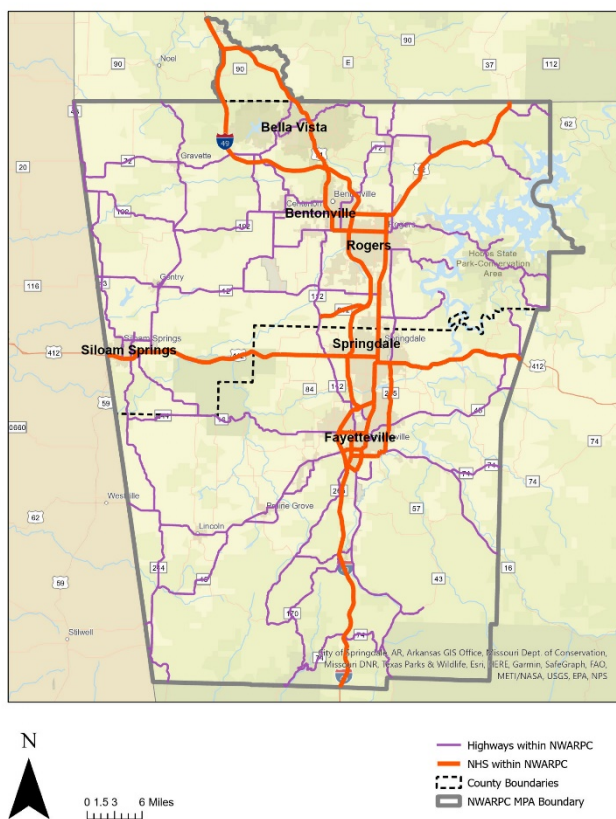## 1.3.2   Transportation Infrastructure

As illustrated in Figure 2, the region is served by several state highways as well as by parts of the federal highway system. The primary roadway facilities include I-49, US 62, US 71, and US 412.

I-49 is a divided interstate highway that extends north-south from Kansas City, Missouri to Fort Smith where it intersects with I-40. I-49 serves several rapidly growing communities in the Northwest Arkansas Region. Although some of the traffic along the roadway is daily commuter traffic to and from Fort Smith, the majority of the traffic is due to commuters traveling between Bentonville, Fayetteville, Springdale, and Rogers. There is also a considerable volume of freight traffic due to the number of large corporate headquarters in the region.

1.3.3   Northwest Arkansas Region ITS Plans

The 2023 Northwest Arkansas Regional ITS Architecture is a tailored framework for ensuring institutional agreement and technical integration for the implementation of ITS projects or groups of projects in Northwest Arkansas. The development of a Regional ITS Architecture program is one of the most important steps in planning for and implementing ITS in a region. The Regional ITS Architecture provides a framework for implementing ITS projects, encourages interoperability and resource sharing among agencies, identifies applicable standards to apply to projects, and allows for cohesive long-range planning among regional stakeholders. It functionally defines what pieces of the system are linked and what information is exchanged between them. It provides a strategic framework for implementation of ITS in the region by defining the vision, mission, goals, objectives, and needs for the region's ITS program. It identifies the strategies and action items that will be advanced to address mobility needs and emphasis areas in Northwest Arkansas; the functional requirements, interfaces, communication needs, design standards that apply; and interagency agreements that are required for its deployment. NWARPC's first Regional ITS Architecture and Deployment Plan was finalized and began implementation in 2007. The 2023 NWARPC Regional ITS Architecture represents an update of the previous architecture based on input from the region's stakeholders.

1.3.4   Stakeholders

Due to the fact that ITS often transcends traditional transportation infrastructure, it is important to involve non-traditional stakeholders in the architecture development and visioning process. Input from these stakeholders has been a critical part of defining the interfaces, integration needs, and overall vision for ITS in a region. The development of the original Northwest Arkansas Regional ITS Architecture included input from a broad range of public and private agencies throughout the region. A smaller group of stakeholders were included in the update to determine what changes in the architecture were needed. The following stakeholder agencies have participated in the current Northwest Arkansas Region project workshops or provided input to the project team:

- ArDOT;
- Benton County;
- City of Bentonville;
- City of Fayetteville;
- City of Lowell;
- City of Rogers;
- City of Siloam Springs;
- City of Springdale;
- Northwest Arkansas National Airport;
- NWARPC;
- Ozark Regional Transit;
- Razorback Transit; and
- Washington County.

A more detailed list of stakeholders, including the individuals representing each agency is provided in **Appendix B: Northwest Arkansas Stakeholder Agencies and Contacts**. A description of each stakeholder agency is provided in **Appendix C: Northwest Arkansas Stakeholder Descriptions**.

2 REGIONAL ITS ARCHITECTURE DEVELOPMENT PROCESS

2.1 PROJECT TASKS

Development of the Northwest Arkansas Regional ITS Architecture relied on stakeholder input to ensure that the updated architecture reflected local needs. NWARPC TSMO and ITS Committee meetings and a workshop were held with stakeholders to gather input for the update. The process that was followed was designed to ensure that stakeholders could provide input and review for the development of the Regional ITS Architecture. The following tasks were undertaken to update the architecture:

- **Task 1 – Organize Stakeholder Groups:** To assist in the development of the Regional ITS Architecture, the project team coordinated with the NWARPC TSMO and ITS Committee throughout the course of the update.

- **Task 2 – Conduct Strategic Planning Interviews with Stakeholders:** The project team conducted stakeholder meetings with the six largest cities, ARDOT, and NWARPC to gain insight into the organization, the organization goals, current state of needs, current infrastructure, and infrastructure goals.

- **Task 3 – Conduct an ITS System Inventory:** The project team performed a baseline regional inventory of ITS infrastructure to help establish a broader understanding of the region's overall ITS capacity. The project team collected data from NWARPC's various program areas, from ARDOT and from the other stakeholders represented on the NWARPC TSMO and ITS Committee.

- **Task 4 – ITS Architecture Workshop and ITS Architecture Development:** The project team organized a strategic planning workshop to engage stakeholders to refine the draft materials from the previous tasks. At this workshop, participants were given the opportunity to comment on the vision, mission, goals, objectives, needs, and focus areas for the region's ITS program.

- **Task 5 – Develop Strategies and Action Items:** In this task, the project team worked with the NWARPC TSMO and ITS Committee to identify strategies and action items that explain how ITS will be advanced to address needs and emphasis areas.

- **Task 6 – Develop ITS Implementation Plan:** In this task, the project team worked with the NWARPC TSMO and ITS Committee to provide recommendations for a phased implementation approach of the ITS Architecture and Deployment Plan.

- **Task 7 – Develop Overall ITS Architecture and Deployment Plan and Executive Summary:** Based on the combined key inputs from the previous tasks, the project team developed the final program plan in terms of key sections dealing with strategic, programmatic, and tactical considerations. The plan also included identification of prioritized implementation plans and timelines of key actions to implement.

2.2 STRATEGIC DIRECTION FOR ITS IN NORTHWEST ARKANSAS

In consultation with the NWARPC TSMO and ITS Committee, TSMO and ITS strategic directions for Northwest Arkansas were defined by the development of statements of vision, mission, goals, and objectives, and they are presented in this section. These statements of strategic direction were developed jointly for TSMO and ITS because the two are so closely linked. Virtually all ITS elements are used in enabling TSMO strategies and most TSMO strategies require ITS elements. The statements of strategic direction were developed to be supportive and complementary.

The statements of strategic direction in this section align with NWARPC's vision for the region, as reflected in plans such as the 2045 Metropolitan Transportation Plan, the region's 2022 Congestion Management Process, and through the discussions conducted with the region's stakeholders. The statements, which were discussed with key stakeholders and refined for the Regional ITS Architecture Update in the workshop meetings on September 21 and 22, 2022, are as follows:

TSMO Vision - To enhance the Northwest Arkansas Region's connectivity through promoting an integrated transportation system that is able to sustain the region's rapid growth.

ITS Vision - To embrace technological innovations in ITS and deploy those ITS elements that will cost-effectively support the region's TSMO Vision.

TSMO Mission - Provide a safe, reliable, and efficient transportation network for the Northwest Arkansas Region through leveraging stakeholder collaboration and innovative technology solutions.

ITS Mission - Develop a world-class ITS system within the Northwest Arkansas Region that will support a safe, reliable, and efficient transportation network.

Goals and Objectives - The TSMO and ITS goals and their associated objectives are intended to define a practical direction to attain the vision and support the mission defined in the previous sub-sections.

- **Goal: Safety**

  TSMO Objectives
  - Reduce crash frequency in the region.
  - Reduce crash severity in the region.
  - Minimize the motor vehicle crash-associated cost incurred by the roadway users in the region.

  ITS Objectives
  - Implement detection and warning systems for:
    - Traffic queues
    - Pedestrians and bicyclists at crossings
    - Excessive speeds
    - Wrong-way driving
    - Work zones
  - Support Connected and Autonomous Vehicle operation.
  - Improve incident detection and response capabilities.

- **Goal: Reliability**

  TSMO Objectives
  - Improve the region's travel-time reliability.
  - Manage congestion more efficiently.
  - Enhance real-time traffic information in the region.

  ITS Objectives
  - Enhance traffic signal-controller capabilities to support advanced and future technology.
  - Implement speed detection, monitoring, and reporting capability.
  - Implement equipment and software for signal coordination.
  - Improve communications network reliability and availability.
  - Expand fiber-optic communications network.

- **Goal: Efficiency**

    TSMO Objectives

    o   Operate a coordinated regional transportation network.
    o   Maintain the regional transportation network.
    o   Provide seamless mobility to transportation network users.

    ITS Objectives

    o   Enhance traffic signal controller capabilities to support advanced and future technology.
    o   Provide real-time traffic, incident, closure, road conditions, travel options, and other traveler information to the public.
    o   Train agency staff on ITS technology and its maintenance.

- **Goal: Collaboration**

    TSMO Objectives

    o   Promote coordination between the various stakeholders in Northwest Arkansas, which includes, but is not limited to, ARDOT, NWARPC, cities, counties, transit authorities, and private sector companies.
    o   Develop a communication framework for the region's stakeholders.
    o   Encourage data and information sharing between the region's stakeholders.

    ITS Objectives

    o   Improve information sharing and coordination of events, incidents, and construction.
    o   Implement communication technology to share data and video across jurisdictional boundaries.
    o   Implement a regional data warehouse and dashboards.

- **Goal: Integration**

    TSMO Objectives

    o   Incorporate the TSMO and ITS strategies into the regional planning.
    o   Focus on implementing strategies that directly improve transportation operations in the region.
    o   Include TSMO and ITS in maintenance, construction, and design processes.

    ITS Objectives

    o   Continue the operation of an NWARPC TSMO and ITS Working Group.
    o   Integrate ITS champions into the regional and local decision-making bodies.

- **Goal: Innovation**

    TSMO Objectives

    o   Leverage feasible technology solutions on the regional network.
    o   Create an environment that attracts transportation innovators to the region.

    ITS Objectives

    o   Continuously modernize ITS technology and equipment.
    o   Regularly review emerging ITS technologies and consider possible applications.
    o   Jointly fund regional pilot applications of new technologies.

- **Goal: Environmental Sustainability**

  TSMO Objectives
  - Reduce vehicle travel delay.
  - Increase use of transit, ridesharing, and non-motorized modes.
  - Reduce motor vehicle emissions that contribute to air quality issues and climate change.

  ITS Objectives
  - Reduce motor vehicle emissions by reducing arterial delay at traffic signals though more demand responsive signal timing.
  - Increase use of transit, ridesharing, and non-motorized modes by increasing traveler information about the availability and access to these options.
  - Increase use of non-motorized modes by using ITS to improve the safety of walking and bicycling.

3 ITS INVENTORY FOR NORTHWEST ARKANSAS

3.1 ITS INVENTORY PROCESS

An important initial step in the architecture development process was to establish an inventory of existing ITS elements. At the TSMO and ITS Workshop and through subsequent discussions with agency representatives throughout the region, Northwest Arkansas stakeholders provided the team with a list of existing, planned, and future systems that would play a role in the region's ITS architecture. "Planned" is defined as a system with funding identified, while "future" is defined as a system that is desired but does not yet have funding identified.

Existing, planned, and future systems in the Northwest Arkansas Region were identified in the following categories:

- **Traffic Management –** includes future traffic management centers (TMCs), detection systems, fixed and portable DMS, and CCTV.
- **Traveler Information –** includes broadcast traveler information and other related technologies such as web-based applications.
- **Public Safety –** includes emergency operations/management centers, improved information sharing among traffic and emergency services, traffic signal preemption, transportation infrastructure protection, wide-area alerts, and systems to aid in evacuations.
- **Maintenance and Construction Management –** includes road weather data, work zone management, and roadway maintenance and construction information.
- **Public Transportation Management –** includes transit and paratransit automated vehicle location (AVL), electronic fare management, transit security, multi-modal coordination, and transit travel information systems.
- **Commercial Vehicle Operations –** includes hazardous material (HAZMAT) management and coordination with Commercial Vehicle Information System Networks (CVISN) efforts.
- **Archived Data Management –** includes electronic data management and archiving systems.

A detailed inventory of existing and planned ITS elements in Northwest Arkansas is provided by stakeholder agency in **Appendix D: Northwest Arkansas Regional ITS Inventory**.

3.2 NORTHWEST ARKANSAS ITS INVENTORY SUMMARY

Traffic Management

Traffic control is the most significant application of ITS in Northwest Arkansas. Each of the cities is responsible for maintaining and operating the traffic signals within their jurisdiction. The traffic signals in the region are generally supported by ITS equipment for vehicle detection, video capture, signal controllers, and communications. All of the cities interviewed had the capability to monitor video feeds and signal operation remotely from city offices. Several, but not all, of the cities have TMCs as a physical space for monitoring this signal system and coordinating corrective actions when necessary. The other cities have staff monitoring operations from their own workspace. Bella Vista, Bentonville, Fayetteville, Rogers, Siloam Springs and Springdale all have the capability to monitor video feeds and signal operations remotely from city offices (or the offices of contracted consultants) and can take corrective actions when necessary. Communications between the various field elements and from the field to the operations center varied between the cities. Some had fiber optic communications while others used wireless Ethernet communication.

ARDOT does not have responsibility for operating or maintaining any of the signals within Northwest Arkansas, but does have a statewide TMC where it receives video feeds from the cities that have that capability. This provides ARDOT with the capability for monitoring signal performance, but not for actual management of the signal operations.

The method for signal operation and the level of ITS technology to support the operations varies within the region. While most cities operate signal equipment that follows different timing plans for different periods of the day, some cities use only fixed phases throughout the day. Only Springdale has evaluated Adaptive Signal Timing using real-time traffic sensors to modify the signal timing in response to demand. They continue to use video detection to identify the need for changes in timing plans but are no longer using adaptive signal timing that changes signal timing in response to real-time or close to real-time data. All of the cities listed above plus the City of Lowell have the capability for video detection of traffic at signals, but not all of the cities use that capability for signal timing.

Most of the cities have the capability for signal preemption. Most use this capability for emergency vehicles, such as police, fire, or EMS vehicles. Some had systems that could also provide preemption for transit vehicles, but none are using that capability at the present time. Several of the cities interviewed have railroad lines crossing city streets. Train detection is used by railroads to activate crossing lights and gates, as well as send signals to interconnected traffic signals for them to independently change their timings to manage traffic until trains clear the intersection. This is used only at high volume roads, with control on low volume roads being primarily by stop or yield signs.

Data Collection and Traveler Information

ITS equipment is used extensively to provide vehicle detection for traffic management throughout the region. Most of the video surveillance at signal locations can provide traffic counts for all movements at an intersection. Some are also capable of identifying pedestrians and bicyclists. At a few locations within the region, there is use of radar to collect vehicle speed information, but this was generally only at locations where speeding is a problem and is used to provide warnings to motorist traveling over the speed limit using speed feedback signs. Only a few of the cities interviewed were recording and storing traffic data for use in performance evaluation or planning. There are no data management systems set up to store, process, report, or transmit traffic data. None of the cities are using traffic data they have collected for their own traveler information systems or for the statewide IDrive Arkansas system.

The main source of traveler information in Northwest Arkansas for travelers is the IDrive Arkansas system managed by ARDOT. The system draws on data collected by ARDOT on traffic speeds, incident locations, lane closures, road construction, road conditions, and live video images at selected locations. The information is available to travelers by cell phone app or a computer, and covers most state roads In Arkansas. The cities in Northwest Aransas are not currently reporting any information about local roads to ARDOT for use in IDrive Arkansas.

Public Safety, Incident Response and Emergency Response

In each of the cities interviewed, Emergency Management was led by either the city's Police Department or Fire Department. Although interviews were not conducted with city departments other than Transportation, the Transportation staff said they were not aware of any ITS for Emergency Management other than for Computer Aided Dispatch (CAD) of emergency vehicles in response to an incident or emergency. In some of the cities interviewed, Police and Fire Department staff were allowed to view video from signal locations, but were not given capability to modify signal timing. All of the cities used weather reports from outside organizations. None have their own Roadway Weather Information System (RWIS) sensors.

Support for Public Transportation and Alternative Modes

Most of the cities interviewed use supplemental traffic control and warning devices for bicycle and pedestrian crossings, particularly at midblock crossings. Most of the cities had applications of Rectangular Rapid Flashing Beacons (RRFB) or High-Intensity Activated Crosswalk (HAWK) signals within their jurisdiction. Most of these are activated by pedestrians or bicyclists pushing an activation button rather than by detection of the presence of a pedestrian or bicyclist from a camera. Many of the cities interviewed had the capability to identify pedestrians and bicyclists from video detection, but were not using the data for activation of warnings or changes in signal timing.

Interviews were not conducted with staff from Ozark Regional Transit (ORT) or Razorback Transit. Staff from the cities interviewed indicated that ORT operates demand-responsive services that use ITS for vehicle dispatch and routing. Razorback Transit uses ITS technology for management of its parking facilities.

Regional Collaboration on ITS Development

NWARPC coordinates the regional transportation activities for the region. In that capacity, NWARPC uses a committee structure to develop regional policies and programs and to identify priorities for federal and state funding provided to the region. NWARPC has formed a "TSMO and ITS Committee" to guide the development of the TSMO Plan and update the Regional ITS Architecture and Deployment Plan for the region. This committee is overseeing the development of strategies for increasing regional collaboration on ITS development and application.

3.3 LINKING ITS ELEMENTS WITH SERVICE PACKAGES

Upon completion of the system inventory, the next step in the development of the architecture was to identify the transportation services that are important to the Northwest Arkansas Region. In the National ITS Architecture, services are referred to as service packages. A service package is a detailed description of an ITS service that is available to be delivered to customers. A service package includes a service-level package and one or more core services and supporting services. Service packages can include several stakeholders and elements that work together to provide a service in the region. Examples of service packages from the National ITS Architecture include Network Surveillance, Traffic Information Dissemination, and Transit Vehicle Tracking. There are currently a total of 152 service packages identified in the National ITS Architecture, Version 9.1, which was the latest version available at the time of this effort. For the Northwest Arkansas Regional ITS Inventory, 55

Services Packages were identified as relevant. A list of those service packages and a description of each is provided in **Appendix E: Service Package Descriptions.**

4   REGIONAL NEEDS, PRIORITIES, ITS STRATEGIES, ACTION ITEMS, AND SERVICE PACKAGES

Needs from the region were identified in the TSMO and ITS Workshop where stakeholders identified the needs in the region. Those that were "High Priority" were specifically identified, which encompassed the needs that the stakeholders wanted to address in the next five years. In addition, during the architecture development phase, other needs became apparent from stakeholders. **Appendix F: Northwest Arkansas ITS Needs and Corresponding Service Packages** documents both the needs discussed at the Workshop as well as any of the needs gathered in the development of the architecture document and the priorities for those needs.

Based on the ITS needs identified, five ITS strategies were identified for addressing the high-priority needs, and specific actions needed to implement the strategies were developed. A summary of the needs, strategies, and actions is provided below.

Strategy 1: Improve the efficiency, effectiveness, and safety of regional traffic management.

> **ITS Need**

- Need for improved traffic management systems, such as closed loop traffic signal systems, throughout the region.
- Need for TMCs in cities for improved traffic management capabilities on major corridors.
- Need for improved signal coordination on arterials and across city boundaries.
- Need for improved data collection systems, such as detectors, throughout the region.
- Need for an ITS-enhanced traffic management system for athletic events at the University of Arkansas and other major events in the region.
- Need for technology-guiding standards and policies in the region.

> **Action Items**

1. Identify the equipment and software used by each jurisdiction within the region to determine compatibility and interoperability.
2. Identify the additional traffic management functions desired collectively in the region and for each jurisdiction.
3. Initiate a regional strategy to develop a fiber optic communication and signal systems connectivity plan.
4. Initiate a regional discussion of the desirability of achieving signal controller consistency in the region over time as a means of supporting coordinated timing between the cities.

Strategy 2: Collect, store, and share more travel-related information to improve operations and traveler information for users of all modes.

ITS Need

- Need to consider data archiving as ITS vehicle detection technologies are implemented and data becomes more available.
- Need for "big data" sources to be purchased and made available to and used by the cities for volumes, speeds, and origin-destinations.
- Need for a regional system for logging, displaying, and tracking planned lane or road closures for maintenance, construction, or special events.

Action Items

1. Identify the additional data desired for traffic management functions collectively in the region and for each jurisdiction, and identify priorities for collecting, storing, and sharing the data.
2. Initiate a regional program for logging, displaying, and tracking planned lane or road closures for maintenance, construction, or special events.

Strategy 3: Improve the regional emergency response to traffic incidents, major storms, and other emergency situations.

ITS Need

- Need to improve incident management coordination capabilities.
- Need to add links to provide all emergency response agencies with video from ARDOT and local jurisdiction TMC video cameras.
- Need to increase the number of portable Dynamic Message Signs (DMS) for use during extended closures and for traffic control during traffic incidents, major storms, and major events.
- Need to consider adding ice detection systems on roads, particularly roads with steep grades.

Action Items

1. Formulate a regional strategy among the agencies involved for improving emergency response.
2. Identify the data, communications, and protocols necessary to improve regional emergency response and the ITS elements necessary to support it.

Strategy 4: Use ITS to improve access to and safe use of alternative modes of transportation, and to reduce motor vehicle emission and vehicle miles of travel.

ITS Need

- Need to improve overall traffic flow in the region that will benefit all transit vehicles and reduce vehicle emissions.
- Need Automatic Passenger Counting (APC) technology on buses to help produce passenger counts more efficiently.

- Need for an app for travelers to get all services in one place (Mobility as a Service), including transit, bikeshare, rideshare, etc.
- Need for technology and software to support transit fleet management functions, including life-cycle cost analysis, maintenance tracking, and scheduling and vehicle replacement scheduling.
- Need to implement ITS strategies to support transportation demand management programs, such as mode shift, teleworking, flexible work hours, bicycling, and walking.

Action Items

1. Organize a regional committee to identify opportunities to improve the access to and safe use of alternative modes of transportation, and to promote demand-management strategies.
2. Identify ITS elements that can be employed to improve the access to and safe use of alternative modes of transportation and prioritize the potential ITS applications.
3. Identify and pursue potential funding sources for ITS elements that can be employed to improve the access to and safe use of alternative modes of transportation.

Strategy 5: Increase regional collaboration on ITS development and applications.

ITS Need

- Need to continue to coordinate planning, deployment, and maintenance of ITS in the region to optimize efficiency and effectiveness in using ITS to meet regional goals and objectives.
- Need to incorporate ITS strategies and funding into the regional planning and programming process.

Action Items

1. Continue to use NWARPC and its committees to promote coordination between the various stakeholders in Northwest Arkansas, including, but not limited to, ARDOT, cities, counties, transit authorities, and private sector companies.

2. Include ITS in planning, programming, design, construction, and maintenance processes.

3. Develop a communication framework for the region's stakeholders to facilitate input on ITS strategies.

4. Integrate ITS champions into the regional and local decision-making bodies.

5. Encourage data and information sharing between the region's stakeholders.

5 CUSTOMIZATION OF THE NATIONAL ITS ARCHITECTURE TO NORTHWEST ARKANSAS

5.1 SERVICE PACKAGE PRIORITIZATION

Stakeholders were asked to prioritize the service packages into high, medium, and long-term priorities based on regional needs, feasibility, likelihood of deployment, and overall contribution of the service package to the goals and vision for ITS functionality in the region. The service package prioritization was a primary factor in developing recommendations for ITS deployment and integration in the Northwest Arkansas Region. These priorities identified the key ITS services that are desired by stakeholders in the Northwest Arkansas Region, as

well as the interfaces that need to be established to provide integrated functionality and establish communication between elements. Maturity and availability of technology were also considered in prioritizing the service packages. Another consideration included whether or not the service package was better suited for private deployment and operations rather than public sector deployment.

It is important to note that the high, medium, and long-term prioritization correspond roughly to the intended time frames for deployment:

- high priority: within the next five years,
- medium priority: within the next ten years, and
- long-term priority: within the next twenty years.

The priorities may shift during the life of the ITS Architecture and a service package can be a high priority, but because of funding or prerequisite project requirements, it might not be possible to deploy for within the five-year timeframe.

52 service packages were selected for implementation in the region. They are identified in Table 1 and sorted by functional area and by priority. Stakeholders prioritized the selected service packages during the workshop and the table organizes the service packages into service areas and priority groupings.

Table 1: Northwest Arkansas Service Package Prioritization by Functional Area

High Priority Service Packages	Medium Priority Service Packages	Long-term Priority Service Packages
Traffic Management		
TM01 Infrastructure-Based Traffic Surveillance	TM02 Vehicle-Based Traffic Surveillance	PM04 Regional Parking Management
TM03 Traffic Signal Control	TM10 Electronic Toll Collection	
TM06 Traffic Information Dissemination	TM13 Standard Railroad Grade Crossing	
TM07 Regional Traffic Management	TM15 Railroad Operations Coordination	
TM08 Traffic Incident Management System	TM17 Speed Warning and Enforcement	
TM09 Integrated Decision Support and Demand Management	PM01 Parking Space Management	
TM17 Speed Warning and Enforcement	SU07 ITS Communications	
TM19 Roadway Closure Management		
Public Safety (formerly Emergency Management)		

High Priority Service Packages	Medium Priority Service Packages	Long-term Priority Service Packages
TM08 Traffic Incident Management System PS01 Emergency Call-Taking and Dispatch PS02 Emergency Response	PS09 Transportation Infrastructure Protection PS10 Wide-Area Alert PS11 Early Warning System PS12 Disaster Response and Recovery PS13 Evacuation and Reentry Management PS14 Disaster Traveler Information	

Maintenance and Construction Management

MC03 Roadway Automated Treatment MC04 Winter Maintenance MC06 Work Zone Management MC08 Maintenance and Construction Activity Coordination	MC05 Roadway Maintenance and Construction MC07 Work Zone Safety Monitoring WX01 Road Weather Data Collection WX02 Weather Information Processing and Distribution	MC01 Maintenance and Construction Vehicle and Equipment Tracking MC02 Maintenance and Construction Vehicle Maintenance

Public Transportation Management

PT06 Transit Fleet Management PT07 Transit Passenger Counting TI02 Personalized Traveler Information TI04 Infrastructure-Provided Trip Planning and Route Guidance	PT05 Transit Security	PT04 Transit Fare Collection Management PT09 Transit Signal Priority PT11 Transit Pedestrian Indication PT14 Multi-modal Coordination

Commercial Vehicle Operations

	CVO04 Administrative Processes CVO08 Smart Roadside and Virtual WIM CVO18 Intelligent Access Program – Weight Monitoring CVO12 HAZMAT Management CVO13 Roadside HAZMAT Security Detection and Mitigation	

High Priority Service Packages	Medium Priority Service Packages	Long-term Priority Service Packages
Traveler Information		
TI01 Broadcast Traveler Information		
TI02 Personalized Traveler Information		
TM06 Traffic Information Dissemination		
Information Management		
DM01 ITS Data Warehouse		
DM02 Performance Monitoring		
TM19 Roadway Closure Management		

5.1.1 Customized Service Packages

The service packages in the National ITS Architecture were customized to reflect the unique systems, subsystems, and terminators in the Northwest Arkansas Region. Terminators represent the people, systems, and general environment that interface to ITS. Each service package is shown graphically with the service package name, local agencies involved, and desired data flows included. Service packages represent a service that will be deployed as an integrated capability.

Figure 3 is an example of an APTS service package for Multimodal Coordination that has been customized for the region to show traffic signal priority for Ozark Regional Transit vehicles. This service package shows the four subsystems: Traffic Management, Transit Management, Transit Vehicle, and Roadway. The service package additionally shows the associated entities (Municipal Traffic Operations Center, Ozark Regional Transit Dispatch, Ozark Regional Transit Fixed Route Transit Vehicle, and Municipal ITS Field Equipment) for multimodal coordination in the region. Data flows between the subsystems indicate what information is being shared.

Service packages that were customized for the Northwest Arkansas Region are shown in **Appendix G: Northwest Arkansas Customized Service Packages**. In the appendix, service packages are grouped by functional area (Traffic Management, Public Safety, Maintenance and Construction Management, Public Transportation Management, etc.).
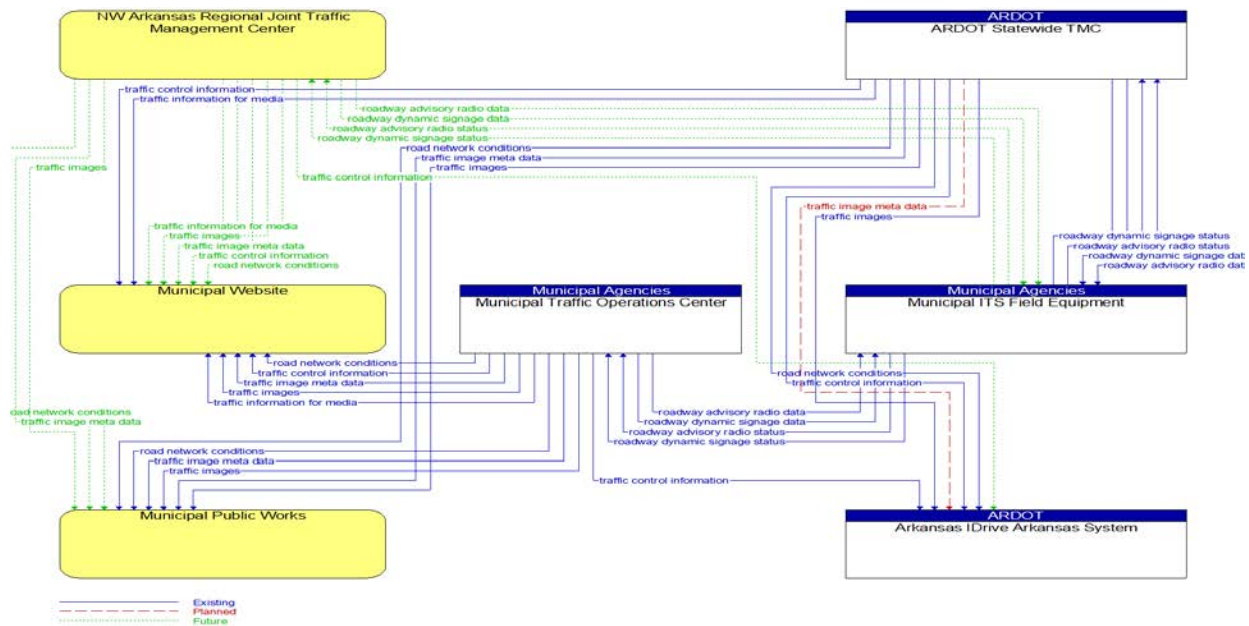
Figure 3: Example Service Package Diagram: Traffic Information Dissemination

5.1.2   Regional ITS Needs and Customized Service Packages

The regional ITS needs that were gathered from stakeholders through the interviews, the workshops, and the TSMO and ITS Committee meetings are shown in **Appendix E: Northwest Arkansas ITS Needs and Corresponding Service Packages**, where they are matched to their respective service package.

5.2   ARCHITECTURE INTERFACES

While it is important to identify the various systems and stakeholders as part of the Regional ITS Architecture, a primary purpose of the architecture is to identify the connectivity between transportation systems in the Northwest Arkansas Region. The service package diagram in Figure 3 shows the high-level relationships of the subsystems and terminators in the Northwest Arkansas Region and the associated local projects and systems. The customized service packages represent services that can be deployed as an integrated capability, and the service package diagrams show the information flows between the subsystems and terminators that are most important to the operation of the service packages. How these systems interface with each other is an integral part of the overall ITS architecture.

5.2.1   Element Connections

There are a large number of different elements identified as part of the Northwest Arkansas Regional ITS Architecture. These elements include traffic management centers, transit vehicles, dispatch systems, emergency management agencies, media outlets, and others – essentially, all of the existing and planned physical components that contribute to the regional ITS. Interfaces have been identified for each element in the Northwest Arkansas Regional ITS Architecture, and each element has been mapped to those other elements with which it must interface.

5.2.2   Data Flows Between Elements

Architecture flows between the subsystems and terminators define the specific information (data) that is exchanged between subsystems and terminators. Each architecture flow has one or more data flows that specify

what information is exchanged and the direction of the exchange. These data flows could be requests for information, alerts and messages, status requests, broadcast advisories, event messages, confirmations, electronic credentials, and other key information requirements. These architecture flows define the interface requirements between the various elements in the Northwest Arkansas Regional ITS Architecture.

An example of the architecture flows between two elements is shown in Table 2. In this summary, the flows between the ARDOT District 4 TMC and the ARDOT CCTV cameras show the information that must go between the elements. Similar to the interfaces, architecture flows are also defined as existing, planned, or future.

Table 2: Example Data Flow Table

Source	Architecture Flows	Destination
ARDOT CCTV Cameras	Traffic images	ARDOT District 4 TMC
ARDOT District 4 TMC	Video surveillance control	ARDOT CCTV Cameras

6 APPLICATION OF THE REGIONAL ITS ARCHITECTURE

Once a region has identified the desired components of ITS for their area and established which agencies and systems need to be connected, the structure of the National ITS Architecture assists with the region's planning and implementation. This section addresses the application of the Regional ITS Architecture in the Northwest Arkansas Region. The National ITS Architecture provides recommendations for standards and functional requirements that should be considered when implementing ITS elements. In addition, an operational concept has been developed for the region and documents the roles and responsibilities of stakeholders in the operation of the Regional ITS Architecture. The implementation of ITS in the Northwest Arkansas Region will likely require interagency agreements. Potential agreements have been identified based on the desired data flows identified in the Northwest Arkansas Region. The ITS Architecture and ITS Deployment Plan, which were developed as part of this process, will be incorporated into the existing planning process, ensuring that the region will achieve the maximum benefit from the development effort.

6.1 FUNCTIONAL REQUIREMENTS

Functions are a description of what the system has to do. In the National ITS Architecture, functions are defined at several different levels, ranging from general subsystem descriptions through somewhat more specific equipment package descriptions to Process Specifications that include substantial detail. Guidance from the USDOT on developing a Regional ITS Architecture recommends that each region determine the level of detail of the functional requirements for their region. In the Northwest Arkansas Region, it is recommended that the development of detailed functional requirements, such as the "shall" statements included in Process Specifications for a system, be developed at the project level. These detailed "shall" statements identify all functions that a project or system needs to perform.

For the Northwest Arkansas Regional ITS Architecture, functional requirements have been identified at two levels. The customized service packages describe the services that ITS needs to provide in the region and the architecture flows between the elements. These service packages and data flows describe what the ITS system in Northwest Arkansas has to do and the data that need to be shared among elements.

At a more detailed level, functional requirements for the Northwest Arkansas Region are described in terms of functions that each element in the architecture performs or will perform in the future. **Appendix H: Northwest Arkansas ITS Element Functions** contains a table that summarizes the functions by element.

6.2 STANDARDS

Standards are an important tool that will allow efficient implementation of the elements in the Northwest Arkansas Regional ITS Architecture over time. Standards facilitate deployment of interoperable systems at local, regional, and national levels without impeding innovation as technology advances, vendors change, and new approaches evolve. The USDOT's ITS Joint Program Office is supporting Standards Development Organizations (SDOs) with an extensive, multi-year program of accelerated, consensus-based standards development to facilitate successful ITS deployment in the United States. **Appendix I: Northwest Arkansas Applicable ITS Standards** identifies each of the ITS standards that could apply to ITS deployments in the Northwest Arkansas Region. These standards are based on the physical subsystem architecture flows.

6.3 OPERATIONAL CONCEPT

An Operational Concept documents each stakeholder's current and future roles and responsibilities in the operation of the regional ITS. The operational concept documents these roles and responsibilities across a range of transportation services. The services covered are:

- **Traffic Management** – The development of signal systems that react to changing traffic conditions and provide coordinated intersection timing over a corridor, an area, or multiple jurisdictions. Traffic management will also include network surveillance capabilities such as detectors and CCTV cameras on arterials and highways.
- **Public Safety** – The development of systems to provide rapid and effective response to incidents, emergency call taking, public safety dispatch, and emergency operations center functions.
- **Maintenance and Construction Management** – The development of systems to manage the maintenance of roadways in the region. Includes the managing of construction operations.
- **Public Transportation Management** – The development of systems to more efficiently manage fleets of transit vehicles. Includes systems to provide transit traveler information both pre-trip and during the trip.
- **Commercial Vehicle Operations** – The development of systems for commercial vehicle permitting and hazardous material (HAZMAT) management.
- **Traveler Information –** The development of systems to provide static and real-time transportation information to travelers.
- **Parking Management –** The development of systems to electronically collect parking fees and provide real-time information on parking availability.
- **Information Management –** The development of systems to collect transportation data for use in non-operational purposes (e.g., planning and research).

Appendix J: Northwest Arkansas Stakeholder Roles and Responsibilities identifies the roles and responsibilities of key stakeholders in each of these transportation services.

6.4 POTENTIAL AGREEMENTS

The Northwest Arkansas Regional ITS Architecture has identified several agency interfaces, information exchanges, and integration strategies that would be needed to provide the ITS services and systems identified by the stakeholders in the region. Interfaces and data flows among public and private entities in the Northwest Arkansas Region will require agreements among agencies that establish parameters for sharing agency

information to support traffic management, incident management, provide traveler information, and other functions identified in the Regional ITS Architecture.

With the implementation of ITS technologies, integrating systems from one or more agencies, and the anticipated level of information exchange identified in the architecture, it is likely that formal agreements between agencies will be needed in the future. These agreements, while perhaps not requiring a financial commitment from agencies in the region, should outline specific roles, responsibilities, data exchanges, levels of authority, and other facets of regional operations. Some agreements will also outline specific funding responsibilities, where appropriate and applicable.

Table 3 provides a list of potential agreements for the Northwest Arkansas Region based on the interfaces identified in the Regional ITS Architecture. It is important to note that, as ITS services and systems are implemented in the region, part of the planning and review process for those projects should include a review of potential agreements that would be needed for implementation or operations.

6.5 PHASES OF IMPLEMENTATION

The Regional ITS Architecture will be implemented through a series of projects led by both public sector and private sector agencies. Key foundation systems will need to be implemented in order to support other systems that have been identified in the Regional ITS Architecture. The deployment of all of the systems required to achieve the final Regional ITS Architecture build out will occur over many years.

A sequence of projects and their respective time frames have been identified in the Northwest Arkansas Regional ITS Architecture. These projects have been sequenced over a 20-year period based on priority, with projects identified as "high-priority" for deployment within 5 years, "medium-priority" with 10 years, and "long-term" within 20 years.

Key service packages that will provide the functions for the foundation systems in the Northwest Arkansas Region were identified in Section 5. Projects associated with the high-priority service packages are identified in Section 7.

Table 3: Northwest Arkansas Potential Agreements

Agreement and Agencies	Agreement Description
Data Sharing and Usage (Public-Private)	Agreement would allow private sector media and information service providers to access and broadcast public transportation agency CCTV camera video feeds, real-time traffic speed and volume data, and incident data. Agreements should specify the control priority to allow traffic agencies first priority to control cameras during incidents or other events. The ability of the traffic agency to deny access to video and data feeds if a situation warrants such action should also be part of the agreement.
Data Sharing and Usage (Public-Public)	Agreement would define the parameters, guidelines, and policies for inter-agency ITS data sharing between the public sector agencies. Similar to data sharing and usage agreements for public-private agencies, the agency that owns the equipment should have first priority of the equipment and the ability to discontinue data sharing if a situation warrants such action.

Electronic Toll Interoperability Agreements	Agreements to define electronic toll collection interoperability between regional tolling authorities, as well as the potential to develop compatibility with transit and parking agencies in the region.
Incident Data Sharing and Usage	Agreement would define the parameters, guidelines, and policies for inter-agency sharing of incident data between transportation and emergency management agencies in the region. Incident information could be sent directly to CAD systems and include information on lane closures, travel delays, and weather.
ITS and Traffic Signal Timing Data Sharing and Usage	Agreement would define the parameters, guidelines, and policies for inter-agency ITS and traffic signal timing sharing between cities, counties, and any other agencies that might maintain their traffic signal system.
Joint Operations Agreements	Agreement to operate the system from a shared control facility that could include traffic, transit, and emergency management. Examples could include a regional TMC or a combined TMC and EOC. The agreement should define such items as hours of operation and time of day/day of week when shared control would take effect, circumstances, or incidents when shared control would take effect, notification procedures between the agencies agreeing to share control arrangements, overriding capabilities of owning agency, etc. Shared field equipment, such as a CCTV camera that can be accessed by multiple agencies, could also be covered under this type of agreement.
Maintenance Agreements	Agreement that would allow multiple public agencies to pull their funding together to hire a single maintenance contractor to maintain ITS devices throughout the region.

7   REGIONAL ITS ARCHITECTURE SERVICE PACKAGE IMPLEMENTATION AND RECOMMENDED HIGH-PRIORITY PROJECTS

Of the 152 service packages available in Version 9.1 of the National ITS Architecture, 55 were selected and customized for deployment in the Northwest Arkansas Region. The service packages outline the functions that stakeholders envision ITS to perform in coming years. The Deployment Plan builds on those service packages through the development of project concepts to implement in the region.

7.1   SERVICE PACKAGES AND SUPPORTING PROJECTS

To implement the ITS service package services in the Northwest Arkansas Region, each service package was reviewed to determine what projects should be deployed to provide the desired services of that service package. Stakeholders provided feedback on these projects at an TSMO and ITS Workshop and Committee Meetings. While the timeframe of the Deployment Plan was as far out as twenty-years, stakeholders generally focused on shorter term projects that were more likely to be funded when identifying projects. The recommended projects for the high-priority service areas are provided in the sections below and in **Appendix K: Northwest Arkansas Recommended High-Priority ITS Projects**. The recommended high-priority projects are organized by service areas. Each service area includes:

- A brief definition of the service package (which have been modified from the National ITS Architecture definitions);
- Recommended projects that will address some or all of the services that are contained in the service package.

It should be noted that not every service package has an associated ITS project. Several service packages were identified as being important to the region, but there were no projects that stakeholders felt were feasible enough to document in the ITS Deployment Plan at this time. In the future, it is likely that additional projects will be added to the Northwest Arkansas Regional ITS Architecture's Deployment Plan to implement these service packages.

7.1.1   Traffic Management Service Area

These service packages and related projects implement the traffic management service area functions. These traffic management service areas represent some of the most commonly deployed projects, such as closed-circuit television (CCTV) cameras, dynamic message signs (DMS), traffic operations centers (TOCs), and traffic signal systems. It is expected that many of the service packages in this area will be deployed prior to service packages in other areas. Traffic management services involve a broad spectrum of stakeholders and their effects impact all transportation sectors, from emergency management agencies such as Police and Fire Departments to transit agencies such as Razorback Transit and Ozark Regional Transit. The high-priority projects recommended for this service area are as follows:

- Northwest Arkansas Regional Operations Committee and Future Northwest Arkansas Joint Regional Traffic Management Center
- ARDOT I-49 Road Network Surveillance and Infrastructure Security Monitoring Expansion
- City of Fayetteville Queue Detectors for I-49 Exit Ramps
- Future Municipal TOC and Traffic Signal System Deployment
- Municipal and County CCTV Camera Deployment
- Municipal and County Real-Time Transportation Information Website Enhancements
- Municipal and County TOC Upgrades
- Standard Railroad Grade Crossing Coordination
- Municipal Speed Warning Systems
- ARDOT, County and Municipal Road Closure Management Systems
- Low Water Crossing Flood Detection and Road Closure Systems
- ARDOT I-49 DMS Deployment Expansion
- ARDOT, County and Municipal Portable DMS Expansion
- Municipal and County DMS Deployment

7.1.2   Public Safety Service Area

These service packages and related projects implement ITS functions that support public safety activities. These service packages are important for incident response, coordination of the emergency management and transportation systems, and protection of the transportation infrastructure. It is important for mutual aid response that plans and projects are coordinated for ITS technologies in Northwest Arkansas. For instance, signal preemption devices deployed in one city should be compatible with other cities to allow responders to use signal preemption during mutual aid responses. The high-priority projects recommended for this service area are as follows:

- Benton County Coordinated Dispatch
- Washington County Coordinated Dispatch
- Municipal and County Traffic/Public Safety Video Sharing
- Northwest Arkansas Regional Mutual Aid Agreements
- Municipal and County Emergency Vehicle Traffic Signal Preemption

7.1.3   Maintenance and Construction Management Service Area

These service packages and related projects implement maintenance and construction management ITS functions. Maintenance and construction activity coordination, portable DMS for road closures and detour information, and road weather data collection primarily for flood and ice detection were identified as priorities for the Northwest Arkansas Region. The high-priority projects recommended for this are as follows:

- ARDOT, County, and Municipal Maintenance and Construction Activity Coordination System
- ARDOT, County, and Municipal Road Weather Data Collection Systems
- ARDOT, County, and Municipal Low Water Crossing Flood Detection and Road
- ARDOT Anti-icing Systems

7.1.4   Public Transportation Management Service Area

These service packages and related projects implement public transportation management ITS functions. Public transportation projects for Ozark Regional Transit and Razorback Transit were identified for a number of service packages. Many of these service packages were considered high priority and will likely be implemented in the near future. The high-priority projects recommended for this service area are as follows:

- Transit Passenger Counting
- Transit Asset Management and Maintenance Scheduling System
- Transit Personalized Interactive Traveler Information

7.1.5   Commercial Vehicle Operations Service Area

These service packages are related to commercial vehicle operations in the region. Planning for commercial vehicle operations is also being done on a statewide level as part of the Commercial Vehicle Information Systems and Networks (CVISN) program. As part of the CVISN program, projects are being developed on a statewide basis rather than a regional basis. Certain HAZMAT projects have been identified specific to the Northwest Arkansas Region due to the large number of freight vehicles operating in the area, as well as to help secure infrastructure such as the Bobby Hopper Tunnel.

No high-priority projects were recommended for this service area.

7.1.6 Traveler Information Service Area

These service packages and related projects implement traveler information ITS functions. Traveler information service area projects address service packages that broadcast traveler information over a wide area. The statewide IDrive Arkansas has become the primary traveler information outlet for highway information. There was strong interest in the Northwest Arkansas stakeholders to see IDrive Arkansas expand to provide more types of roadway information and for arterials as well as highways. The high-priority projects recommended for this service area are as follows:

- Expansion of IDrive Arkansas to include Arterial Data from Cities and Counties
- Municipal and County Real-Time Transportation Information Website Enhancements
- Municipal and County Real-Time Transportation Information Website Enhancements
- Northwest Arkansas Media Liaison and Coordination
- Northwest Arkansas Regional Traveler Information Website
- Mobility as a Service App

7.1.7 Information Management Service Area

These service packages and related projects implement archived data management ITS functions. Data collected through ITS deployments can be housed in several different formats. The service packages selected by stakeholders will allow data for a specific agency to be housed by that agency, or all data from throughout the region can be sent to a site to be housed together. Data housed by an agency as part of an ITS data mart would likely be part of another project deployment and are not called out separately in this section. For example, DMS implementation might include software to archive all of the messages placed on the DMS over a period of time. The high-priority projects recommended for this service area are as follows:

- Northwest Arkansas Regional Data Warehouse
- Northwest Arkansas Online Performance Dashboard

7.2 CONSIDERATION OF EMERGING TECHNOLOGIES

As the NWARPC study area grows, maintaining mobility safely and efficiently will become more complex. With growth comes higher traffic volumes, a more complex mix of modes on the transportation system, more points of conflict, and a need for more sophisticated methods of evaluating and managing transportation needs. Rapid development of a broad range of technologies in vehicle guidance, monitoring systems, automated data collection systems, artificial intelligence, traffic management software, communication systems, and data management tools is creating new and exciting opportunities for how transportation services are provided and managed. By examining the emerging technologies that are on the horizon, the transportation agencies in the NWARPC study area can make decisions now that will help maximize the value of the emerging capabilities as they become available.

Based on the current status of technology use in Northwest Arkansas and the interests of staff from the area's transportation agencies, the following are recommended for future consideration over time to supplement the high-priority ITS projects recommended in Section 7.1:

- **Pedestrian and Bicyclist Detection, Notification, and Warnings** – To promote a safer travel environment for pedestrians and bicyclists, the cities and counties should pursue the development of video- or radar-based bicycle and pedestrian detection systems at high-conflict intersections to notify drivers, activate warning signs, or adjust crossing time if pedestrians or cyclists are present.
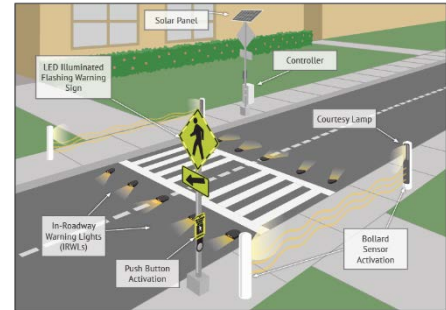
- **Weather and Flood Warning Systems** – Consider developing a multi-agency weather and flood warning system that assembles the best available information on severe weather events (rain, sleet, snow, tornados, or high winds) and provides warning to drivers and other travelers. The system should include a coordinated system for determining road closures due to weather or flooding and suggested alternative routes.

- **Signal Infrastructure-to-Vehicle Communications** – As the capability for communicating with connected vehicles improves over time and the number of connected vehicles increases, the cities and counties should consider technology for warning of red lights or queues at intersections or other safety functions to support connected vehicle technology.
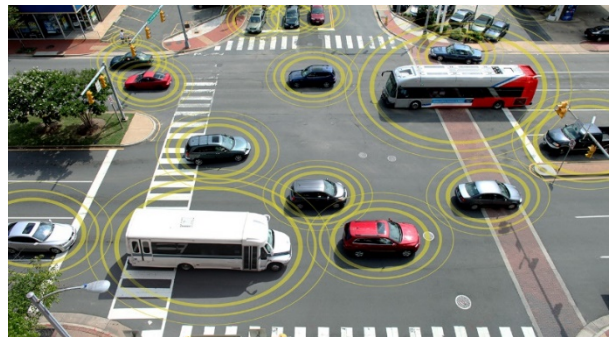
- **End-of-Queue Warning System** – As traffic volumes increase in Northwest Arkansas and congestion becomes more common, NWARPC and the transportation agencies in the area should consider future use of queue warnings to inform drivers about stopped or slow traffic ahead to provide vehicles more time to slow down safely. Queue warning systems use real-time traffic detection to identify queues and roadside dynamic message signs (DMS) to display the warnings.

- **Roadway Design, Infrastructure, and Maintenance to Support Safe Automated and Autonomous Vehicle Operations** – As the capability for automated and autonomous vehicle operation improves over time, the agencies responsible for designing, constructing, and maintaining the area's roads should consider modifying their practices to support the safe operation of automated and autonomous vehicles.

- **Advanced Video-based Data Collection** – The cities and counties should continue to research, procure, install, and use advanced video-based data collection to provide data on the movement of vehicles/people by all modes including cars, trucks, motorcyclists, bicyclists, and pedestrians. This type of data will be useful for signal timing, signal priority, warning systems, and long-range planning for special facilities for specific modes.

- **Automated Traffic Signal Performance Monitoring (ATSPM)** – As adequate data collection systems are implemented to support it, the cities, counties and ARDOT should develop or install an ATSPM system to provide the capability to evaluate signal timing and make improvements where appropriate.

- **Unmanned Aerial Vehicles (Drones) for Data Collection** – The Northwest Arkansas transportation agencies should monitor the development of and regulations regarding use of drone technology and explore the opportunities to use the technology to collect information more safely and cost-effectively. Drones have been used by transportation agencies throughout the US for bridge inspections, crash scene investigations, and data collection at locations that are difficult to reach in person.

8   FUNDING OF ITS PROJECTS

It was noted in the Northwest Arkansas Regional ITS Architecture document that both FHWA and FTA require that a region have an ITS architecture in place in order to be eligible for federal funding of transportation projects. Implementation of the ITS plans and projects presented in the ITS Architecture and Deployment Plan represent a major challenge for ARDOT and the operating agencies in Northwest Arkansas.

Funding for transportation in Northwest Arkansas comes from a combination of sources including federal, state, regional, and local city or county funding. ARDOT receives funds from a variety of federal funding formula and discretionary programs and many of these can be used for implementation and operation of ITS elements. In Arkansas, MPOs mostly get funds from the USDOT's Surface Transportation Block Group Program (STBGP), plus federal grant programs like the Carbon Reduction Program that is part of the Bipartisan Infrastructure Law. Transit operators receive funds from the FTA and from fares and advertising. Cities and counties receive funds for transportation from local taxes and from the state through the Connecting Arkansas Program (CAP), which started in 2009. CAP-2 is the state's second CAP funding program, created by legislation in 2020, and it made the CAP funding program permanent. CAP-2 provides a 1/2 cent sales tax for transportation in the state. From the amount generated, 70% will go to ARDOT, 15% will go to the cities, and 15% will go to the counties.

The challenges in implementing ITS are largely institutional and financial, but analytical tools and data are needed as well. Some of the major challenges in implementing ITS in Northwest Arkansas include:

- Creating a stable funding source for ongoing operations and maintenance;
- Integrating tools and methods for measuring benefits of ITS into the planning process;
- Establishment of specific goals and a mission for ITS projects;
- Increasing the visibility of ITS in the state and regional transportation planning processes;
- Increasing awareness among local officials and decisionmakers about ITS and its capabilities;
- Increasing awareness among staff responsible for project implementation;
- Staff training in planning, design, and construction of ITS projects; and
- Educating both agencies and the general public about the full-range of ITS applications, including those relevant to local transportation and emergency service agencies.

New sources of revenue are needed in order to establish a stable base for operations and maintenance and to fund any potential expansion of the system. The following subsections describe the available funding programs that may be used for ITS projects and operations.

8.1 FEDERAL FUNDING PROGRAMS

In late 2015, the U.S. Congress enacted the Fixing America's Surface Transportation Act (FAST Act), which provided funds for surface transportation activities. The FAST Act provided just over $300 billion dollars for surface transportation projects through the fiscal years of 2016 to 2020. The FAST Act built upon the Moving Ahead for Progress in the 21st Century Act (MAP-21), which was enacted in 2012, by expanding its scope to include improving highway mobility, supporting economic growth by creating jobs, and accelerating project delivery and promoting innovation. MAP-21 set out to make surface transportation projects streamlined, performance based, and multimodal, while improving safety, maintaining infrastructure, reducing traffic congestion, improving efficiency, protecting the environment, and expediting project delivery. In 2022, the U.S. Congress enacted the Bipartisan Infrastructure Law, which provided new funding sources to plan, design, build, manage, operate and maintain transportation infrastructure and service in the U.S. Many of these new funding programs can be used to support ITS infrastructure and services.

Appendix L: Potential Federal Funding Sources for the Northwest Arkansas ITS Architecture provides a description of the most relevant programs for funding of ITS. Where possible, the descriptions identify the purpose of the program, eligible uses, eligible recipients, and the amount of money authorized for the program. Descriptions are presented for the following programs:

Federal Aid Programs

- National Highway Performance Program (NHPP)
- Surface Transportation Block Group Program (STBGP)
- Highway Safety Improvement Program (HSIP)
- Railway-Highway Crossings (set-aside from HSIP)
- Transportation Alternatives Program (TAP) – part of STBGP

Federal Transit Funding Programs

- Urbanized Area Formula Grants
- Fixed Guideway Capital Investment Grants
- Mobility for Seniors and Individuals with Disabilities
- Formula Grants for Rural Areas

Federal Discretionary Grant Programs

- Advanced Transportation Technologies and Innovative Mobility Development (ATTIMD)/Advanced Transportation Technology and Innovation (ATTAIN)
- Rebuilding American Infrastructure with Sustainability and Equity (RAISE)
- Nationally Significant Freight & Highway Projects (INFRA)
- Transportation Infrastructure Finance and Innovation Act (TIFIA)

Bipartisan Infrastructure Act Programs

- Congestion Relief Program
- Accelerated Innovation Deployment (AID)
- Strengthening Mobility and Revolutionizing Transportation (SMART) Grants
- Safe Streets and Roads for All (SS4A) Grants
- Carbon Reduction Program Grants

- Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT) – Formula and Discretionary Grants
- Charging and Fueling Infrastructure Grants

8.2 ITS FUNDING CHALLENGES

Funding for ITS projects can be challenging due in part to their unconventional approach in mitigating traffic problems and improving overall efficiency of roadways. Far less money is spent in building and maintaining ITS than the other elements of the transportation network. In this section, capital funding, operations and maintenance funding, and the benefits of private-public partnerships are presented.

8.2.1 Capital Funding

Funding for constructing ITS projects may use many of the on-going federal funding categories, including the National Highway Performance Program (NHPP) , the Surface Transportation Block Grant (STBG) Program, and the Highway Safety Improvement Program (HSIP). FTA funding can also be available to fund ITS equipment from a variety of programs. Federal funding may also be available from the numerous new programs created by the FAST Act and the Bipartisan Infrastructure Law, all of which are described in **Appendix L: Potential Federal Funding Sources for the Northwest Arkansas ITS Architecture**.

City and county governments also have some available funds for ITS and traffic management projects including funds from the CAP program but, in most cases, local government budgets are usually taken up by operations and maintenance activities with very little remaining for significant capital projects.

8.2.2 Operations and Maintenance Funding

Ongoing funding for operations and maintenance require that a stable source of funding be established that allows for both day-to-day operation and replacement of equipment as it wears out or becomes obsolete. Federal sources that are currently used for operations and maintenance funding include NHPP, and STBG program funds. STBG funds can be used for operations and maintenance activities with no time limit and an 80 percent federal share, with a 20 percent state/local match. NHPP funds can also be used with an 80/20 split between federal and state/local funds.

9 MAINTAINING THE REGIONAL ARCHITECTURE

The Northwest Arkansas Regional ITS Architecture addresses the region's vision for ITS implementation at the time the plan was developed. Stakeholders invested a considerable amount of effort in the development of the Regional ITS Architecture and Regional ITS Deployment Plan. The plan needs to be incorporated into the regional planning process so that the ITS vision for the region is considered when implementing ITS projects and to ensure that the region remains eligible for federal funding for implementation of the projects.

As the region grows, needs will change and, as technology progresses, new ITS opportunities will arise. Shifts in regional needs and focus as well as changes in the National ITS Architecture will necessitate that the Northwest Arkansas Regional ITS Architecture be updated to remain a useful resource for the region.

9.1 USE OF THE REGIONAL ITS ARCHITECTURE IN THE REGIONAL PLANNING PROCESS

The Northwest Arkansas Regional ITS Architecture can serve as a valuable resource in the development of the Metropolitan Transportation Plan (MTP). The needs identified in the ITS Architecture should be considered by the NWARPC Policy Committee and Technical Advisory Committee in the planning process. During the project

selection process, the service package prioritization developed by stakeholders during the ITS architecture development process should be utilized to facilitate the selection of projects for inclusion in the MTP.

As projects transition from the MTP to the Transportation Improvement Program (TIP), each project should be evaluated to determine if the project includes any ITS elements. If the project contains an ITS element, then the Regional ITS Architecture needs to be reviewed to ensure that the project is in conformance. NWARPC can assist agencies as they perform this examination as part of the project application process.

9.1.1 Process for Determining Architecture Conformity

The Northwest Arkansas Regional ITS Architecture documents the customized service packages that were developed as part of the ITS architecture process. To satisfy federal requirements and remain eligible to use federal funds, a project must conform to the Regional ITS Architecture. The following steps are recommended to show conformance:

- Identify the ITS components in the project;

- Identify the corresponding ITS service packages(s) from the Regional ITS Architecture;

- Locate the ITS components that are being implemented as part of the project within the service package;

- Compare the connections to other agencies or elements documented in the ITS architecture, as well as the information flows between them to the connections that will be part of the project; and

- Document any changes necessary to the ITS Architecture or the project to ensure there is conformance.

Identifying the ITS Components

ITS components can be fairly apparent in an ITS-focused project, such as CCTV or DMS deployments, but could also be included in other types of projects. For example, an arterial widening project could include the installation of signal system interconnect, signal upgrades, and the incorporation of the signals in the project limits into a city's closed loop signal system. These are all ITS deployments and should be included in the ITS architecture.

Identifying the Corresponding Service Packages

If a project was included in the Northwest Arkansas Regional ITS Architecture, then the applicable service package(s) for that project must be identified. The service packages selected and prioritized for the Northwest Arkansas Region were identified in Table 1. Detailed service package definitions are located in **Appendix F: Service Package Descriptions**, and customized service packages for the region are included in **Appendix G: Northwest Arkansas Customized Service Packages**.

Identifying the Component within the Service Package

Once an ITS element is located on the service package, the evaluator may determine that the element name should be modified. For example, an element called the Bella Vista Traffic Operations Center was included in the architecture, but at the time of deployment, the owner agency might decide to call the center by a new name. This name change should be documented using the process outlined in Section 9.3.

Evaluating the Connections and Flows

The connections and architecture flows documented in the service package diagrams were selected based on the information available at the time the plan was developed. As the projects are designed, decisions will be

made on the system layout that might differ from what is shown in the service package. These changes in the project should be documented in the ITS service packages using the process outlined in Section 9.3.

Documenting Required Changes

If any changes are needed to accommodate the project under review, Section 9.3 describes how those changes should be documented. Any changes will be incorporated during the next architecture update. Conformance will be accomplished by documenting how the service package(s) should be modified so that the connections and data flows are consistent with the project.

9.2 MAINTENANCE PROCESS

ARDOT will be responsible for leading the maintenance of the Northwest Arkansas Regional ITS Architecture and Deployment Plan in coordination with NWARPC. Maintenance includes both modifications to the plan as well as complete updates. Modifications to the Regional ITS Architecture will often be necessitated by ITS projects that are receiving federal funding, but do not conform to the Regional ITS Architecture. NWARPC will take the lead in working with agencies that receive federal funding for ITS projects and will keep a record of any changes that are needed to the Regional ITS Architecture. Complete updates to the Regional ITS Architecture will occur every five years in the year preceding the MTP and will be led by ARDOT.

Table 4 summarizes the maintenance process agreed upon by stakeholders in the region.

Modifications to the Regional ITS Architecture will often be necessitated by ITS projects that are receiving federal funding, but do not conform to the Regional ITS Architecture. NWARPC will take the lead in working with agencies that receive federal funding for ITS projects and will keep a record of any changes that are needed to the Regional ITS Architecture. Complete updates to the Regional ITS Architecture will occur every five years in the year preceding the MTP and will be led by ARDOT.

Table 4: Regional ITS Architecture and Deployment Plan Maintenance Summary

Maintenance Details	Regional ITS Architecture		Regional ITS Deployment Plan	
	Modification	**Complete Update**	**Modification**	**Complete Update**
Timeframe for Updates	As needed	Every 5 years	Annually	Every 5 years
Scope of Update	Update service packages to satisfy architecture compliance requirements of projects or to document other changes that impact the ITS Architecture	Entire ITS Architecture	Update project status and add or remove projects as needed	Entire ITS Deployment Plan
Lead Agency	NWARPC	ARDOT	NWARPC	ARDOT
Participants	Stakeholders impacted by service package modifications	Entire stakeholder group	Entire stakeholder group	

Results	Service package or other change(s) documented for next complete update	Updated Northwest Arkansas Regional ITS Architecture document, Appendices, and RAD-IT database	Updated project tables	Updated Northwest Arkansas Regional ITS Deployment Plan document

9.3 PROCEDURE FOR SUBMITTING ITS ARCHITECTURE CHANGES BETWEEN SCHEDULED UPDATES

Updates to the Northwest Arkansas Regional ITS Architecture will occur on a regular basis to maintain the architecture as a useful planning tool. Between complete plan updates smaller modifications will likely be required to accommodate ITS projects in the region. Section 5.1.1 contains step-by-step guidance for determining whether or not a project requires architecture modifications.

For situations where a change is required, an ITS Architecture Maintenance Documentation Form was developed and is included in **Appendix M: Architecture Maintenance Documentation Form.** This form should be completed and submitted to NWARPC whenever a change to the Regional ITS Architecture is proposed.

The Maintenance Documentation form identifies three levels of modifications. They include:

Level 1 – Basic changes that do not affect the structure of the architecture

> Examples include: Changes to stakeholder or element name, element status, or data flow status

Level 2 – Structural changes that impact only one agency

> Examples include: Addition of a new service package or modifications to an existing service package that affects only one agency

Level 3 – Structural changes that have the potential to impact multiple agencies

> Examples include: Addition of a new service package or modifications to an existing service package that involves multiple agencies or incorporation of a new stakeholder into the architecture

In the process of documenting the change, the stakeholder proposing the change should contact any other agency that will be impacted by the modification to obtain feedback. This communication between agencies will simplify the process of performing a complete plan update. NWARPC will review and accept the proposed changes. When a complete update is performed by ArDOT, all of the documented changes will be incorporated into the architecture. However, changes could be documented at other times as agencies are planning for future projects using the same form.

9.4 MAINTAINING THE REGIONAL ITS DEPLOYMENT PLAN

Just as the ITS Architecture developed for the Northwest Arkansas Region addresses the region's vision for ITS implementation at the time the plan was developed, the ITS Deployment Plan addresses the projects that stakeholders agreed were necessary to implement in order to reach their ITS vision. As the region grows, needs will change and, as technology progresses, new ITS opportunities will arise. Shifts in regional focus, as well as changes in the National ITS Architecture, will necessitate that the Northwest Arkansas Regional ITS Architecture be updated to remain a useful resource for the region. These same changes will create new project opportunities or perhaps make projects listed in this ITS Deployment Plan obsolete. NWARPC will be responsible

for maintaining the Regional ITS Architecture with assistance from the stakeholders represented on the TSMO and ITS Committee.

Stakeholders agreed in a meeting of the TSMO and ITS Committee upon a procedure for updating the Regional ITS Architecture and Deployment Plan. The procedure outlines how to document architecture changes for inclusion in the next plan update. While complete plan updates are scheduled to occur every five years, stakeholders agreed that it would be beneficial to review the projects identified in the ITS Deployment Plan once a year. The NWARPC Policy Committee and Technical Advisory Committee will lead the annual project reviews. The purpose of the discussion would be to update the project status, remove projects that were completed, add project detail when available, and add new projects. Any corresponding changes to the ITS architecture changes would be documented and retained by NWARPC for inclusion during the next complete update as outlined in the Regional ITS Architecture.