

# ITS ARCHITECTURE OVERVIEW

---

This document provides a summary of the National ITS Architecture<sup>1</sup>, and includes definitions of National ITS Architecture terminology.

## Why Develop an ITS Architecture?

The U.S. Department of Transportation (U.S. DOT) developed the National ITS Architecture to ensure that intelligent transportation systems deployed around the country can communicate with one other and share information to maximize the return of investment on ITS. The architecture is a framework that describes the functions of system components, how these components interconnect, the organizations involved, and the type of information to be shared.

For example, if a transportation agency wants to clear incidents faster, the architecture defines a function to monitor roadways and identifies the interconnection and information flows between the roadway, the traffic management center, and the emergency management center needed to provide responders with incident information. The architecture provides the framework for the process, but does not define how this is done with technology or management techniques.

The reasons for updating the statewide ITS architecture to conform with the National ITS Architecture include the following:

- Develop a framework for institutional agreements and technical integration for organized ITS project deployment that meets local transportation user needs.
- Build consensus among regional stakeholders about resource and information sharing and activity coordination.
- Meet federal funding requirements.

The Federal Highway Administration (FHWA) published a policy<sup>2</sup> that all agencies seeking federal highway trust funding for ITS projects must develop a regional architecture that is compliant with the National ITS Architecture. The Federal Transit Administration (FTA) published a similar policy<sup>3</sup> that applies to federal funding from the mass transit account of the highway trust fund.

---

<sup>1</sup> *National ITS Architecture, Version 6.1*. U.S. Department of Transportation. Jan. 7, 2009. [itsarch/iteris.com/itsarch](http://itsarch/iteris.com/itsarch). Accessed July 20, 2010.

<sup>2</sup> *Intelligent Transportation System Architecture and Standards: Final Rule*, U.S. Department of Transportation, Federal Highway Administration, FHWA Docket No. FHWA-99-5899, Jan. 8, 2001.

<sup>3</sup> Federal Transit Administration National ITS Architecture Policy on Transit Projects: Notice, Federal Transit Administration, FTA Docket No. FTA-99-6147, Jan. 8, 2001.

## Physical Architecture

The physical architecture creates a high-level structure around the processes and data flows included in the logical architecture. It consists of subsystems, equipment packages, terminators, architecture flows, and architecture interconnects. Figure 1 illustrates the high-level physical architecture of the National ITS Architecture and includes the subsystems and architecture interconnects between subsystems.

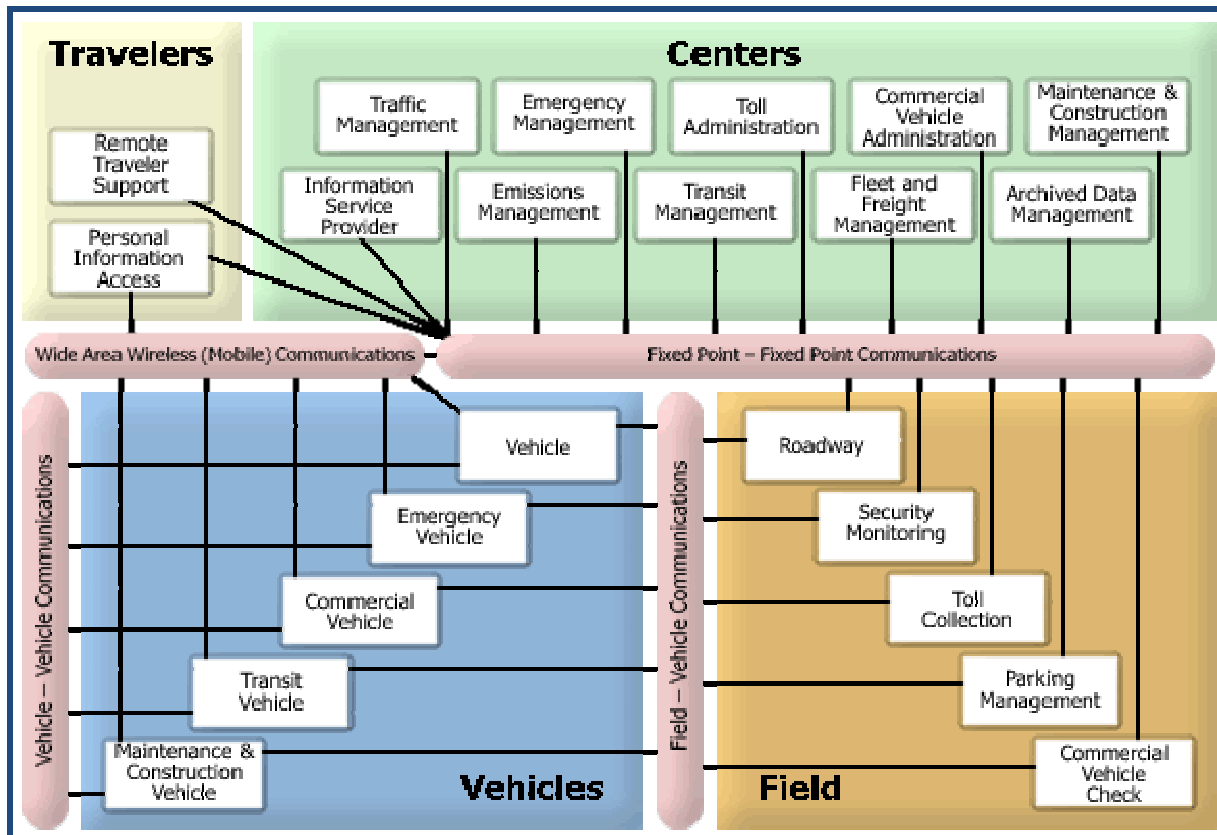


Figure 1: High-Level Physical National ITS Architecture

## Subsystems

A subsystem represents a grouping of processes defined in the logical architecture that may be defined by single entities. There are 22 subsystems in the physical architecture that are assigned to four overarching classes that correspond to the physical world as described in Table 1 and illustrated in Figure 1.

**Table 1: Subsystem Classes**

Subsystem Class	Function	Real World Examples
Centers	Provide management, administration, and support functions for the transportation system.	ODOT Region 2 Transportation Operations Center (TOC) 911 Centers
Field	Provide direct interface to the roadway network, vehicles traveling on the roadway network, and travelers in transit.	Dynamic Message Signs Highway Advisory Radio Traffic Signals
Vehicles	Use the roadway network and provide driver information and safety systems.	Fixed Route Buses Police Vehicles
Travelers	Gain access to traveler information through the use of equipment.	TripCheck Website Google Transit

## Stakeholders

Stakeholders are the backbone of the Oregon Statewide ITS Architecture and consensus amongst stakeholders has helped the state successfully deploy ITS projects in the past and will continue to ensure coordination and integration of future ITS endeavors. The key stakeholders include the transportation, transit, and public safety agencies who primarily own and operate ITS throughout the state. Expanded stakeholders include other public agencies, private sector organizations, and travelers/system users.

## System Inventory

The Oregon Statewide ITS Architecture includes a comprehensive inventory of the existing and planned ITS elements in Oregon. In Turbo Architecture each inventory element includes the element name, the associated stakeholder, and the associated subsystem(s) and/or terminator(s). There is also a field available for including a description. The Oregon Statewide ITS Architecture primarily focuses on the elements that comprise the subsystems, but does include a few key terminators. Terminators typically play a larger role in project-specific architectures (e.g. the personnel that operate the actual subsystem and the people that interface to the system).

## User Services

User services describe what functions intelligent transportation systems should perform from the user's perspective. Users encompass a broad range including groups such as the traveling public, transportation agency personnel, emergency management personnel, and commercial vehicle operators. Although a user service is a functional requirement of the system, it does not describe where components fit into the architecture or how the service will be implemented. Selection of user services provides a high-level means of identifying the services to provide that address the regional user needs and problems. To simplify the range of requirements in a broad area of services, the user services are

logically grouped into eight user services bundles, shown in Table 2. A description of each user service may be found on the National ITS Architecture website<sup>4</sup>.

**Table 2: User Services in the National ITS Architecture**

User Services Bundles and User Services	
1	Travel and Traffic Management
2	Public Transportation Management
3	Electronic Payment
4	Commercial Vehicle Operations
5	Emergency Management
6	Advanced Vehicle Safety Systems
7	Information Management
8	Maintenance and Construction Management

## Market Packages

Market packages are deployment-oriented groupings of physical architecture entities that address specific user services. The user services identified earlier in this document are too broad in scope to aid in the planning of actual deployments. Market packages are made up of one or more equipment packages that work together to deliver a transportation service and the architecture flows that connect them with subsystems and terminators. Figures 2 through 11 illustrate the advanced public transportation system market packages (these figures are directly from the National ITS Architecture website).<sup>5</sup> A market package includes subsystems (the large rectangular boxes), the equipment packages (the small rectangular boxes), the terminators (the oval boxes), and the architecture flows (the arrows). Eight broad categories of interest are used to group the 90 market packages and a description of each market package may be found on the National ITS Architecture website.

---

<sup>4</sup> *User Services Bundles and User Services*. U.S. Department of Transportation. Jan. 7, 2009. [itsarch/iteris.com/itsarch/html/user/userserv.htm](http://itsarch/iteris.com/itsarch/html/user/userserv.htm). Accessed August 20, 2010.

<sup>5</sup> *Market Packages*. U.S. Department of Transportation. Jan. 7, 2009. <http://www.iteris.com/itsarch/html/mp/mpindex.htm> Accessed August 20, 2010.

**APTS01 – Transit Vehicle Tracking**

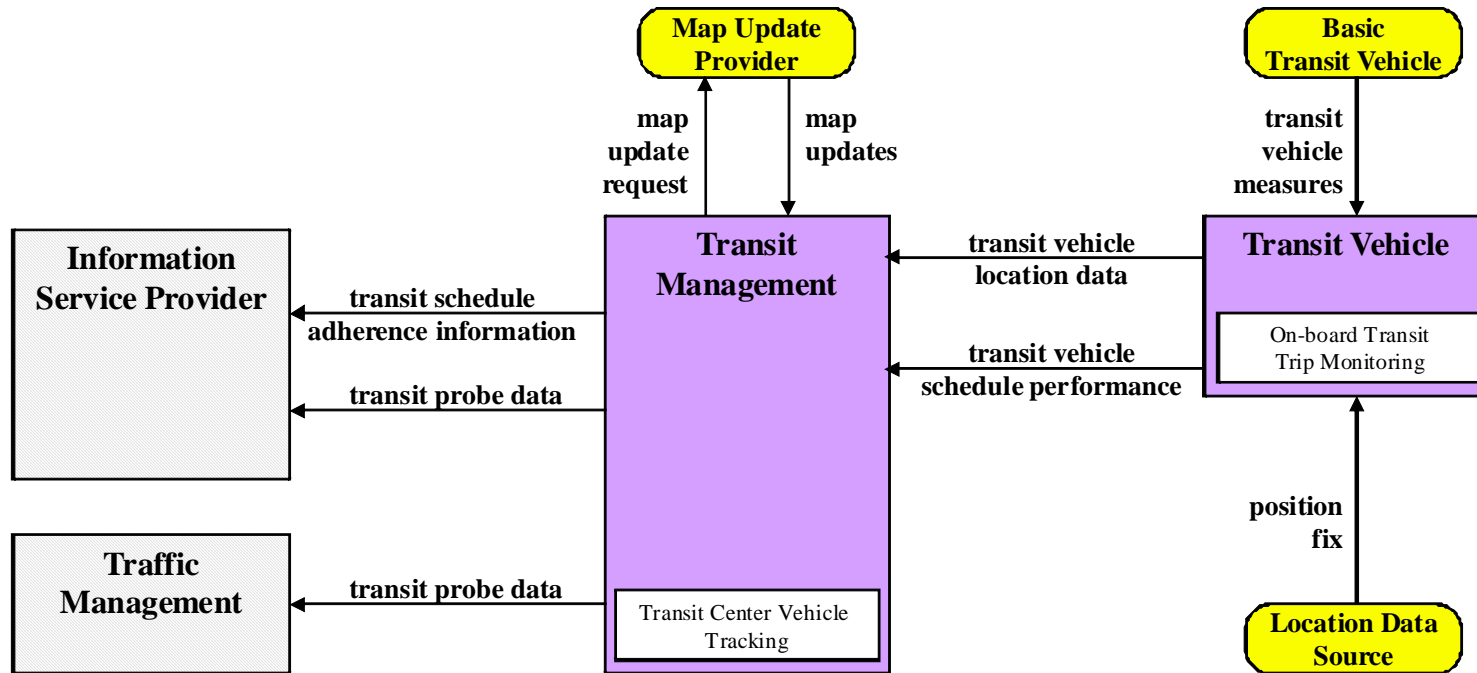


Figure 2: APTS 01

**APTS02 – Transit Fixed-Route Operations**

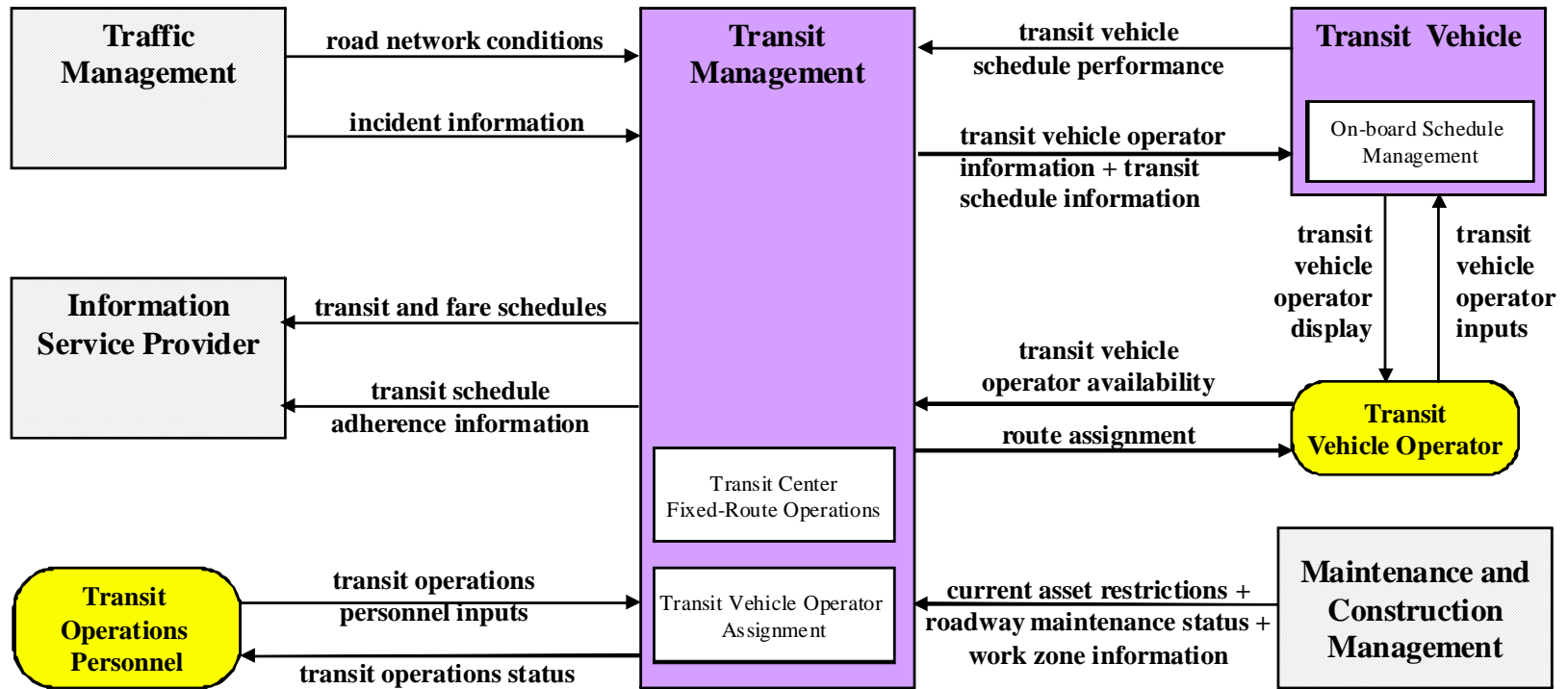


Figure 3: APTS 02

**APTS03 – Demand Response Transit Operations**

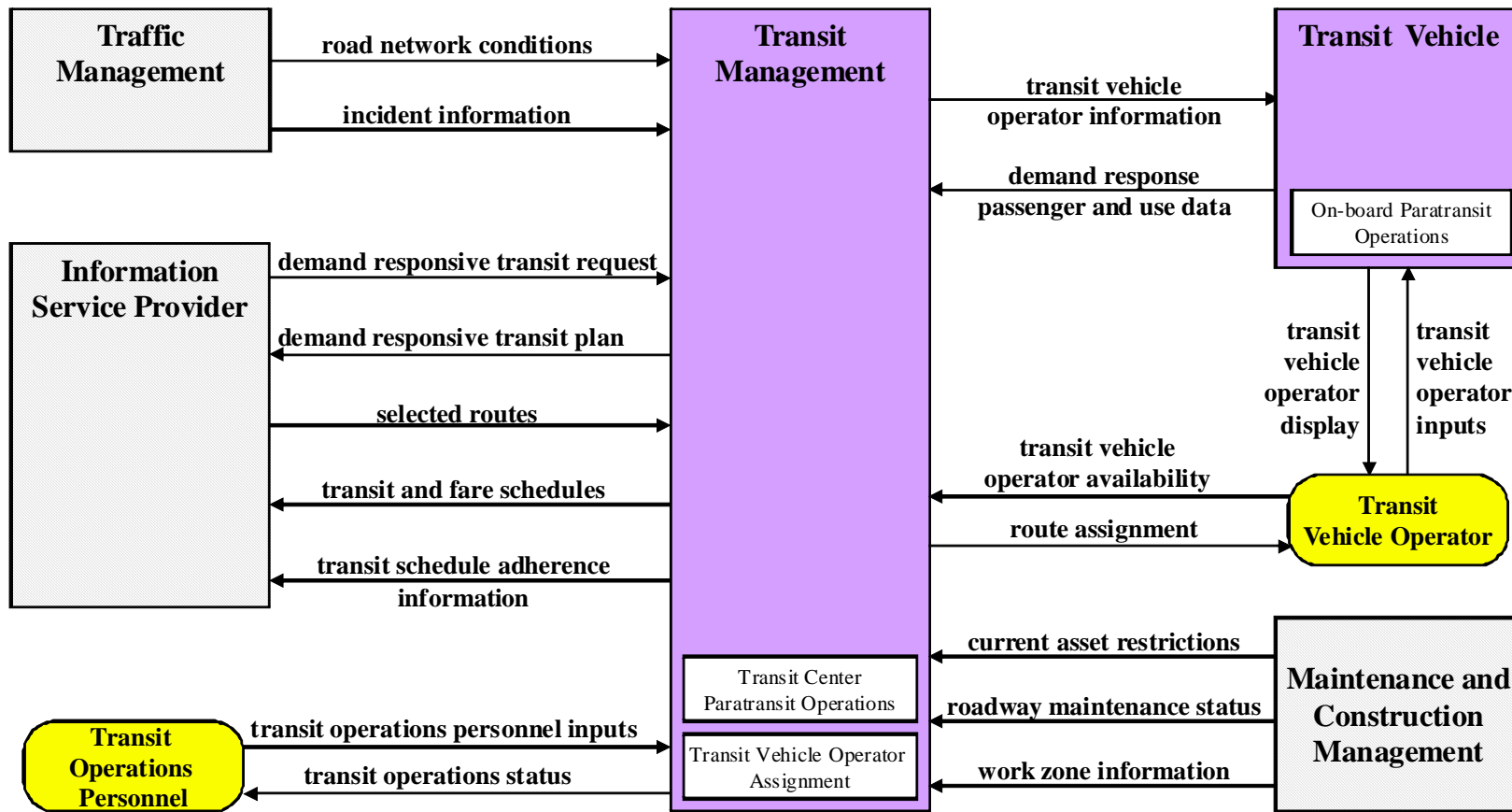


Figure 4: APTS 03

**APTS04 – Transit Fare Collection Management**

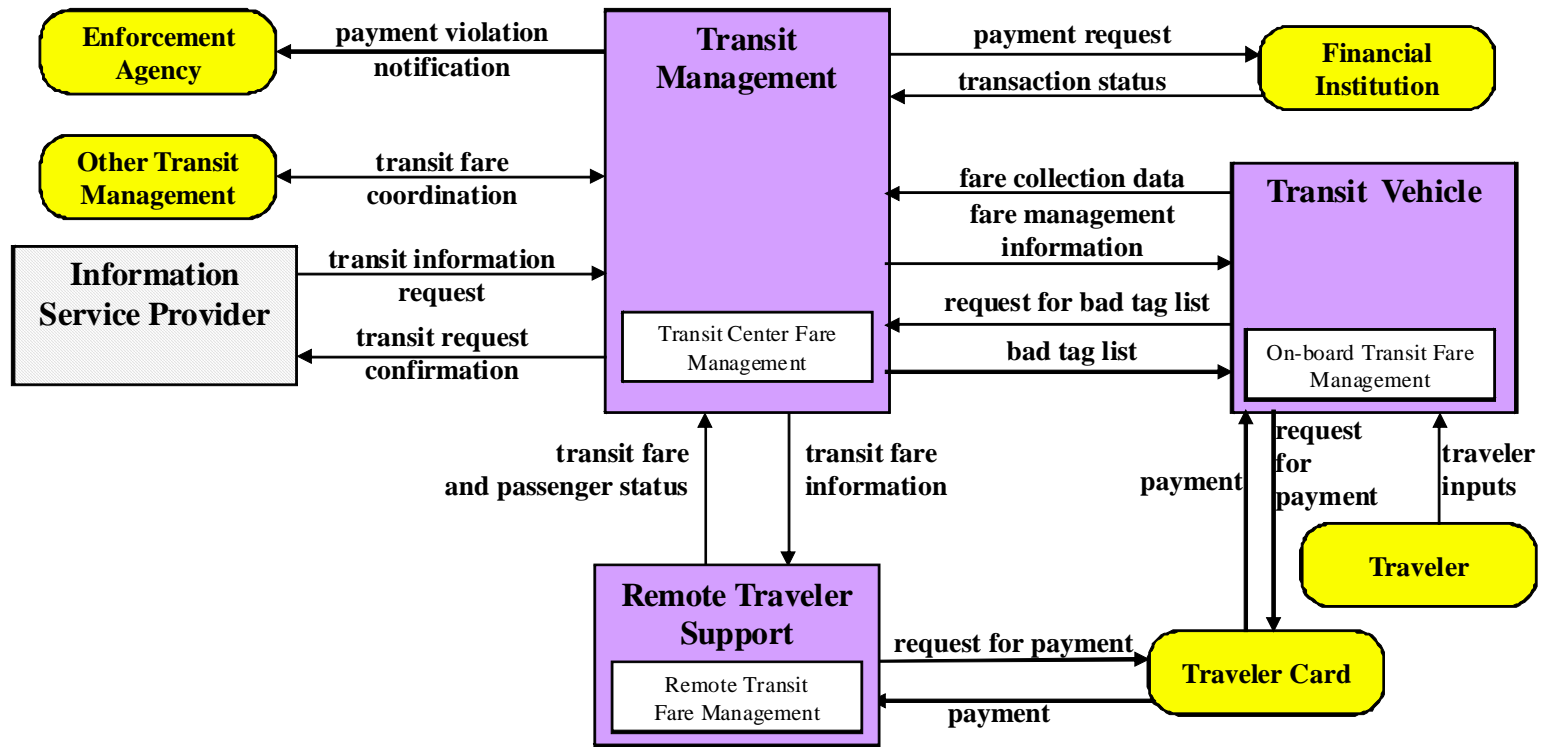


Figure 5: APTS 04

**APTS05 - Transit Security**

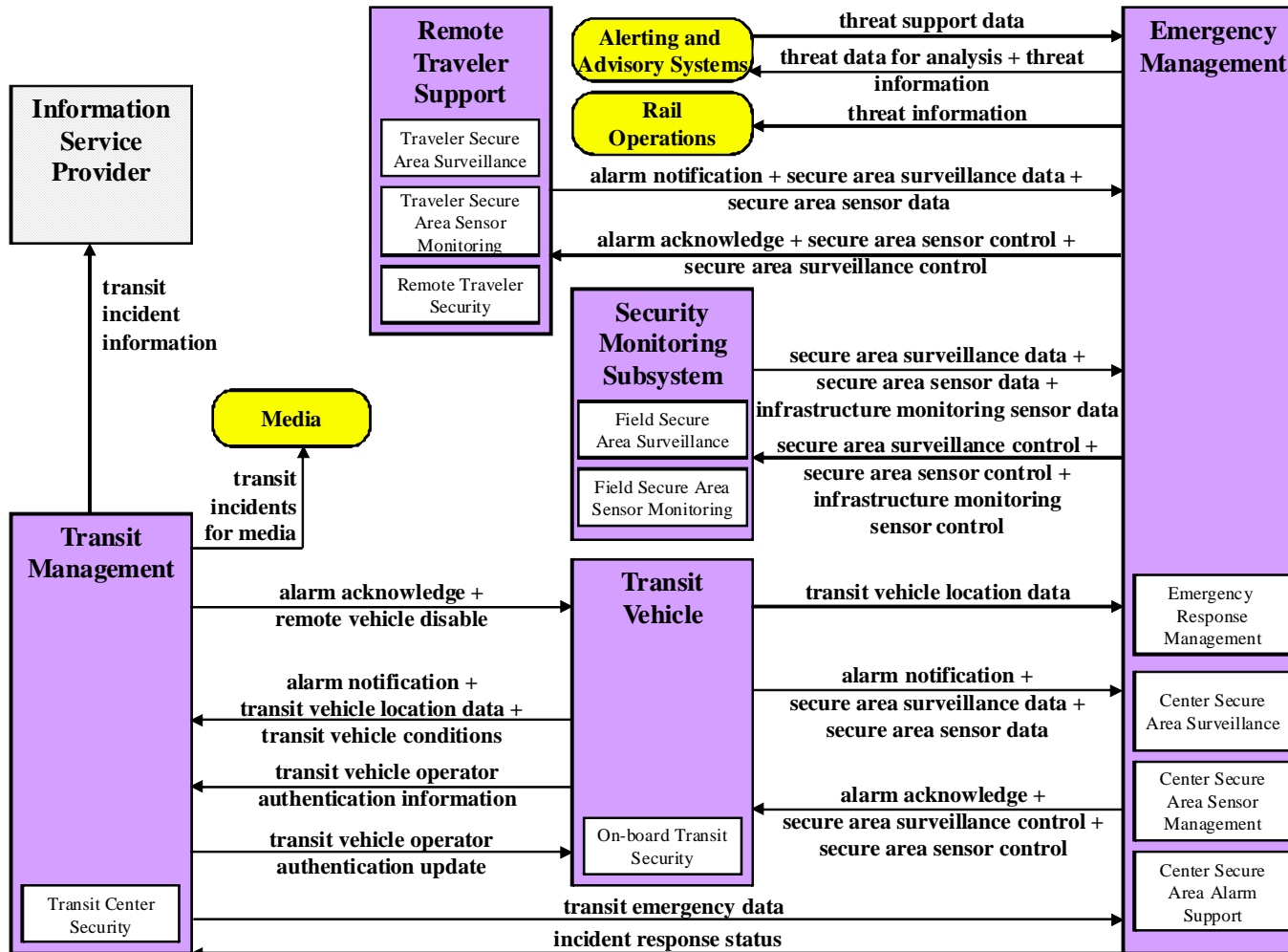


Figure 6: APTS 05

**APTS06 - Transit Fleet Management**

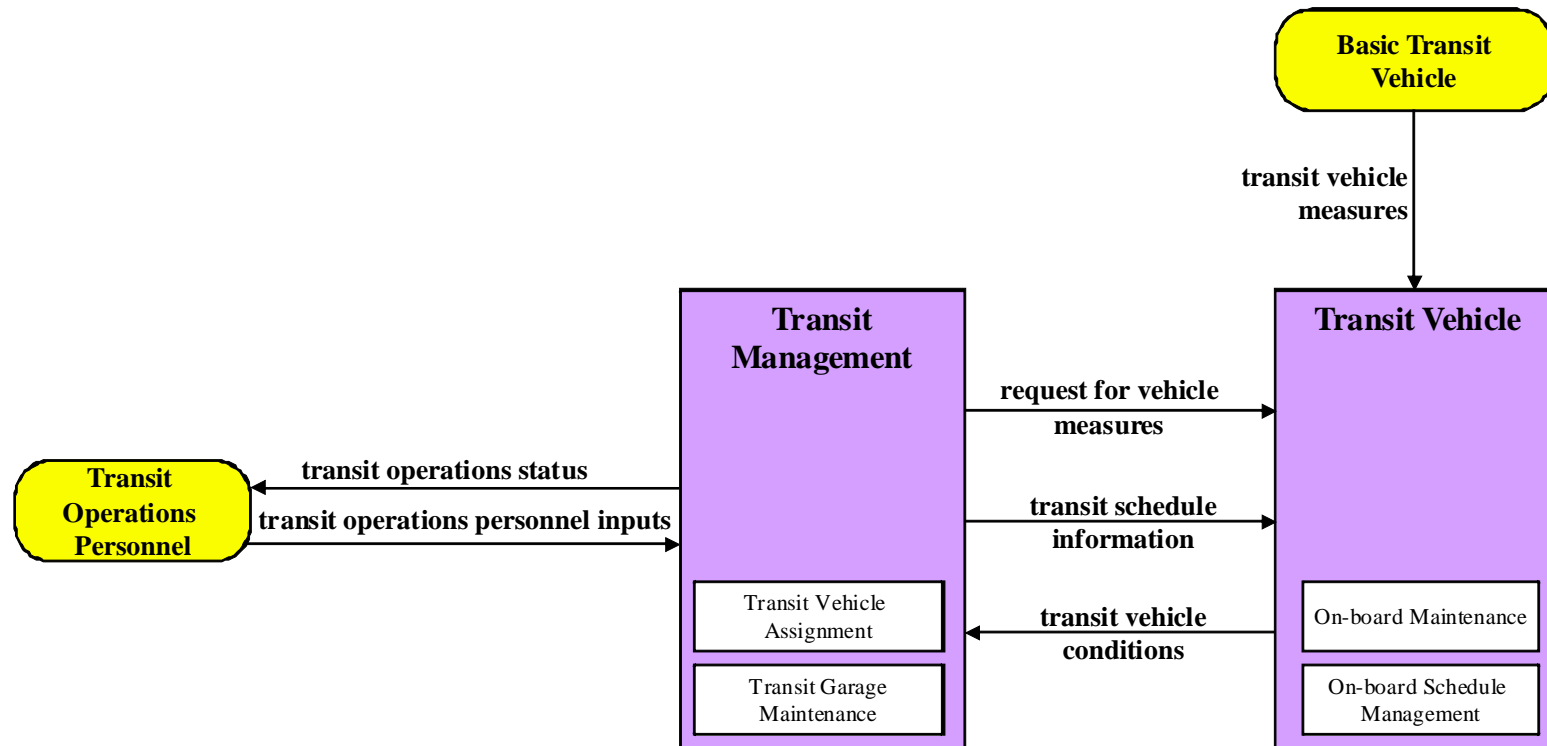


Figure 7: APTS 06

**APTS07 – Multi-modal Coordination**

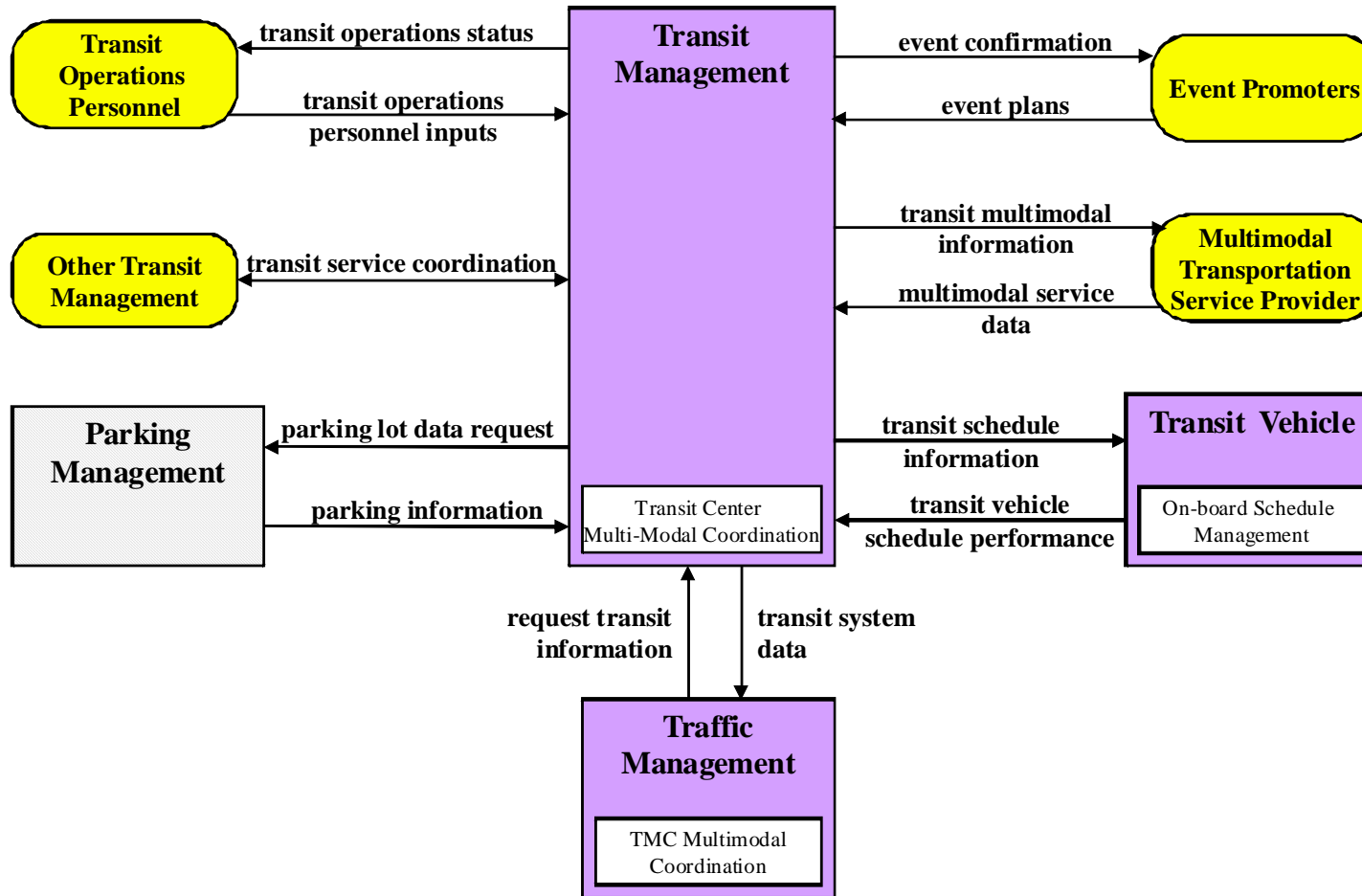


Figure 8: APTS 07

**APTS08 - Transit Traveler Information**

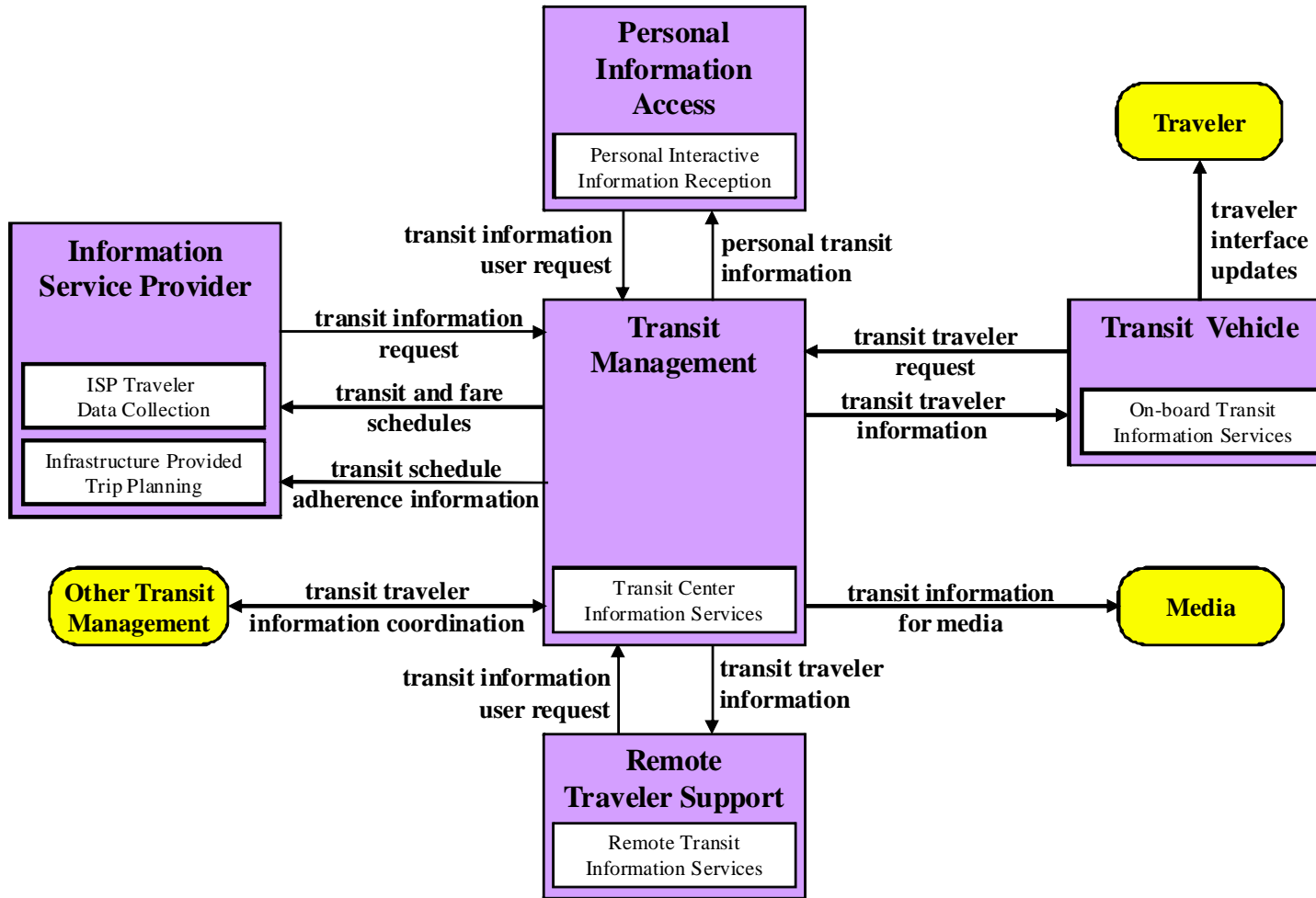


Figure 9: APTS 08

**APTS09 – Transit Signal Priority**

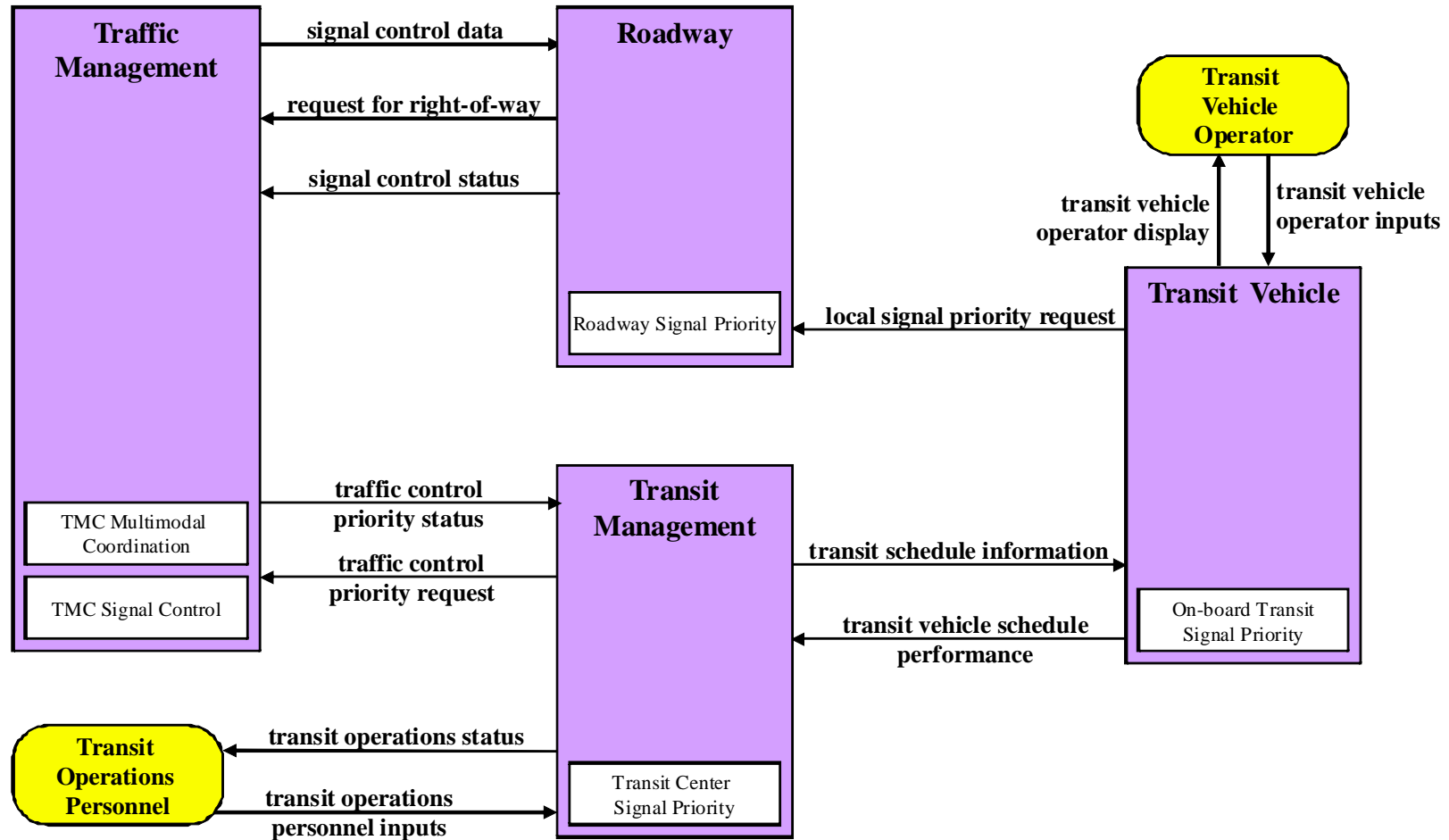


Figure 10: APTS 09

### APTS10 – Transit Passenger Counting

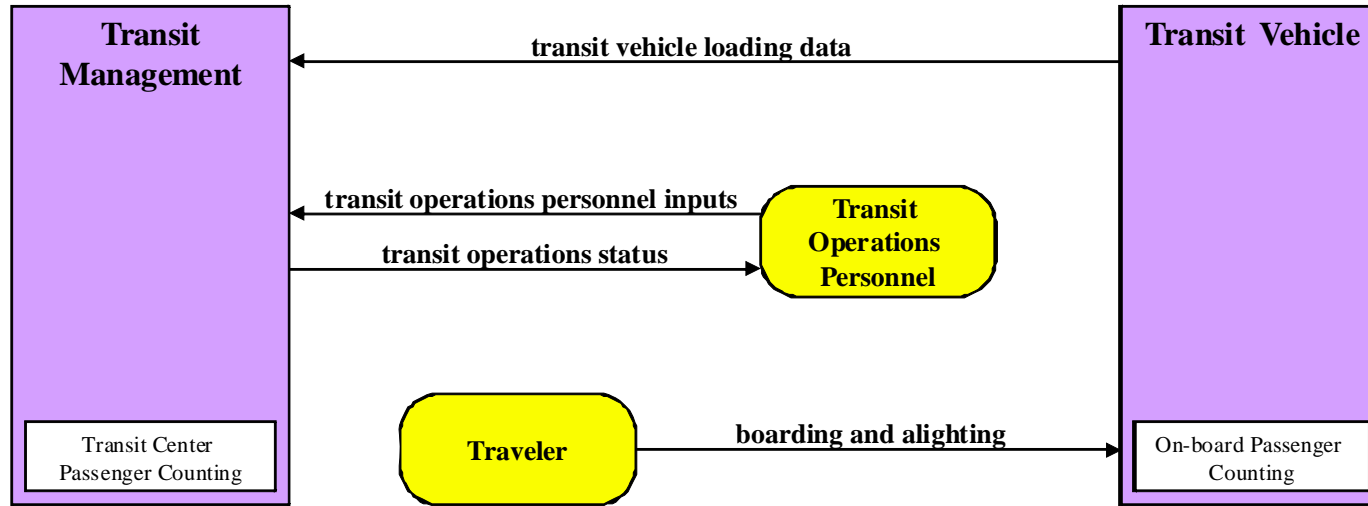


Figure 11: APTS 10