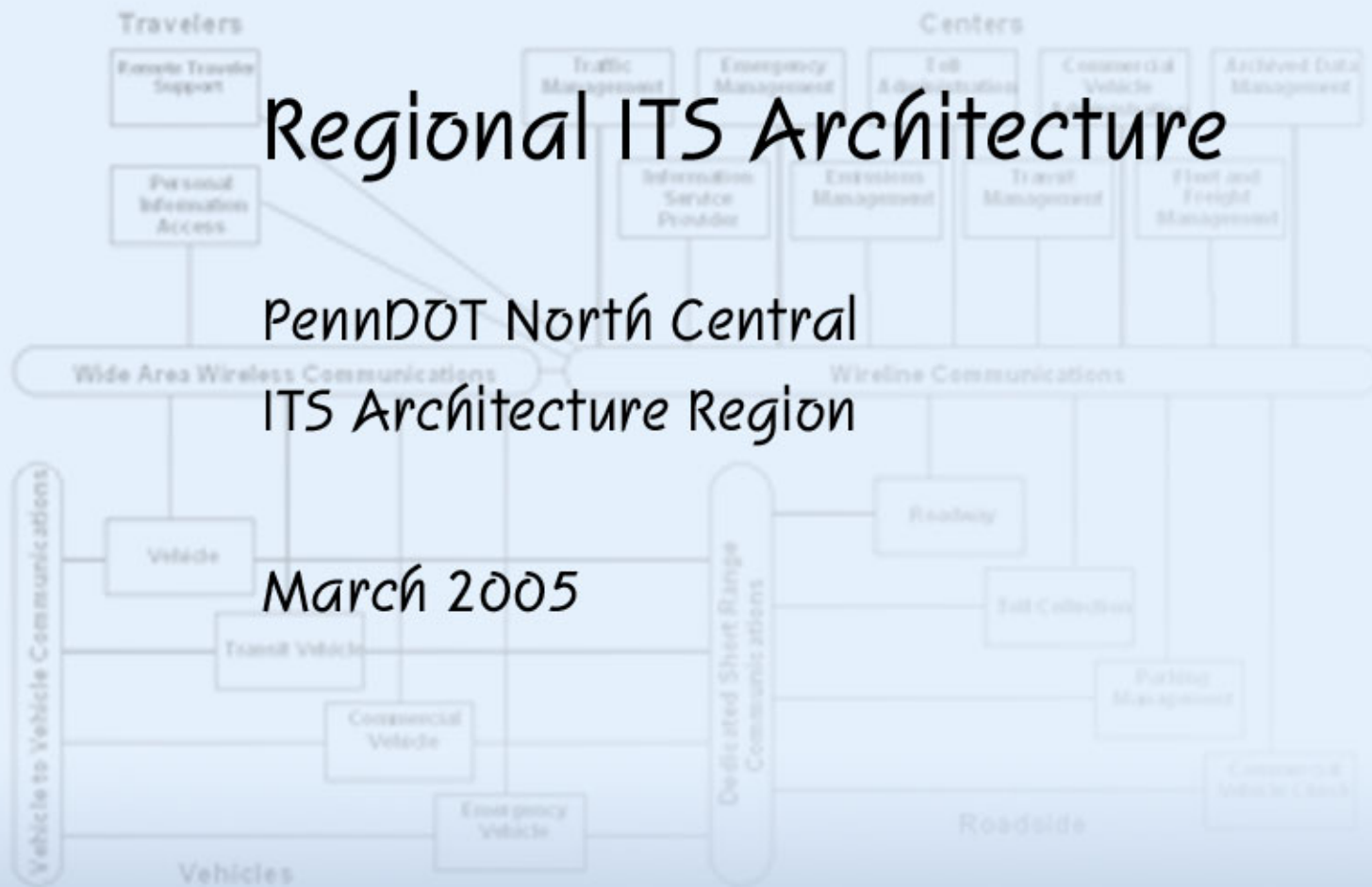


# Regional ITS Architecture

PennDOT North Central  
ITS Architecture Region

March 2005



PA

r e g i o n a l i t s a r c h i t e c t u r e



## TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	ARCHITECTURE PROCESS .....	2
1.2	USING THIS DOCUMENT .....	3
1.3	UTILITY OF THE ARCHITECTURE .....	7
1.4	ITS STANDARDS.....	8
1.5	MAINTAINING THE ARCHITECTURE .....	10
1.6	MOVING FORWARD/INSTITUTIONALIZING ITS .....	16
<b>2</b>	<b>ARCHITECTURE SCOPE .....</b>	<b>23</b>
2.1	SCOPE OF SERVICES .....	23
2.2	CONFORMITY MATRIX .....	23
2.3	DESCRIPTION OF THE REGION .....	26
2.4	REGIONAL STAKEHOLDERS .....	30
2.5	REGIONAL ITS PROJECTS .....	33
<b>3</b>	<b>REGIONAL SYSTEMS INVENTORY, NEEDS, AND SERVICES .....</b>	<b>44</b>
3.1	ELEMENT DESCRIPTIONS .....	44
3.2	SYSTEMS INVENTORY.....	50
3.3	NEEDS .....	68
3.4	SERVICES .....	92
<b>4</b>	<b>REGIONAL ITS ARCHITECTURE.....</b>	<b>117</b>
4.1	SUBSYSTEM INTERCONNECT DIAGRAM .....	119
4.2	REGIONAL SUBSYSTEM INTERCONNECT DIAGRAM SHOWING ELEMENTS .....	121
4.3	INTERCONNECT MATRIX.....	125
4.4	ITS ARCHITECTURE .....	130
	<b>REFERENCES.....</b>	<b>459</b>
	<b>APPENDIX A: ACRONYMS .....</b>	<b>460</b>
	<b>APPENDIX B: ITS DEFINITIONS .....</b>	<b>462</b>
	<b>APPENDIX C: SUBSYSTEM AND TERMINATOR DEFINITIONS .....</b>	<b>465</b>
	<b>APPENDIX D: ARCHITECTURE FLOW DEFINITIONS .....</b>	<b>473</b>
	<b>APPENDIX E: OPERATIONS COVERAGE.....</b>	<b>483</b>
	<b>APPENDIX F: BOOKEND I MEETING I MINUTES .....</b>	<b>485</b>
	<b>APPENDIX G: VALIDATION MEETING MINUTES .....</b>	<b>493</b>
	<b>APPENDIX H: BOOKEND II MEETING MINUTES .....</b>	<b>516</b>

## LIST OF TABLES

TABLE 2-1: NORTH CENTRAL ITS ARCHITECTURE REGION POPULATION BY COUNTY .....	27
TABLE 2-2: COMPARISON OF KEY POPULATION DEMOGRAPHICS NORTH CENTRAL ITS ARCHITECTURE REGION, PENNSYLVANIA, AND THE UNITED STATES .....	27
TABLE 2-3: COMPARISON OF COMMUTING PATTERNS AMONG WORKERS 16 & OVER NORTH CENTRAL ITS ARCHITECTURE REGION, PENNSYLVANIA, AND THE UNITED STATES.....	28
TABLE 2-4: PENNDOT NORTH CENTRAL ITS ARCHITECTURE REGION LINEAR MILES .....	28
TABLE 2-5: PENNDOT NORTH CENTRAL DAILY VEHICLE MILES OF TRAVEL.....	29
TABLE 2-6: SIGNIFICANT HIGHWAY CORRIDORS.....	29
TABLE 2-7: REGIONAL ITS PROJECTS .....	34
TABLE 3-1: REGIONAL SYSTEMS INVENTORY .....	52
TABLE 3-2: REGIONAL NEEDS TABLE .....	69
TABLE 3-3: REGIONAL SERVICES TABLE .....	93
TABLE 4-1: REGIONAL SUBSYSTEMS/TERMINATORS.....	123
TABLE 4-2: REGIONAL INTERCONNECT MATRIX.....	126

## TABLE OF FIGURES

FIGURE 1-1: PENNDOT ITS ARCHITECTURE REGIONS .....	1
FIGURE 1-2: PENNSYLVANIA ITS ARCHITECTURE PROCESS SCHEMATIC .....	3
FIGURE 1-3: PENNSYLVANIA ITS ARCHITECTURE WEB SITE.....	6
FIGURE 1-4: PENNDOT DISTRICT MAP .....	17
FIGURE 1-5: PENNSYLVANIA MPO/RPO MAP .....	17
FIGURE 2-1: NORTH CENTRAL ITS ARCHITECTURE REGION .....	26
FIGURE 4-1: SUBSYSTEM INTERCONNECT DIAGRAM .....	120
FIGURE 4-2: REGIONAL SUBSYSTEM INTERCONNECT DIAGRAM SHOWING ELEMENTS .....	122

**Williamsport – Metropolitan Planning Organization**

*Pending adoption on May 13, 2005*

**Northern Tier – Rural Planning Organization**

*Pending adoption on April 11, 2005*

**SEDA-COG – Rural Planning Organization**

*Pending adoption on May 13, 2005*

## ACKNOWLEDGEMENTS

Major contributions from the Statewide Working Group, Regional Advisory Panel, and Parsons Brinckerhoff made the development of the North Central Regional ITS Architecture possible.

### **Statewide Working Group**

The Statewide Working Group guided the Commonwealth through the development of the Architectures. Their principal role was to ensure that the Regional Architectures were reasonably uniform and consistent.

**Dennis Lebo** – PennDOT Central Office,  
*Chief of Program Development/Project  
Manager*

**Dominic Munizza** – PennDOT District 11-0

**Craig Reed** – PennDOT Central Office,  
*BHSTE Bureau Director*

**Denny Prestash** – PennDOT District 2-0

**Steve Koser** – PennDOT Central Office,  
*ITS & Congestion Management Division  
Chief*

**John Ward** – Delaware Valley Regional  
Planning Commission (DVRPC)

**Matt Weaver** – PennDOT Central Office,  
*Civil Engineer Manager*

**Lt. Thomas McDaniel** – Pennsylvania  
State Police (PSP)

**Brenda Murphy** – PennDOT Central  
Office, *Western Regional ITS Liaison*

**Jessie Yung** – Federal Highway  
Administration (FHWA)

**Mike Pack** – PennDOT Central Office,  
*Eastern Regional ITS Liaison*

**Mike Herron** – Federal Highway  
Administration (FHWA)

**Karen Russell** – PennDOT Central Office,  
*Program Development Division*

### **Regional Champion**

The Regional Champion supported the RAP by facilitating the RAP meetings and played a critical role in coordinating with the Statewide Working Group for merging statewide visions with Regional characteristics. The Champion for this Region was:

**Teresa McClain** – PennDOT District 3-0

## **Regional Advisory Panel**

The Regional Advisory Panel lead and guided the Regional ITS Architecture development in the Southwest ITS Architecture Region. The Architecture was developed with input from regional stakeholders, channeled and focused by the RAP.

**Rick Biery** – Northern Tier Planning and Development Commission

**Sgt. Tom McLaughlin** – Pennsylvania State Police (PSP)

**Thomas Boyle** – North Central Counter-Terrorism Task Force

**Mark Murawski** – Williamsport Area Transportation Study

**Lt. James Carey** – Pennsylvania State Police (PSP)

**Steve Mutchler** – PennDOT District 3-0

**Fern Harmon** – Pennsylvania Emergency Management Agency (PEMA)

**William Nichols** – Williamsport Bureau of Transportation

**Steve Herman** – SEDA-Council of Governments

**Philip Petter** – North Central Counter-Terrorism Task Force

**Alan Keller** – PennDOT District 3-0

**Jeff Stover** -- SEDA-COG Joint Rail Authority

**Jim McAllister** – SEDA-Council of Governments

**Joshua Warfel** – Williamsport Bureau of Transportation

## **Parsons Brinckerhoff**

The principal role of Parsons Brinckerhoff was to oversee and produce the Regional ITS Architectures. The PB Team consisted of:

**Mike Harris** – PB Farradyne – Project Manager

**Noah Goodall** – PB Farradyne – Web

**Joel Ticatch** – PB Farradyne – Assistant Project Manager and North Central Region Lead

**Joe Barr** – PB – North Central Region Support

**JD Schneeberger** – PB Farradyne – Turbo

## Conformity Statement

*The North Central Region of the Commonwealth of Pennsylvania is in compliance with the requirements of the “Intelligent Transportation Systems Architecture and Standards,” as mandated by the Federal Highway Administration (23 CFR 940) and supported by the policy of the Federal Transit Administration.*

*The following policy objectives are enumerated in 23 CFR 940.5: “ITS projects shall conform to the National ITS Architecture and standards in accordance with the requirements contained in this [Federal rule]. Conformance with the National ITS Architecture is interpreted to mean the use of the National ITS Architecture to develop a [R]egional ITS Architecture, and the subsequent adherence of all ITS projects to that [R]egional ITS Architecture. Development of the [R]egional ITS Architecture should be consistent with the transportation planning process for Statewide and Metropolitan Transportation Planning.”*

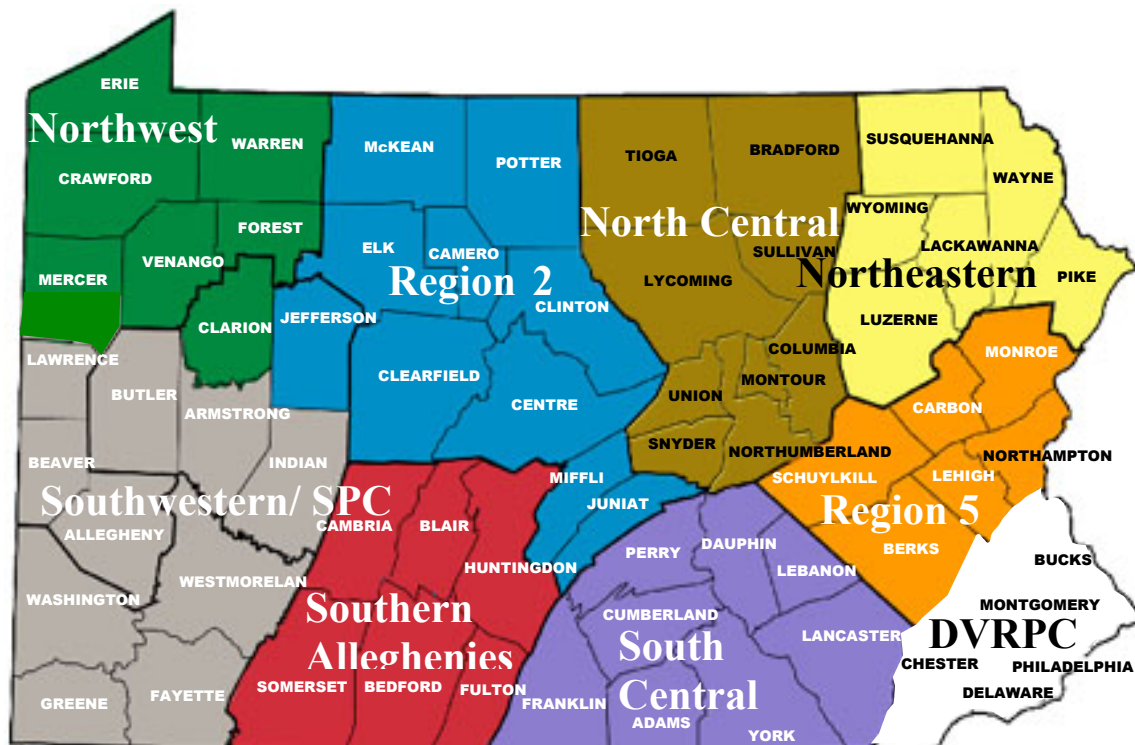
*The North Central Region’s ITS Architecture was developed to address these specific policy objectives. The resultant Regional ITS Architecture is consistent with Pennsylvania’s statewide and metropolitan transportation planning processes.*

## 1 Introduction

This document, developed under the *Pennsylvania Intelligent Transportation Systems (ITS) Architecture* initiative, presents the ITS Architecture for Pennsylvania's North Central Region, which is comprised of nine counties in the north central part of the state. The North Central Region encompasses PennDOT Engineering District 3-0. The document is the result of intensive data-gathering, research, and planning activities conducted between March 2003 and March 2005. The current version of the ITS Architecture was generated in March 2005.

The North Central ITS Architecture was prepared under the auspices of a Regional Advisory Panel (RAP), a panel of experts drawn from transportation stakeholder organizations across the Region and State. Additional stakeholder organizations participated in the process of "validating" the Architecture. PB Farradyne, a division of Parsons Brinckerhoff, Inc., executed development of the Architecture under contract to the Pennsylvania Department of Transportation (PennDOT). PennDOT appointed an ITS Statewide Working Group to establish statewide ITS Architecture standards, advise and guide the statewide process, and ensure consistency across the Regions.

The North Central ITS Architecture is one of nine Regional Architectures being developed across the Commonwealth of Pennsylvania, as shown in Figure 1-1, below:



**Figure 1-1: PennDOT ITS Architecture Regions**



## **1.1 Architecture Process**

PennDOT took a structured approach to developing Regional ITS Architectures throughout the State. The Regional ITS Architecture development process was defined and documented in the “Pennsylvania ITS Architecture Phase I Report,” dated February 2003. PennDOT, the Federal Highway Administration (FHWA), the Pennsylvania State Police (PSP), and the Planning Partners championed the former effort.

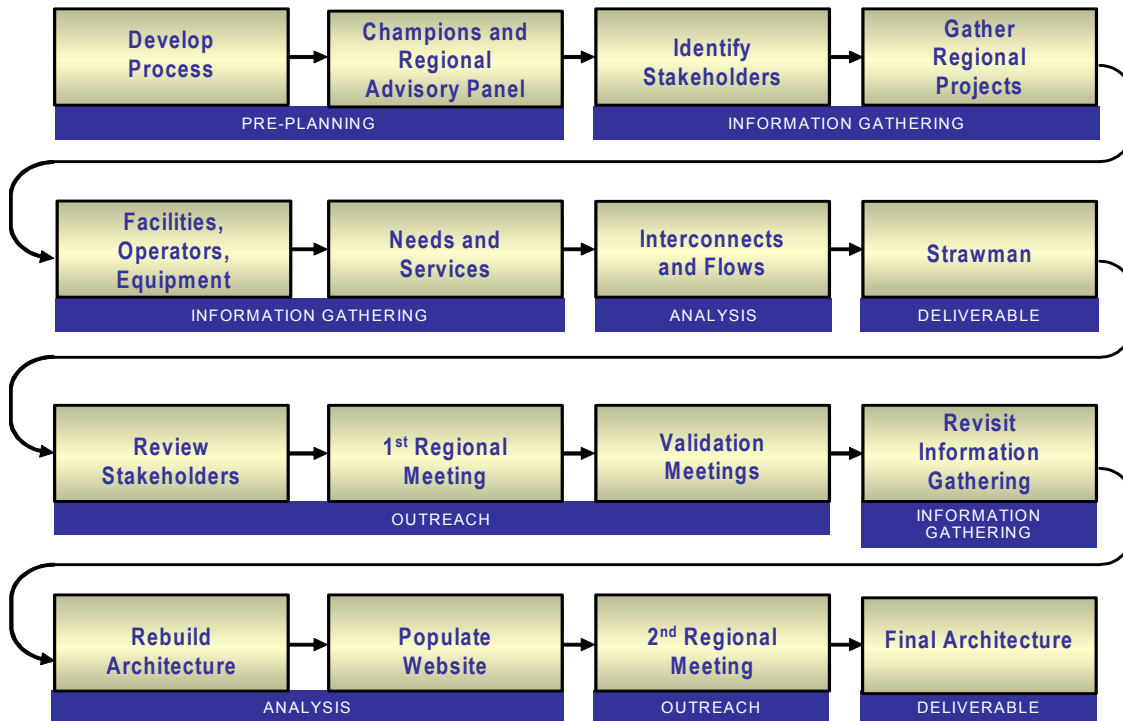
The Phase I Report describes PennDOT’s approach towards developing Regional ITS Architectures in Pennsylvania while utilizing the national guidance. The approach ensures that the resultant Architectures depict the ITS infrastructure in the Region and conform to the National ITS Architecture. The process developed is inherently flexible and adaptable so that special conditions and circumstances in each Region can be effectively addressed or otherwise accommodated, while maintaining consistency statewide.

The development process was specifically designed to support the preparation and refinement of Regional ITS Architectures across Pennsylvania. The process benefits the Pennsylvania environment, optimizes the national guidance, and creates an efficient and effective response to regional needs and circumstances.

The complete process for developing Regional ITS Architectures in Pennsylvania, as described in the Phase I Report, is:

- Task 1.0 — Define Architecture Scope
- Task 2.0 — Inventory Systems and Define Needs, Services, and Operations Concept
- Task 3.0 — Generate Strawman Regional ITS Architecture
- Task 4.0 — Conduct Outreach to Validate Regional ITS Architecture
- Task 5.0 — Finalize the Regional ITS Architecture

The process is depicted in further detail in the following schematic:



**Figure 1-2: Pennsylvania ITS Architecture Process Schematic**

## 1.2 Using this Document

This document is, principally, a resource instrument, designed to assist engineers, planners, designers, developers, managers, and decision-makers in defining a regionally-integrated surface transportation infrastructure that promotes safety, maximizes operational efficiencies, and utilizes appropriate technologies. Materials in the document are targeted at traditional surface transportation organizations, transit agencies, and the host of entities that interface with the transportation infrastructure. The latter include incident and emergency management personnel, commercial vehicle operators, shippers, operators of tourist destinations, event managers, traveler information providers, etc.

The document is a resource instrument to be consulted during the planning process. It is not intended as a textbook to be read from cover-to-cover.

The term “ITS” implies the use of technologies or other innovations to achieve new operational efficiencies in transportation. Yet, an ITS Architecture is, itself, technology-independent; that is, it identifies *who and what* need to connect, but not *how* those connections ought to best be accomplished.

An ITS Architecture describes the interrelationships that exist—or ought to exist—among transportation “elements” across the Region. It distinguishes between those

relationships that exist now and those planned for the future. However, the Architecture does not judge the efficacy, or utility, of those relationships or assess whether the technologies or procedures supporting those linkages are optimized.

These sorts of judgments will need to be made after the Regional ITS Architecture is finalized.

### **Document Organization and Access Strategies**

The ITS Architecture is presented in five primary sections:

- Section 1 — *Introduction*
- Section 2 — *Architecture Scope*
- Section 3 — *Regional Systems Inventory, Needs, and Services*
- Section 4 — *Regional Architecture*
- *Appendices*

Section 1, *Introduction*, contains important background information and establishes the “context” for the Architecture effort. This section defines key concepts and terms, examines the utility of a Regional ITS Architecture, the importance of maintaining the Architecture, ITS standards, and strategies for mainstreaming, or institutionalizing, ITS. This section should be read in its entirety.

Section 2, *Architecture Scope*, summarizes the general scope and magnitude of the Regional ITS Architecture effort. It describes The North Central Region, emphasizing those characteristics that potentially impact transportation activities and performance. It further identifies major ITS stakeholders and existing and planned ITS projects across the Region. This section of the document should also be read in its totality.

Section 3, *Regional Systems Inventory, Needs, and Services*, contains the essential “building blocks” of the ITS Architecture. It identifies and defines each pertinent ITS “element” in the Region. “Elements” are the organizational entities (e.g., the PennDOT District Offices, 911 Communications Centers, and Regional Transit Agency Offices) that operate in the transportation environment. Additionally, the section presents the ITS Systems Inventory, organized by element and linked back to the Projects List in Section 2. The Needs and Services tables establish the interrelationships among the Region’s ITS elements. Each element in the Needs Table is defined in terms of the “inputs” it requires from the other elements with which it interacts; similarly, each element in the Services Table is defined in terms of the “outputs” it furnishes to other elements.

Users of the ITS Architecture should familiarize themselves with the general content of Section 3. Thereafter, when they are engaged in ITS deployment planning or related

activities, they can generally proceed directly to Section 4. Users can return to Section 3, as needed, for descriptions of the elements being investigated, identification of the pertinent roadway corridors, and more comprehensive understanding of the interrelationships across elements.

Section 4, *Regional Architecture*, graphically displays the details of the ITS Architecture. Notably, Figure 4-2, *Regional Subsystem Interconnect Diagram Showing Elements*, identifies the systems and subsystems with which each regional ITS element is associated; elements are color-coded—here and throughout the remainder of the document—according to which of the four primary systems they fall under (i.e., Centers, Roadside, Vehicles, or Travelers). Similarly, Table 4-2, *Regional Interconnect Matrix*, specifies which elements gather inputs from—or furnish outputs to—other elements. The remainder of Section 4 is a compendium of the ITS elements. Each element is depicted in terms of the other elements with which it interfaces, and then each “element pair” is examined in detail. The detailed pairings show the types of information that pass between the elements, the direction of the information flow, and whether the flow currently exists or is planned.

Practitioners consulting the Regional ITS Architecture can use Table 4-2 to determine those elements pertinent to their investigations and proceed directly to the corresponding interconnect diagrams. From the diagrams, practitioners can gather the essential information.

The *Appendices* contain a wealth of supplemental materials to assist practitioners in comprehending the Architecture. These include: (1) ITS acronyms; (2) definitions of ITS terminology; (3) definitions of subsystems/terminators and architecture flows identified and defined in the National ITS Architecture; (4) “operations coverage” across the Region; and (5) summaries of Outreach and Validation meetings.

### **Sample Access Scenario**

The Regional ITS Architecture is a valuable planning tool. The following sample scenario defines how a stakeholder in the Region might utilize the material presented in this document:

A transit agency planner in The North Central Region preparing to deploy an automatic vehicle location (AVL) system on its buses can learn a great deal from consulting the Regional ITS Architecture. By turning to the Regional Transit Agency Offices’ Interconnect Diagram, the transit planner can immediately grasp the range of stakeholders potentially interested in receiving pertinent vehicle location and more detailed transit data (e.g., 911 Communication Centers, PennDOT Traffic Management Centers, Personal Traveler Information Devices, etc.). The planner would discover that connections between 911 Communication Centers are generally in place; that the remaining interfaces do not currently exist, but are planned for the future.

By consulting the interconnect and information flow diagrams, the transit planner would further learn that AVL inputs might effectively be used to improve the detail, precision,

and timeliness of transit emergency data that already pass to other agencies in the Region. The diagrams further show that future “hooks” are planned for communicating bus status data to other agencies. For example, PennDOT would like to use the transit vehicles as probe data to identify congested corridors in the Region. Other stakeholders might be interested in broadcasting vehicle status or delay data to their users.

Access to the ITS Architecture enables users to view the pertinent infrastructure before new ITS projects are undertaken. Existing and planned interrelationships can be quickly viewed and grasped, and the realm of agencies and other entities with a potential stake in the subject matter can be easily identified. Details about the information passing between stakeholders offer insight into optimizing future deployments and concretizing the range of possibilities for important new projects.

### Accessing the Architecture On-Line

Key sections of the Regional ITS Architecture—notably Section 4 of the hardcopy document—are accessible on-line. To access the North Central Architecture, go to:

[www.paits.org/nc](http://www.paits.org/nc)

When you access this location, the web screen shown in Figure 1-3 will be displayed:

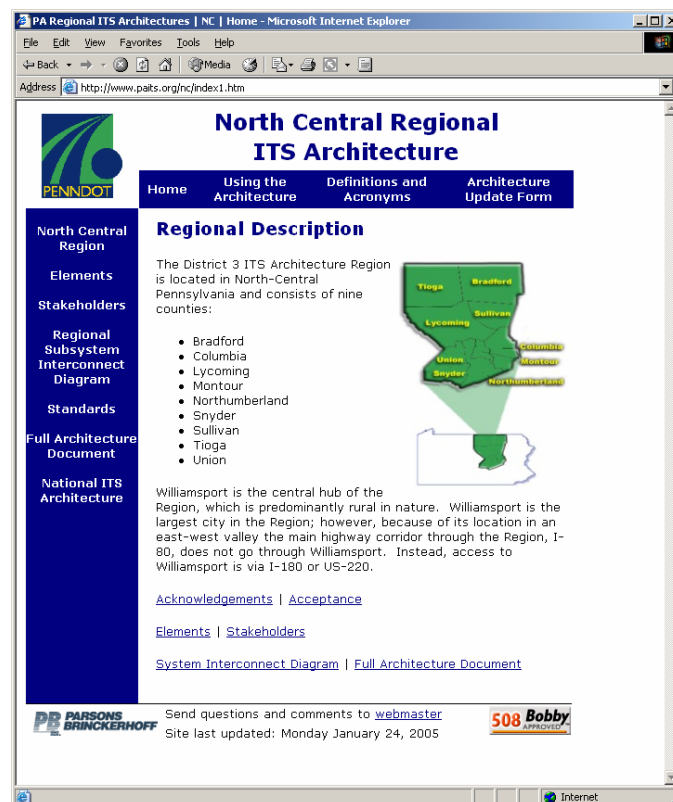


Figure 1-3: Pennsylvania ITS Architecture Web Site

From the North Central ITS Architecture Homepage ([www.paits.org/nc](http://www.paits.org/nc)), there are three ways to access information about a specific element:

1. Click on “Elements” and select any element from the list.
2. Click on “Stakeholders” and select the correct stakeholder, and then select an element.
3. Click on the “System Interconnect Diagram” for a sausage diagram of the Region that lists the elements grouped by type. Clicking on the element in the diagram will take you to page associated with the selected element.

After locating the page for a given element, users can download a PDF file that includes the interconnect diagram and architectural flow diagrams.

Definitions of Architecture terms, acronyms, information flows, and subsystem terminators are also included on the website.

### **1.3 Utility of the Architecture**

Developing, maintaining, and utilizing the ITS Architecture offers a range of significant benefits to the adopting Region. These benefits include the following:

- A Regional ITS Architecture enables planning and deployment to occur in an organized and coordinated manner. It offers a framework for systematically identifying and evaluating prospective solutions to the transportation problems in the Region. It establishes an environment for inter-agency cooperation and coordination. Stakeholders across the Region may use the Architecture to plan their ITS projects to support regional goals and priorities. Utilization of the Architecture also helps to ensure consistency among the state, regional, and local planning processes.
- A Regional ITS Architecture establishes institutional mechanisms that promote the development and deployment of ITS projects. The Architecture compels the Region to set up forums for the discussion of regional transportation requirements. These forums, in turn, encourage the building of relationships among transportation professionals and stakeholders across the Region—these professionals are thereby given opportunities to understand the needs, issues, constraints, etc. of other transportation sectors. As the regional dialogue expands, institutional barriers tend to crumble and the integration of disparate goals, concepts, approaches, and solutions is increasingly possible. With this institutional integration comes the sharing of technologies and information, so that innovative, region-wide thinking becomes a guiding principle in transportation planning and new, synergistic relationships take hold. Additionally, the Architecture provides the basis for updating the Transportation Plan, the Transportation Improvement Program (TIP), the Statewide TIP, and the State Implementation Plan (SIP).

- A Regional ITS Architecture promotes interoperability. The Architecture reveals to stakeholders the key interrelationships presently established in the Region and those planned for the future. These interrelationship requirements identify those areas where operational or technology bridges to multiple agencies are needed. In this way, the Architecture helps to anticipate and plan for the integration requirements between state, regional, and local systems. Significantly, the Architecture promotes adherence to consistent and uniform standards across the Region. By its very nature, it also ensures consistency in documentation of ITS elements across the Region.
- A Regional ITS Architecture encourages efficient investment. As prospective new ITS projects are identified in the Region, they can be “plotted” on the Regional Architecture and their interrelationships with existing and planned components assessed. This lessens the probability that a particular project will result in a “dead-end” investment. It also helps planners to identify and invest in projects capable of addressing multiple needs, such as automated vehicle location (AVL) systems that can both improve on-road performance and inform customers of status conditions. In general, the Architecture offers regional stakeholders a basis for prioritizing ITS projects and making sound investment choices.
- A Regional ITS Architecture satisfies the Federal mandate. The mandate of the U.S. Federal Highway Administration (FHWA) requires that Regional ITS Architectures be completed by April 2005, in order for stakeholders in the Region to continue using Federal funds for the development and deployment of ITS projects. Consequently, promulgation of Regional ITS Architectures is necessary for continued access to Federal funds for ITS deployment.

## **1.4 ITS Standards**

ITS standards are industry-consensus standards that define how system components operate within a consistent framework. By specifying how systems and components interconnect, ITS standards promote interoperability.

A seamless transportation system relies on clear communication between agencies, systems, and individuals. To ensure that different entities can communicate, the systems must be designed according to standards. For PennDOT, this might mean systems that can exchange data between regional and statewide centers. At the local level, this can mean data exchanges between jurisdictions concerning incidents, congestion, and signal timing plans.

An interoperable and seamless transportation system provides several benefits. Transportation agencies are now increasingly communicating with law enforcement, as police are usually the first to learn of incidents. Many transportation agencies are linking their transportation management centers with police dispatch. When systems are interoperable, police and emergency units can respond faster to crashes; this often

relieves congestion and improves safety. In an emergency, quick and reliable communication is even more crucial.

To accrue the benefits noted above, systems and the underlying equipment must be designed according to standards that enable interoperability. Future systems and equipment should be designed to meet these standards. Existing systems and equipment, additionally, should be updated to meet the standards.

The USDOT's ITS Standards Program is working with existing standards development organizations (SDO's) to establish a national collection of ITS standards. The following organizations participate in ITS standards activities:

- AASHTO (American Association of State Highway and Transportation Officials)
- ASTM (American Society for Testing and Materials)
- IEEE (Institute of Electrical and Electronics Engineers)
- ITE (Institute of Transportation Engineers)
- NEMA (National Electrical Manufacturers Association)
- SAE (Society of Automotive Engineers)

The following organization oversees the development of ITS standards:

- ANSI (American National Standards Institute)

For more information on ITS standards, visit [www.standards.its.dot.gov](http://www.standards.its.dot.gov) or [www.ntcip.org](http://www.ntcip.org).

To identify ITS standards applicable to the North Central ITS Architecture, visit the National ITS Architecture website. This site provides a listing of all National ITS Architecture information flows and their associated standards. A North Central ITS Architecture user can access applicable ITS standards by:

1. Viewing the information flow diagrams in the North Central ITS Architecture document.
2. Visiting the National ITS Architecture website:  
<http://itsarch.iteris.com/itsarch/html/af/padde.htm>
3. Identifying a specific Architecture Flow, by name, in the Regional ITS Architecture document, clicking on that Architecture Flow name on the National ITS Architecture website, and then reviewing the details under "Standard Activities."

The current ITS standards—or pertinent standards activities—will be displayed for the information flow that the user specifies.



## 1.5 Maintaining the Architecture

As ITS projects are planned and implemented, the Regional ITS Architecture will need to be updated to reflect the new ITS priorities and strategies emerging through the transportation planning process. The Regional ITS Architecture is not a static document, but rather is a “living” document. The ITS Architecture must grow and adapt as plans change, ITS projects are implemented, and ITS needs and services evolve in the Region.

In order to serve as a regional framework, the Regional Architecture must be maintained so that it continues to reflect the current and planned ITS systems, interconnections, etc. The following circumstances or conditions may all trigger the need to make changes to the Architecture:

- Changes in Regional needs. Regional ITS Architectures are created to support transportation planning in addressing regional needs. Over time, these needs can change and the corresponding aspects of the Regional ITS Architecture that address these needs may have to be updated. These changes in needs will also typically be expressed in updates to planning documents, such as regional transportation plans.
- New stakeholders. As new stakeholders become active in ITS, the Regional ITS Architecture should be updated to reflect their place in the regional view of ITS elements, interfaces, and information flows. Why might new stakeholders emerge? The stakeholders might represent new organizations that were not in place during the original Architecture development. Maybe the geographic scope of the Architecture is being expanded, bringing in new stakeholders. Perhaps additional transportation modes or transportation services are being considered that touch the systems of additional stakeholders.
- Changes in scope of services considered. The range of services considered by the Regional ITS Architecture expands. This might happen because the National ITS Architecture has been expanded and updated to include new user services or to better define how existing elements satisfy the user services. A Regional ITS Architecture based on an earlier version of the National ITS Architecture should take into consideration these changes as the Regional ITS Architecture is updated. The National ITS Architecture may have expanded to include a user service that has been discussed in the Region, but not included in the Architecture, or was included in a cursory manner. Changes in the National ITS Architecture are not, of themselves, a reason to update a Regional ITS Architecture, but the Region may want to consider new services in the context of their regional needs.
- Changes in stakeholder or element names. An agency’s name, or the name used to describe their element(s), undergoes change. Transportation agencies occasionally merge, split, or just rename themselves. In addition, element names may evolve as projects are defined. The Regional ITS Architecture

should be updated to use the current names for both stakeholders and elements.

- Changes in other Architectures. A Regional ITS Architecture covers not only elements and interfaces within the Region, but also interfaces to elements in adjoining Regions. Changes in the Regional ITS Architecture in one Region may necessitate changes in the Architecture in an adjoining Region to maintain consistency between the two.

There are also several changes relating to project definition that will cause the need for updates.

- Change due to project definition or implementation. When actually defined or implemented, a project may add, subtract, or modify elements, interfaces, or information flows from the Regional ITS Architecture. Because the Regional Architecture is meant to describe the current (as well as future) regional implementation of ITS, it must be updated to accurately reflect how the developed projects integrate into the Region.
- Change due to project addition/deletion. Occasionally a project will be added or deleted through the planning process, or even during project delivery. Some aspects of the Regional ITS Architecture that are associated with the project may be expanded, changed, or removed.
- Change in project priority. Due to funding constraints or other considerations, the planned project sequencing may change. Delaying a project may have a ripple effect on other projects that depend on it; conversely, raising the priority for a project's implementation may impact other projects that are related to it.

The purpose of maintaining the Architecture is to keep it current and relevant, so that stakeholders will use it as a technical and institutional reference when developing specific ITS project plans. In order to maintain the Architecture, three decisions must be discussed:

- Who — Who will lead and implement the maintenance effort?
- When — When will the Regional ITS Architecture change be updated?
- What — What parts of the Regional ITS Architecture will be maintained?
- How — How will the Architecture be maintained?

### **Who Will Maintain the Architecture?**

In cooperation with the Pennsylvania ITS Architecture Regions, PennDOT Central Office expects to utilize a statewide approach to maintaining the Commonwealth's nine Regional ITS Architectures. Although PennDOT Central Office will lead the

maintenance effort in The North Central Region, *all* stakeholders will still need to participate in the process. Maintenance of the Architecture is a recurring, long-term effort that requires inputs from all stakeholders in the Region.

### **When Will the Architecture be Updated?**

The Regional ITS Architecture is expected to be updated every four years to coincide with updates to long-range plans throughout the Commonwealth. There will be a process planning effort prior to the update in order to ensure statewide consistency of the updates. This timeframe will be used throughout the state. The next update to the North Central ITS Architecture is projected to be completed by Autumn 2008.

### **What Will be Maintained?**

The constituent parts of the Regional ITS Architecture that will be maintained is referred to as the “baseline.” The baseline of the Regional ITS Architecture for The North Central Region includes:

- Description of the Region. This description includes the geographic scope, functional scope, and architecture horizon. Geographic scope defines the ITS elements within the Region. Functional scope defines which services are included. Architecture horizon is the distance (in years) into the future that the Architecture will consider.
- Regional ITS Projects Matrix. The matrix includes a list of existing and planned ITS projects for the Region.
- List of stakeholders. The listing and description of ITS Stakeholders in the Region should be revised as stakeholders evolve, consolidate, or separate.
- List of elements. The inventory of ITS elements is a key aspect to the Architecture. Changes in stakeholders, as well as operational concepts, may impact the inventory of elements. Furthermore, implementation and planning status may change (i.e., change from planned to existing).
- Systems Inventory. Links the ITS Projects Matrix to Regional elements. Additionally, the Systems Inventory defines the functionalities of the elements.
- Needs and Services Tables. The Needs and Services Tables define the existing and future flow of information being shared between elements. The Needs and Services tables serve as the building blocks for the programming/building of the Architecture.
- Interconnect diagrams. Interfaces between elements define the interactions between one another. They provide information on “who” is talking to “whom.”

- Information flow diagrams. Information flows between elements define the details of the Architecture. They are the detailed description of how elements interact or will interact in the future. This is the key aspect of the baseline and will likely see the greatest amount of change.
- Applicable ITS Standards. The selection of standards depends on the information exchange requirements. The maintenance process should consider how ITS standards may have evolved and matured since the last update.

### **How Will the Architecture be Maintained?**

PennDOT Central Office will be responsible for updating the aforementioned parts of the Regional ITS Architecture. In order to document the necessary changes to the Regional ITS Architecture, the Pennsylvania ITS Architecture website ([www.paits.org](http://www.paits.org)) will be utilized as a tool for tracking changes to the Architecture.

All stakeholders in the Region involved in ITS project activity will be responsible for documenting additions, changes, and updates to the ITS Architecture.

To document an update, go to the North Central ITS Architecture Homepage ([www.paits.org/nc](http://www.paits.org/nc)) and follow these steps:

1. Select the “Architecture Update Form” at the top of the screen. This link takes you to the requisite form.
2. Complete the “Architecture Update Form.” The form, shown on the following page allows a stakeholder to suggest an update to the Architecture. The form is broken into five sections: (1) Contact Information, (2) New ITS Project, (3) New Stakeholder, (4) New Element, and (5) Other Changes. Each section is described below:
  - Contact Information — Contains contact information (name, organization, email, and phone number) so that the stakeholder submitting the form can be contacted in the future.
  - New ITS Project — Future ITS projects considered for State and/or Federal funding should be documented in this section. Project name, stakeholder, type of funding requested, location, deployment date, and a brief description of the project should be inputted here.
  - New Stakeholder — Requests for new stakeholders and changes to stakeholder names/descriptions should be identified in this section of the form. The status, existing or planned, should also be identified.
  - New Element — Requests for a new element and changes to element names/descriptions should be identified in this section of the form. The status, existing or planned, should also be identified.

- Other Changes — Other changes to the Regional ITS Architecture can be documented in this section.
3. Submit the “Architecture Update Form.” The form can be submitted by clicking on the “Submit” button on the bottom of the webpage. Once submitted, the form will be sent to the webmaster who will compile the information. The information will be utilized for the next update to the Regional ITS Architecture.
  4. Once the “Architecture Update Form” has been submitted, the information will be sent to the webmaster. The webmaster will compile the information and post it on the Architecture website. Once posted, the information can be accessed by (1) clicking on the “update list” link at the top of the “Architecture Maintenance Form” webpage or (2) going to <http://paitis.org/nc/update.htm>.

## North Central ITS Architecture Maintenance Form

### Contact Information

Name of Submitter:	Submission Date:
Organization:	Phone Number:
Email Address:	

### New ITS Project

Project Name:	
Stakeholders:	Funding: <input type="checkbox"/> Local Funding <input type="checkbox"/> State Funding <input type="checkbox"/> Federal Funding Details:
Location:	Deployment Date:
Project Description:	

### New Stakeholder

Stakeholder Name:
Status: <input type="checkbox"/> Existing <input type="checkbox"/> Planned
Stakeholder Description:

### New Element

Element Name:	Stakeholder:
Status: <input type="checkbox"/> Existing <input type="checkbox"/> Planned	
Element Description:	

### Other Changes

Other Changes:
----------------

Contact the [PAITS Webmaster](#) with questions and comments.

## **1.6 Moving Forward/Institutionalizing ITS**

Across the State, PennDOT has enjoyed strong commitment to ITS deployment initiatives, some through traditional funding mechanisms and most through federal funds earmarked for ITS. In virtually all Regions, there is an increasing emphasis on regional deployments and coordination among public agencies, illuminated by the cooperative effort displayed by the creation of Regional ITS Architectures. An integral part of the ITS planning, agency coordination, and program development activities is the cooperation and coordination with PennDOT Districts, MPO's and/or RPO's throughout the State that overlap, and regional stakeholders.

The application of advanced technologies to solve some of the transportation-related problems was first initiated by staff from DVRPC in the Philadelphia Region a few decades ago. Since then, there is a fully integrated system in place in Pittsburgh and operation centers are being explored in many other areas of the State. However, only since 2002, has there been a concerted effort to consolidate all of the individual ITS efforts by each agency and jurisdiction into a comprehensive and consolidated plan, starting with the creation of Regional ITS Architectures for each Region of the State that are coordinated and have statewide consistency.

Each regional agency represented in these Regional ITS Architectures has unique responsibilities for planning, operating, maintaining, or monitoring the transportation system.

Responsibility for, and involvement with, ITS by key agencies in The North Central Region has become a joint effort between PennDOT Districts, MPO's, and regional stakeholders. These groups, together, have assumed responsibility for coordinating regional ITS planning and deployment.

Figure 1-4 shows a map of the current PennDOT district boundaries by county. Figure 1-5 shows a map of the current MPO and RPO boundaries by county. The purpose of these figures is to give the reader context into the PennDOT district and MPO boundaries.

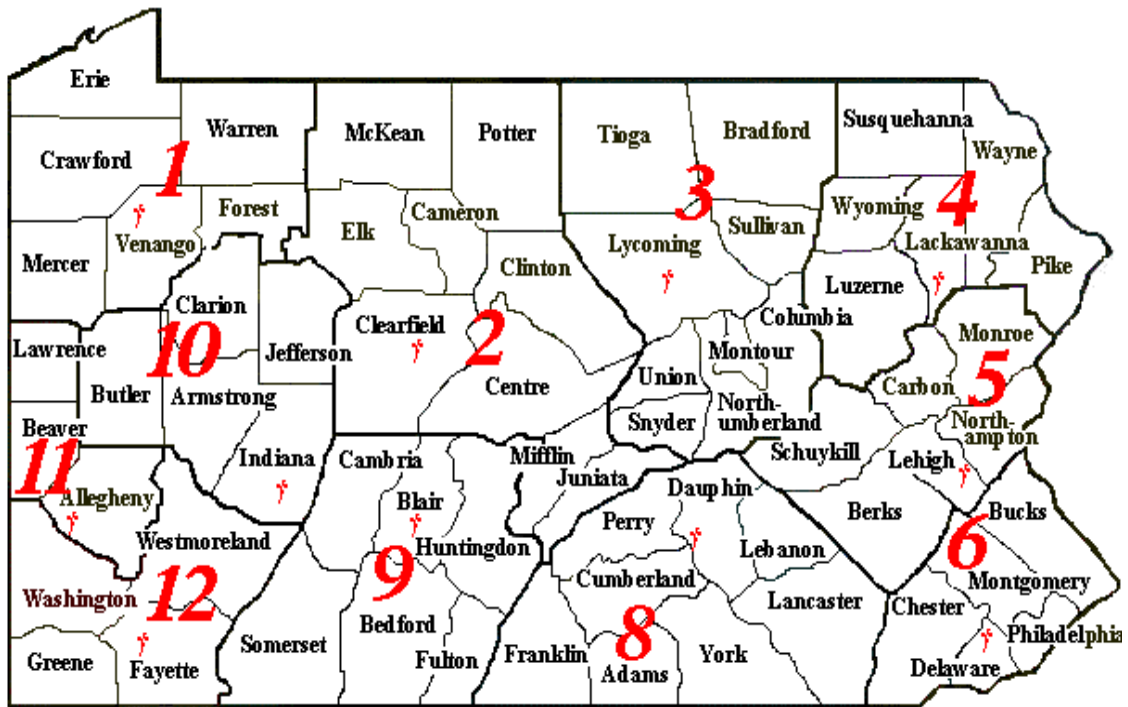


Figure 1-4: PennDOT District Map

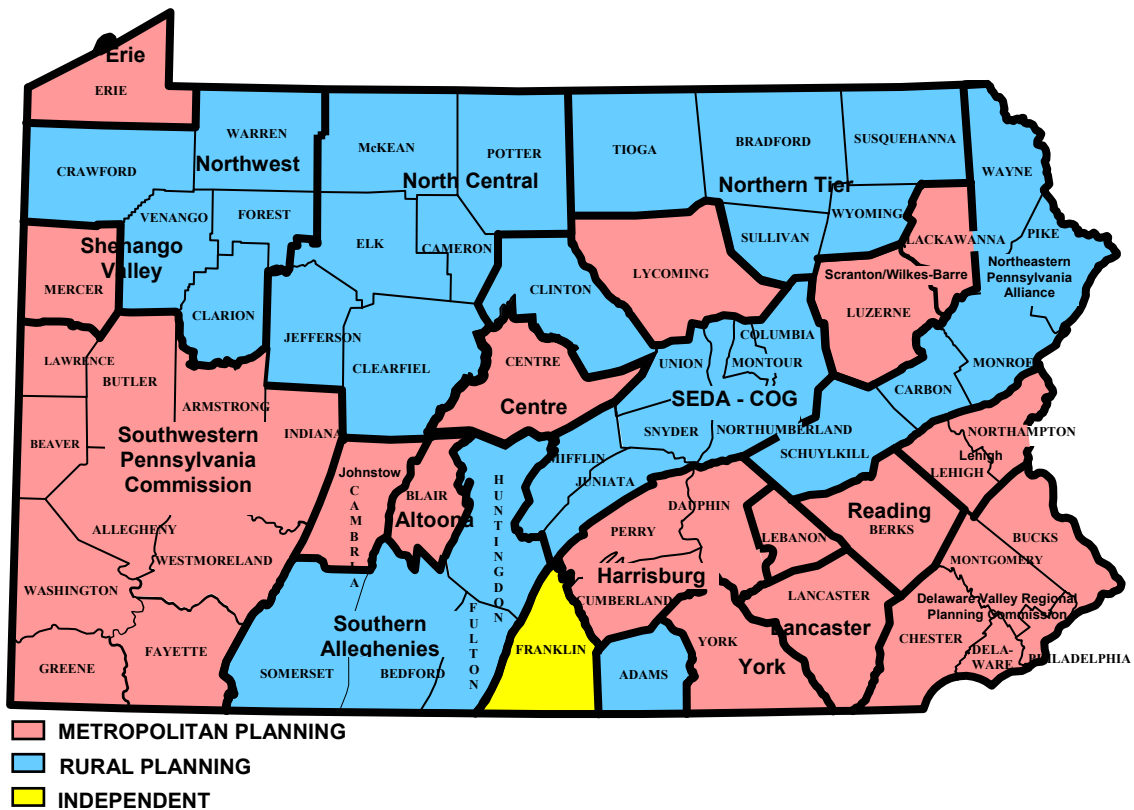


Figure 1-5: Pennsylvania MPO/RPO Map



## **Mainstreaming**

To date, there have been ITS plans in place to cover a few metropolitan areas across the Commonwealth of Pennsylvania. These early plans have led to isolated, non-integrated ITS equipment being scattered throughout the State, except for in the Pittsburgh and Philadelphia Regions. The current deployments have primarily been PennDOT led. The ITS projects deployed to date have already produced important benefits for PennDOT and the traveling public. Unfortunately they have also led to questions about integration across boundaries and the costs, in labor and resources, associated with operating and maintaining these technology deployments.

The Regional ITS Architecture effort has helped to begin addressing these issues by, first, bringing regional agencies to the table to discuss regional technology deployment. Secondly, the Architectures have built a regional foundation for understanding the needs, applications, and linkages to the technologies that are currently deployed or scheduled to be deployed. Lastly, the ITS Architectures will set the stage for “mainstreaming” to occur.

“Mainstreaming” is, simply, getting technology issues in the transportation environment in front of the representative regional bodies for discussion, analysis, and decision making, in the same way that traditional transportation improvements are processed. ITS and operations can no longer be considered just a PennDOT initiative, but must now be viewed as requiring regional input.

Throughout the State, MPO’s and RPO’s will work with PennDOT and other regional stakeholders to include ITS as part of long-range plans that eventually spill into regional and statewide Transportation Improvement Programs (TIP’s). MPO’s and RPO’s should strive to go beyond the basic federal requirement of including transportation projects receiving certain types of federal funds in a Region’s TIP and use the TIP to highlight ITS projects. Project evaluation criteria used to select projects might now be modified in order for ITS projects to be fairly evaluated. Most traditional selection processes to date have excluded valuable ITS projects by not considering the regional needs and benefits associated with technology projects.

There are key factors that can contribute to increased coordination and mainstreaming of ITS within the transportation planning process throughout the Commonwealth of Pennsylvania:

- Creating and utilizing committees or task forces that foster ITS discussions and open communications.
- Cultivating support for ITS deployments, coordination, and integration from the administrators of influential state and regional transportation agencies.
- Creating committees to target coordination, integration, technical, and policy issues.

- Learning from previous ITS deployments.
- Instilling trust in representatives of area agencies in the responsibilities and performance of the MPO, RPO, PennDOT, and regional stakeholder staff that enable them to mainstream ITS and coordinate the area's ITS/Operations efforts.
- Encouraging advocacy for ITS initiatives among top managers.
- Incorporating ITS projects in the Region's long-range transportation plans.
- Developing ITS programs and plans.
- Utilizing the Regional ITS Architecture.
- Including ITS projects within the TIP.
- Utilizing enhanced criteria for selecting ITS projects for inclusion in the TIP.
- Educating elected officials and agency administrators in ITS terminology and strategies.
- Educating other prime stakeholders (beyond traditional transportation agencies) about ITS.
- Educating MPO and RPO staff about ITS.
- Conducting scanning reviews to ITS deployments in external regions and states.

### ***MPO, RPO, and PennDOT Role***

Throughout the State, transportation officials can look to the MPO/RPO to function in the role of ITS facilitator, ITS educator, and ITS project funding prioritizer. The MPO/RPO is often best able to provide a regional context for projects in geographic areas with many political boundaries and to better understand the experiences of a traveling public that tends to have minimal interest in the jurisdictions they pass through. The MPO/RPO has historically been able to recognize the different philosophies of sub-regions and fuse these philosophies into common goals and priorities when working on regional projects. In addition, the MPO/RPO offers a direct conduit to the politicians and is, therefore, seen as the only entity fully capable of educating elected officials about ITS regional applications.

MPO/RPO staff members must recognize, however, that their involvement with specific ITS projects relies on invitations to participate from the sponsoring agencies, such as PennDOT. Inclusion in non-planning activities is generally possible because the MPO/RPO staff have an established record of being knowledgeable, cooperative, and trustworthy. The MPO/RPO staff has earned the respect of the Region not only from their collective knowledge and responsiveness, but also because they have not

overreached their authority. Indeed, when the MPO/RPO staff is knowledgeable about ITS applications, good listeners, and not prone to pressing a narrow agenda, the process to mainstreaming ITS products and services is much simpler since the agency most attuned to the transportation planning process is also the agency most trusted. These conditions may prove to be the most critical toward mainstreaming ITS in the transportation planning process.

### **Regional ITS Coordination Committees**

Regional agencies should consider coordinating all regional ITS efforts into a single regional operations plan. To do this, a committee composed of transportation agencies and operators should be formed. There should be a policy body and a technical body to the committee. This plan should then be used as input into the regional long-range plan.

Elected officials and transportation managers sometimes use or form committees through which they act as regional advocates for ITS. These can be non-profit government organizations composed of elected officials, as well as business interests. The primary goal of these committees is generally to use technology to improve mobility through political and project advocacy. On an annual basis, the committee members adopt a set of projects with regional significance; these include ITS products and services promoted to municipal managers and local transportation officials.

In some metropolitan areas around the country, elected officials and transportation managers have personally taken on the responsibility to act as advocates for ITS products and services. Strong leadership from top management of transportation providers can elevate ITS throughout the Region.

ITS technologies tend to be most useful when planned and deployed from a regional perspective that cuts across geographic boundaries, agencies, and transportation modes. A wide range of stakeholders should have input into ITS planning and deployment activities since many of these agencies will be required to operate these systems or provide coordination and information to enable these systems to function efficiently. This requires elected officials and staff within—and across agencies—to communicate and coordinate with one another. It can, however, be difficult to plan for and deploy ITS within a Region, especially in areas comprised of many local autonomous communities.

One role of a regional committee is to aid in coordinating ITS activities across jurisdictions and agencies. In keeping with the coordinating role, the committee can form a workgroup to improve procedures for incident clearance and make the procedures more uniform within the Region. The workgroup can consist of law enforcement personnel, MPO staff, DOT staff, and officials from select municipalities.

## **Endorsement of ITS**

Public endorsement of ITS products and services demonstrates to all regional stakeholders that ITS is accepted as a tool to solve transportation problems and will be seriously considered as a funding option in the Region's transportation planning process. Elected officials are the most important people from whom to garner support for ITS since they make funding decisions and can influence support by other stakeholders. It is also important for mid- and upper-level transportation managers to support ITS since they inform elected officials and guide funding decisions within their respective transportation organizations. To gain their support, elected officials and transportation managers need to be provided with data and information that define ITS products and services, explain how the technologies are used, and detail the benefits of ITS that can potentially accrue.

In The North Central Region, regular updates from the MPO's to elected officials should be considered during ITS program planning, and implementation. For example, to secure support, the MPO's can brief officials on the logical arguments supporting freeway management in order to receive congestion information and show relationships among incidents, congestion, and air pollution. Local problems can be highlighted and then examined in terms of how ITS products and services can help solve these problems. The message is that transportation professionals in the Region should aggressively manage traffic and focus on reliability and mobility.

## **Education**

Education can improve coordination across jurisdictions and modes in several ways, including increasing awareness of ITS products and services, reducing tensions between agencies representing different transportation modes, and getting planners and operations staff to understand each other's responsibilities and terminology. A lack of awareness of ITS products and services, and their associated benefits, hinders the routine consideration of ITS technologies in a Region's planning and deployment processes. Until a few years ago, ITS education was primarily the responsibility of each agency considering ITS. However, MPO staff should consider taking the lead in creating and providing programs to educate regional stakeholders.

There are many forums available for educating and training transportation professionals in ITS, and not all require a formal classroom setting. For instance, "scanning tours" take place outside a classroom. These tours enable participants to learn how to use the technologies and then interject some first-hand knowledge about the equipment being analyzed into the ITS discussion. Invitees to these scanning tours can consist of:

- County commissioners,
- Executive boards,
- Policy boards,
- Transit operations staff,
- MPO staff,
- Politicians, and

- Public safety officials.

A mixture of upper management, operations, and policy people should be considered. Scanning tours should be taken at the beginning of regional planning efforts or when exposure is needed in advance of a specific project to help decision-makers conceptualize what they need. Elected officials and transportation managers can also become educated about ITS technologies, products, and services by participating on regional, statewide, or national committees, especially those established to consider ITS solutions.

Training courses are available for stakeholders in the Region to learn more about ITS. Such courses are available through the National Highway Institute (NHI) at the following website:

<http://www.nhi.fhwa.dot.gov/default.asp>

National ITS Architecture and Turbo Architecture training are available through the U.S. Department of Transportation. Information on training can be found at the following website:

<http://itsarch.iteris.com/itsarch/html/training/training.htm>

## 2 Architecture Scope

This section summarizes the study's scope of services and identifies the matrix used to assess "conformity." The Conformity Matrix, developed by the Statewide Working Group, is specific to Pennsylvania and has been used in every Region across the Commonwealth to ensure statewide consistency. Descriptions of the Region, regional stakeholders, and existing regional ITS projects are also included in this section.

### 2.1 Scope of Services

At the outset of the study, the North Central Architecture Region's Regional Advisory Panel (RAP) determined that the Region would need to work through all five of the study tasks required to develop the Regional ITS Architecture. The five tasks are:

- Define an Architecture Scope,
- Inventory Systems and Define Needs, Services, and an Operations Coverage,
- Generate a Strawman Regional ITS Architecture,
- Conduct Outreach to Validate the Regional ITS Architecture, and
- Finalize the Regional ITS Architecture.

Consistent with its mandate, the RAP oversaw execution of the Architecture development methodology.

### 2.2 Conformity Matrix

The Pennsylvania Architecture Checklist, specified in the Phase I Report, that preceded the Architecture study, was used to verify compliance of the North Central ITS Architecture with the prescribed methodology. By checking off the bulleted list of outputs and considerations in the checklist tables, below, a Region and State ensures conformity with the Federal Mandate and consistency among the Architectures.

Compliance of the North Central ITS Architecture with the Pennsylvania Architecture Checklist is validated in the following tables:

**Checklist Table #1**

Key Task To Complete	Key Outputs from Task to Include in Regional ITS Architecture (Do we have?)	Considerations and Conformity & Validation Checks (Did we consider and address?)
<b>Define the Regional Architecture Scope</b>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Description-of-region map and text, that includes:                             <ul style="list-style-type: none"> <li>✓ Geographic area (Districts, Counties, Cities, Corridors)</li> <li>✓ Service boundaries, major roadway systems</li> <li>✓ Relationship among jurisdictions within Region</li> <li>✓ Relationship to adjacent Regions and jurisdictions</li> </ul> </li> <li><input checked="" type="checkbox"/> Existing projects matrix (key projects only), that includes:                             <ul style="list-style-type: none"> <li>✓ Project description</li> <li>✓ Impacts on Region</li> <li>✓ ITS components</li> <li>✓ Timetables</li> </ul> </li> <li><input checked="" type="checkbox"/> Scope of services summary (If Not Previously Developed), that includes:                             <ul style="list-style-type: none"> <li>✓ Regional stakeholders list</li> <li>✓ Owners and operators of ITS systems in Region</li> <li>✓ Entities with stake or interest in Regional transportation issues</li> <li>✓ Conformity requirements matrix</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Has a Regional Champion been identified?</li> <li><input checked="" type="checkbox"/> Have traditional, existing, transportation planning documentation been reviewed?</li> <li><input checked="" type="checkbox"/> Is there consistency between regional scope and transportation plans?</li> <li><input checked="" type="checkbox"/> Is there consistency between Regional scope and National ITS Architecture</li> </ul>

**Checklist Table #2**

Key Task to Complete	Key Outputs from Task to Include in Regional ITS Architecture (Do we have?)	Considerations and Conformity & Validation Checks (Did we consider and address?)
<b>Develop an Inventory of Regional Systems &amp; Define Regional Needs, Services, and Operational Concept</b>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> System inventory, that includes:                             <ul style="list-style-type: none"> <li>✓ System name(s)</li> <li>✓ Descriptions</li> <li>✓ Status (existing or planned)</li> <li>✓ Associated subsystems/terminators in National ITS Architecture</li> <li>✓ System owner/operator (stakeholders and system elements)</li> </ul> </li> <li><input checked="" type="checkbox"/> Needs and services summary, that includes:                             <ul style="list-style-type: none"> <li>✓ Regional needs</li> <li>✓ ITS services (planned or implemented)</li> </ul> </li> <li><input checked="" type="checkbox"/> Operations coverage that includes:                             <ul style="list-style-type: none"> <li>✓ Operational roadways.</li> <li>✓ Assignment of operational coverage</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Is there completeness and consistency of the inventory among stakeholders?</li> <li><input checked="" type="checkbox"/> Is the conformity to and compatibility with the Architecture?</li> <li><input checked="" type="checkbox"/> Has the Region considered the following:                             <ul style="list-style-type: none"> <li>✓ System operations that extend beyond Regional boundaries</li> <li>✓ Impacts on contiguous Regions or jurisdictions</li> <li>✓ Operational characteristics along corridors and at local levels</li> <li>✓ Locations and operational characteristics of planned traffic operations centers (TMC)</li> <li>✓ Working relationship among stakeholder organizations</li> </ul> </li> </ul>

**Checklist Table #3**

Key Task to Complete	Key Outputs from Task to Include in Regional ITS Architecture (Do we have?)	Considerations and Conformity & Validation Checks (Did we consider and address?)
<p><b>Generate Strawman (Rough Draft) Architecture</b></p>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Develop a Regional systems interconnect summary, that includes:                             <ul style="list-style-type: none"> <li>✓ Diagram of actual and potential connections between subsystems</li> <li>✓ Connection status (existing or planned) for each connection</li> </ul> </li> <li><input checked="" type="checkbox"/> Develop Regional information flow diagrams, that include:                             <ul style="list-style-type: none"> <li>✓ Descriptive name for the information</li> <li>✓ Information flow status (existing or planned)</li> <li>✓ Direction of information flow</li> </ul> </li> <li><input checked="" type="checkbox"/> Develop a Regional Strawman Architecture, that includes:                             <ul style="list-style-type: none"> <li>✓ Architecture approach</li> <li>✓ Needs &amp; services</li> <li>✓ Systems inventory</li> <li>✓ Interconnects</li> <li>✓ Information flows</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Have the interconnections and information exchanges across Regional boundaries been identified?</li> <li><input checked="" type="checkbox"/> Has the ability of the communications infrastructure to support the proposed interconnections been addressed at a high-level?</li> <li><input checked="" type="checkbox"/> Is there completeness and consistency in the interconnects summary?</li> <li><input checked="" type="checkbox"/> Is there completeness and consistency among the information flow diagrams?</li> <li><input checked="" type="checkbox"/> Is there consistency and compatibility with the completed or evolving Architectures in other Regions in the state?</li> <li><input checked="" type="checkbox"/> Is there conformity and compatibility with the National ITS Architecture?</li> </ul>

**Checklist Table #4**

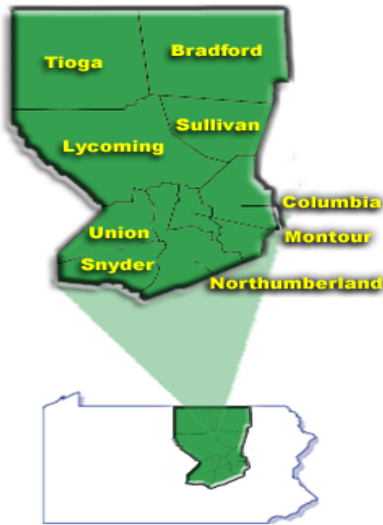
Key Task to Complete	Key Outputs from Task to Include in Regional ITS Architecture (Do we have?)	Considerations and Conformity & Validation Checks (Did we consider and address?)
<p><b>Conduct Outreach to Validate Architecture</b></p>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Develop Stakeholders' guide to Regional Architecture, that could include:                             <ul style="list-style-type: none"> <li>✓ Background on Regional Architecture project</li> <li>✓ Stakeholder review and validation process</li> <li>✓ Glossary of technical terms</li> </ul> </li> <li><input checked="" type="checkbox"/> Documentation of stakeholder inputs</li> <li><input checked="" type="checkbox"/> Refined and validated Architecture</li> </ul>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Have real-world and program issues been considered?</li> <li><input checked="" type="checkbox"/> Have any unusual institutional Issues been identified?</li> <li><input checked="" type="checkbox"/> Have any specialized data-sharing requirements been identified?</li> <li><input checked="" type="checkbox"/> Have political considerations been identified?</li> <li><input checked="" type="checkbox"/> Have any other unique conditions, circumstances, or issues in the Region been identified?</li> <li><input checked="" type="checkbox"/> Have Stakeholders from areas contiguous to the Region been involved?</li> <li><input checked="" type="checkbox"/> Is there conformity with FHWA Regional ITS Architecture Assessment Criteria?</li> </ul>



**Checklist Table #5**

Key Task to Complete	Key Outputs from Task to Include in Regional ITS Architecture <i>(Do we have?)</i>	Considerations and Conformity & Validation Checks <i>(Did we consider and address?)</i>
<b>Finalize the Regional Architecture</b>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Final Regional ITS Architecture Document</li> <li><input checked="" type="checkbox"/> Statewide Operations Framework Input                             <ul style="list-style-type: none"> <li>✓ Regional Architecture overview</li> <li>✓ High-level Regional operations summary</li> <li>✓ Relationship between Region and State</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Is there consistency and compatibility among the Regional ITS Architectures?</li> </ul>

### 2.3 Description of the Region



The North Central ITS Architecture Region is located in North-Central Pennsylvania and consists of nine counties: Bradford, Columbia, Lycoming, Montour, Northumberland, Snyder, Sullivan, Tioga, and Union. PennDOT Engineering District 3-0 is encompassed in the North Central ITS Architecture Region.

Williamsport is the central hub of the Region, which is predominantly rural in nature. Williamsport is the largest city in the Region; however, because of its location in an east-west valley the main highway corridor through the Region, I-80, does not go through Williamsport. Instead, access to Williamsport is via I-180 or US-220.

**Figure 2-1: North Central ITS Architecture Region**

*(Source: PennDOT District 3-0 Web site)*

Table 2-1 reveals that nearly five hundred thousand people — or approximately four percent of statewide residents of the Commonwealth of Pennsylvania — live in the North Central ITS Architecture Region. Approximately seventy percent of the Region’s population resides in Lycoming, Northumberland, Bradford, and Columbia Counties, with the remainder scattered among the other three counties of the Region.

**Table 2-1: North Central ITS Architecture Region Population by County**

<b>County</b>	<b>% Population</b>
<b>Bradford</b>	<b>13%</b>
<b>Columbia</b>	<b>13%</b>
<b>Lycoming</b>	<b>25%</b>
<b>Montour</b>	<b>4%</b>
<b>Northumberland</b>	<b>19%</b>
<b>Snyder</b>	<b>8%</b>
<b>Sullivan</b>	<b>1%</b>
<b>Tioga</b>	<b>8%</b>
<b>Union</b>	<b>9%</b>
<b>Total Population in the North Central Region</b>	<b>486,847</b>

(Source: U.S. Census Bureau, 2000)

Table 2-2 compares specific population traits in the North Central Region to those across Pennsylvania and the U.S. generally. For instance, the Region is nominally more homogeneous than either the statewide or national populations — only 4.0 percent of the North Central residents are classified as minorities. The Region’s population skews older than the state or national averages — the median age of North Central residents is 39, as compared to 38 years statewide and 35 years nationally. Also, mean family size is smaller and per capita income is lower in the North Central Region than across Pennsylvania or the U.S.

**Table 2-2: Comparison of Key Population Demographics North Central ITS Architecture Region, Pennsylvania, and the United States**

<b>Demographic Factor</b>	<b>North Central Region</b>	<b>Pennsylvania</b>	<b>United States</b>
<b>Total Population</b>	<b>486,847</b>	<b>12,281,054</b>	<b>281,421,906</b>
<b>% Minority Population</b>	<b>4.0%</b>	<b>14.6%</b>	<b>24.9%</b>
<b>Median Age (In Years)</b>	<b>38.6</b>	<b>38.0</b>	<b>35.3</b>
<b>Mean Family Size</b>	<b>2.94</b>	<b>3.04</b>	<b>3.14</b>
<b>Per Capita Income</b>	<b>\$16,987</b>	<b>\$20,880</b>	<b>\$21,587</b>

(Source: U.S. Census Bureau, 2000)

Table 2-3 examines commuting patterns in the Region to the state and national commuting conditions. Nearly four-out-of-five North Central workers drive to work alone, higher than the state and national “drive-alone” rates. Eleven percent of workers in the Region carpool to work, which is slightly above the statewide average of ten percent. Only one percent of workers use public transportation; considerably less than state and national transit usage trends. The average one-way commute time for North

Central ITS Architecture Region workers is 22 minutes, which compares favorably to the 25-26 minutes for Pennsylvania and U.S. workers generally.

**Table 2-3: Comparison of Commuting Patterns Among Workers 16 & Over North Central ITS Architecture Region, Pennsylvania, and the United States**

<b>Commuting Pattern</b>	<b>North Central Region</b>	<b>Pennsylvania</b>	<b>United States</b>
<b>Total Workers 16 &amp; Over</b>	<b>214,084</b>	<b>5,556,311</b>	<b>128,279,228</b>
<b>% Commuters Driving Alone</b>	<b>78.6</b>	<b>76.5%</b>	<b>75.7%</b>
<b>% Commuters Carpooling</b>	<b>11.2%</b>	<b>10.4%</b>	<b>12.2%</b>
<b>% Commuters Using Public Transportation</b>	<b>0.9%</b>	<b>5.2%</b>	<b>4.7%</b>
<b>Mean Travel Time to Work (Minutes)</b>	<b>21.5</b>	<b>25.2</b>	<b>25.5</b>

(Source: U.S. Census Bureau, 2000)

As shown in Table 2-4, the North Central Region encompasses a substantial network of roadways. As reported in PennDOT's *2002 Highway Statistics*, the Region contains 12,014.3 linear miles of roadway, signifying 9.8 percent of the Commonwealth's total linear mileage. This includes 4,368.1 linear miles of roadway maintained by PennDOT, with the remaining road miles maintained by the municipalities, etc.

**Table 2-4: PennDOT North Central ITS Architecture Region Linear Miles**

<b>County</b>	<b>PennDOT Linear Miles</b>	<b>Total Linear Miles</b>
<b>Bradford</b>	<b>897.1</b>	<b>2,493.8</b>
<b>Columbia</b>	<b>493.9</b>	<b>1,390.1</b>
<b>Lycoming</b>	<b>725.2</b>	<b>2,185.8</b>
<b>Montour</b>	<b>172.1</b>	<b>412.2</b>
<b>Northumberland</b>	<b>528.0</b>	<b>1,424.1</b>
<b>Snyder</b>	<b>303.3</b>	<b>856.4</b>
<b>Sullivan</b>	<b>245.0</b>	<b>616.8</b>
<b>Tioga</b>	<b>621.7</b>	<b>1,935.9</b>
<b>Union</b>	<b>281.8</b>	<b>699.2</b>
<b>Regional Total</b>	<b>4,368.1</b>	<b>12,014.3</b>
<b>Statewide Total</b>	<b>39,905.5</b>	<b>120,297.7</b>

Table 2.5 depicts the daily vehicle miles of travel (DVMT) across the Region, which is substantial. Total DVMT on all roadways in the Region, as reported in the *2002 Highway Statistics* was approximately 13.9 million miles. The DVMT on PennDOT roadways was approximately 11.5 million miles.

**Table 2-5: PennDOT North Central Daily Vehicle Miles of Travel**

<b>County</b>	<b>PennDOT DVMT</b>	<b>Total DVMT</b>
<b>Bradford</b>	<b>1,246,733</b>	<b>1,426,632</b>
<b>Columbia</b>	<b>1,673,875</b>	<b>1,906,646</b>
<b>Lycoming</b>	<b>2,534,951</b>	<b>3,221,528</b>
<b>Montour</b>	<b>702,669</b>	<b>797,575</b>
<b>Northumberland</b>	<b>1,839,060</b>	<b>2,172,844</b>
<b>Snyder</b>	<b>1,009,815</b>	<b>1,176,396</b>
<b>Sullivan</b>	<b>170,852</b>	<b>266,451</b>
<b>Tioga</b>	<b>1,197,864</b>	<b>1,507,776</b>
<b>Union</b>	<b>1,216,952</b>	<b>1,479,676</b>
<b>Regional Total</b>	<b>11,592,771</b>	<b>13,955,524</b>
<b>Statewide</b>	<b>217,331,036</b>	<b>287,203,348</b>

The North Central ITS Architecture Region contains a range of important highway corridors. The most significant corridors are depicted in Figure 2-6.

**Table 2-6: Significant Highway Corridors**

<b>Interstates</b>	<b>United States (U.S.) Routes</b>	<b>Pennsylvania (PA) Routes</b>
Interstate 80 (I-80)	US Route 6 (US-6)	PA Route 61 (PA-61)
Interstate 180 (I-180)	US Route 11 (US-11)	
	US Route 15 (US-15)	
	US Route 220 (US-220)	

The North Central Region contains tourist attractions and travel destinations, including:

- Endless Mountains ski areas,
- Little League World Series,
- Bloomsburg Fair,
- Significant hunting and fishing destinations, and
- PennDOT Welcome Centers.

The Region is also home to multiple transit providers, including:

- Williamsburg Bureau of Transportation, and
- Endless Mountains Transportation Authority.

## 2.4 Regional Stakeholders

This section documents the Regional stakeholders defined by the RAP for inclusion and participation in the Regional ITS Architecture effort. Stakeholders are generally identified in terms of agencies and specific individuals in those agencies responsible for policy and operations. Agencies were selected by assessing the mission of operation of services related to the transportation system. Therefore Emergency Management Services (EMS), Incident Management (IM), ITS, Transit, and enforcement activities were all included. Planning agencies were included as well because capital and some Operations & Maintenance (O&M) funds are programmed through these agencies.

**Adjacent State Emergency Management Agencies:** Statewide and regional emergency management agencies in New York State, which borders the District 3-0 Region. These agencies are responsible for coordination activities related to major incidents and events that cross state borders and have impacts within the Region.

**Adjacent State Public Safety Agencies:** Statewide and regional police/public safety agencies in New York State, which borders the District 3-0 Region. These agencies are responsible for coordination activities related to major emergencies and disasters that cross state borders and have impacts within the Region.

**Adjacent State Transportation Agencies:** Agencies responsible for operating, maintaining, and managing major transportation facilities adjacent to the District 3-0 Region in New York State. Agencies include the New York State DOT (both centrally and within Region 6) and the New York State Thruway Authority.



**Attractions and Event Promoters:** Locations, venues, facilities, and businesses within the Region that attract major trip-making, thereby creating impacts on the transportation system. Regional attractions include the Little League Baseball World Series (and associated museum), the Bloomsburg Fair, and numerous recreation and tourism sites.

**Commercial Vehicle Companies:** Privately owned trucking companies responsible for the safe and efficient movement of goods using the transportation system in the Region. Services provided by various commercial vehicle agencies include the delivery of intermodal shipments (containers and trailers), bulk materials (including chemical and HAZMAT products), and specialized cargo (legal, over-dimensional, and heavy haul shipments).

**Counties:** Bradford, Columbia, Lycoming, Montour, Northumberland, Snyder, Tioga, and Union county government operations within the D3-0 Region. Departments typically having an impact on the transportation system include incident and emergency management agencies such as county police, fire, EMS, 911, and EMA's, as well as County planning departments.

**General Public:** The community or the people as a whole using the transportation system. The general public may be an automobile driver, transit passenger, computer, or cell-phone user obtaining travel information, or any other person interacting with the transportation system in the Region.

**Information Service Providers:** Public agencies and private companies that provide information to media outlets and the general public on the status of the transportation system, including delays, incidents, and facility closures.

**Local School Districts:** Municipal and regional entities that operate schools within the Region. In addition, school districts are responsible for providing students with transportation to and from school on a daily basis.

**Municipalities:** Municipal governments located within the region, whose responsibilities include traffic signal operations, traffic management, and emergency response (fire/police/EMS). The major municipality within the Region is the City of Williamsport, with the rest of the region comprising a large number of boroughs and townships, which vary in nature from urban to suburban to rural. Staffing and hours of service vary widely, from cities with a large staff that operate 24 hours per day, 7 days per week to townships with only a handful of paid staff that are only open 2-3 days per week during regular business hours.



**Pennsylvania Department of Transportation (PennDOT):**

The Pennsylvania Department of Transportation is the Commonwealth's statewide transportation agency responsible for building, maintaining, and operating the state's roads, bridges and tunnels. PennDOT consists of a single Central Office and 11 District Offices throughout the state.

PennDOT's Central Office consists of several internal organizations, including the Bureau of Maintenance and Operations (BOMO), Motor Carrier Division, Bureau of Planning and Research (BPR), Bureau of Highway Safety and Traffic Engineering (BHSTE), Bureau of Licensing, Bureau of Motor Vehicles, Bureau of Freights and Rails, Bureau of Information Systems, Communication Office of Information Technology, and Press Office. PennDOT's Central Office oversees statewide operations and is responsible for coordination of transportation services between the 11 Districts.

PennDOT's District Offices are responsible for the design, operation, maintenance, and construction of state highways and bridges in their respective districts.

For more information, visit PennDOT's website (<http://www.dot.state.pa.us>).



**Pennsylvania Emergency Management Agency (PEMA):**

The Pennsylvania Emergency Management Agency (PEMA) coordinates state agency emergency response, including the Office of

the State Fire Commissioner and Office of Homeland Security, to support county and local governments in the areas of civil defense, disaster mitigation and preparedness, planning, and response to and recovery from man-made and natural disasters. For more information, visit PEMA's website (<http://www.pema.state.pa.us>).



**Pennsylvania Office of Homeland Security:**

Pennsylvania Homeland Security addresses the security needs of the state. Developed in response to 9/11 the Homeland Security Office is focusing on a range of important security needs and services, including transportation-related issues. Potential high-threat topics — e.g., nuclear power plants, DOE shipments, chemical industry, major distribution of gas and electric utilities, and other target infrastructure — are all covered through the Office's Homeland Security mission. Initially, the ITS Architecture focuses on security issues as part of incident management. In the future, as the Office's mandate is refined, additional security services and needs are likely to be reflected in the Architecture.

**Pennsylvania State Police (PSP):** The Pennsylvania State Police is a full service statewide law enforcement agency that fulfills the law enforcement needs of the general public across the Commonwealth of Pennsylvania. Transportation services provided by the Pennsylvania State Police include: (1) incident response, (2) commercial vehicle inspections, and (3) law enforcement on state highways. For more information, visit the Pennsylvania State Police website (<http://www.psp.state.pa.us>).



**Private Utility Companies:** Private companies located within the Region delivering utility services such as natural gas, electricity, water, sewer, telephone, and cable. These companies have an impact on the Regional transportation system due to their ongoing planning and emergency maintenance and construction activities.

**Regional Airports:** Commercial and general aviation airports and airfields located throughout the Region, including Williamsport Regional Airport (IPT), which is the only commercial airport located within the Region. In addition to providing scheduled and unscheduled aviation service, these airports are also involved in incident and emergency response, as well as providing traveler information.

**Regional Media:** The regional media consists of all regional/local television and radio stations that provide weather, traffic, and other information to the general public via means of mass communication.

**Regional Railroads:** Railroads provide for the bulk movement of goods within and to/from the Region (no passenger rail service currently exists within District 3-0). Railroads operating within the Region include Norfolk Southern, Canadian Pacific, local short lines, and county/regional railroad authorities.

**Regional Transit Agencies:** Public agencies and private companies operating public transportation services within the Region, including City Bus (Williamsport Bureau of Transportation), the Endless Mountain Transportation Authority (EMTA), and various paratransit/demand response operators, as well as private companies such as Susquehanna Trailways and Greyhound.

**Spill Centers:** These agencies are responsible for environmental clean up after incidents, particularly when hazardous materials are involved. Spill Centers include the Department of Environmental Protection, Department of Agriculture, and others who respond to incidents on the roadway.

**Towing Industry:** The towing industry consists of privately owned towing agencies in the Region responsible for the incident cleanup and the removal of vehicles at incident sites.

**Various Stakeholders:** This stakeholder represents several stakeholders within the Region working in conjunction to initiate, own, operate, and/or maintain transportation infrastructure within the Region.

**Weather Information Providers:** Public agencies and private companies that provide weather forecast information to transportation agencies, emergency response agencies, media outlets, and the general public. Includes the National Weather Service/NOAA, Accuweather, The Weather Channel, and others.

## 2.5 Regional ITS Projects

The Regional ITS Projects Matrix identifies ITS projects in the Region and provides a high-level description of the projects. The matrix denotes the status of each project, as follows:

- Existing — An ITS project that is deployed and operational.
- Planned 1 — A future ITS project that is programmed or formally documented by the MPO, DOT, transit agency, police, or other transportation stakeholder.
- Planned 2 — A future ITS project that is not programmed or documented.

The information on projects shown in the matrix (see Table 2-7) was collected from Regional or Municipal planning documents, or otherwise enunciated by members of the RAP. Regional stakeholders went through a process of defining projects as existing, planned 1, or planned 2. A planning horizon of 20 years was used as a criterion in determining those projects to include in the matrix.



**Table 2-7: Regional ITS Projects**

<b>Stakeholder</b>	<b>Project</b>	<b>Status</b>	<b>Project Description</b>
<b>Adjacent State Transportation Agencies</b>	Region 6 TMC (New York State DOT)	Existing	Provides operations and incident management coordination for the NYS DOT Region 6 area.
<b>Commercial Vehicle Companies</b>	Private Carrier Commercial Vehicle Tracking System	Existing	Commercial Vehicle Tracking System provides tracking information of all the trucks using the system. Commercial vehicles also have communication devices to communicate with the trucking agency on-route.
<b>Commercial Vehicle Companies</b>	Private Carrier Fleet Maintenance Management	Existing	This program provides capabilities to administer preventive maintenance schedules.
<b>Commercial Vehicle Companies</b>	FHWA Carrier Compliance Review	Existing	The FHWA Compliance Review process involves examining carrier records to ensure that the carrier meets all safety-related regulations and does not have unsafe operating practices.
<b>Counties</b>	Mobile Command Vehicle (Lycoming County Emergency Management Agency)	Existing	Vehicle available for setting up mobile command centers at emergency and incident locations.
<b>Counties</b>	Vital Emergency Communications Link (Lycoming County)	Planned 1	Lycoming County is installing a vital communications link between local police departments and the County Emergency Communications Center.
<b>Counties</b>	Geographic Information Systems	Existing	Computer application used to manage spatial data and mapping for a variety of purposes.

<b>Stakeholder</b>	<b>Project</b>	<b>Status</b>	<b>Project Description</b>
<b>Counties</b>	Remote Stream Gauge Sensors	Existing	Readings from remote sensors provide advance warning of flooding conditions.
<b>Counties</b>	Geographic Information Systems	Existing	Computer application used to manage spatial data and mapping for a variety of purposes.
<b>Counties</b>	1-800-ENS	Existing	Single telephone number for reporting unsafe conditions at Highway-Rail Intersections.
<b>Counties</b>	EMA Emergency Response	Planned 2	Develop enhanced emergency response unit as part of Lycoming County EMA.
<b>Counties</b>	PennDOT Liaison Desk	Planned 2	Set up PennDOT liaison desk at Lycoming County EMA, which can be activated in case of emergencies that require PennDOT coordination.
<b>Counties</b>	Improved Emergency Information	Planned 2	Provided improved and expanded information about emergency conditions to public and private transit service providers.
<b>Counties</b>	Improved School Transportation Planning	Planned 2	Improve communications between planning organizations and school districts regarding planning and future infrastructure needs.
<b>Counties</b>	Improved Communication with Railroads	Planned 2	Improve communications between railroads and planning organizations regarding planning and future infrastructure needs.

<b>Stakeholder</b>	<b>Project</b>	<b>Status</b>	<b>Project Description</b>
<b>PennDOT (Central Office)</b>	Winter Road Condition Hotline for Interstate Highways	Existing	A hotline phone service that disseminates seasonal statewide road conditions including road closures, detours, alternative routes, work zone/ construction events, and road surface conditions.
<b>PennDOT (Central Office)</b>	Roadway Weather Information System (RWIS)	Existing	Road Weather Information Systems collect weather information/images throughout the state. RWIS information is made available to the public and transportation agencies via a webpage.
<b>PennDOT (Central Office)</b>	PennDOT Performance and Registration Information Systems Management (PRISM)	Existing	This project began as an effort to explore the potential of linking the Commercial Vehicle registration process to motor carrier safety.
<b>PennDOT (Central Office)</b>	PennDOT Safety and Fitness Electronic Record (SAFER)	Planned 1	SAFER is a software program that enables the enforcement community to transmit and receive data on CVO safety, credential, and inspection to and from the roadside.
<b>PennDOT (Central Office)</b>	PennDOT Transportation Management Centers (TMC's)	Planned 2	PennDOT intends to enhance existing Transportation Management Centers (TMC's), and establish new TMC's, to monitor and control the transportation system in partnership with other transportation operations providers.

<b>Stakeholder</b>	<b>Project</b>	<b>Status</b>	<b>Project Description</b>
<b>PennDOT (Central Office)</b>	PennDOT "Wizard" Work Zone Alert Radio	Planned 1	The alert radio alerts truck drivers to work zone conditions.
<b>PennDOT (Central Office)</b>	Statewide Telecommunication	Planned 2	This project would develop a statewide telecommunication system
<b>PennDOT (Central Office)</b>	Construction Projects (current and future)	Existing	This projects allows for road closure, work zone and construction information dissemination through PennDOT website.
<b>PennDOT (Central Office)</b>	Central Repository	Planned 2	This project would involve developing a central repository for information. The central repository information would include work zone information, real time traffic information, and accident information among others. The central repository will facilitate better coordination among various PennDOT offices and the customers.
<b>PennDOT (Central Office)</b>	Real -time Traffic Information Website	Planned 2	This project would include deployment of a real time traffic information website which would disseminate the following real time information: traffic information, incident information, work zone information and weather advisory information.
<b>PennDOT (Central Office)</b>	Statewide GIS based Incident Detour Map	Planned 2	This project would develop a statewide GIS based incident detour map for various major interstate routes.  The statewide GIS based data would be consistent with the Counties' GIS data.

<b>Stakeholder</b>	<b>Project</b>	<b>Status</b>	<b>Project Description</b>
<b>PennDOT (Central Office)</b>	Video Sharing	Planned 2	This project would involve sharing of video images among various PennDOT Districts, PSP, PEMA, and other coordinating agencies.
<b>PennDOT (Central Office)</b>	Web site Portal for Assisting Commercial Vehicle Operators	Planned 2	In addition to the real time traffic information, this website would assist the commercial vehicle operators by providing video images, incident alerts, customized incident information/alerts, site restrictions. This website would also assist the commercial vehicle operators by reducing paper work necessary for their operations.
<b>Pennsylvania Department of Transportation (District 3-0)</b>	Portable Dynamic Message Signs (DMS)	Existing	4 portable DMS units are currently deployed to provide information to travelers regarding roadway and travel conditions. Additional DMS units are available from county maintenance offices if necessary.
<b>Pennsylvania Department of Transportation (District 3-0)</b>	Permanent/Overhead Dynamic Message Signs (DMS)	Existing	1 permanent/overhead DMS unit provides information to travelers on roadway and travel conditions.
<b>Pennsylvania Department of Transportation (District 3-0)</b>	Highway Advisory Radio (HAR)	Existing	One movable HAR broadcasting station is available to provide travelers with radio information about roadway and weather conditions, as well as construction and special events. This movable unit is used mostly to provide construction information.

<b>Stakeholder</b>	<b>Project</b>	<b>Status</b>	<b>Project Description</b>
<b>Pennsylvania Department of Transportation (District 3-0)</b>	Pre-Assigned Detour Routes	Existing	Pre-determined and statically signed detour routes that can be used in the event of a major incident along or closure of an Interstate highway. Information about which detour routes to follow can be disseminated using VMS, HAR, and other ITS systems. Detour routes are currently in place along SR-80/I-80.
<b>Pennsylvania Department of Transportation (District 3-0)</b>	Pennsylvania Welcome Center	Existing	Welcome Center located on US-15 provides travelers with trip planning, roadway safety, and other traveler information.
<b>Pennsylvania Department of Transportation (District 3-0)</b>	PennDOT D3 Web Site	Existing	District web site provides information about roadway construction, weather conditions, and general district operations.
<b>Pennsylvania Department of Transportation (District 3-0)</b>	US-220 Reconstruction	Planned 2	As part of the reconstruction of US-220, installation of additional portable VMS units has been proposed.
<b>Pennsylvania Department of Transportation (District 3-0)</b>	Incident Response Trailers	Existing	Incident response trailers are prepared for deployment at each of the County Maintenance Offices.
<b>Pennsylvania Department of Transportation (District 3-0)</b>	Toll-Free Traveler Information	Planned 2	Develop a toll-free information number providing traveler information to the general public.
<b>Pennsylvania Department of Transportation (District 3-0)</b>	Welcome Center/Rest Area Displays	Planned 2	Install video displays at PennDOT Welcome Centers and roadside rest areas to provide traveler information to motorists.

<b>Stakeholder</b>	<b>Project</b>	<b>Status</b>	<b>Project Description</b>
<b>Pennsylvania Department of Transportation (District 3-0)</b>	Traveler Information Beacons	Planned 2	Install beacons (similar to HAR beacons) that can be activated to inform drivers that updated traveler information is available (via radio, at Welcome Centers/rest areas, and via other means).
<b>Pennsylvania Department of Transportation (District 3-0)</b>	Operations Database	Planned 2	Develop (and regularly update) database of operations-related information (i.e. contact information and standard operating procedures).
<b>Pennsylvania Department of Transportation (District 3-0)</b>	Video Sharing	Planned 2	As CCTV cameras are installed in the Region, share video images with 911 Communication Centers and other key stakeholders.
<b>Pennsylvania Department of Transportation (District 3-0)</b>	Improved Incident Command	Planned 2	In coordination with other stakeholders, developed an improved incident command structure, including standard operating procedures.
<b>Pennsylvania Department of Transportation (District 3-0)</b>	Improved School Transportation Information	Planned 2	Provide improved/enhanced information to school districts regarding roadway conditions.
<b>Pennsylvania Department of Transportation (District 3-0)</b>	Define Traveler Information Roles & Responsibilities	Planned 2	Better define the various roles and jurisdictions of PennDOT and other agencies in terms of providing traveler information to the general public.
<b>Pennsylvania Emergency Management Agency (PEMA)</b>	PEMA Emergency Operation Center	Existing	Emergency Operation Center provides agency coordination for significant incidents, events, and emergencies throughout Pennsylvania. Also collects/distributes information from various agencies for a Daily Incident Report webpage.

<b>Stakeholder</b>	<b>Project</b>	<b>Status</b>	<b>Project Description</b>
<b>Pennsylvania Emergency Management Agency (PEMA)</b>	PEMA Truck	Existing	PEMA truck acts as a backup to the operations of the PEMA's Emergency Operations Center. The mobility of the truck allows establishing an Emergency Operations Center at the incidence location in case of major incident.
<b>Pennsylvania Emergency Management Agency (PEMA)</b>	Pennsylvania Emergency Information Reporting System (PEIRS)	Existing	A statewide electronic database, the Pennsylvania Emergency Information Reporting System (PEIRS) collects information from all state agencies responding to incidents/emergencies in the Commonwealth of Pennsylvania.
<b>Pennsylvania Emergency Management Agency (PEMA)</b>	Regional Agile Port Intermodal Distribution System (RAPID)	Existing	This system uses global positioning satellites to keep track of any military cargo or hazardous materials moving by ship, truck or rail
<b>Pennsylvania State Police (PSP)</b>	Incident Information Management System (IIMS)	Existing	The Incident Information Management System is a database used to provide PSP vehicles incident reporting and dispatching capabilities.
<b>Pennsylvania State Police (PSP)</b>	PSP Dispatch Centers	Existing	PSP Dispatch Centers are responsible for PSP operations. Dispatch Centers dispatch PSP Vehicles to incidents and emergencies on state highways.



<b>Stakeholder</b>	<b>Project</b>	<b>Status</b>	<b>Project Description</b>
<b>Pennsylvania State Police (PSP)</b>	PSP Consolidated Dispatch Centers	Planned 1	PSP Consolidated Dispatch Centers will provide consolidated dispatch and management of PSP resources for incident/emergency operations throughout the coverage area.
<b>Pennsylvania State Police (PSP)</b>	Mobile Data Terminals (MDT's)	Existing and Planned 1	In-vehicle systems used by the vehicles to communicate and receive dispatch information from PSP and other agencies' systems. MDT's are currently being integrated with other state agencies now (i.e. PEMA) and municipal agencies in the future.
<b>Pennsylvania State Police (PSP)</b>	PSP CHIPS Enhancement	Existing and Planned 2	The Pennsylvania State Police (North Central Region) currently have access to PennDOT District 3-0 TMC CHIPS software. This software provides PSP with the ability to control DMS. This project would enhance the current system.
<b>Regional Transit Agencies</b>	City Bus Radio Communication System (City Bus - Williamsport Bureau of Transportation)	Existing	Radios are used for voice communication between transit vehicles and the dispatch center.
<b>Regional Transit Agencies</b>	City Bus Automatic Vehicle Location (City Bus - Williamsport Bureau of Transportation)	Existing	The majority of the City Bus fleet is equipped with AVL technology for dispatching and stop annunciation.
<b>Regional Transit Agencies</b>	City Bus Automated Stop Announcements (City Bus - Williamsport Bureau of Transportation)	Existing	The majority of the City Bus fleet is equipped with automatic stop enunciators tied into the AVL system.

<b>Stakeholder</b>	<b>Project</b>	<b>Status</b>	<b>Project Description</b>
<b>Regional Transit Agencies</b>	Endless Mountains Transportation Authority (EMTA) Automatic Vehicle Location System	Existing	AVL technology provides real-time location of transit vehicles, for dispatching and customer information functions. System is currently in the process of being deployed.
<b>Regional Transit Agencies</b>	Jersey Shore Transit Service	Planned 2	Provide improved public transit service to the Jersey Shore area.
<b>Regional Transit Agencies</b>	Transit/School Coordination	Planned 2	Improved coordination between transit agencies and school districts.
<b>Regional Transit Agencies</b>	Transit Operator Coordination	Planned 2	Improve coordination and eliminate redundancy among the multiple public transit providers, particularly in Lycoming County.
<b>Towing Industry</b>	Towing Industry Coordination	Planned 2	The North Central Region has a need for improving the information shared with the towing industry. This information includes: (1) communication of location and resources needed and (2) timing and coordination.
<b>Various Stakeholders</b>	800 MHz Statewide Communication System	Existing	This project involves the deployment of a statewide 800 MHz wireless communication system for state agencies.
<b>Various Stakeholders</b>	511 Traveler Information Phone System	Planned 2	Project that may be initiated by PennDOT and to collect and distribute traveler information via a dedicated 511 phone number throughout the state.
<b>Various Stakeholders</b>	AMBER Alert Coordination	Existing	AMBER alert coordination between PennDOT Central Office, PEMA, PennDOT District Offices, and PSP.

### 3 Regional Systems Inventory, Needs, and Services

The National ITS Architecture provides guidance on collecting and creating ITS Architectures using regional data. Given this guidance, this section provides a common sense approach to gathering information, providing a logical flow down to this information in order to create the Regional ITS Architecture. This section documents elements (groups that operate), systems inventory (what these groups are doing), needs (information or data that these groups need or use from others) and services (information or data that these groups provide to others). This section also includes a section on operations coverage.

#### 3.1 Element Descriptions

Element descriptions are furnished below to document the groups that operate in the transportation environment as related to ITS. These elements are described in terms of their mission and relationship to the Regional ITS Architecture. Elements refer to organizational entities that operate in the transportation environment and are stakeholders in the effort. Elements also include planning agencies that are involved in the “business” of programming ITS into the mainstream project planning process.

**911 Communication Centers:** County-operated locations serving as Public Safety Answering Points (PSAP’s) for answering and managing 911 calls. Include systems and personnel that coordinate incident dispatch with various emergency response agencies, as well as dispatch requests from responders in the field. Municipal public safety vehicles and other specialty response vehicles, such as wreckers, ambulances, and local fire, police and EMS, and HAZMAT teams are dispatched by the 911 centers.

**Adjacent PennDOT District and County Offices:** The PennDOT Engineering Districts located adjacent to District 3-0, along with the County Maintenance Offices located in those districts. District 2-0 is located to the west of District 3-0, District 4-0 is located to the east of District 3-0, District 5-0 is located southeast of District 3-0, and District 8-0 is located south of District 3-0. These adjacent districts coordinate with PennDOT on a variety of operations and management issues, and will share responsibilities under the proposed statewide operations framework. Includes a variety of systems to operate each District’s transportation facilities, such as existing/planned surveillance, communications, and system management tools.

**Adjacent State Emergency Management Offices:** Emergency management agency offices/operations centers located in New York State, adjacent to District 3-0. This element provides coordination with respect to emergencies and disasters that have impacts within the District. Includes a variety of systems to monitor emergencies and coordinate emergency management, including existing/planned wireline and wireless communications technologies, mobile incident response vehicles, and systems/procedures to coordinate with other stakeholder agencies.

**Adjacent State Public Safety Offices:** Police/public safety offices/operations centers located in New York State, adjacent to District 3-0. This element provides coordination with respect to incidents and other public safety activities that have a impacts within the District. Includes a variety of systems to monitor and coordinate these incidents, including existing/planned wireline and wireless communications technologies, mobile incident response vehicles, and systems/procedures to coordinate with other stakeholder agencies.

**Adjacent State Transportation Offices:** Offices and Transportation Management Centers operated by transportation agencies in New York State, adjacent to District 3-0. Facilities included in this element include the NYSDOT Incident Coordination Center, the NYSDOT Region 6 TMC, and the TMC that will be operated by the New York State Thruway Authority. This element provides general coordination regarding adjacent state incidents and traffic conditions that will impact the District 3-0 Region. Includes a variety of systems to operate each jurisdiction's transportation facilities, including existing/planned surveillance, communications, and system management tools.

**Attractions and Event Promoters:** Regional attractions and event locations that generate large traffic events that have a significant impact on the local and regional transportation system. Systems in this element include parking management, control of traffic signals on adjacent arterials, communication with local and regional public safety/emergency management agencies, and connections to nearby DMS installations.

**Commercial Vehicle Company Offices:** Commercial Vehicle Company Offices owned by private freight hauling agencies operating in the Region. This element also includes the Pennsylvania Motor Trucking Association. Includes the existing and future Commercial Vehicle Company systems which provide the capability for freight managers to furnish drivers with routing information, support safety and hazardous materials credentialing, conduct safety checks, support vehicle diagnostic checks and on-board monitoring, automate recordkeeping, etc.

**Commercial Vehicles:** Privately-owned freight hauling vehicles operating in the Region. This element includes existing and future in-vehicle devices enabling vehicles to communicate with (1) Commercial Vehicle Company Offices, (2) Commercial Vehicle Company systems, and (3) and other agency systems throughout the Commonwealth of Pennsylvania.



**County EMA Centers:** County Emergency Management Agency-operated locations where centralized emergency coordination is located during emergency situations. Include systems and personnel at the center that provide a single point of coordination by collocating representatives from various emergency response agencies/departments.

**County/Regional Planning Organizations:** County and/or regional agencies responsible for planning for both the long-range future of the transportation system and the short-range programming of funds for upcoming projects. Includes existing/future systems for data management and data archiving, regional planning and programming, and coordination of Geographic Information Systems.

**High Threat Facilities:** Operations and management headquarters for major security assets located within or adjacent to the Region, which require special treatment in terms of emergency response and security. Existing/future systems include facility surveillance and secure communications with local, state, and national police and emergency management agencies.

**Incident Response Agency Offices:** Incident response agency offices include all the agencies that are involved in the incident clearance stage of incident management. Example: Spill centers, Department of Agriculture, Department of Environmental Protection, etc.

**Information Service Providers:** Information services providers include agencies, which provide real-time traffic and logistics information solutions for consumers, businesses, and transportation agencies. Information Service Providers disseminate information via the regional media outlets.

**Local School District Offices:** Local and regional entities responsible for providing pupil transportation. Existing/future systems include radio communications, vehicle management, route optimization, contract management, and vehicle tracking.

**Local School District Transit Vehicles:** Vehicles operated by public agencies and private contractors to provide pupil transportation within the Region. Depending on the location, vehicles may be equipped with radio communications and/or vehicle tracking systems.

**Municipal Field Devices:** Municipality-operated traffic management field devices. Includes traffic signal system components, CCTV cameras, and video/loop detection devices.

**Municipal Traffic Management Offices:** The element consists of municipality-operated traffic engineering and operations offices throughout the Region. It includes systems and personnel that provide existing/future monitoring, controlling, and maintaining of traffic management field devices—typically signal systems. The element also provides traffic signal timing change coordination, as well as emergency, maintenance, and construction coordination with other agencies. Operations coordinated between municipal traffic offices are also present within the Region, including existing “Traffic Information Coordination” and planned “Traffic Control Coordination” information flows.

**Municipal/Regional Public Safety Offices:** This element consists of municipality-operated and public non-profit safety offices and includes systems and

personnel from police, fire, and EMS agencies that provide local incident response and traffic control services.

**Municipal/Regional Public Safety Vehicles:** Includes systems, resources and personnel operating police, fire, EMS, and other emergency response vehicles including helicopter resources and bomb squads. Also includes existing/planned in-vehicle systems including voice/data communications.



**PEMA Emergency Operation Center:** Systems housed at the PEMA Statewide Emergency Operation Center (Harrisburg), Western Area Office (Indiana), and Eastern Area Office (Hamburg). PEMA Western and Eastern Regional Offices serve as regional operational arms of the Statewide Emergency Operation Center in Harrisburg.

PEMA stores, coordinates, and utilizes emergency response and evacuation information/plans to facilitate coordinated emergency response for all responding agencies throughout Pennsylvania. PEMA supports county and local governments in the areas of civil defense, disaster mitigation and preparedness, planning, and response to and recovery from manmade or natural disasters. It interfaces with other emergency management agencies to support coordinated emergency response involving multiple agencies. As the response progresses, situation information, including damage assessments, response status, and evacuation and resource data, are shared to keep all allied agencies apprised of the response.

**PennDOT Central Office Field Devices:** Field devices owned and operated by PennDOT Central Office. Field devices include existing/future RWIS stations, commercial vehicle check systems, automatic traffic recorders, and other field devices distributed on and along the roadway that monitor, control, and manage traffic.

**PennDOT Central Office Organizations:** Systems located at the PennDOT Central Office Organizations in Harrisburg. The element consists of those Central Office Organizations operating transportations systems, including the Bureau of Maintenance and Operations (BOMO), Motor Carrier Division, Bureau of Planning and Research (BPR), Bureau of Highway Safety and Traffic Engineering (BHSTE), Bureau of Licensing, Bureau of Motor Vehicles, Bureau of Freights and Rails, Bureau of Information Systems, Communication Office of Information Technology, and Press Office.

**PennDOT D2 TMC:** Pennsylvania Department of Transportation Engineering District 2-0 existing Transportation Management Center (TMC) including personnel and existing/planned systems that provide traffic management, incident/emergency response, and maintenance and construction coordination services along PennDOT

roadways. The District 2-0 TMC may act as a Regional Transportation Management Center (RTMC) in the future.

**PennDOT D3 County Maintenance Offices:** Pennsylvania Department of Transportation District 3-0 County Maintenance Offices located in each of the nine counties within the Region. Includes personnel and existing/future systems that provide overall coordination and support for construction and routine maintenance on PennDOT roadways, as well as management of construction and maintenance equipment.

**PennDOT D3 Field Devices:** Pennsylvania Department of Transportation Engineering District 3-0-operated field devices. Includes existing/future DMS, HAR, and CCTV, traffic flow detection systems, ramp metering, 'Wizards,' and queue detector systems and equipment, as well as low-technology solutions such as predetermined detour routes and 1/10 of mile markers.

**PennDOT D3 Maintenance and Construction Vehicles:** Pennsylvania Department of Transportation Engineering District 3-0-operated maintenance vehicles. Includes field personnel and existing/future in-vehicle systems for routine construction and maintenance vehicles. Note that while the element includes the word "construction" for consistency with the National ITS Architecture, all of PennDOT's vehicle are considered maintenance vehicles, with major construction performed by private contractors.

**PennDOT D3 TMC:** Existing Pennsylvania Department of Transportation Engineering District 3-0 TMC in Montoursville, PA responsible for all D3 counties. Includes personnel and existing/future systems that provide traffic management, incident/emergency response, as well as maintenance and construction coordination along PennDOT roadways. As of 2005, this element consists of a very informal arrangement hosted within the existing office spaces of D3 Traffic Unit personnel. In the future, the TMC may be upgraded, including developing a dedicated space, providing dedicated computer facilities, and improving systems integration.

**PennDOT D4 TMC:** Pennsylvania Department of Transportation Engineering District 4-0 existing Transportation Management Center (TMC) including personnel and existing/planned systems that provide traffic management, incident/emergency response, and maintenance and construction coordination services along PennDOT roadways. The District 4-0 TMC may act as a Regional Transportation Management Center (RTMC) in the future.

**PennDOT STMC:** A potential future PennDOT transportation management center for providing statewide coordination and operations. The STMC is based on the latest PennDOT Statewide Transportation Management Approach, will be located in Harrisburg, and will provide (1) traffic, incident, and emergency management operations, and (2) will be a collection/distribution point for traveler information data throughout the entire state of Pennsylvania. Additionally, the PennDOT STMC will be responsible for (1) coordinating PennDOT statewide operations, (2) coordinating among Districts and adjacent states, (3) coordinating with other state agencies (PSP,

PTC, and PEMA), (4) performing political and public relations, (5) coordinating weather events, and (6) commercial vehicle operations.

**PennDOT Welcome Centers and Rest Areas:** The North Central Region has two Welcome Centers, near the Pennsylvania border, that provide travelers with information. The Region also has rest areas within its boundaries that provide similar services as the Welcome Centers.

**Pennsylvania Office of Homeland Security:** State-level department responsible for coordination of activities between other state agencies involved in security and threat management. Appropriate communications and management systems are still under development.

**Personal Traveler Information Devices:** This element consists of Personal Traveler Information Devices owned by the general public used to access and provide transportation information. Personal Traveler Information devices include personal computers, phones (including cell phones for reporting incidents and retrieving travel conditions en-route), and personal digital assistants (PDA's).



**Private Utility Company Offices:** Headquarters or field office locations for private companies located within the Region that provide utility services such as natural gas, electricity, water, sewer, telephone, and cable.



**PSP Offices:** Includes the (1) Pennsylvania State Police Headquarters located in Harrisburg Pennsylvania, (2) existing barracks, and (3) existing/future Consolidated Dispatch Centers. PSP Offices represent public safety systems that support incident management, disaster response and evacuation, security monitoring, disseminating incident information and other security and public safety-oriented ITS applications.

PSP Offices utilize several existing and future systems including mobile data terminals (MDT's) and Incident Information Management System (IIMS). MDT's are used to communicate and dispatch PSP vehicles. MDT's are currently being integrated with other state agencies now (i.e. PEMA) and municipal agencies in the future. Additionally, PSP Offices interface with other Emergency Management agencies to support coordinated emergency response. The IIMS is an all exclusive system performing dispatch and reporting functions throughout the Region and state.



**PSP Vehicles:** All existing/future systems within Pennsylvania State Police vehicles. In-vehicle systems include voice communications and mobile data terminals (MDT's) used by the vehicles to communicate and receive dispatch information from PSP and other agency systems. MDT's are currently being integrated with other state



agencies now (i.e. PEMA) and municipal agencies in the future.

**Railroad Offices:** Centralized and local operations and management location for railroads operating within the Region. Some offices are located within the Region, whereas others are remote and located elsewhere. Include systems deployed for railroad operations and management within the Region, such as grade crossing warning devices, wayside and in-cab signal systems, yard/terminal facilities, and maintenance facilities.

**Regional Airport Offices:** Management, operations, and first responder offices and facilities located at regional airports which provide operations management, traveler information, and emergency response for airport-related travel, incidents, and emergencies.



**Regional Media Outlets:** Systems housed at regional television and radio stations that collect, process, store, and/or disseminate transportation information to the traveling public. The Regional Media provides basic advisories, traffic and road conditions, transit schedule information, yellow pages information, and parking information to the general public.

**Regional Transit Agency Offices:** Offices/dispatching centers operated by public and private transportation agencies/companies within the Region to manage fixed-route transit and paratransit operations. Includes systems and personnel that provide centralized transit and emergency tracking, dispatching, and management.

**Regional Transit Vehicles:** Vehicles and in-vehicle systems operated by public and private transit providers in the Region. Includes drivers and in-vehicle systems that provide existing/future driver-to-dispatch communications, automated stop announcements, transit signal priority, AVL, and safety/security surveillance, as well as vehicle maintenance and diagnostics tracking.

**Towing Industry Responders:** This element consists of privately-owned wrecker companies operating in the Region and their corresponding vehicles responsible for the towing and cleanup of traffic incidents.

**Weather Information Providers:** Systems operated by private companies and public agencies that collect, analyze, and disseminate information on current and future weather conditions. Existing/future systems include surveillance devices (e.g., satellites, weather stations, and Doppler radar), central database and analysis tools, and public and private information distribution networks.

### **3.2 Systems Inventory**

Using existing documentation, ITS systems in the Region — both existing and planned — were identified. The inventory is presented in tabular format by agency. The

information presented here provides traceability from the systems projects initially entered into the Architecture. Because the Architecture is a “living” document, this section will need to be updated as time passes. Projects are grouped into three categories: *Existing*, *Planned 1*, and *Planned 2*. As noted previously, *Planned 1* projects refer to efforts that are currently programmed or funded, whereas *Planned 2* projects are neither funded nor programmed.

**Table 3-1: Regional Systems Inventory**

<b>Element</b>	<b>Stakeholder</b>	<b>Functionality</b>	<b>Status</b>	<b>Project/Program</b>
911 Communication Centers	Counties	Provides call-taking for emergencies and dispatching of all county and local emergency vehicles	Existing	<ul style="list-style-type: none"> <li>• County 911 Communication Centers</li> <li>• 1-800-ENS</li> <li>• Vital Emergency Communications Link</li> </ul>
Adjacent PennDOT Districts and County Offices	Pennsylvania Department of Transportation (PennDOT)	Provides general coordination with PennDOT District 3-0 Offices	Existing	
Adjacent State Emergency Management Offices	Adjacent State Emergency Management Agencies	Provides general coordination with PennDOT District 3-0 Offices	Planned 2	
Adjacent State Public Safety Offices	Adjacent State Public Safety Agencies	Provides general coordination with PennDOT District 3-0 Offices	Planned 2	
Adjacent State Transportation Offices	Adjacent State Transportation Agencies	Provides overall statewide coordination of NYSDOT resources, response and system status during major incidents and emergencies	Existing	<ul style="list-style-type: none"> <li>• NYSDOT Incident Coordination Center</li> </ul>

Element	Stakeholder	Functionality	Status	Project/Program
		Provides traffic management for the Region 6 area	Existing	<ul style="list-style-type: none"> <li>• NYSDOT Region 6 TMC</li> </ul>
Attractions and Event Promoters	Event Promoters/Attractors	Attaches significant traffic to the area to visit cultural, recreational, and entertainment destinations	Existing	
Commercial Vehicle Company Offices	Commercial Vehicle Companies	Provides the PennDOT Motor Carrier Division with appropriate credentials, registration, and title fees	Existing	<ul style="list-style-type: none"> <li>• Private Carrier Commercial Vehicle Tracking System</li> <li>• Private Carrier Fleet Maintenance Management</li> <li>• FHWA Carrier Compliance Review</li> </ul>
		Provides vehicle tracking of Commercial Vehicles	Existing	
		Provides capabilities to track cargo and freight	Existing	
		Provides capabilities to generate preventative maintenance schedules based on the vehicle miles traveled determined using vehicle tracking	Existing	
		Provides appropriate transportation and emergency agencies with hazmat and emergency information	Existing	
Commercial Vehicles	Commercial Vehicle Companies	Monitors adherence to the PennDOT Motor Carrier Division weight and safety enforcement activities	Existing	<ul style="list-style-type: none"> <li>• Private Carrier Commercial Vehicle Tracking System</li> <li>• Private Carrier Fleet Maintenance Management</li> <li>• FHWA Carrier Compliance</li> </ul>
		Supports devices to communicate with Commercial Vehicle Company Offices. May include the addition of a cell-based radio and equipment	Existing	

Element	Stakeholder	Functionality	Status	Project/Program
		Offers the capability for Commercial Vehicle Offices to track vehicles using automatic vehicle location (AVL) systems and to monitor the movement of cargo and freight	Existing	Review
County EMA Centers	Counties	Provides response to and coordination of emergencies	Existing	<ul style="list-style-type: none"> <li>Remote Stream Gauge Sensors</li> <li>Lycoming County EMA Mobile Command Vehicle</li> </ul>
County/Regional Planning Organization Offices	Counties	Coordinates county and regional planning activities in accordance with state and federal requirements	Existing	<ul style="list-style-type: none"> <li>Geographic Information Systems</li> </ul>
High Threat Facilities	High Threat Facilities	Major facilities that require special security and/or emergency response coordination	Existing	<ul style="list-style-type: none"> <li>Cowanesque Dam</li> <li>Tioga-Hammond Dam</li> <li>Blanchard Dam</li> <li>PPL Susquehanna Nuclear Plant</li> </ul>
		Reports high-threat facility information to 911 Communication and EMA Centers	Existing	
Incident Response Agency Offices	Spill Centers	Notifies PEMA in case of a major spill	Existing	
		Coordinates with PEMA in case of a HAZMAT event	Existing	

Element	Stakeholder	Functionality	Status	Project/Program
		Coordinates with PEMA in case of incidents involving food products	Existing	
Information Service Providers	Information Service Providers	Provides information to radio and TV stations about current traffic conditions, detour routes, and other traffic information	Existing	<ul style="list-style-type: none"> <li>General Media Traveler Information</li> </ul>
Local School Districts Offices	Local School Districts	Provides transportation for students to and from school	Existing	
Local School District Transit Vehicles	Local School Districts	Provides pupil transportation through a mix of public and private contractor vehicles	Existing	
Municipal Field Devices	Municipalities	Controls municipally owned traffic signal systems	Existing	<ul style="list-style-type: none"> <li>Municipal Signal Systems</li> </ul>
Municipal Traffic Management Offices	Municipalities	Operates local traffic signal systems	Existing	
		Provides funding and oversight for public transit service		
Municipal/Regional Public Safety Offices	Municipalities	Coordinates local fire and police response	Existing	<ul style="list-style-type: none"> <li>Vital Emergency Communications Link</li> </ul>

Element	Stakeholder	Functionality	Status	Project/Program
Municipal Public Safety Vehicles	Municipalities	Provides local fire and police response. Receive reports of incidents at HRI's	Existing	<ul style="list-style-type: none"> <li>1-800-ENS</li> </ul>
PEMA Emergency Operation Center	Pennsylvania Emergency Management Agency (PEMA)	Notifies appropriate transportation and emergency agencies of any major disasters	Existing	<ul style="list-style-type: none"> <li>PEMA Emergency Operation Center</li> <li>PEMA Truck</li> <li>Pennsylvania Emergency Information Reporting System (PEIRS)</li> </ul>
		Coordinates with cooperating agencies in case of major disasters	Existing	
		Runs a statewide electronic database, Pennsylvania Emergency Information Reporting System (PEIRS) that collects information from all state agencies responding to incidents/emergencies statewide.	Existing	
		Gathers/provides specific incident information from/to County Emus, Pennsylvania State Police, PennDOT, and PTC	Existing	
		Gathers current and forecast road conditions and surface weather information from a variety of sources to monitor major natural disasters	Existing	
		Disseminates disaster information to the public	Existing	
		Monitors alerting and advisory systems reported by other emergency agencies	Existing	

Element	Stakeholder	Functionality	Status	Project/Program
		Develops and stores emergency evacuation plans	Existing	
		Serves as one-point contact for all the coordinating agencies during emergencies	Existing	
		Provides incident command in case of a major event	Existing	
		Contacts on-site field officers through the County EMA agencies.	Existing	
PennDOT Central Office Field Devices	Pennsylvania Department of Transportation (PennDOT)	Monitors roadway weather conditions and provides RWIS data to PennDOT Central Office and County Maintenance Offices	Existing	<ul style="list-style-type: none"> <li>• Roadway Weather Information System (RWIS)</li> <li>• PennDOT Commercial Vehicle Information Systems and Networks (CVISN) Project</li> </ul>
		Collects Commercial Vehicle safety inspection and violations data	Existing	
PennDOT Central Office Organizations	Pennsylvania Department of Transportation (PennDOT)	PennDOT BHSTE coordinates with PEMA and other agencies (PennDOT Districts, PSP, County EMA's, Transit agencies, etc.) in case of major incidents	Existing	<ul style="list-style-type: none"> <li>• PennDOT Transportation Management Centers (TMC's)</li> <li>• Winter Road Condition Hotline for Interstate Highways</li> </ul>
		The PennDOT Central Office Press Office communicates traffic-related information to Regional Media Outlets	Existing	



Element	Stakeholder	Functionality	Status	Project/Program
		PennDOT (Motor Carrier Division) maintains commercial vehicle registrations	Existing	<ul style="list-style-type: none"> <li>• Roadway Weather Information System (RWIS)</li> <li>• PennDOT Commercial Vehicle Information Systems and Networks (CVISN) Project</li> <li>• PennDOT Performance and Registration Information Systems Management (PRISM)</li> <li>• PennDOT Safety and Fitness Electronic Record (SAFER)</li> <li>• PennDOT ITS Transportation Management Approach</li> <li>• Construction Projects (current and future)</li> <li>• Central Repository</li> <li>• Real-time Traffic Information Website</li> <li>• Statewide GIS based Incident Detour Map</li> </ul>
		CVO Supports the exchange of safety credential information across the jurisdictions	Existing	
		CVO Supports the collection and review of carrier safety data and determines the carrier safety rating	Planned 1	
		PennDOT Motor Carrier Division conducts roadside commercial vehicle inspections	Existing	
		PennDOT Motor Carrier Division provides appropriate credentials to motor carriers and collects necessary registration and title fees	Existing	
		PennDOT Motor Carrier Division conducts weight enforcement activities	Existing	
		PennDOT Bureau of Planning and Research owns and maintains Automatic Traffic Recorders throughout the state	Existing	
		RWIS data flows from the RWIS site to Central Office (BOMO) to a public website	Existing	

Element	Stakeholder	Functionality	Status	Project/Program
		RWIS monitors roadway weather conditions and transfers information to PennDOT BOMO	Existing	<ul style="list-style-type: none"> <li>• Video Sharing</li> <li>• Web site Portal for Assisting Commercial Vehicle Operators</li> <li>• Statewide Telecommunication</li> </ul>
		Receives environmental conditions information from various weather sources to aid in scheduling routine maintenance activities	Existing	
PennDOT D2 TMC	Pennsylvania Department of Transportation (PennDOT)	Responsible for off-peak control of designated functions in District 3-0	Planned 2	
		Has the capability to operate District 3-0 ITS equipment	Planned 2	
		District 3-0 responsibilities include incident management, traveler information/advisories, special event management, AMBER Alert, and the monitoring of roadway conditions.	Planned 2	
PennDOT D3 County Maintenance Offices	Pennsylvania Department of Transportation (PennDOT)	PSP contacts D3 County Maintenance Office which then contacts D3 Office/TMC when there is an incident	Existing	<ul style="list-style-type: none"> <li>• Incident Response Trailers</li> </ul>
		PSP contacts County Maintenance Office for sand trucks, vehicle removals, etc.	Existing	

Element	Stakeholder	Functionality	Status	Project/Program
		PSP contacts County Maintenance Office for sand trucks, vehicle removals, etc.	Existing	
		D3 County Maintenance Offices must fill out incident information forms (manually) and send them to PennDOT Central office (BHSTE) using email and fax	Existing	
		Receive real-time RWIS data from RWIS stations	Existing	
		Provides prepared mobile incident response	Existing	
PennDOT D3 Field Devices	Pennsylvania Department of Transportation (PennDOT)	4 portable and 1 permanent/overhead DMS units provide travelers with text information about roadway system conditions	Existing	<ul style="list-style-type: none"> <li>• Portable Dynamic Message Signs (DMS)</li> <li>• Permanent/Overhead Dynamic Message Signs (DMS)</li> <li>• US 220 Reconstruction</li> <li>• Highway Advisory Radio (HAR)</li> <li>• Pre-Assigned Detour Routes</li> </ul>
		1 movable Highway Advisory Radio broadcasting stations is used to provide travelers with verbal information about roadway system conditions, particularly during construction	Existing	
		Color-coded detour signs (both permanently installed and temporarily deployed) are used to direct motorists to follow detours around specific sections of Interstate due to major incidents or highway closures	Existing	
PennDOT D3 Maintenance and	Pennsylvania Department of	Provides on-board systems that support effective	Existing	<ul style="list-style-type: none"> <li>• D3 Maintenance and</li> </ul>

Element	Stakeholder	Functionality	Status	Project/Program
Construction Vehicles	Transportation (PennDOT)	winter operations		Construction Vehicles
PennDOT D3 TMC	Pennsylvania Department of Transportation (PennDOT)	Provides centralized control and monitoring of ITS devices	Existing	<ul style="list-style-type: none"> <li>• PennDOT D3 Office</li> <li>• Portable Dynamic Message Signs (DMS)</li> <li>• Permanent/Overhead Dynamic Message Signs (DMS)</li> <li>• US 220 Reconstruction</li> <li>• D3 web site</li> <li>• Highway Advisory Radio (HAR)</li> <li>• Pre-Assigned Detour Routes</li> <li>• D3 Traffic Management Center</li> </ul>
		Provides travelers with text information about roadway system conditions	Existing	
		Provides travelers with verbal information about roadway system conditions	Existing	
		Color-coded detour signs (both permanently installed and temporarily deployed) are used to direct motorists to follow detours around specific sections of Interstate due to major incidents or highway closures	Existing	
		Provides centralized control and monitoring of ITS devices	Planned 2	
		Provides travelers with text information about roadway system conditions	Planned 2	
		As part of the statewide operations framework, D3 will be the location of a Traffic Management Center that will operate the ITS infrastructure within the district, mainly during regular business hours.	Planned 2	

Element	Stakeholder	Functionality	Status	Project/Program
PennDOT D4 TMC	Pennsylvania Department of Transportation (PennDOT)	Responsible for off-peak control of designated functions in District 3-0	Planned 2	
		Has the capability to operate District 3-0 ITS equipment	Planned 2	
		District 3-0 responsibilities include incident management, traveler information/advisories, special event management, AMBER Alert, and the monitoring of roadway conditions.	Planned 2	
PennDOT STMC	Pennsylvania Department of Transportation (PennDOT)	Could potentially serve as back-up operations management to PennDOT RTMC's	Planned 2	<ul style="list-style-type: none"> <li>• PennDOT Transportation Management Centers (TMC's)</li> <li>• Winter Road Condition Hotline for Interstate Highways</li> <li>• Roadway Weather Information System (RWIS)</li> <li>• PennDOT Commercial Vehicle Information Systems and Networks (CVISN) Project</li> <li>• PennDOT Performance</li> </ul>
		May support ATIS systems	Planned 2	
		May coordinates statewide operations (among districts and other states) and other state agencies (PSP, PTC, PEMA)	Planned 2	
		May perform political and public relations on behalf of PennDOT	Planned 2	
		May coordinate weather events throughout PennDOT	Planned 2	

Element	Stakeholder	Functionality	Status	Project/Program
		May coordinate incident, emergency, and inter/intra-state events	Planned 2	and Registration Information Systems Management (PRISM) <ul style="list-style-type: none"> <li>• PennDOT Safety and Fitness Electronic Record (SAFER)</li> <li>• PennDOT ITS Transportation Management Approach</li> <li>• Construction Projects (current and future)</li> <li>• Central Repository</li> <li>• Real -time Traffic Information Website</li> <li>• Statewide GIS based Incident Detour Map</li> <li>• Video Sharing</li> <li>• Web site Portal for Assisting Commercial Vehicle Operators</li> <li>• Statewide Telecommunication</li> </ul>
		May act as central data repository	Planned 2	
		May coordinate amber alert for PennDOT	Planned 2	
		May be responsible for maintaining commercial vehicle registrations and credentials	Planned 2	
		May be responsible for maintaining the state's Motor Carrier Safety Assistance Program (MCSAP) files	Planned 2	
		May be responsible for conducting roadside inspections	Planned 2	
		May be responsible for conducting weight enforcement activities	Planned 2	

<b>Element</b>	<b>Stakeholder</b>	<b>Functionality</b>	<b>Status</b>	<b>Project/Program</b>
PennDOT Welcome Centers and Rest Areas	Pennsylvania Department of Transportation (PennDOT)	Provides traveler information and other services at official PennDOT Welcome Centers and roadside rest areas	Existing	<ul style="list-style-type: none"> <li>• Pennsylvania Welcome Centers</li> </ul>
Pennsylvania Office of Homeland Security	Pennsylvania Office of Homeland Security	Coordinates homeland security activities within the Commonwealth, both with local and county officials and with the federal Department of Homeland Security	Existing	
Personal Traveler Information Devices	General Public	Provides the capability to access traffic information from personal devices including pagers, cell phones, computers, PDA, etc.	Existing	<ul style="list-style-type: none"> <li>• In-Vehicle Technology</li> <li>• Additional Personal Information Services</li> </ul>
Private Utility Companies	Private Utility Companies	Provides gas, electric, water, sewer, telephone, and cable service, parallel to and crossing transportation facilities.	Existing	
PSP Offices	Pennsylvania State Police (PSP)	Receives roadway incident notification from the County 911 Centers, PennDOT Offices, and PTC Offices	Existing	<ul style="list-style-type: none"> <li>• Pennsylvania State Police Dispatch Centers</li> <li>• Incident Information Management System (IIMS)</li> <li>• Pennsylvania State Police</li> </ul>
		Receives work zone coverage plans and requests for troopers to cover work zones from PennDOT District Offices	Existing	

Element	Stakeholder	Functionality	Status	Project/Program
		Receives forwarded 911 calls from County 911 Communication Centers	Existing	Consolidated Dispatch Center <ul style="list-style-type: none"> <li>• 800 MHz Statewide Communication System</li> <li>• AMBER Alert Coordination</li> <li>• PennDOT District 5-0 Video Sharing Project</li> </ul> 1. PSP CHIPS Enhancement
		Coordinates with other incident response agencies through PennDOT provided radio communication	Existing	
		Coordinates with other agencies in case of major incidents	Existing	
		Provides incident information to other agencies including PEMA, PennDOT, and radio stations	Existing	
		Coordinates with PennDOT County Maintenance Offices or District Offices for requesting salt, and performing other maintenance operations	Existing	
		The 800 MHz radio is planned for the entire Region. This will create interoperability for all public service vehicles and centers	Planned 1	
		PSP currently have access to PennDOT District 5-0 CHIPS system, although it is currently not running. Future enhancements will allow PSP to control PennDOT field devices	Planned 2	
PSP Vehicles	Pennsylvania State	Coordinates with PSP CDC in case of incident	Existing	<ul style="list-style-type: none"> <li>• 800 MHz Statewide</li> </ul>



Element	Stakeholder	Functionality	Status	Project/Program
	Police (PSP)	County/Municipal 911 Centers are contacted by field command to dispatch specialty services and vehicles, such as wreckers and hazmat teams. Specialty services and vehicles are also contacted directly by the field command	Existing	<p>Communication System</p> <ul style="list-style-type: none"> <li>• Emergency Vehicle Traffic Signal Preemption</li> <li>• Mobile Data Terminals (MDT's)</li> </ul>
Railroad Offices	Regional Railroads	Railroads provide goods movement within the region. Movement of railroad vehicles within the region is supervised from centralized control centers, located both within and outside the district. Railroads also receive reports of problems and malfunctions at HRI's.	Existing	<ul style="list-style-type: none"> <li>• 1-800-ENS</li> </ul>
Regional Airport Offices	Regional Airports	Provides commercial, business, and general aviation services	Existing	
Regional Media Outlets	Regional Media	Information about roadway conditions and incidents is distributed to the public via general media outlets (radio and TV)	Existing	<ul style="list-style-type: none"> <li>• General Media Traveler Information</li> </ul>
Regional Transit Agency Offices	Regional Transit Agencies	Provides communication between transit vehicles and the dispatch centers	Existing	<ul style="list-style-type: none"> <li>• City Bus Radio Communication System</li> </ul>

Element	Stakeholder	Functionality	Status	Project/Program
		Through Automatic Vehicle Location (AVL), provides real-time tracking of bus locations and schedule adherence	Existing	<ul style="list-style-type: none"> <li>• EMTA Radio Communication System</li> <li>• City Bus Automatic Vehicle Location (AVL)</li> <li>• EMTA Automatic Vehicle Location (AVL)</li> </ul>
Regional Transit Vehicles	Regional Transit Agencies	Provides communication between transit vehicles and dispatch centers / base stations, and provides customer service information to passengers	Existing	<ul style="list-style-type: none"> <li>• City Bus Radio Communication System</li> <li>• City Bus Automatic Vehicle Location (AVL)</li> <li>• City Bus Automated Stop Announcements</li> </ul>
Towing Industry Responders	Towing Industry	Helps with cleanup at accident sites	Existing	
		Contacted by the PSP Offices and 911 Communication Centers	Existing	
Weather Information Providers	Weather Information Providers	Provides transportation agencies, emergency response agencies, and the general public with forecasts and other weather information	Existing	

### **3.3 Needs**

Sections 3.3 and 3.4 examine each element defined in Section 3.2 in terms of *needs* (what each element — i.e., agency stakeholder — needs from others) and *services* (what each element can provide to others). This information is used to program *Turbo Architecture*, the National ITS Architecture software. “Needs” refer to the information inputs from one agency operation to another; they are presented in tabular format and trace back to the systems inventory.

**Table 3-2: Regional Needs Table**

Element	Need (operation/data inputs from others)	Status	Origin Element
911 Communication Centers	Incident response information/coordination	Existing	County EMA Centers, Incident Response Agency Offices, Municipal/Regional Public Safety Offices, Municipal/Regional Public Safety Vehicles, PEMA Emergency Operation Center, PennDOT D3 County Maintenance Offices, PennDOT D3 TMC, PSP Offices
		Planned 2	Information Service Providers
	Traffic conditions	Existing	PennDOT D3 TMC
		Planned 2	Information Service Providers
	Emergency archived data	Existing	County EMA Centers
	Railroad advisories	Existing	Railroad Offices
	Transit emergency information	Existing	Regional Transit Agency Offices
	Weather information	Existing	PennDOT D3 County Maintenance Offices, Weather Information Providers

Element	Need (operation/data inputs from others)	Status	Origin Element
	Maintenance and construction information	Existing	PennDOT D3 County Maintenance Offices
	Emergency traffic control response	Existing	Municipal Traffic Management Offices
	High threat information	Existing	High Threat Facilities
	Traffic images	Planned 2	PennDOT D3 Field Devices
	Traffic information	Planned 2	Information Service Providers, PennDOT D3 County Maintenance Offices
Adjacent PennDOT District and County Offices	Maintenance and construction coordination	Existing	PennDOT D3 County Maintenance Offices , PennDOT D3 TMC
	Weather information	Existing	PennDOT D3 County Maintenance Offices
	Work zone coordination	Existing	PennDOT D3 County Maintenance Offices, PennDOT D3 TMC
	Incident response information/coordination	Existing	PennDOT D3 TMC
	Traffic information	Existing	PennDOT D3 TMC

<b>Element</b>	<b>Need (operation/data inputs from others)</b>	<b>Status</b>	<b>Origin Element</b>
	Traffic control coordination	Planned 2	PennDOT D3 TMC
Adjacent State Emergency Management Offices	Incident response information/coordination	Existing	PEMA Emergency Operation Center
Adjacent State Public Safety Offices	Incident response information/coordination	Existing	PSP Offices
	High threat information	Existing	PSP Offices
Adjacent State Transportation Offices	Maintenance and construction information	Existing	PennDOT D3 County Maintenance Offices
		Planned 2	PennDOT STMC
	Work plan coordination	Existing	PennDOT D3 County Maintenance Offices
		Planned 2	PennDOT STMC
	Work zone information	Existing	PennDOT D3 County Maintenance Offices
		Planned 2	PennDOT STMC

Element	Need (operation/data inputs from others)	Status	Origin Element
	Incident response information/coordination	Planned 2	PennDOT D3 TMC, PennDOT STMC
	Traffic information coordination	Planned 2	PennDOT D3 TMC, PennDOT STMC
Attractions and Event Promoters	Special event coordination	Existing	Information Service Providers, Municipal Traffic Management Offices, Regional Transit Agency Offices,
Commercial Vehicle Company Offices	Relaying information from emergency operations to trucking companies	Existing	PennDOT D3 TMC, PSP Offices
	On-board safety information	Planned 1	Commercial Vehicle Vehicles
	Trip log and identification information	Planned 1	Commercial Vehicle Vehicles
	Safety inspection/screening records	Existing	PennDOT Central Office Field Devices
Commercial Vehicles	Fleet coordination	Planned 1	Commercial Vehicle Company Offices

Element	Need (operation/data inputs from others)	Status	Origin Element
County EMA Centers	Incident response information/coordination	Existing	911 Communication Centers, Incident Response Agency Offices, Municipal/Regional Public Safety Offices, Municipal/Regional Public Safety Vehicles, PEMA Emergency Operation Center, PennDOT D3 County Maintenance Offices, PennDOT D3 TMC, PSP Offices
		Planned 2	Information Service Providers
	Traffic conditions	Existing	PennDOT D3 TMC
		Planned 2	Information Service Providers
	Emergency archived data	Existing	911 Communication Centers
	Railroad advisories	Existing	Railroad Offices
	Transit emergency information	Existing	Regional Transit Agency Offices
	Weather information	Existing	PennDOT D3 County Maintenance Offices, Weather Information Providers
Maintenance and construction information	Existing	PennDOT D3 County Maintenance Offices	



Element	Need (operation/data inputs from others)	Status	Origin Element
	Emergency traffic control response	Existing	Municipal Traffic Management Offices
	High threat information	Existing	High Threat Facilities
	Traffic images	Planned 2	PennDOT D3 Field Devices
	Traffic information	Planned 2	Information Service Providers, PennDOT D3 County Maintenance Offices
County/Regional Planning Organization Offices	Archived data	Existing	Local School District offices, Municipal Traffic Management Offices, PennDOT Central Office Organizations, PennDOT D3 TMC, Railroad Offices, Regional Airport Offices, Regional Transit Agency Offices
		Planned 2	PennDOT STMC
High Threat Facilities	High threat information	Existing	911 Communication Centers, County EMA Centers
Incident Response Agency Offices	Incident response information/coordination	Existing	911 Communication Centers, County EMA Centers, PEMA Emergency Operation Center

<b>Element</b>	<b>Need (operation/data inputs from others)</b>	<b>Status</b>	<b>Origin Element</b>
Information Service Providers	Incident information	Planned 2	911 Communication Centers, County EMA Centers, PennDOT D3 TMC, PSP Offices, Regional Transit Agency Offices
	Traffic conditions	Planned 2	911 Communication Centers, Municipal Traffic Management Offices, PennDOT D3 County Maintenance Offices, PennDOT D3 TMC
	Traffic images	Planned 2	PennDOT D3 Field Devices
	Special event information	Planned 2	Attractions and Event Promoters
	Weather information	Planned 2	PennDOT D3 County Maintenance Offices, Weather Information Providers
	Traffic information coordination	Planned 2	911 Communication Centers, PennDOT D3 TMC
Local School District Offices	Maintenance and construction work plans	Planned 2	PennDOT D3 County Maintenance Offices, PennDOT D3 TMC
	Traffic conditions	Planned 2	PennDOT D3 County Maintenance Offices, PennDOT D3 TMC

Element	Need (operation/data inputs from others)	Status	Origin Element
	Weather information	Planned 2	PennDOT D3 County Maintenance Offices, PennDOT D3 TMC
	AVL data	Planned 2	Local School District Transit Vehicles
Local School District Transit Vehicles	Driver instructions	Existing	Local School District Offices
Municipal Field Devices	Request for signal priority	Existing	Municipal/Regional Public Safety Vehicles
	Signal control	Existing	Municipal Traffic Management Offices
Municipal Traffic Management Offices	Incident response information/coordination	Existing	County EMA Centers, PennDOT D3 County Maintenance Offices
	Traffic information coordination	Existing	PennDOT D3 TMC
	Road closures	Existing	PennDOT D3 County Maintenance Offices, PennDOT D3 TMC
	Maintenance and construction information	Existing	PennDOT D3 County Maintenance Offices,

<b>Element</b>	<b>Need (operation/data inputs from others)</b>	<b>Status</b>	<b>Origin Element</b>
	Archived data	Existing	County/Regional Planning Organizations
	Weather Information	Existing	PennDOT D3 County Maintenance Offices, Weather Information Providers
	Special event information	Existing	Event Promoters/Attractors
	Traffic control coordination	Planned 2	PennDOT D3 TMC
	Traffic images	Planned 2	Municipal Field Devices
Municipal/Regional Public Safety Offices	Incident response information/coordination	Existing	911 Communication Centers, County EMA Centers, Municipal/Regional Public Safety Vehicles, PSP Offices
Municipal/Regional Public Safety Vehicles	Dispatch Information	Existing	911 Communication Centers, Municipal Public Safety Offices
	Traffic signal priority	Existing	Municipal Field Devices
PEMA Emergency Operation Center	Incident/emergency information and response coordination	Existing	911 Communication Centers, County EMA Centers, PennDOT Central Office Organizations, PennDOT STMC , Pennsylvania Office of Homeland Security

Element	Need (operation/data inputs from others)	Status	Origin Element
	Traffic conditions	Planned 2	PennDOT STMC
	Hazmat information	Existing	Commercial Vehicle Company Offices
PennDOT Central Office Field Devices	RWIS device control	Existing	PennDOT Central Office
		Planned 2	PennDOT STMC
	Safety inspection and electronic screening information	Planned 2	Commercial Vehicles, PennDOT STMC
PennDOT Central Office Organizations	PennDOT Bureau of Planning and Research collects archived data	Existing	Regional Transit Agencies, PennDOT D3 TMC
		Planned 2	PennDOT STMC
	Incident/emergency response coordination and information	Existing	PEMA Emergency Operation Center, PennDOT D3 TMC, PSP Offices
		Planned 2	PennDOT STMC
	Work plan coordination	Existing	PennDOT D3 TMC
		Planned 2	PennDOT STMC

Element	Need (operation/data inputs from others)	Status	Origin Element
	Maintenance and construction coordination	Existing	PennDOT D3 TMC
	Traffic information and roadway conditions	Existing	PennDOT D3 TMC
		Planned 2	PennDOT STMC
	Weather information	Planned 2	PennDOT STMC
	Request for traffic and emergency information for the media	Existing	Regional Media Outlets
	PennDOT Motor Carrier Division conducts weight enforcement activities	Existing	PSP Offices
		Planned 2	PennDOT STMC
	PennDOT (Motor Carrier Division) maintains commercial vehicle registrations	Existing	Commercial Vehicle Company Offices
		Planned 2	PennDOT STMC
	Tax credentials, audits information, and ax-related enforcement activities (Motor Carrier Division)	Existing	Commercial Vehicle Company Offices
		Planned 2	PennDOT STMC
	RWIS information (BOMO)	Existing	PennDOT Central Office Field Devices

<b>Element</b>	<b>Need (operation/data inputs from others)</b>	<b>Status</b>	<b>Origin Element</b>
		Planned 2	PennDOT STMC
PennDOT D2 TMC	Incident/emergency information and response coordination	Planned 2	PennDOT D3 County Maintenance Offices, PennDOT D3 TMC, PennDOT STMC
	Traffic information	Planned 2	PennDOT D3 County Maintenance Offices, PennDOT D3 TMC, PennDOT STMC
	Traffic control coordination	Planned 2	PennDOT D3 County Maintenance Offices, PennDOT D3 TMC, PennDOT STMC
	Maintenance and construction coordination	Planned 2	PennDOT D3 County Maintenance Offices, PennDOT STMC
	Road weather information	Planned 2	PennDOT D3 County Maintenance Offices, PennDOT STMC
PennDOT D3 County Maintenance Offices	Incident, construction, and emergency information	Existing	PennDOT D3 TMC, 911 Communication Centers
	Pre-assigned detour route information	Existing	PennDOT D3 TMC
	Maintenance status and coordination information	Existing	PennDOT D3 TMC, 911 Communication Centers
	Weather information	Existing	PennDOT Central Office Field Devices

Element	Need (operation/data inputs from others)	Status	Origin Element
	Incident notification	Planned 2	PSP Vehicles, PSP Offices
	Incident verification	Planned 2	PSP Vehicles, PSP Offices
	Incident status information	Planned 2	PSP Vehicles, PSP Offices
	Incident, roadway condition, construction, and emergency information	Existing	County EMA Centers, PSP Offices, PennDOT D2 TMC, PennDOT D4 TMC
	Roadway condition, construction, and maintenance information	Existing	Adjacent PennDOT District and County Offices
	Roadway conditions, dispatch information, and maintenance status	Existing	PennDOT D3 County Maintenance Offices
	Weather information	Existing	Weather Information Providers
	Major incident and emergency information	Existing	Adjacent State Emergency Management Offices, Adjacent State Transportation Offices
	Incident clearance information	Planned 2	PSP Vehicles
PennDOT D3 Field Devices	Incident, construction, and emergency information	Existing	PennDOT D3 TMC
	Pre-assigned detour route information	Existing	PennDOT D3 TMC
	AMBER Alert notification	Existing	PennDOT D3 TMC
	Safety messages	Existing	PennDOT D3 TMC
	Incident, roadway condition, construction, and emergency information	Planned 2	PennDOT D3 TMC



<b>Element</b>	<b>Need (operation/data inputs from others)</b>	<b>Status</b>	<b>Origin Element</b>
PennDOT D3 Maintenance and Construction Vehicles	Snow plow routing information	Existing	PennDOT D3 County Maintenance Office
PennDOT D3 TMC	Roadway condition information	Existing	PennDOT D3 County Maintenance Office
	Incident notification	Existing	County 911 Communication Centers, PSP Offices, PennDOT D3 County Maintenance Office, County Public Safety Vehicles, Municipal Public Safety Vehicles, Municipal Traffic Management Offices, Motorists, General Public
	Incident verification	Existing	PSP Offices, PennDOT D3 County Maintenance Office, County Public Safety Vehicles
	Incident status information	Existing	PSP Offices, PennDOT D3 County Maintenance Office, County 911 Communication Centers
	Incident clearance information	Existing	PSP Offices, PennDOT D3 County Maintenance Office, County 911 Communication Centers
	Weather information	Existing	PennDOT Central Office, Weather Information Providers
	Amber Alert notification	Existing	PEMA Emergency Operation Center

<b>Element</b>	<b>Need (operation/data inputs from others)</b>	<b>Status</b>	<b>Origin Element</b>
	Maintenance and construction activity information	Existing	PennDOT D3 County Maintenance Office, Private Utility Company Offices
	Major incident, detour, and construction information	Existing	PennDOT D2 RTMC, PennDOT D4 RTMC
	Safety messages for posting	Existing	PennDOT Central Office
	Major incident, detour, and construction information	Existing	Adjacent State Transportation Offices
	ITS planning and funding information	Existing	County Planning Organization Offices
	Notification of major congestion-causing events	Existing	Attractions and Event Promoters
	Special event coordination	Planned 2	Attractions and Event Promoters
	Transit emergency and incident information	Planned 2	Regional Transit Agency Offices
	Direct notification of major emergency events	Planned 2	PEMA Emergency Operation Center, County EMA Centers, County 911 Communication Centers
	Incident notification	Planned 2	PennDOT D3 Field Devices, PSP Vehicles
	Incident verification	Planned 2	PennDOT D3 Field Devices, PSP Vehicles, County 911 Communication Centers, Municipal Public Safety Vehicles, Municipal Traffic Management Offices
	Incident status information	Planned 2	PennDOT D3 Field Devices, PSP Vehicles, County Public Safety Vehicles, Municipal Public Safety Vehicles

<b>Element</b>	<b>Need (operation/data inputs from others)</b>	<b>Status</b>	<b>Origin Element</b>
	Incident clearance information	Planned 2	PennDOT D3 Field Devices, County Public Safety Vehicles, Municipal Public Safety Vehicles, PSP Vehicles
	Real time roadway condition information	Planned 2	PennDOT D3 Field Devices
	Construction zone information	Planned 2	PennDOT D3 Field Devices, Construction Contractors
	Incident verification	Planned 2	PSP Dispatch Centers, County Public Safety Vehicles, Municipal Public Safety Vehicles
	Detailed roadway and incident information	Planned 2	Adjacent PennDOT District and County Offices, Adjacent State TMC's
	Major incident and emergency information	Planned 2	Adjacent State Public Safety/ Emergency Management Agency Offices
	Incident notification	Planned 2	Incident Response Agencies
	Special event coordination	Planned 2	Event Promoters
	Truck status information (HAZMAT, Weigh-in-Motion, oversize loads)	Planned 2	Commercial Vehicle Company Offices, Commercial Vehicles
	Detailed construction and maintenance status information	Planned 2	PennDOT D3 County Maintenance Office
	Major incident and activity information	Planned 2	High-Threat Facilities
	Incident/evacuation planning information	Planned 2	High-Threat Facilities
	Flooding information	Planned 2	County 911 Communication Centers

<b>Element</b>	<b>Need (operation/data inputs from others)</b>	<b>Status</b>	<b>Origin Element</b>
PennDOT D4 TMC	Incident/emergency information and response coordination	Planned 2	PennDOT D3 County Maintenance Offices, PennDOT D3 TMC, PennDOT STMC
	Traffic information	Planned 2	PennDOT D3 County Maintenance Offices, PennDOT D3 TMC, PennDOT STMC
	Traffic control coordination	Planned 2	PennDOT D3 County Maintenance Offices, PennDOT D3 TMC, PennDOT STMC
	Maintenance and construction coordination	Planned 2	PennDOT D3 County Maintenance Offices, PennDOT STMC
	Road weather information	Planned 2	PennDOT D3 County Maintenance Offices, PennDOT STMC
PennDOT STMC	Incident/emergency information and coordination	Planned 2	PEMA Emergency Operation Center, PennDOT Central Office Organizations, PennDOT D3 TMC, PSP Offices
	Traffic control coordination	Planned 2	PennDOT D3 TMC
	Traffic conditions and information	Planned 2	PEMA Emergency Operation Center, PennDOT Central Office Organizations, PennDOT D3 TMC

Element	Need (operation/data inputs from others)	Status	Origin Element
	Archived data	Planned 2	PennDOT Central Office Organizations, PennDOT D3 TMC
	Weather information	Planned 2	PennDOT Central Office Organizations PennDOT D3 TMC, PennDOT Central Office Field Devices
	Work zone information	Planned 2	PennDOT D3 TMC
	Special event information	Planned 2	Event Promoters
	Maintenance and Construction information including snow removal	Planned 2	PennDOT Central Office Organizations
	Vehicle registrations	Planned 2	PennDOT Central Office Organizations, Commercial Vehicle Company Offices
	Credentialing information	Planned 2	PennDOT Central Office Organizations, PennDOT Central Office Field Devices, Commercial Vehicle Company Offices
	Hazmat information	Planned 2	Commercial Vehicle Company Offices
PennDOT Welcome Centers and Rest Areas	Traveler information	Planned 2	PennDOT D3 TMC

<b>Element</b>	<b>Need (operation/data inputs from others)</b>	<b>Status</b>	<b>Origin Element</b>
Pennsylvania Office of Homeland Security	High Threat Facility Incident Information	Existing	PEMA Emergency Operation Center
Personal Traveler Information Devices	Personal traveler information	Planned 2	Regional Transit Agency Offices
	Traffic condition information	Existing	Information Service Providers
	Incident, roadway condition, construction, and emergency information	Planned 2	PennDOT D3 TMC
Private Utility Company Offices	Maintenance information	Planned 2	PennDOT D3 TMC
PSP Offices	Incident, construction, and emergency information	Existing	PennDOT D3 TMC
	Incident and emergency information	Existing	PSP Vehicles, 911 Communication Centers, County EMA Centers
	Incident clearance status	Existing	PSP Vehicles, 911 Communication Centers
	Maintenance and construction activity information	Existing	PennDOT D3 TMC, PennDOT D3 County Maintenance Office
	GPS location information	Existing	PSP Vehicles
	Flooding information	Existing	911 Communication Centers
	Incident coordination	Existing	Municipal/Regional Public Safety Offices
	Incident, roadway condition, construction, and emergency information	Planned 1	PennDOT D3 TMC

Element	Need (operation/data inputs from others)	Status	Origin Element
	Relaying incident and emergency information to and from affected County 911 centers and State agencies such as PennDOT, PEMA, DEP, Fish & Boat Commission and PUC (motor carrier)	Planned 2	911 Communication Centers, PennDOT D3 TMC, PEMA Emergency Operation Center
	Crash report data via PROPHECY - GPS	Existing	PennDOT D3 TMC
	Coordination with other agencies	Planned 2	PennDOT D3 TMC
	Incident/Crash Cluster via PROPHECY- GPS	Existing	PennDOT D3 TMC
	Safety advisories/Wanted Persons via DMS	Existing	PennDOT D3 TMC
	Video information (Live)	Planned 2	Regional Media Outlets, PEMA Emergency Operation Center, PSP Dispatch Centers
	Detour information	Existing	PennDOT D3 TMC, PEMA Emergency Operation Center
	Credential information	Existing	Commercial Vehicle Company Offices, PennDOT Central Office Organizations
	Hazmat information	Planned 1	Commercial Vehicle Company Offices
	Work zone information	Existing	PennDOT D3 County Maintenance Office
	Transit emergency and incident information	Existing	Regional Transit Agency Offices
	Incident and emergency information/response	Planned 1	PennDOT STMC
	Weather information	Planned 1	Weather Information Providers
	Event information	Existing	Attractions and Event Promoters

Element	Need (operation/data inputs from others)	Status	Origin Element
	Incident coordination	Planned 2	Adjacent State Public Safety Offices
	High threat facility incident information	Planned 2	Adjacent State Public Safety Offices
PSP Vehicles	Emergency Dispatch	Existing	PSP Offices
	Incident detection and location information	Existing	PSP Offices
	Incident status updates	Existing	PSP Offices
	Incidence command information	Existing	PSP Offices
	Flooding information	Existing	County 911 Communication Centers
	Coordination through 800 MHz voice communications with all regional emergency management agency centers and vehicles	Planned 1	County EMA Centers, County 911 Communication Centers, PSP Vehicles, PEMA Emergency Operation Center, PennDOT D3 TMC, PennDOT STMC
Railroad Offices	Rail crossing problems/malfunctions	Existing	County 911 Communication Centers
	HRI Advisories	Planned 1	PennDOT D3 TMC
Regional Airport Offices	ITS planning and funding information	Existing	County Planning Organization Offices
	Archive information/coordination	Existing	County/Regional Planning Organization Offices
Regional Media Outlets	Incident, construction, and emergency information	Existing	PennDOT D3 TMC, PennDOT Central Office Organizations
	Roadway condition information	Existing	PennDOT D3 TMC
	System status information	Existing	Regional Transit Agency Offices
	Traffic condition information	Existing	Information Service Providers



Element	Need (operation/data inputs from others)	Status	Origin Element
	Maintenance and weather information	Existing	PennDOT D3 County Maintenance Offices
	Incident/emergency information	Existing	PSP Offices, 911 Communication Centers, County EMA Centers, Municipal Traffic Management Offices
	Detour information	Planned 2	PennDOT D3 TMC
	Incident, roadway condition, construction, and emergency information	Planned 2	PennDOT D3 TMC, PennDOT STMC
Regional Transit Agency Offices	GPS location information	Existing	Regional Transit Agency Vehicles
	ITS planning and funding information	Existing	County Planning Organization Offices
	Transit incident information	Existing	911 Communication Centers, County EMA Centers
	Maintenance and weather information	Existing	PennDOT D3 County Maintenance Offices
	Event information	Existing	Attractions and Event Promoters
	Weather information	Planned 1	Weather Information Providers
	Maintenance and construction activity information	Planned 2	Private Utility Company Offices, Municipal Traffic Management Offices
	Roadway conditions	Planned 2	PennDOT D3 County Maintenance Offices
	Incident, roadway condition, construction, and emergency information	Planned 2	PennDOT D3 TMC

<b>Element</b>	<b>Need (operation/data inputs from others)</b>	<b>Status</b>	<b>Origin Element</b>
Regional Transit Vehicles	Dispatch and operations management information	Existing	Regional Transit Agency Offices
Towing Industry Responders	Dispatch information	Existing	911 Communication Centers, PSP Offices
Weather Information Providers	Weather information	Existing	PennDOT D3 County Maintenance Offices

### 3.4 Services

Sections 3.3 and 3.4 examine each element defined in Section 3.2 in terms of *needs* (what each element — i.e., agency stakeholder — needs from others) and *services* (what each element can provide to others). This information is used to program *Turbo Architecture*, the National ITS Architecture software. “Services” refer to the information outputs from one agency operation to another; they are presented in tabular format and trace back to the systems inventory.

**Table 3-3: Regional Services Table**

<b>Element</b>	<b>Service (operation/data outputs to others)</b>	<b>Status</b>	<b>Destination Element</b>
911 Communication Centers	Incident response information/coordination	Existing	County EMA Centers, Municipal Public Safety Offices, PEMA Emergency Operation Center, Incident Response Agency Offices, PennDOT D3 County Maintenance Offices, PennDOT D3 TMC, PSP Offices, Regional Transit Agency Offices
		Planned 2	Information Service Providers
	Resource request	Existing	PennDOT D3 County Maintenance Offices, PennDOT D3 TMC
	Emergency vehicle dispatch	Existing	Municipal/Regional Public Safety Vehicles, Towing Industry Responders
	HRI advisories	Existing	Railroad Offices
	High threat information	Existing	High Threat Facilities
	Traffic control coordination	Existing	PennDOT D3 County Maintenance Offices
	Traffic information coordination	Existing	PennDOT D3 TMC

Element	Service (operation/data outputs to others)	Status	Destination Element
		Planned 2	Information Service Providers, PennDOT D3 County Maintenance Offices
Adjacent PennDOT District and County Offices	Incident response information/coordination	Existing	PennDOT D3 TMC
	Traffic information	Existing	PennDOT D3 TMC
	Maintenance and construction coordination	Existing	PennDOT D3 County Maintenance Offices, PennDOT D3 TMC
	Road weather information	Existing	PennDOT D3 County Maintenance Offices, PennDOT D3 TMC
	Work Plan information	Existing	PennDOT D3 County Maintenance Offices, PennDOT D3 TMC
	Work zone information	Existing	PennDOT D3 County Maintenance Offices, PennDOT D3 TMC
	Traffic control coordination	Existing	PennDOT D3 TMC
Adjacent State Emergency Management Offices	Incident response information/coordination	Existing	PEMA Emergency Operation Center

<b>Element</b>	<b>Service (operation/data outputs to others)</b>	<b>Status</b>	<b>Destination Element</b>
Adjacent State Public Safety Offices	High threat information	Existing	PSP Offices
	Incident response information/coordination	Existing	PSP Offices
Adjacent State Transportation Offices	Incident response coordination	Planned 2	PennDOT D3 TMC, PennDOT STMC
	Threat information coordination	Planned 2	PennDOT D3 TMC
	Traffic information coordination	Planned 2	PennDOT D3 TMC, PennDOT STMC
	Maintenance and construction coordination	Existing	PennDOT D3 County Maintenance Offices
		Planned 2	PennDOT STMC
	Work plan coordination	Existing	PennDOT D3 County Maintenance Offices
	Work zone information	Existing	PennDOT D3 County Maintenance Offices, PennDOT STMC
Attractions and Event Promoters	Special event coordination	Existing	Municipal Traffic Management Offices, PennDOT D3 TMC, PSP Offices, Regional Transit Agency Offices

Element	Service (operation/data outputs to others)	Status	Destination Element
		Planned 2	Information Service Providers
Commercial Vehicle Company Offices	Hazmat information	Planned 2	PEMA Emergency Operation Center, PennDOT STMC
	Fleet to driver update	Existing	Commercial Vehicles
Commercial Vehicles	On-board vehicle and safety data	Existing	Commercial Vehicle Company Offices
	Trip log	Existing	Commercial Vehicle Company Offices
	Driver to fleet update	Existing	Commercial Vehicle Company Offices
	Highway watch program	Planned 2	PSP Offices, 911 Communication Centers, PennDOT D8 TMC
	Safety inspection records	Planned 2	PennDOT Central Office Field Devices
County EMA Centers	Incident response information/coordination	Existing	County EMA Centers, Municipal Public Safety Offices, PEMA Emergency Operation Center, Incident Response Agency Offices, PennDOT D3 County Maintenance Offices, PennDOT D3 TMC, PSP Offices, Regional Transit Agency Offices

Element	Service (operation/data outputs to others)	Status	Destination Element
		Planned 2	Information Service Providers
	Resource request	Existing	PennDOT D3 County Maintenance Offices, PennDOT D3 TMC
	Emergency vehicle dispatch	Existing	Municipal/Regional Public Safety Vehicles, Towing Industry Responders
	HRI advisories	Existing	Railroad Offices
	High threat information	Existing	High Threat Facilities
	Traffic control coordination	Existing	PennDOT D3 County Maintenance Offices
	Traffic information coordination	Existing	PennDOT D3 TMC
		Planned 2	Information Service Providers, PennDOT D3 County Maintenance Offices



Element	Service (operation/data outputs to others)	Status	Destination Element
County/Regional Planning Organization Offices	Archived data	Existing	Local School District Offices, Municipal Traffic Management Offices, PennDOT Central Office Organizations, PennDOT D3 TMC, Railroad Offices, Regional Airport Offices, Regional Transit Agency Offices
		Planned 2	PennDOT STMC
High Threat Facilities	Threat information coordination	Existing	911 Communication Centers, County EMA Centers, PEMA Emergency Operation Center
Incident Response Agency Offices	Incident response information/coordination	Existing	911 Communication Centers, County EMA Centers, PEMA Emergency Operation Center
Information Service Providers	Incident information	Planned 2	911 Communication Centers, County EMA Centers, PennDOT D3 TMC, PSP Offices, Regional Transit Agency Offices
	Traffic conditions	Planned 2	911 Communication Centers, PennDOT D3 TMC, Municipal Traffic Management Offices

<b>Element</b>	<b>Service (operation/data outputs to others)</b>	<b>Status</b>	<b>Destination Element</b>
	Weather information	Planned 2	PennDOT D3 County Maintenance Offices
	Traveler information	Planned 2	Personal Traveler Information Devices, Regional Media Outlets
	Traffic information coordination	Planned 2	911 Communication Centers, PennDOT D3 TMC
	Special event information	Planned 2	Attractions and Event Promoters
Local School District Offices	Archived data	Existing	County/Regional Planning Organizations
	Driver instructions	Existing	Local School District Transit Vehicles
Local School District Transit Vehicles	Emergency notification	Existing	Local School District Offices
	Vehicle conditions	Existing	Local School District Offices
	AVL data	Planned 2	Local School District Offices
Municipal Field Devices	Traffic images	Planned 2	Municipal Traffic Management Offices

<b>Element</b>	<b>Service (operation/data outputs to others)</b>	<b>Status</b>	<b>Destination Element</b>
Municipal Traffic Management Offices	Incident response information/coordination	Existing	911 Communication Centers, County EMA Centers
	Traffic information	Existing	PennDOT D3 TMC, Regional Media Outlets
		Planned 2	Information Service Providers
	Road closures	Existing	PennDOT D3 TMC
	Archived data	Existing	County/Regional Planning Organizations
	Maintenance and construction work plans	Existing	Regional Transit Agency Offices
	Special event information	Existing	Attractions and Event Promoters
	Traffic control coordination	Planned 2	PennDOT D3 TMC
Municipal/Regional Public Safety Offices	Incident response information/coordination	Existing	911 Communication Centers, County EMA Centers, PSP Offices
	Emergency vehicle dispatch	Existing	Municipal/Regional Public Safety Vehicles

<b>Element</b>	<b>Service (operation/data outputs to others)</b>	<b>Status</b>	<b>Destination Element</b>
Municipal/Regional Public Safety Vehicles	Emergency dispatch coordination	Existing	911 Communication Centers, Municipal/Regional Public Safety Offices
	Incident command coordination	Existing	911 Communication Centers, Municipal/Regional Public Safety Offices
PEMA Emergency Operation Center	Incident response coordination	Existing	911 Communication Centers, Adjacent State Emergency Operation Centers County EMA Centers, Incident Response Agency Offices, PennDOT Central Office Organizations
		Planned 2	PennDOT STMC
	PIERS Incident data	Existing	911 Communication Centers
	Threat information coordination	Existing	Pennsylvania Office of Homeland Security
PennDOT Central Office Field Devices	RWIS information	Existing	PennDOT Central Office Organizations, PennDOT D3 County Maintenance Offices
		Planned 2	PennDOT STMC

<b>Element</b>	<b>Service (operation/data outputs to others)</b>	<b>Status</b>	<b>Destination Element</b>
	Safety inspection reports and violation notification	Existing	PennDOT Central Office Organizations
		Planned 2	PennDOT STMC
PennDOT Central Office Organizations	Request for archived data (BPR)	Existing	Regional Transit Offices, PennDOT D3 TMC
		Planned 2	PennDOT STMC
	Incident and emergency information and coordination (BHSTE)	Existing	PEMA Emergency Operation Center, PennDOT D3 TMC, PSP Offices
		Planned 2	PennDOT STMC
	Traffic information and conditions (BHSTE)	Existing	PennDOT D3 TMC
		Planned 2	PennDOT STMC
	Work zone information (BOMO)	Existing	PennDOT D3 TMC
		Planned 2	PennDOT STMC
	Maintenance and construction coordination	Existing	PennDOT D3 TMC

Element	Service (operation/data outputs to others)	Status	Destination Element
		Planned 2	PennDOT STMC
	Commercial vehicle enforcement information (Motor Carrier Division)	Existing	PSP Offices
		Planned 2	PennDOT STMC
	Media information	Existing	Regional Media Outlets
PennDOT D2 TMC	Traffic information	Planned 2	PennDOT D3 TMC, PennDOT D3 County Maintenance Offices, PennDOT STMC
	Incident information	Planned 2	PennDOT D3 TMC, PennDOT D3 County Maintenance Offices, PennDOT STMC
	Road closures	Planned 2	PennDOT D3 TMC, PennDOT D3 County Maintenance Offices, PennDOT STMC
	Road weather information	Planned 2	PennDOT D3 TMC, PennDOT D3 County Maintenance Offices, PennDOT STMC

Element	Service (operation/data outputs to others)	Status	Destination Element
	Road conditions	Planned 2	PennDOT D3 TMC, PennDOT D3 County Maintenance Offices, PennDOT STMC
	Maintenance and construction information	Planned 2	PennDOT D3 County Maintenance Offices, PennDOT STMC
	Work zone information	Planned 2	PennDOT D3 County Maintenance Offices, PennDOT STMC
	CCTV control	Planned 2	PennDOT D3 Field Devices
	DMS control	Planned 2	PennDOT D3 Field Devices
PennDOT D3 County Maintenance Offices	Incident notification	Existing	PennDOT D3 TMC
	Incident verification	Existing	PennDOT D3 TMC
	Incident status information	Existing	PennDOT D3 TMC
	Incident clearance information	Existing	PennDOT D3 TMC
	Roadway condition information	Existing	PennDOT D3 TMC

<b>Element</b>	<b>Service (operation/data outputs to others)</b>	<b>Status</b>	<b>Destination Element</b>
	Snow plow routing information	Existing	PennDOT Maintenance and Construction Vehicles
	Weather information	Existing	Weather Information Providers
	Maintenance and construction activity information	Existing	PennDOT D3 TMC, PSP Offices, 911 Communication Centers
	Roadway condition, construction, and maintenance information	Existing	Adjacent PennDOT District and County Offices
	Maintenance and weather information	Existing	Regional Transit Agency Offices, Regional Media Outlets
	Incident, roadway condition, construction, and emergency information	Existing	Municipal Traffic Management Offices, PennDOT D2 TMC, PennDOT D4 TMC
	Major incident and emergency information	Existing	Adjacent State Emergency Management Offices, Adjacent State Transportation Offices
	Maintenance, construction, and roadway information	Existing	Local School District Offices
	Roadway conditions	Planned 2	Regional Transit Agency Office



<b>Element</b>	<b>Service (operation/data outputs to others)</b>	<b>Status</b>	<b>Destination Element</b>
	General incident, construction, and emergency information	Planned	Information Service Providers, Regional Media Outlets
	Incident notification and dispatch needs	Planned 2	911 Communication Centers
	Incident, roadway condition, construction, and emergency information	Existing	County EMA Centers, PSP Offices, PennDOT D2 TMC
	Incident, roadway condition, construction, and emergency information	Planned 2	PennDOT D2 TMC
PennDOT D3 Field Devices	Incident notification	Planned 2	PennDOT D3 TMC
	Incident verification	Planned 2	PennDOT D3 TMC
	Incident status information	Planned 2	PennDOT D3 TMC
	Incident clearance information	Planned 2	PennDOT D3 TMC
	Real time roadway condition information	Planned 2	PennDOT D3 TMC
	Video images	Planned 2	911 Communication Centers, Information Services Providers

Element	Service (operation/data outputs to others)	Status	Destination Element
	Construction zone status information	Planned 2	PennDOT D3 TMC, Construction Contractors
PennDOT D3 Maintenance and Construction Vehicles	Roadway conditions, dispatch information, and maintenance status	Existing	PennDOT D3 County Maintenance Office
PennDOT D3 TMC	Incident, construction, and emergency information	Existing	PennDOT D3 Field Devices, PennDOT D3 County Maintenance Office, PSP Dispatch Centers, PEMA Emergency Operation Center
	Maintenance status and coordination information	Existing	PennDOT D3 County Maintenance Offices
	Major incident, detour, and construction information	Existing	Adjacent PennDOT District and County Offices, Adjacent State Transportation Offices
	Roadway condition information	Existing	Regional Media Outlets, ISPs
	AMBER Alert notification	Existing	PennDOT D3 Field Devices
	Pre-assigned detour route information	Existing	PennDOT D3 Field Devices, PennDOT D3 County Maintenance Office

Element	Service (operation/data outputs to others)	Status	Destination Element
	ITS planning data	Existing	County Planning Organization Offices
	Incident, roadway condition, construction, and emergency information	Planned 2	Regional Transit Agency Offices, Municipal Traffic Management Offices
	Incident, construction, and emergency information	Planned 2	PennDOT D3 Field Devices, PennDOT D3 County Maintenance Office, PSP Offices, PEMA Emergency Operation Center, Regional Media Outlets
	Incident notification and dispatch needs	Planned 2	County 911 Communication Centers
	Road and weather information	Planned 2	Local School District Offices
	Detailed incident, detour, and construction information	Planned 2	Adjacent PennDOT Districts, Adjacent State TMC's, PennDOT Welcome Centers and Rest Areas
	Major incident and emergency information	Planned 2	Adjacent State Public Safety/ Emergency Management
	Detour information	Planned 2	General Public, Motorists, Regional Media Outlets, Information Service Providers
	HRI advisories	Planned 1	Railroad Offices

Element	Service (operation/data outputs to others)	Status	Destination Element
	Construction zone information	Planned 2	PennDOT D3 Field Devices, Motorists, General Public
	Maintenance information	Planned 2	Private Utility Company Offices
	Real-time roadway condition information	Planned 2	Motorists, General Public
PennDOT D4 TMC	Traffic information	Planned 2	PennDOT D3 TMC, PennDOT D3 County Maintenance Offices, PennDOT STMC
	Incident information	Planned 2	PennDOT D3 TMC, PennDOT D3 County Maintenance Offices, PennDOT STMC
	Road closures	Planned 2	PennDOT D3 TMC, PennDOT D3 County Maintenance Offices, PennDOT STMC
	Road weather information	Planned 2	PennDOT D3 TMC, PennDOT D3 County Maintenance Offices, PennDOT STMC
	Road conditions	Planned 2	PennDOT D3 TMC, PennDOT D3 County Maintenance Offices, PennDOT STMC

<b>Element</b>	<b>Service (operation/data outputs to others)</b>	<b>Status</b>	<b>Destination Element</b>
	Maintenance and construction information	Planned 2	PennDOT D3 County Maintenance Offices, PennDOT STMC
	Work zone information	Planned 2	PennDOT D3 County Maintenance Offices, PennDOT STMC
	CCTV control	Planned 2	PennDOT D3 Field Devices
	DMS control	Planned 2	PennDOT D3 Field Devices
PennDOT STMC	Incident and emergency information and coordination	Planned 2	Adjacent State Transportation Offices, PEMA Emergency Operation Center, PennDOT Central Office Organizations, PennDOT D3 TMC, PSP Offices
	Request for archived data	Planned 2	Adjacent State Transportation Offices, PennDOT Central Office Organizations, PennDOT D3 TMC
	Traffic information, restrictions, and conditions	Planned 2	Adjacent State Transportation Offices, PennDOT Central Office Organizations, PennDOT D3 TMC
	Work zone information	Planned 2	Adjacent State Transportation Offices, PennDOT Central Office Organizations, PennDOT D3 TMC

<b>Element</b>	<b>Service (operation/data outputs to others)</b>	<b>Status</b>	<b>Destination Element</b>
	Maintenance and construction coordination	Planned 2	Adjacent State Transportation Offices, PennDOT Central Office Organizations, PennDOT D3 TMC
	Commercial vehicle enforcement information	Planned 2	PennDOT Central Office Organizations, Commercial Vehicle Company Offices
	Road weather information	Planned 2	PennDOT Central Office Organizations, PennDOT D3 TMC, Regional Media Outlets
	Media information	Planned 2	Regional Media Outlets
PennDOT Welcome Centers and Rest Areas	N/A	N/A	N/A
Pennsylvania Office of Homeland Security	Threat information coordination	Existing	PEMA Emergency Operation Center
Personal Traveler Information Devices	N/A	N/A	N/A
Private Utility Company Offices	Maintenance and construction activity information	Planned 2	PennDOT D3 TMC, Regional Transit Agency Offices

<b>Element</b>	<b>Service (operation/data outputs to others)</b>	<b>Status</b>	<b>Destination Element</b>
PSP Offices	Information from 911 Communication Centers	Planned 2	PSP Vehicles, PennDOT D3 TMC
	Communication with PSP Vehicles	Existing	PSP Vehicles
	Incident notification	Existing	PennDOT D3 TMC, PennDOT D3 County Maintenance Offices, County EMA Centers
	Incident verification	Existing	PennDOT D3 TMC, PennDOT D3 County Maintenance Offices
	Incident status information	Existing	PennDOT D3 County Maintenance Offices
	Maintenance and construction activity information	Existing	PennDOT D3 County Maintenance Offices
	Safety information	Existing	PennDOT Central Office Organizations
	Credentialing information	Existing	PennDOT Central Office Organizations
	Incident coordination	Existing	Municipal/Regional Public Safety Offices
	24 hour information input/output	Planned 2	PennDOT D3 TMC

Element	Service (operation/data outputs to others)	Status	Destination Element
	Incident response coordination	Existing	911 Communication Centers, County EMA Centers, Municipal Offices, PennDOT D3 TMC, PEMA Emergency Operation Center, PennDOT Central Office Organizations
		Planned 1	PennDOT D3 TMC, PennDOT STMC
	Safety advisories/Wanted Persons via DMS	Planned 2	PennDOT D3 Field Devices
	Emergency dispatch	Existing	PSP Vehicles, Towing Industry Responders
	Incident/emergency information	Existing	Regional Media Outlets, Information Service Providers
	Capability to control PennDOT DMS signs	Planned 1	PennDOT D3 Field Devices
	Incident and emergency information/response	Planned 1	PennDOT STMC
	Incident notification and dispatch needs	Planned 2	911 Communication Centers
	Incident coordination	Planned 2	Adjacent State Public Safety Offices
	High threat facility incident information	Planned 2	Adjacent State Public Safety Offices



<b>Element</b>	<b>Service (operation/data outputs to others)</b>	<b>Status</b>	<b>Destination Element</b>
PSP Vehicles	Emergency dispatch information	Existing	PSP Offices
	Vehicle tracking	Existing	PSP Offices
Railroad Offices	Grade crossing data	Existing	County Planning Organization Offices
	Incident information	Existing	911 Communication Centers, County EMA Centers
	Rail ITS needs	Existing	County Planning Organization Offices
Regional Airport Offices	Emergency dispatch request	Existing	911 Communication Centers
	Archive information/coordination	Existing	County/Regional Planning Organization Offices
Regional Media Outlets	Road network conditions	Existing	PennDOT D3 TMC, PEMA Emergency Operation Center, County EMA Centers, County 911 Communication Centers
		Planned 1	PennDOT STMC, PennDOT D3 TMC
Regional Transit Agency Offices	Incident information	Existing	County 911 Communication Centers, County EMA Centers, Towing Provider

<b>Element</b>	<b>Service (operation/data outputs to others)</b>	<b>Status</b>	<b>Destination Element</b>
	System status information	Existing	General Public, Regional Media Outlets
	Dispatch and operations management information	Existing	Regional Transit Agency Vehicle
	ITS planning data	Existing	County Planning Organization Offices, PennDOT Central Office Organizations
	Personal traveler information	Planned 2	Personal Traveler Information Devices
	Transit emergency and incident information	Planned 2	PennDOT D3 TMC, PSP Offices, Information Service Providers
Regional Transit Vehicles	GPS location information	Existing	Regional Transit Agency Offices
	Congestion and incident information	Existing	Regional Transit Agency Offices
Towing Industry Responders	Emergency dispatch coordination	Existing	911 Communication Centers, PSP Offices
Weather Information Providers	Weather information	Existing	911 Communication Centers, County EMA Centers, Municipal Traffic Management Offices, PEMA Emergency Operation Center, PennDOT Central Office, PennDOT D3 County Maintenance Offices, PennDOT D3 TMC, PennDOT STMC

<b>Element</b>	<b>Service (operation/data outputs to others)</b>	<b>Status</b>	<b>Destination Element</b>
	Weather information	Planned 1	PSP Offices, Regional Transit Agency Offices, Information Service Providers

## 4 Regional ITS Architecture

The Regional ITS Architecture was created using the process discussed in Section 1.1 'Architecture Process' on this document. The development of the Regional ITS Architecture consisted of: (1) developing a Strawman document using the RAP as a source of information gathering, (2) outreaching to ITS stakeholders in the Region and validating the Strawman, and (3) revising the Architecture to reflect stakeholder inputs from the outreach process. This process is further discussed below.

### **Strawman**

Using existing documentation and information gathered from the RAP (Section 3 tables) a Strawman, or draft, Regional ITS Architecture was developed. The RAP consisted of key stakeholders in the Region and was used to gather preliminary information for Architecture development. This information was then used to assign actual and potential "interconnects" and "information flows" between among the ITS elements. The result was this effort was a draft version of this Final Report, known as the Strawman Architecture. The Strawman Architecture document was created and submitted to PennDOT on August 27, 2004.

### **Outreach**

Outreach is the sharing of information to stakeholders. The ITS Architecture effort was led with outreach being a central activity of the project. Stakeholders were gathered through an extensive effort working with the RAP. RAP members identified key regional persons and agencies involved in surface transportation activities that may benefit from the ITS Architecture effort. Three outreach segments were scheduled into the process to gather input and reach out to these important stakeholders:

Outreach Activity 1: Regional Meeting (called the 1st Bookend meeting)—this meeting provided an introduction to ITS, provided context for the effort and set the stage for smaller working meetings.

Outreach Activity 2: Small Working Meetings (called Validation meetings)-these were a series of meetings that were smaller in size and broken into functional areas such as; traffic, emergency management, incident management, enforcement, transit and planning. Stakeholders attending these meetings reviewed and edited a piece of the draft of the ITS Architecture that pertained directly to their agency and job function. In this way the ITS Architecture became validated by each stakeholder represented in the ITS Architecture.

Outreach Activity 3: Regional Meeting (called the 2nd Bookend meeting)—this meeting concluded the ITS Architecture effort and launched the next steps of preparing a regional operations plan that has input into the regional long-range plan and regional transportation improvement program.

All of these activities were led by PennDOT and regional champions. In many cases RAP members championed the effort as well. The success of this regions ITS Architecture effort can be directly tied to the efforts of regional champions and the willingness of the regional stakeholders to participate to complete this effort.

### Bookend Meeting #1

On November 18, 2004, a Stakeholders Bookend Meeting convened in Williamsport Pennsylvania. The meeting began the outreach process by introducing Regional stakeholders to ITS operation, ITS planning, and the Architecture project.

Agencies represented at the Bookend Meeting included PennDOT, airports, transit agencies, counties, cities, emergency management agencies, planning offices, townships, partnership organizations, the enforcement community, and policy organizations. Detailed meeting minutes, including the stakeholders in attendance, are included in Appendix F.

### Validation Meetings

Validation meetings were conducted in December 2004 with small intimate groups of stakeholders to validate the Strawman Architecture. These meetings were used to expand, tailor, and refine the documentation of existing and planned interconnects and information flows. Detailed meeting minutes from the Validation Meetings are contained in Appendix G.

### Bookend Meeting #2

Bookend Meeting #2 was held on February 24, 2005 in Williamsport, Pennsylvania. The meeting included many of the stakeholders that participated at the first Bookend Meeting and validation meetings. Detailed meeting minutes are included in Appendix F.

## ***Final Architecture***

This report, Final Regional ITS Architecture, was developed based on comments received from stakeholders during the outreach process. Stakeholder comments from the outreach process were reconciled and incorporated into the Strawman document, resulting in the Final Architecture. The following sections depict the final ITS Architecture diagrams. These diagrams include:

- Subsystem Interconnect Diagrams,
- Interconnect Diagrams, and
- Information Flow Diagrams.

## **4.1 Subsystem Interconnect Diagram**

This diagram presents the Regional ITS Architecture relationships between subsystems and the communication between them. As shown this diagram provides a visual representation of data used in the development of the Regional ITS Architecture. Subsystems that do not pertain this particular Regional ITS Architecture are denoted in a light grey text. The Subsystem Interconnect Diagram is divided into four system classes; Travelers, Centers, Vehicles, and Roadside. A color scheme (green, yellow, blue, and red) links subsystems and elements back to the System Interconnect Diagram.

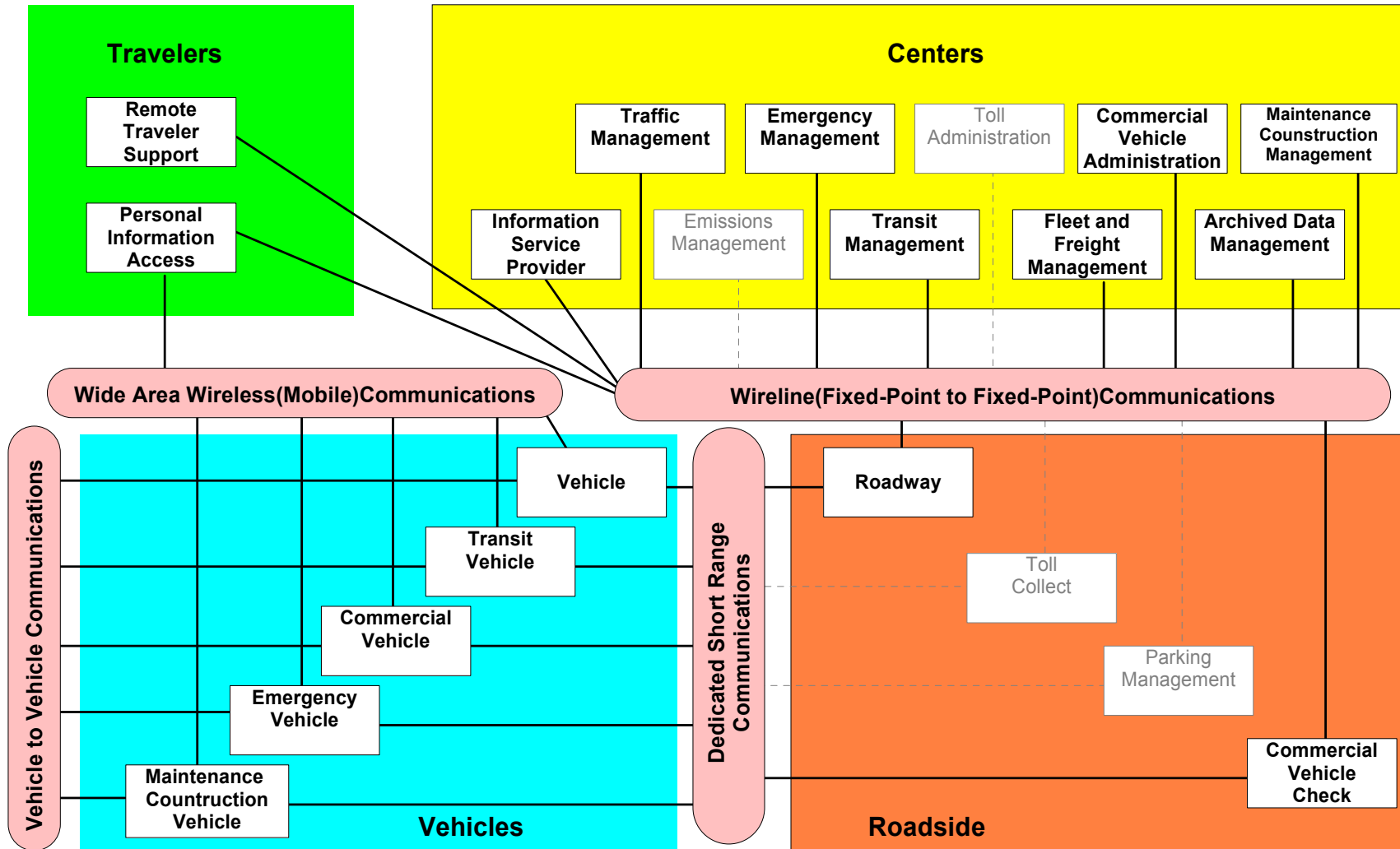


Figure 4-1: Subsystem Interconnect Diagram

## **4.2 Regional Subsystem Interconnect Diagram showing Elements**

This diagram presents the regional ITS Architecture relationships between subsystems, the communication between them, and the elements within each subsystem. As shown this diagram provides a visual representation of data used in the development of the Regional ITS Architecture. In this diagram elements have been added to make this diagram useful for regional specificity. This information is also provided in a tabular format listed by element.



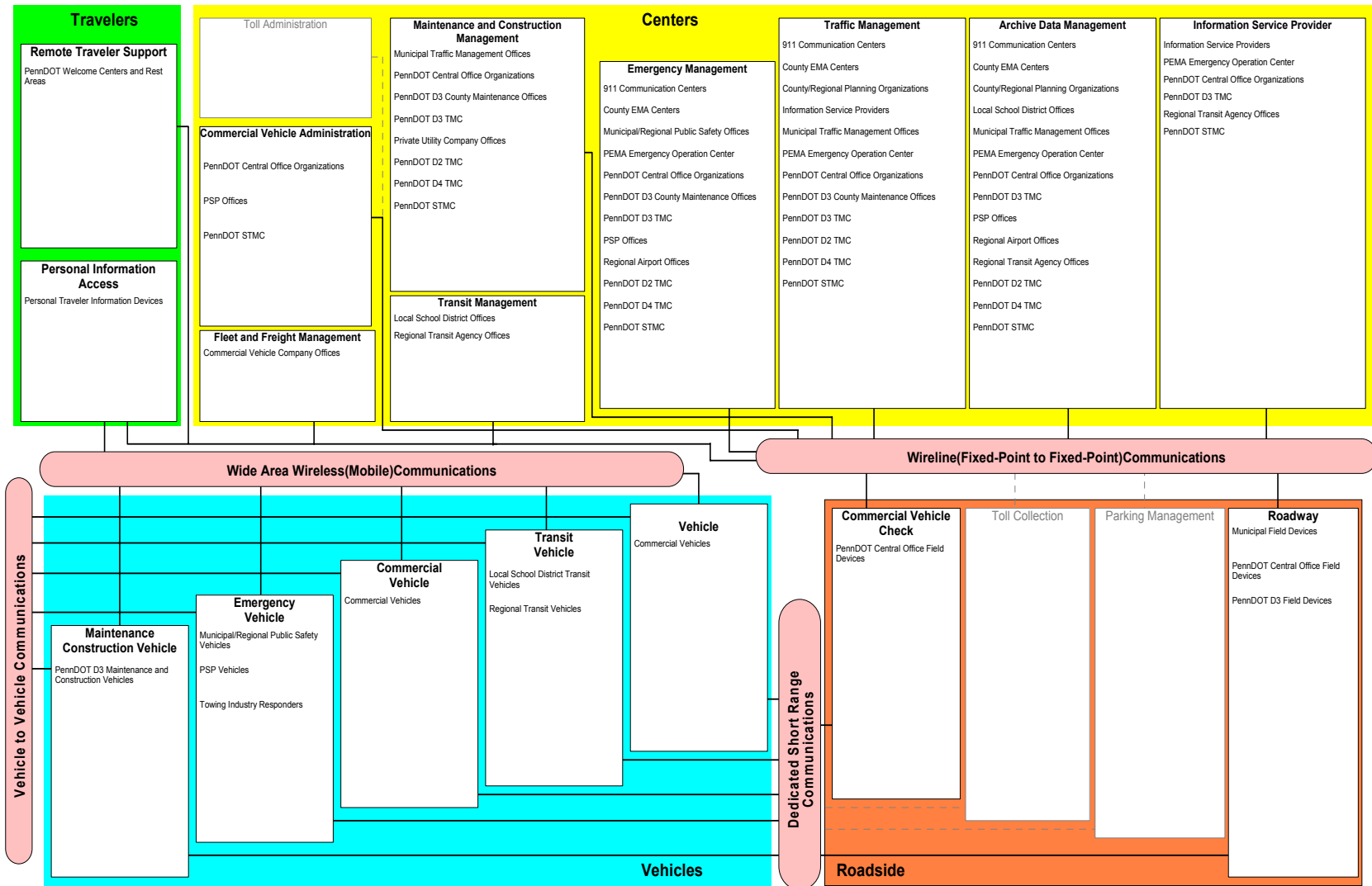


Figure 4-2: Regional Subsystem Interconnect Diagram showing Elements

**Table 4-1: Regional Subsystems/Terminators**

<b>Element</b>	<b>Subsystem/Terminator mapped to:</b>
911 Communication Centers	Archived Data Management Emergency Management Traffic Management
Adjacent PennDOT District and County Offices	Emergency Management Information Service Provider Maintenance and Construction Management Traffic Management
Adjacent State Emergency Management Offices	Emergency Management
Adjacent State Public Safety Offices	Emergency Management
Adjacent State Transportation Offices	Emergency Management Information Service Provider Maintenance and Construction Management Traffic Management
Attractions and Event Promoters	Event Promoters
Commercial Vehicle Company Offices	Fleet and Freight Management
Commercial Vehicles	Commercial Vehicle Vehicle
County EMA Centers	Archived Data Management Emergency Management Traffic Management
County/Regional Planning Organizations	Archived Data Management Traffic Management
High Threat Facilities	Emergency Management
Incident Response Agency Offices	Emergency Management
Information Service Providers	Information Service Provider Traffic Management
Local School District Offices	Archived Data Management Transit Management
Local School District Transit Vehicles	Transit Vehicle
Municipal Field Devices	Roadway
Municipal Traffic Management Offices	Archived Data Management

Element	Subsystem/Terminator mapped to:
	Maintenance and Construction Management Traffic Management
Municipal/Regional Public Safety Offices	Emergency Management
Municipal/Regional Public Safety Vehicles	Emergency Vehicle
PEMA Emergency Operation Center	Archived Data Management Emergency Management Information Service Provider Traffic Management
PennDOT Central Office Field Devices	Commercial Vehicle Check Roadway
PennDOT Central Office Organizations	Archived Data Management Commercial Vehicle Administration Emergency Management Information Service Provider Maintenance and Construction Management Traffic Management
PennDOT D2 TMC	Archived Data Management Emergency Management Maintenance and Construction Management Traffic Management
PennDOT D3 County Maintenance Offices	Emergency Management Maintenance and Construction Management Traffic Management
PennDOT D3 Field Devices	Roadway
PennDOT D3 Maintenance and Construction Vehicles	Maintenance and Construction Vehicle
PennDOT D3 TMC	Archived Data Management Commercial Vehicle Administration Emergency Management Information Service Provider Maintenance and Construction Management Traffic Management
PennDOT D4 TMC	Archived Data Management Emergency Management Maintenance and Construction Management

Element	Subsystem/Terminator mapped to:
	Traffic Management
PennDOT STMC	Archived Data Management Commercial Vehicle Administration Emergency Management Information Service Provider Maintenance and Construction Management Traffic Management
PennDOT Welcome Centers and Rest Areas	Remote Traveler Support
Pennsylvania Office of Homeland Security	Emergency Management
Personal Traveler Information Devices	Personal Information Access
Private Utility Company Offices	Maintenance and Construction Management
PSP Offices	Archived Data Management Commercial Vehicle Administration Emergency Management
PSP Vehicles	Emergency Vehicle
Railroad Offices	Rail Operations
Regional Airport Offices	Archived Data Management Emergency Management
Regional Media Outlets	Media
Regional Transit Agency Offices	Archived Data Management Information Service Provider Transit Management
Regional Transit Vehicles	Transit Vehicle
Towing Industry Responders	Emergency Vehicle
Weather Information Providers	Weather Service

### 4.3 Interconnect Matrix

This section documents the actual and potential “interconnects” (i.e., interfaces) among the ITS elements. Interconnects show where one operation will connect data or information with another operation. The section is primarily documented as Turbo software output.

**Table 4-2: Regional Interconnect Matrix**

	911 Communication Centers	Adjacent PennDOT District and County Offices	Adjacent State Emergency Management Offices	Adjacent State Public Safety Offices	Adjacent State Transportation Offices	Attractions and Event Promoters	Commercial Vehicle Company Offices	Commercial Vehicles	County EMA Centers	County/Regional Planning Organizations	High Threat Facilities	Incident Response Agency Offices	Information Service Providers	Local School District Offices	Local School District Transit Vehicles	Municipal Field Devices	Municipal Traffic Management Offices	Municipal/Regional Public Safety Offices	Municipal/Regional Public Safety Vehicles	PEMA Emergency Operation Center	PennDOT Central Office Field Devices	PennDOT Central Office Organizations	PennDOT D2 TMC	PennDOT D3 County Maintenance Offices	PennDOT D3 Field Devices	PennDOT D3 Maintenance and Construction Vehicles	PennDOT D3 TMC	PennDOT D4 TMC	PennDOT STMC	PennDOT Welcome Centers and Rest Areas	Pennsylvania Office of Homeland Security	Personal Traveler Information Devices	Private Utility Company Offices	PSP Offices	PSP Vehicles	Railroad Offices	Regional Airport Offices	Regional Media Outlets	Regional Transit Agency Offices	Regional Transit Vehicles	Towing Industry Responders	Weather Information Providers			
911 Communication Centers								X		X	X	X				X	X	X	X				X	X		X							X		X	X	X	X	X		X	X			
Adjacent PennDOT District and County Offices																							X			X																			
Adjacent State Emergency Management Offices																				X																									
Adjacent State Public Safety Offices																																			X										
Adjacent State Transportation Offices																								X			X		X																
Attractions and Event Promoters													X			X										X													X						
Commercial Vehicle Company Offices							X													X		X													X										
Commercial Vehicles								X													X																								
County EMA Centers	X									X	X	X				X	X		X				X											X				X	X					X	

	911 Communication Centers	Adjacent PennDOT District and County Offices	Adjacent State Emergency Management Offices	Adjacent State Public Safety Offices	Adjacent State Transportation Offices	Attractions and Event Promoters	Commercial Vehicle Company Offices	Commercial Vehicles	County EMA Centers	County/Regional Planning Organizations	High Threat Facilities	Incident Response Agency Offices	Information Service Providers	Local School District Offices	Local School District Transit Vehicles	Municipal Field Devices	Municipal Traffic Management Offices	Municipal/Regional Public Safety Offices	Municipal/Regional Public Safety Vehicles	PEMA Emergency Operation Center	PennDOT Central Office Field Devices	PennDOT Central Office Organizations	PennDOT D2 TMC	PennDOT D3 County Maintenance Offices	PennDOT D3 Field Devices	PennDOT D3 Maintenance and Construction Vehicles	PennDOT D3 TMC	PennDOT D4 TMC	PennDOT STMC	PennDOT Welcome Centers and Rest Areas	Pennsylvania Office of Homeland Security	Personal Traveler Information Devices	Private Utility Company Offices	PSP Offices	PSP Vehicles	Railroad Offices	Regional Airport Offices	Regional Media Outlets	Regional Transit Agency Offices	Regional Transit Vehicles	Towing Industry Responders	Weather Information Providers					
County/Regional Planning Organizations														X		X					X				X		X									X	X		X								
High Threat Facilities	X								X											X																											
Incident Response Agency Offices	X								X											X																											
Information Service Providers	X					X			X								X							X	X		X			X			X												X		
Local School District Offices										X					X									X		X																					
Local School District Transit Vehicles														X																																	
Municipal Field Devices																X		X																													
Municipal Traffic Management Offices	X					X			X	X			X											X			X																				X
Municipal/Regional Public Safety Offices	X								X										X																X												
Municipal/Regional Public Safety Vehicles	X														X			X																													
PEMA Emergency Operation Center	X		X				X		X		X	X										X						X		X																	

	911 Communication Centers	Adjacent PennDOT District and County Offices	Adjacent State Emergency Management Offices	Adjacent State Public Safety Offices	Adjacent State Transportation Offices	Attractions and Event Promoters	Commercial Vehicle Company Offices	Commercial Vehicles	County EMA Centers	County/Regional Planning Organizations	High Threat Facilities	Incident Response Agency Offices	Information Service Providers	Local School District Offices	Local School District Transit Vehicles	Municipal Field Devices	Municipal Traffic Management Offices	Municipal/Regional Public Safety Offices	Municipal/Regional Public Safety Vehicles	PEMA Emergency Operation Center	PennDOT Central Office Field Devices	PennDOT Central Office Organizations	PennDOT D2 TMC	PennDOT D3 County Maintenance Offices	PennDOT D3 Field Devices	PennDOT D3 Maintenance and Construction Vehicles	PennDOT D3 TMC	PennDOT D4 TMC	PennDOT STMC	PennDOT Welcome Centers and Rest Areas	Pennsylvania Office of Homeland Security	Personal Traveler Information Devices	Private Utility Company Offices	PSP Offices	PSP Vehicles	Railroad Offices	Regional Airport Offices	Regional Media Outlets	Regional Transit Agency Offices	Regional Transit Vehicles	Towing Industry Responders	Weather Information Providers				
PennDOT Central Office Field Devices							X													X		X					X																			
PennDOT Central Office Organizations							X		X											X	X					X		X						X					X	X						
PennDOT D2 TMC																							X					X																		
PennDOT D3 County Maintenance Offices	X	X			X			X				X	X			X					X		X			X	X	X						X						X	X				X	
PennDOT D3 Field Devices	X											X														X																				
PennDOT D3 Maintenance and Construction Vehicles																								X																						
PennDOT D3 TMC	X	X			X	X			X			X	X			X					X	X	X	X			X	X	X			X	X		X		X			X	X				X	
PennDOT D4 TMC																							X				X	X																		
PennDOT STMC					X		X		X											X	X	X	X			X	X	X					X							X						
PennDOT Welcome Centers and Rest Areas																										X																				
Pennsylvania Office of Homeland Security																				X																										
Personal Traveler Information Devices												X																																		

	911 Communication Centers	Adjacent PennDOT District and County Offices	Adjacent State Emergency Management Offices	Adjacent State Public Safety Offices	Adjacent State Transportation Offices	Attractions and Event Promoters	Commercial Vehicle Company Offices	Commercial Vehicles	County EMA Centers	County/Regional Planning Organizations	High Threat Facilities	Incident Response Agency Offices	Information Service Providers	Local School District Offices	Local School District Transit Vehicles	Municipal Field Devices	Municipal Traffic Management Offices	Municipal/Regional Public Safety Offices	Municipal/Regional Public Safety Vehicles	PEMA Emergency Operation Center	PennDOT Central Office Field Devices	PennDOT Central Office Organizations	PennDOT D2 TMC	PennDOT D3 County Maintenance Offices	PennDOT D3 Field Devices	PennDOT D3 Maintenance and Construction Vehicles	PennDOT D3 TMC	PennDOT D4 TMC	PennDOT STMC	PennDOT Welcome Centers and Rest Areas	Pennsylvania Office of Homeland Security	Personal Traveler Information Devices	Private Utility Company Offices	PSP Offices	PSP Vehicles	Railroad Offices	Regional Airport Offices	Regional Media Outlets	Regional Transit Agency Offices	Regional Transit Vehicles	Towing Industry Responders	Weather Information Providers
Private Utility Company Offices																									X															X		
PSP Offices	X		X	X	X	X	X	X	X			X					X				X		X			X		X										X	X		X	X
PSP Vehicles																												X														
Railroad Offices	X									X															X																	
Regional Airport Offices	X									X																													X			
Regional Media Outlets	X							X				X				X					X		X					X										X				
Regional Transit Agency Offices	X				X			X	X			X				X					X		X					X	X		X	X	X				X		X			X
Regional Transit Vehicles																																						X				
Towing Industry Responders	X																																	X								
Weather Information Providers	X							X				X				X							X		X									X				X				



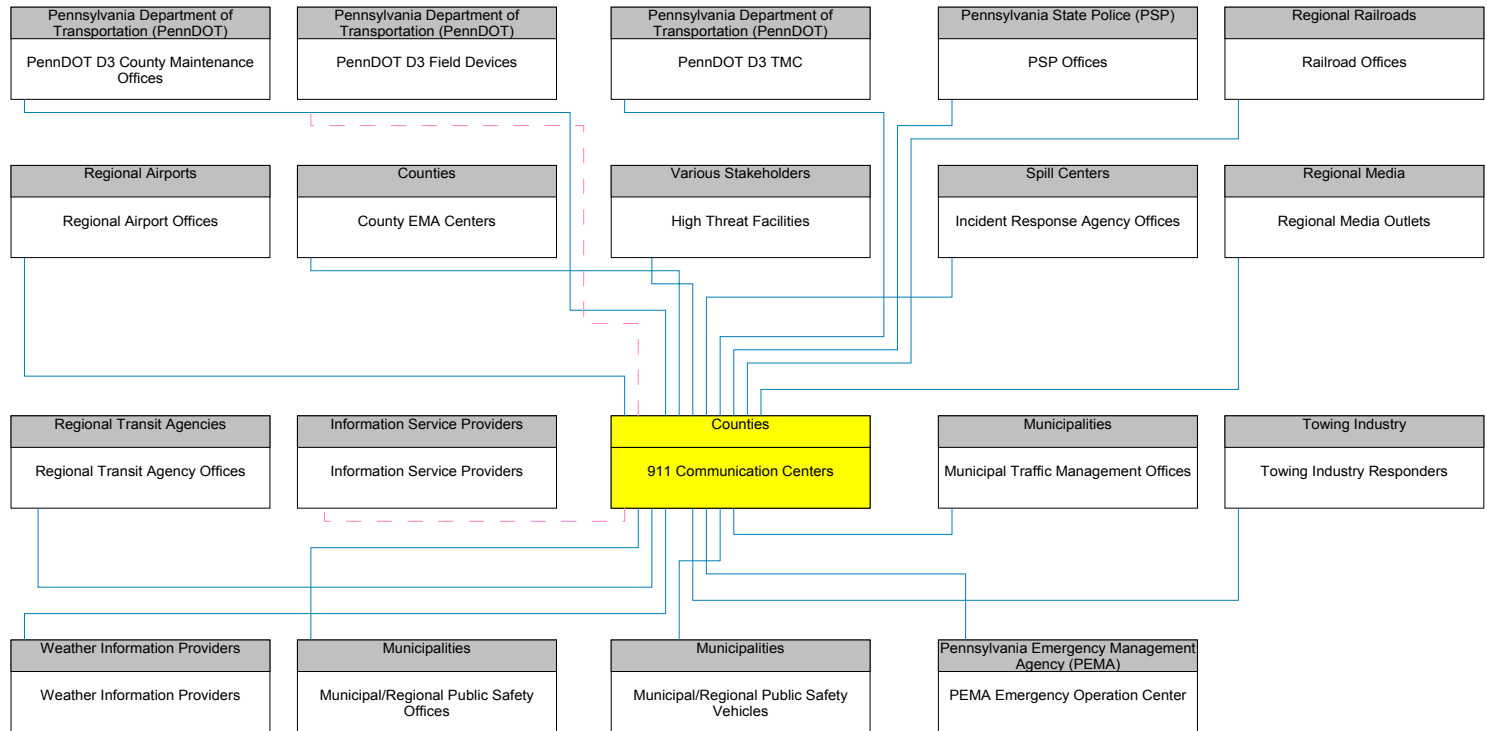
#### **4.4 ITS Architecture**

This section documents the “information flow” between the elements. The information flows describe what data or information is passing between one operation and another operation. The section is primarily documented as Turbo software outputs.

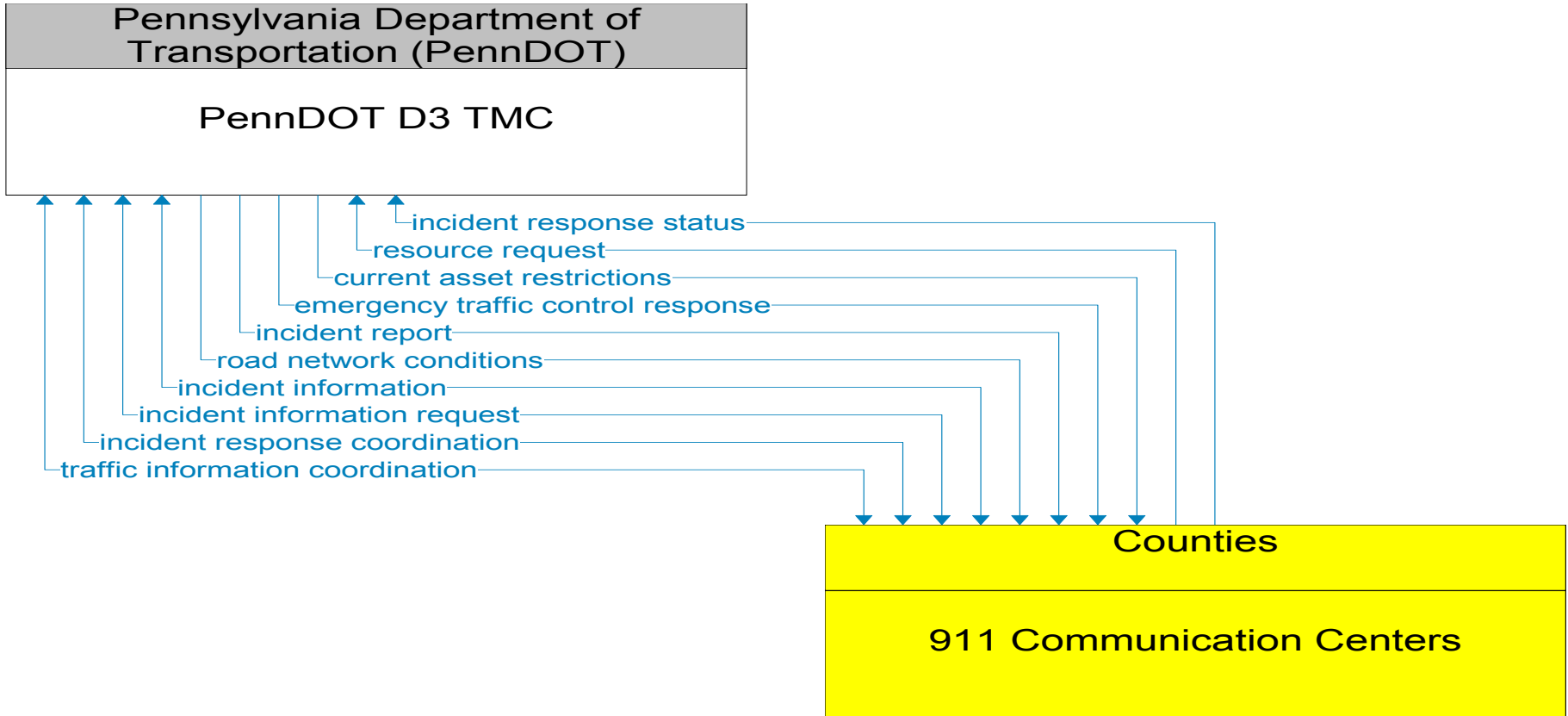
# 911 Communication Centers



# 911 Communication Centers Interconnect Diagram



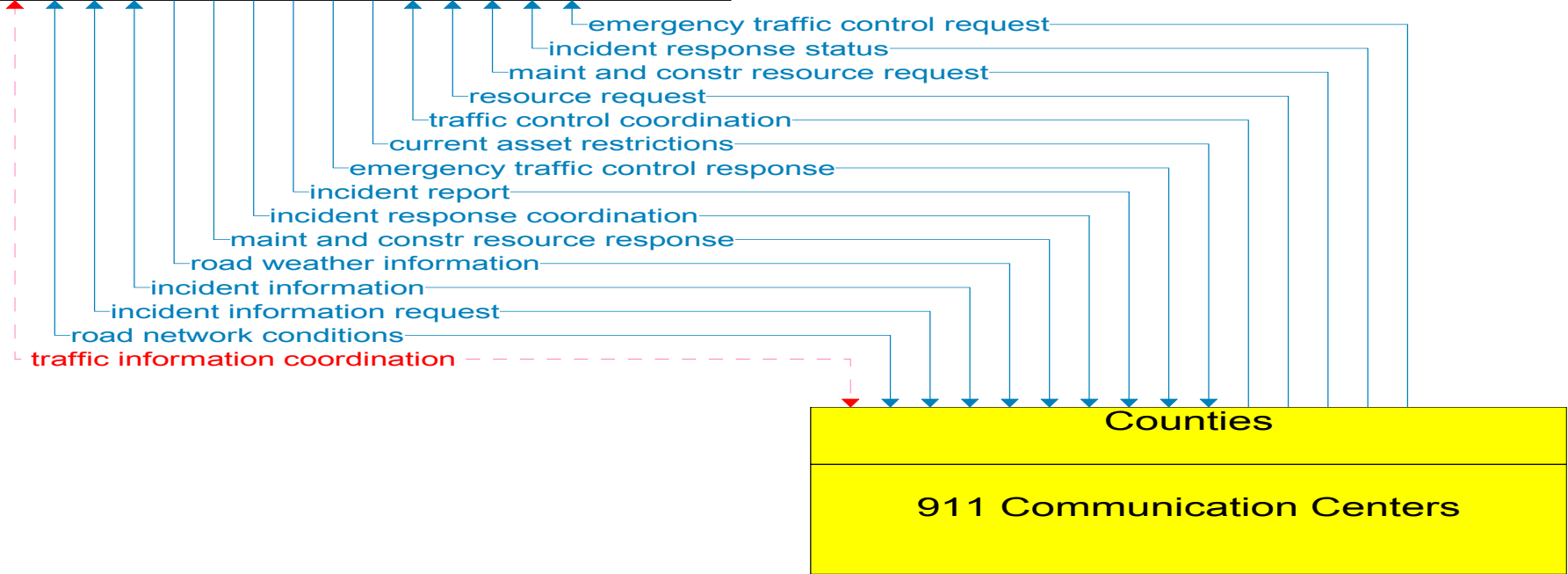
— Existing  
- - - Planned

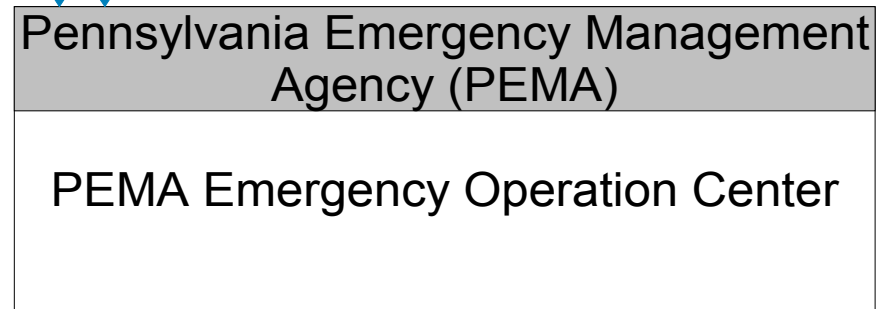
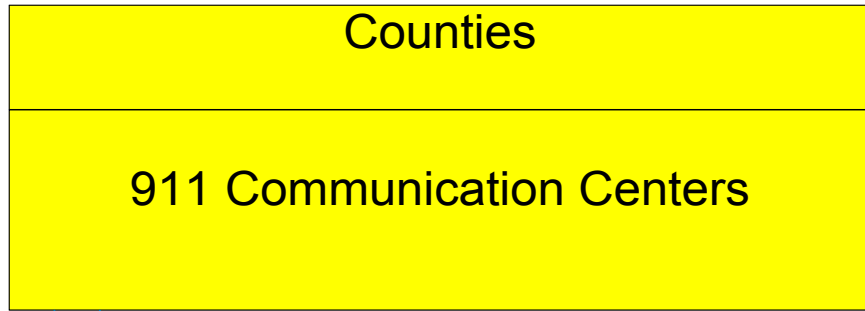


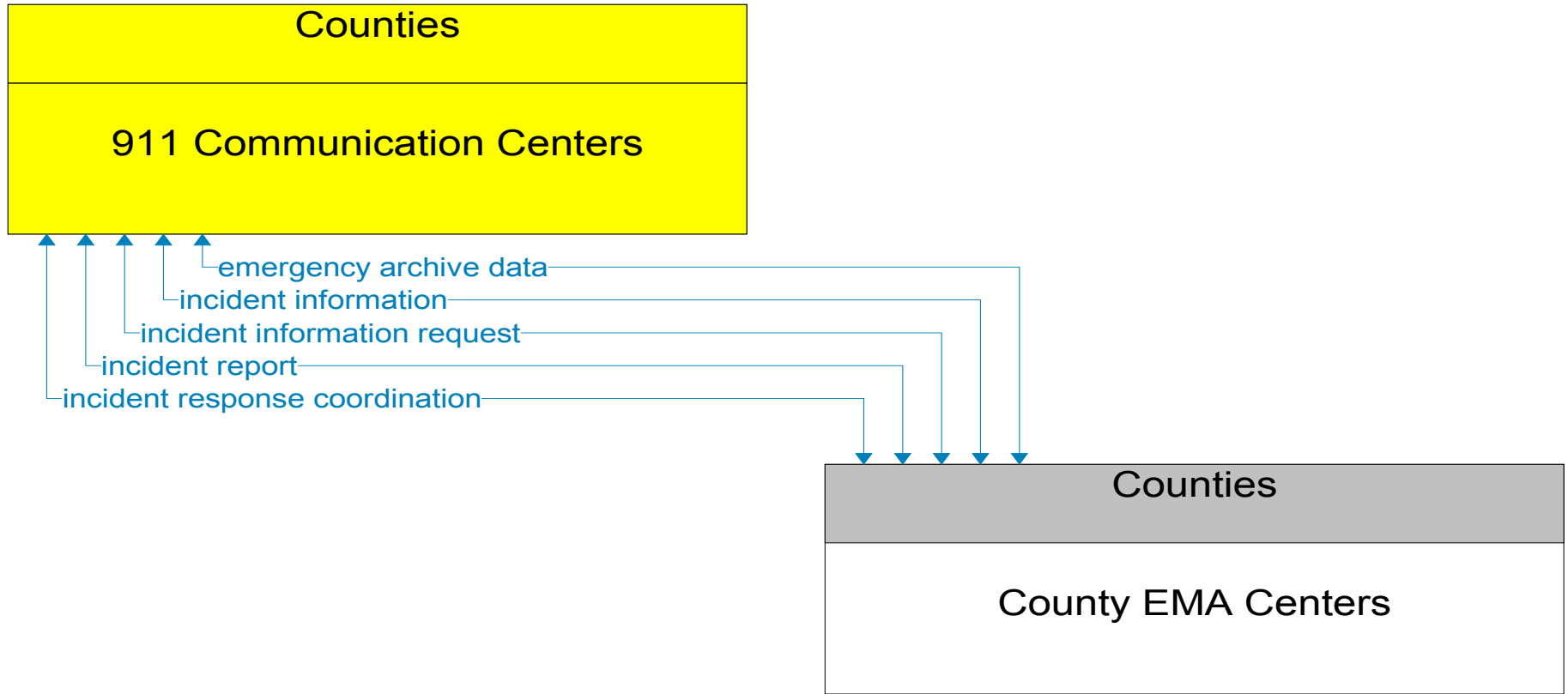
———— Existing  
- - - - - Planned

**Pennsylvania Department of Transportation (PennDOT)**

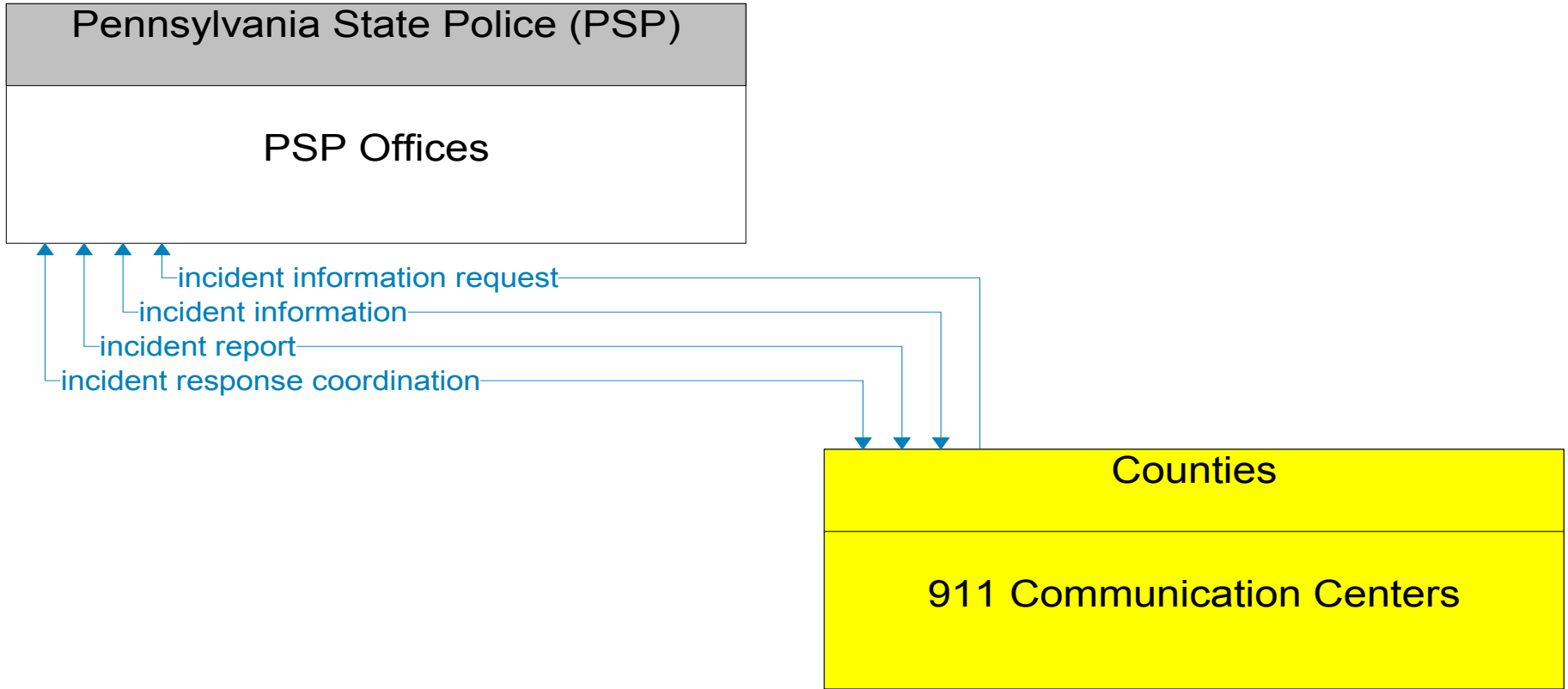
**PennDOT D3 County Maintenance Offices**





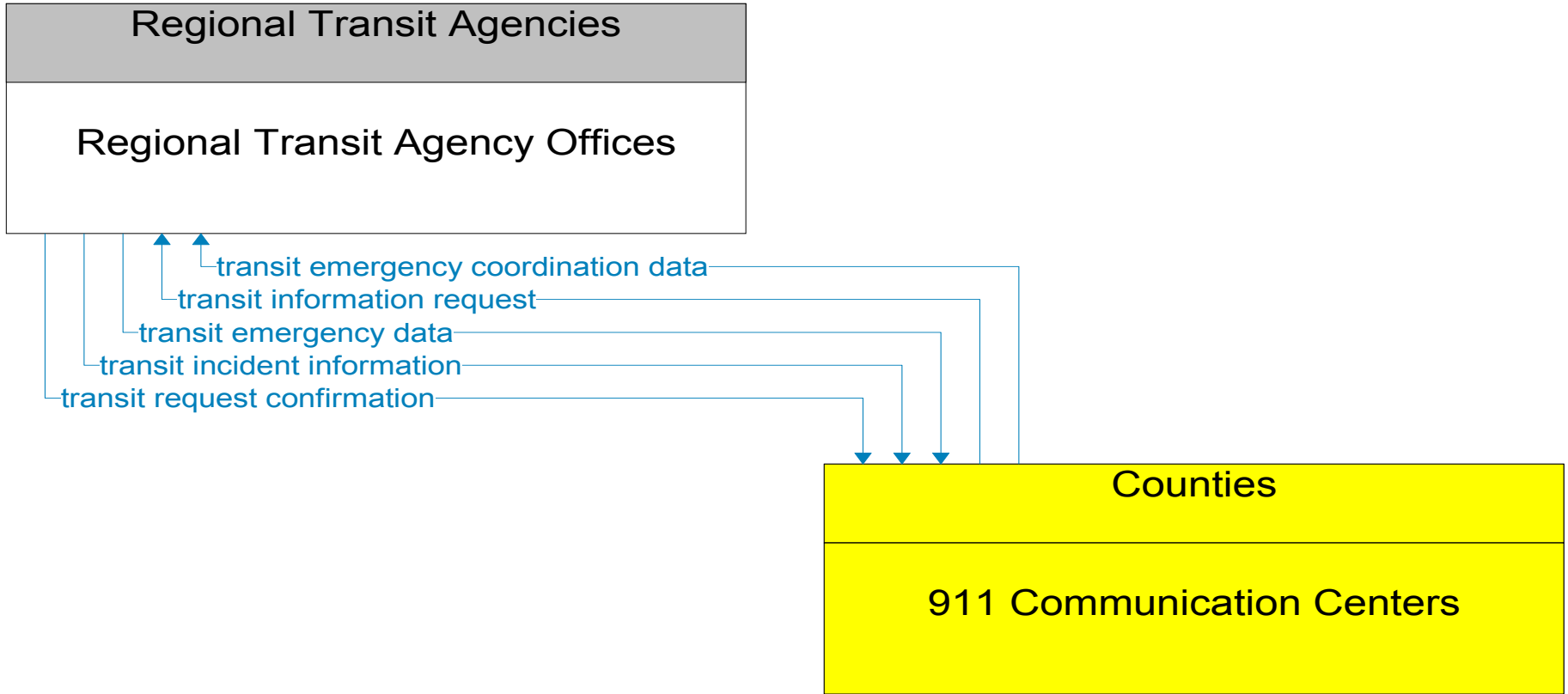


———— Existing  
- - - - - Planned

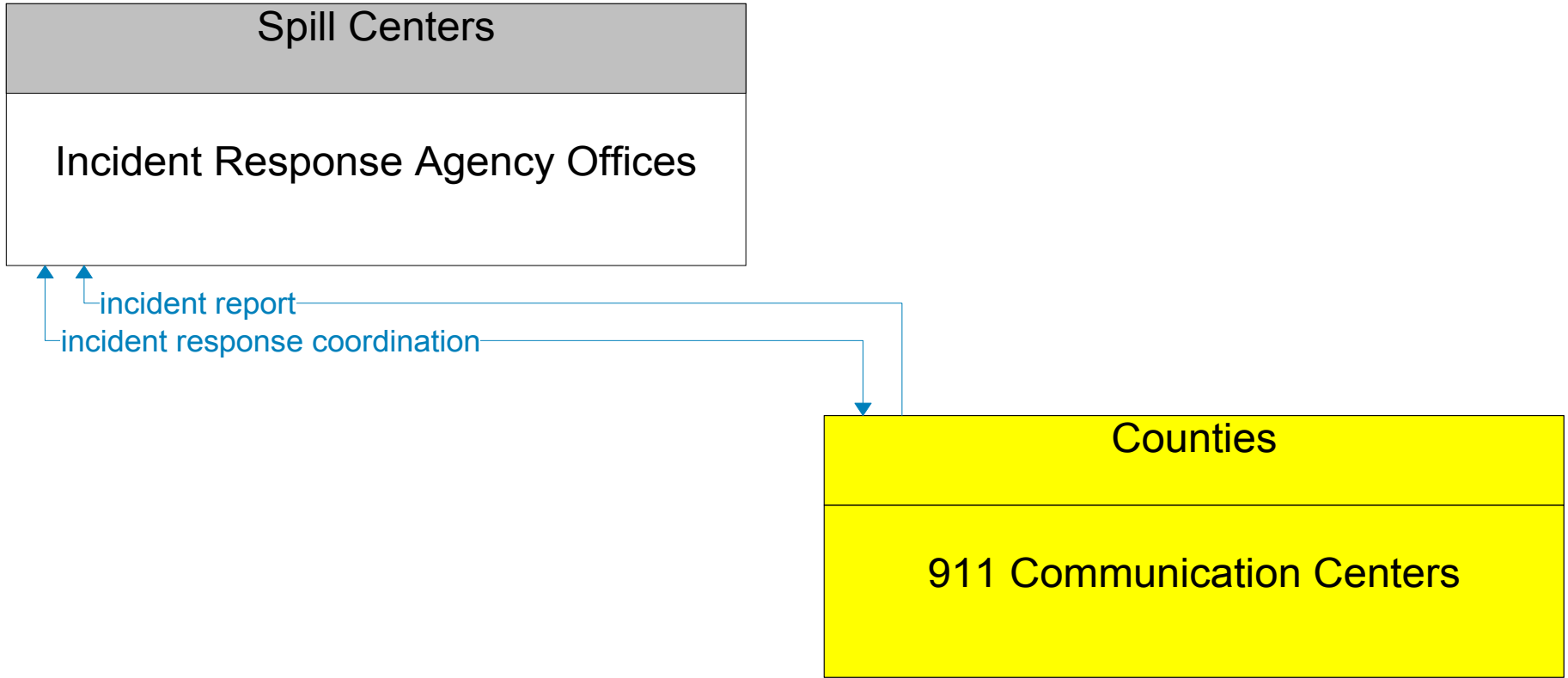


———— Existing  
----- Planned

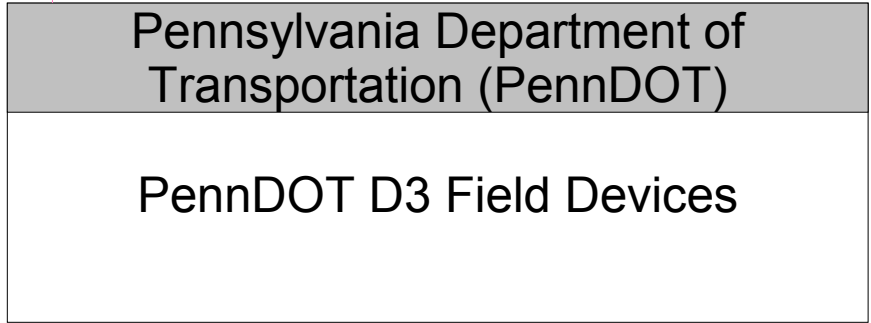
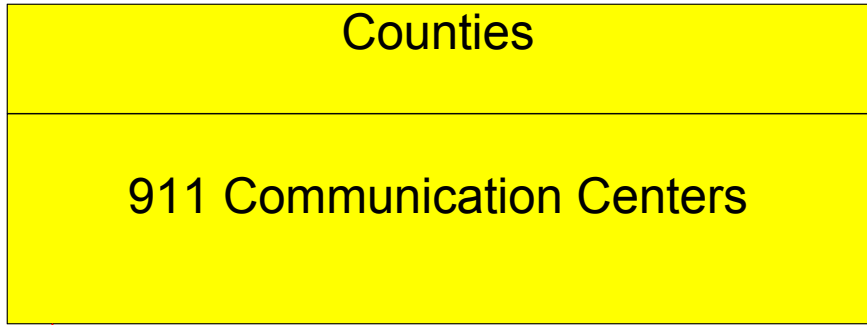


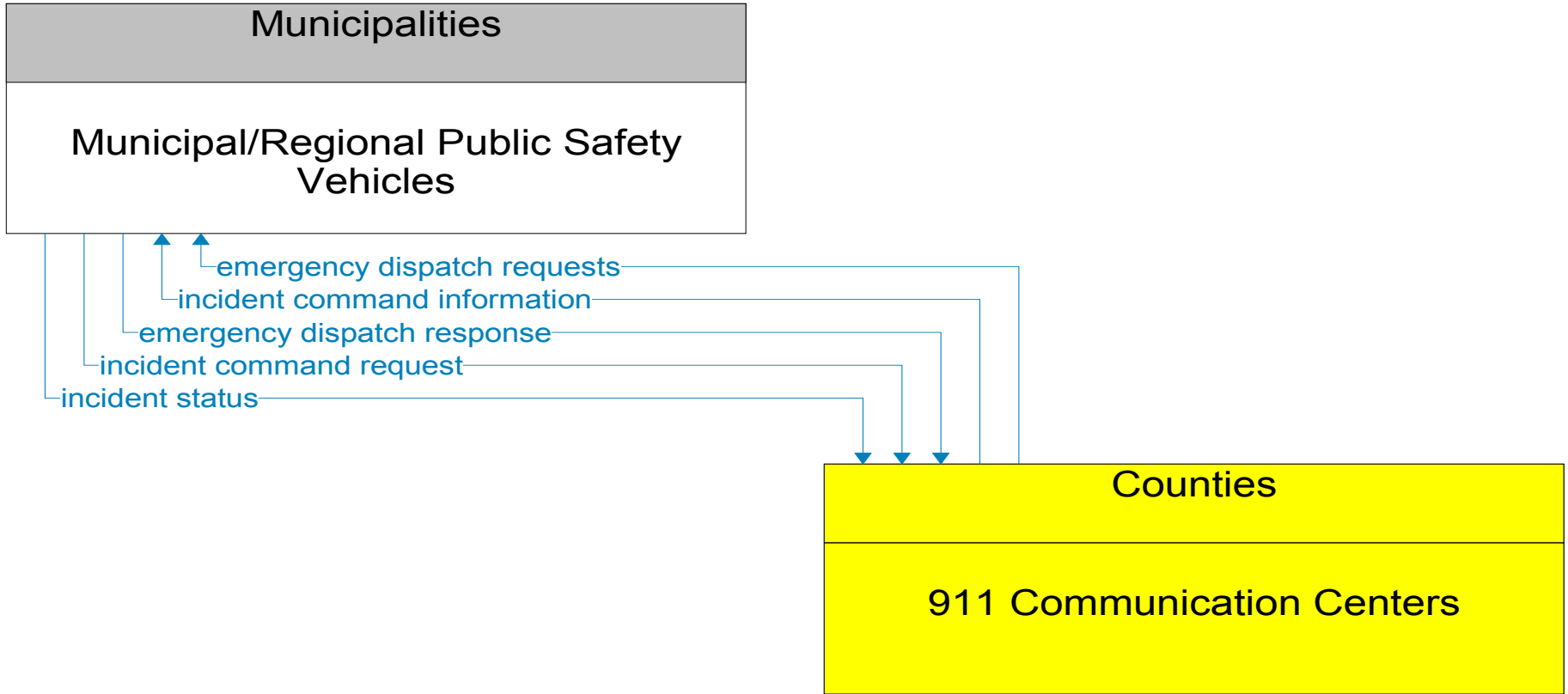


———— Existing  
- - - - - Planned

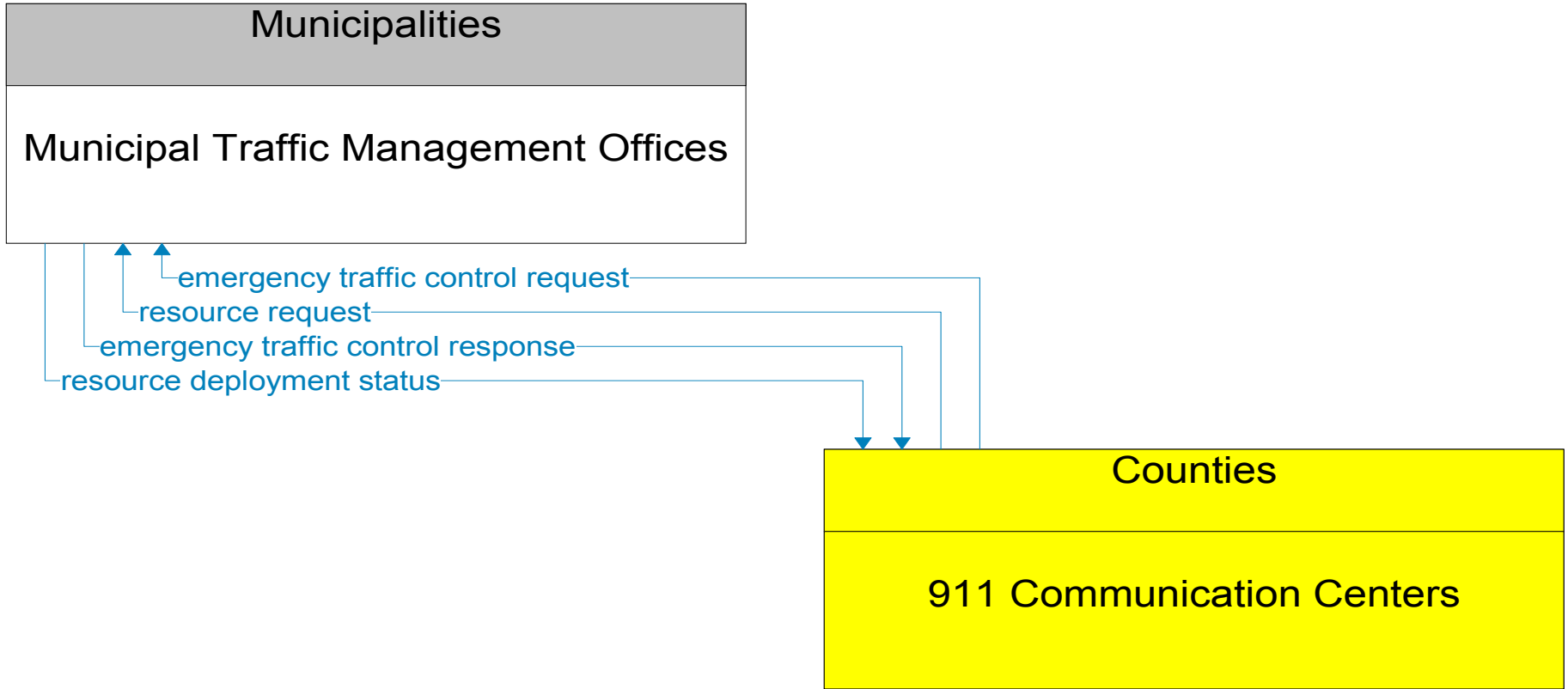


———— Existing  
- - - - - Planned

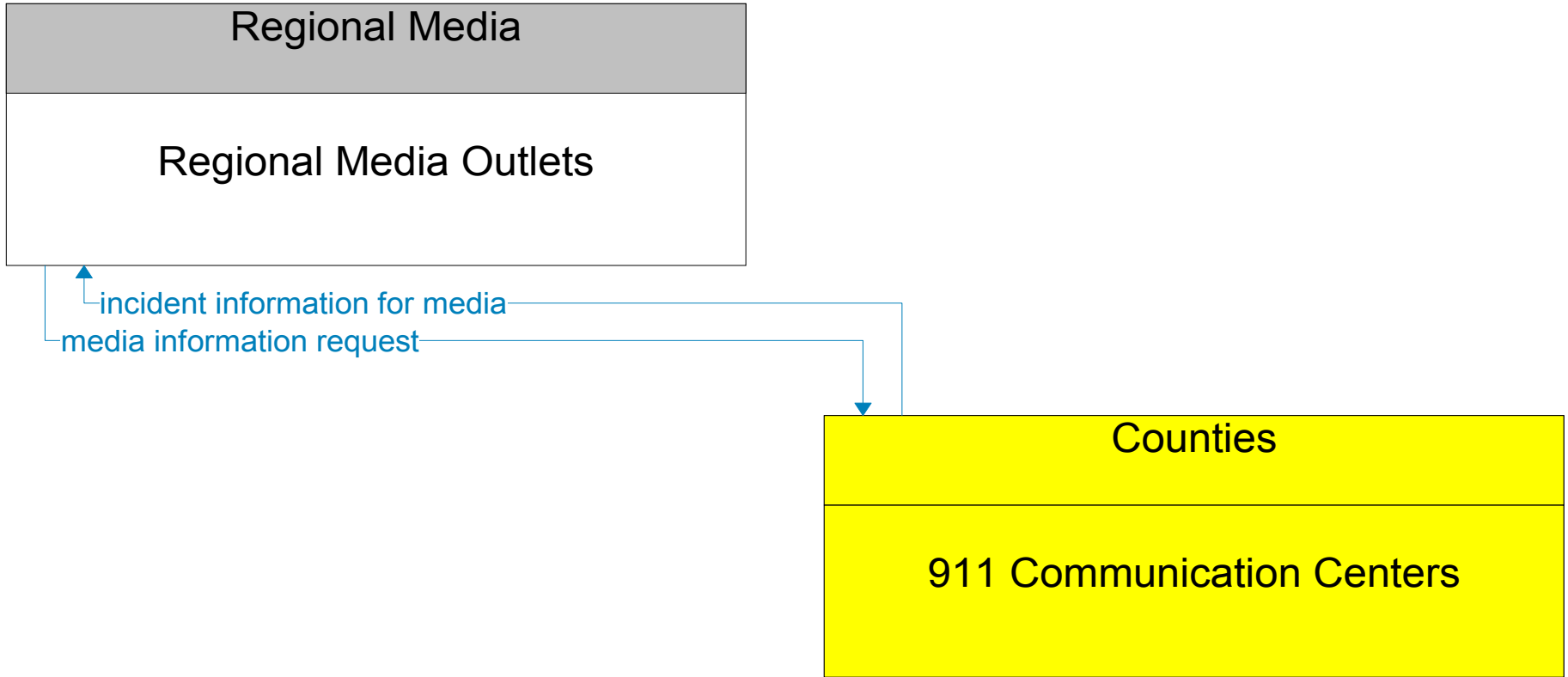




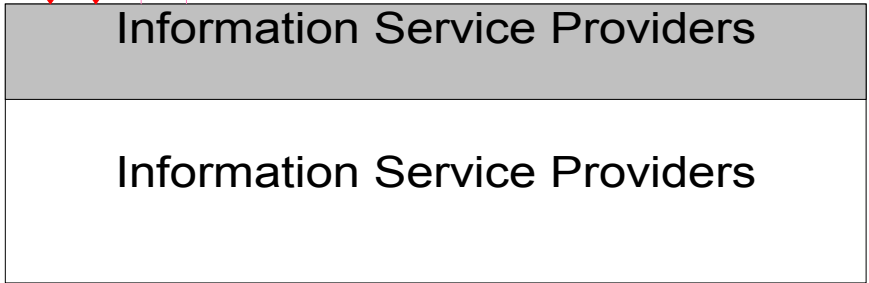
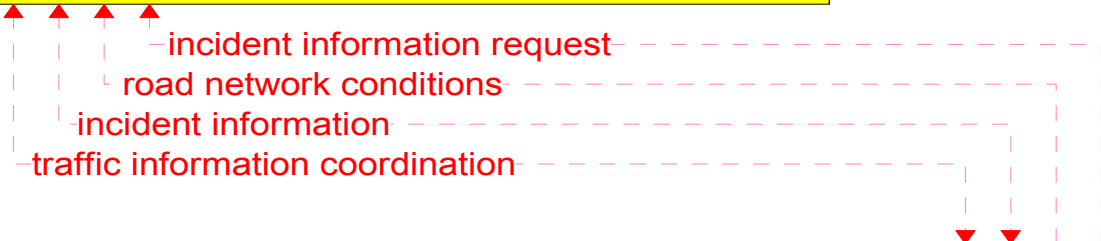
———— Existing  
----- Planned



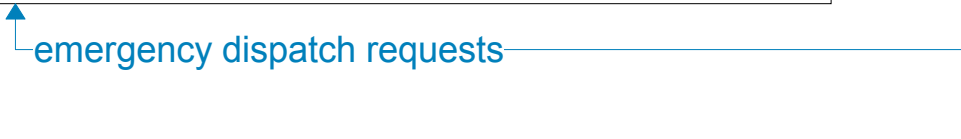
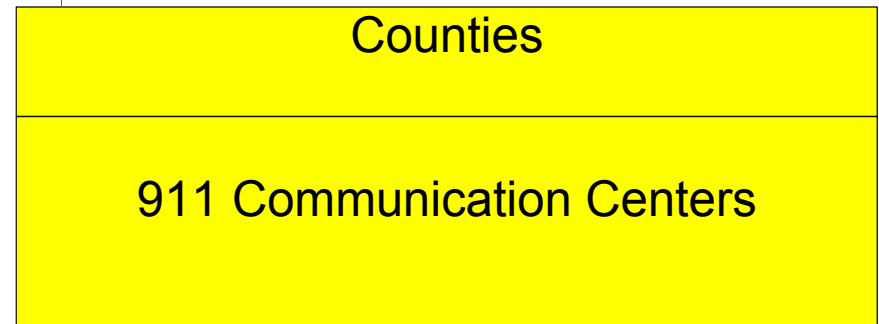
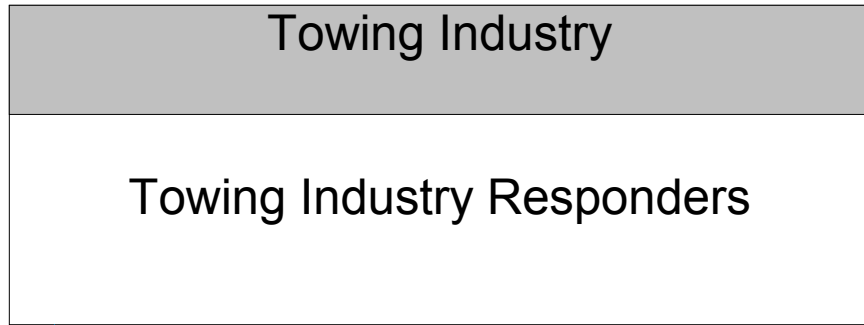
———— Existing  
----- Planned



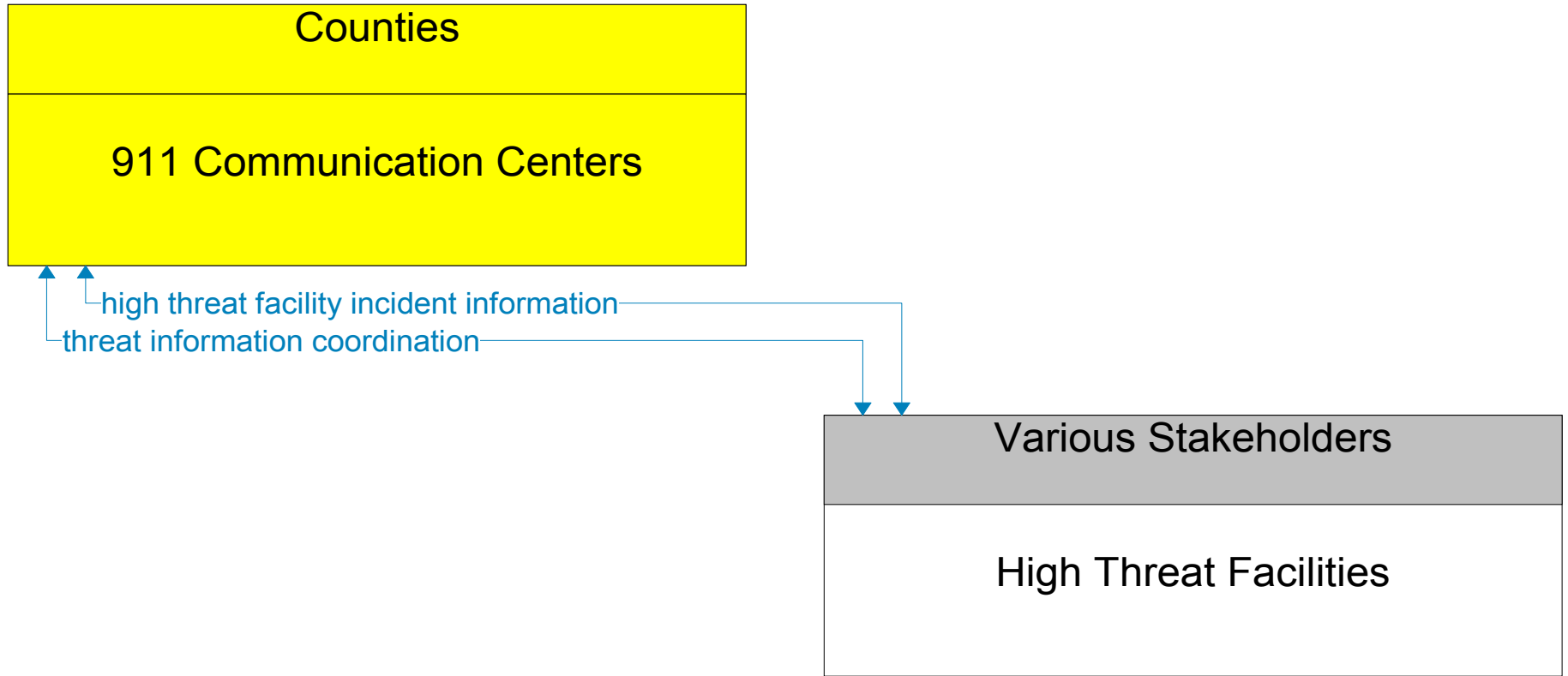
———— Existing  
- - - - - Planned

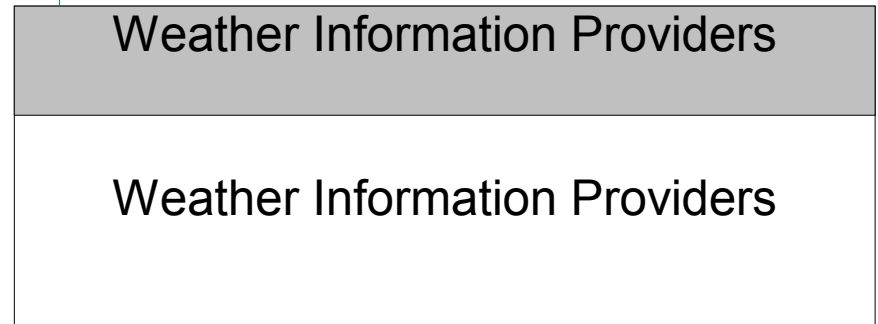
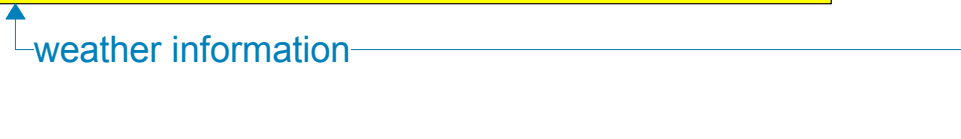
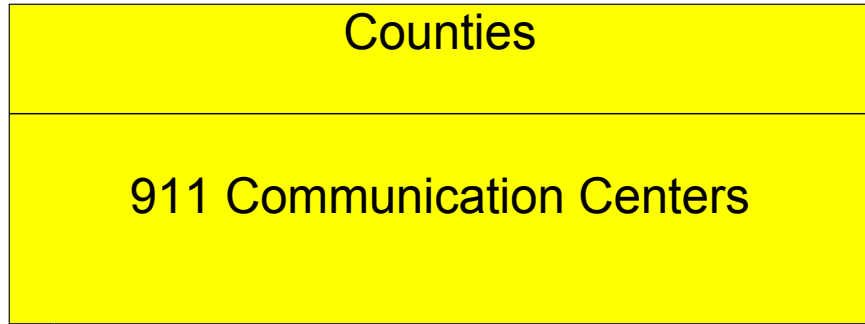


———— Existing  
- - - - - Planned

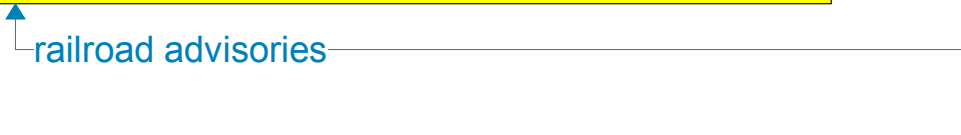
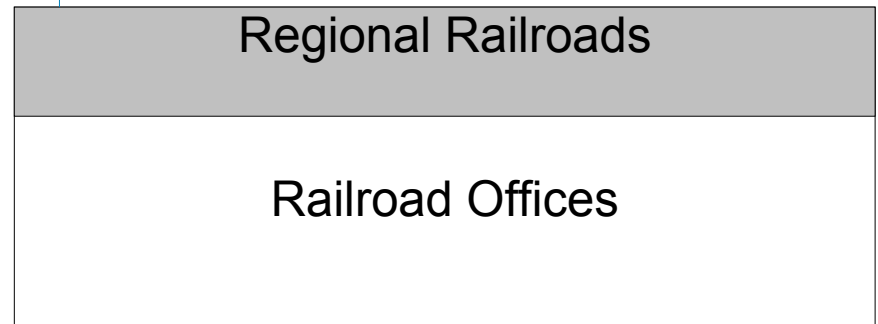
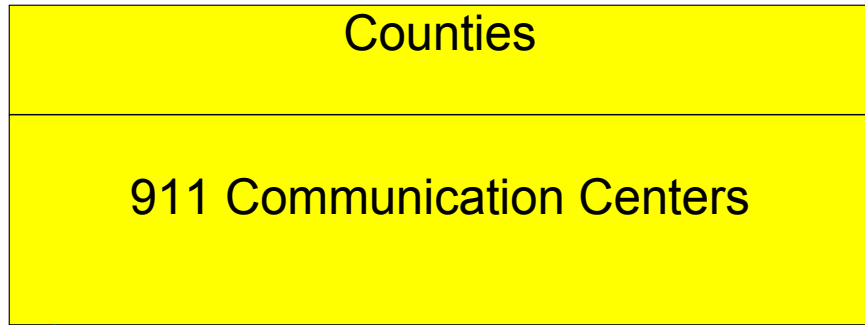


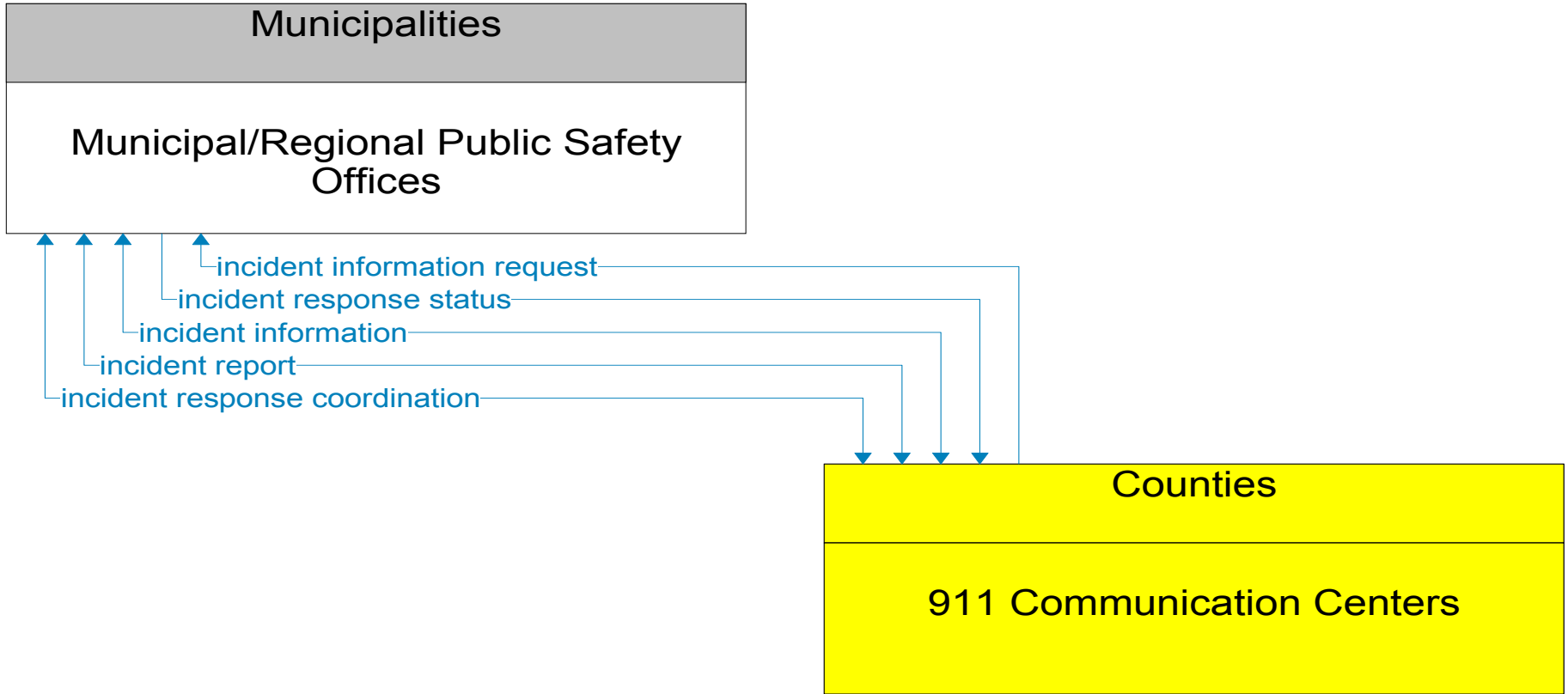




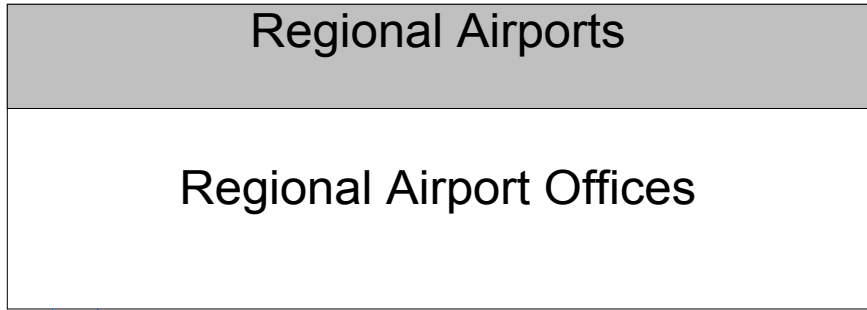


———— Existing  
- - - - - Planned



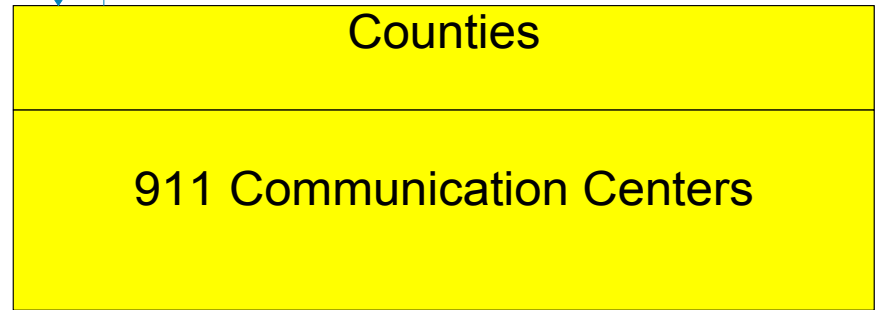


———— Existing  
- - - - - Planned



resource deployment status

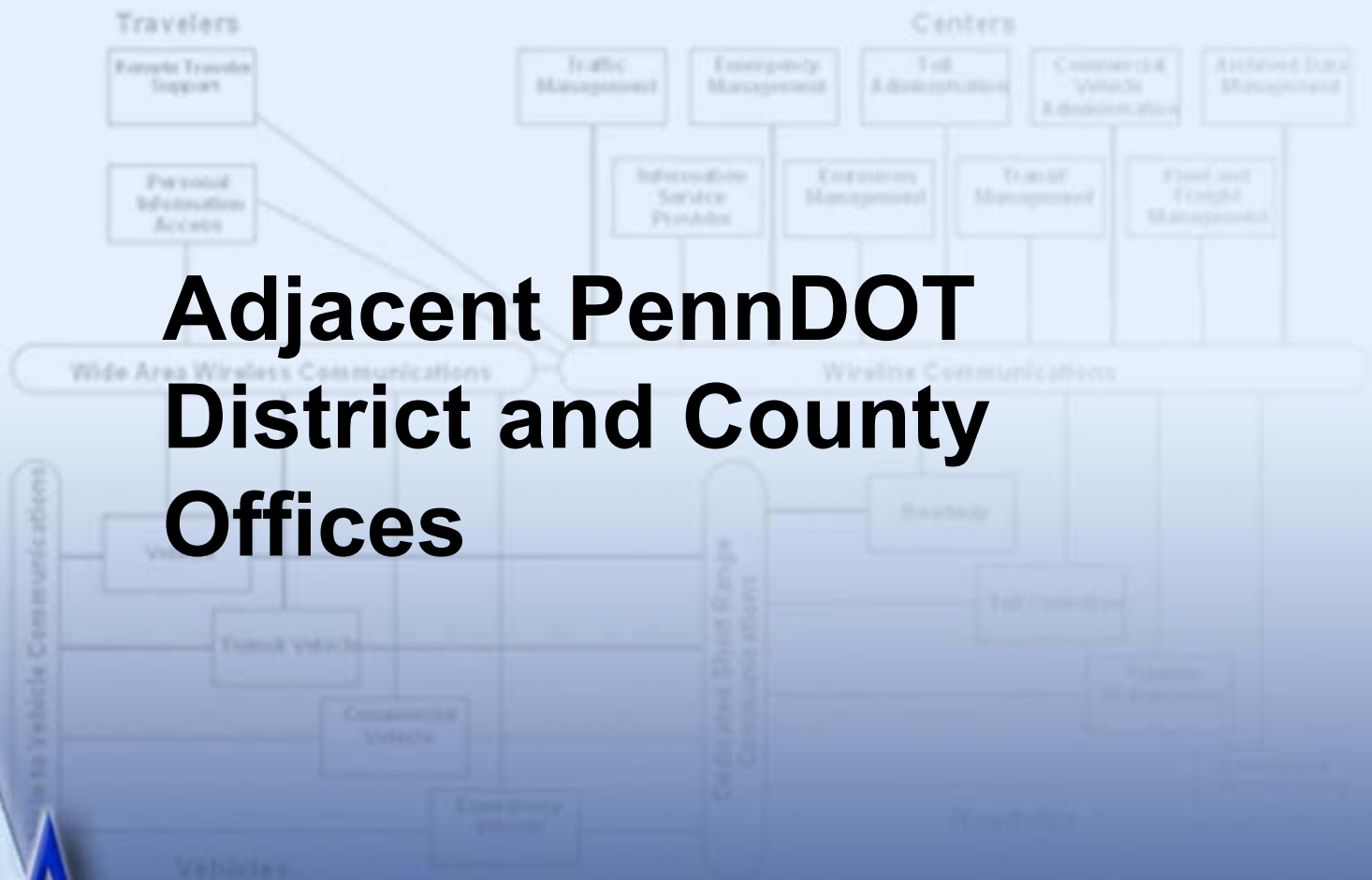
resource request



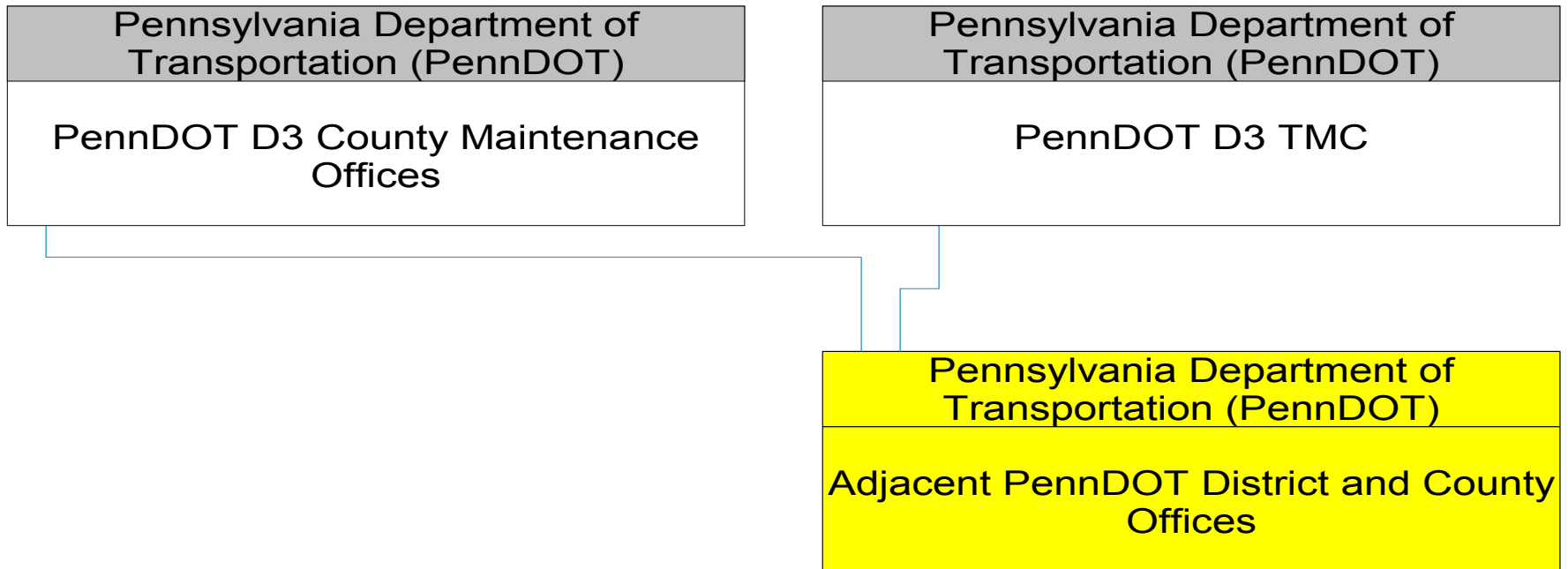
Existing

Planned

# Adjacent PennDOT District and County Offices



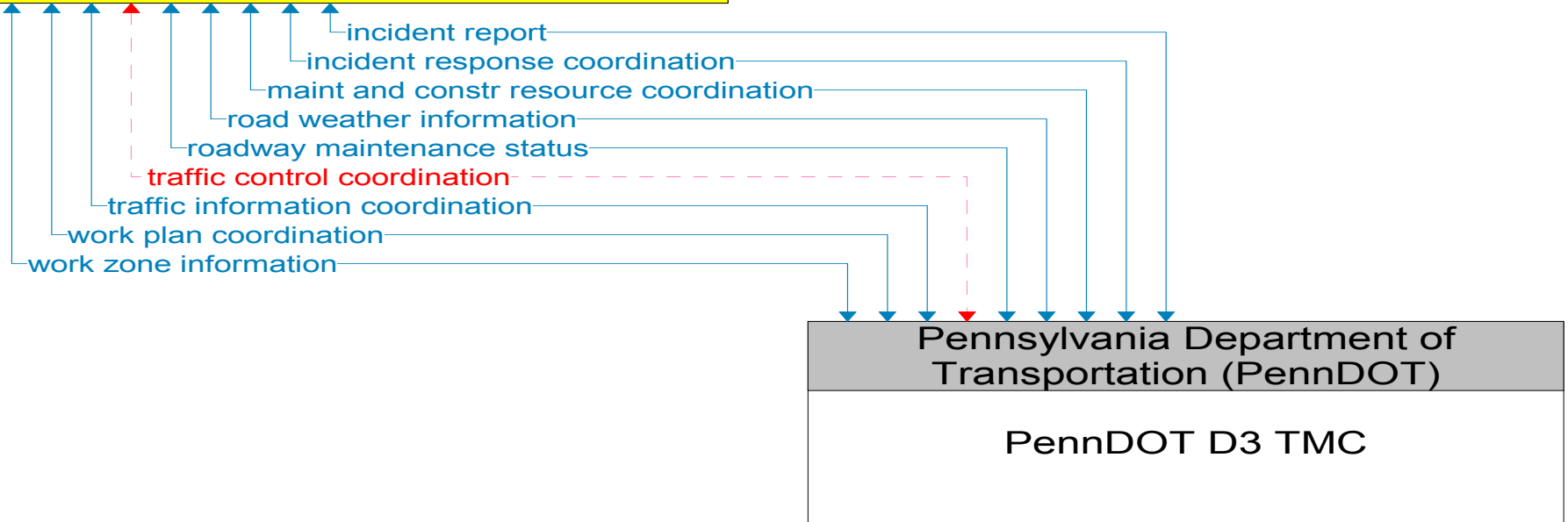
# Adjacent PennDOT District and County Offices Interconnect Diagram



———— Existing  
----- Planned

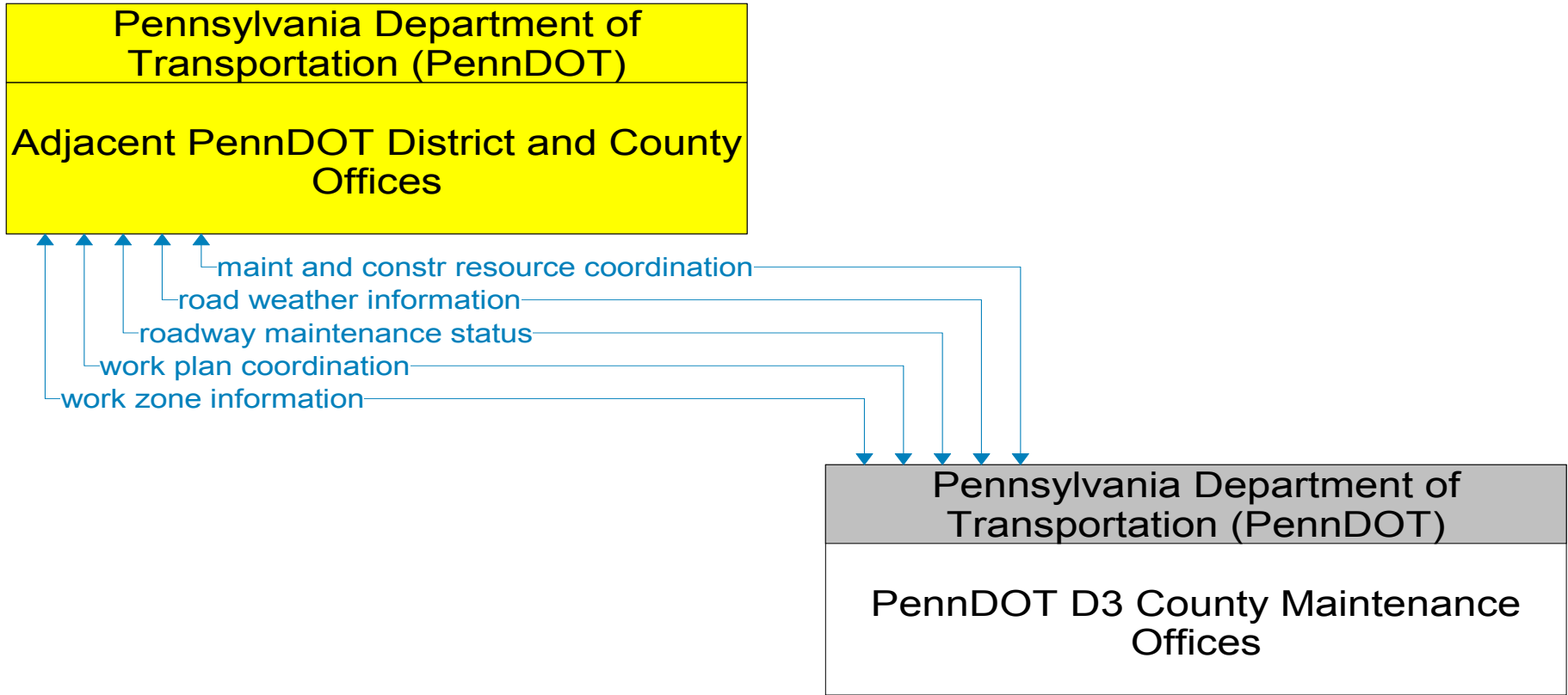
Pennsylvania Department of  
Transportation (PennDOT)

Adjacent PennDOT District and County  
Offices



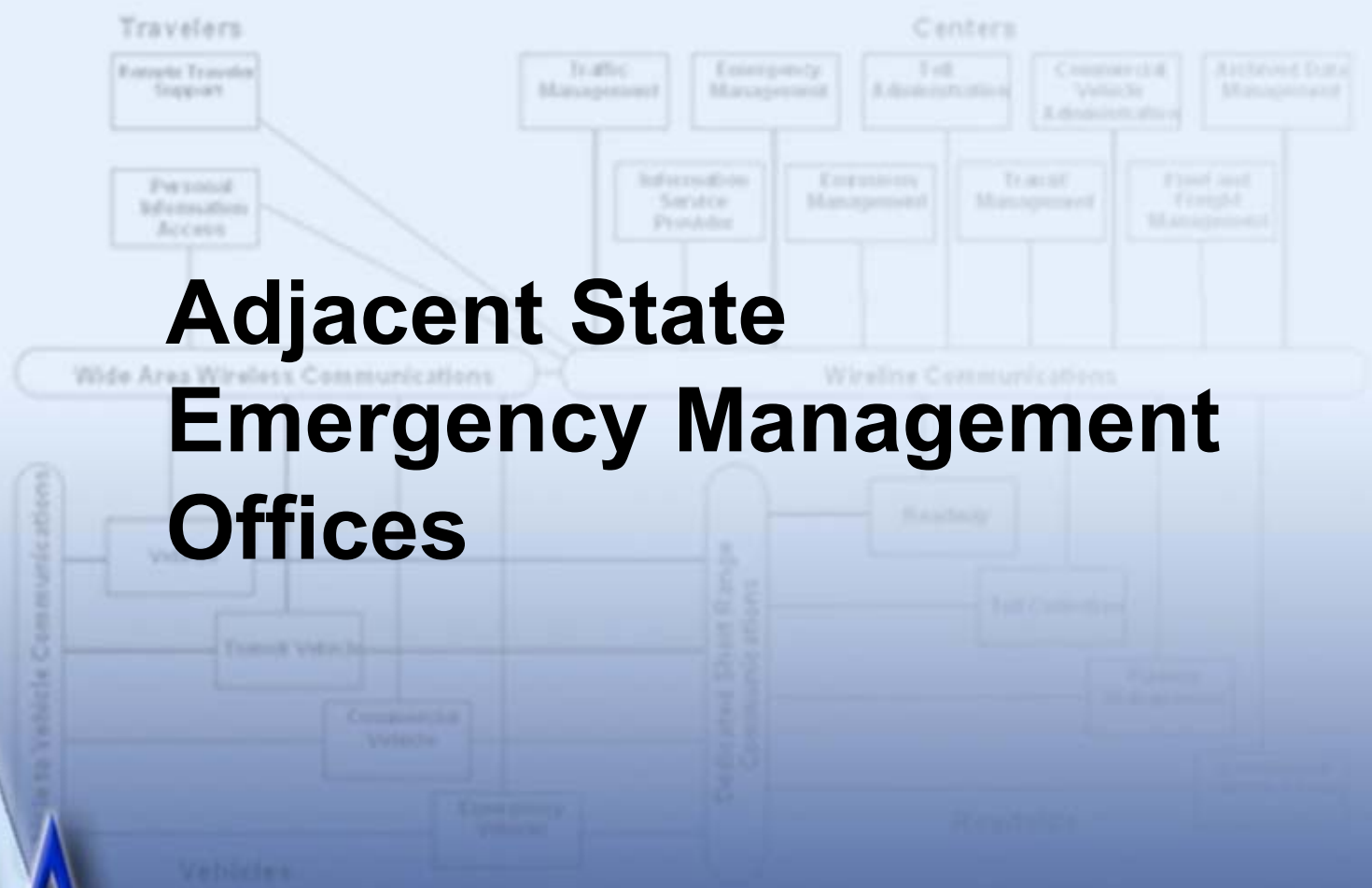
Existing  
Planned



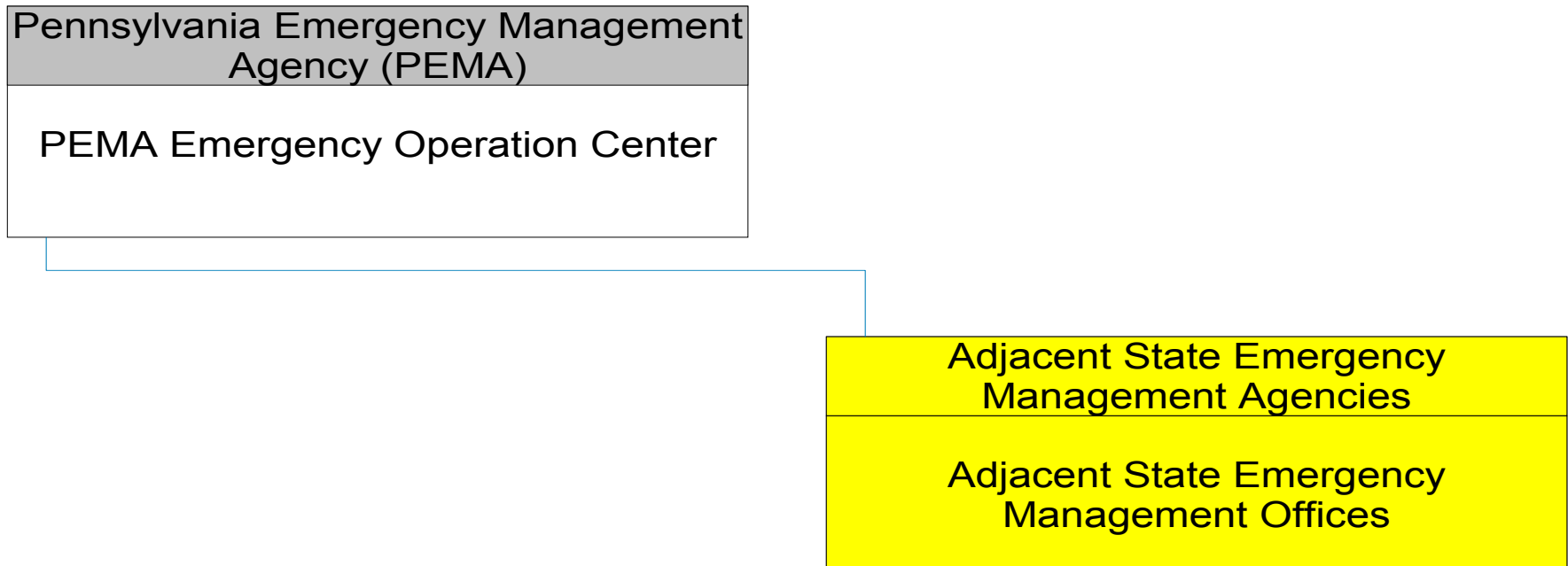


———— Existing  
----- Planned

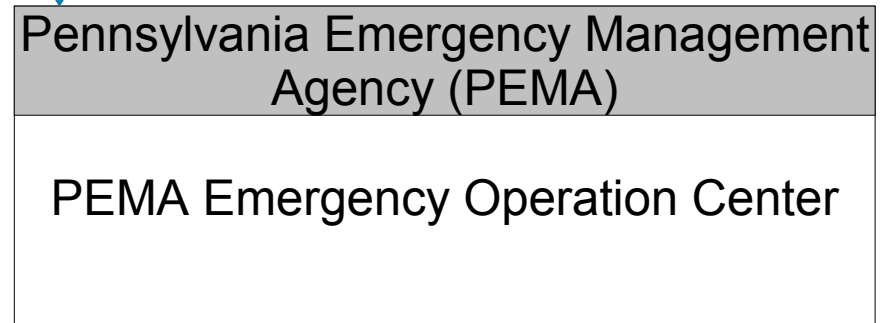
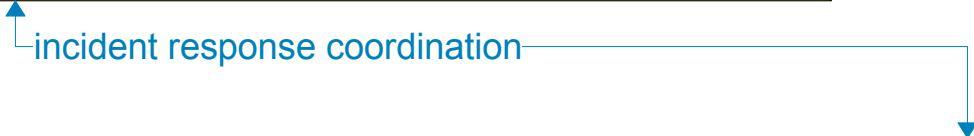
# Adjacent State Emergency Management Offices



# Adjacent State Emergency Management Offices Interconnect Diagram

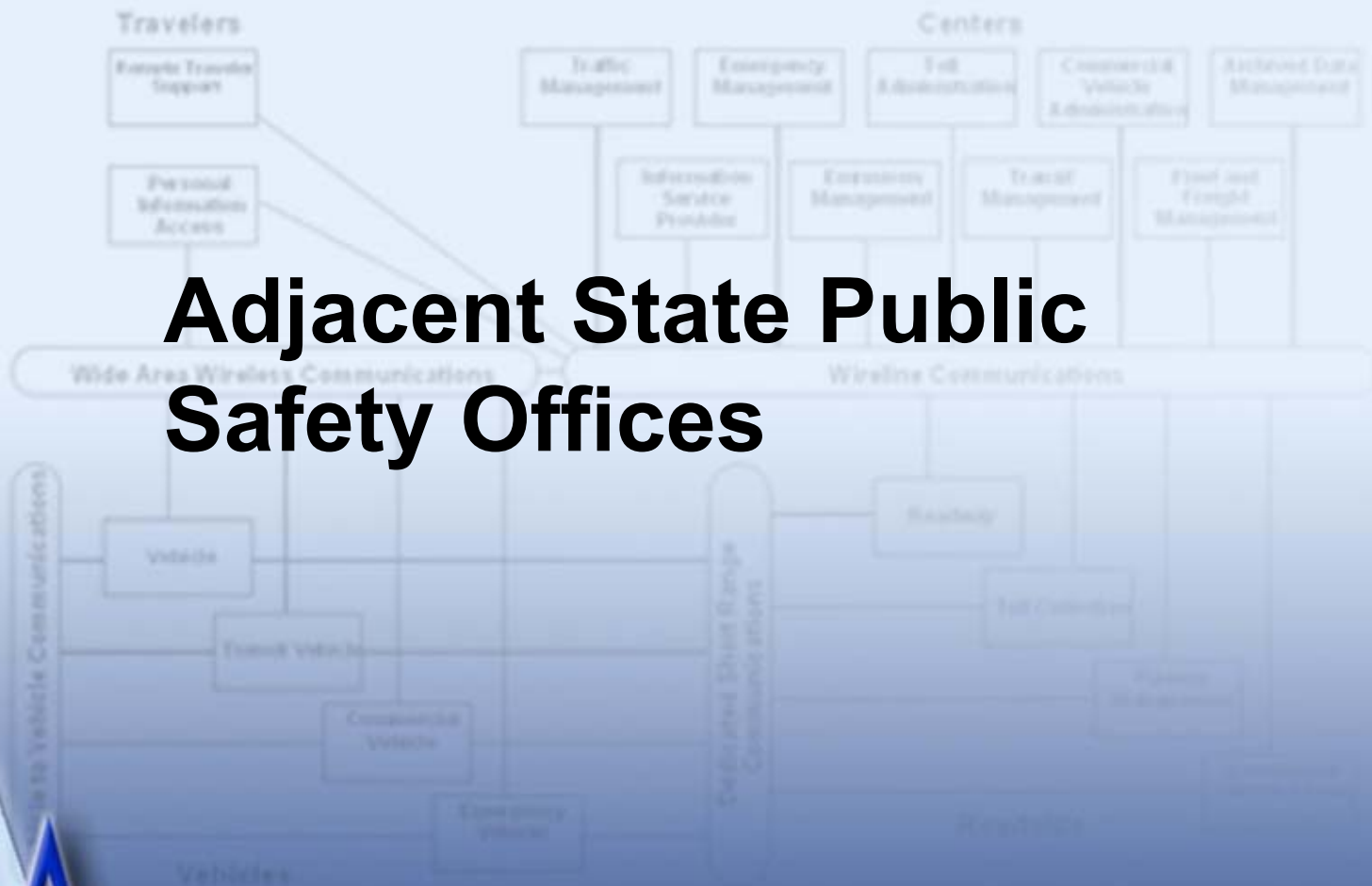


———— Existing  
----- Planned

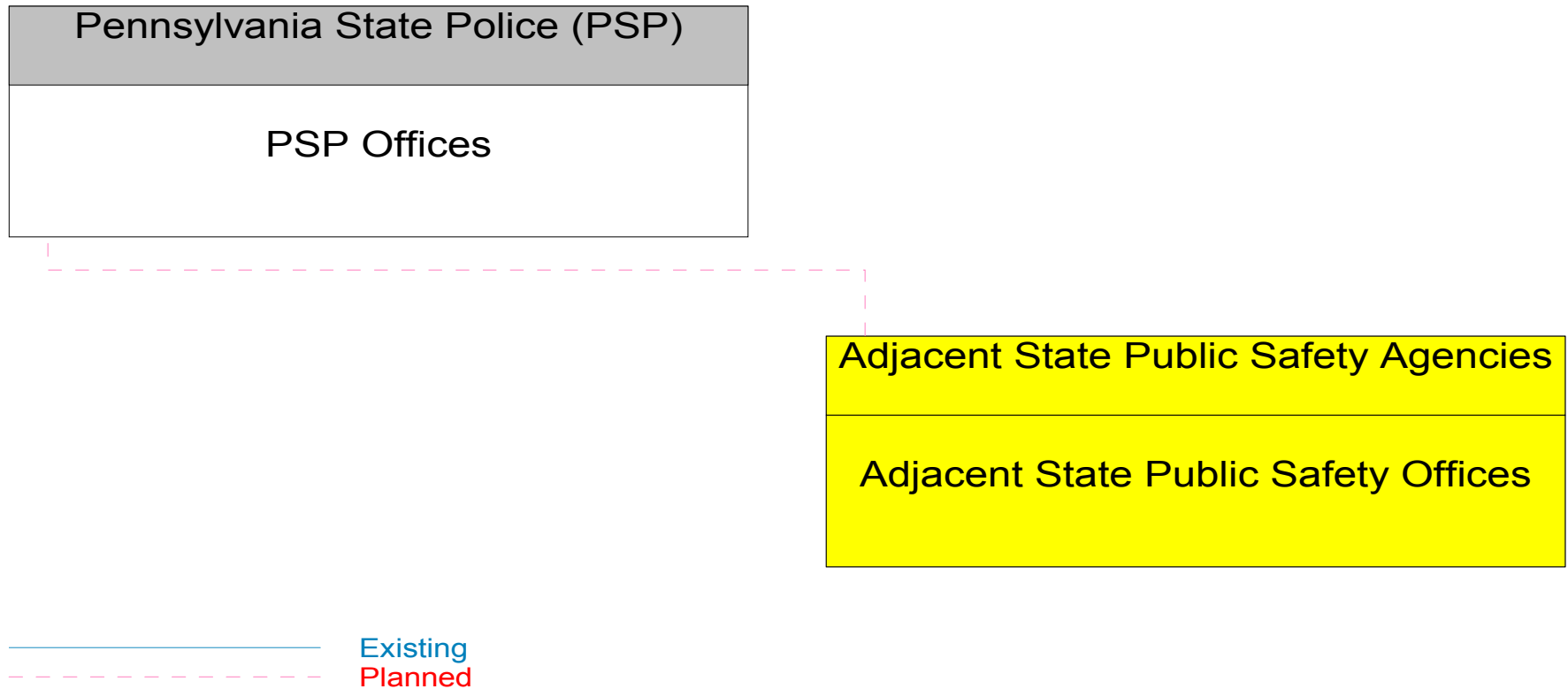


———— Existing  
- - - - - Planned

# Adjacent State Public Safety Offices

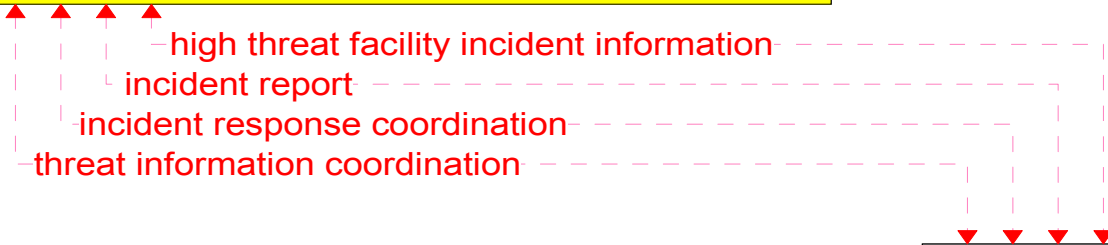


# Adjacent State Public Safety Offices Interconnect Diagram



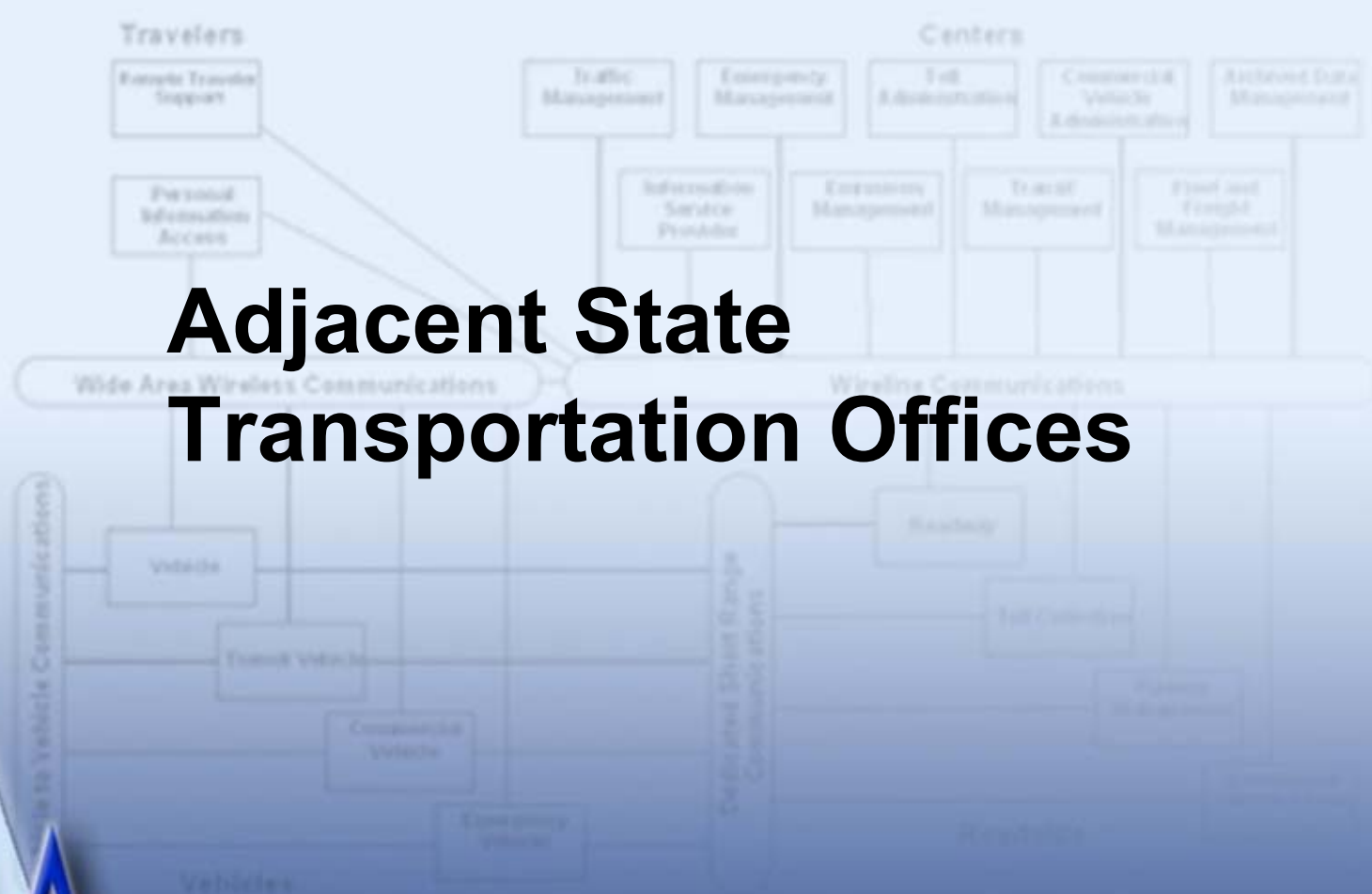
Adjacent State Public Safety Agencies

Adjacent State Public Safety Offices



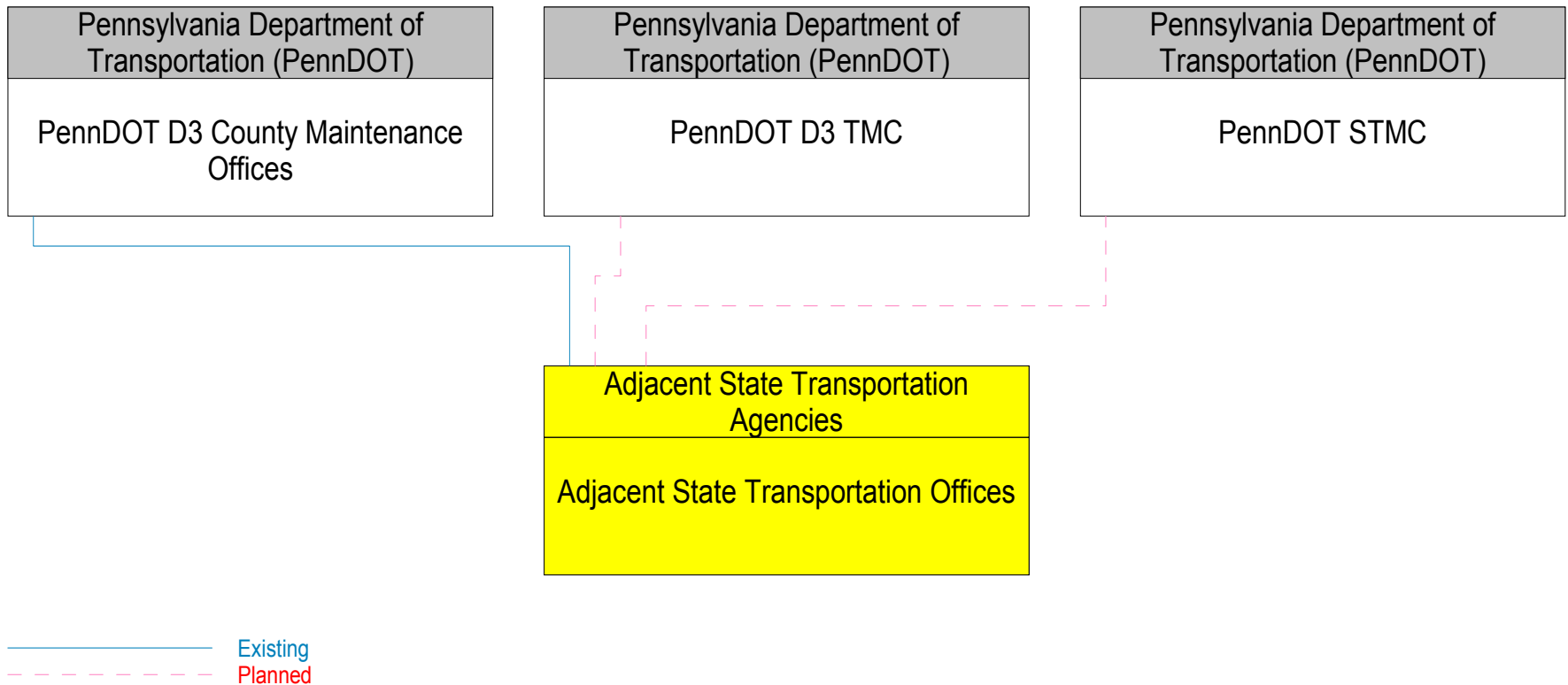
———— Existing  
- - - - - Planned

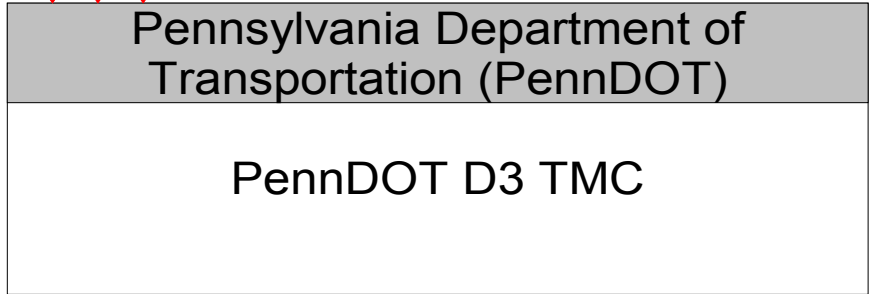
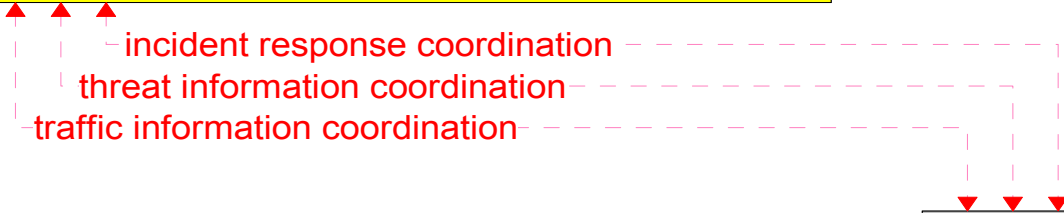
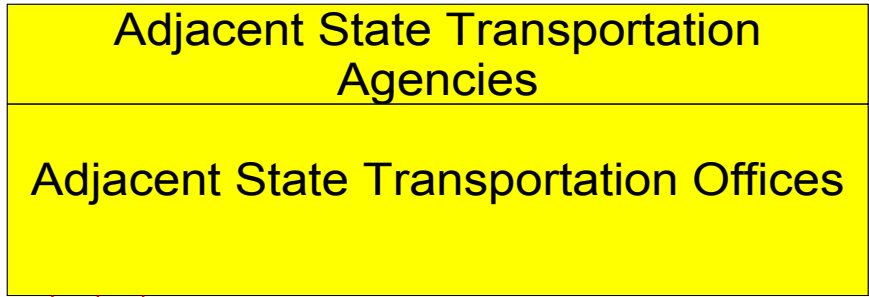
# Adjacent State Transportation Offices



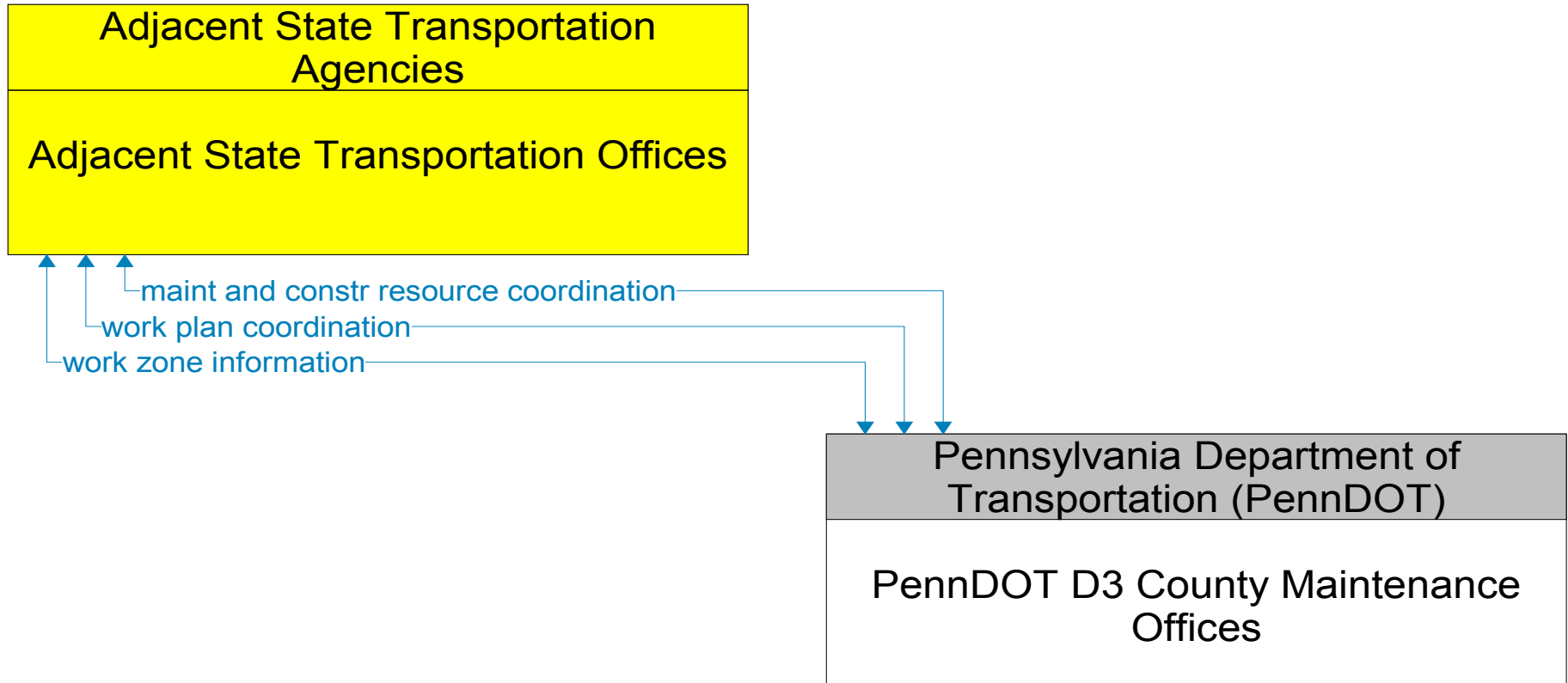


# Adjacent State Transportation Offices Interconnect Diagram

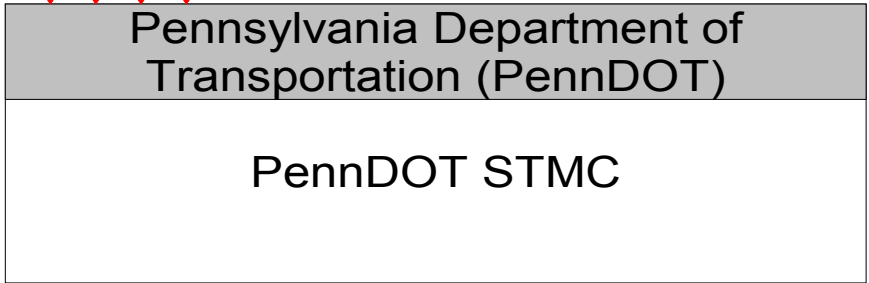
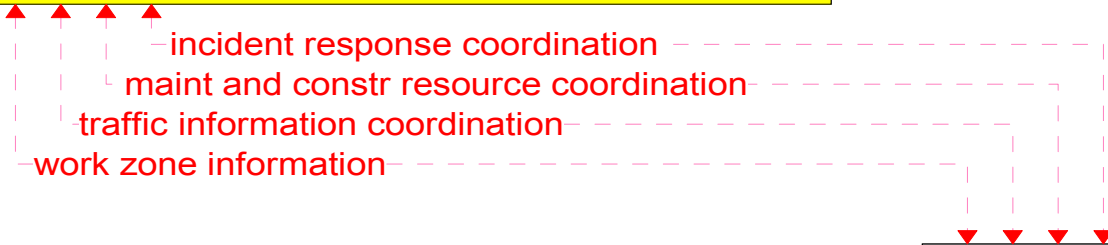
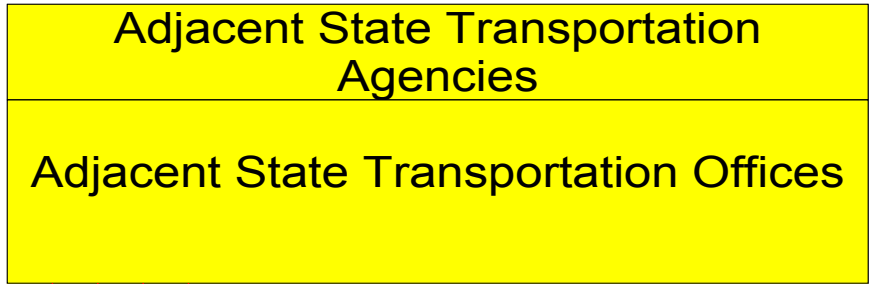




———— Existing  
- - - - - Planned

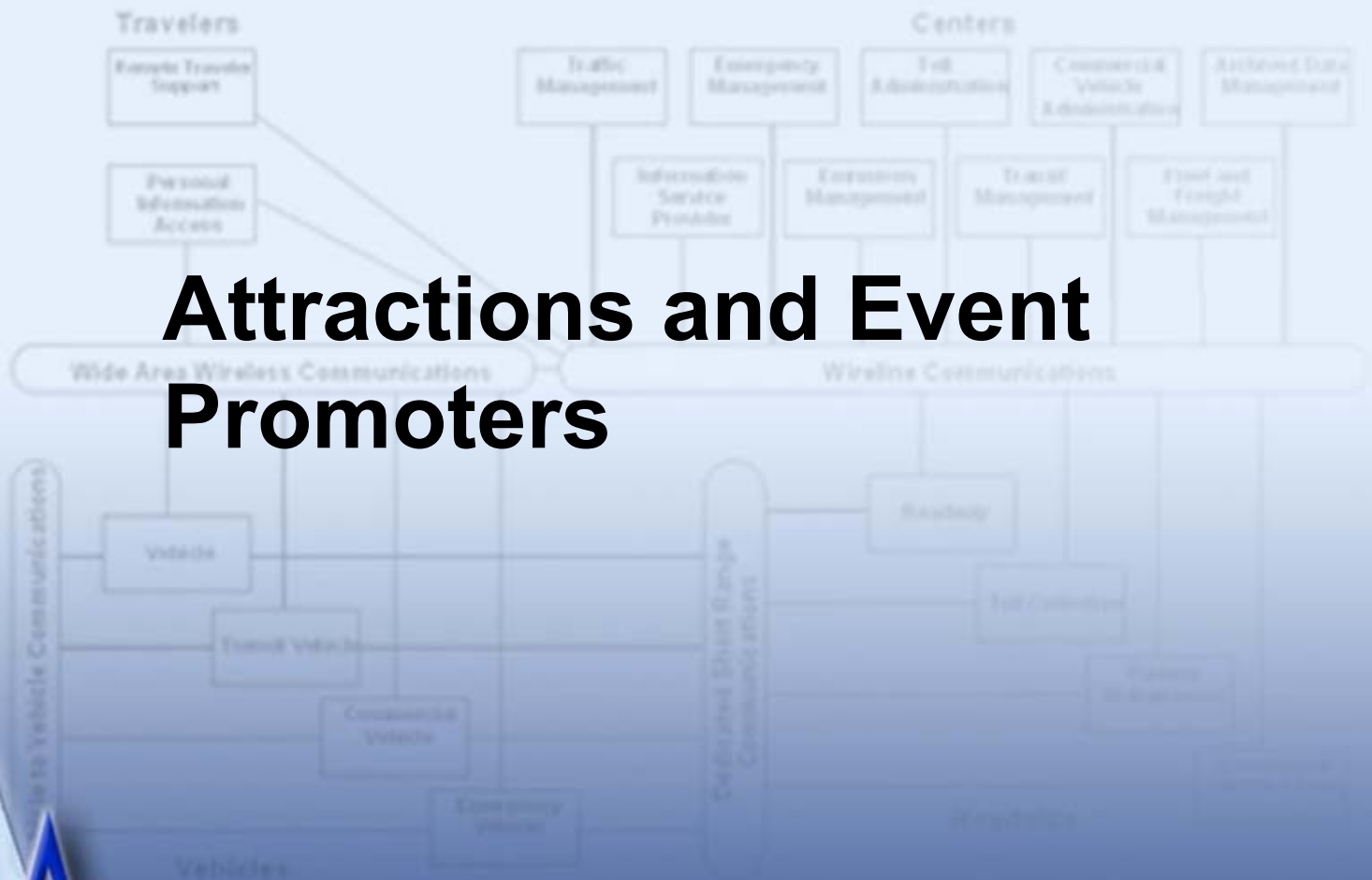


———— Existing  
----- Planned



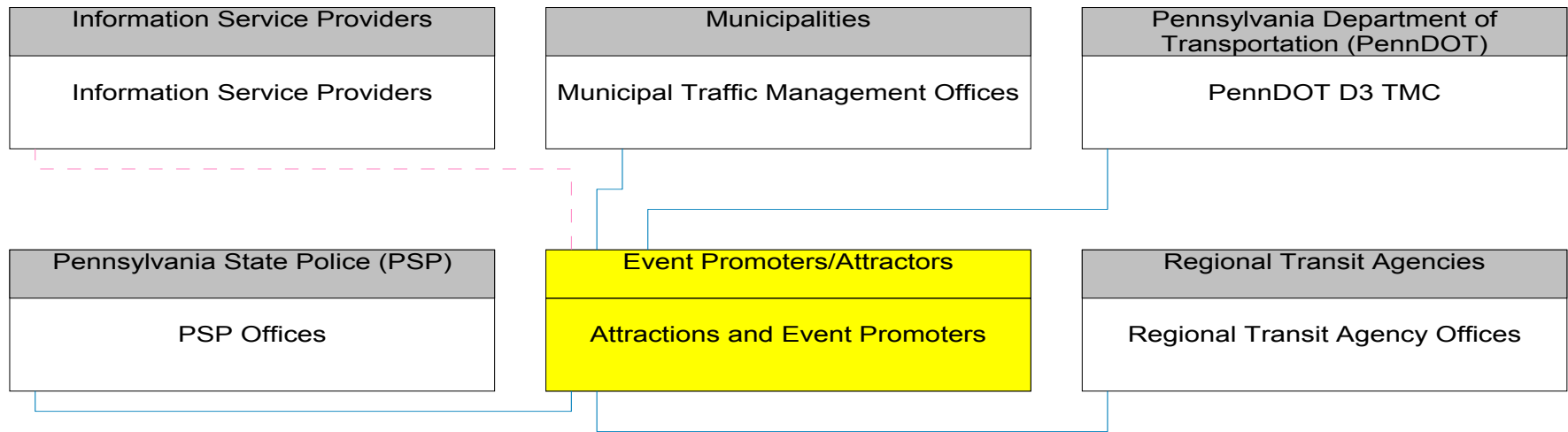
———— Existing  
- - - - - Planned

# Attractions and Event Promoters

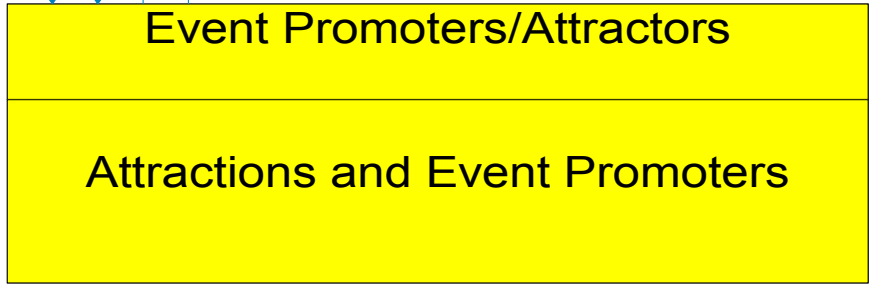
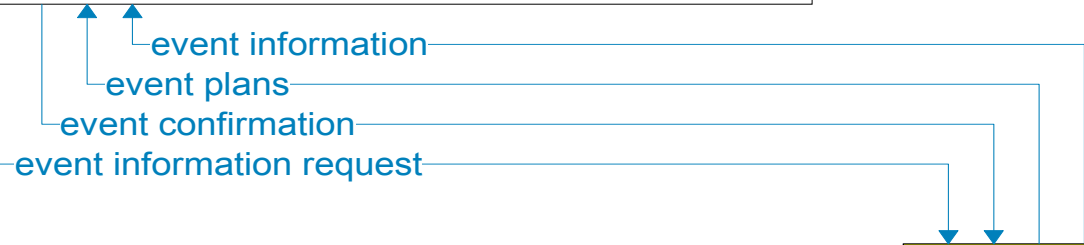
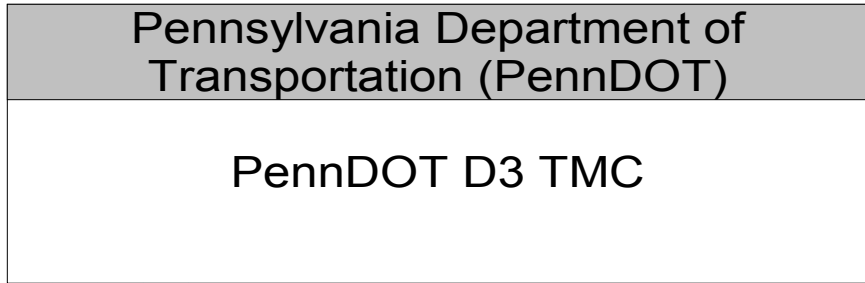


PA

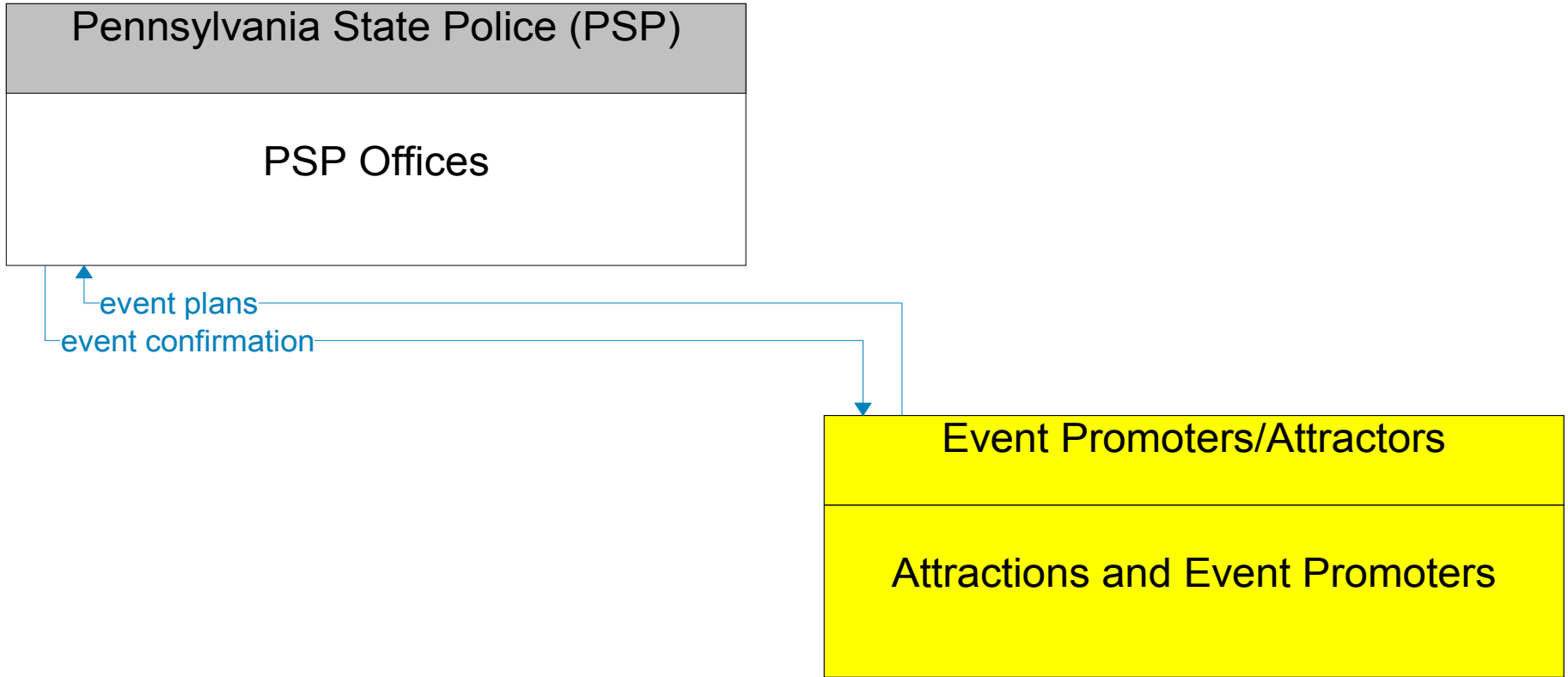
# Attractions and Event Promoters Interconnect Diagram



— Existing  
- - - Planned

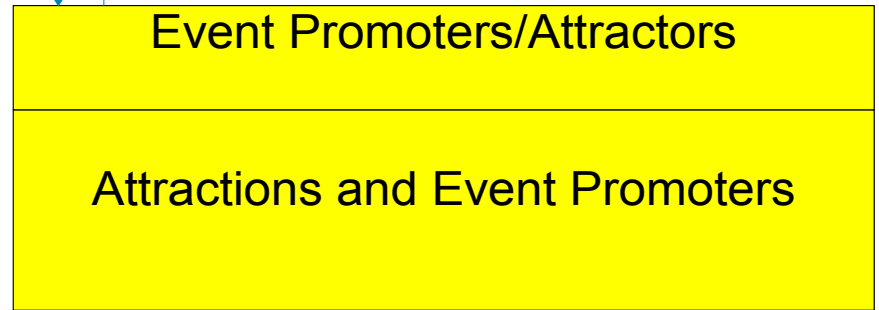
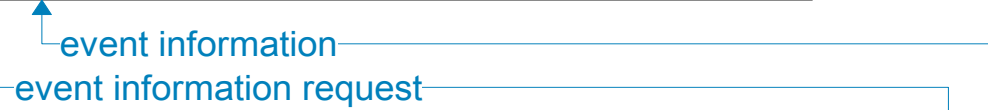
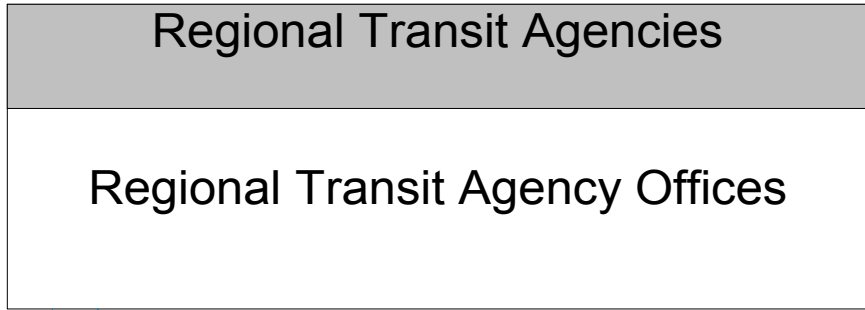


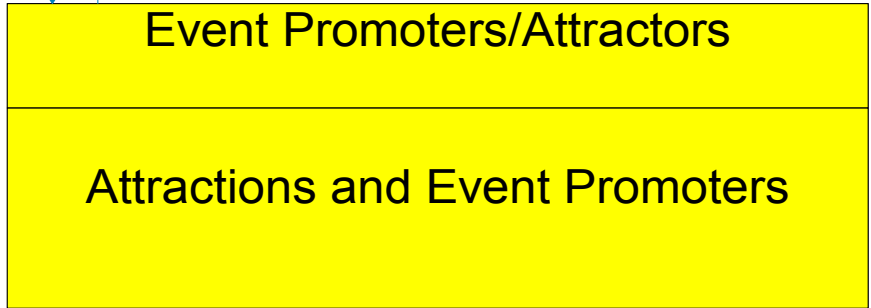
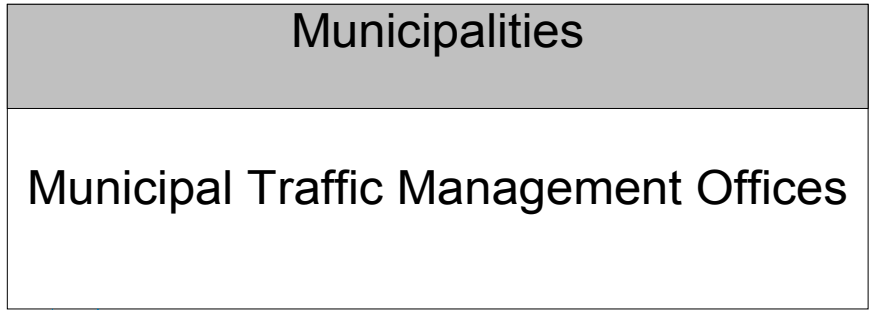
Existing  
Planned



———— Existing  
----- Planned



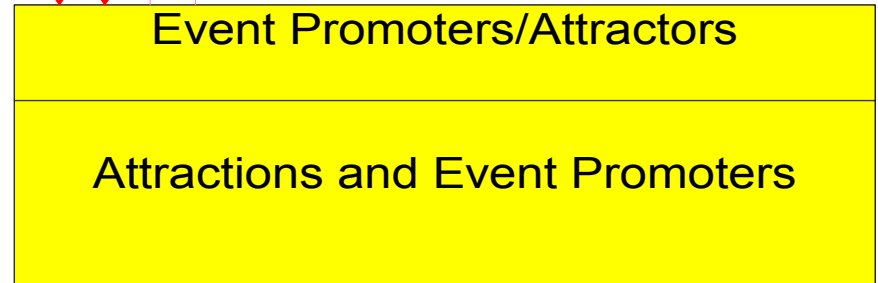
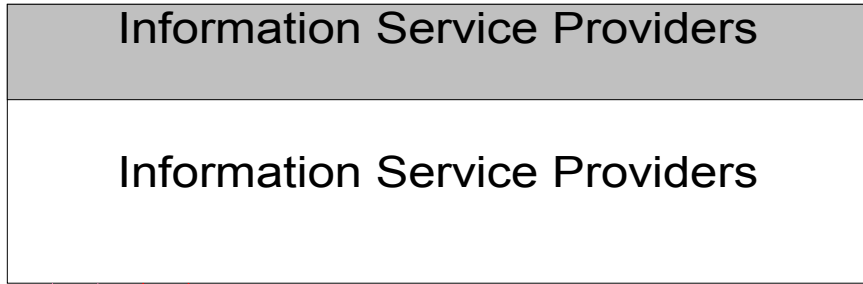




event plans

event confirmation

Existing  
Planned

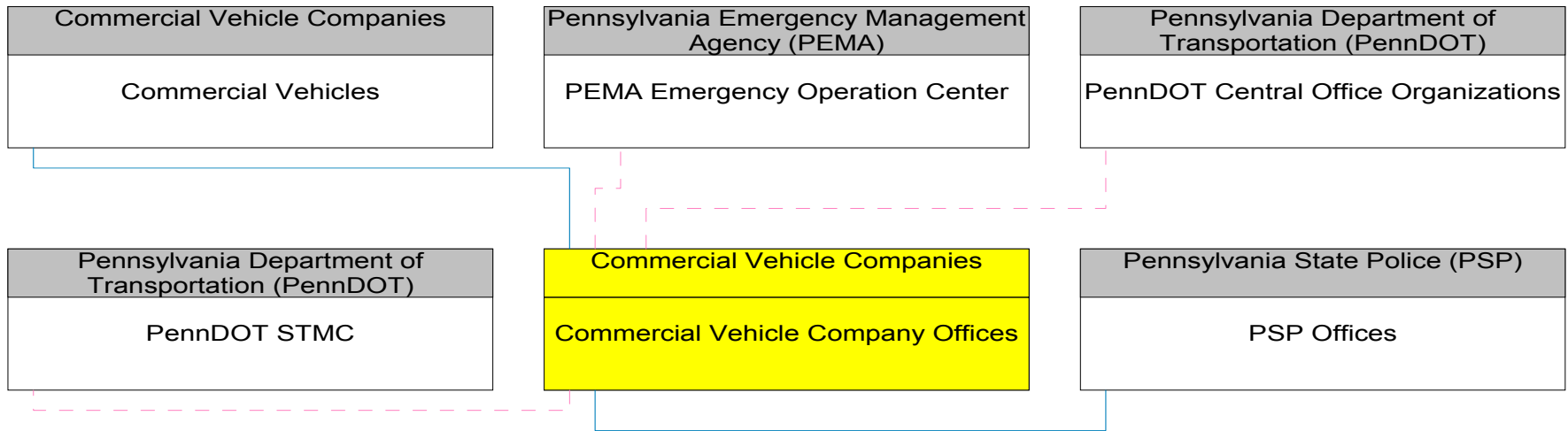


———— Existing  
- - - - - Planned

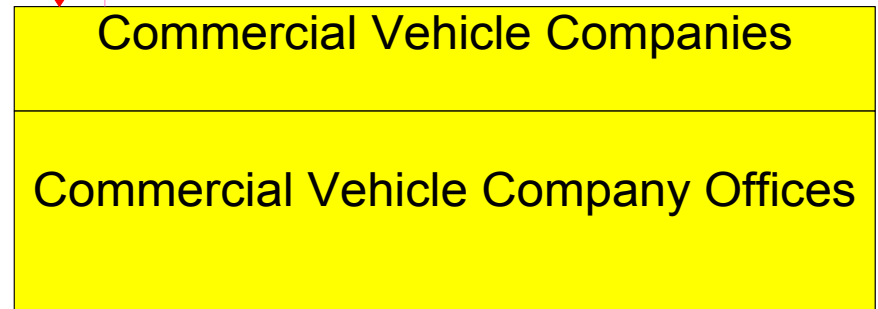
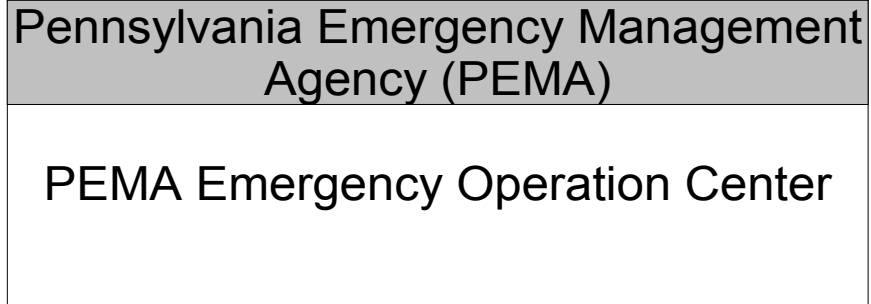
# Commercial Vehicle Company Offices



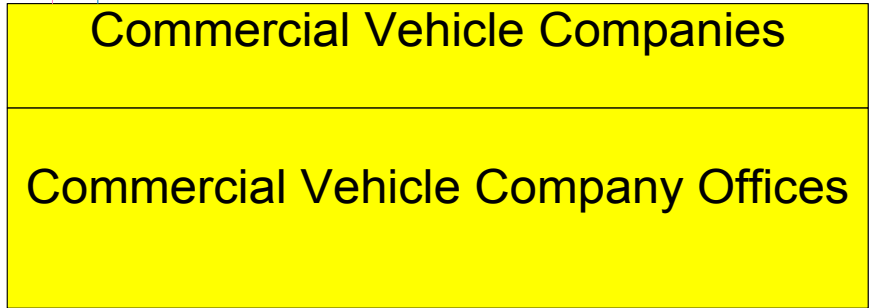
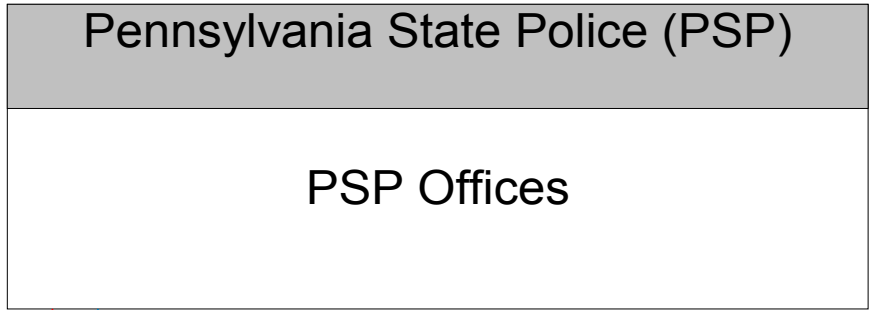
# Commercial Vehicle Company Offices Interconnect Diagram



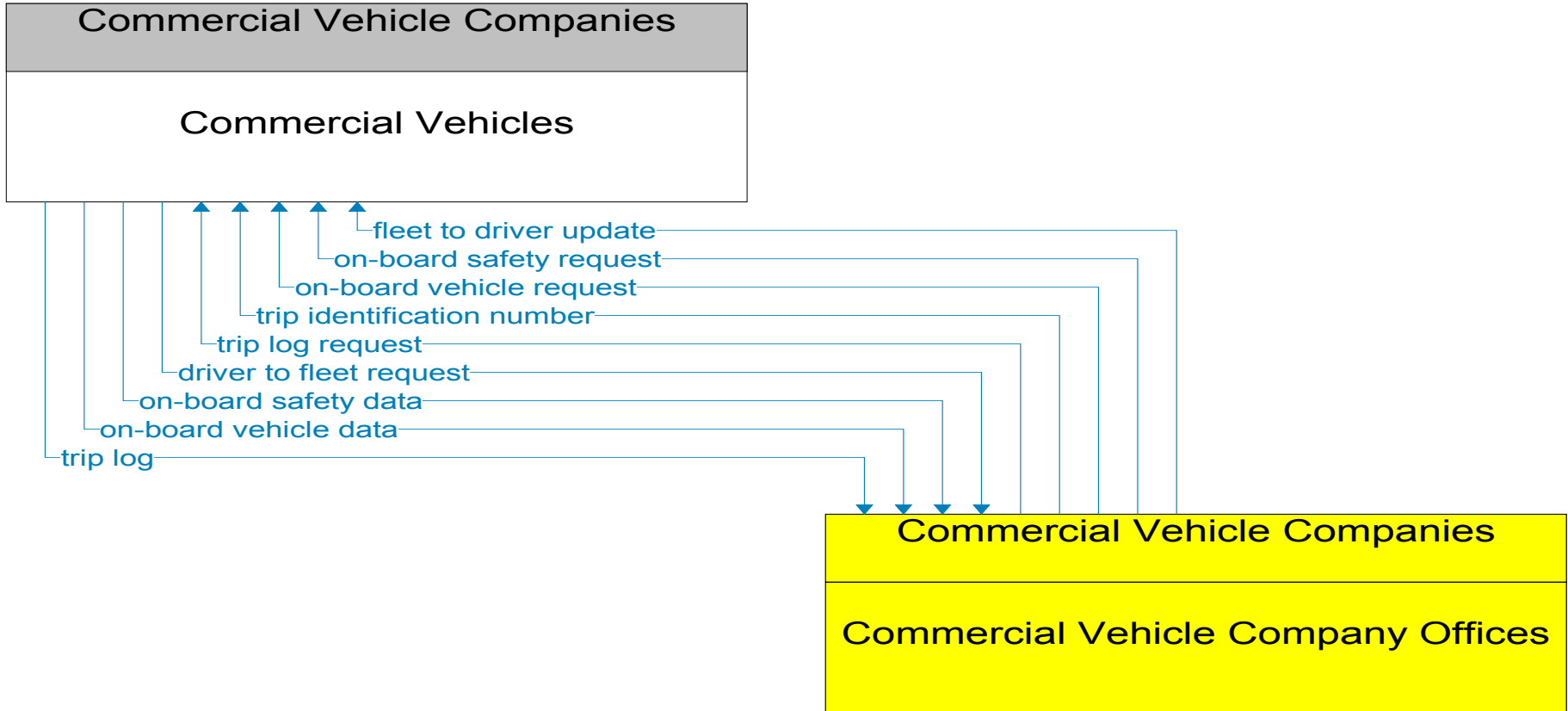
— Existing  
- - - Planned



Existing  
Planned



Existing  
Planned

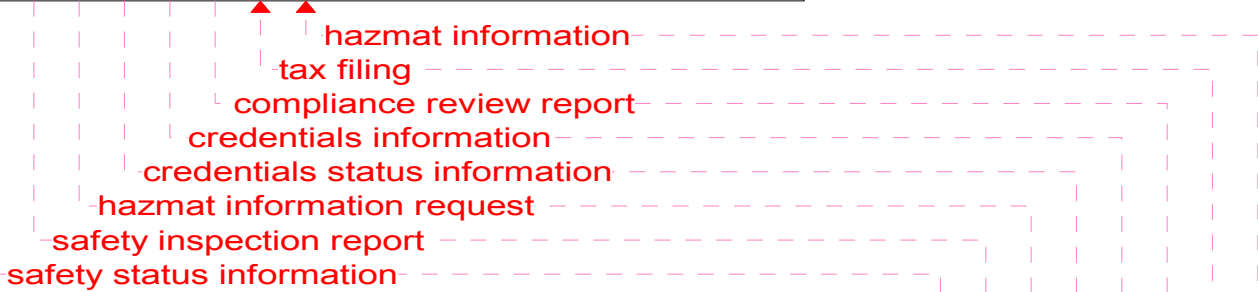


———— Existing  
- - - - - Planned



**Pennsylvania Department of  
Transportation (PennDOT)**

**PennDOT STMC**



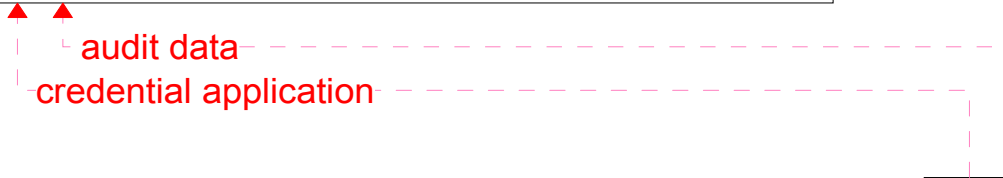
**Commercial Vehicle Companies**

**Commercial Vehicle Company Offices**

———— Existing  
- - - - - Planned

Pennsylvania Department of  
Transportation (PennDOT)

PennDOT Central Office Organizations

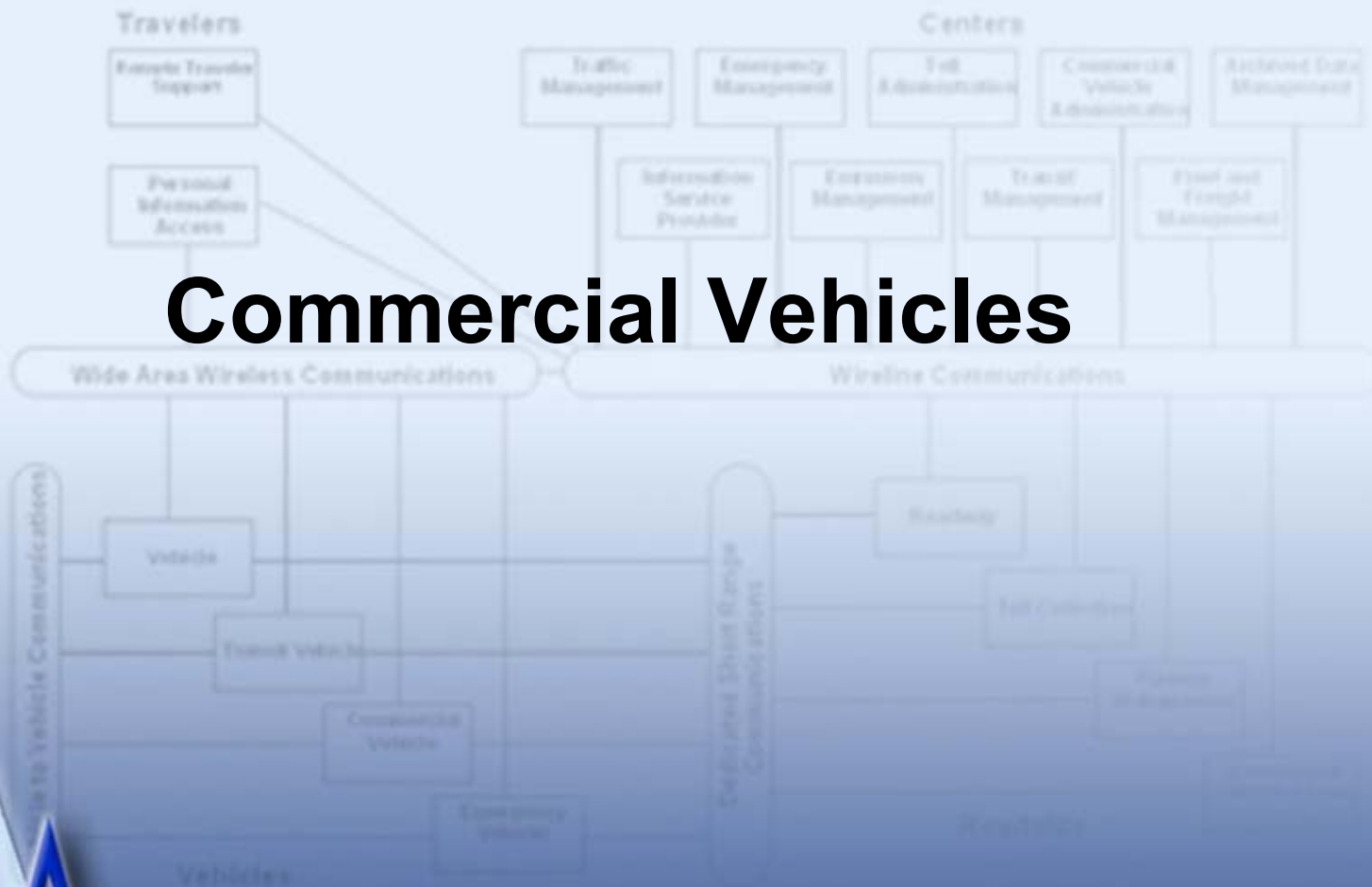


Commercial Vehicle Companies

Commercial Vehicle Company Offices

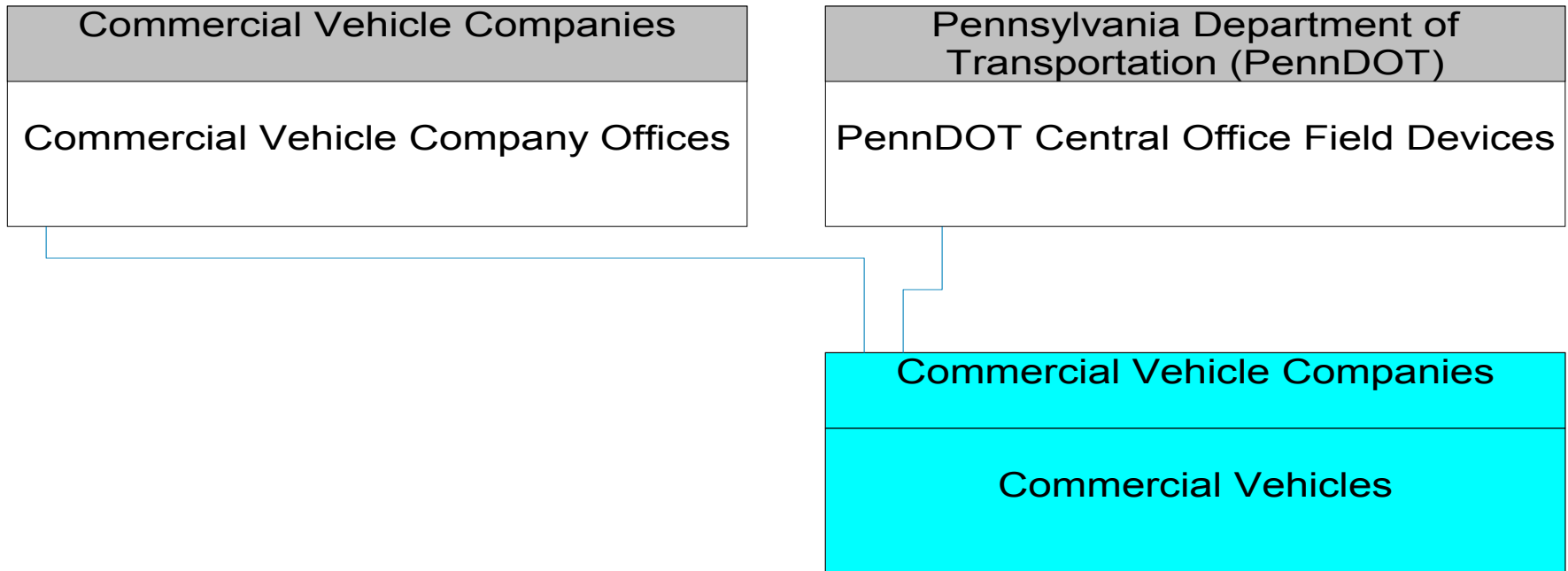
———— Existing  
- - - - - Planned

# Commercial Vehicles

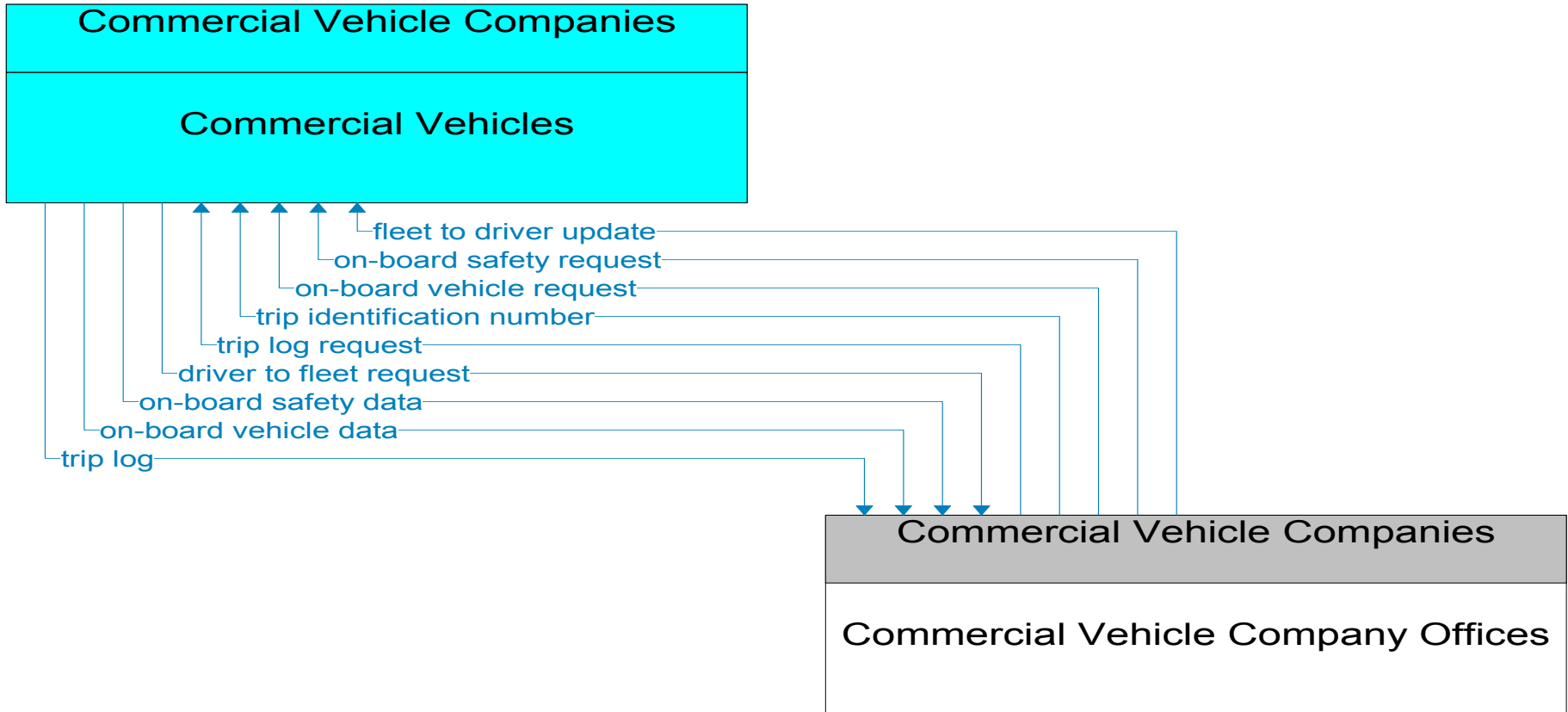


PA

# Commercial Vehicles Interconnect Diagram

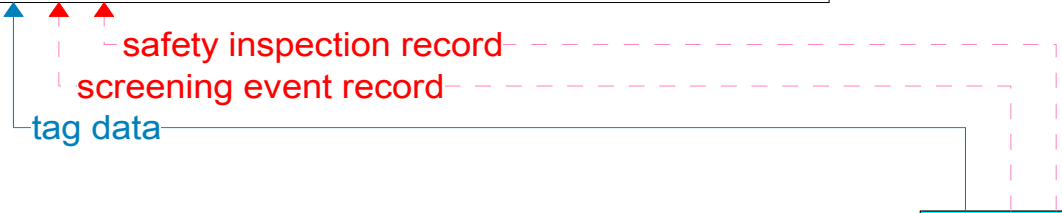


———— Existing  
----- Planned



Pennsylvania Department of  
Transportation (PennDOT)

PennDOT Central Office Field Devices

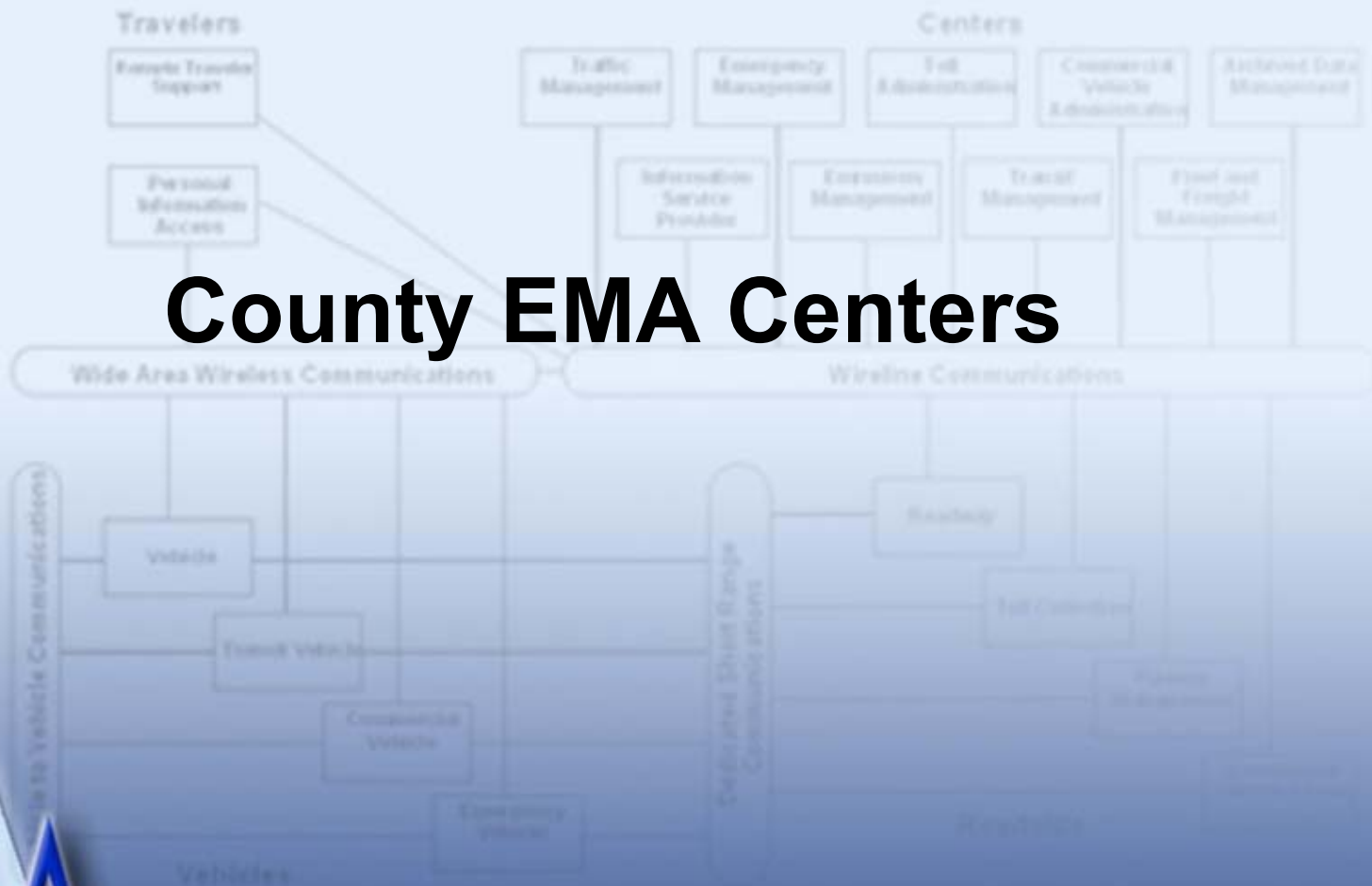


Commercial Vehicle Companies

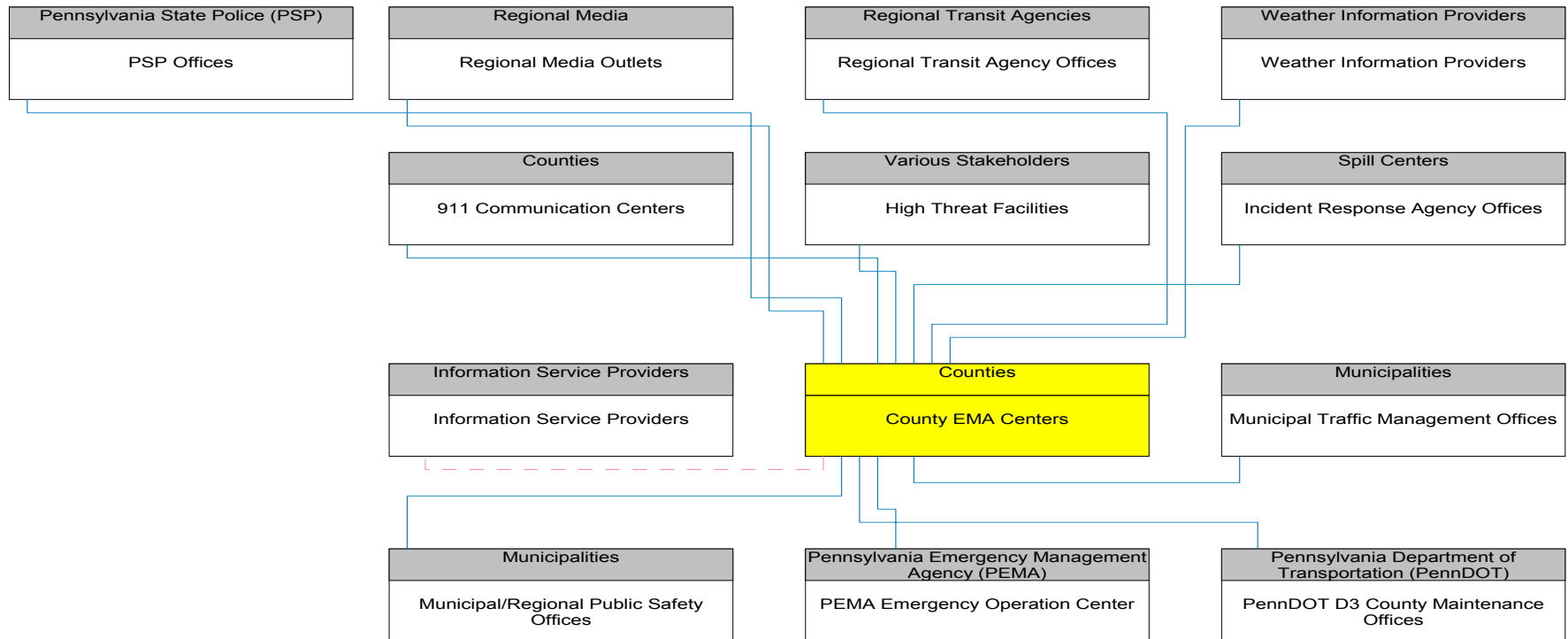
Commercial Vehicles

———— Existing  
- - - - - Planned

# County EMA Centers

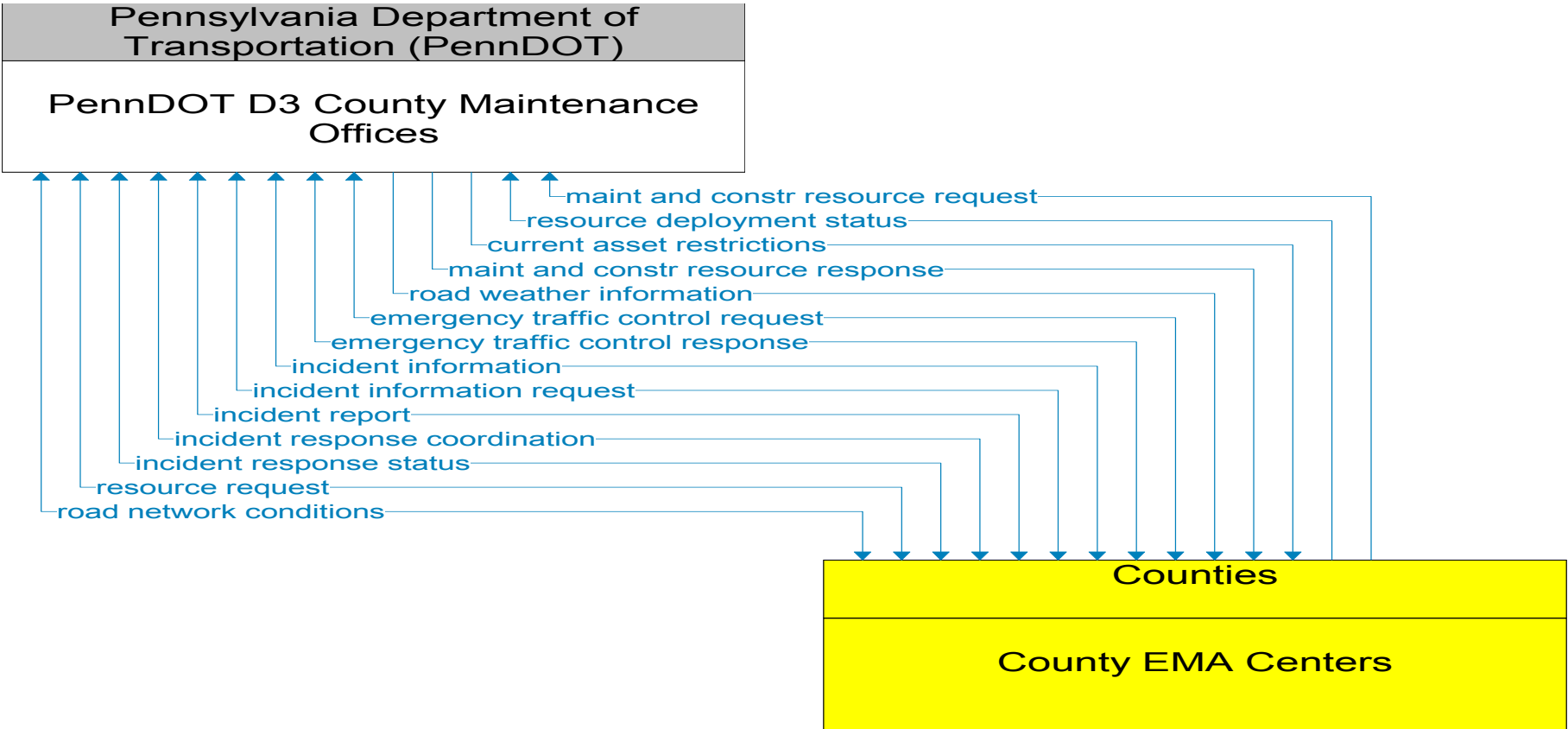


# County EMA Centers Interconnect Diagram

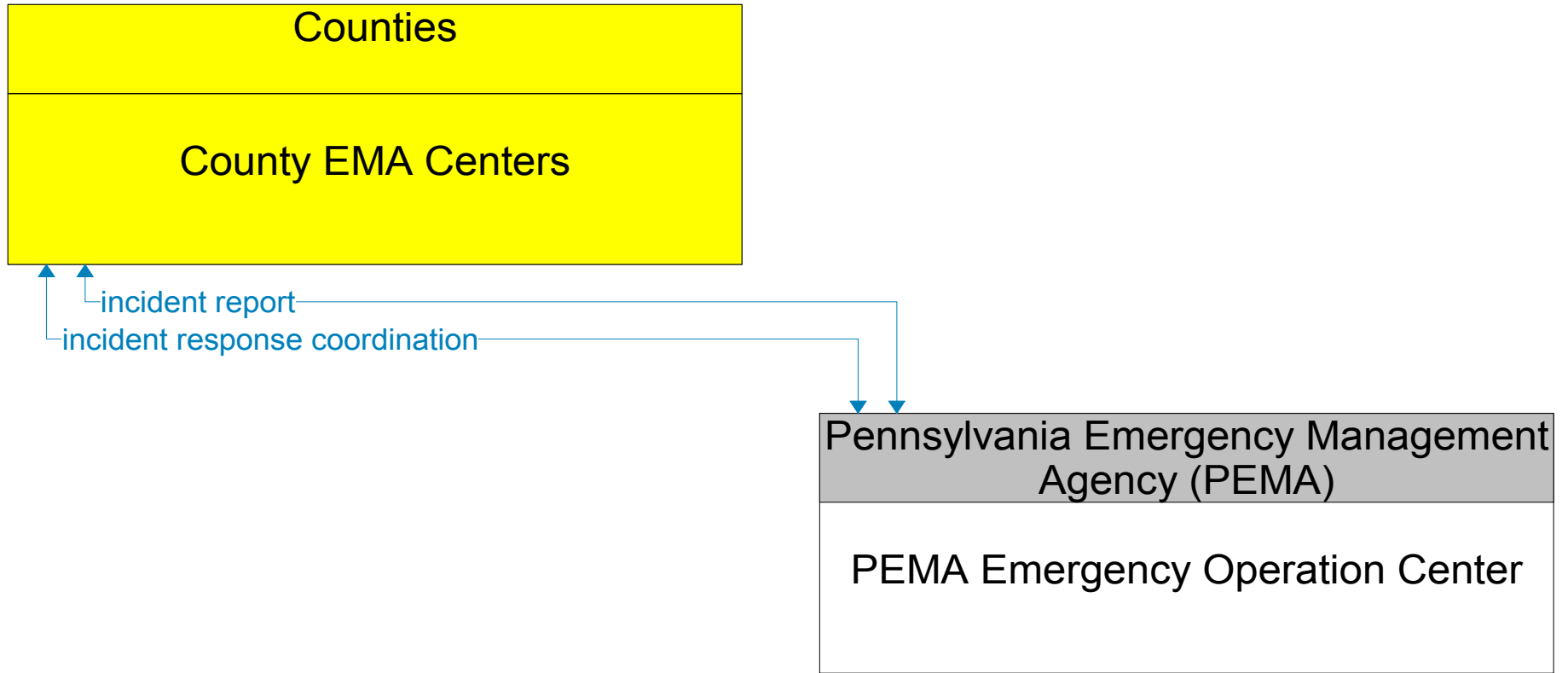


— Existing  
- - - Planned

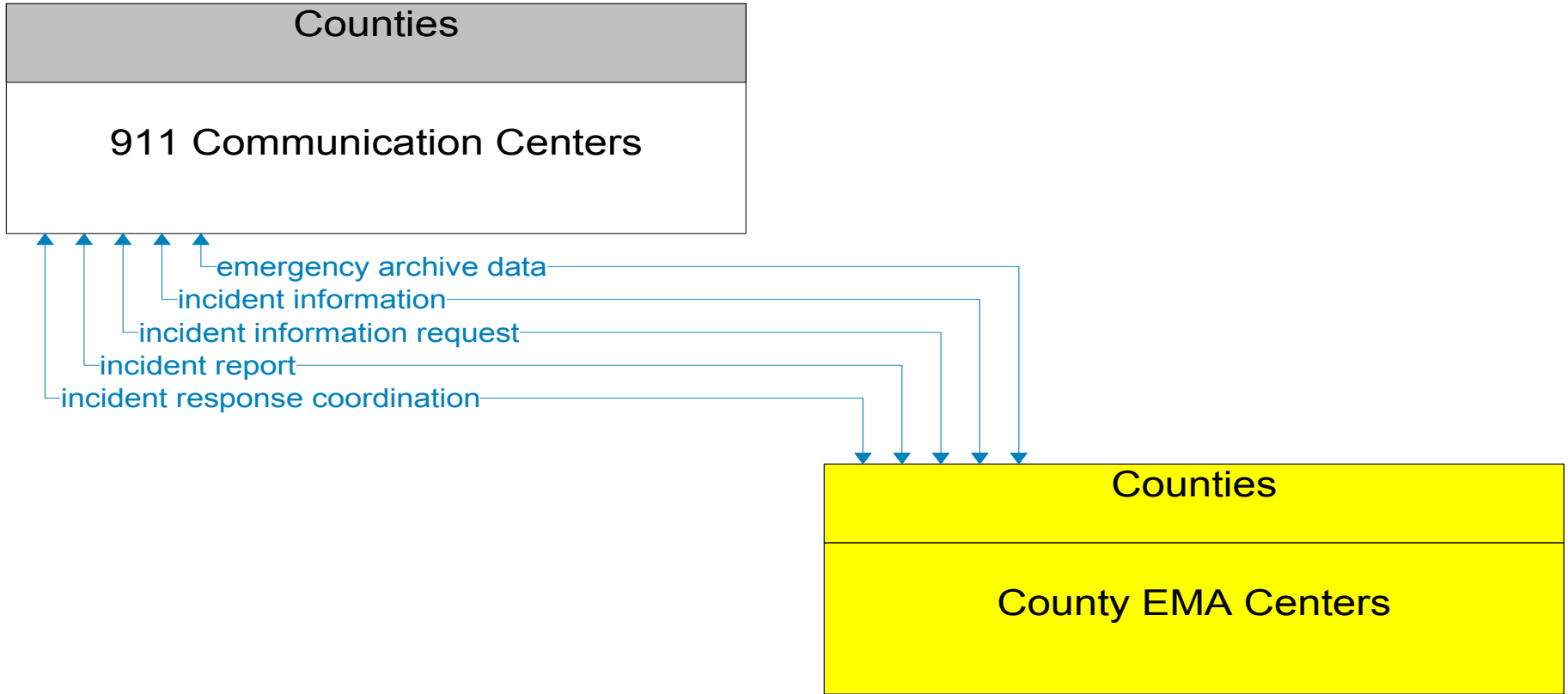




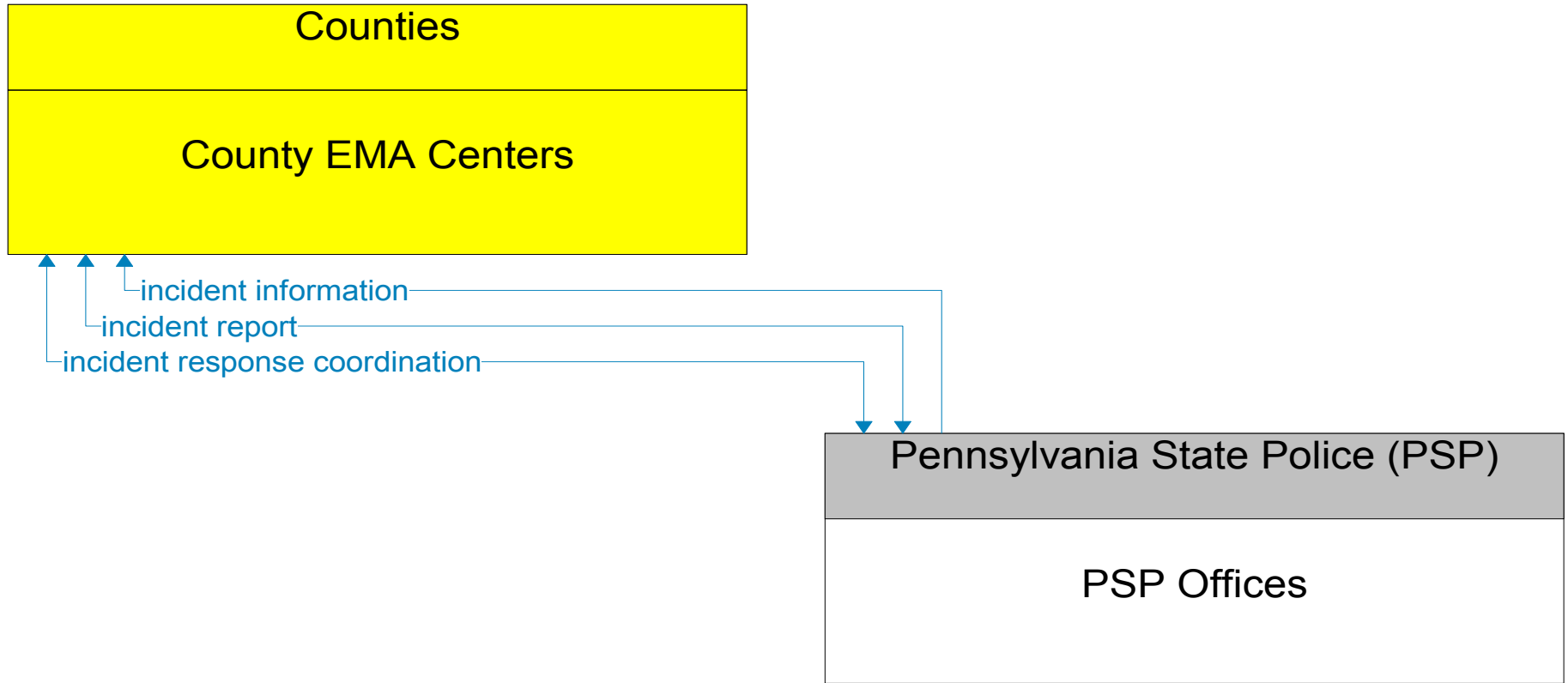
———— Existing  
 - - - - - Planned



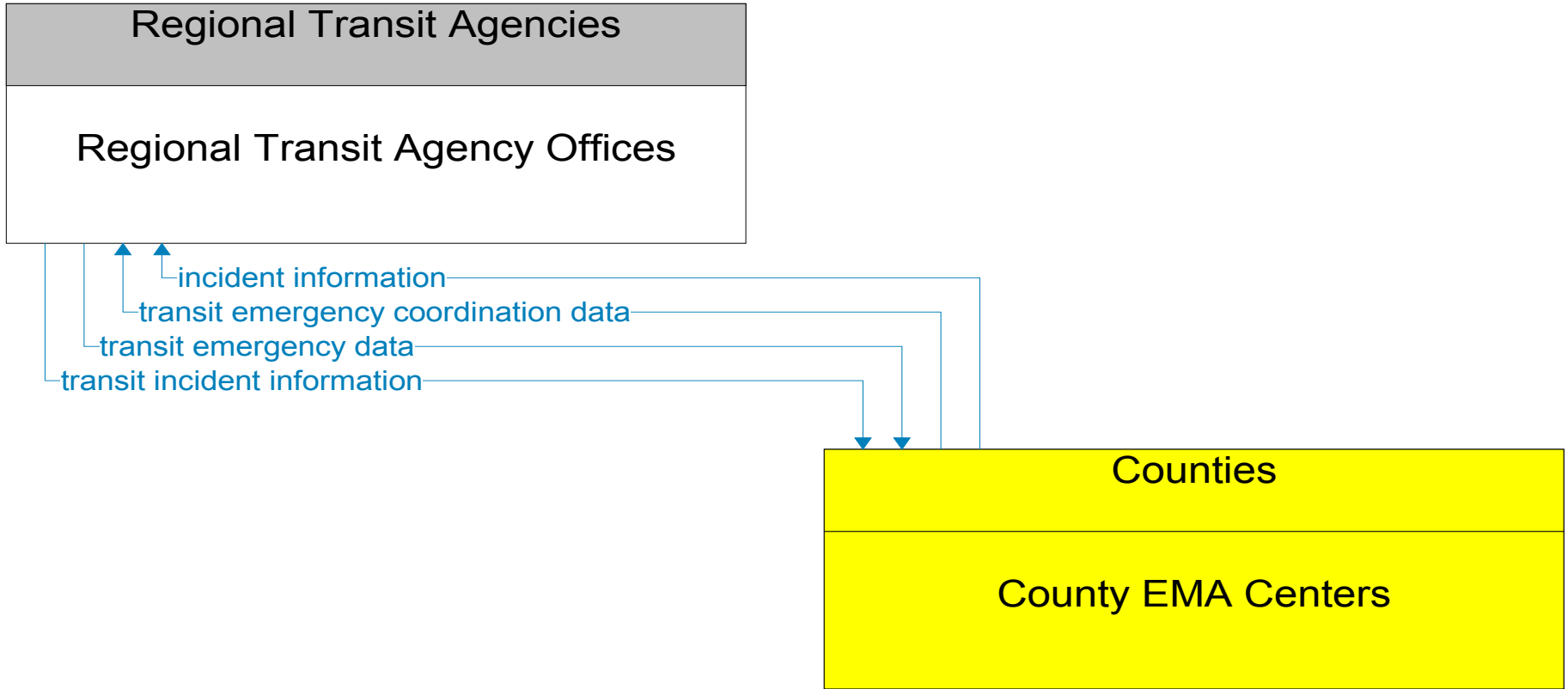
———— Existing  
- - - - - Planned



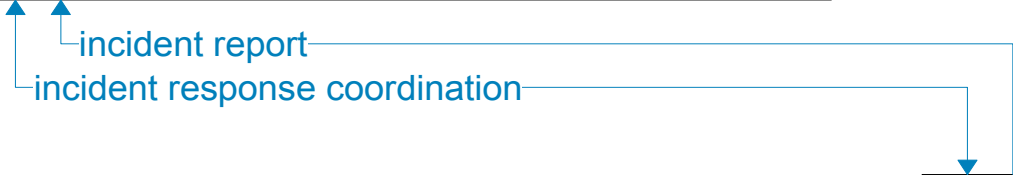
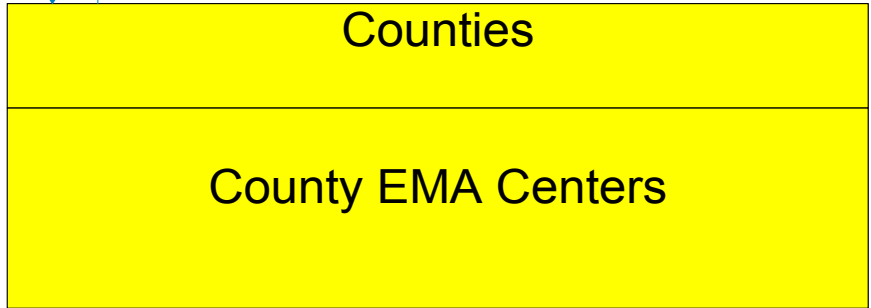
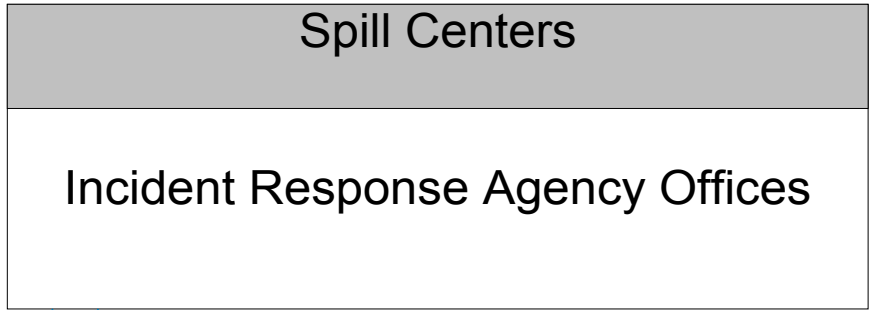
———— Existing  
----- Planned



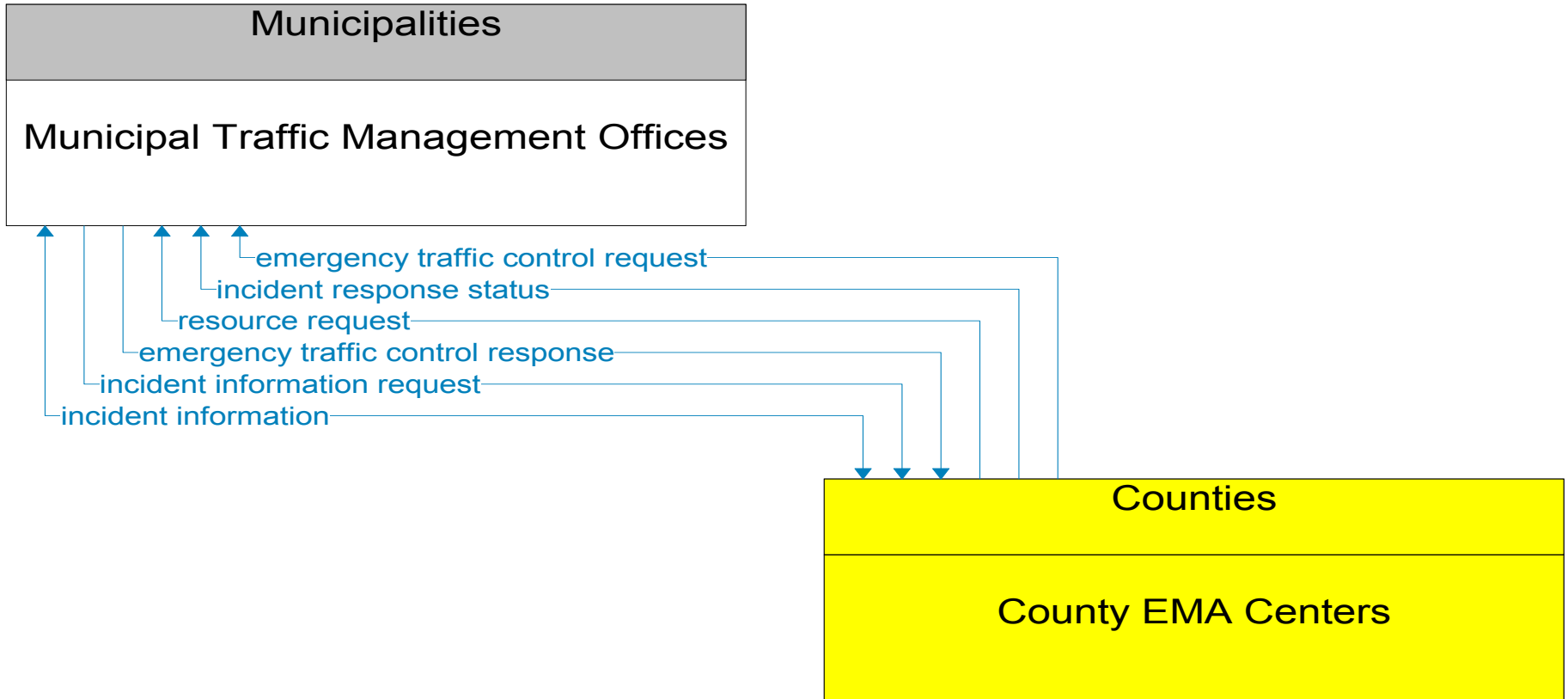
— Existing  
- - - Planned



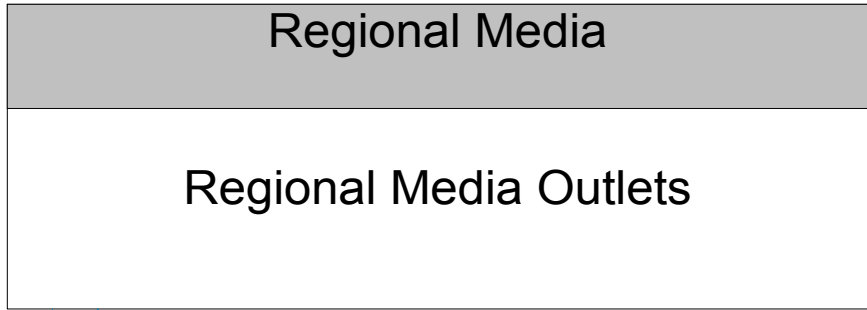
———— Existing  
- - - - - Planned



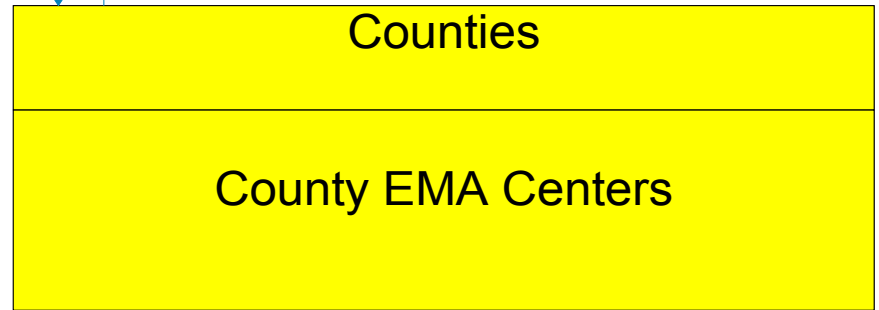
Existing  
Planned



———— Existing  
- - - - - Planned

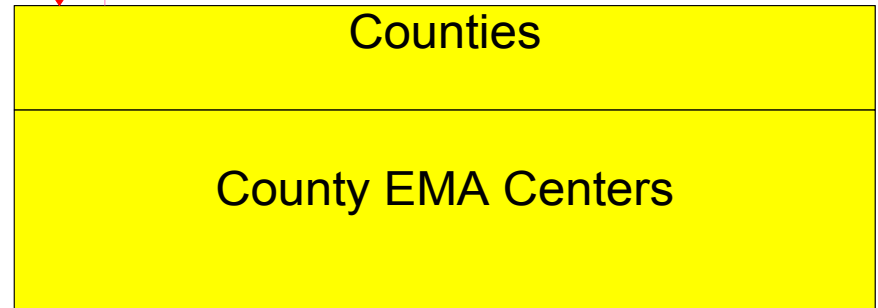
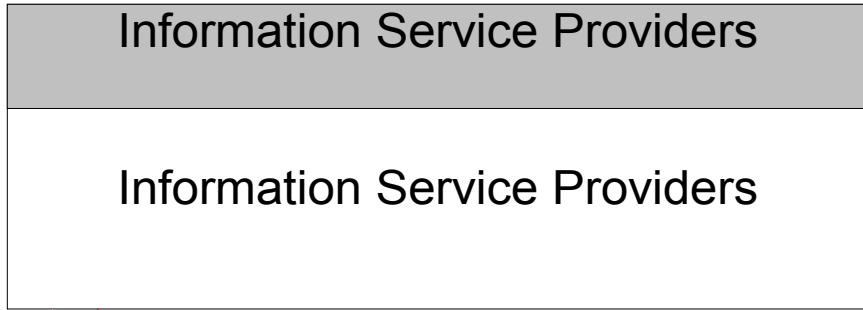


incident information for media  
media information request

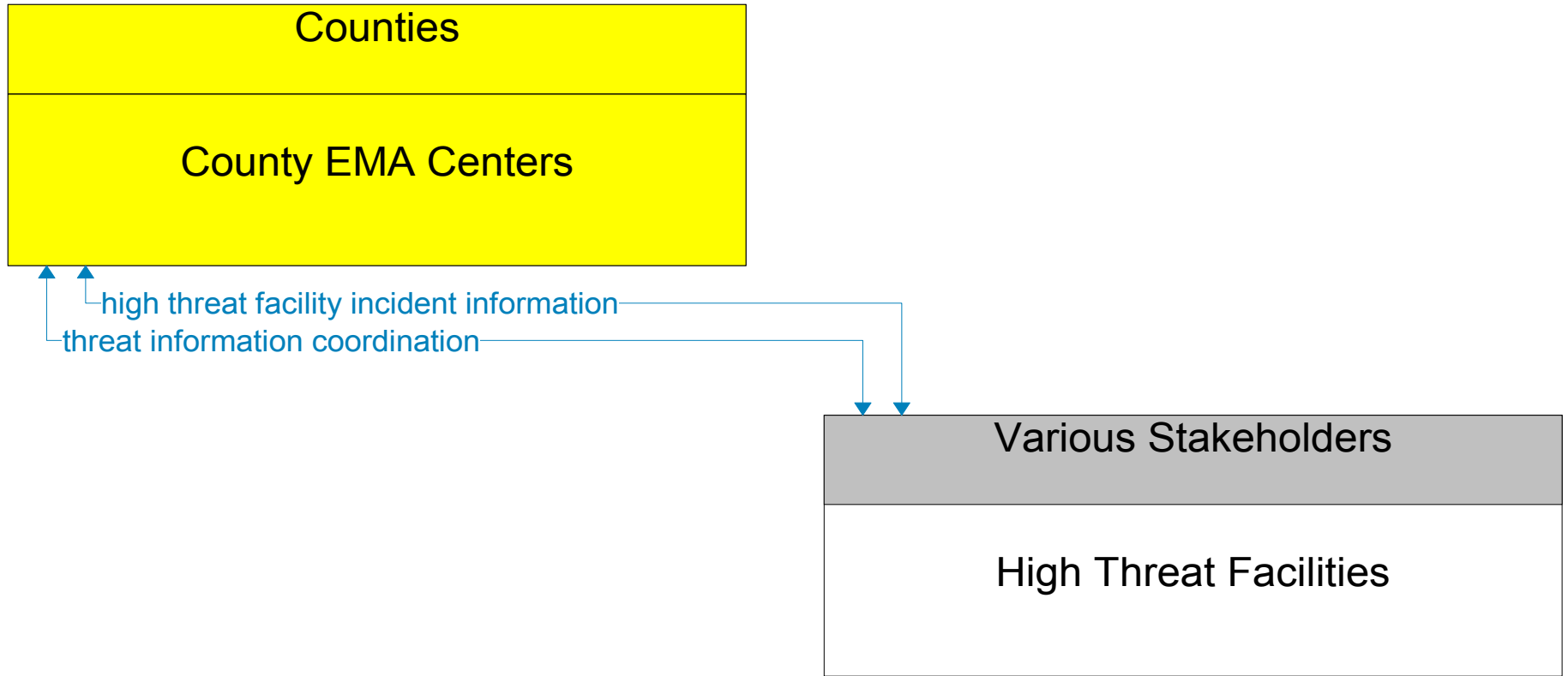


Existing  
Planned

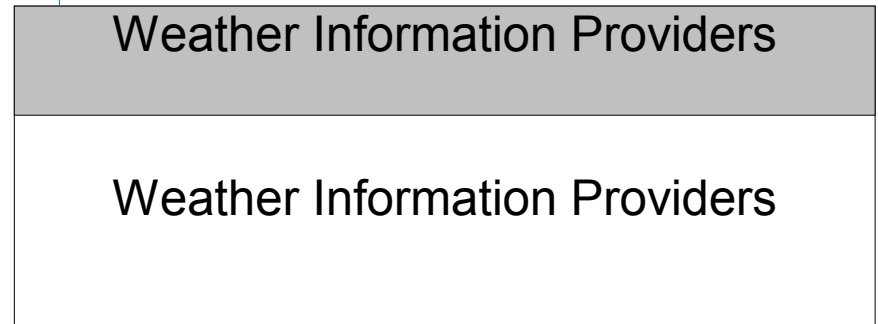
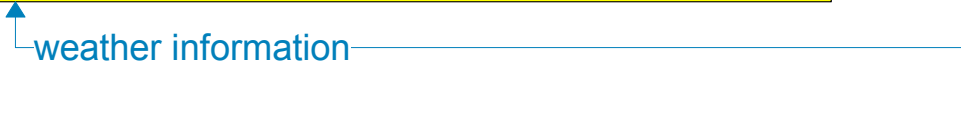
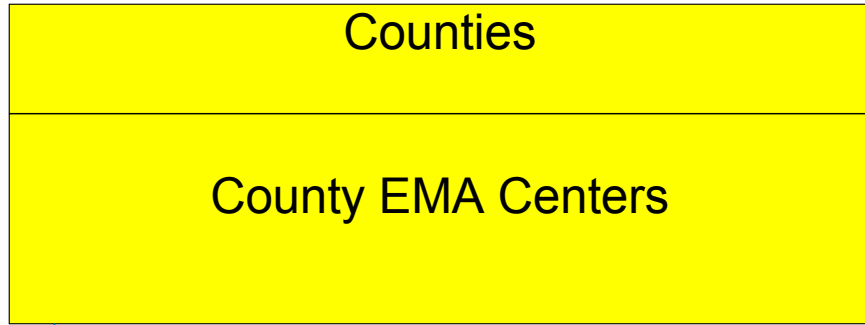




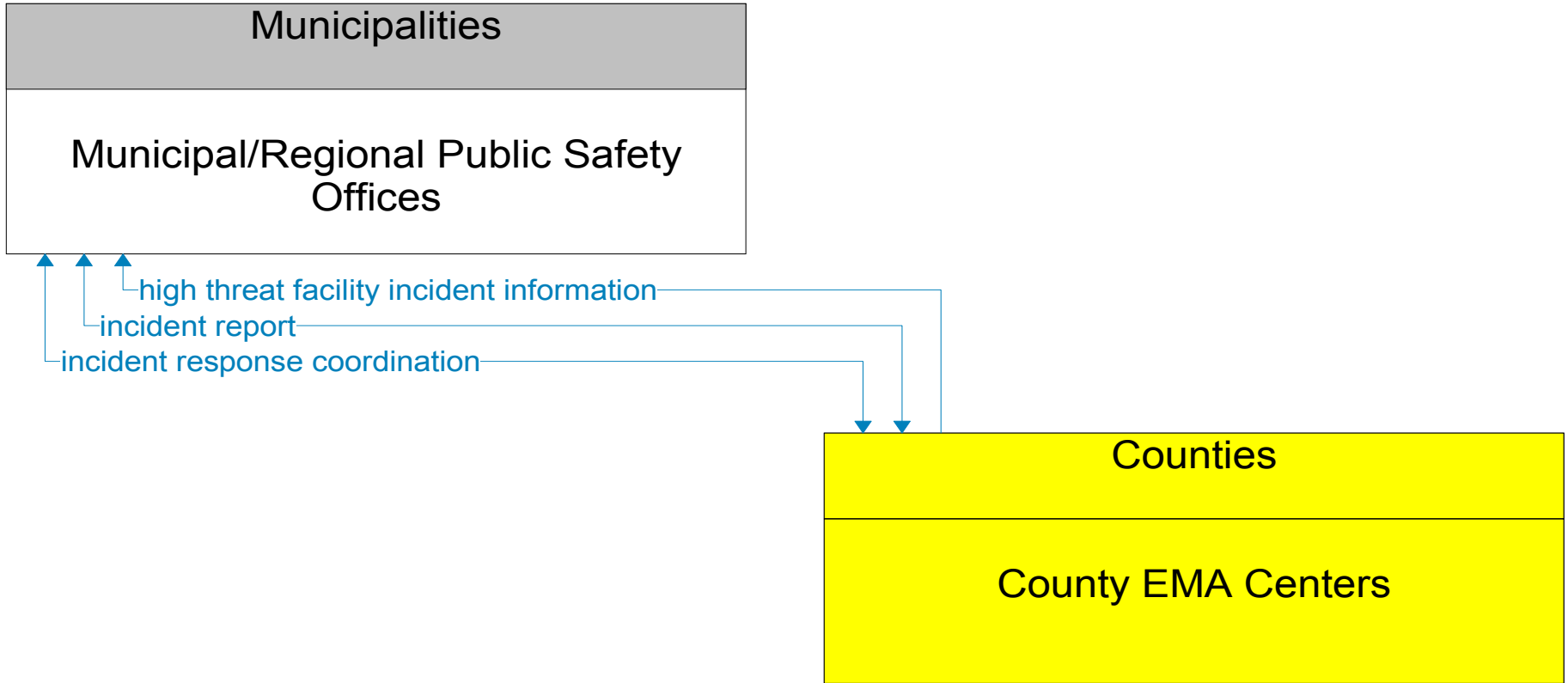
Existing  
Planned



———— Existing  
- - - - - Planned



———— Existing  
- - - - - Planned

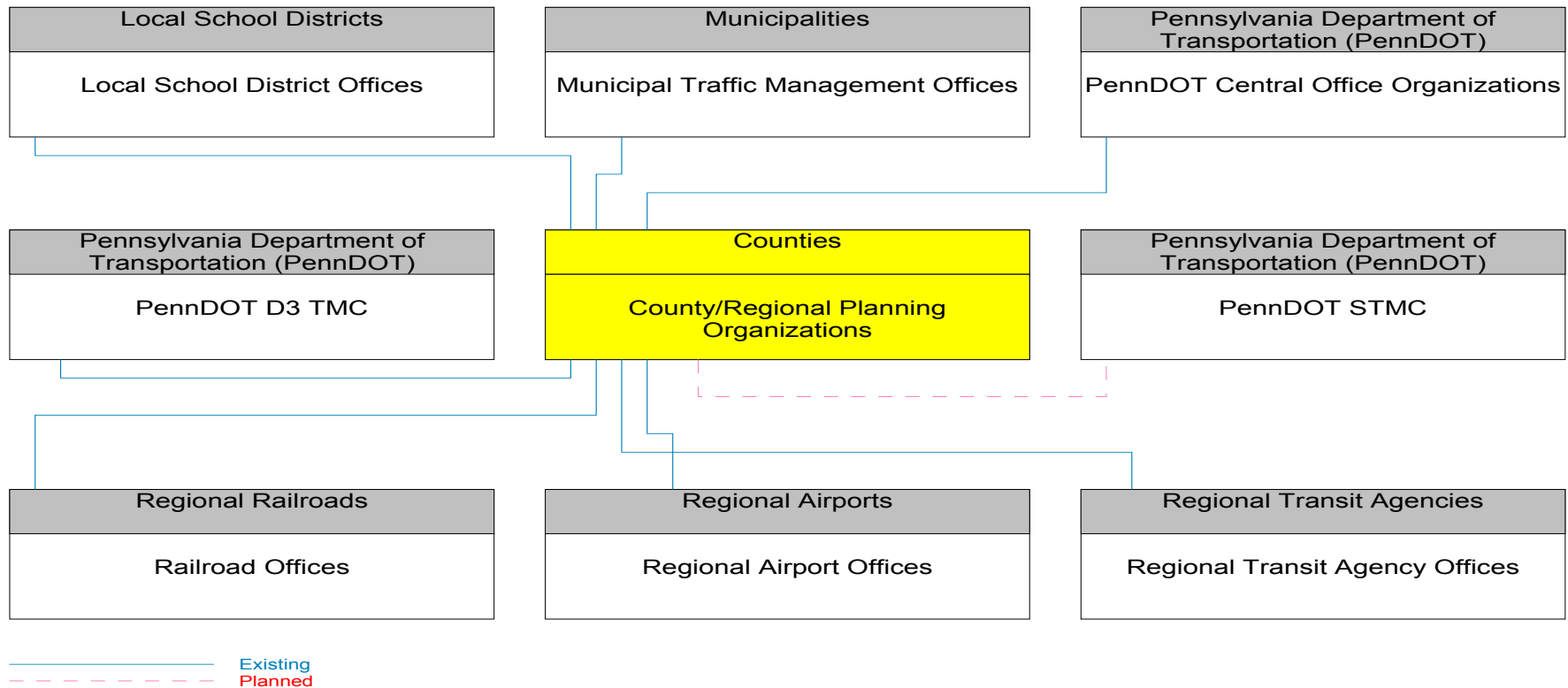


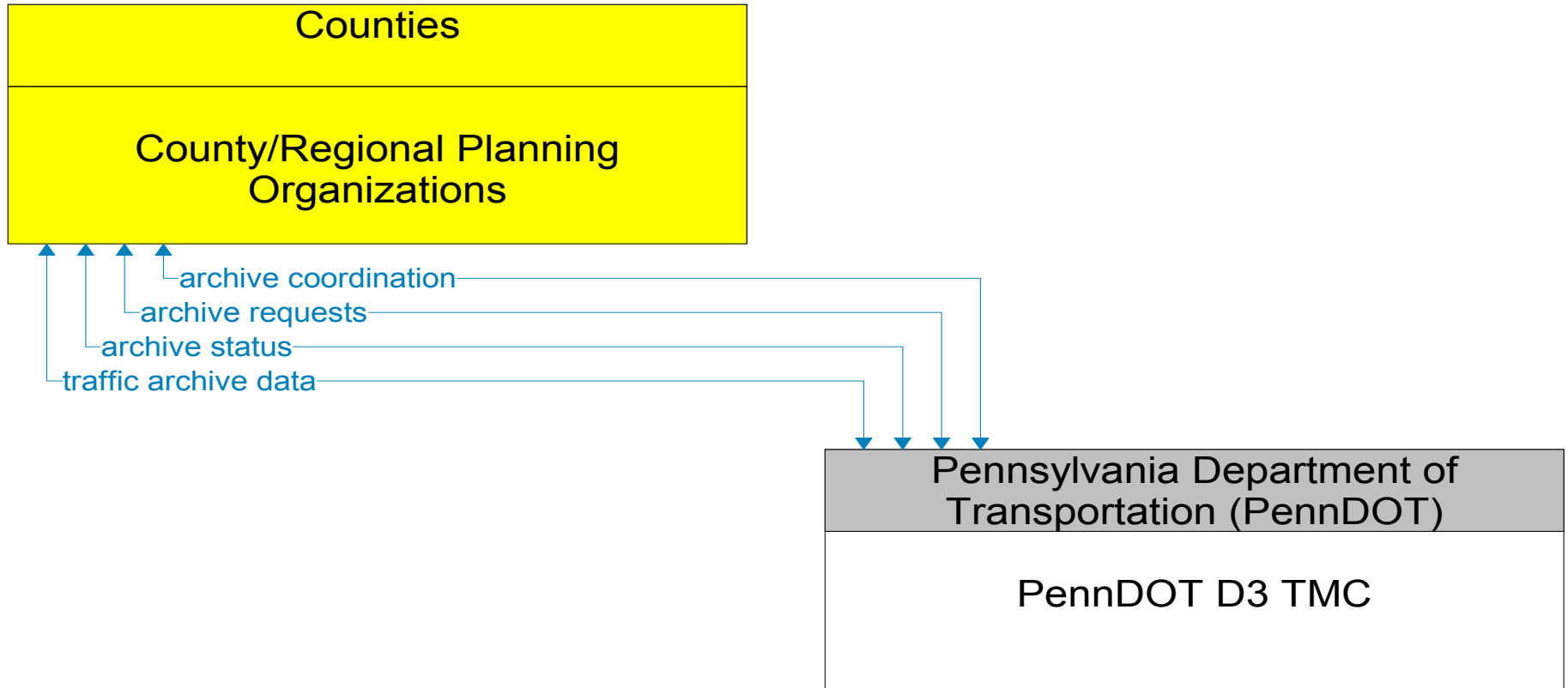
———— Existing  
----- Planned

# County/Regional Planning Organizations

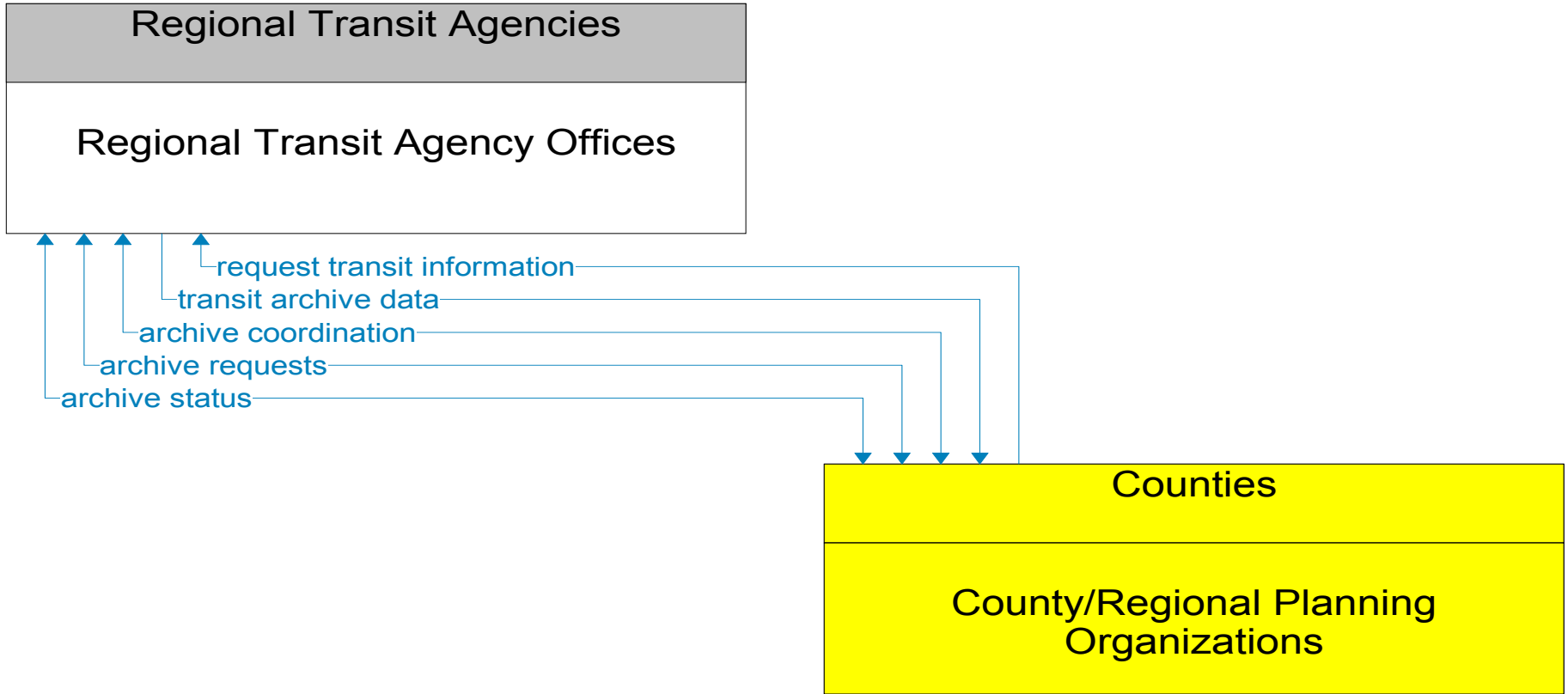


# County/Regional Planning Organizations Interconnect Diagram



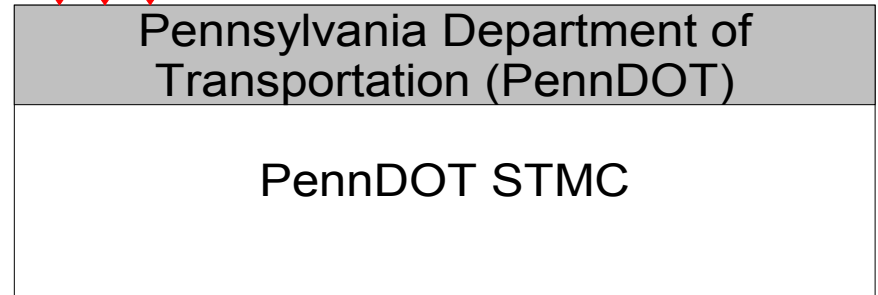
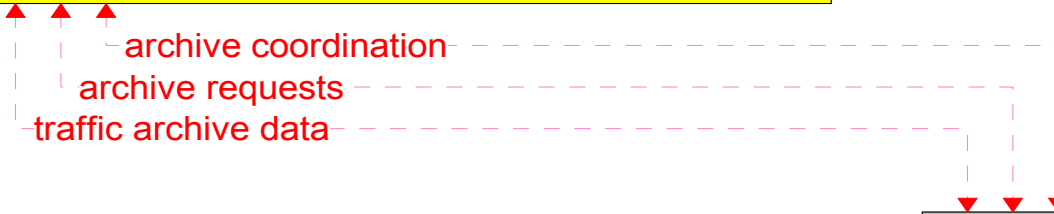


———— Existing  
----- Planned



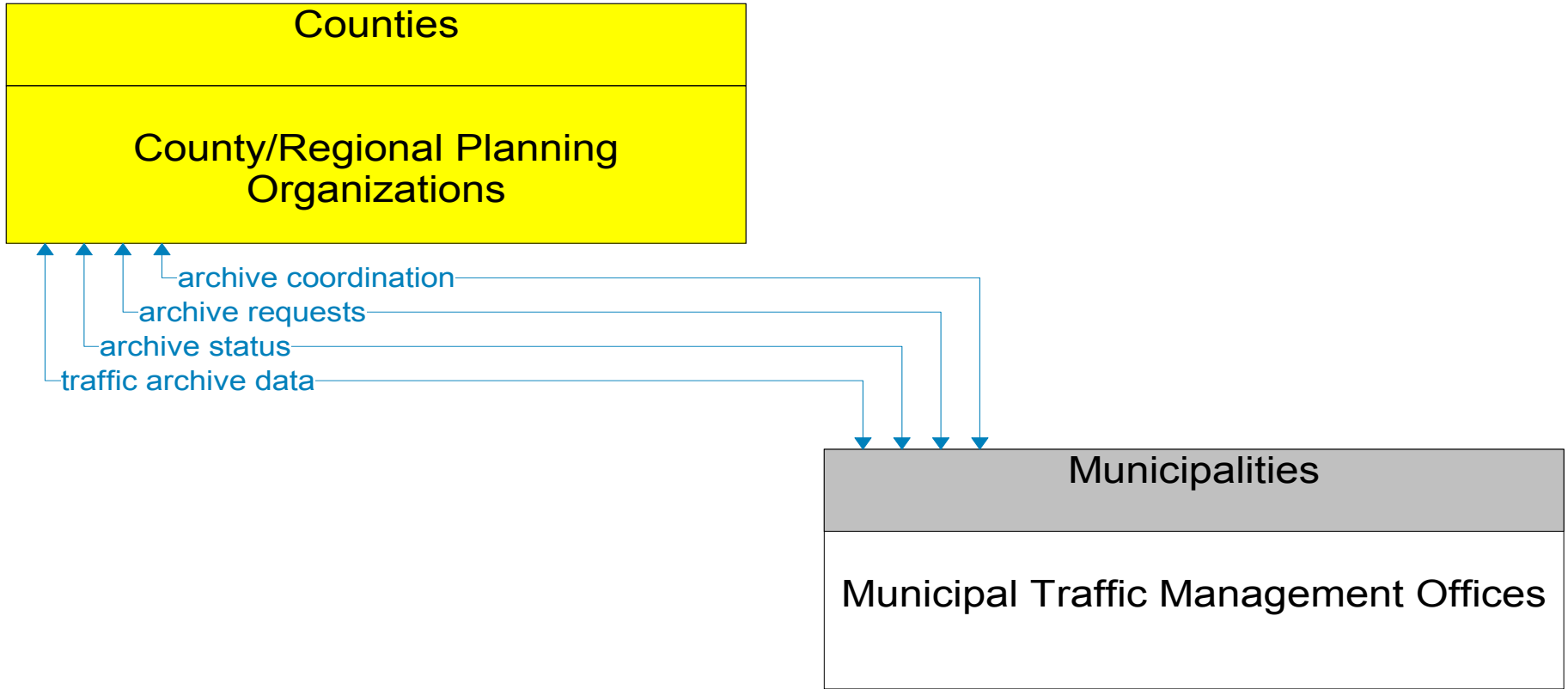
———— Existing  
- - - - - Planned



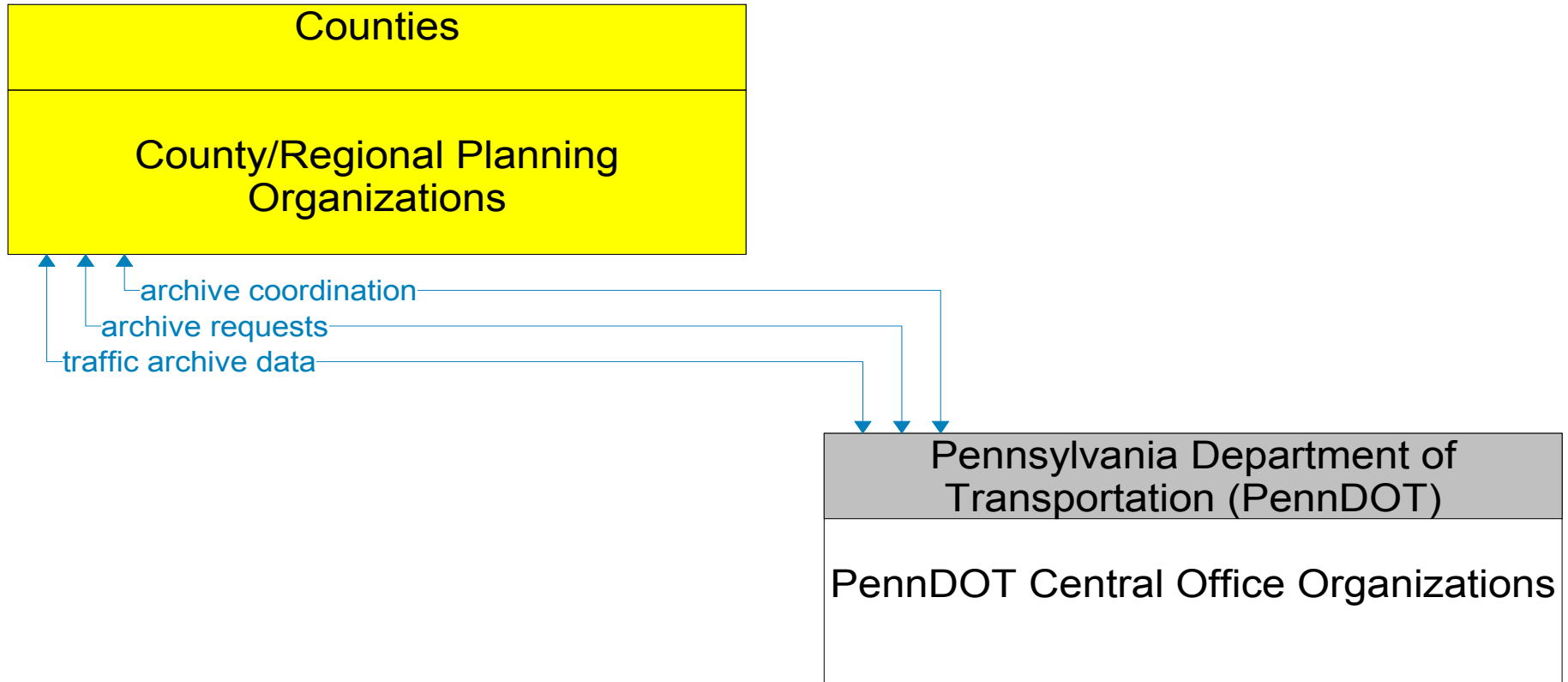


———— Existing

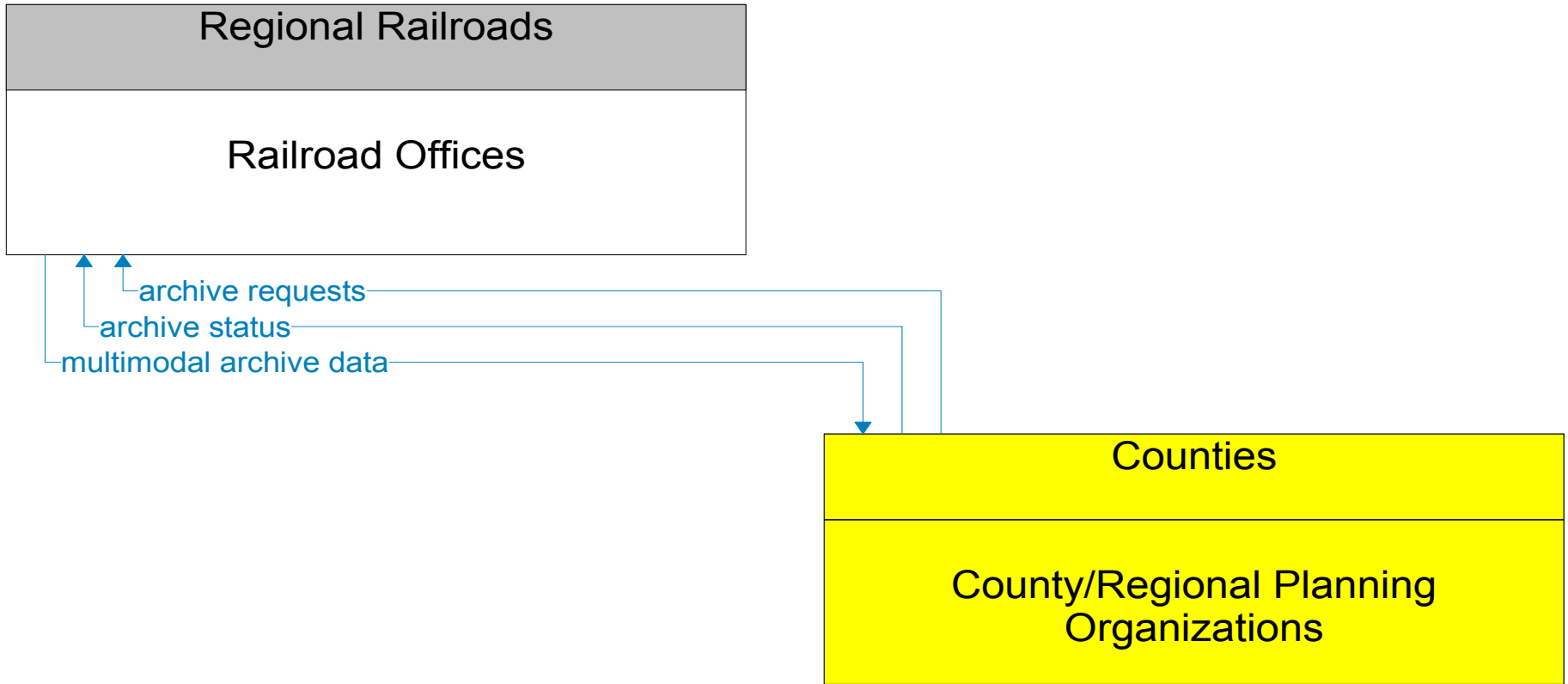
- - - - - Planned



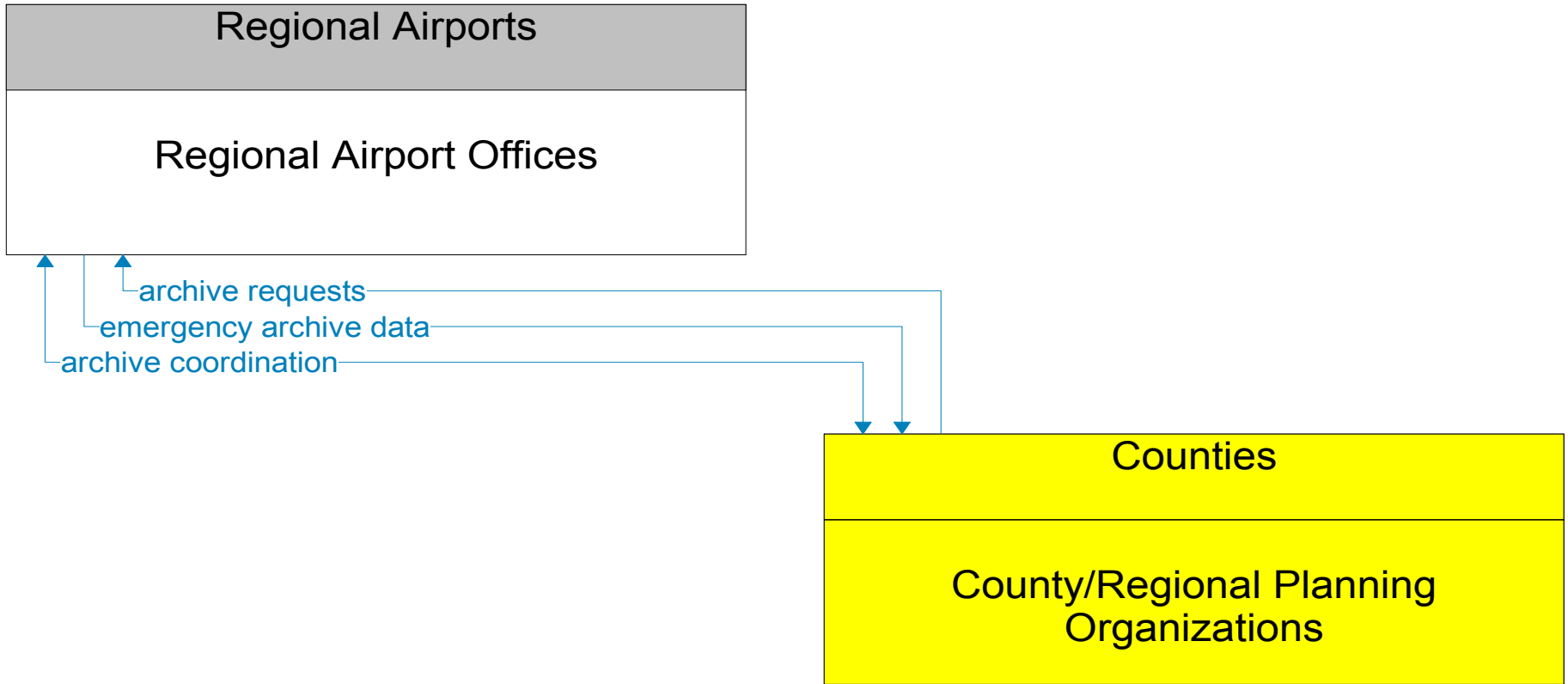
———— Existing  
----- Planned



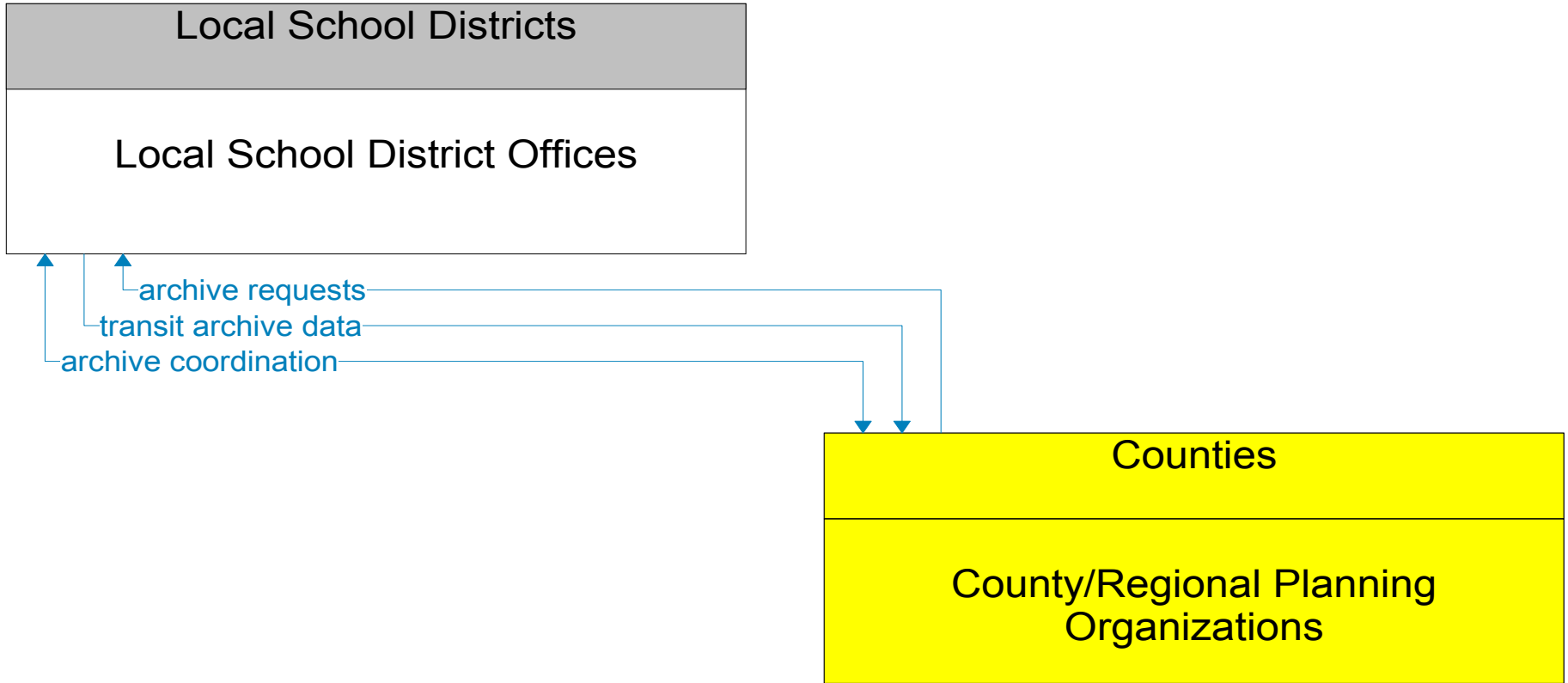
———— Existing  
----- Planned



———— Existing  
----- Planned



———— Existing  
----- Planned



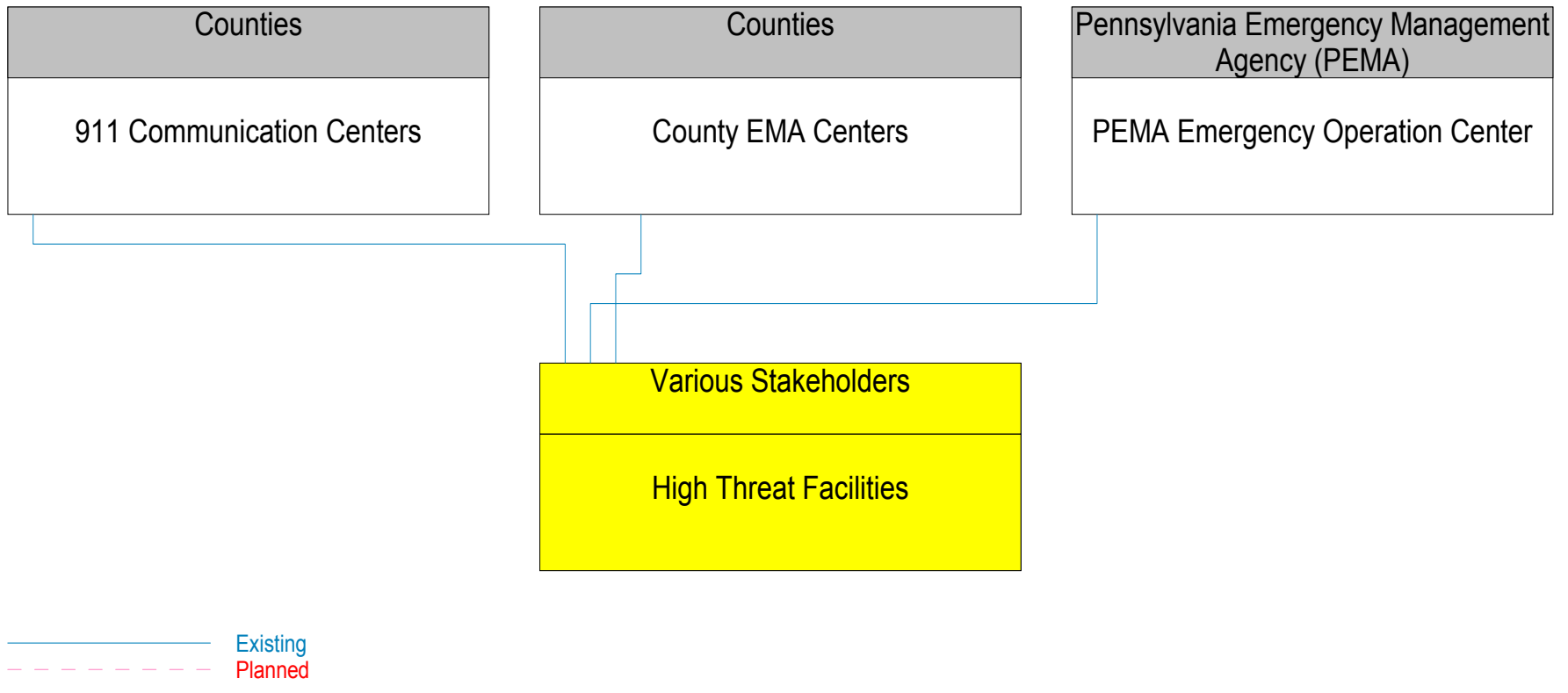
———— Existing  
- - - - - Planned



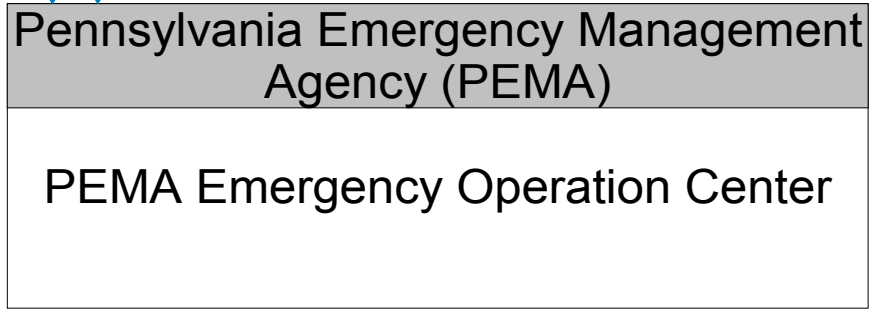
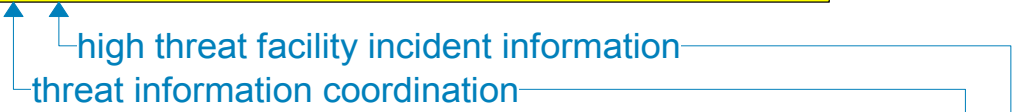
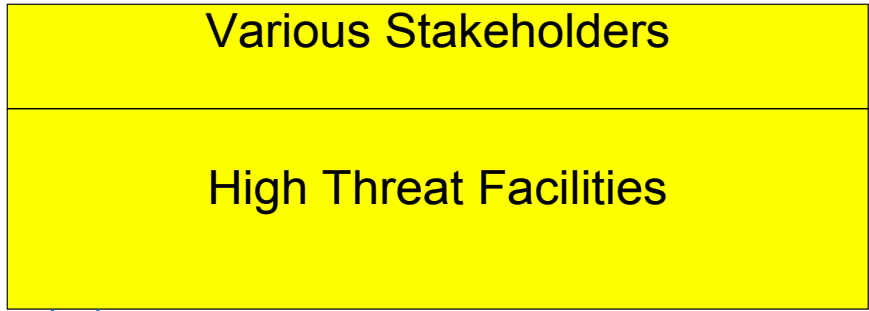
# High Threat Facilities

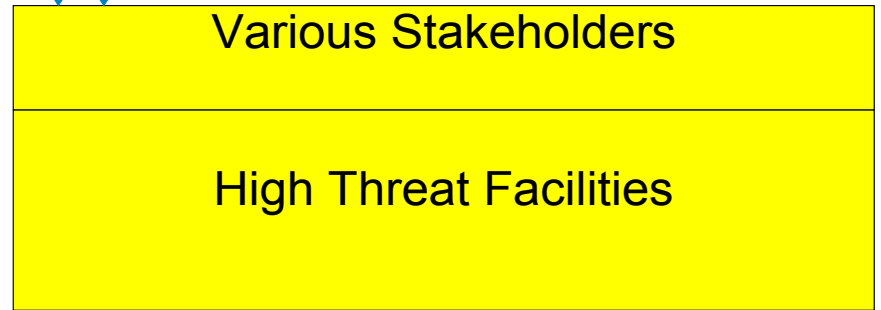
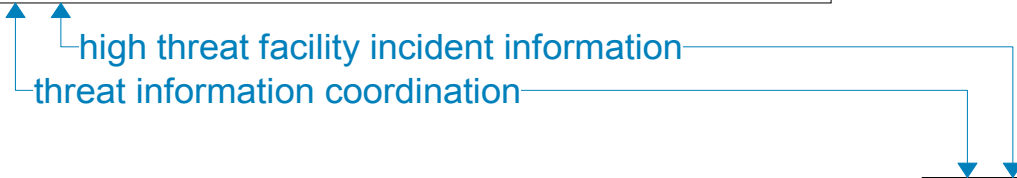
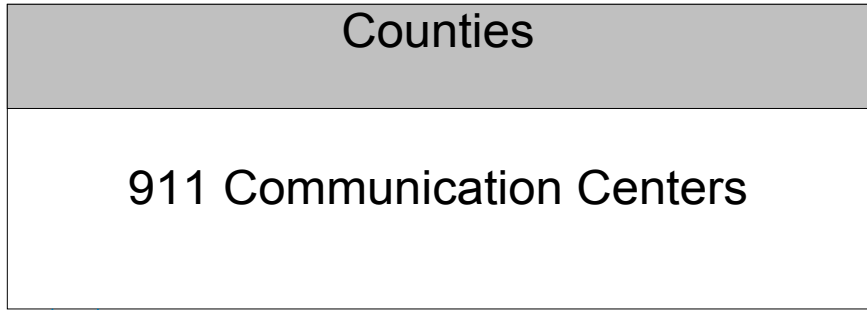
PA

# High Threat Facilities Interconnect Diagram

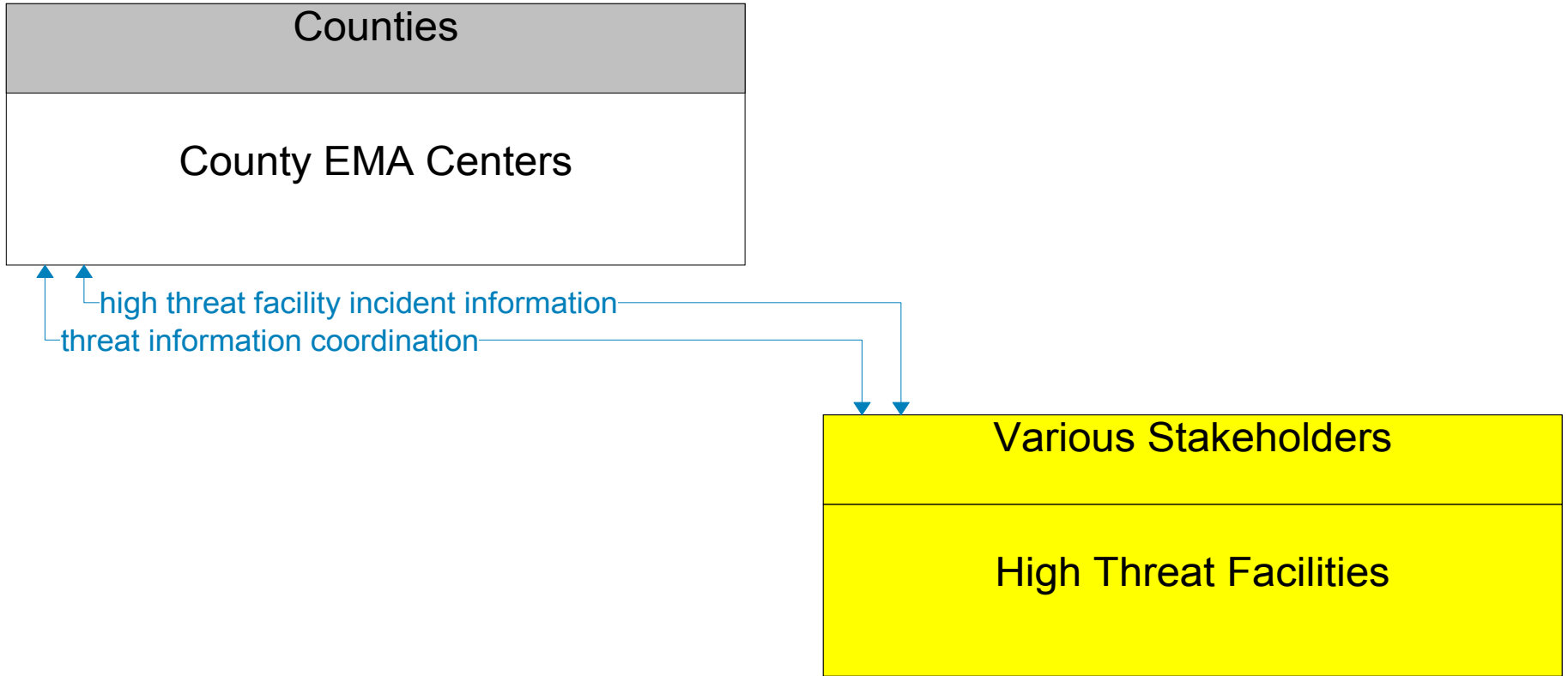






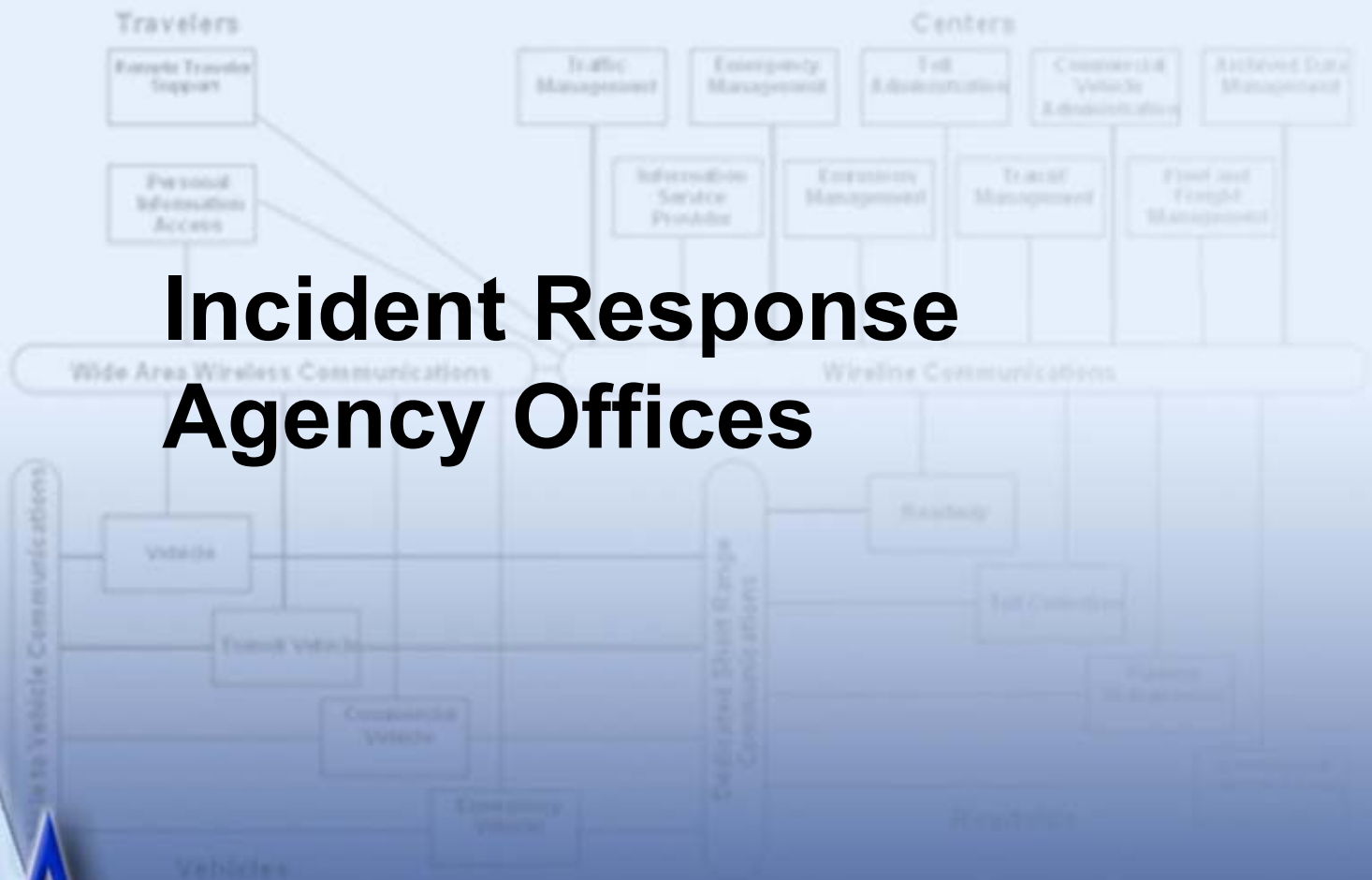


———— Existing  
- - - - - Planned



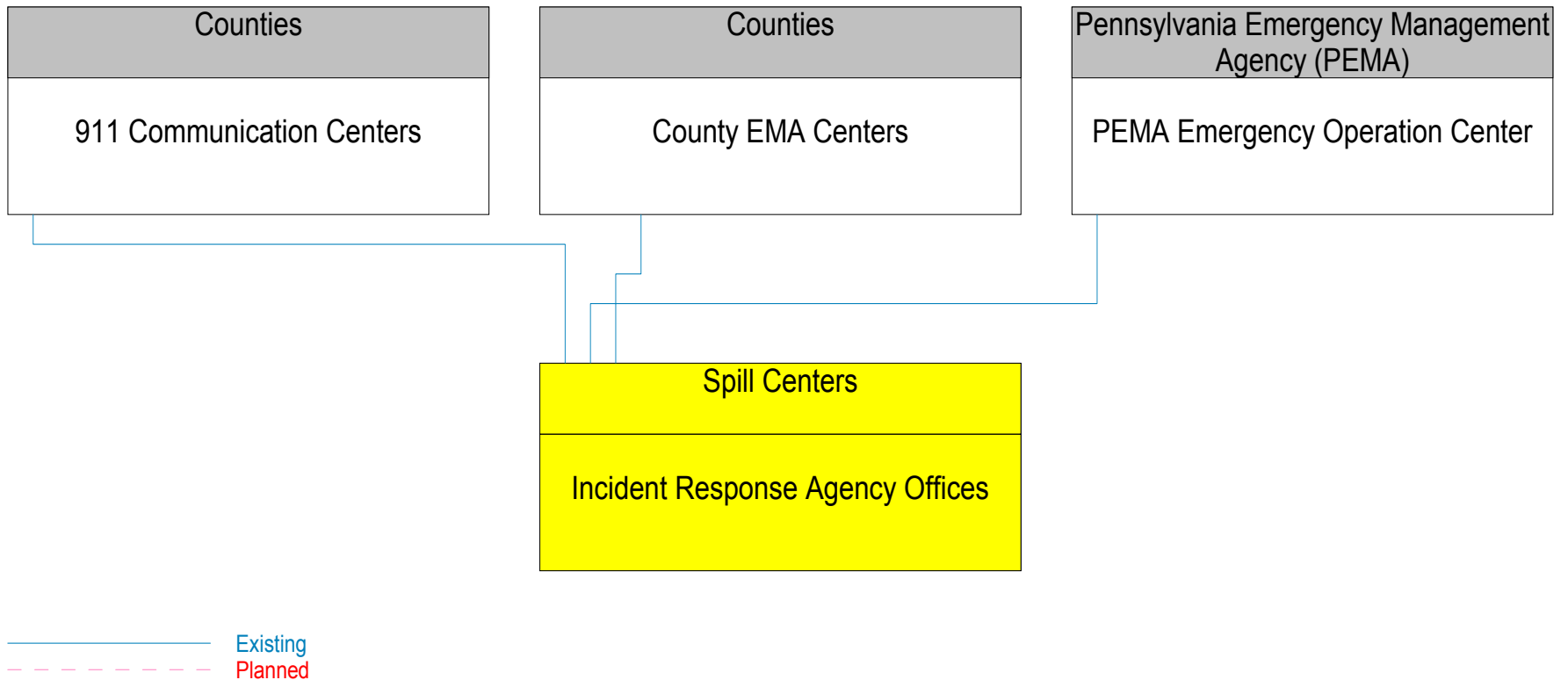
———— Existing  
----- Planned

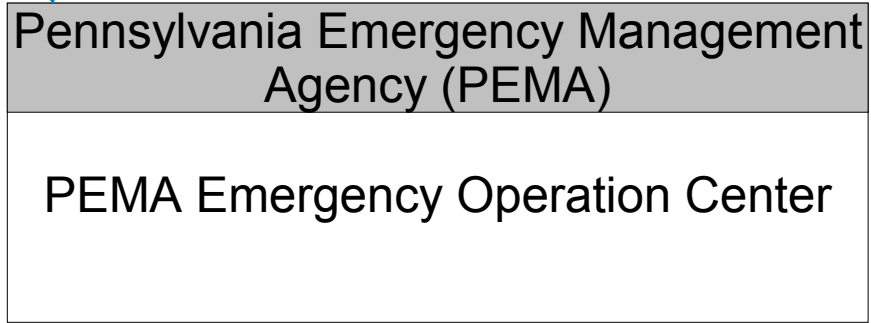
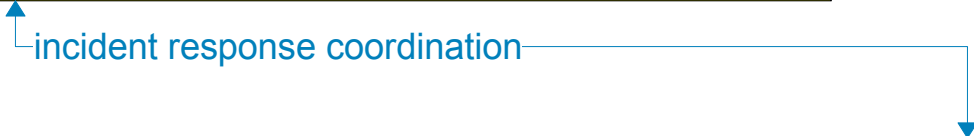
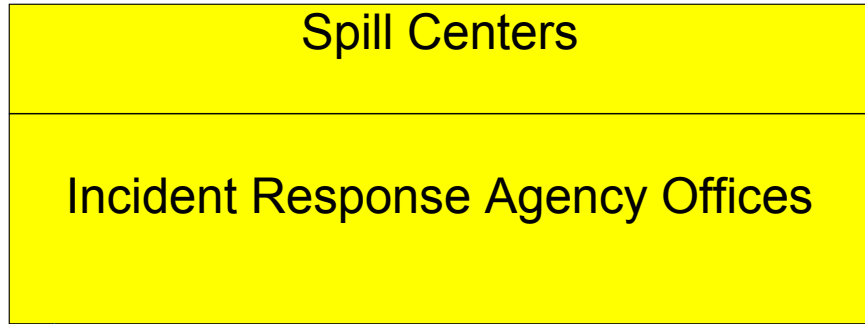
# Incident Response Agency Offices

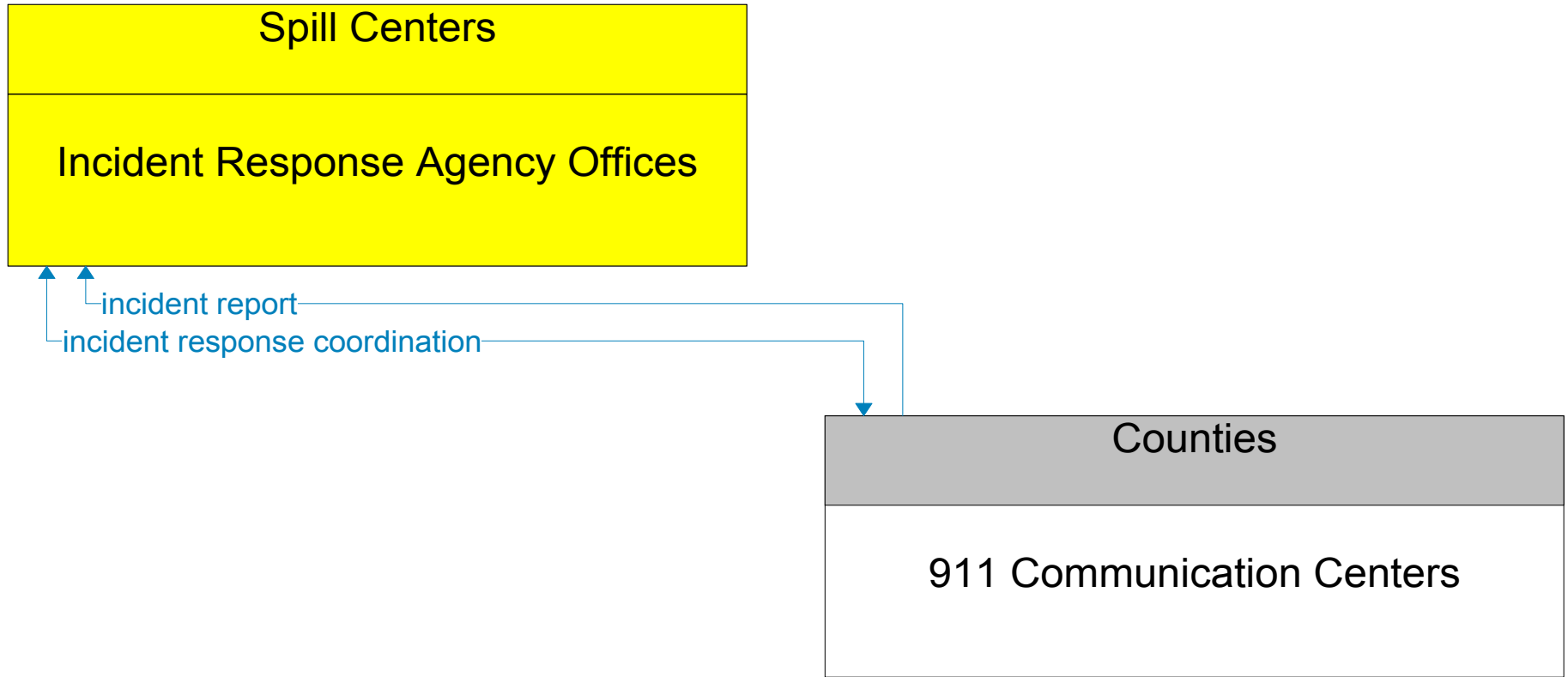


PA

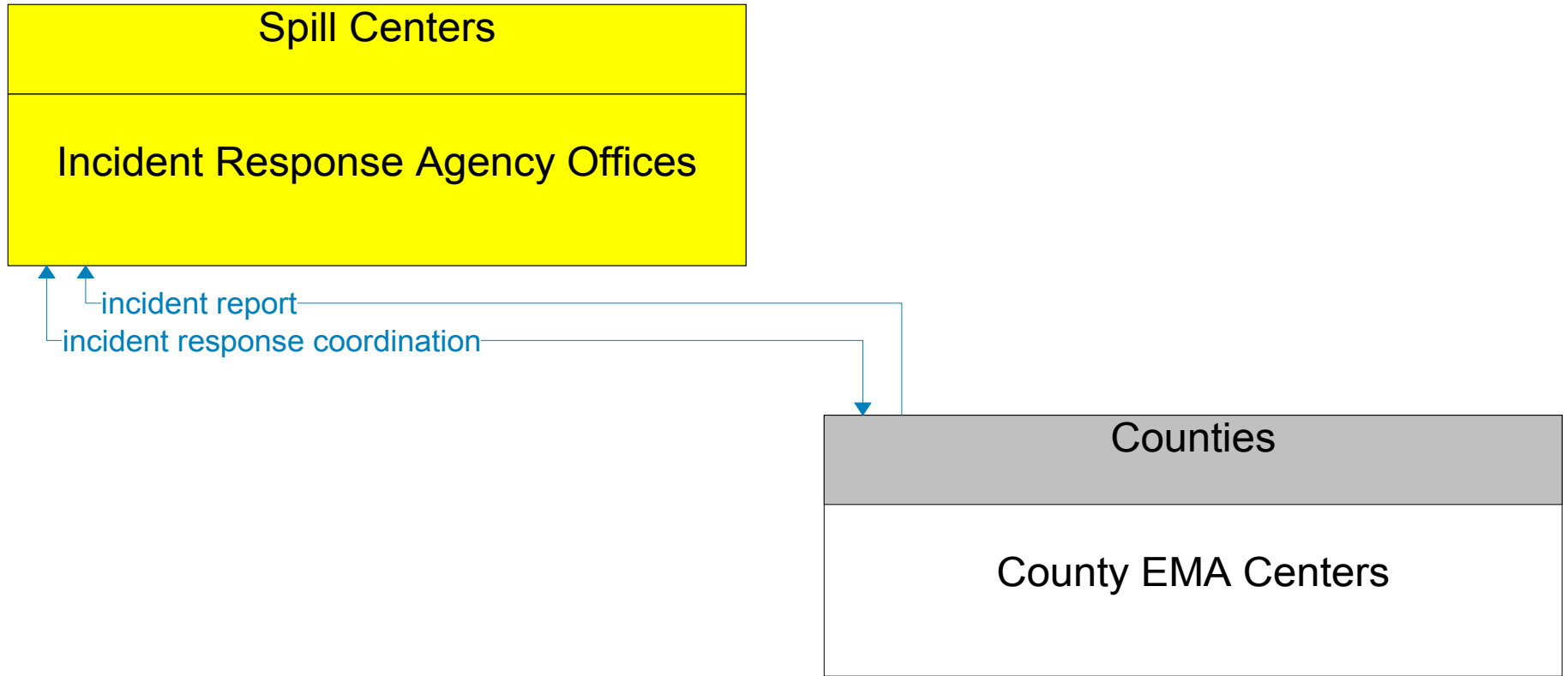
# Incident Response Agency Offices Interconnect Diagram







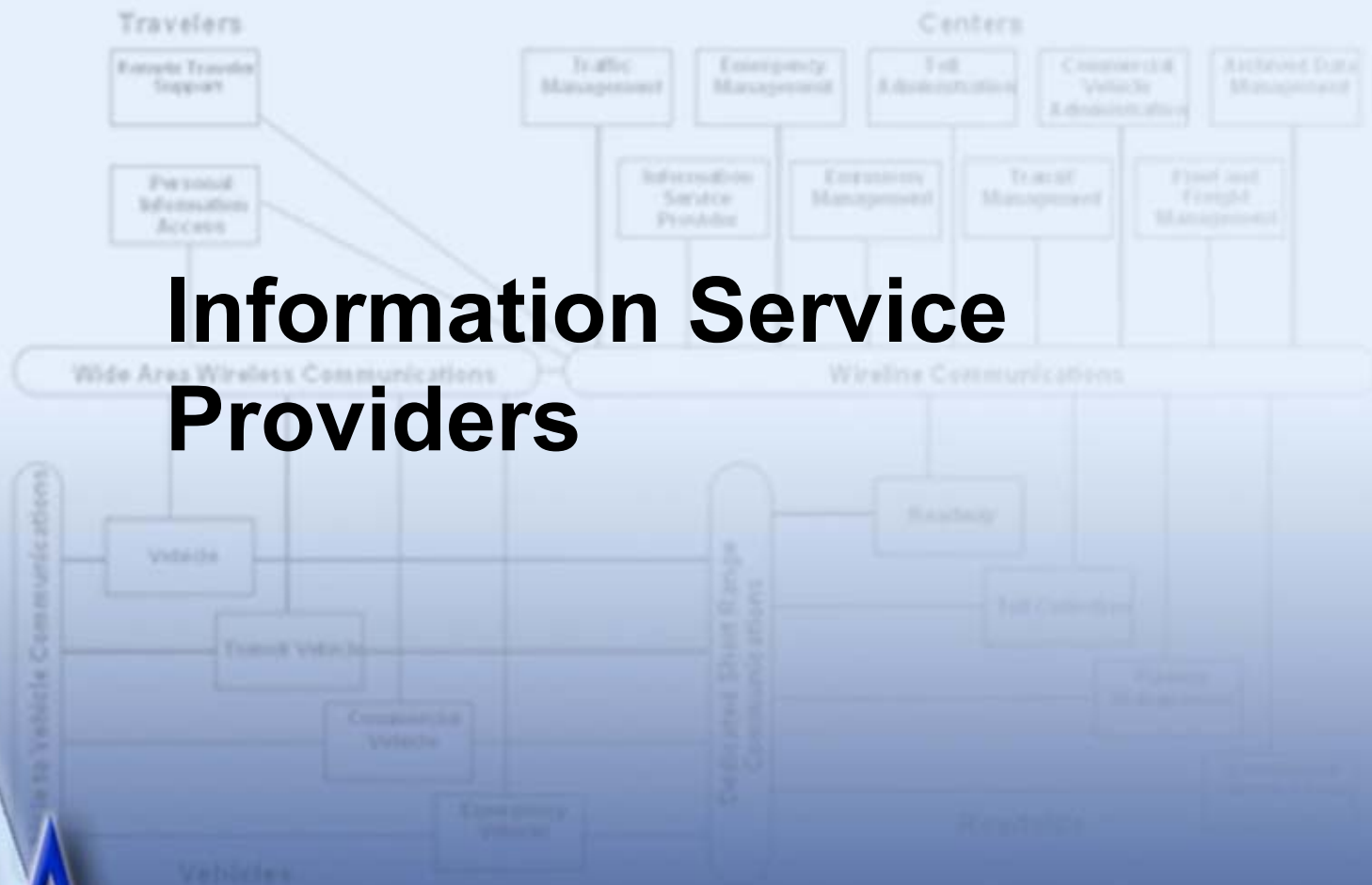
———— Existing  
----- Planned



———— Existing  
----- Planned

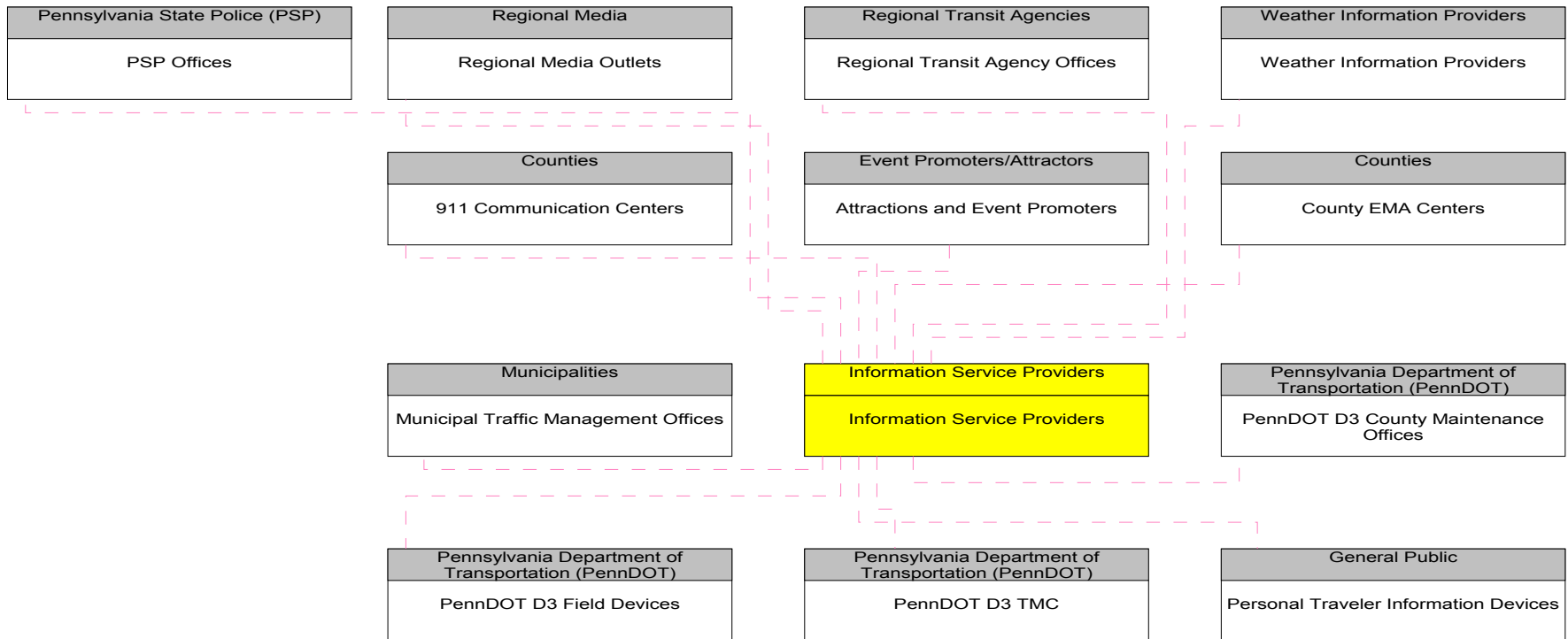


# Information Service Providers

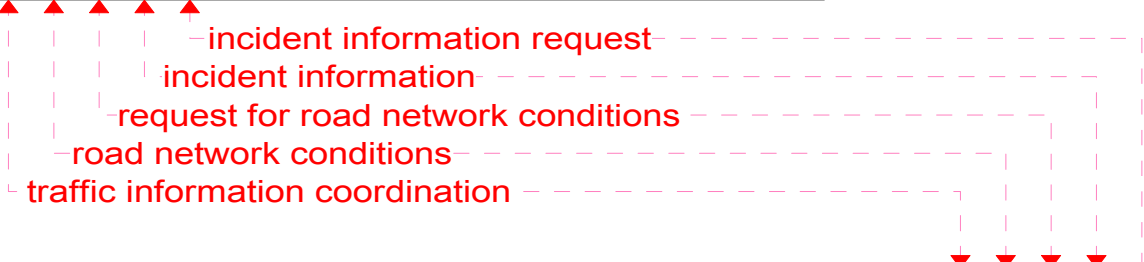
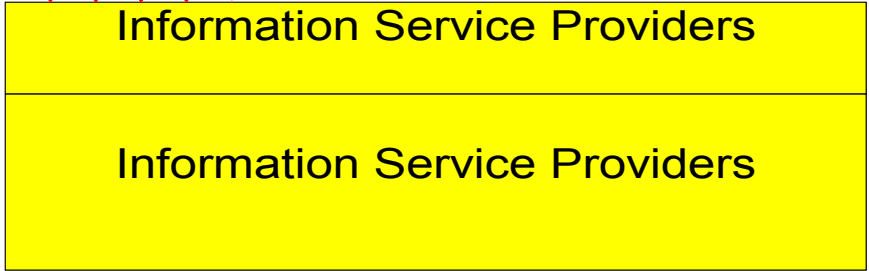
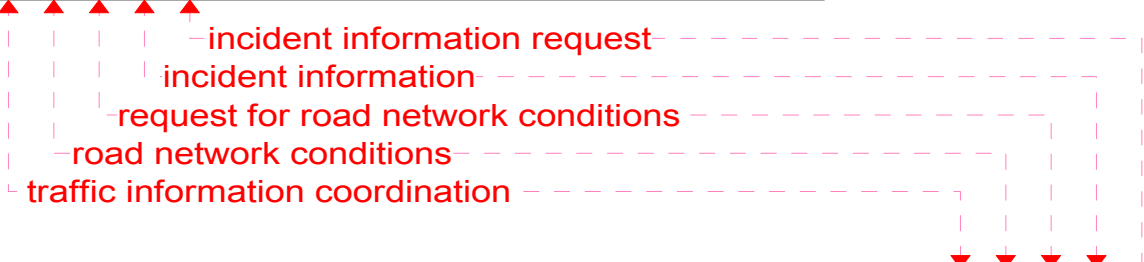
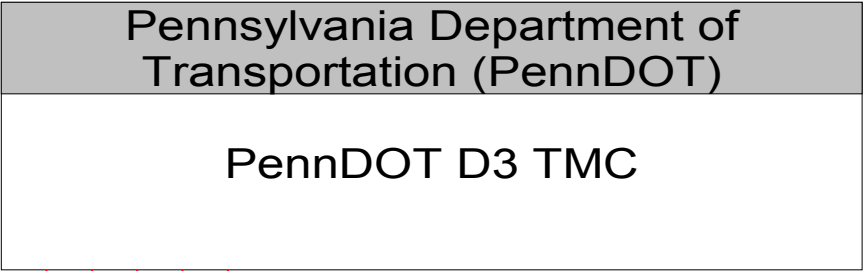


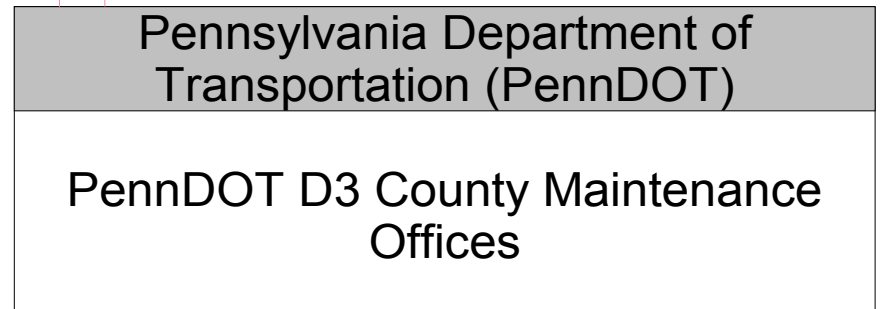
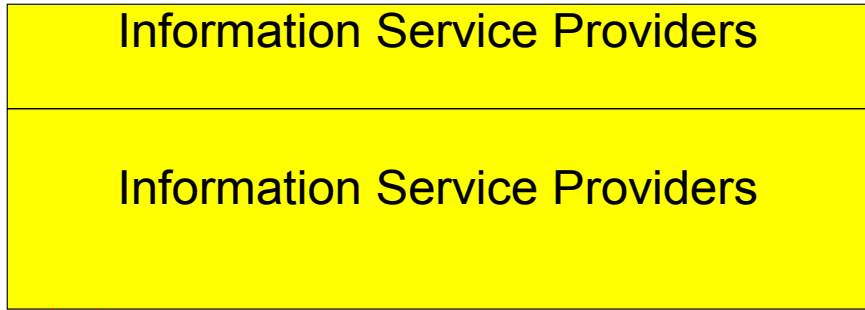
PA

# Information Service Providers Interconnect Diagram

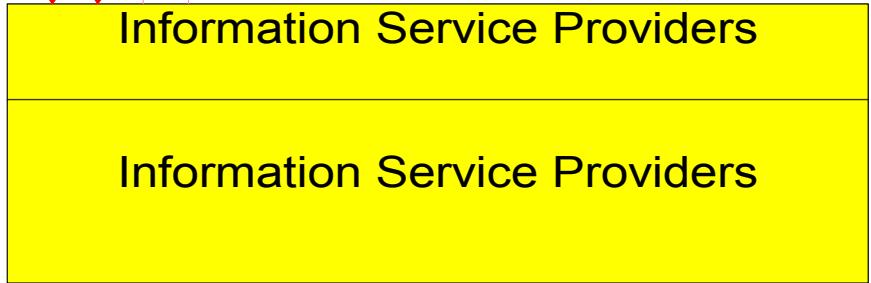
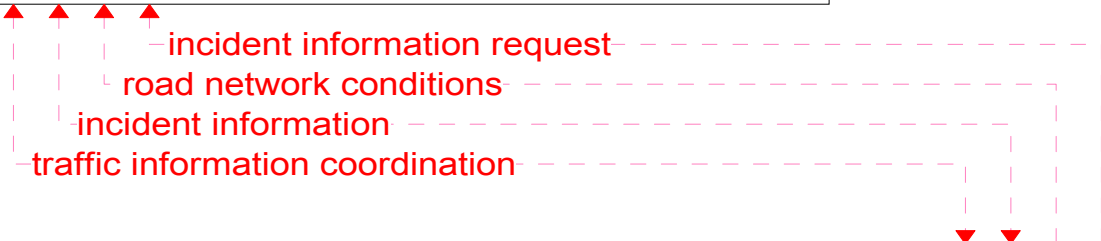


— Existing  
- - - Planned

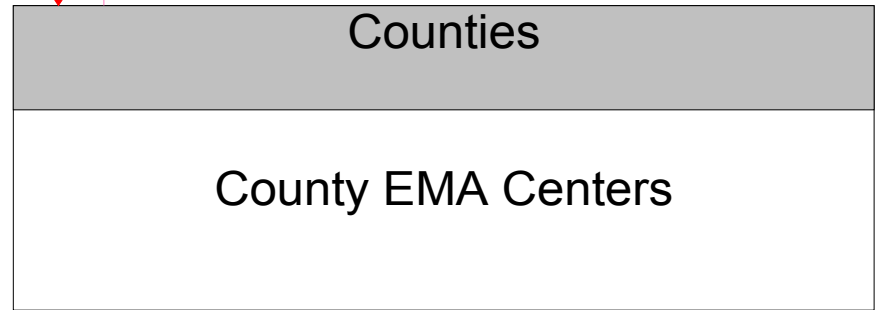
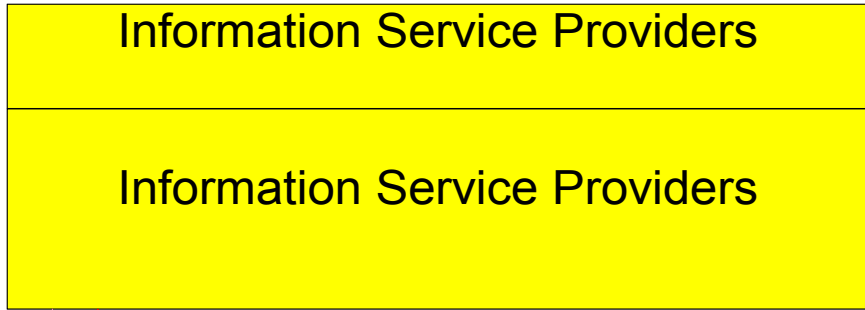




———— Existing  
- - - - - Planned

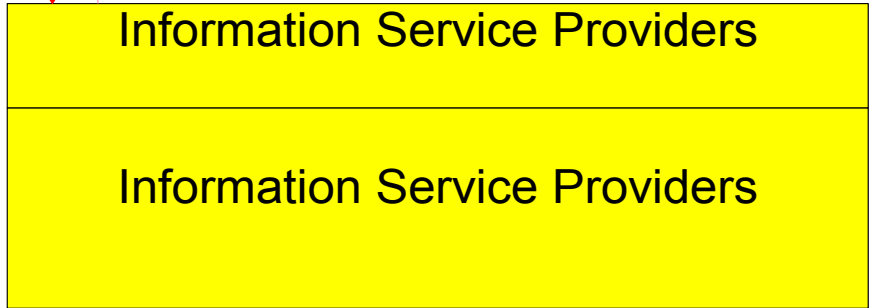
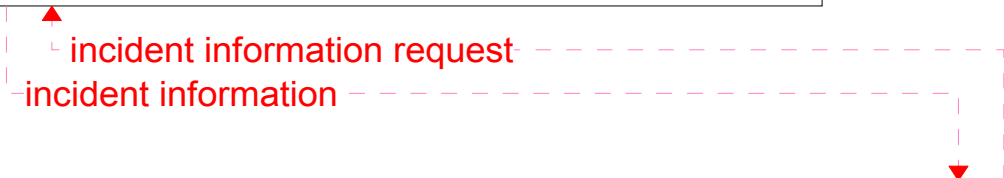
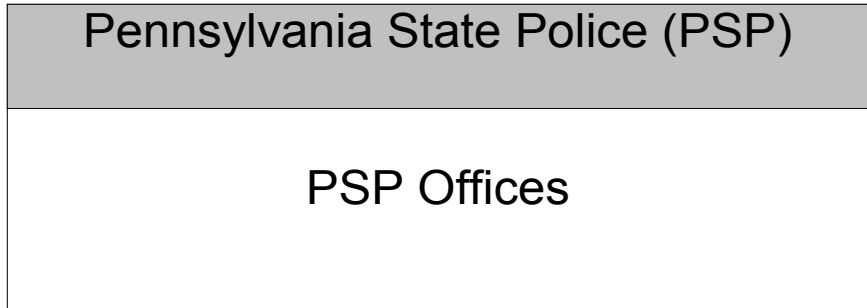


———— Existing  
- - - - - Planned

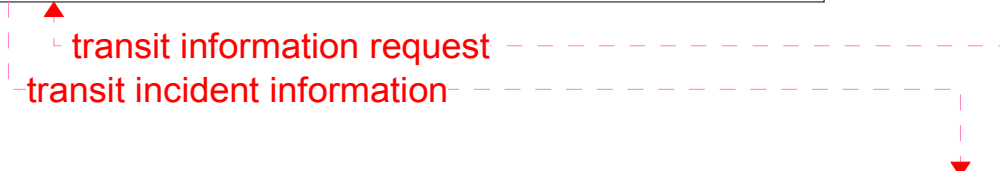
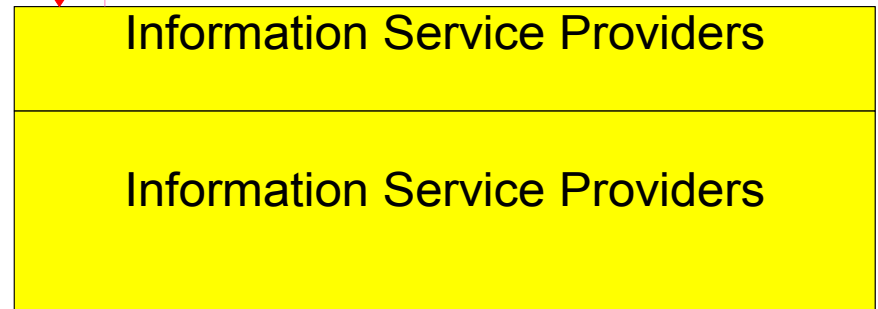
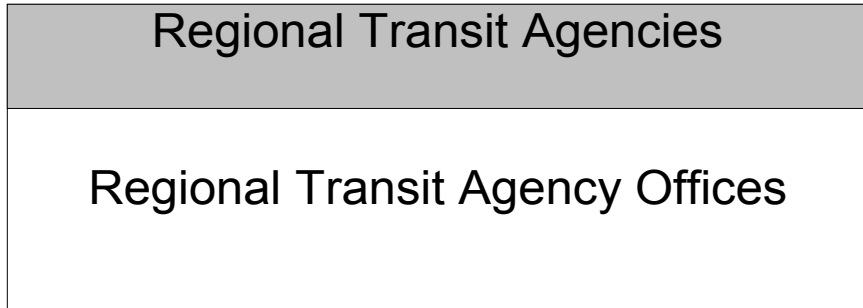


Existing

Planned

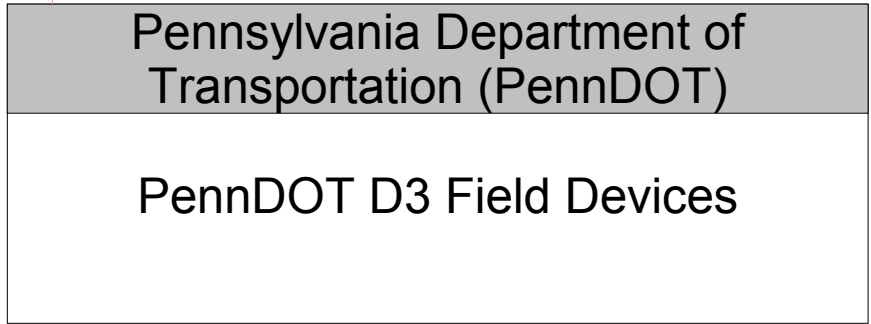
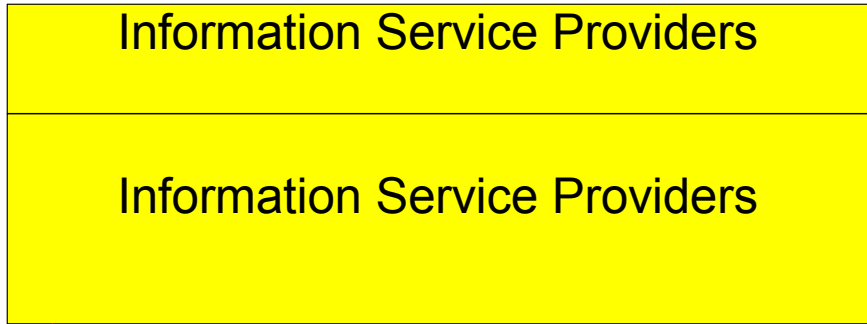


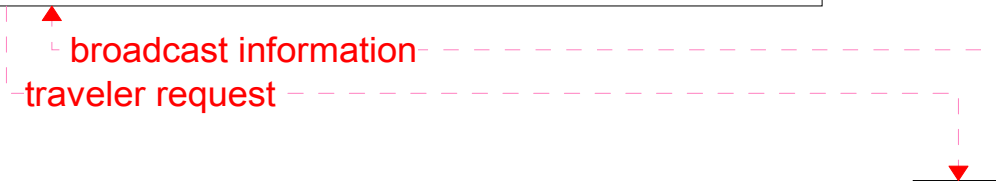
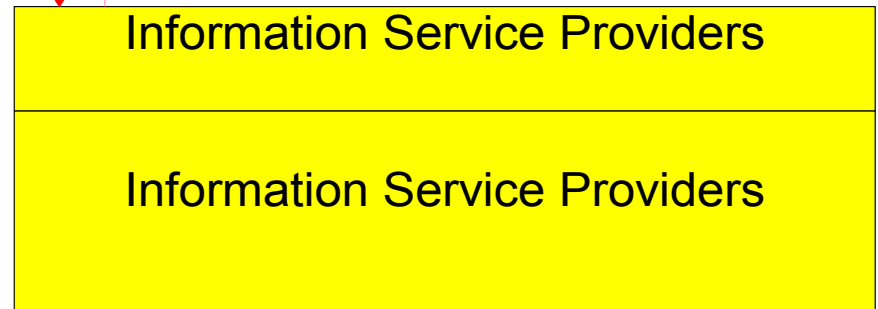
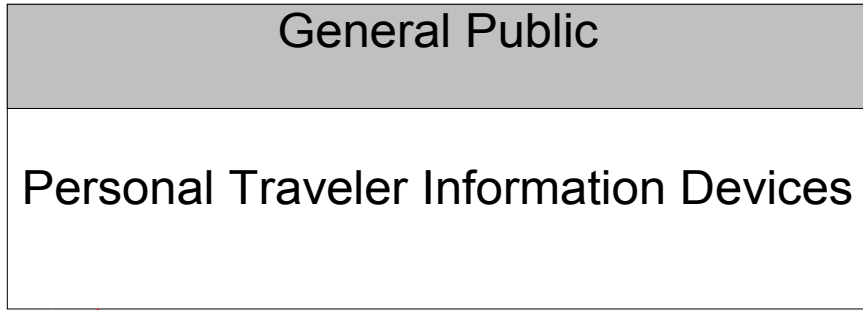
———— Existing  
- - - - - Planned



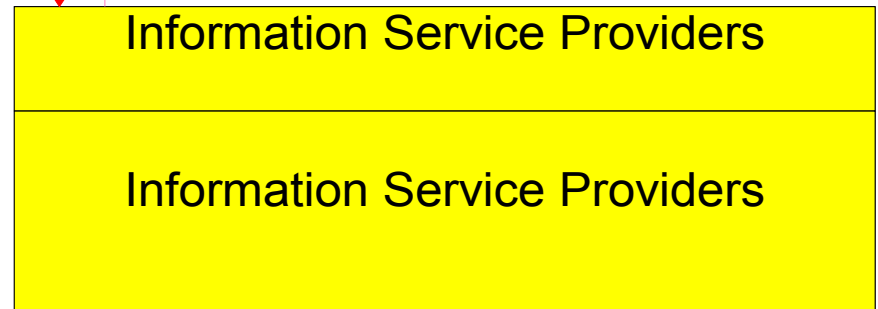
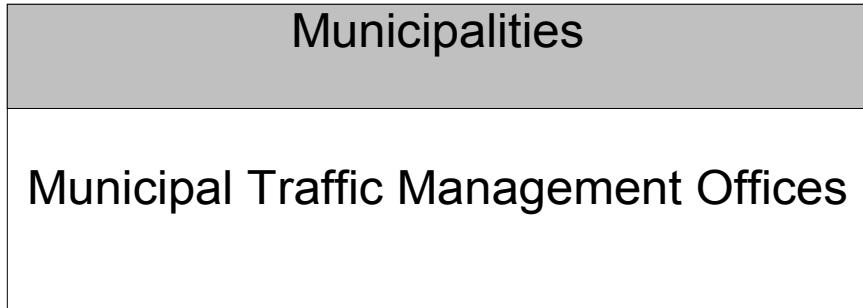
Existing  
Planned



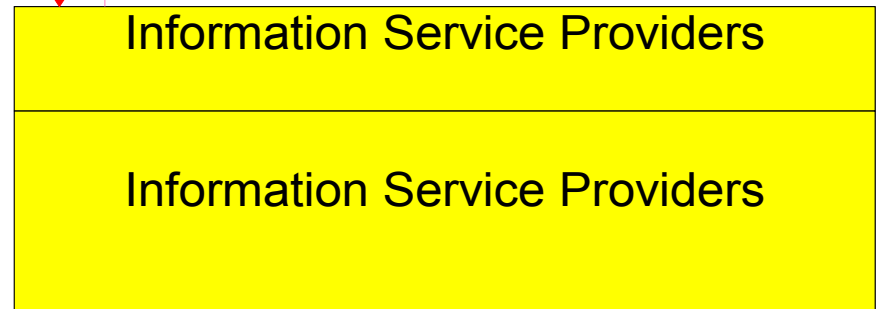
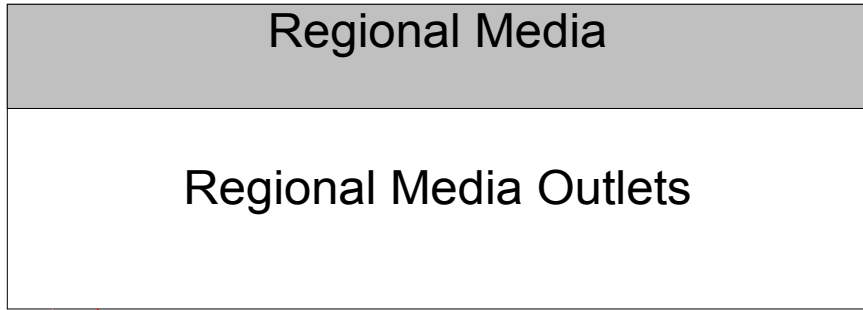




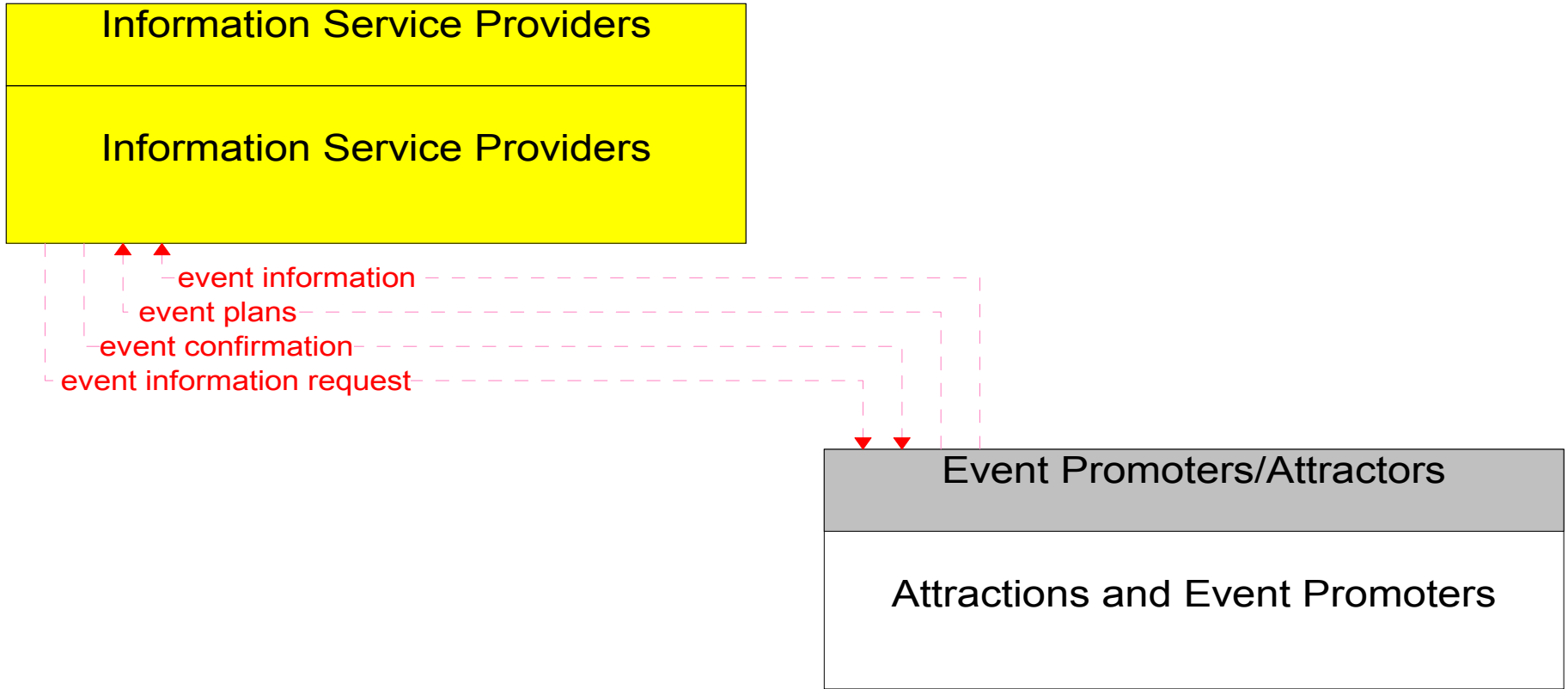
———— Existing  
- - - - - Planned

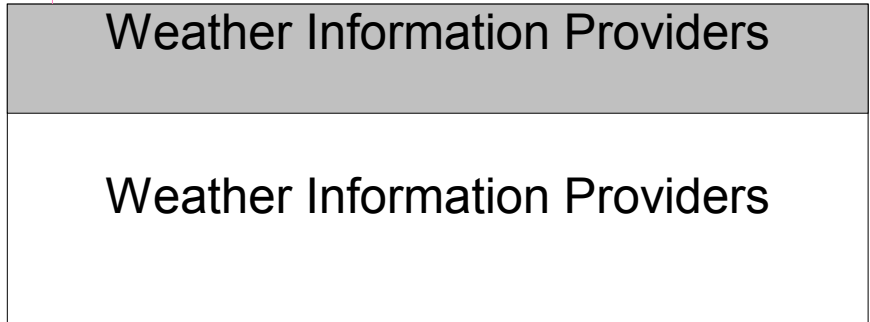
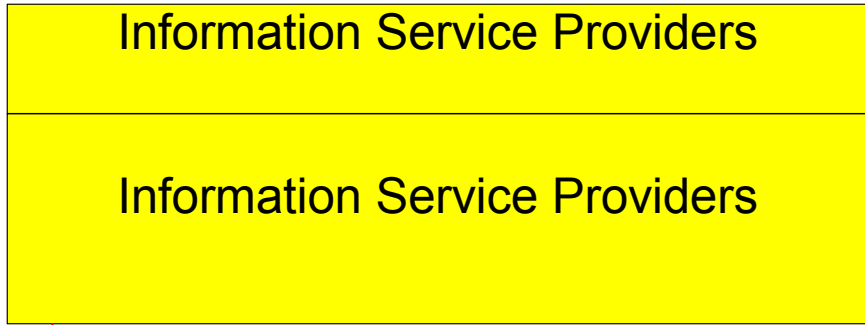


———— Existing  
- - - - - Planned

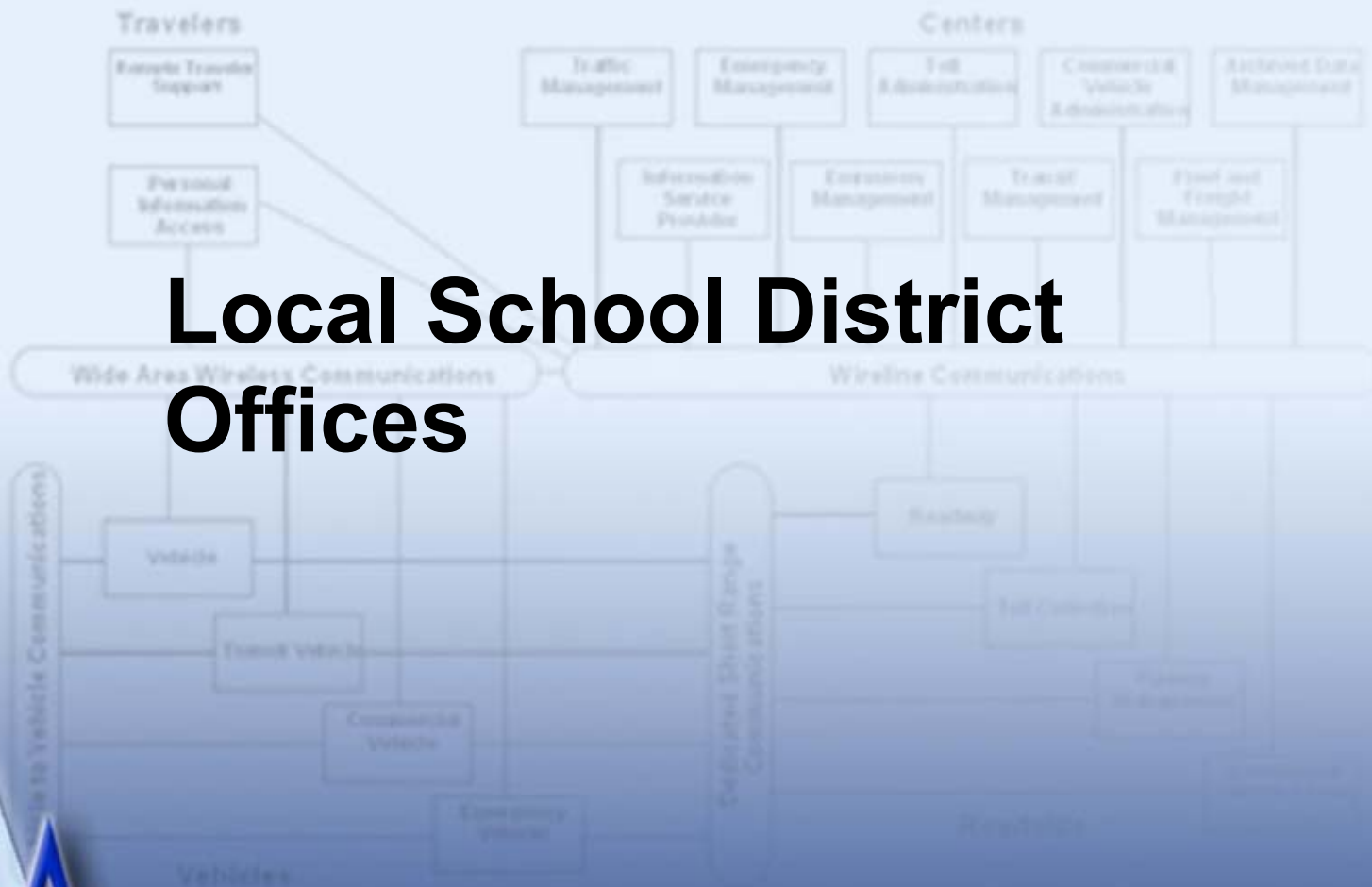


———— Existing  
- - - - - Planned

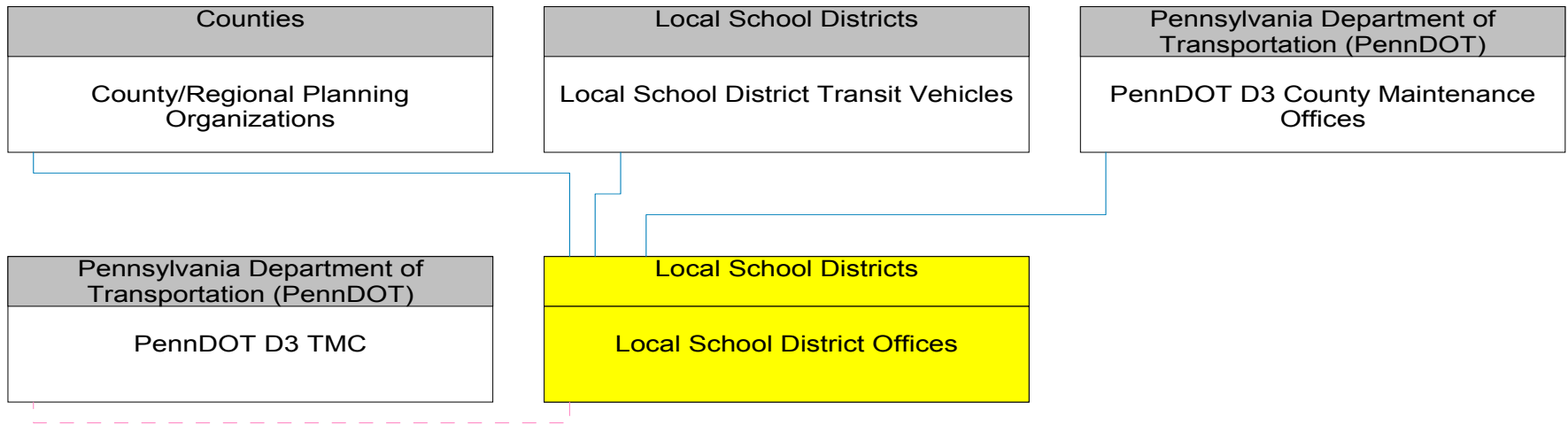




# Local School District Offices

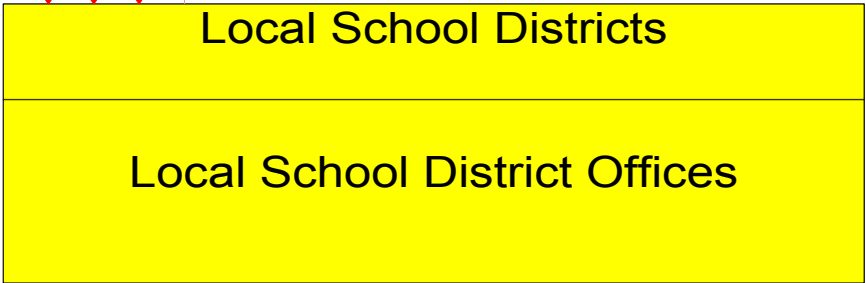
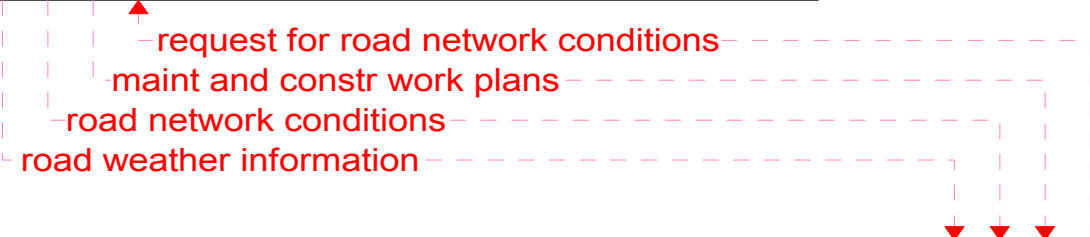
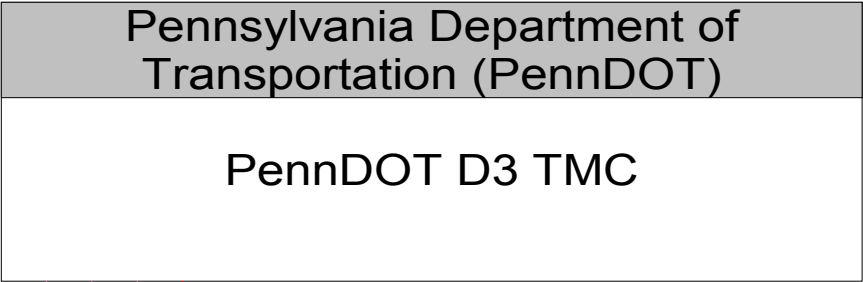


# Local School District Offices Interconnect Diagram



— Existing  
- - - Planned

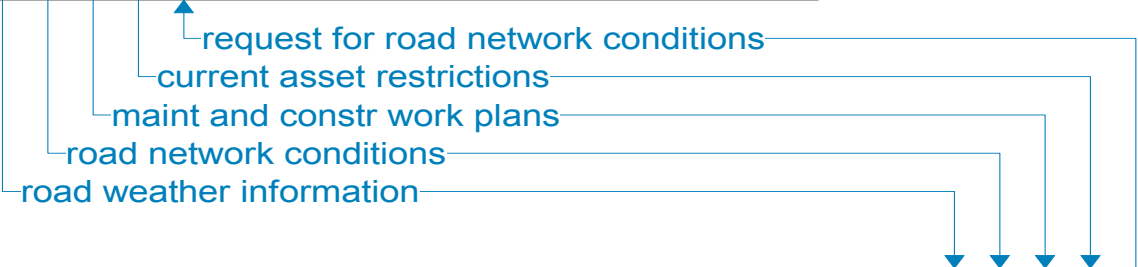




Existing  
Planned

**Pennsylvania Department of  
Transportation (PennDOT)**

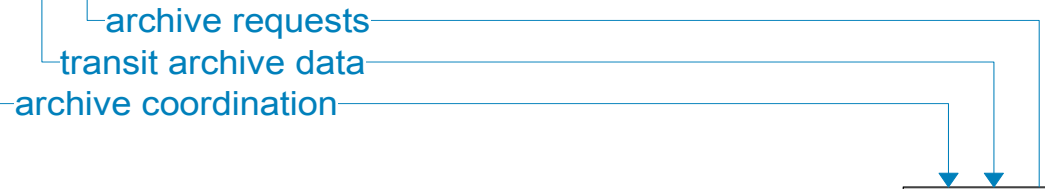
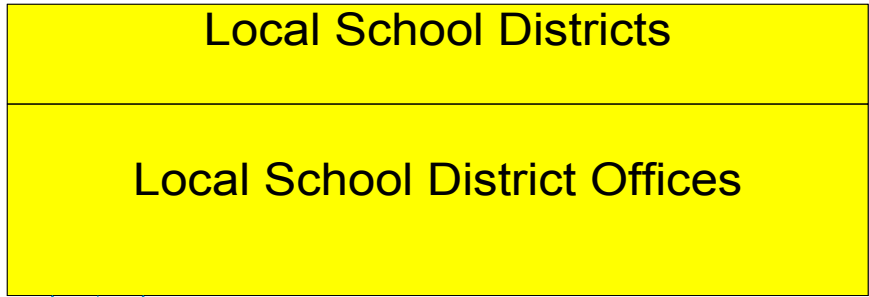
**PennDOT D3 County Maintenance  
Offices**



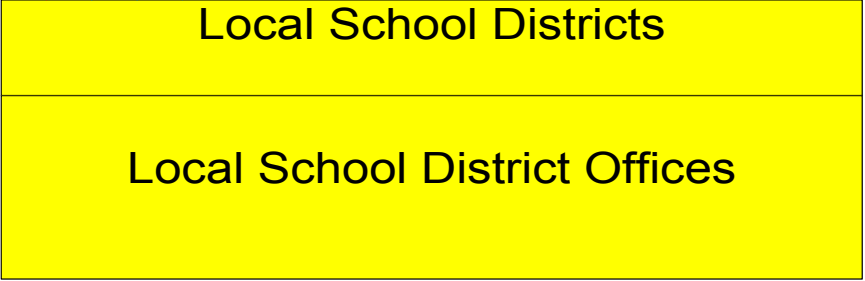
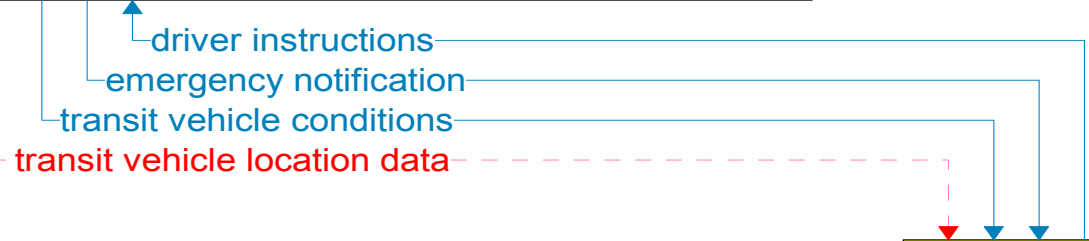
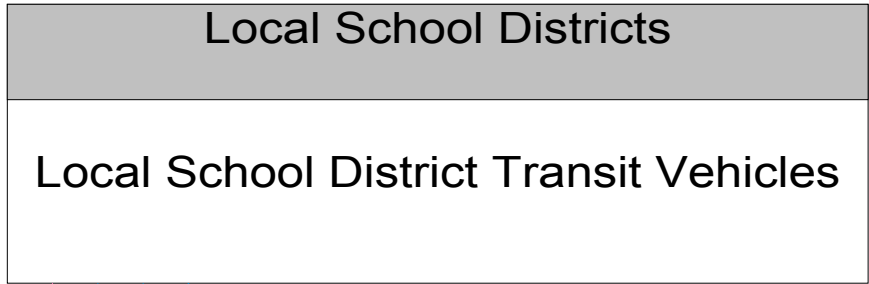
**Local School Districts**

**Local School District Offices**

———— Existing  
- - - - - Planned

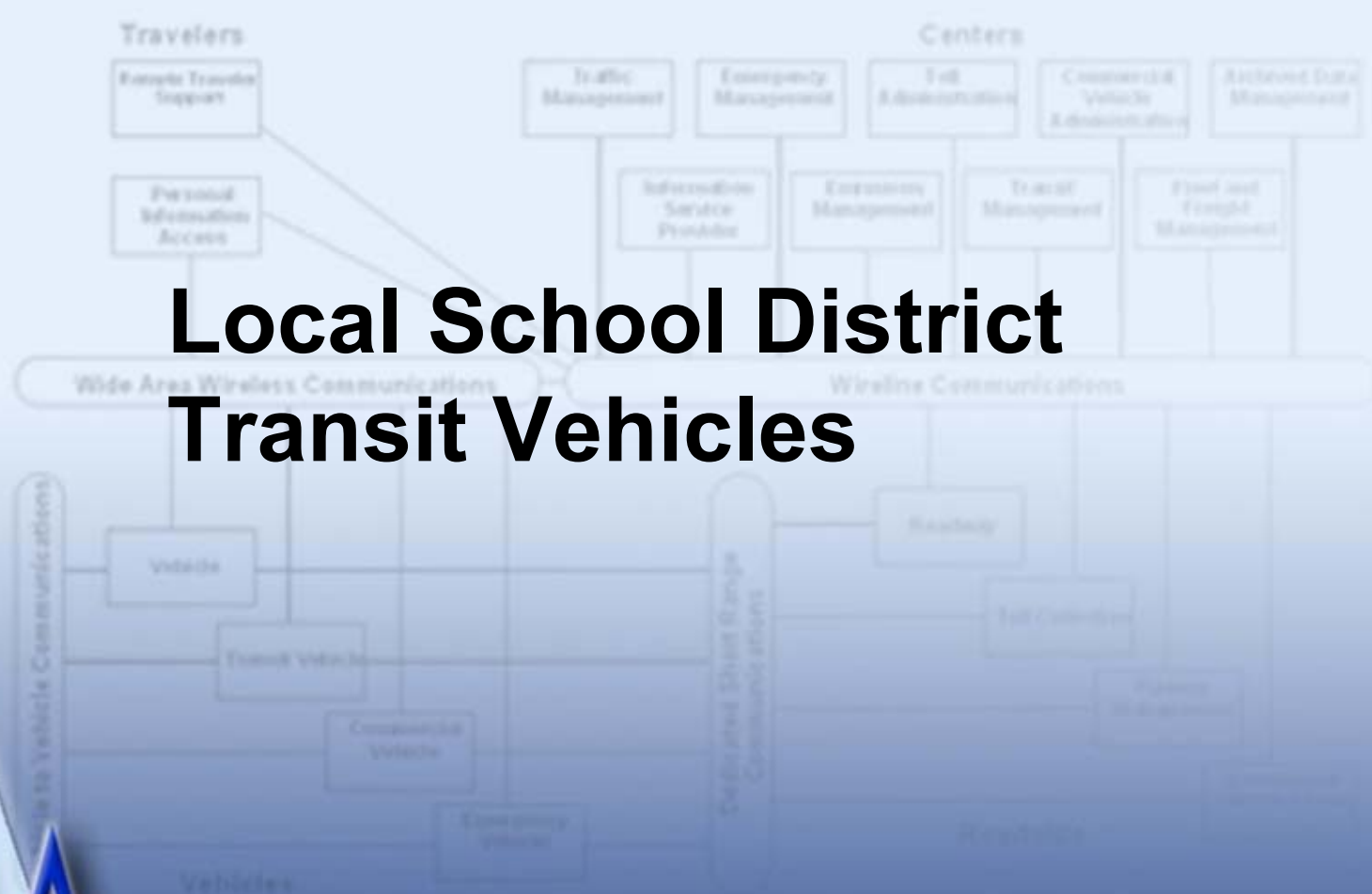


Existing  
Planned

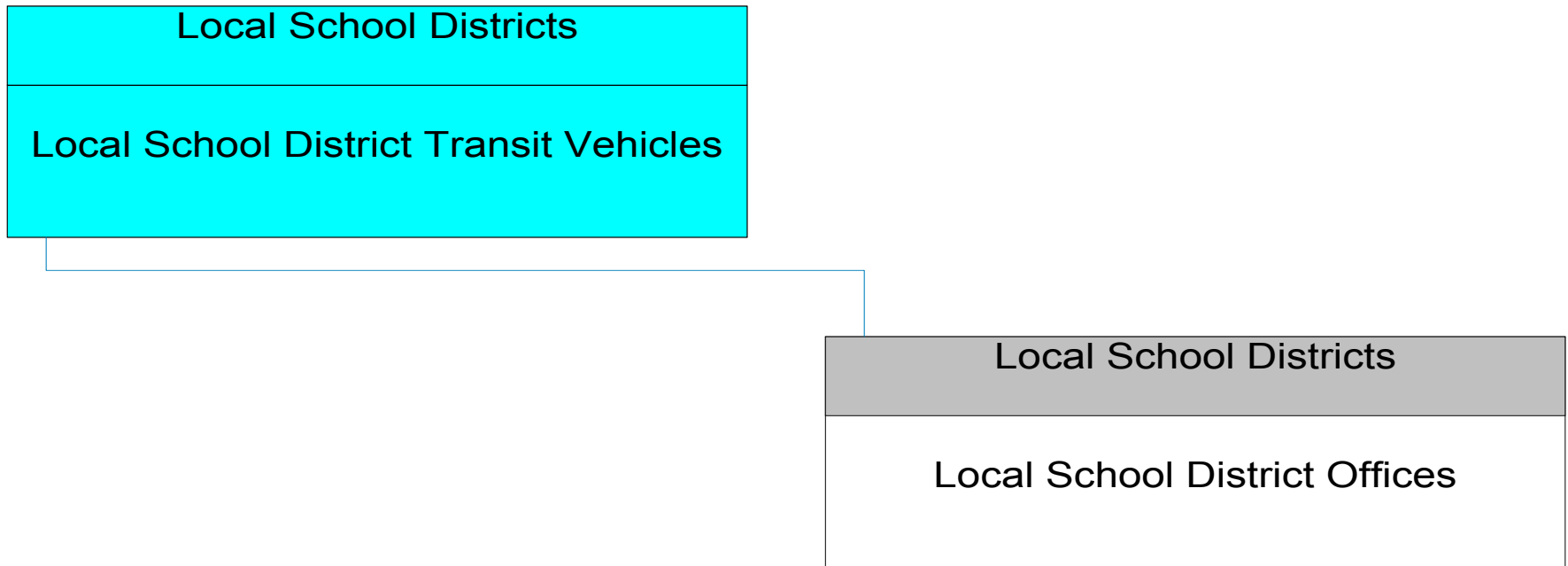


Existing  
Planned

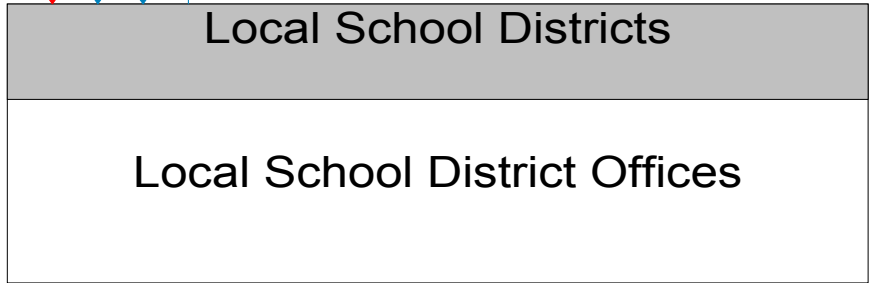
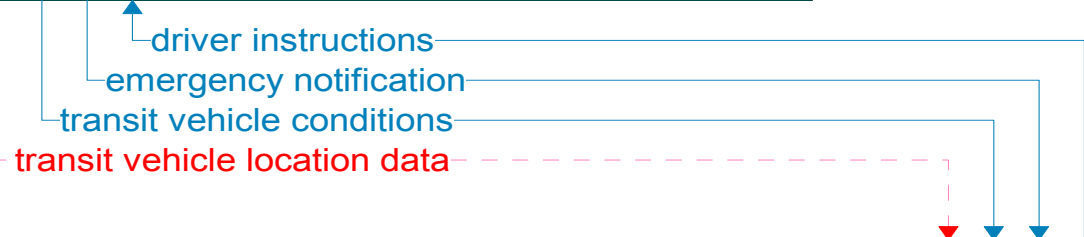
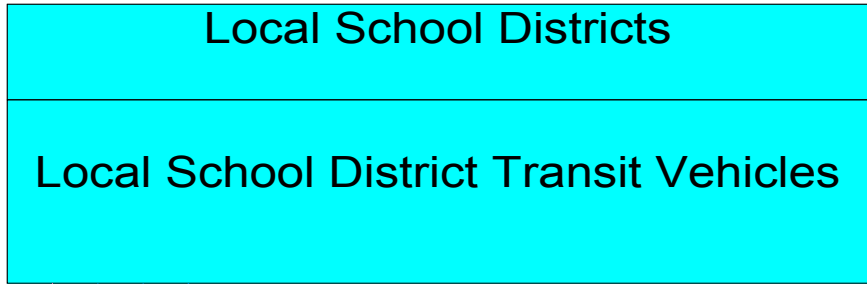
# Local School District Transit Vehicles



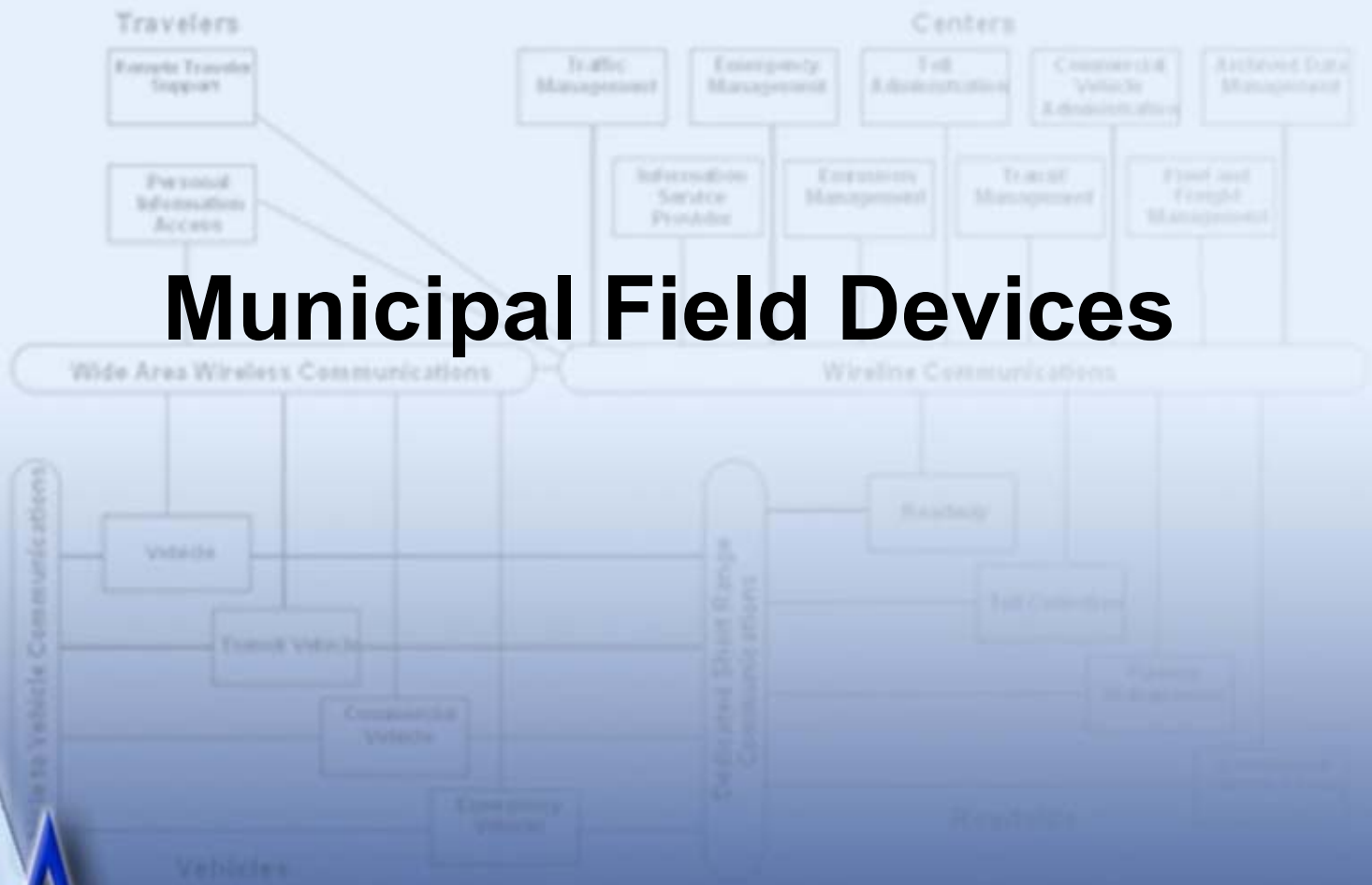
# Local School District Transit Vehicles Interconnect Diagram



———— Existing  
----- Planned

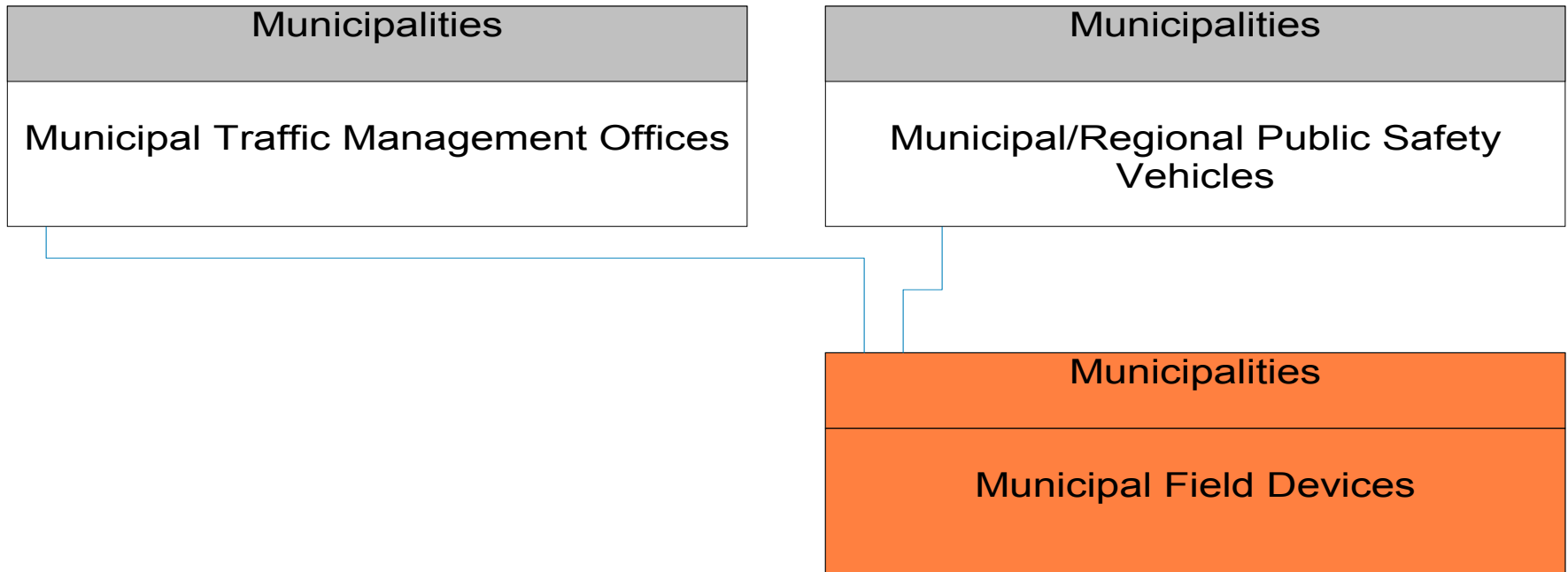


# Municipal Field Devices

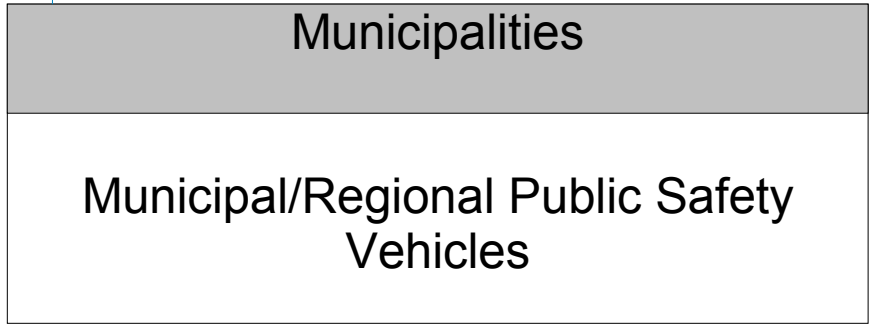
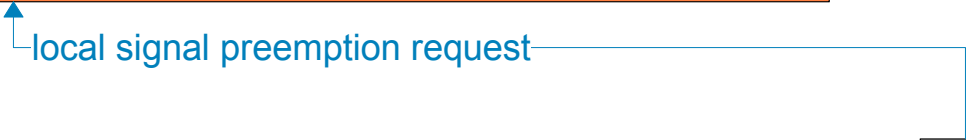


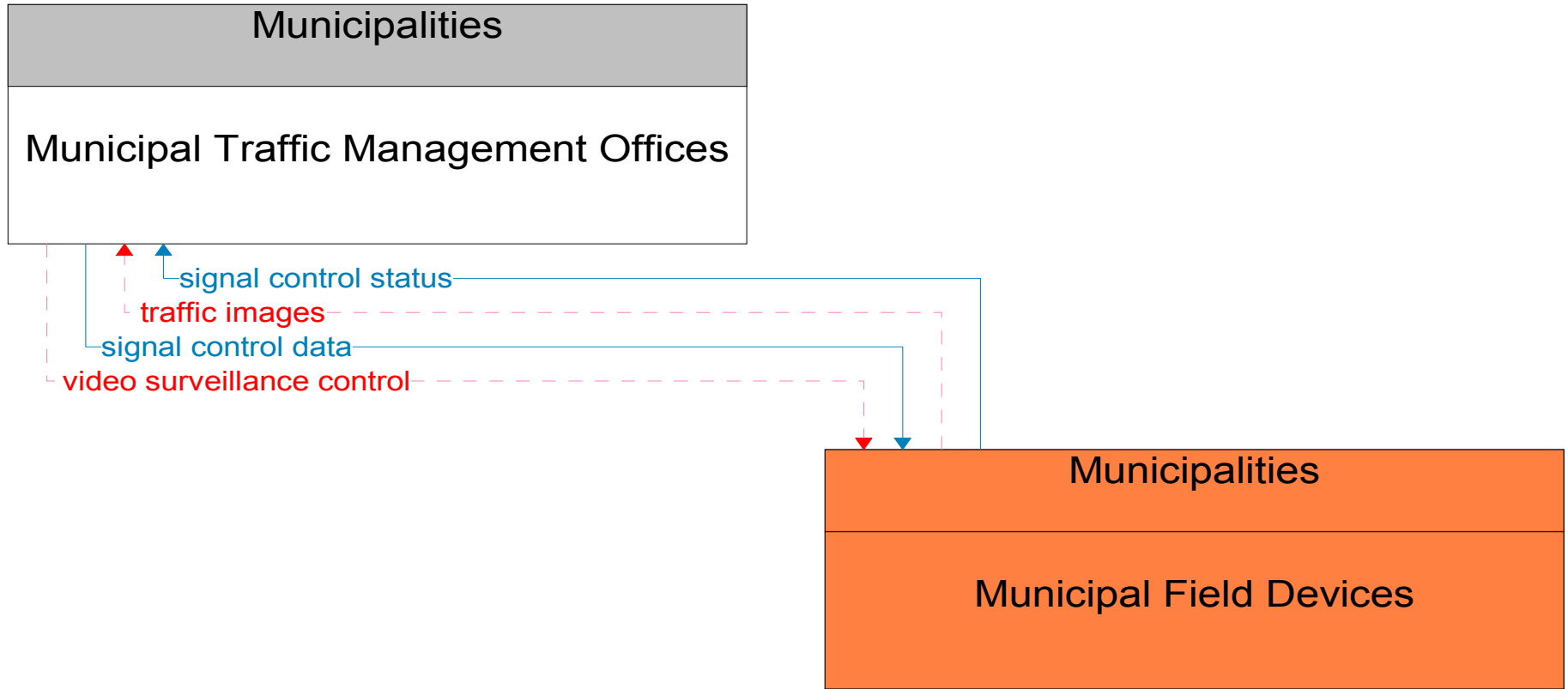


# Municipal Field Devices Interconnect Diagram



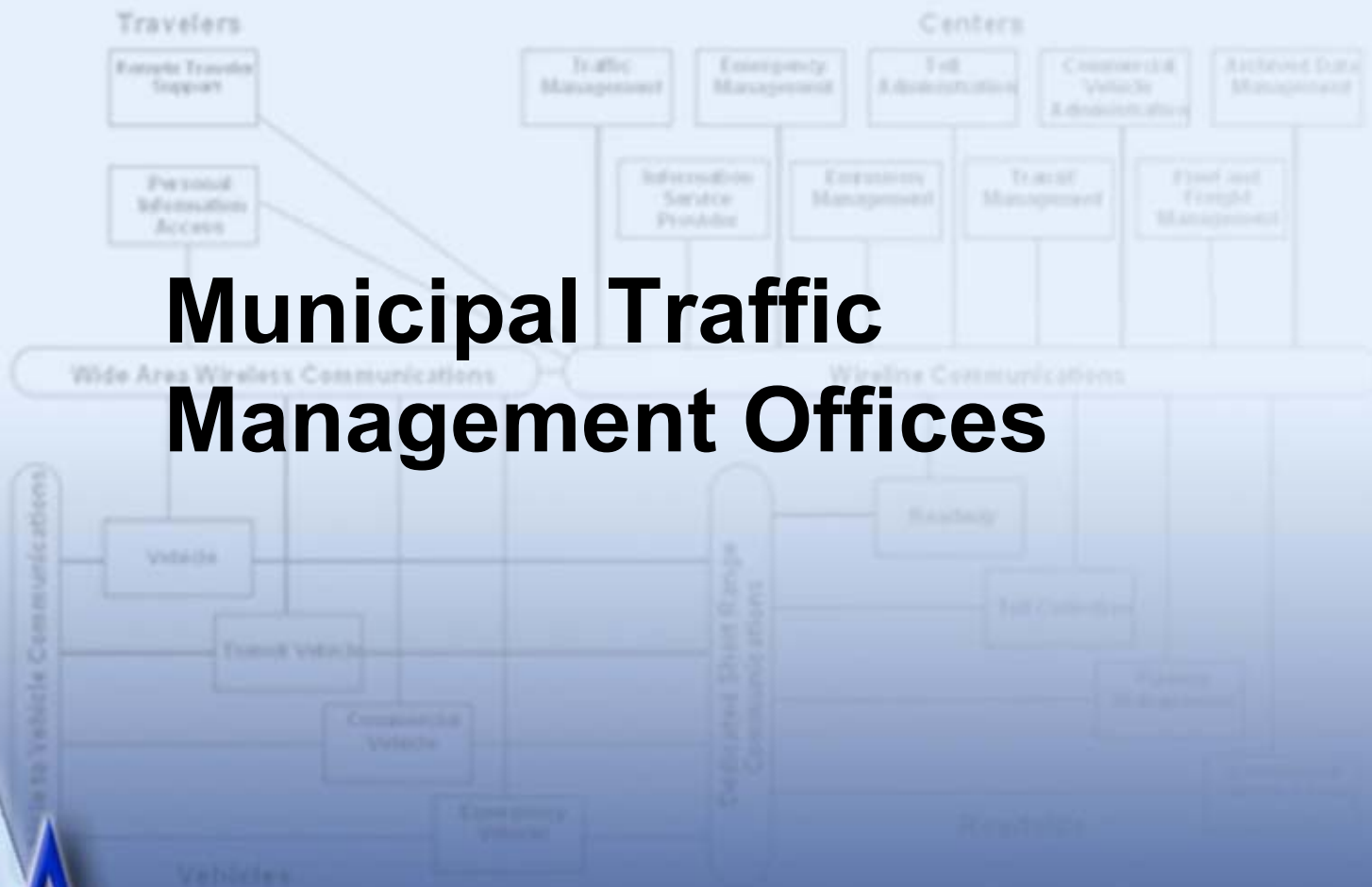
———— Existing  
- - - - - Planned



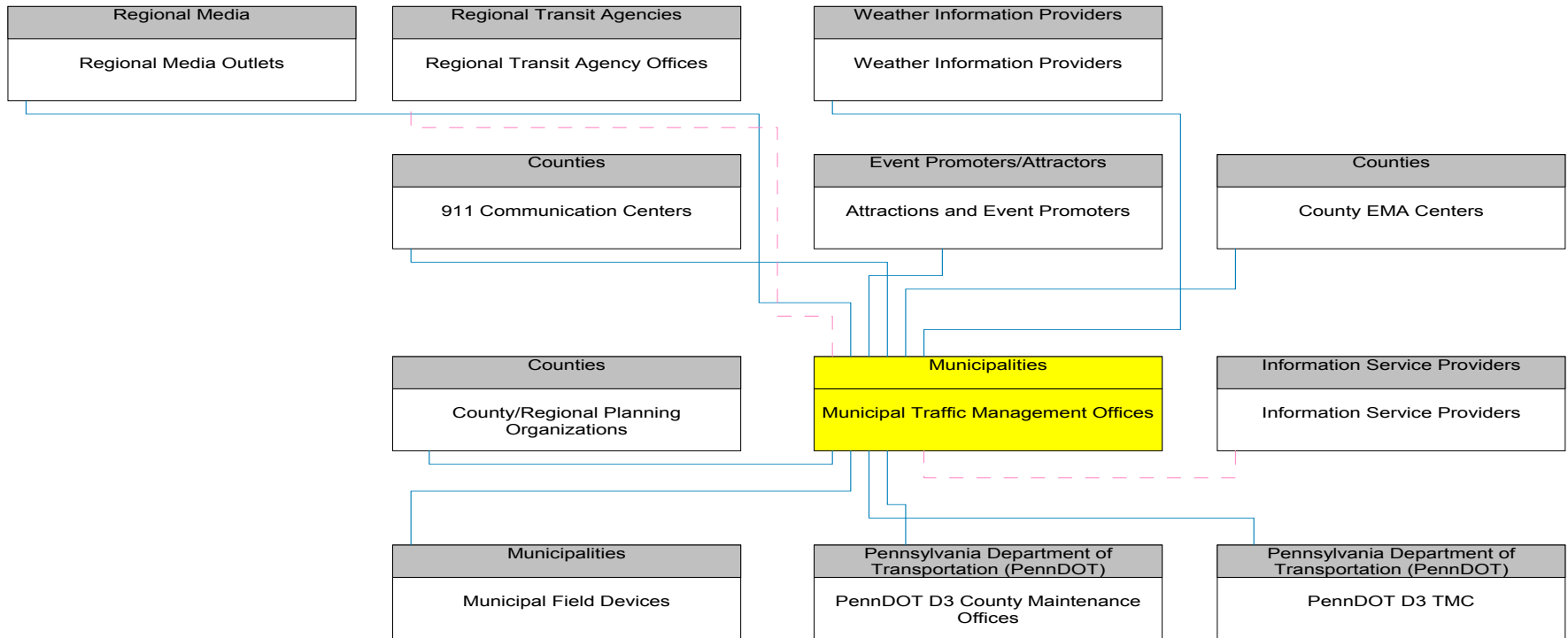


———— Existing  
----- Planned

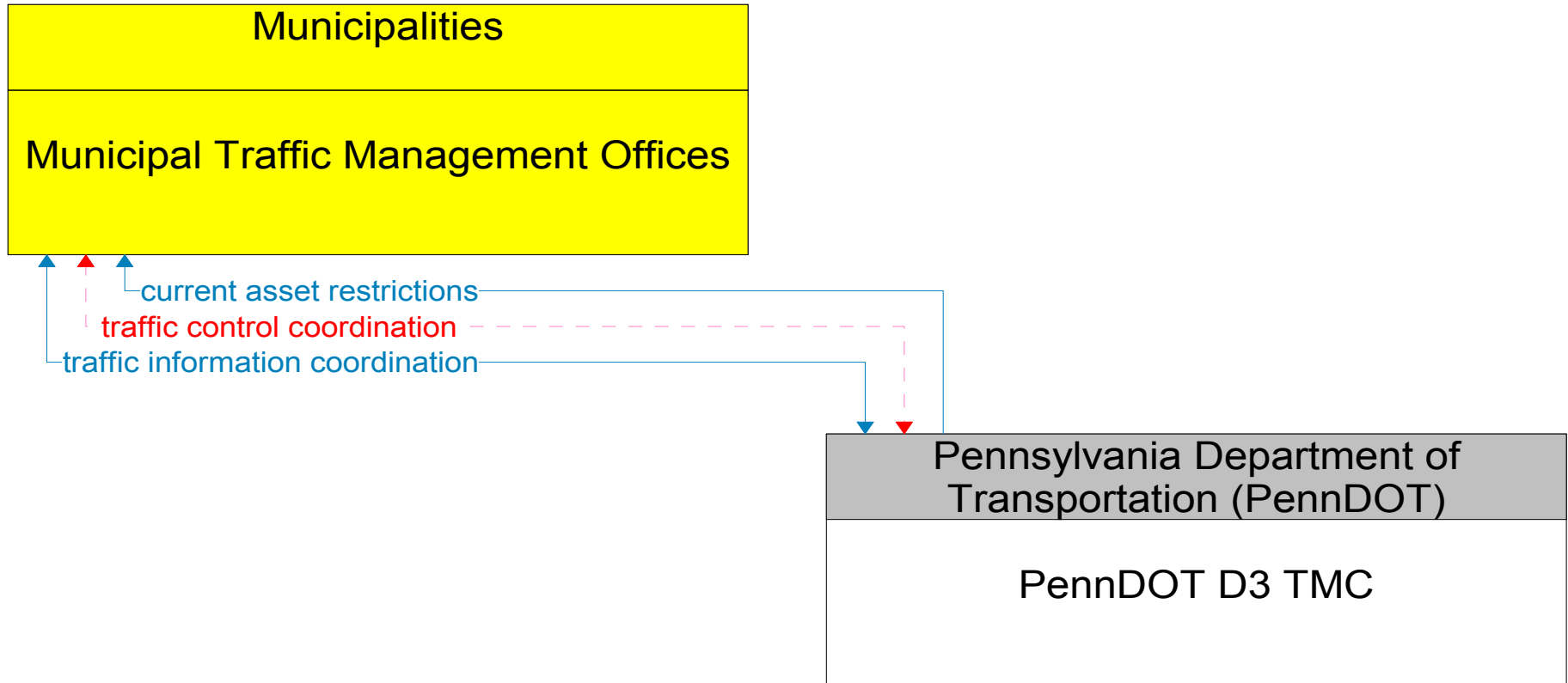
# Municipal Traffic Management Offices



# Municipal Traffic Management Offices Interconnect Diagram

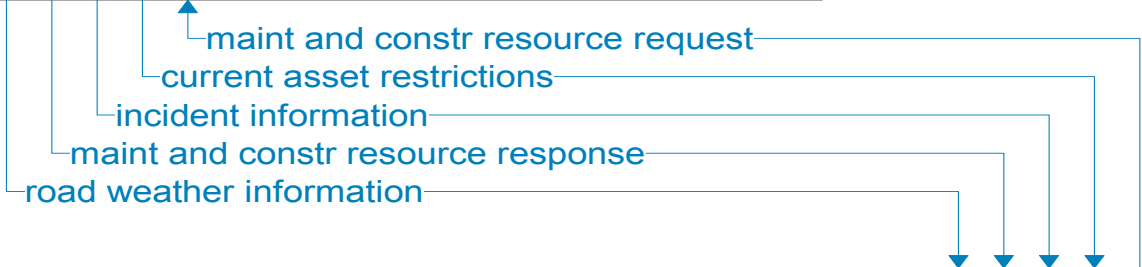


— Existing  
- - - Planned



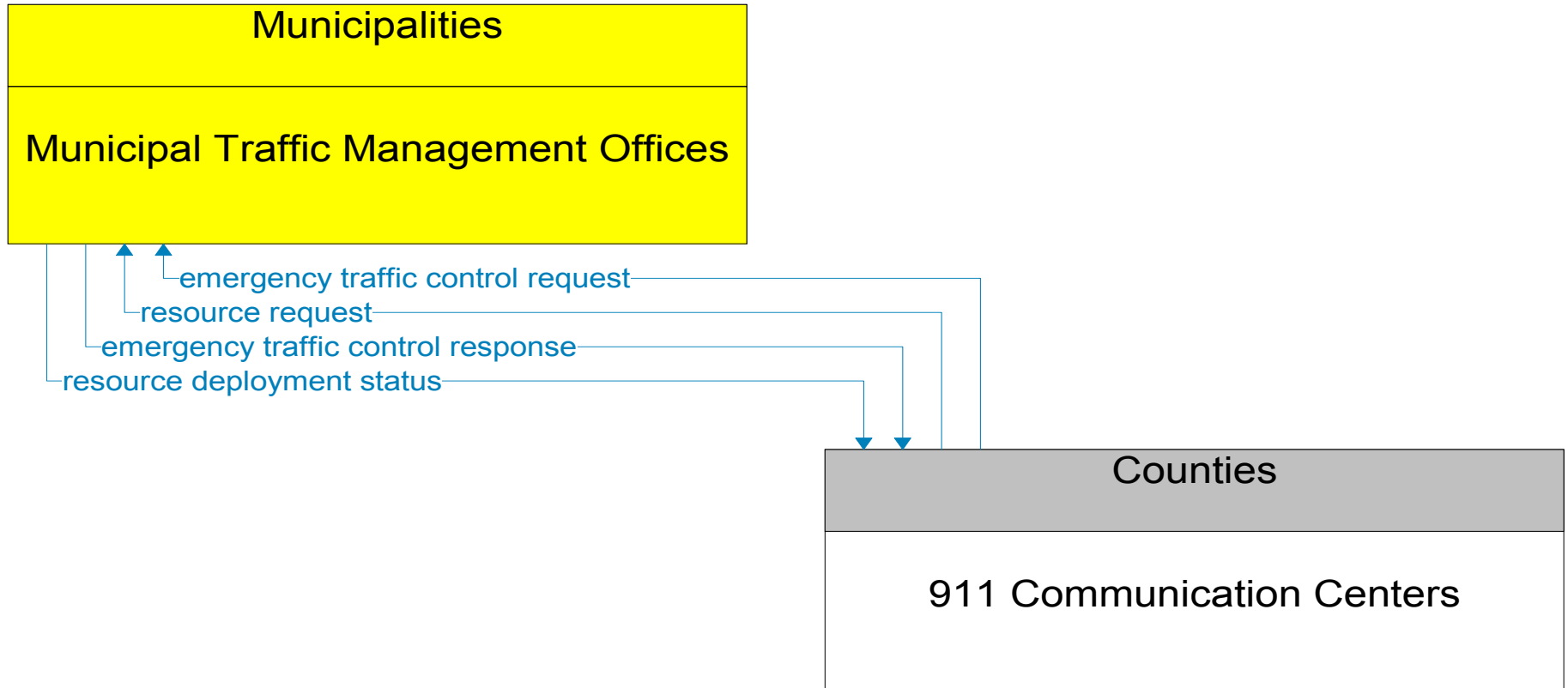
———— Existing  
- - - - - Planned

**Pennsylvania Department of Transportation (PennDOT)**  
**PennDOT D3 County Maintenance Offices**



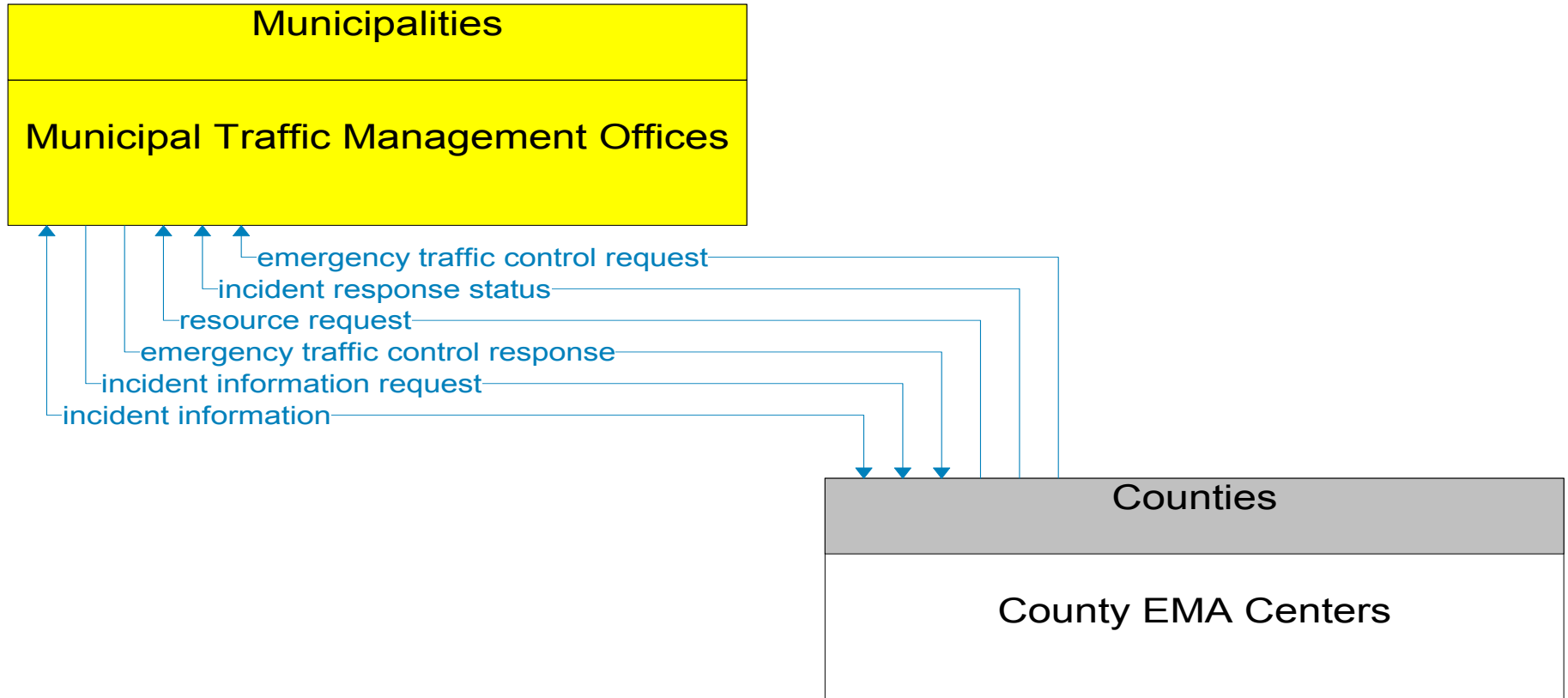
**Municipalities**  
**Municipal Traffic Management Offices**

———— Existing  
- - - - - Planned

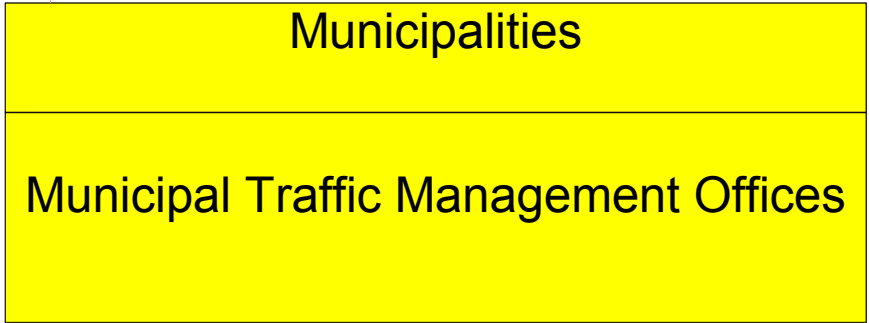
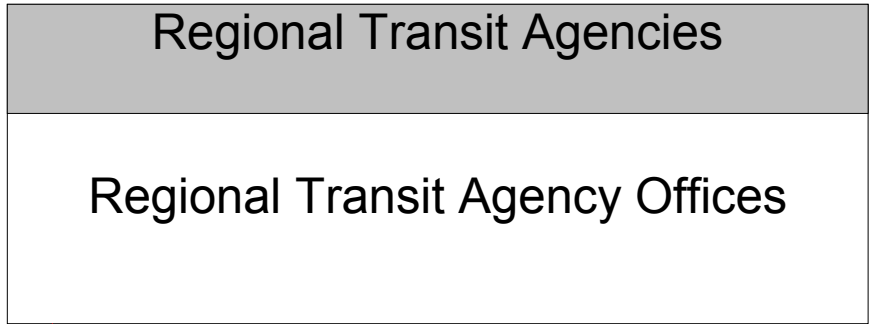


———— Existing  
----- Planned

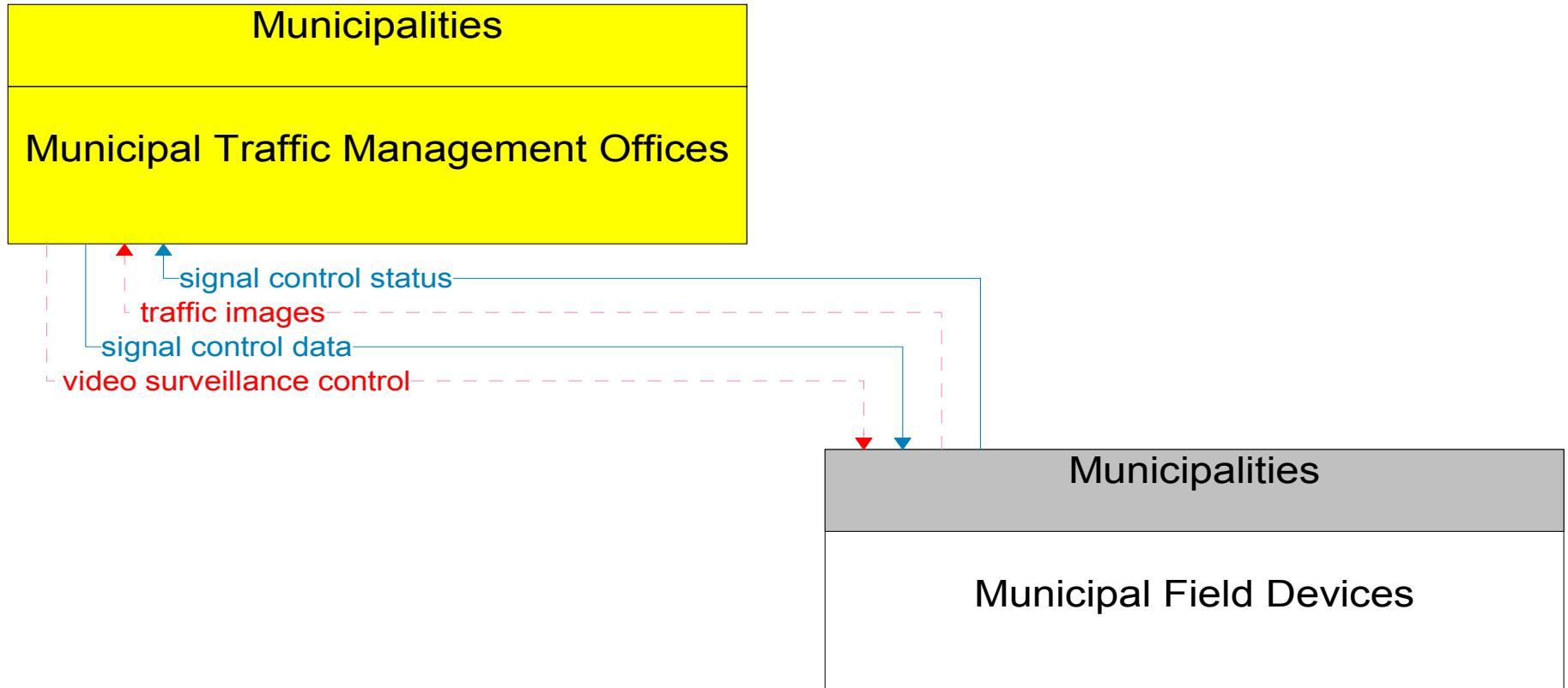




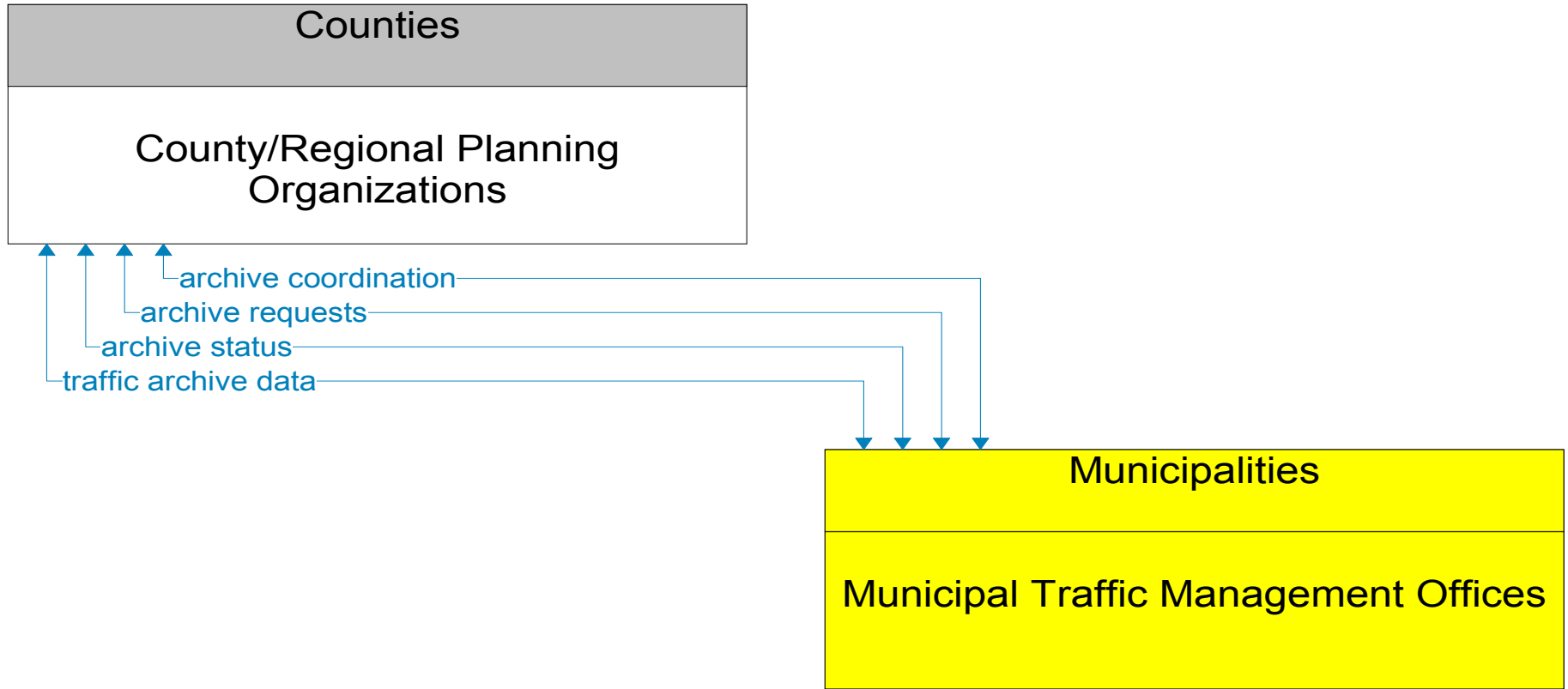
———— Existing  
- - - - - Planned



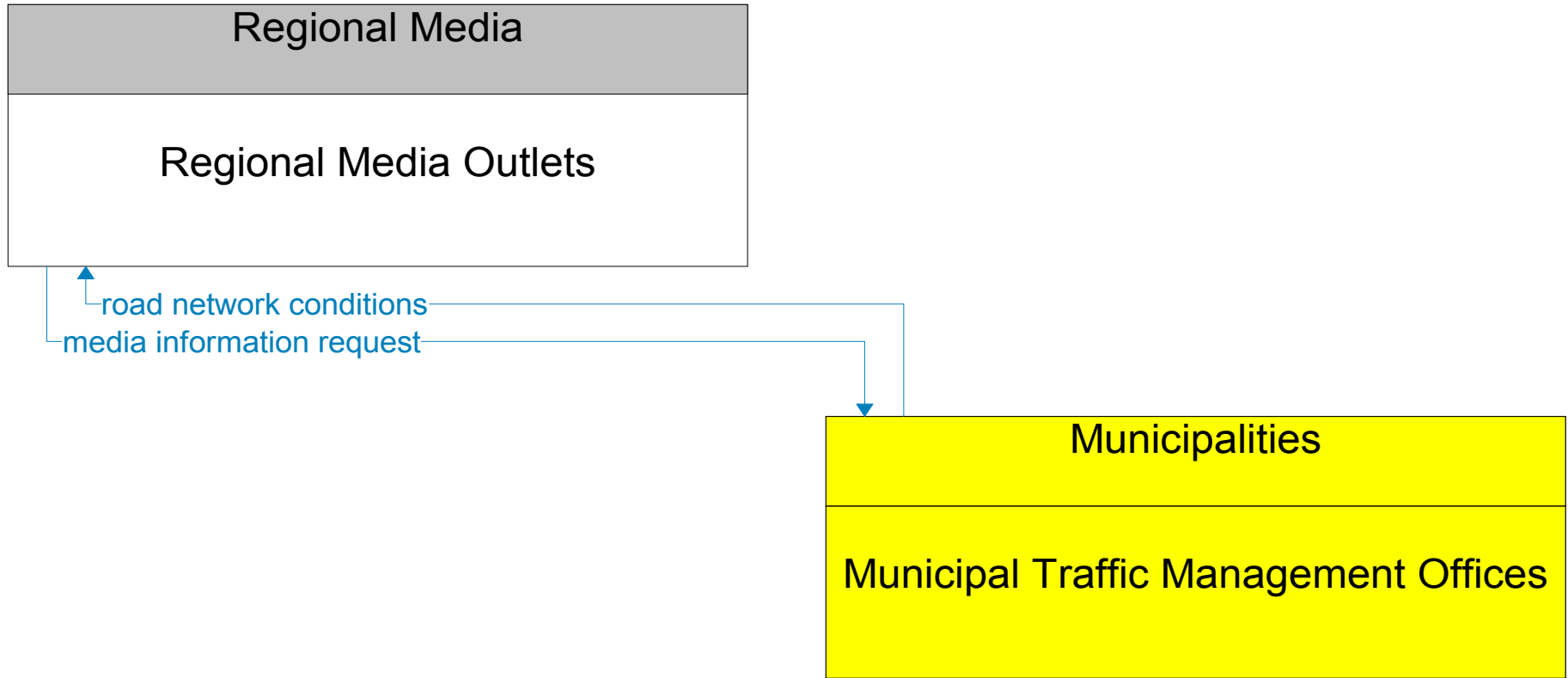
———— Existing  
- - - - - Planned



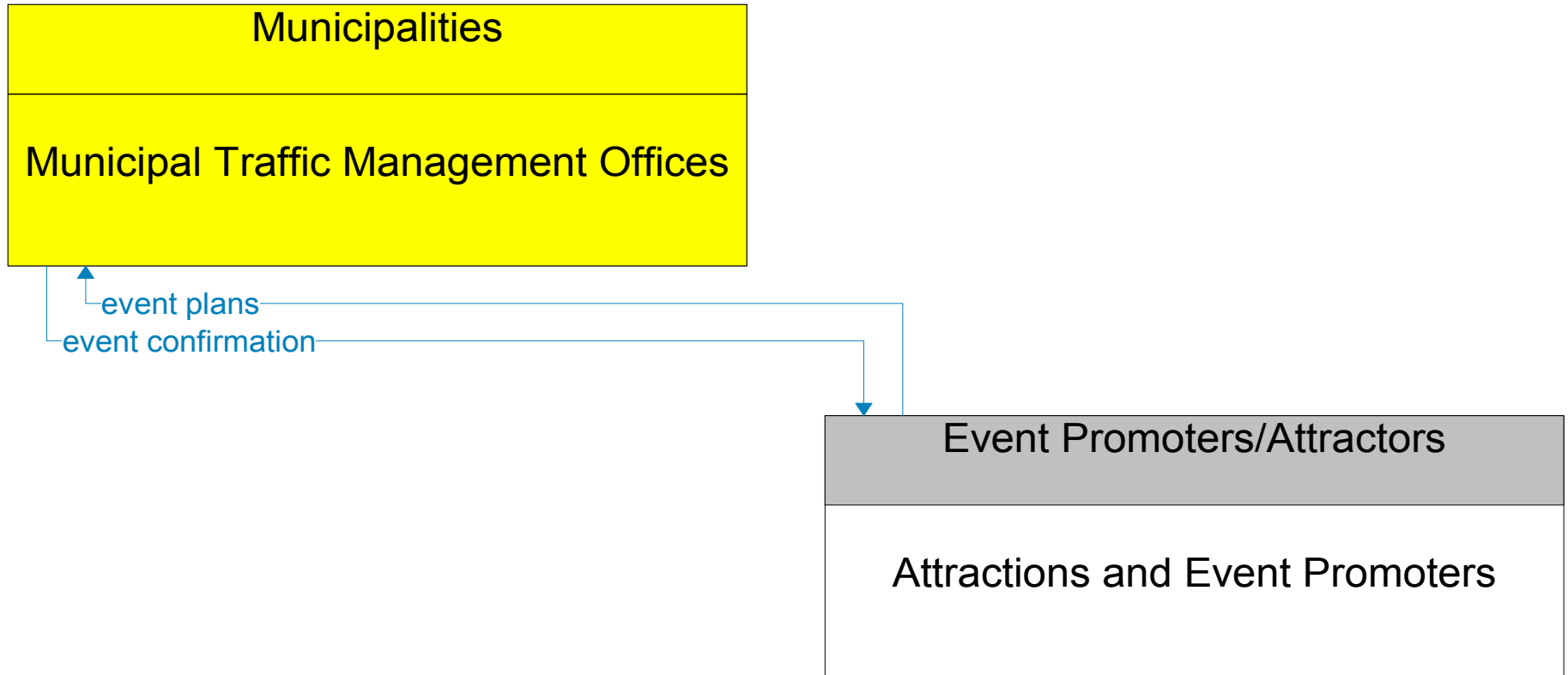
— Existing  
- - - Planned



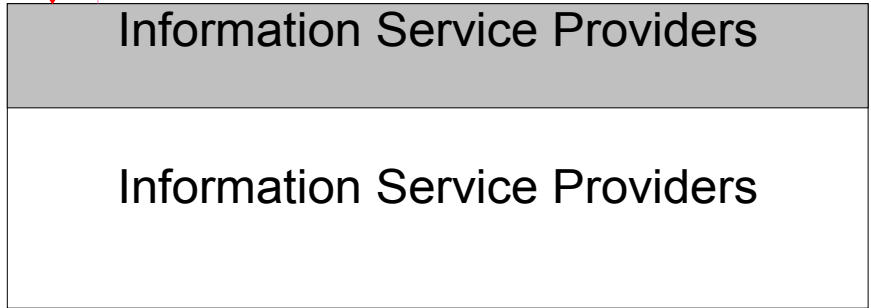
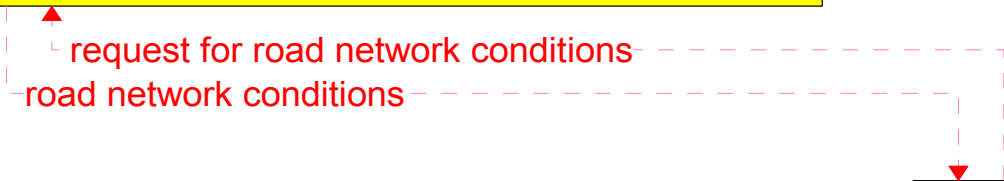
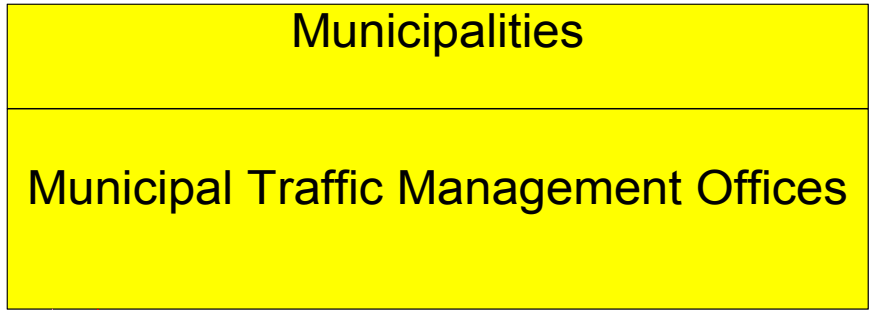
———— Existing  
- - - - - Planned



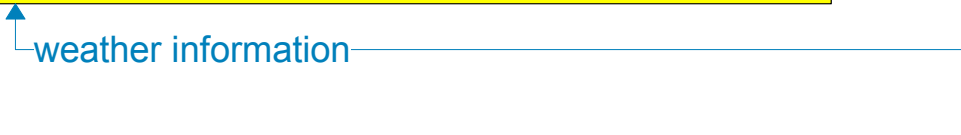
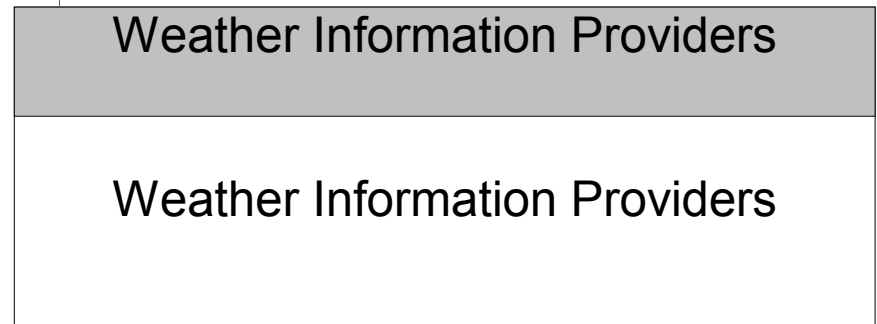
———— Existing  
- - - - - Planned



———— Existing  
----- Planned



Existing  
Planned



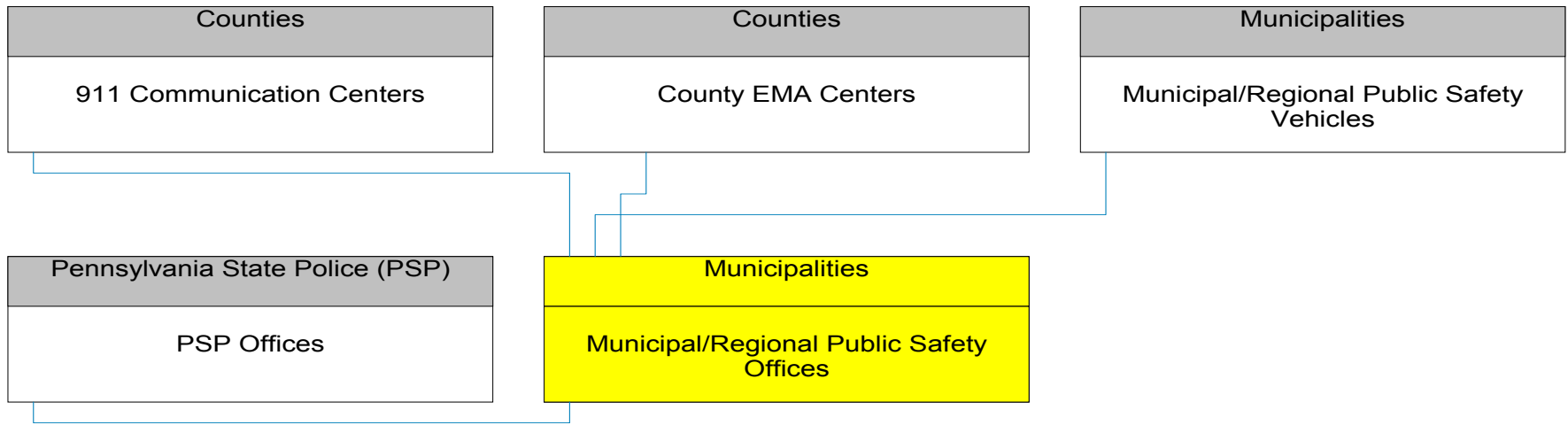
———— Existing  
- - - - - Planned



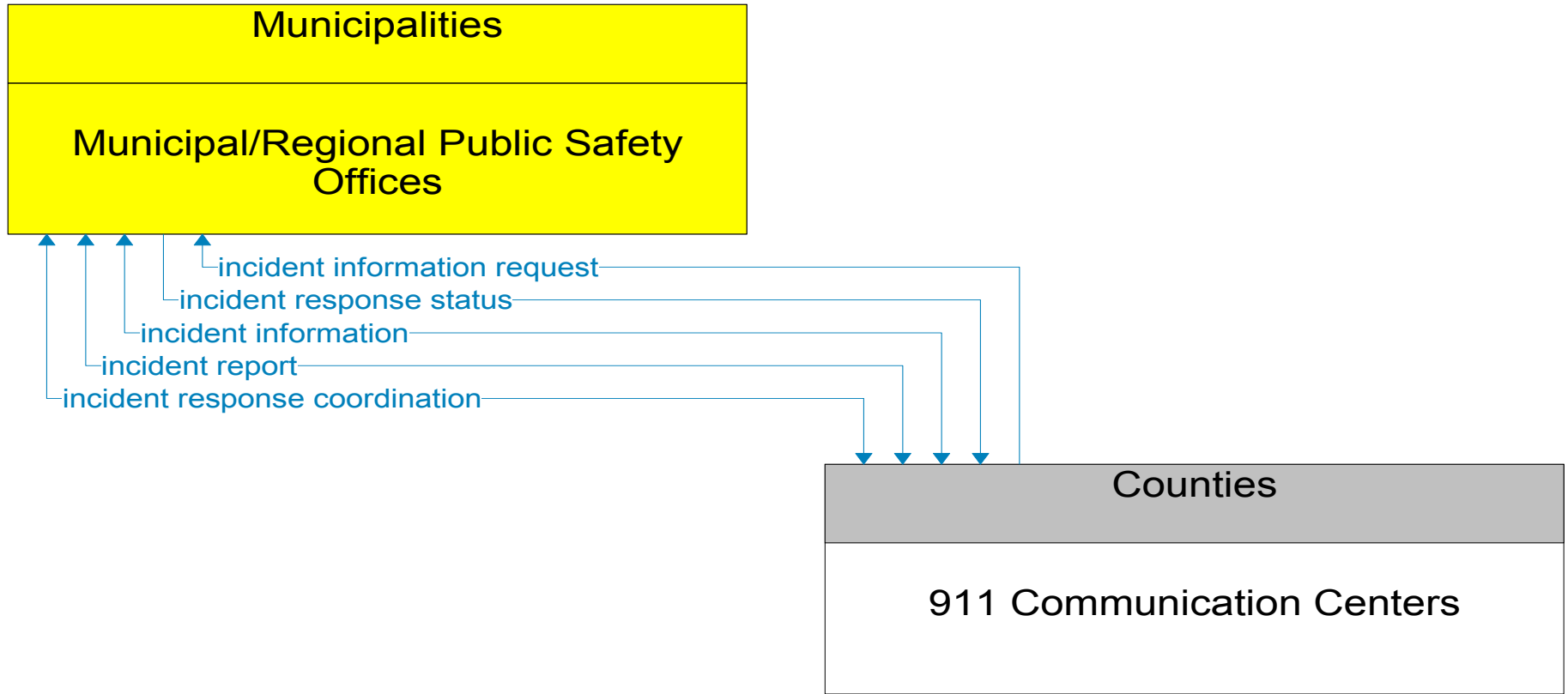
# Municipal/Regional Public Safety Offices

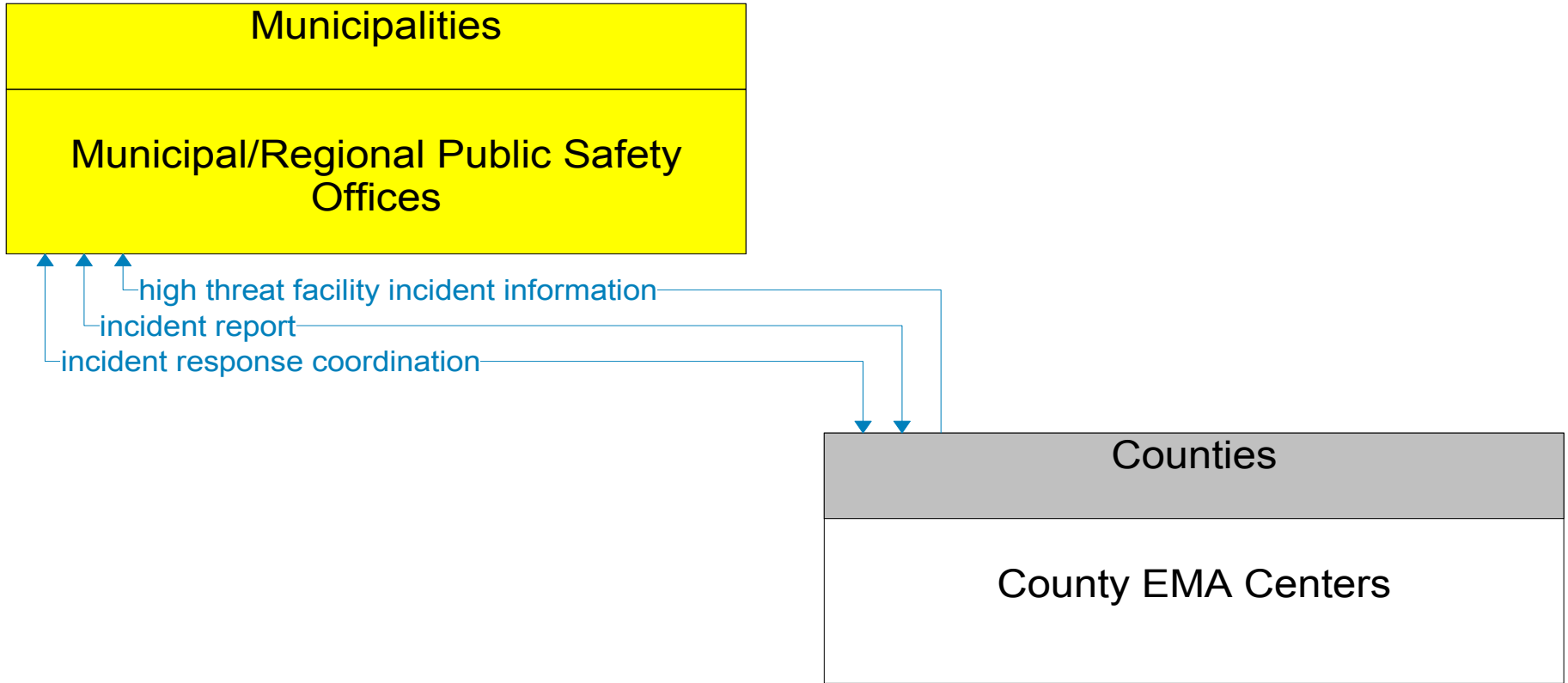


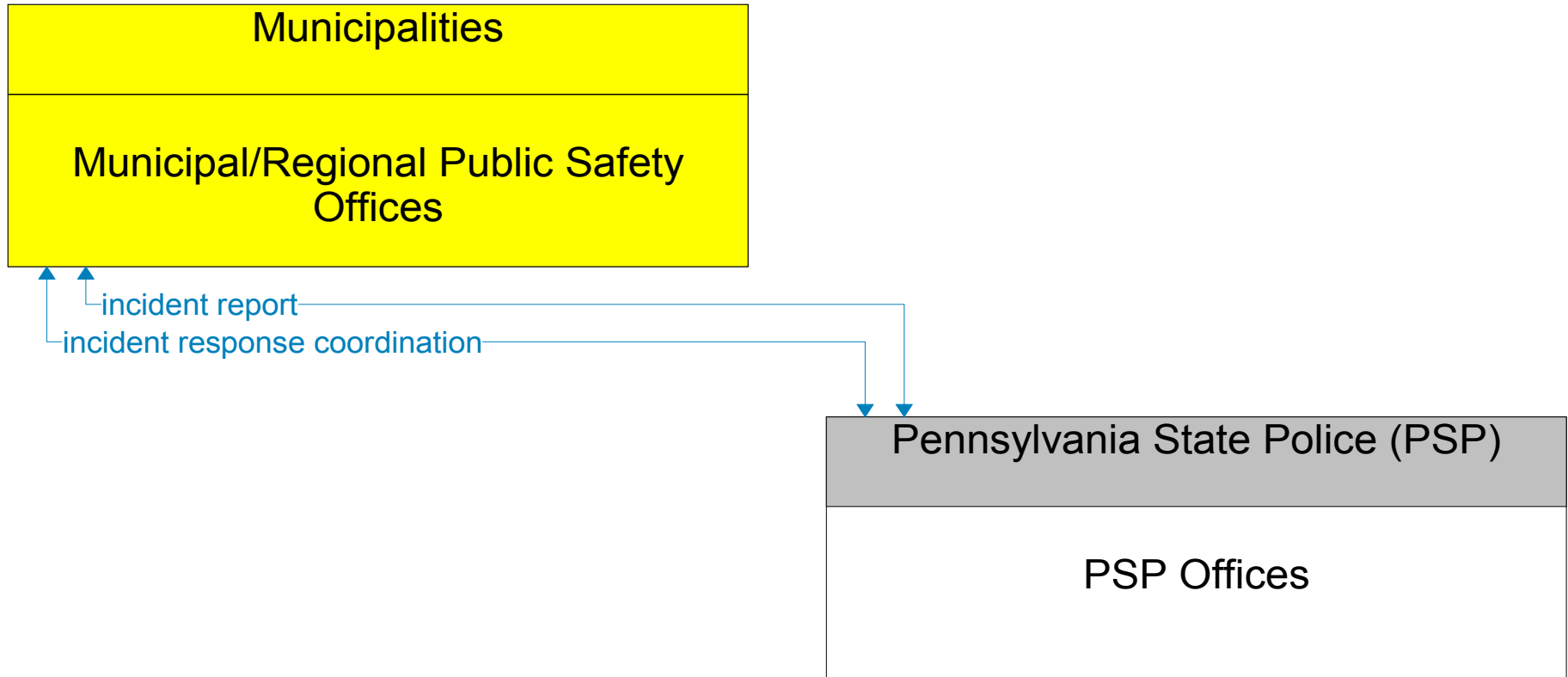
# Municipal/Regional Public Safety Offices Interconnect Diagram



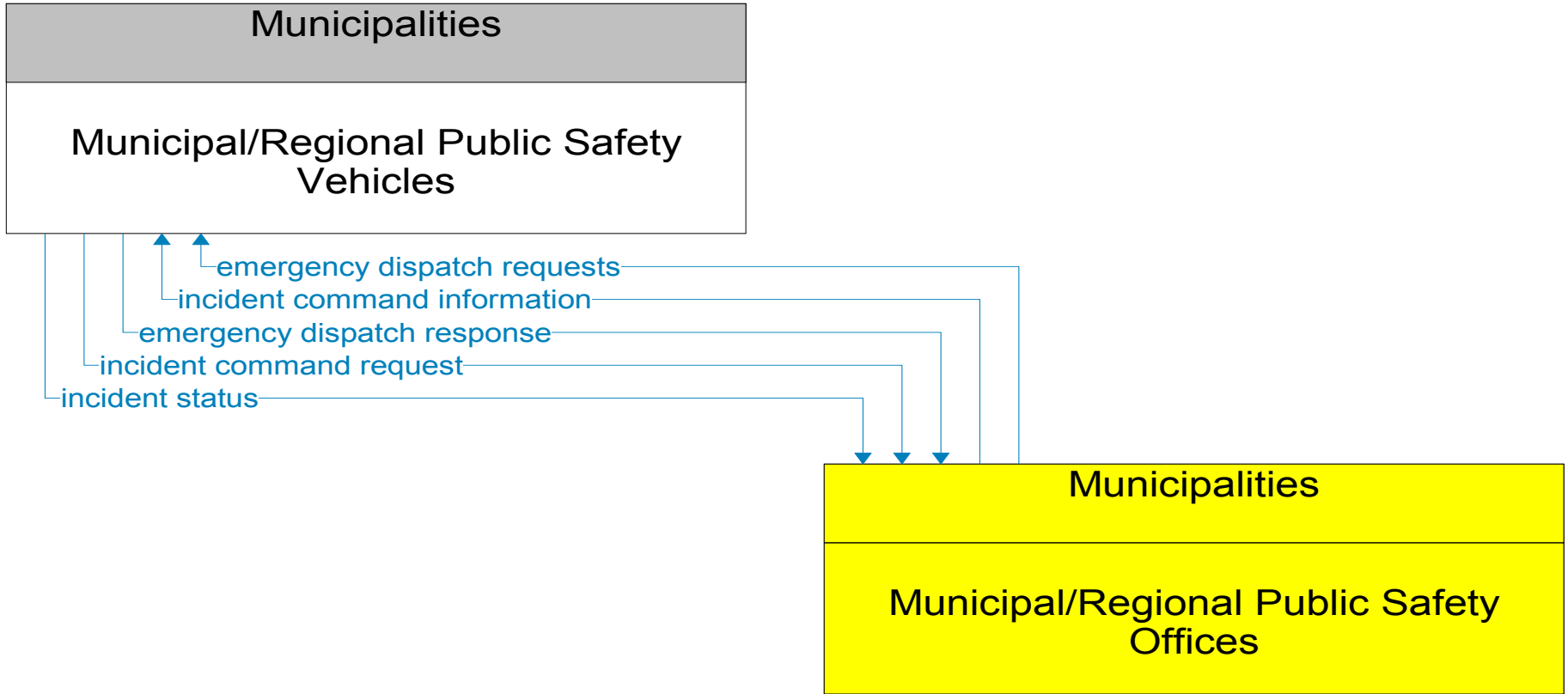
— Existing  
- - - Planned





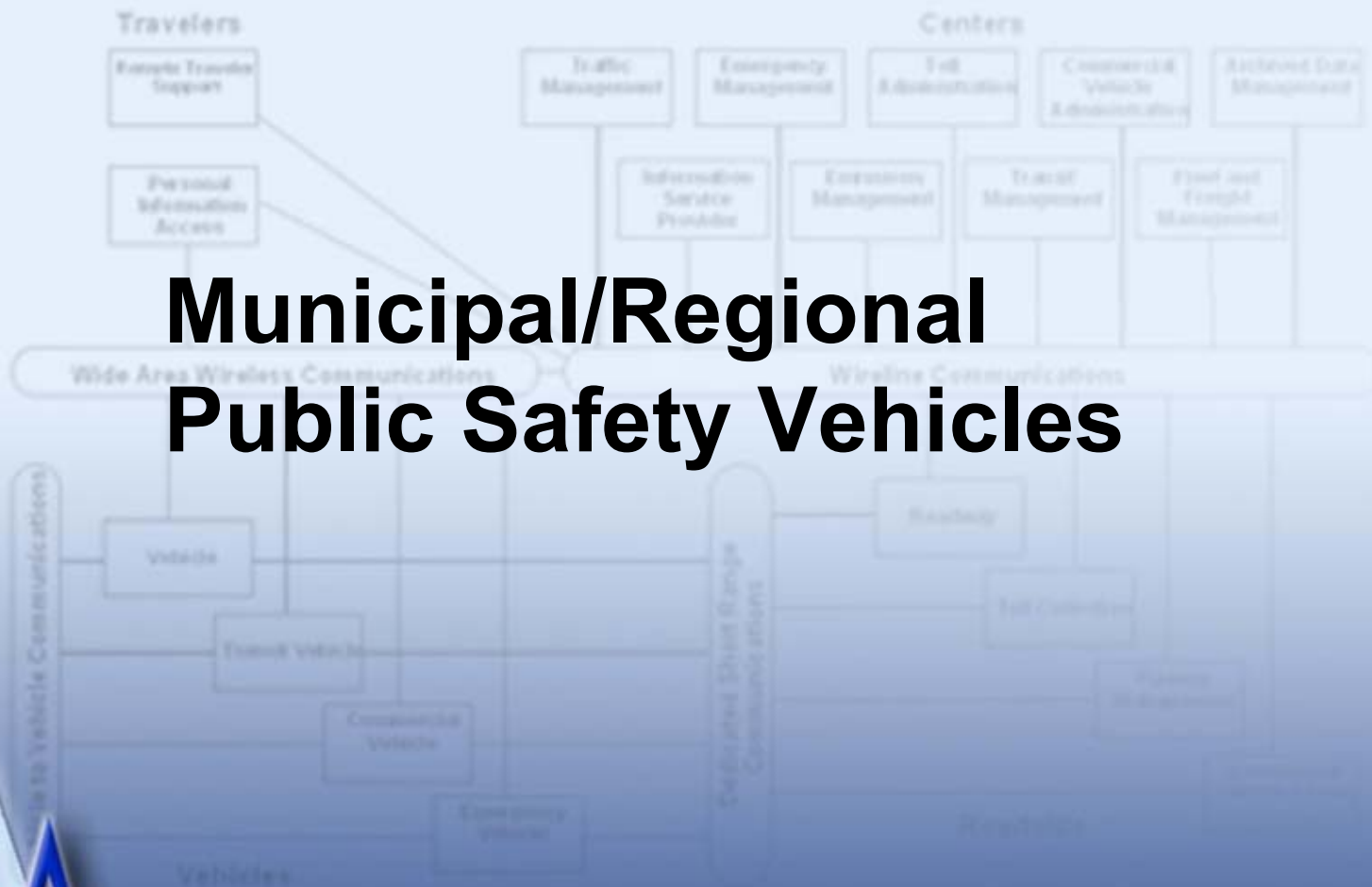


———— Existing  
----- Planned

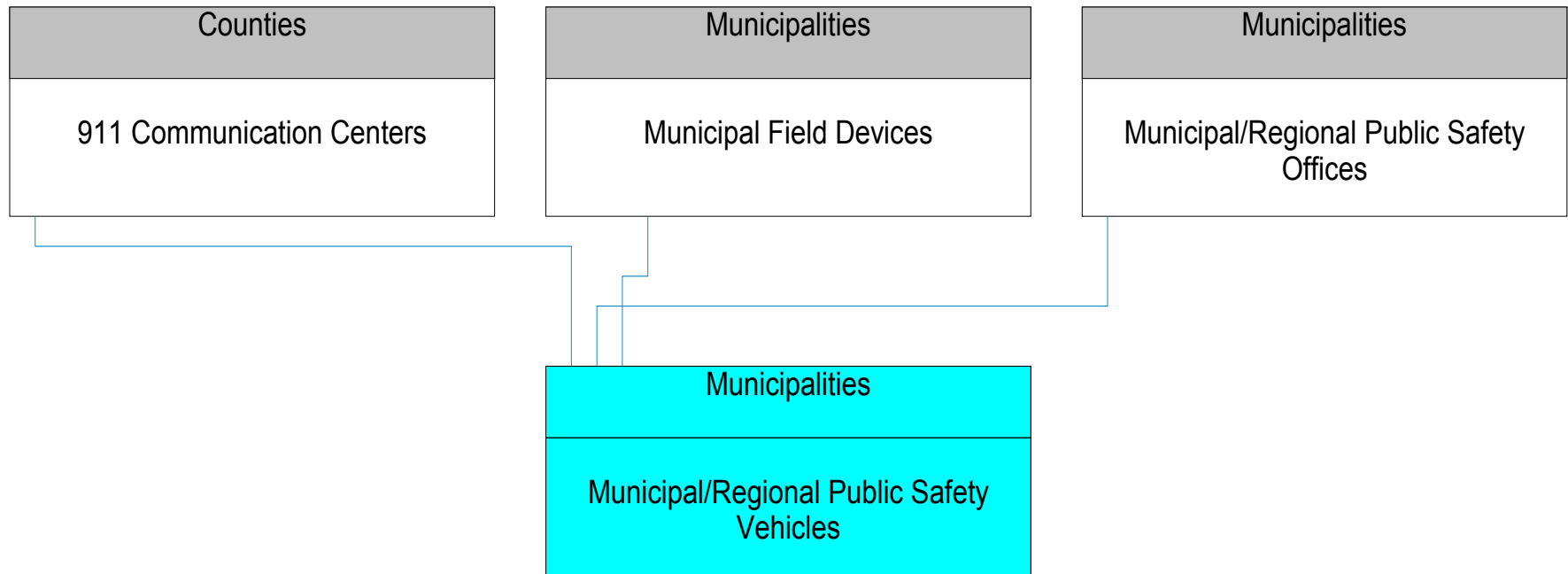


———— Existing  
----- Planned

# Municipal/Regional Public Safety Vehicles

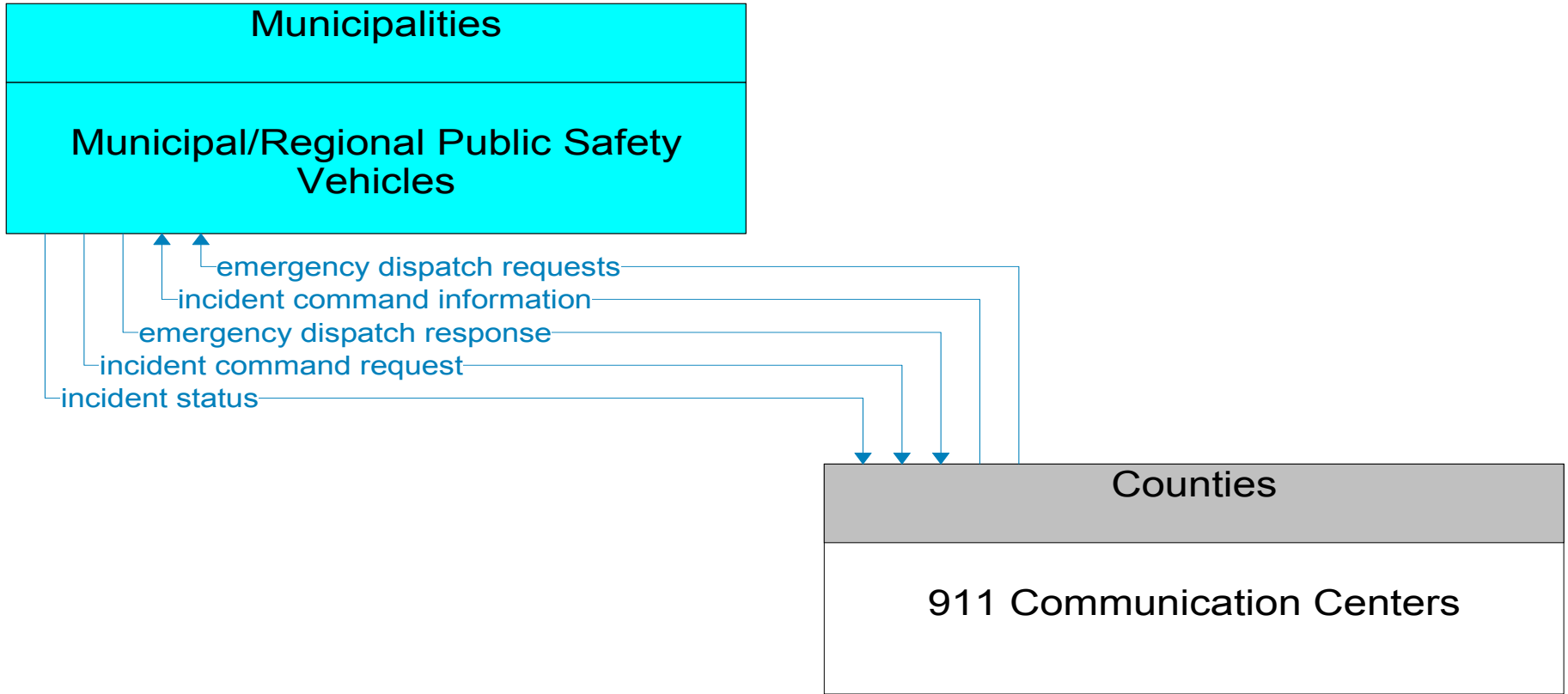


# Municipal/Regional Public Safety Vehicles Interconnect Diagram

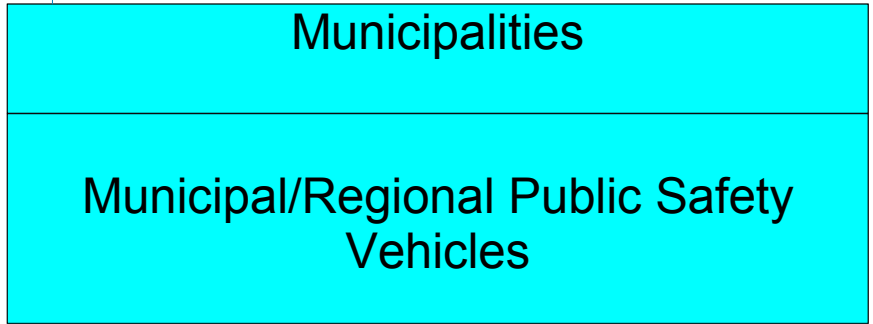
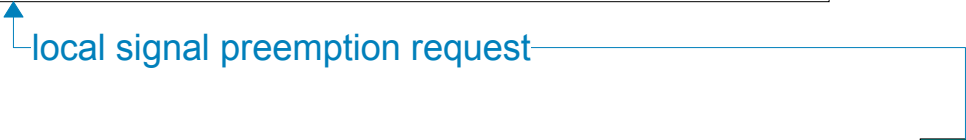


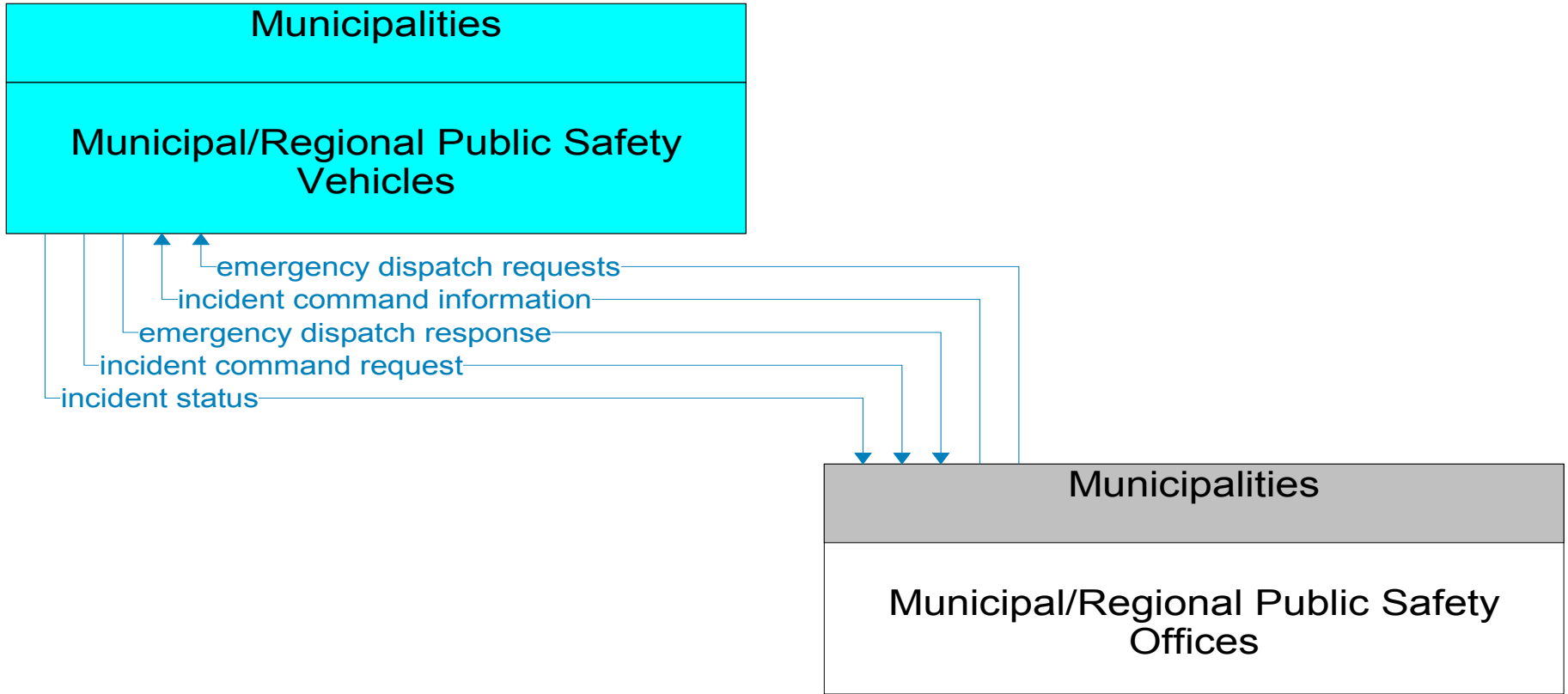
— Existing  
- - - Planned





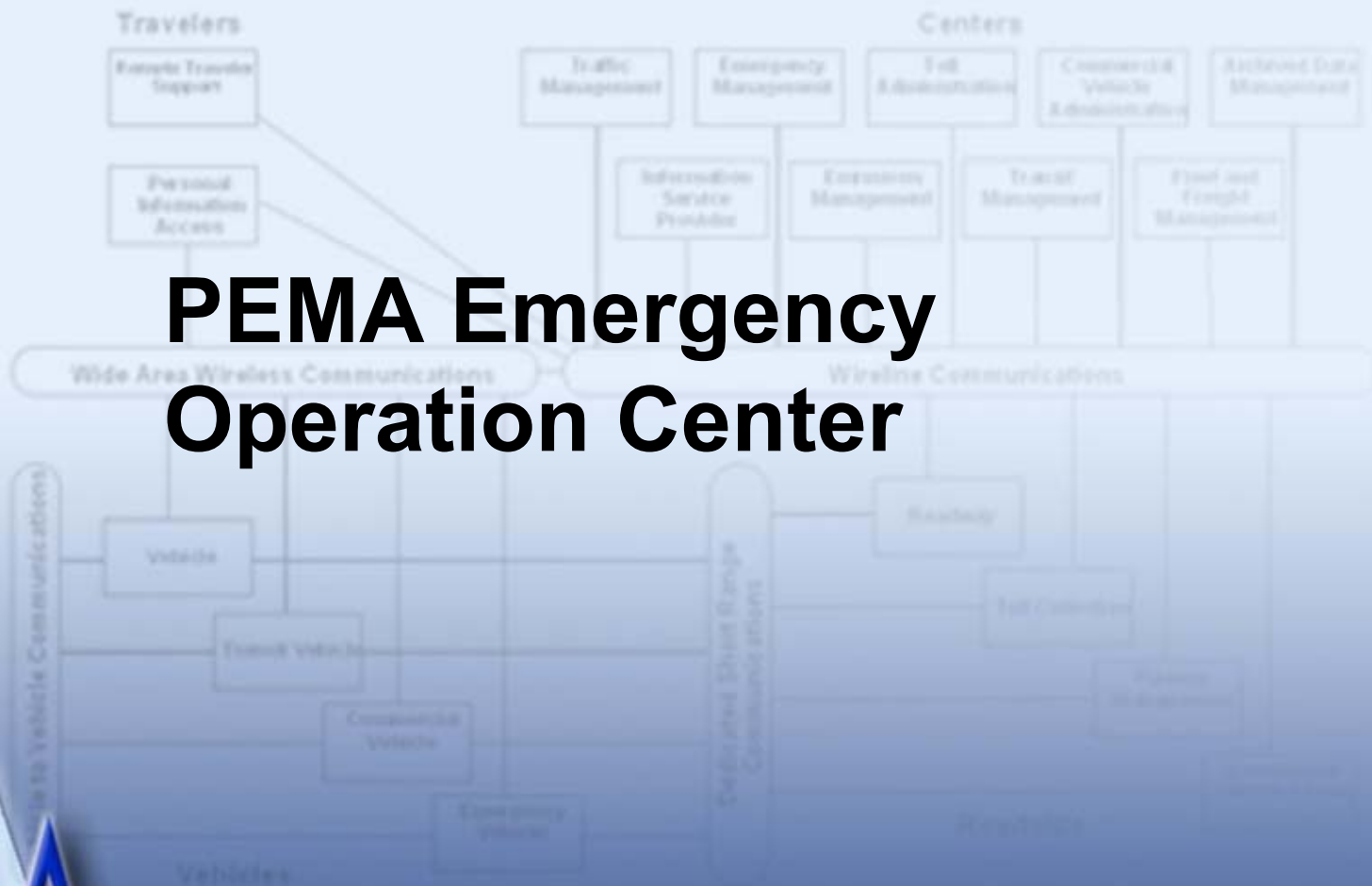
———— Existing  
- - - - - Planned





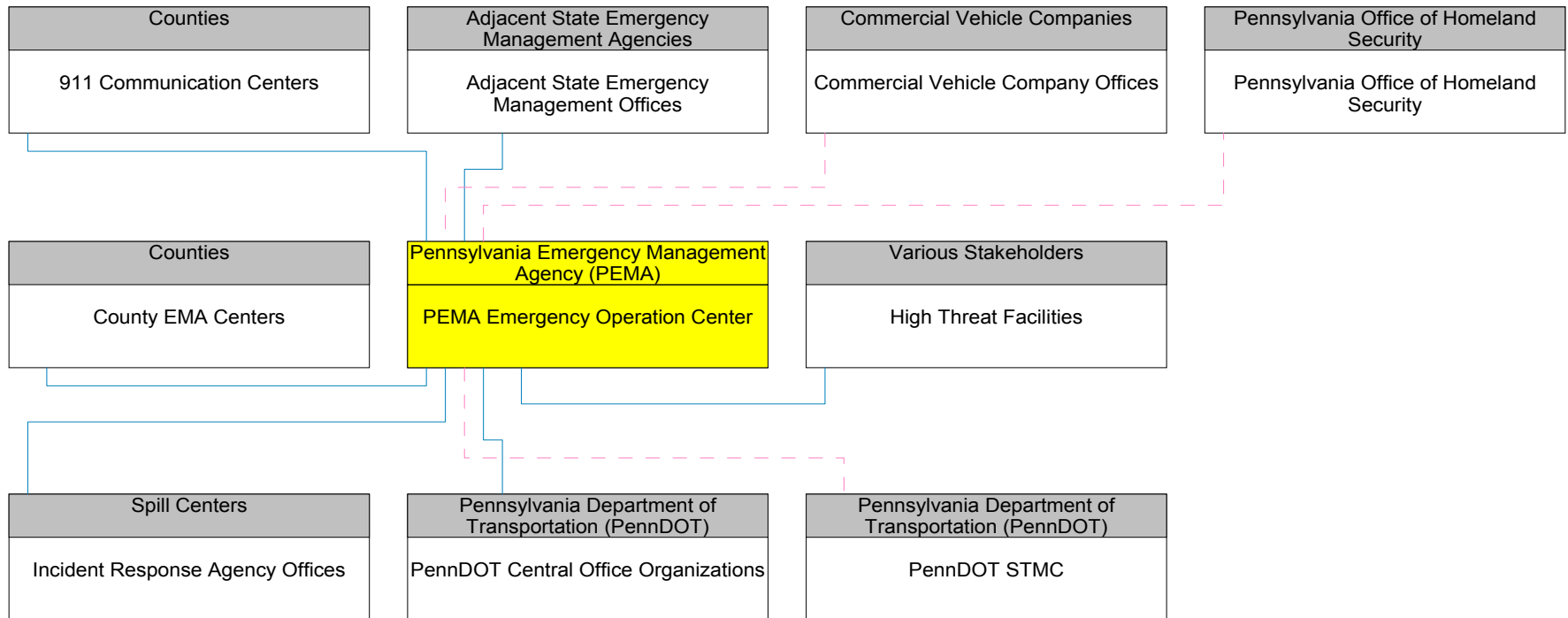
———— Existing  
- - - - - Planned

# PEMA Emergency Operation Center

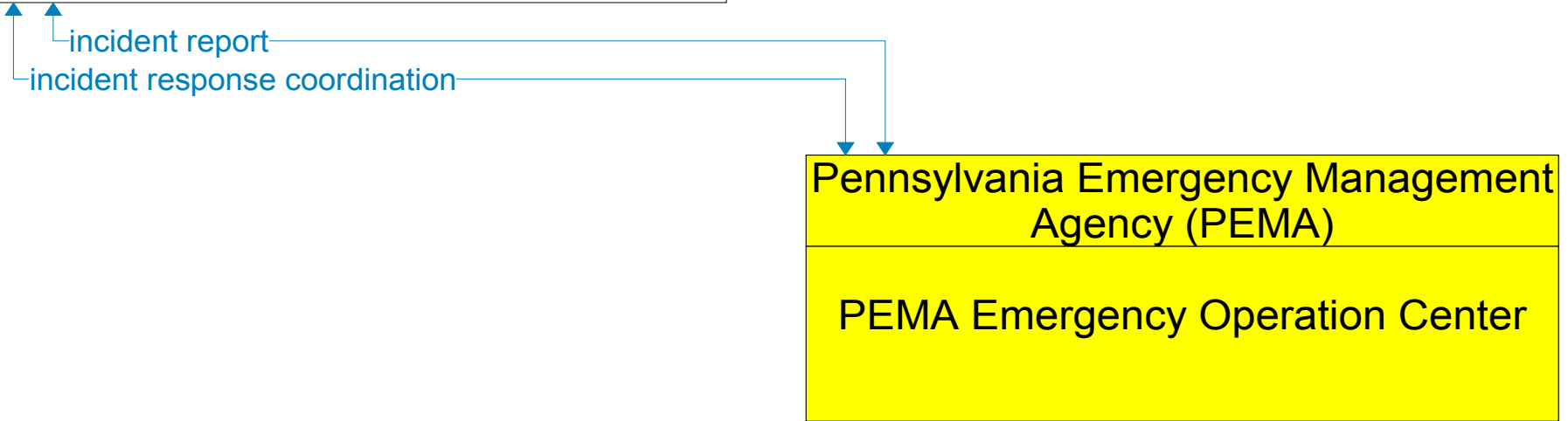
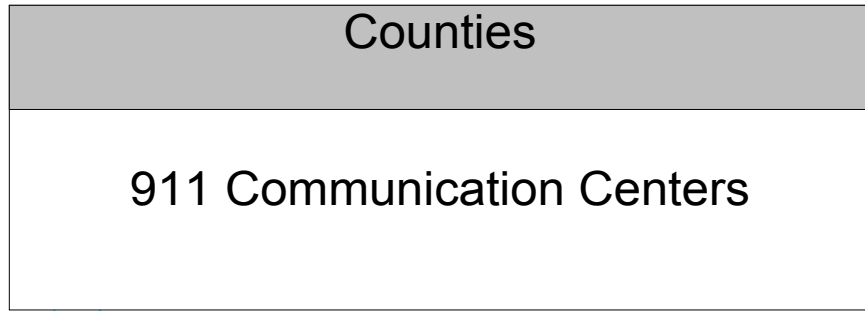


PA

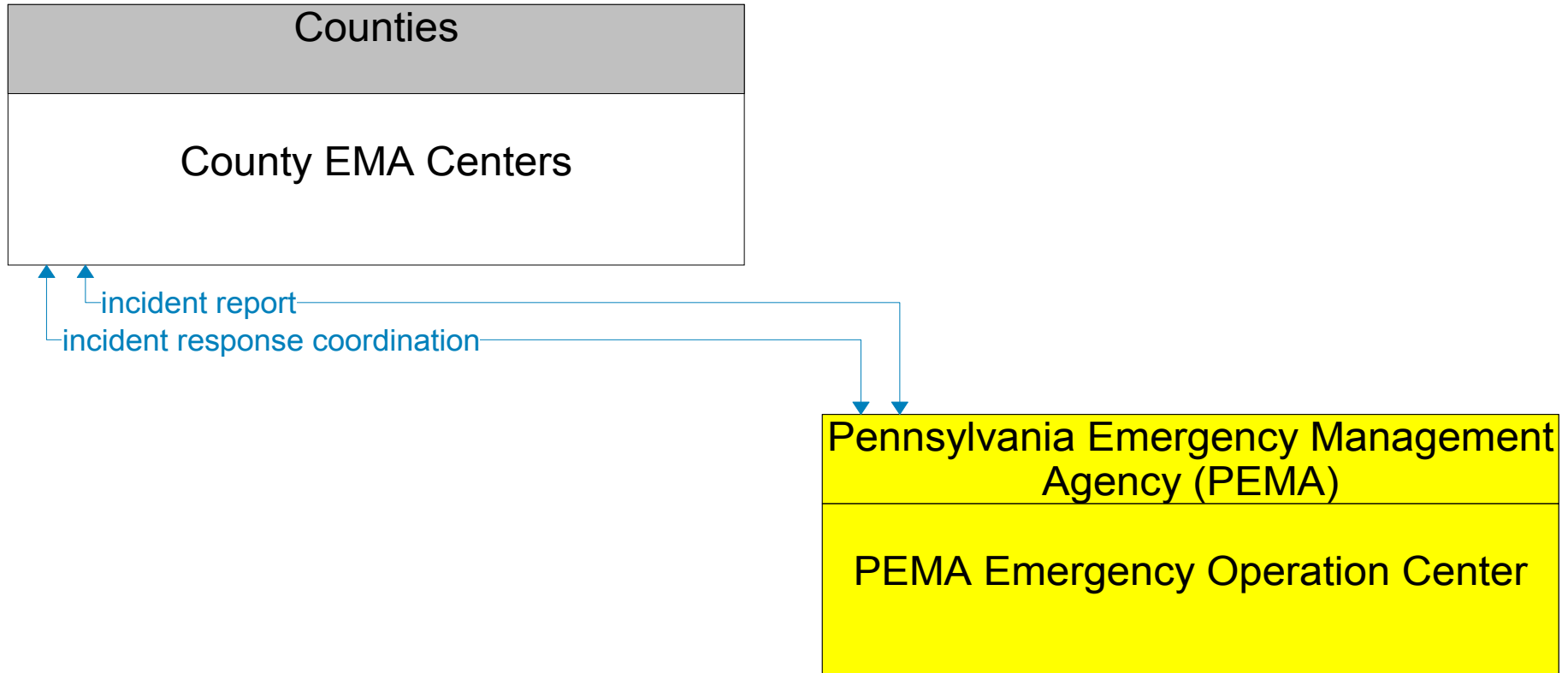
# PEMA Emergency Operation Center Interconnect Diagram



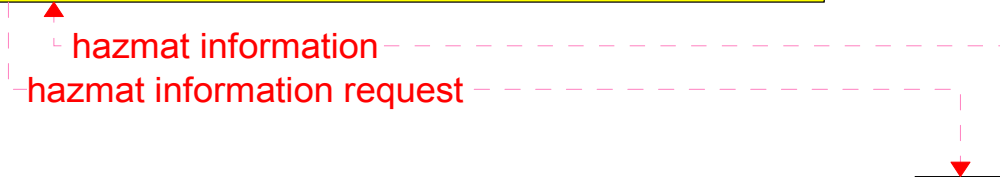
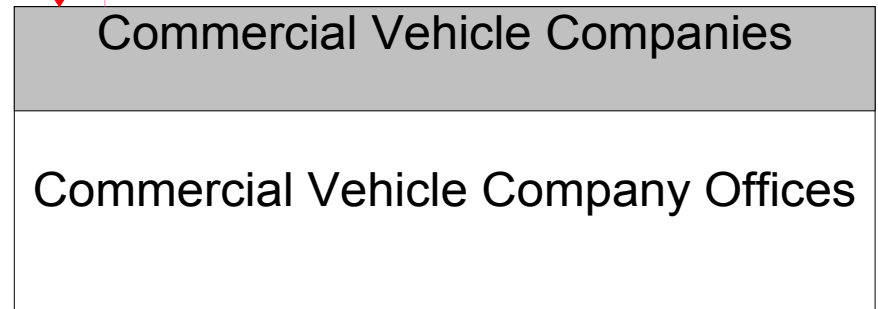
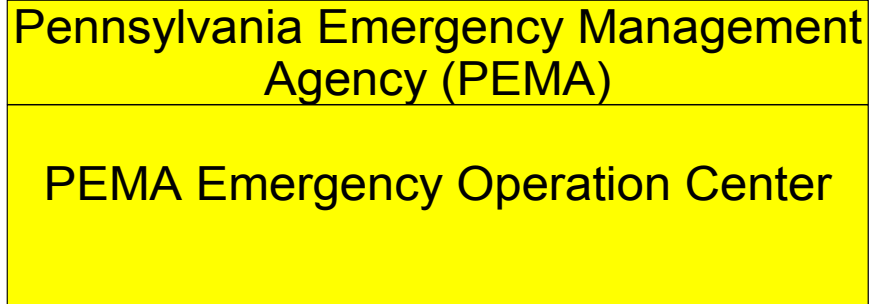
— Existing  
 - - - Planned



———— Existing  
----- Planned

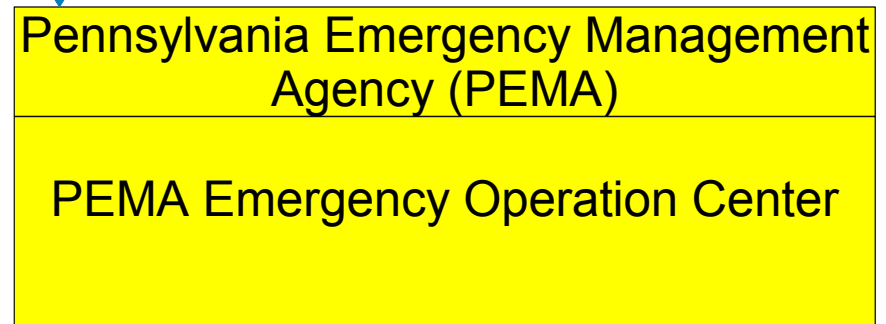
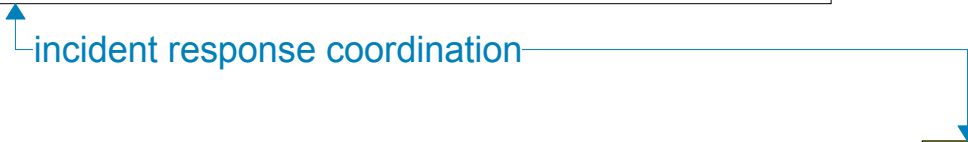
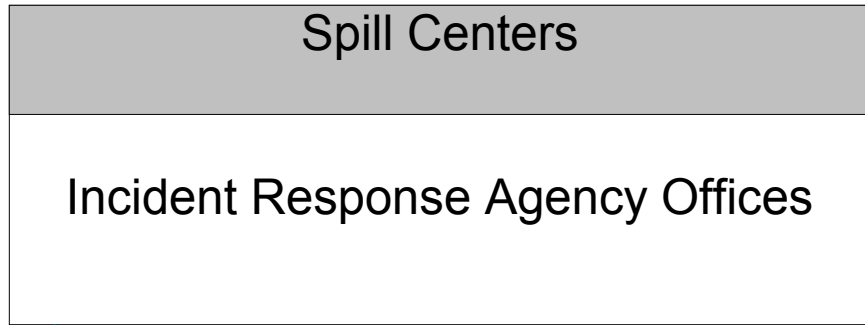


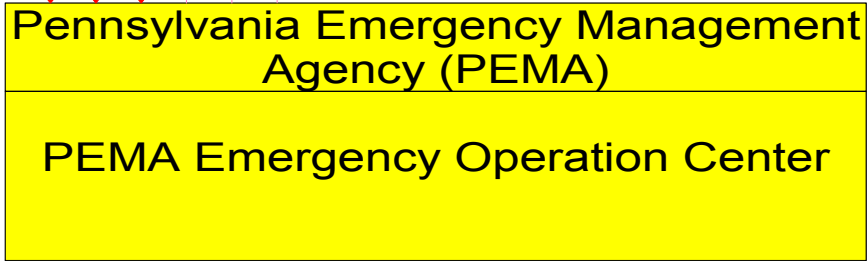
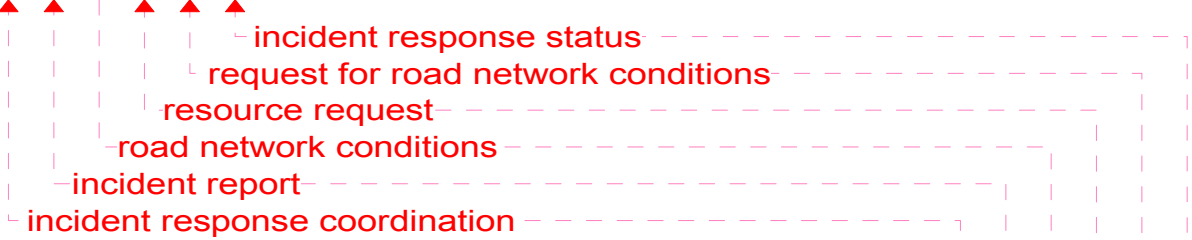
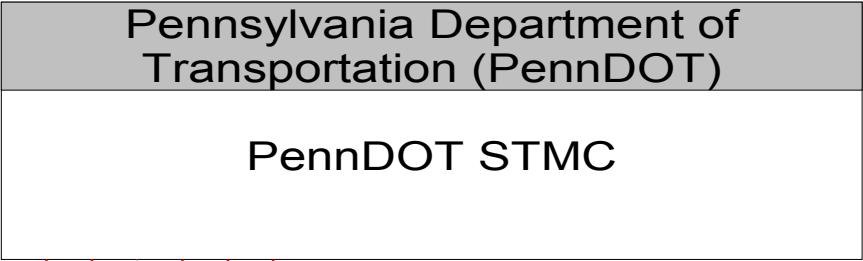
———— Existing  
- - - - - Planned



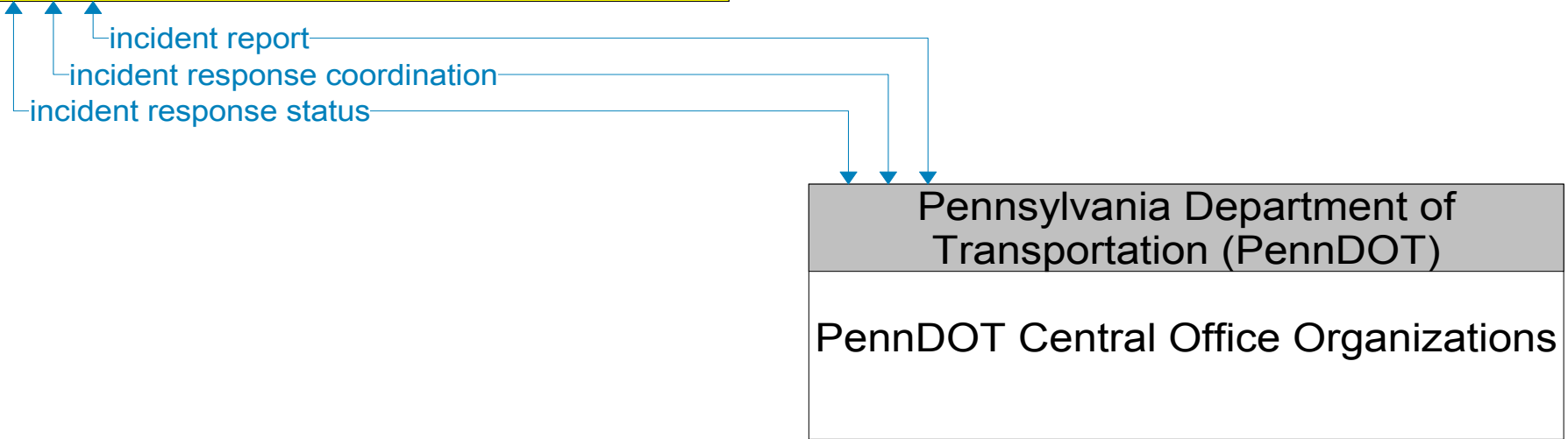
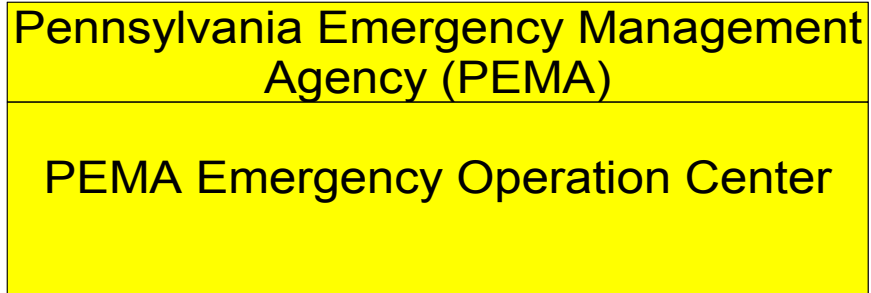
———— Existing  
- - - - - Planned



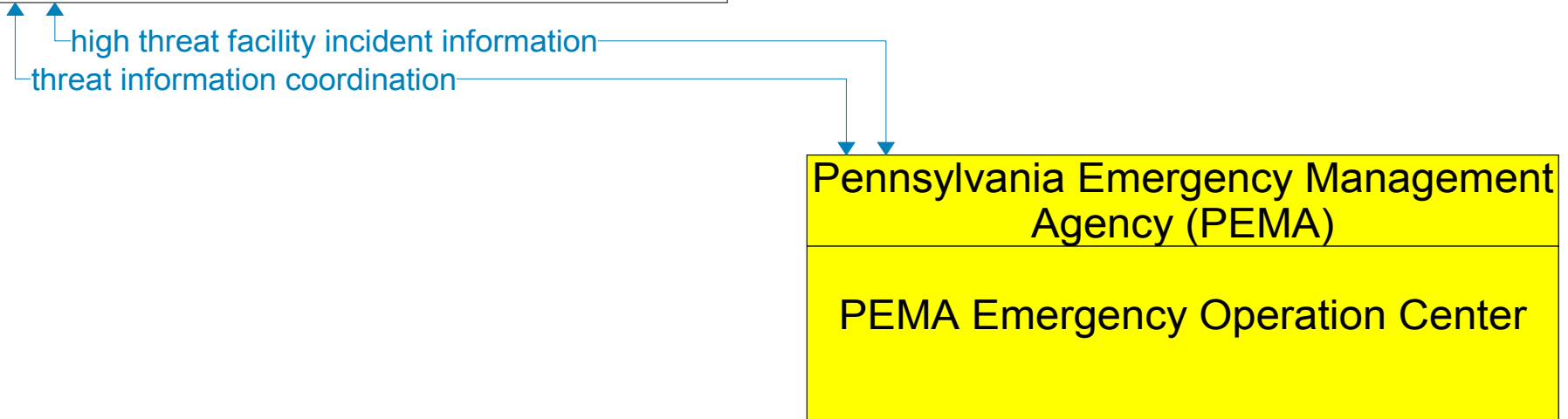
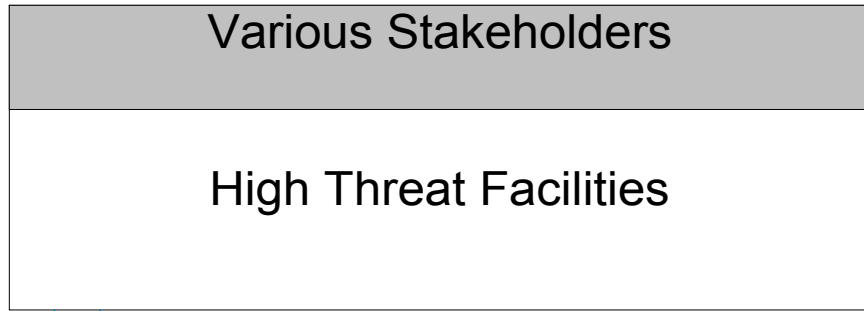




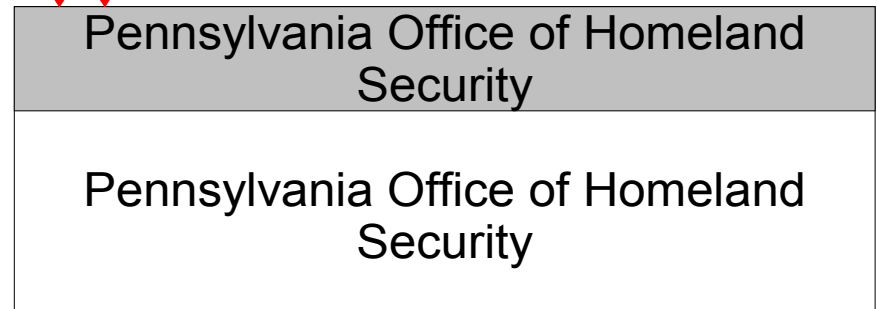
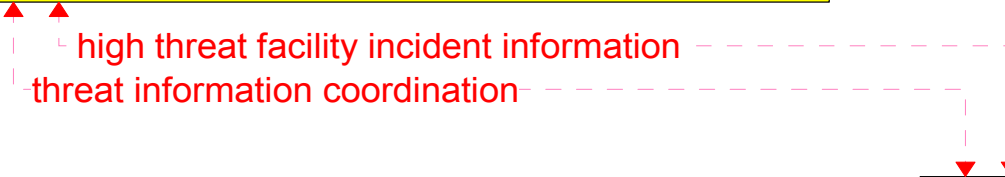
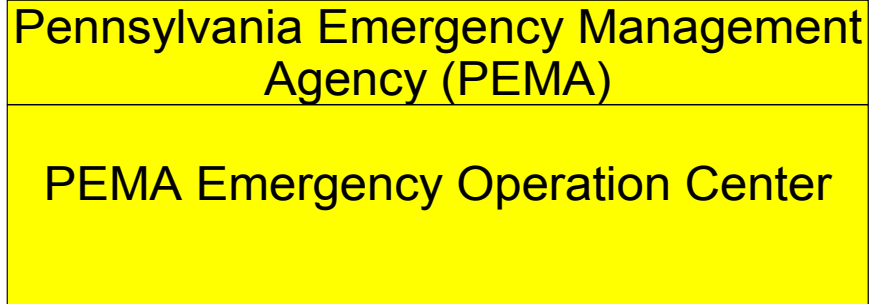
———— Existing  
- - - - - Planned



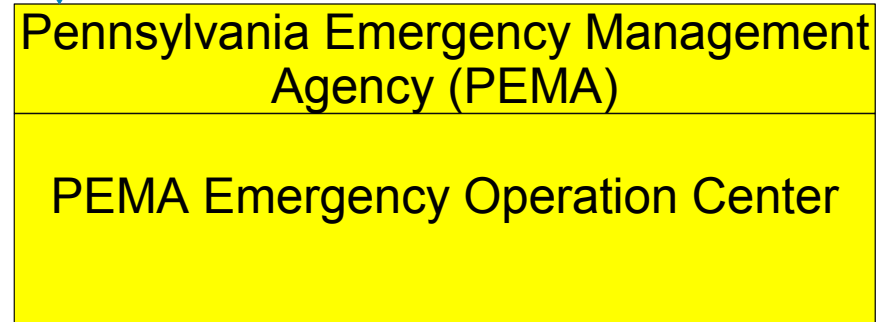
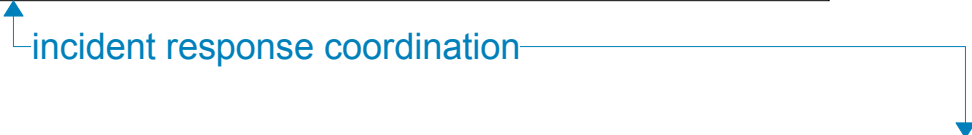
———— Existing  
- - - - - Planned



———— Existing  
----- Planned

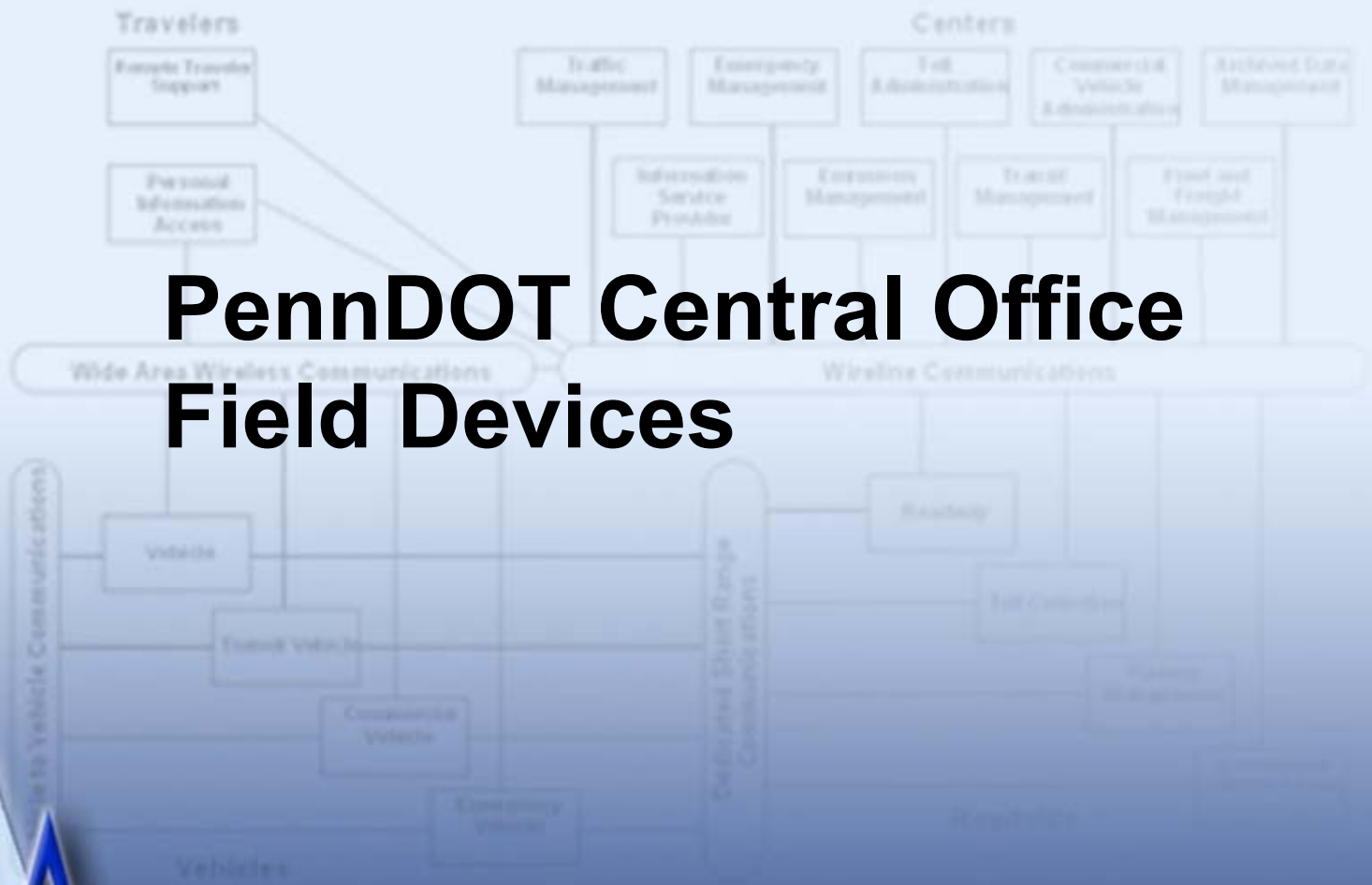


———— Existing  
- - - - - Planned

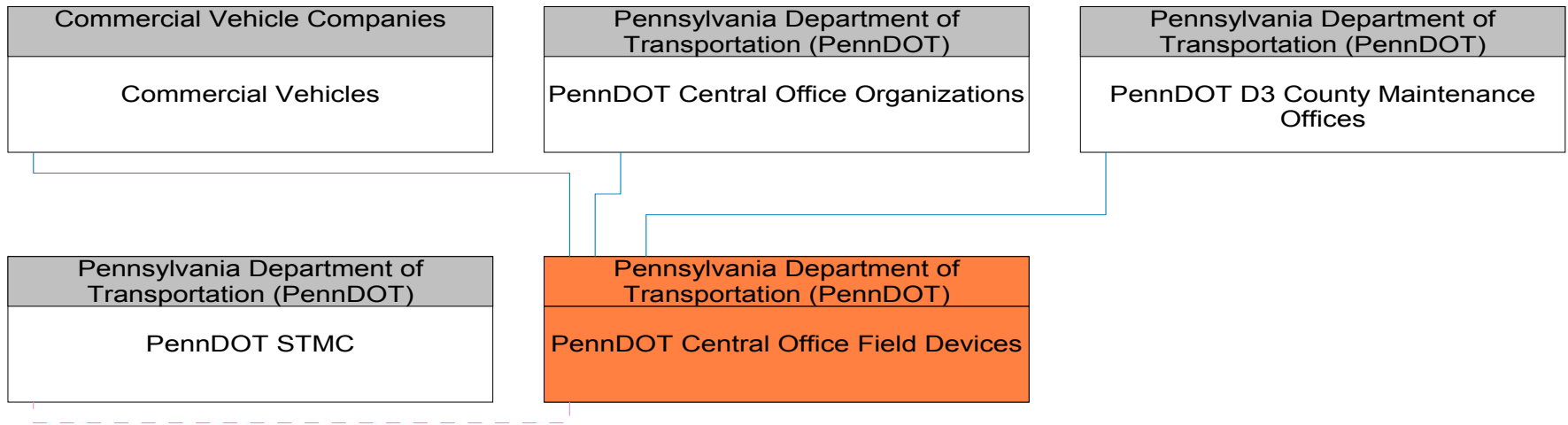


———— Existing  
----- Planned

# PennDOT Central Office Field Devices



# PennDOT Central Office Field Devices Interconnect Diagram



— Existing  
- - - Planned



Pennsylvania Department of  
Transportation (PennDOT)

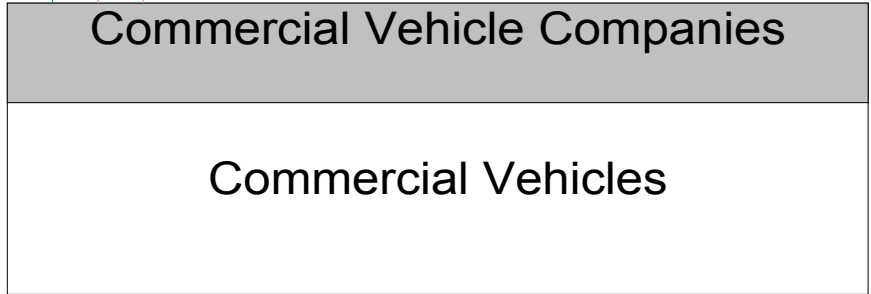
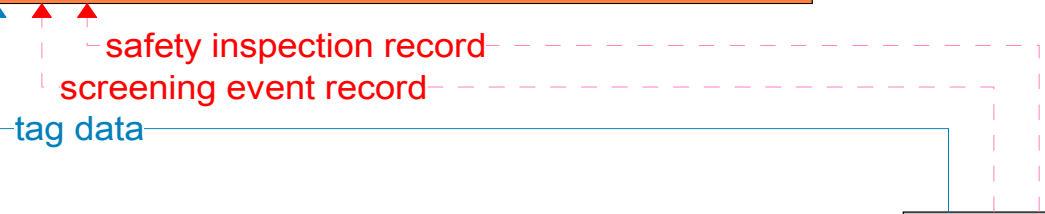
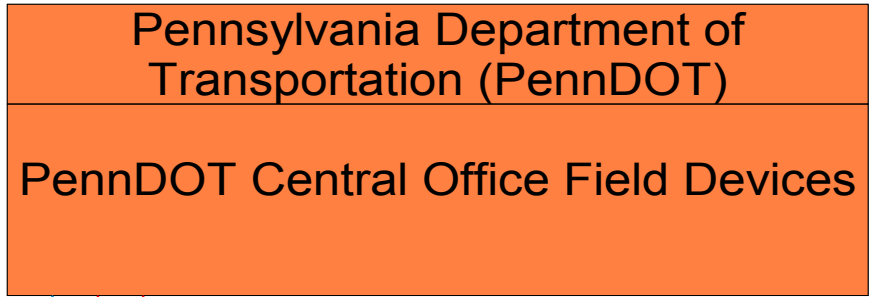
PennDOT D3 County Maintenance  
Offices

environmental conditions data

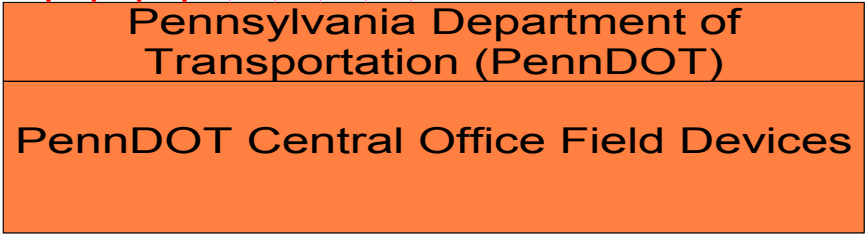
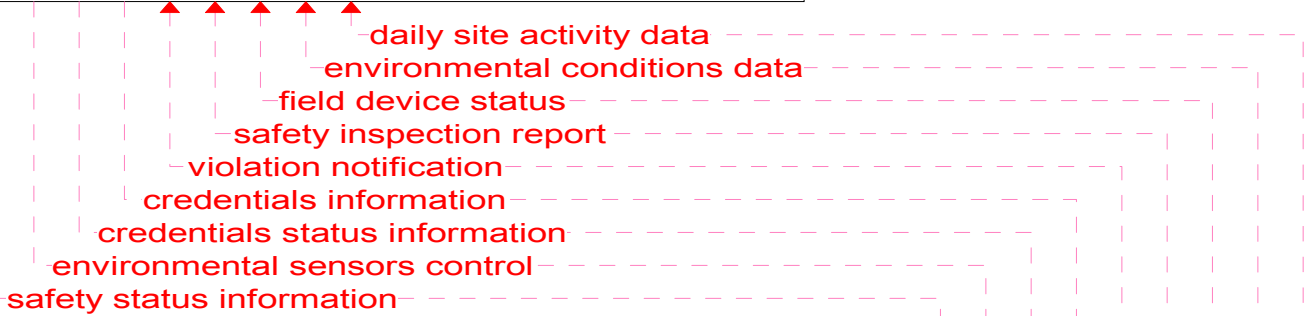
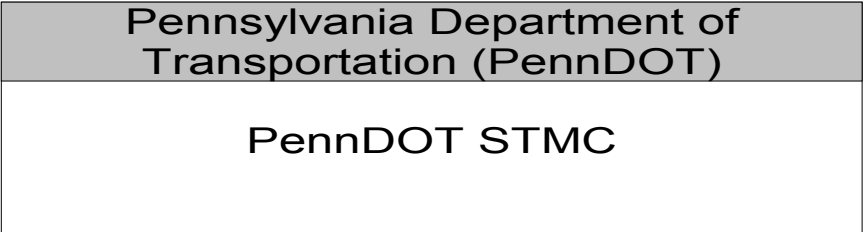
Pennsylvania Department of  
Transportation (PennDOT)

PennDOT Central Office Field Devices

Existing  
Planned



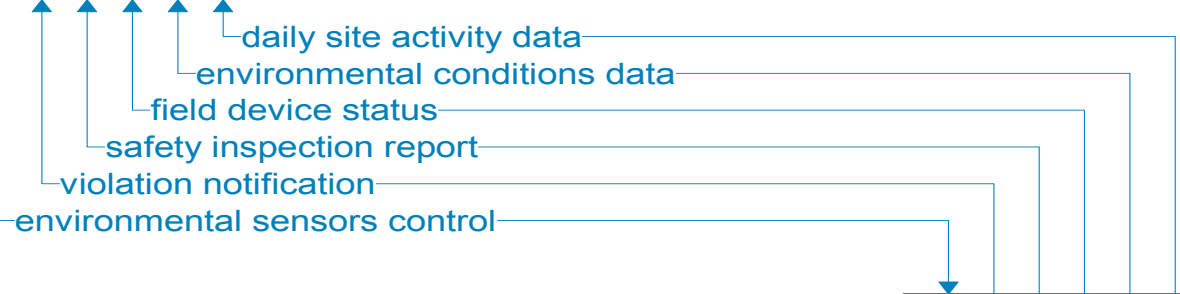
Existing  
Planned



———— Existing  
- - - - - Planned

Pennsylvania Department of  
Transportation (PennDOT)

PennDOT Central Office Organizations

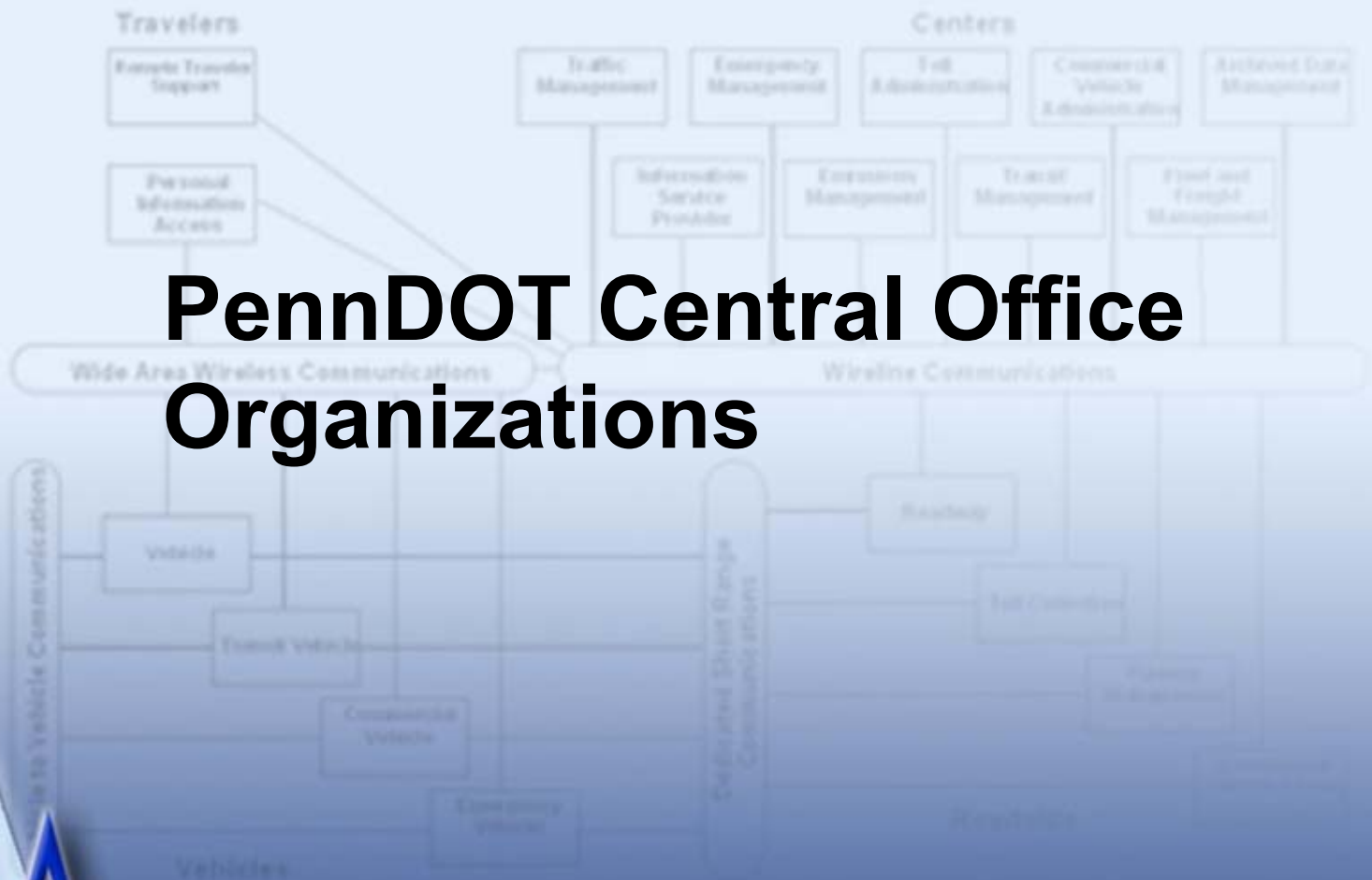


Pennsylvania Department of  
Transportation (PennDOT)

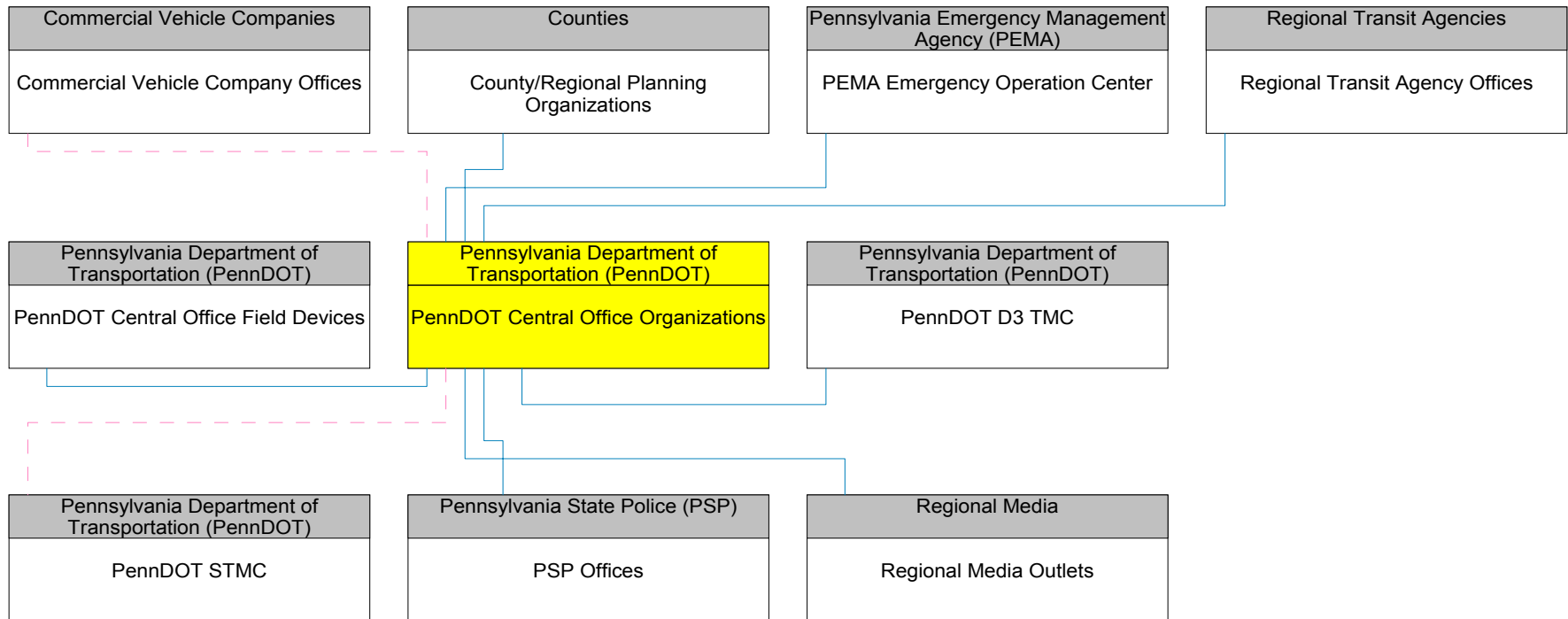
PennDOT Central Office Field Devices

Existing  
Planned

# PennDOT Central Office Organizations

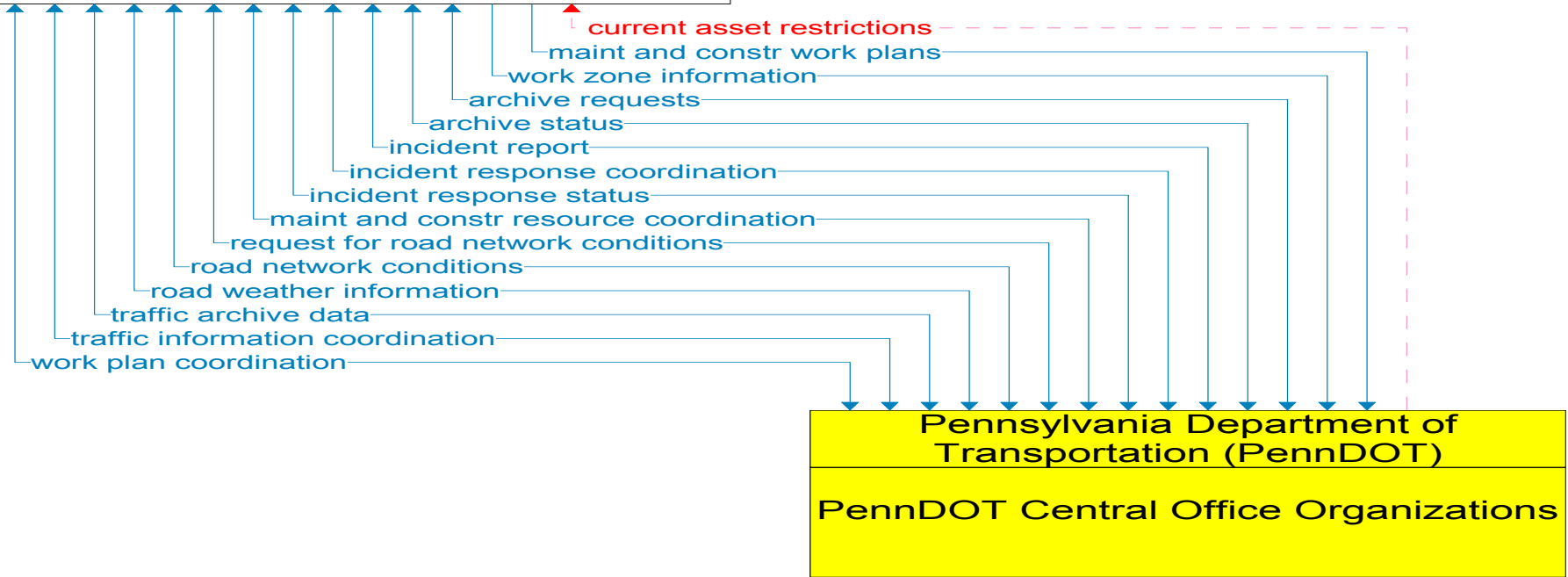


# PennDOT Central Office Organizations Interconnect Diagram

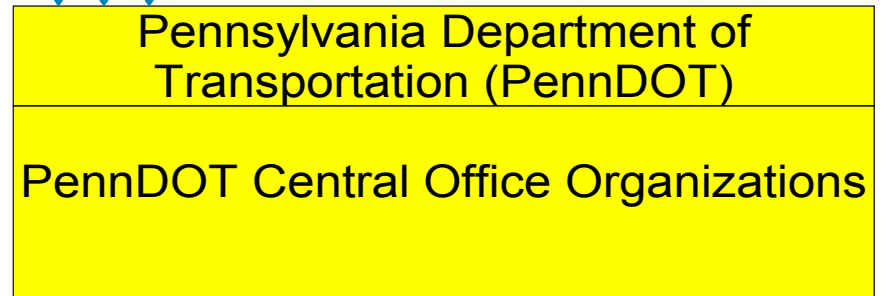
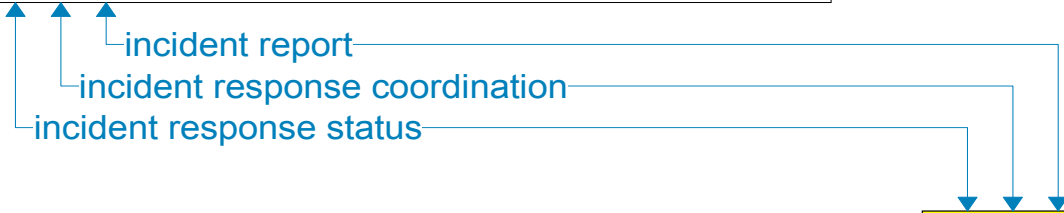
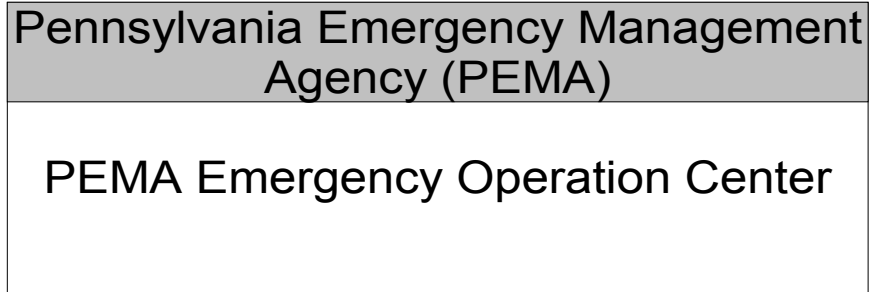


— Existing  
- - - Planned

Pennsylvania Department of Transportation (PennDOT)  
PennDOT D3 TMC

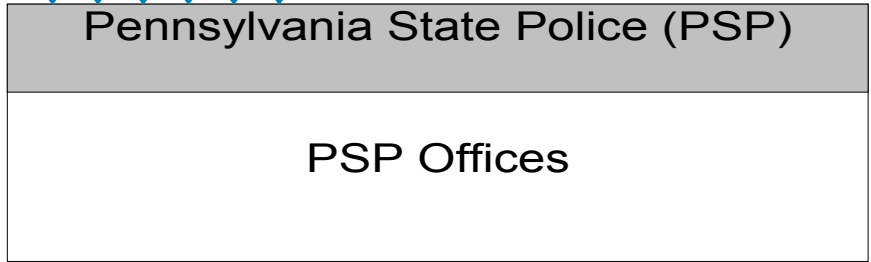
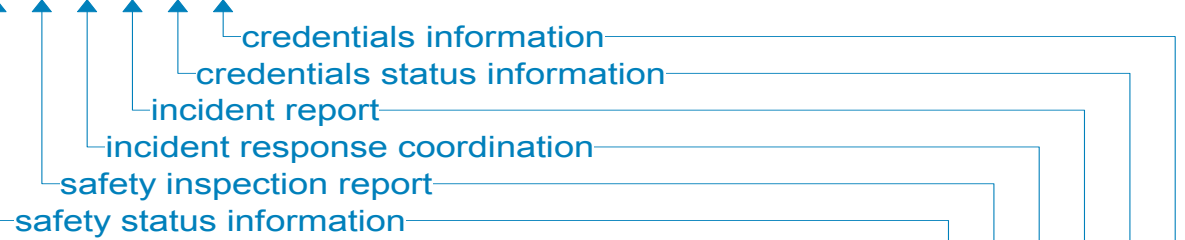
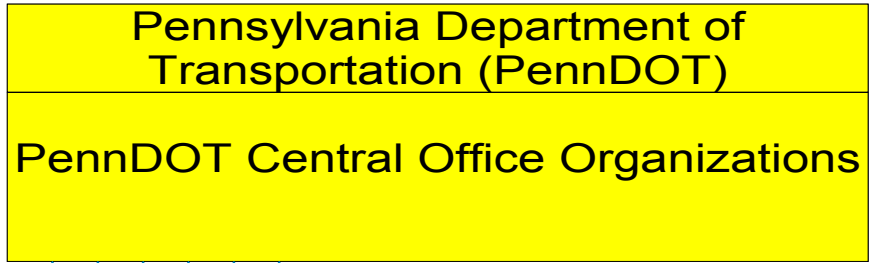


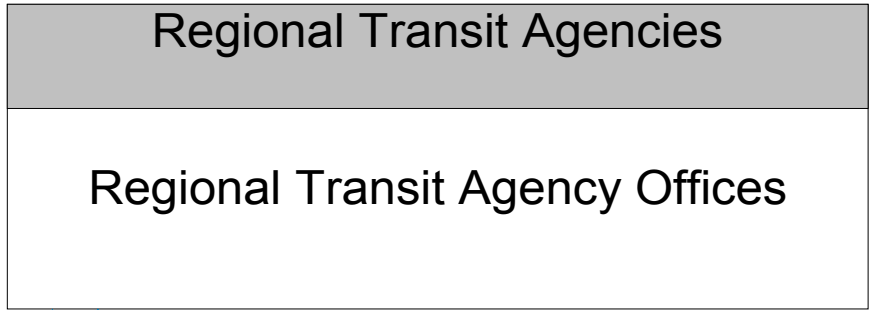
Existing  
Planned



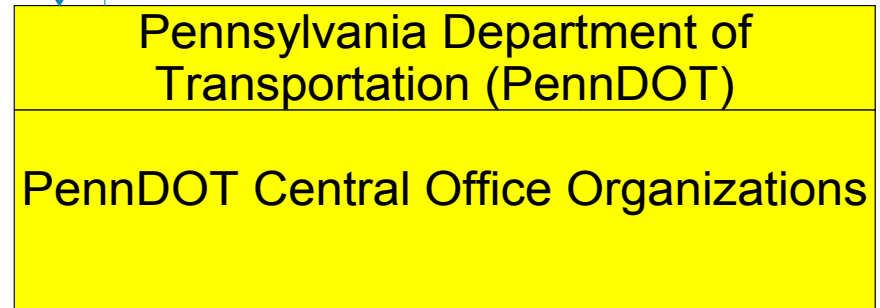
———— Existing  
----- Planned



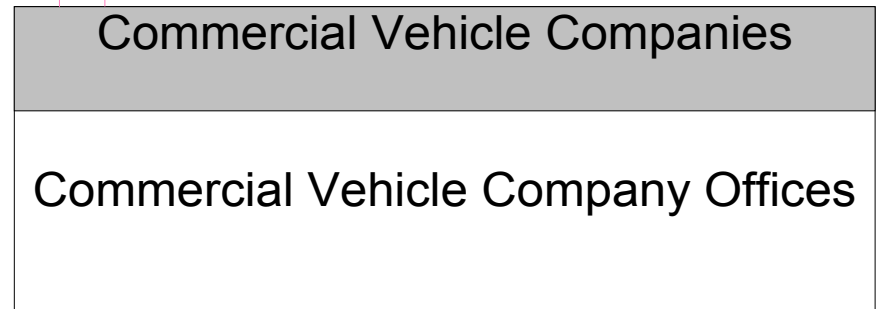
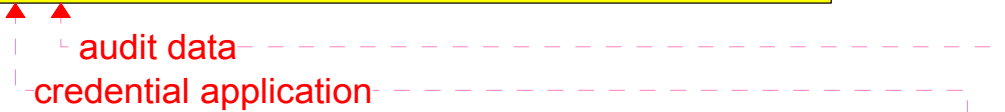
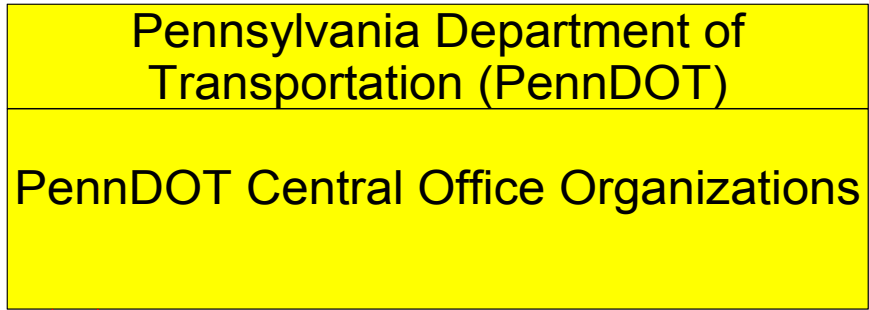




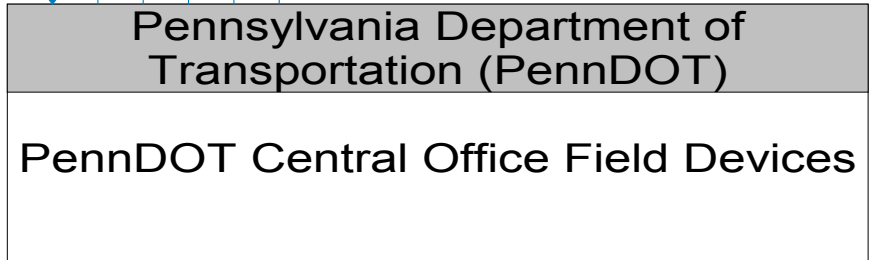
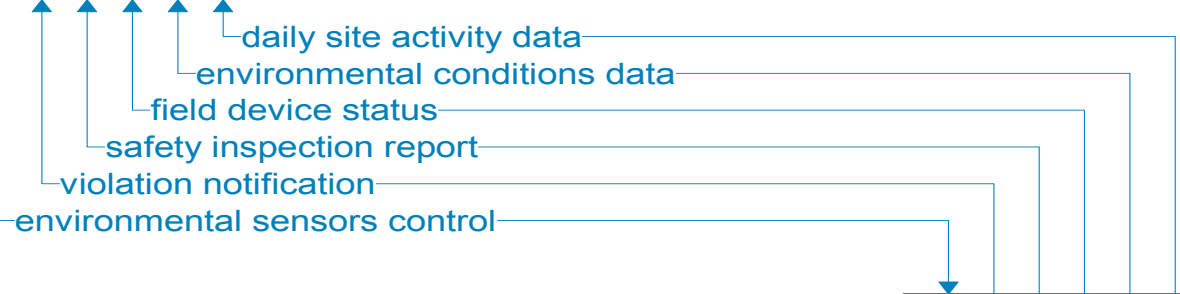
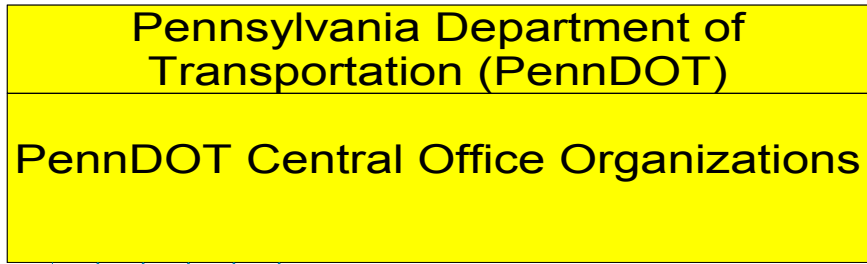
archive requests  
transit archive data



Existing  
Planned

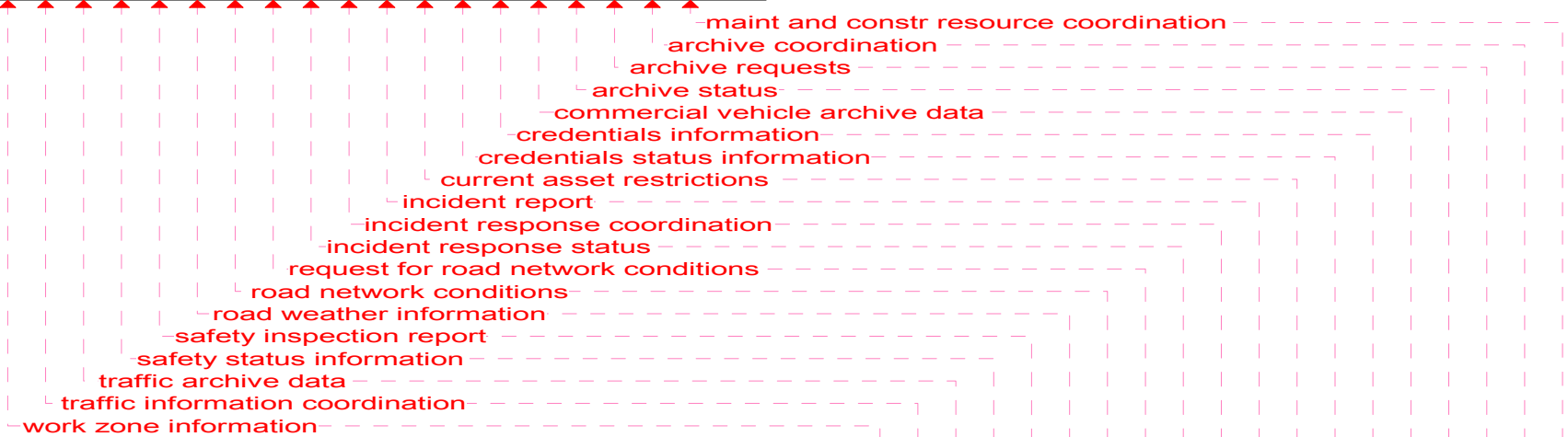


———— Existing  
- - - - - Planned



Pennsylvania Department of Transportation  
(PennDOT)

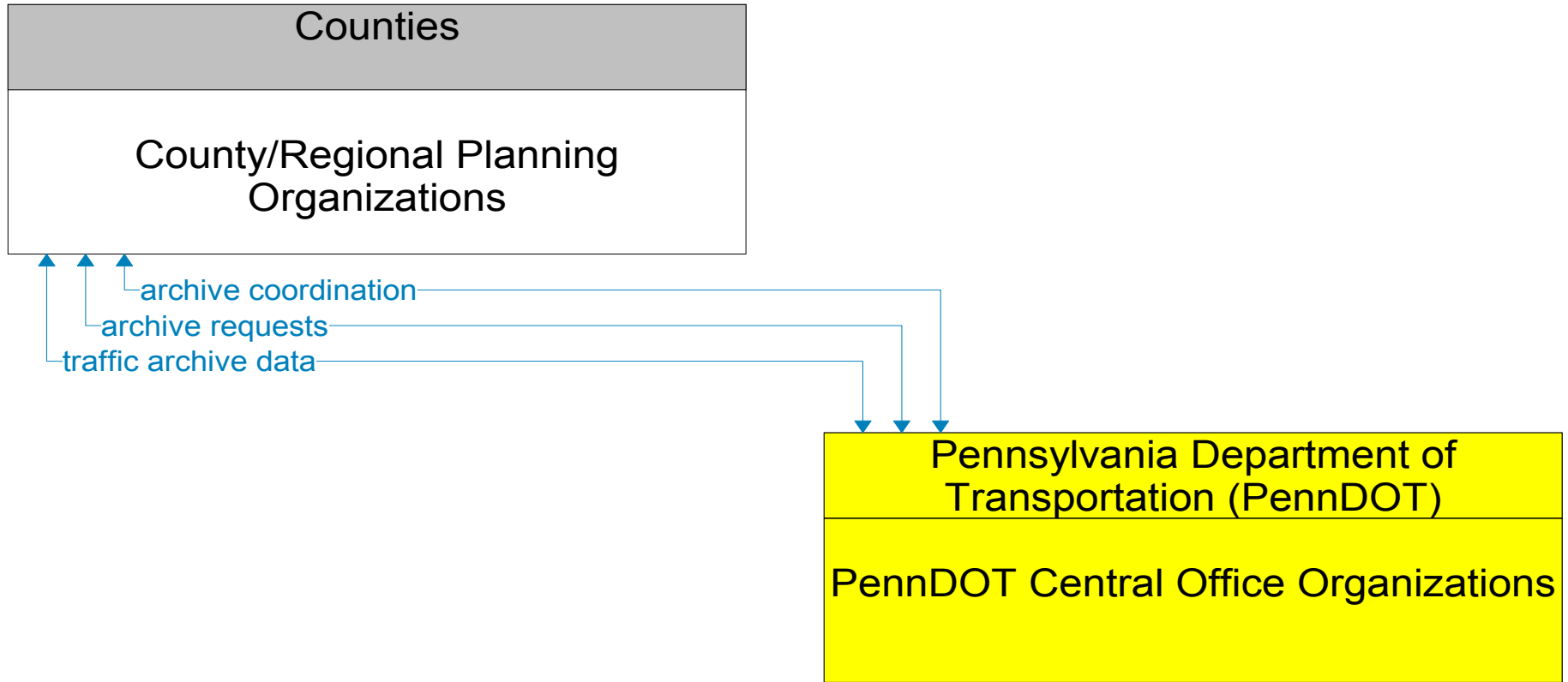
PennDOT STMC



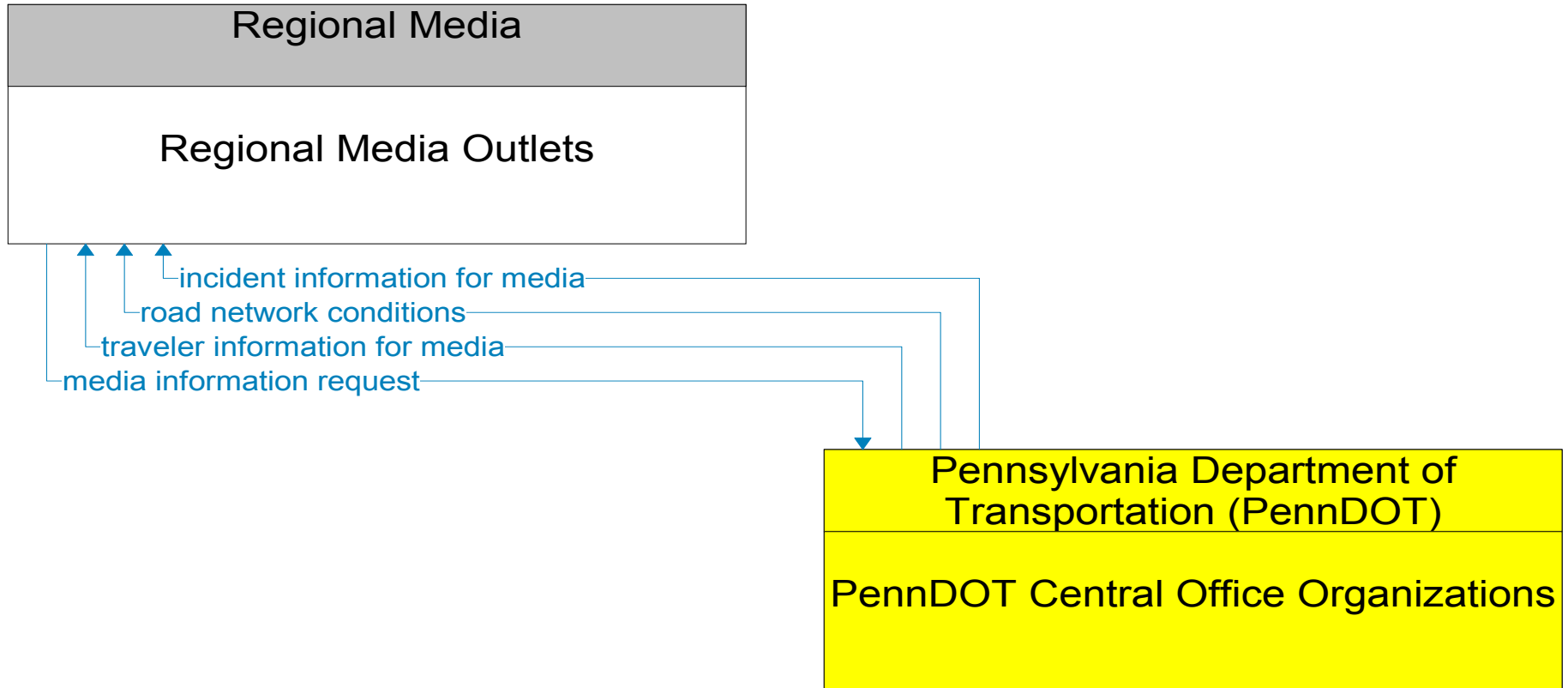
Pennsylvania Department of Transportation  
(PennDOT)

PennDOT Central Office Organizations

———— Existing  
- - - - - Planned

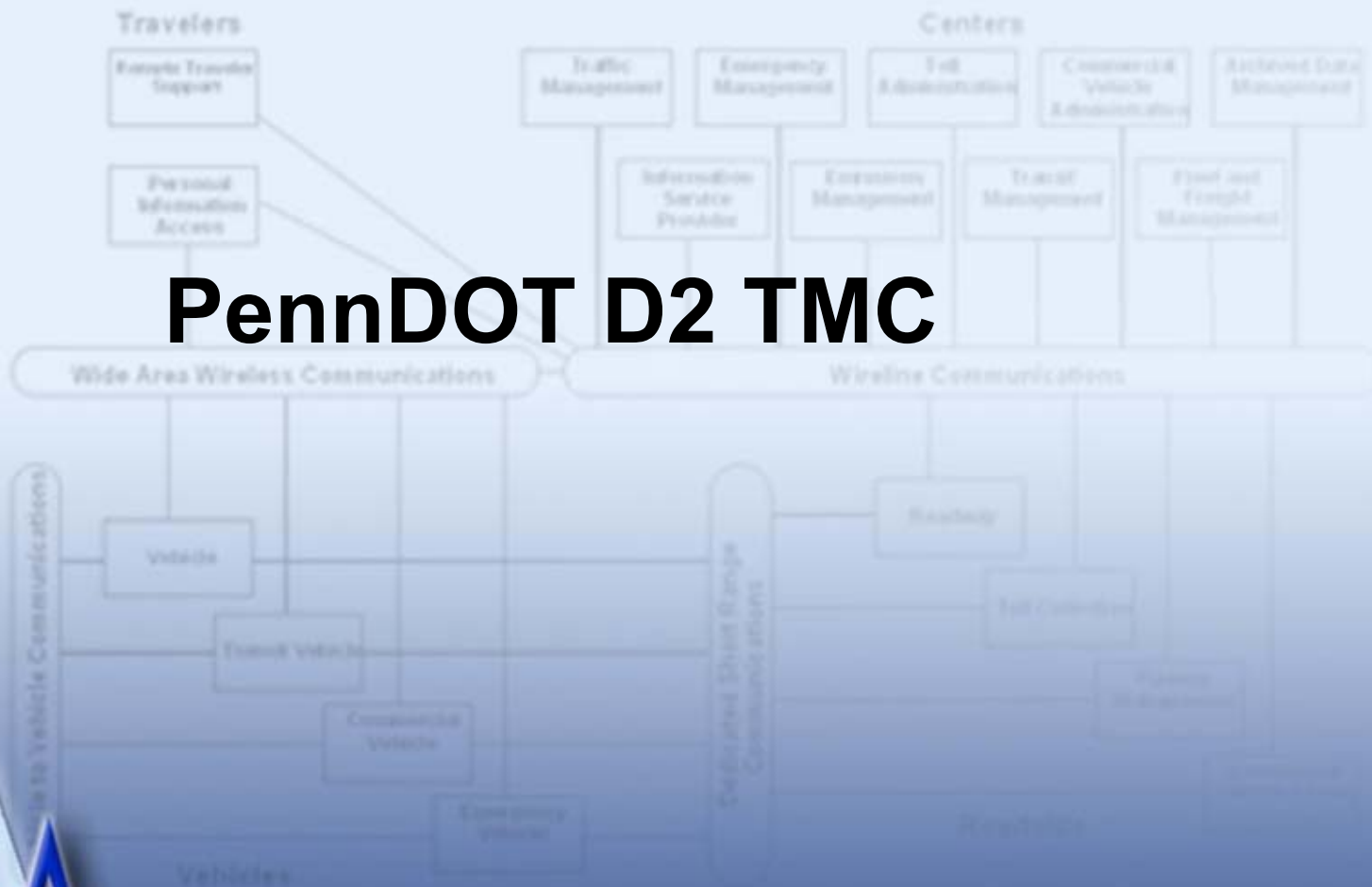


———— Existing  
- - - - - Planned



———— Existing  
- - - - - Planned

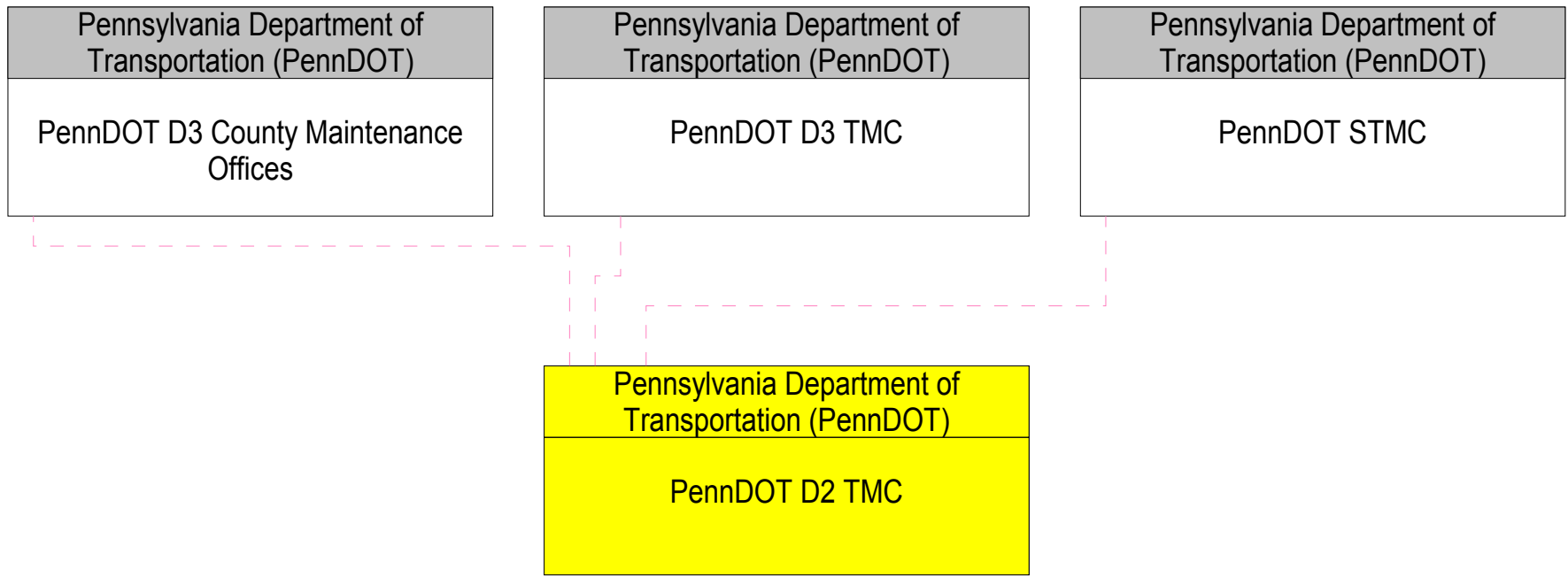
# PennDOT D2 TMC



PA



# PennDOT D2 TMC Interconnect Diagram

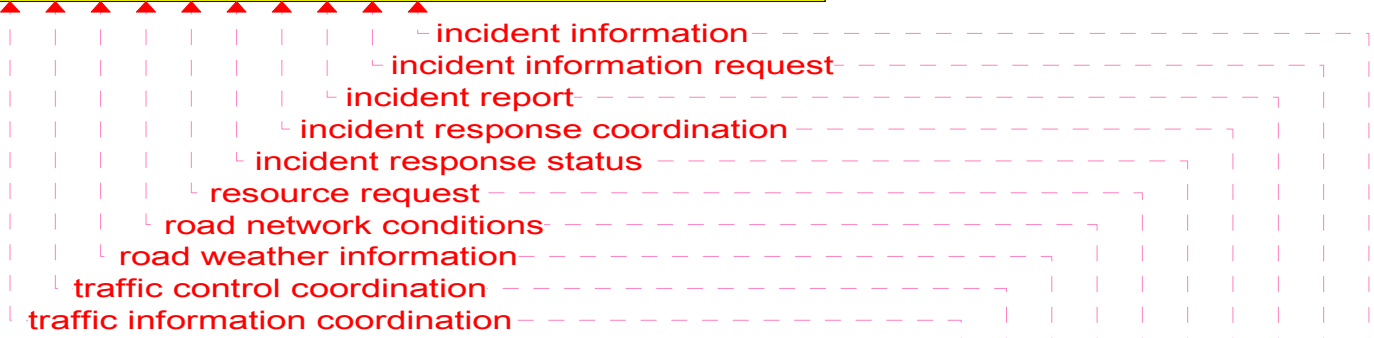


———— Existing  
- - - - - Planned

Pennsylvania Department of  
Transportation (PennDOT)

---

PennDOT D2 TMC



Pennsylvania Department of  
Transportation (PennDOT)

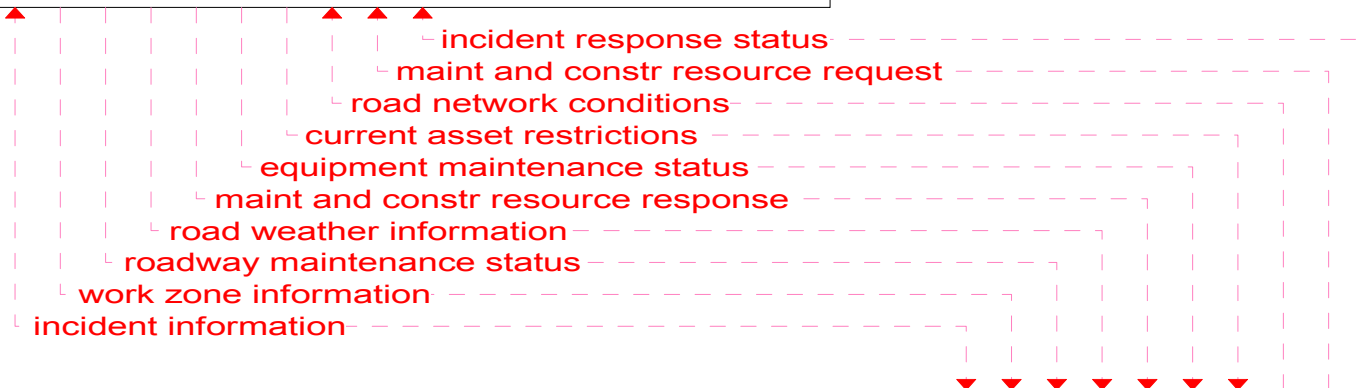
---

PennDOT D3 TMC

———— Existing  
- - - - - Planned

Pennsylvania Department of  
Transportation (PennDOT)

PennDOT D3 County Maintenance  
Offices

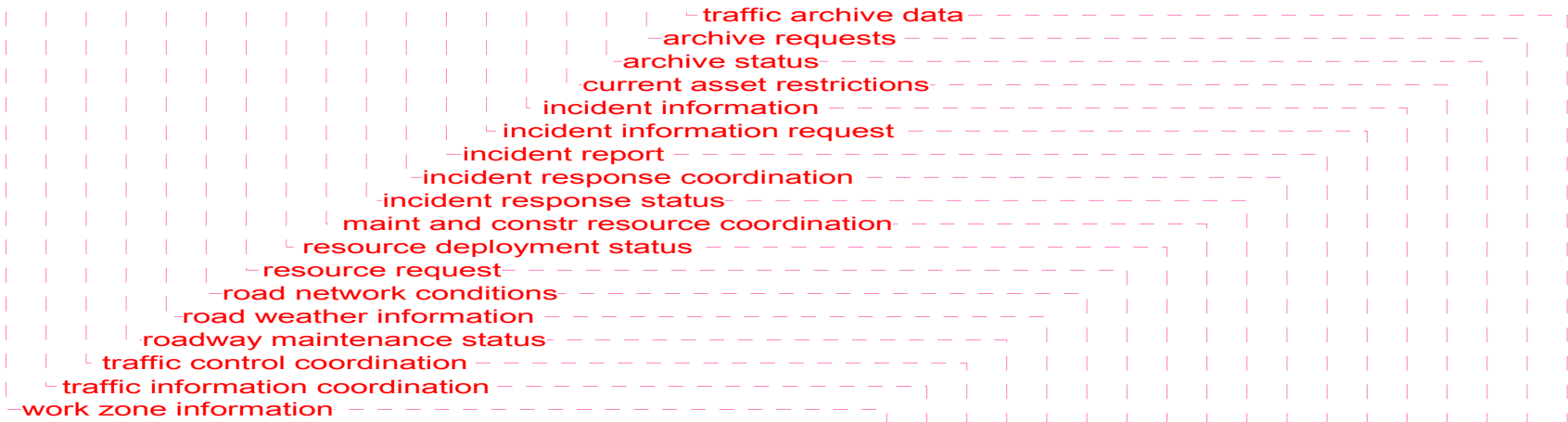


Pennsylvania Department of  
Transportation (PennDOT)

PennDOT D2 TMC

———— Existing  
- - - - - Planned

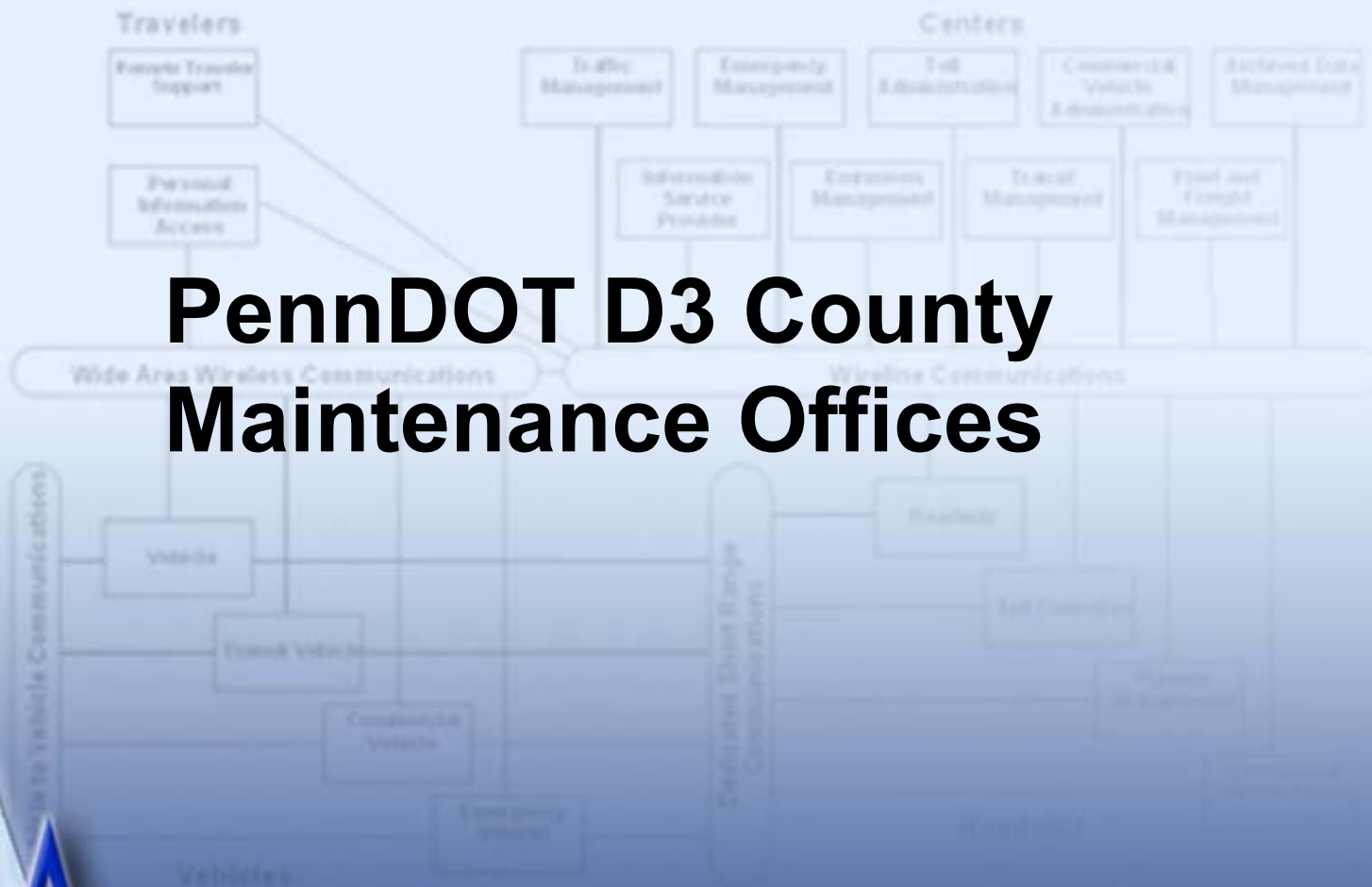
Pennsylvania Department of Transportation (PennDOT)  
PennDOT D2 TMC



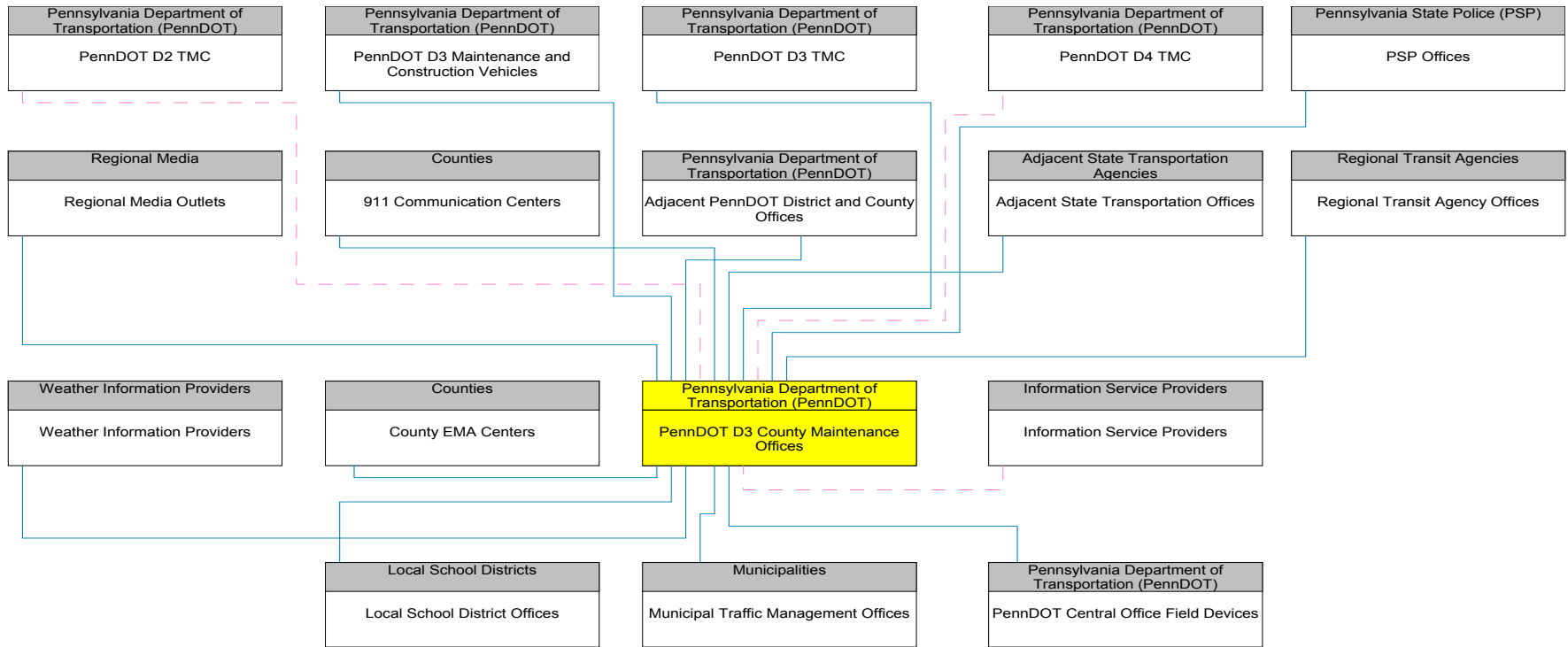
Pennsylvania Department of Transportation (PennDOT)  
PennDOT STMC

Existing  
Planned

# PennDOT D3 County Maintenance Offices

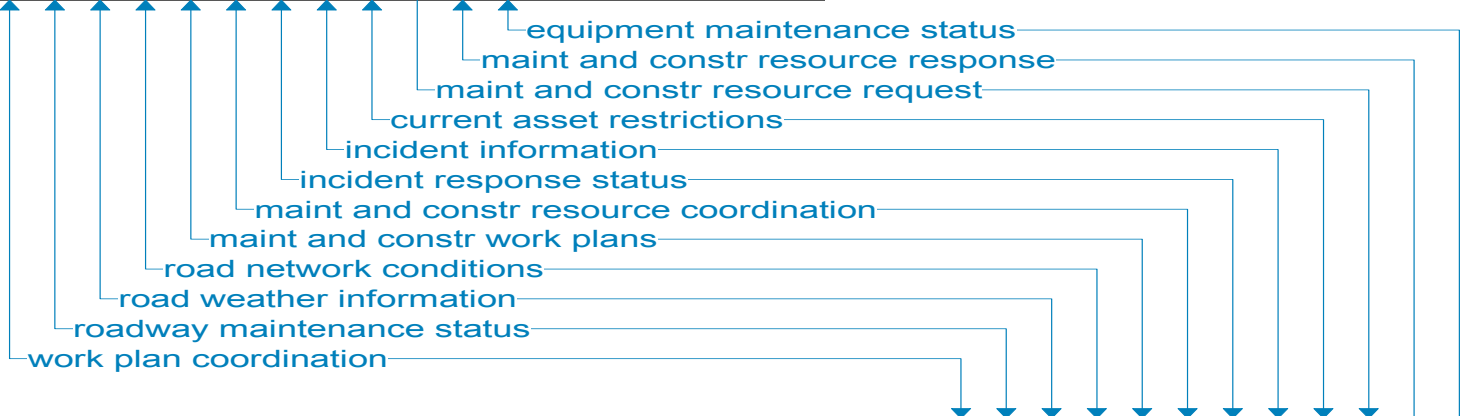


# PennDOT D3 County Maintenance Offices Interconnect Diagram



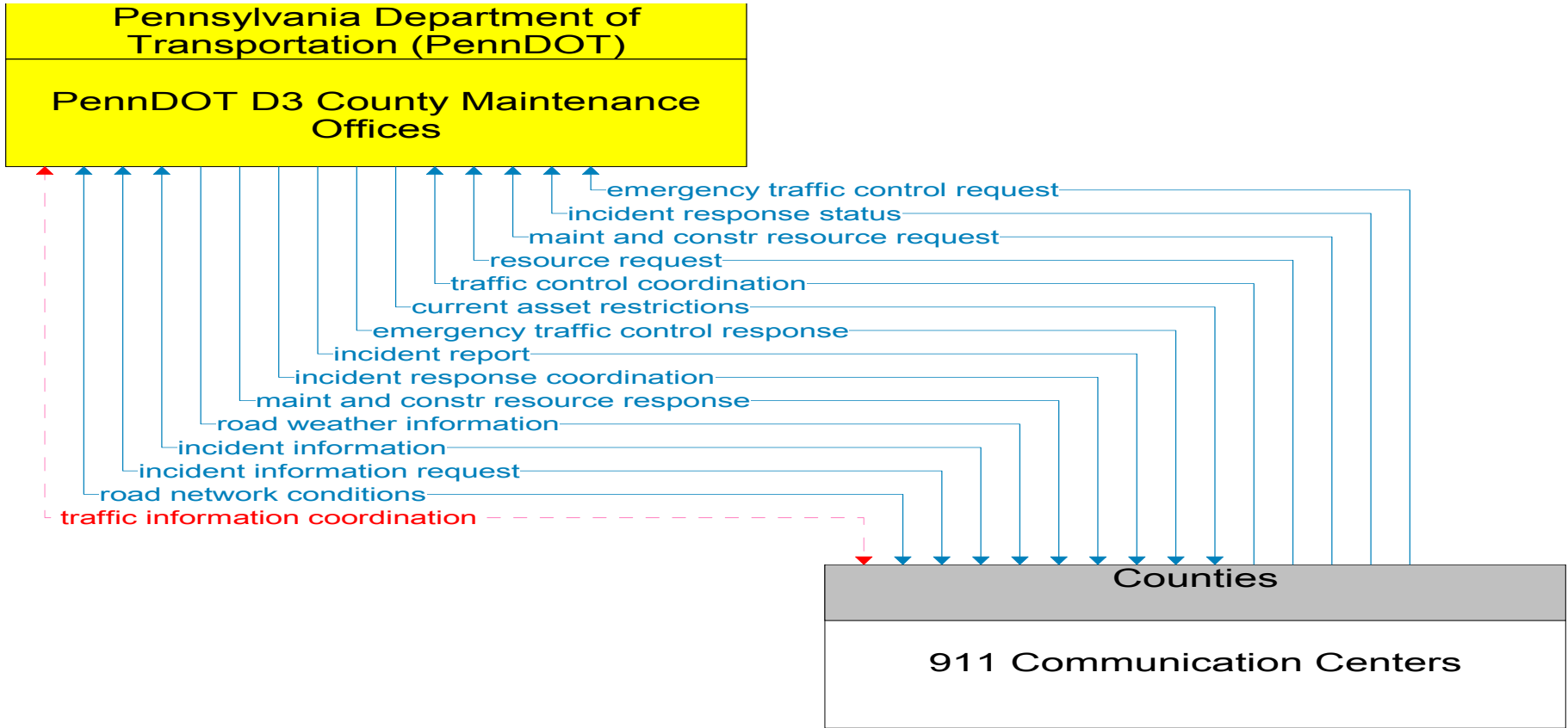
— Existing  
- - - Planned

**Pennsylvania Department of Transportation (PennDOT)**  
 PennDOT D3 TMC



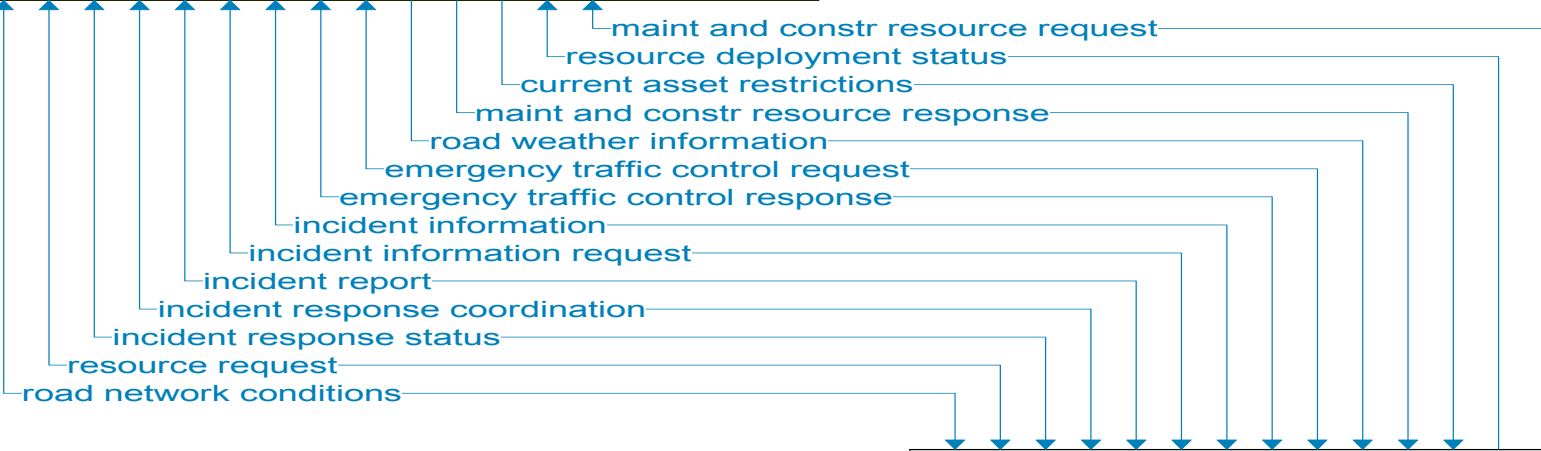
**Pennsylvania Department of Transportation (PennDOT)**  
 PennDOT D3 County Maintenance Offices

———— Existing  
 - - - - - Planned



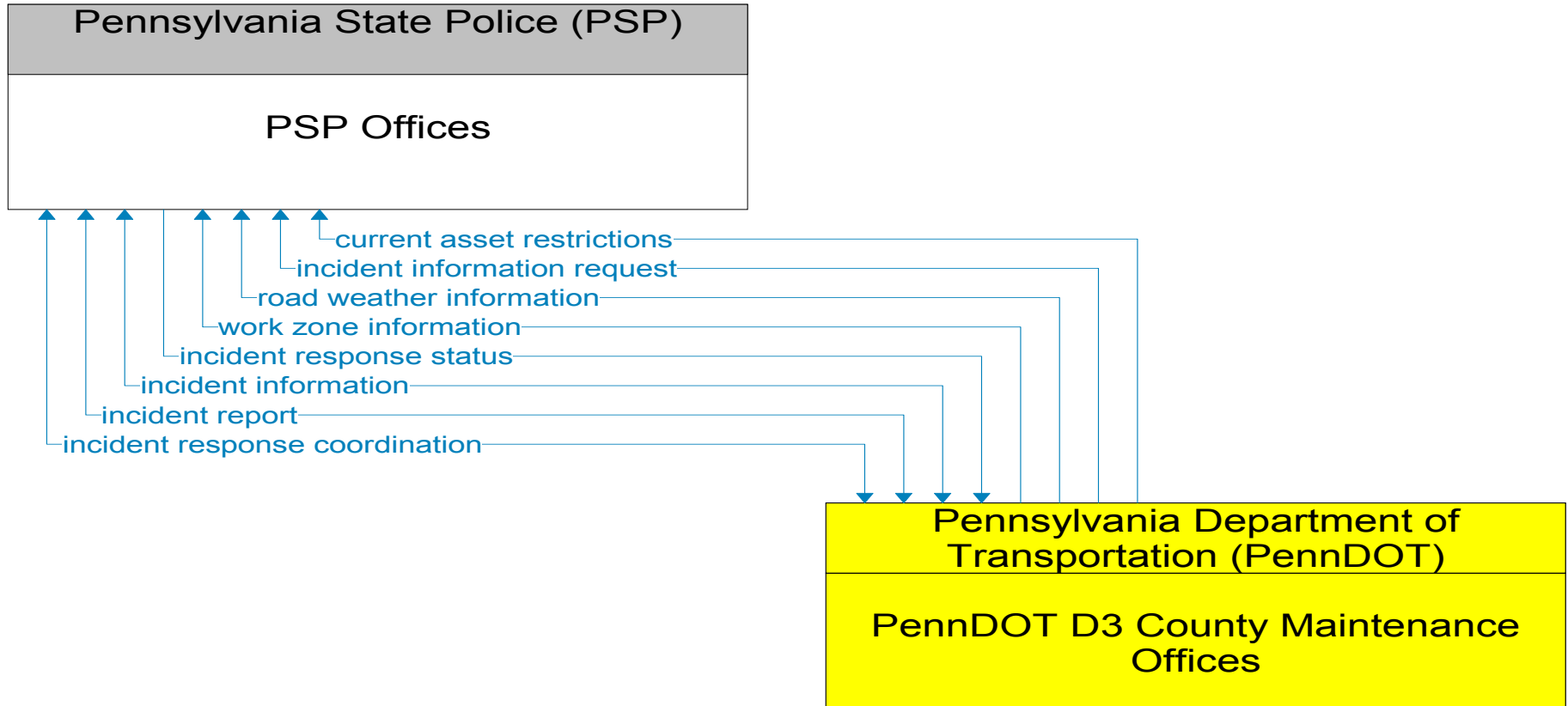


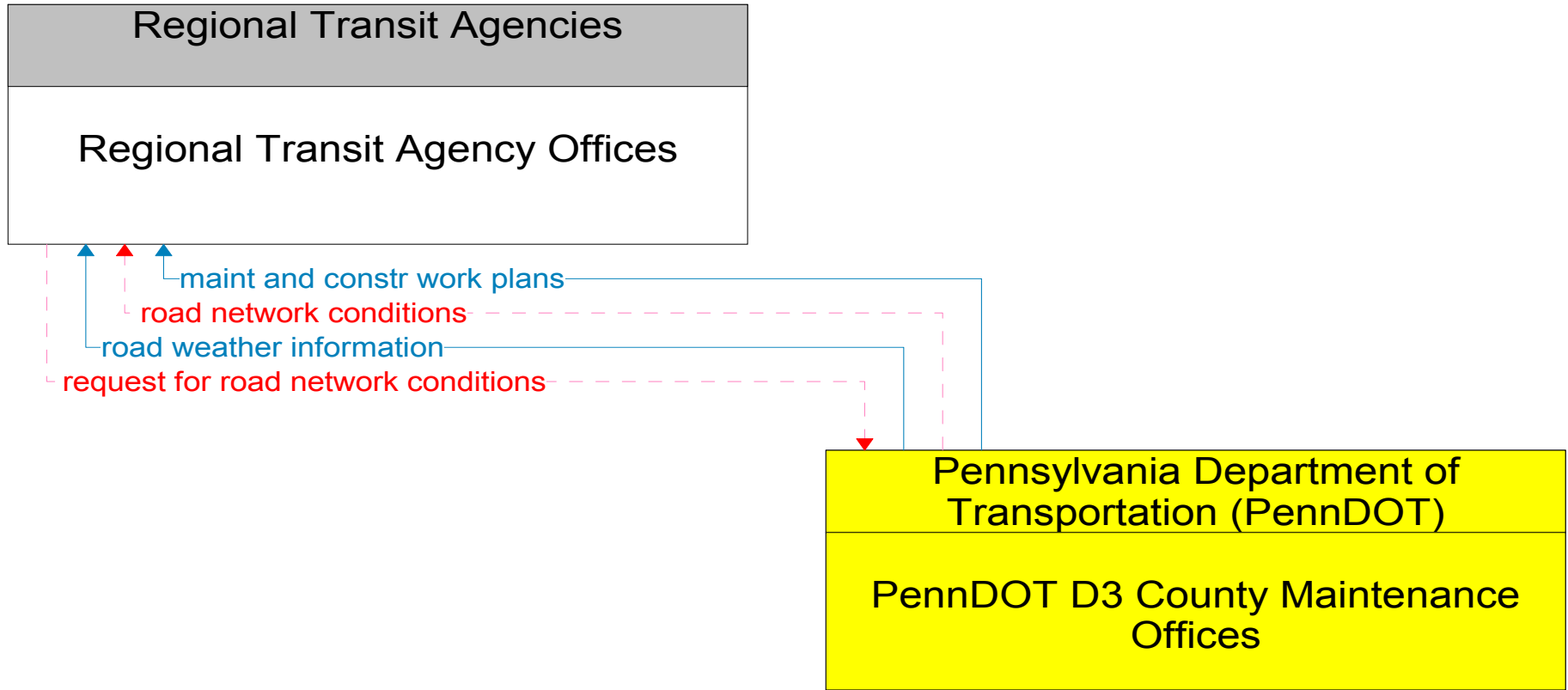
**Pennsylvania Department of Transportation (PennDOT)**  
**PennDOT D3 County Maintenance Offices**



**Counties**  
**County EMA Centers**

———— Existing  
----- Planned

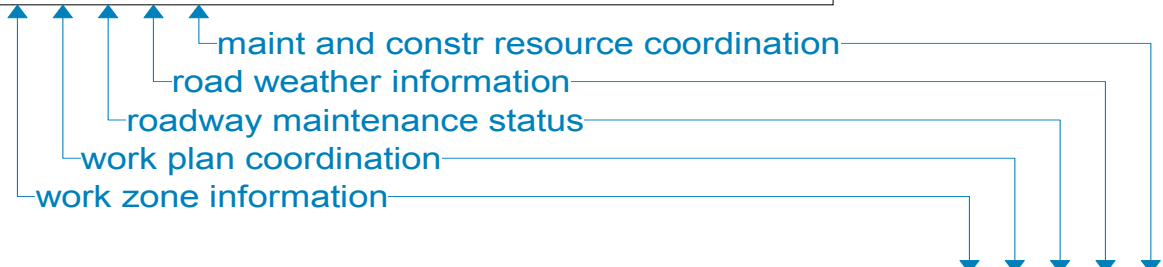




———— Existing  
- - - - - Planned

Pennsylvania Department of  
Transportation (PennDOT)

Adjacent PennDOT District and County  
Offices



Pennsylvania Department of  
Transportation (PennDOT)

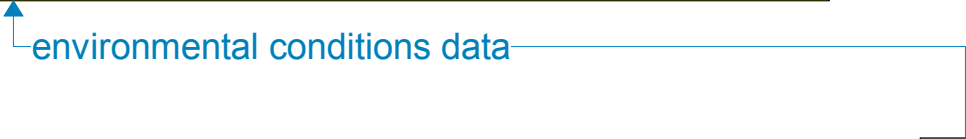
PennDOT D3 County Maintenance  
Offices

———— Existing  
- - - - - Planned

Pennsylvania Department of  
Transportation (PennDOT)

---

PennDOT D3 County Maintenance  
Offices



Pennsylvania Department of  
Transportation (PennDOT)

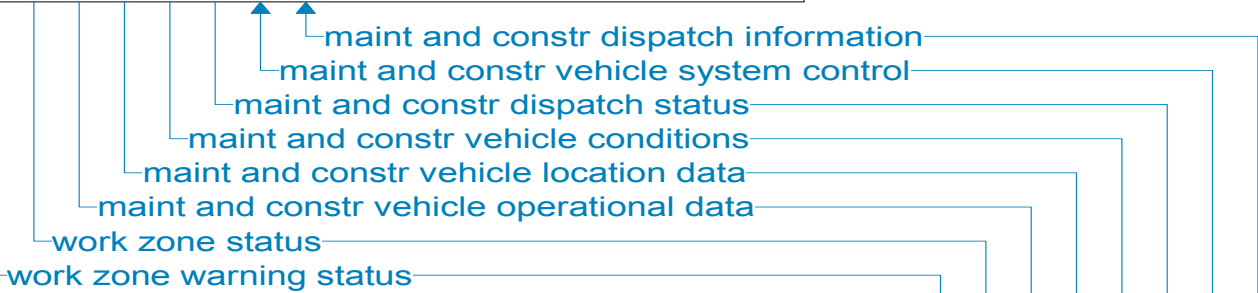
---

PennDOT Central Office Field Devices

———— Existing  
- - - - - Planned

**Pennsylvania Department of  
Transportation (PennDOT)**

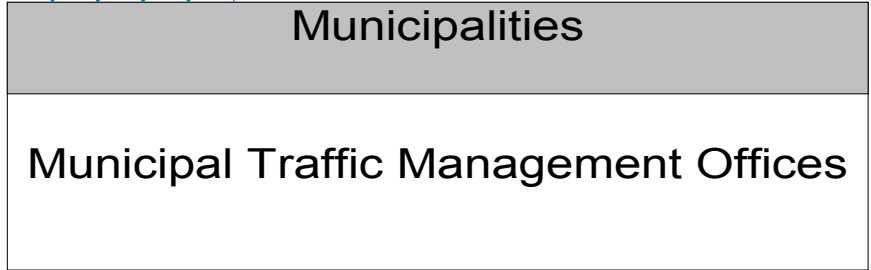
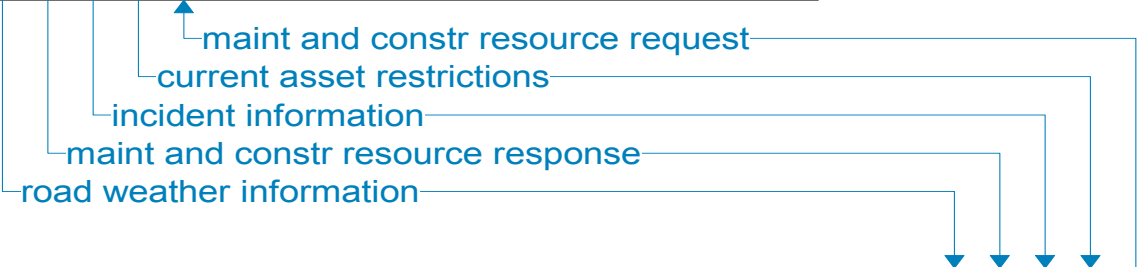
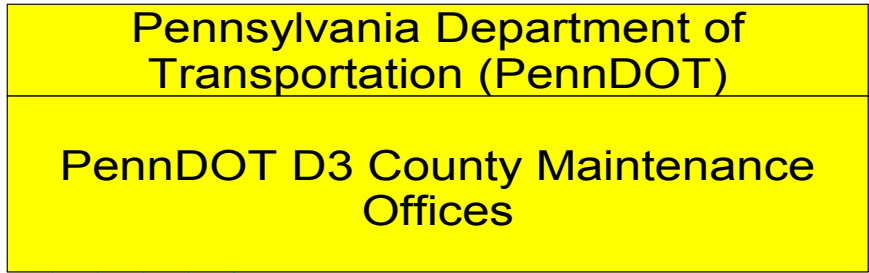
**PennDOT D3 Maintenance and  
Construction Vehicles**



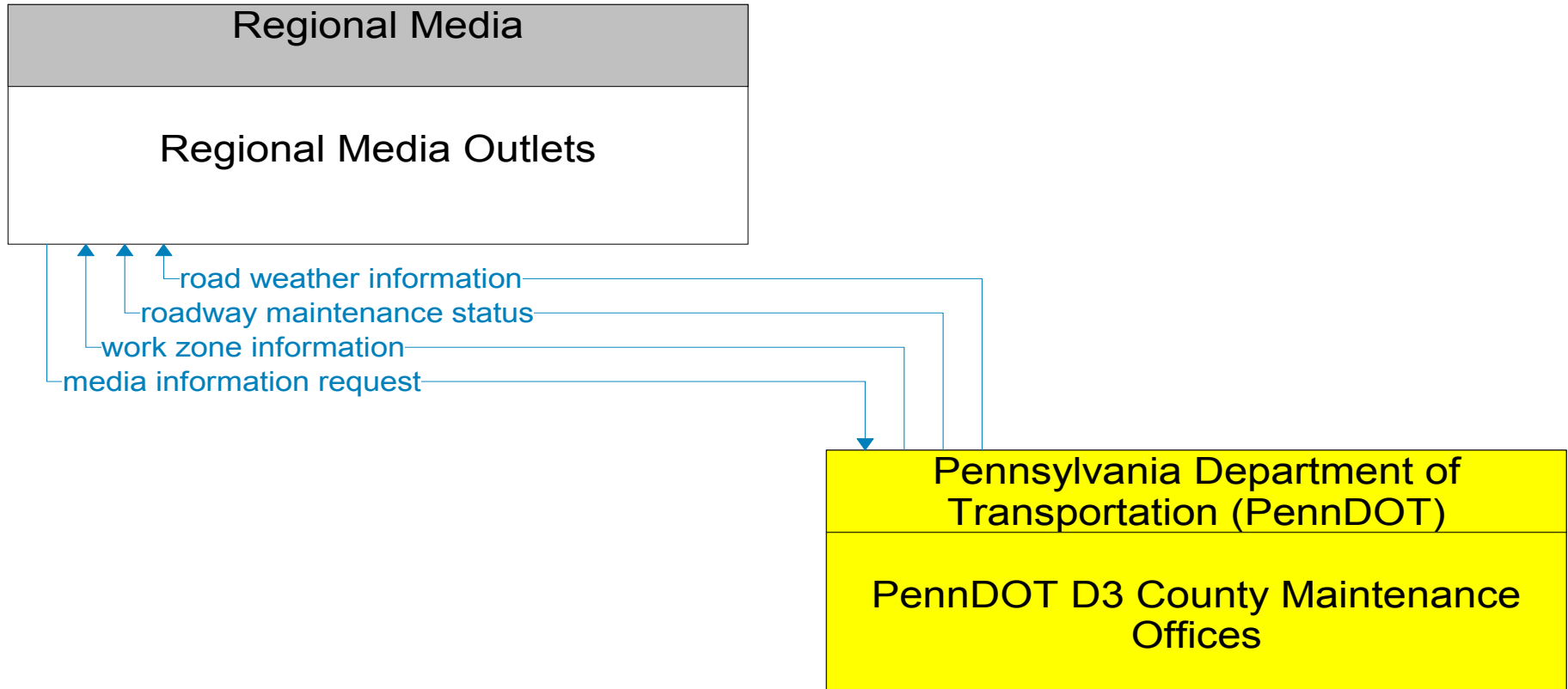
**Pennsylvania Department of  
Transportation (PennDOT)**

**PennDOT D3 County Maintenance  
Offices**

———— Existing  
- - - - - Planned

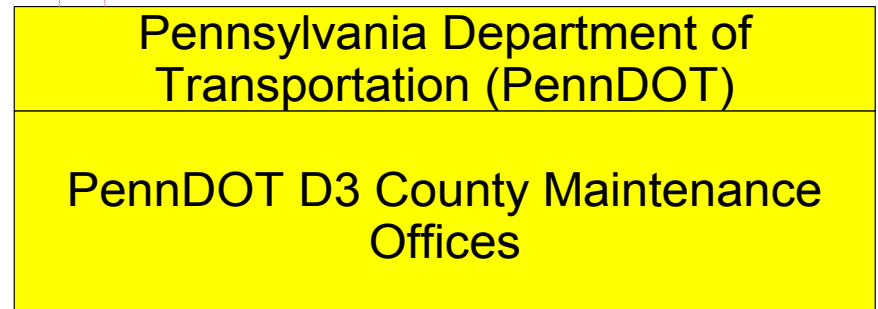
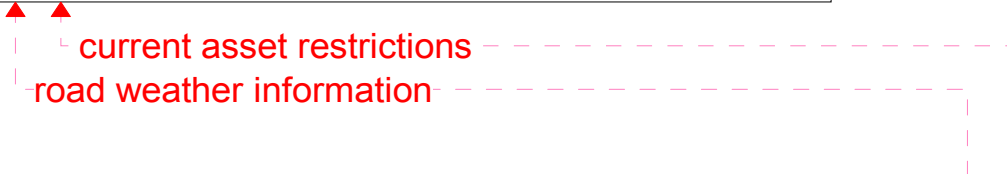
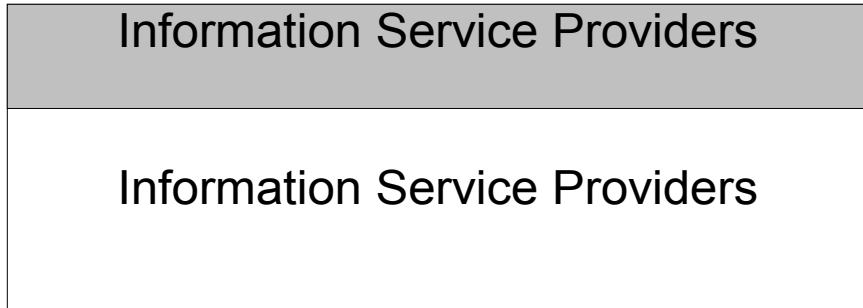


———— Existing  
- - - - - Planned



———— Existing  
----- Planned





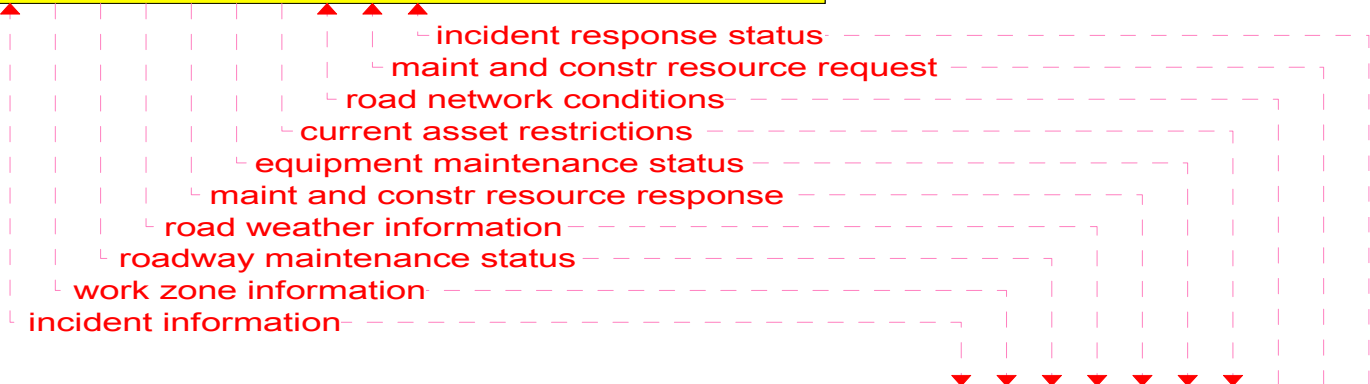
———— Existing

- - - - - Planned

Pennsylvania Department of  
Transportation (PennDOT)

---

PennDOT D3 County Maintenance  
Offices



Pennsylvania Department of  
Transportation (PennDOT)

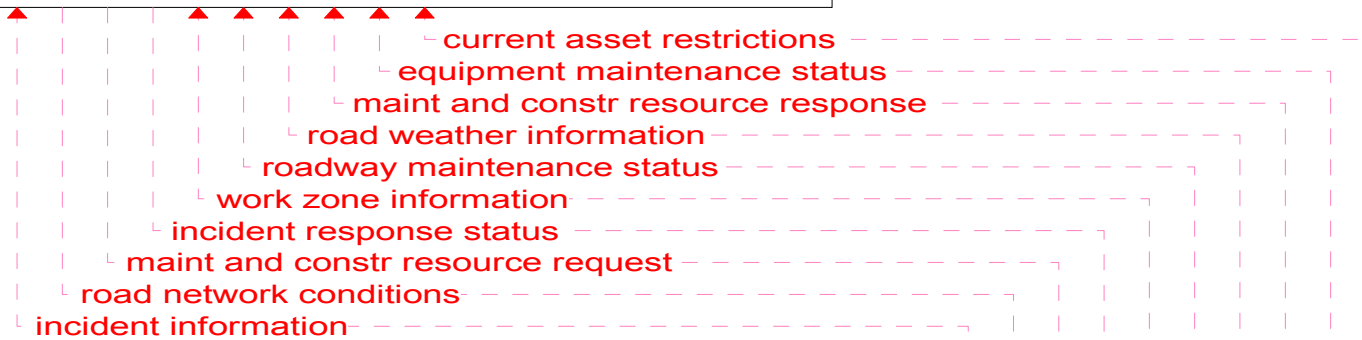
---

PennDOT D2 TMC

———— Existing  
- - - - - Planned

Pennsylvania Department of  
Transportation (PennDOT)

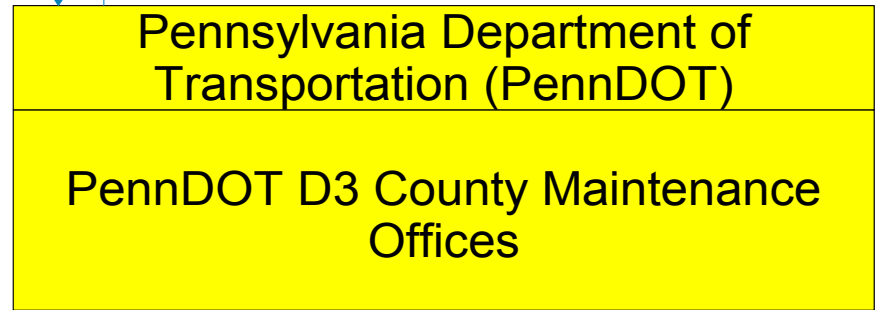
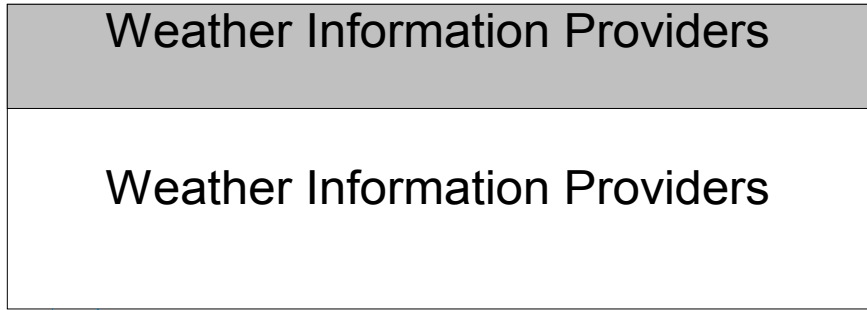
PennDOT D4 TMC



Pennsylvania Department of  
Transportation (PennDOT)

PennDOT D3 County Maintenance  
Offices

———— Existing  
- - - - - Planned

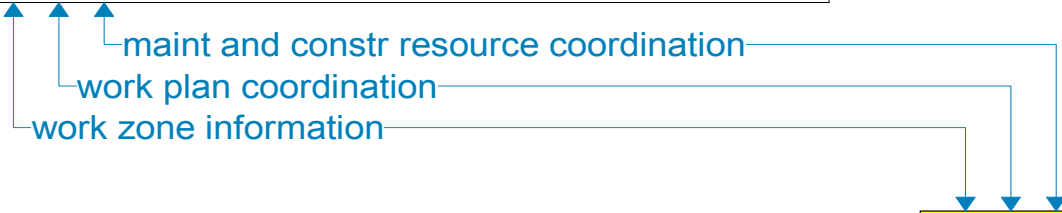
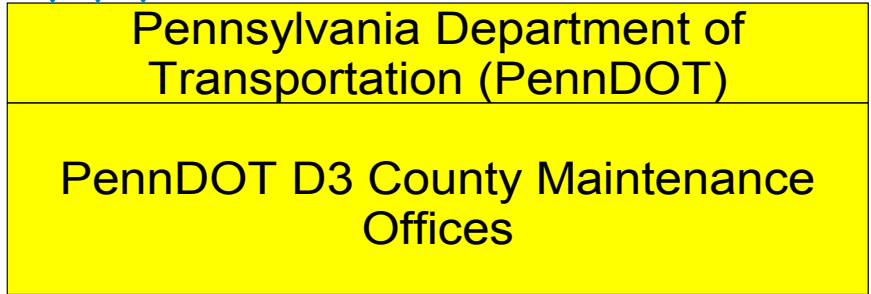
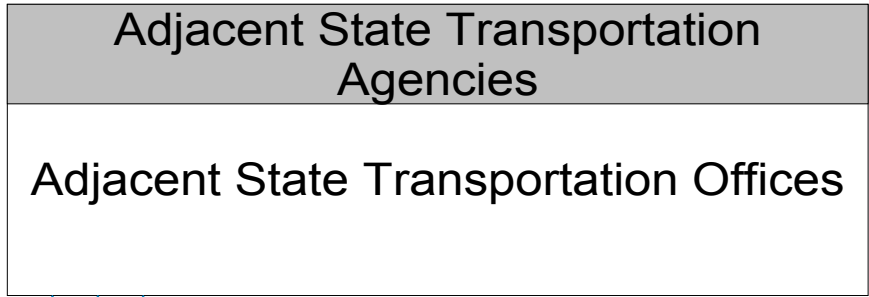


road weather information

weather information

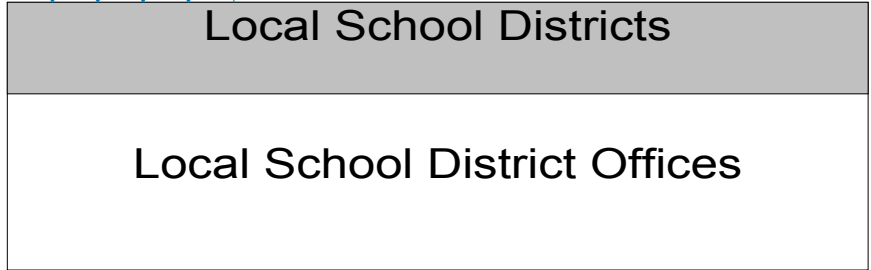
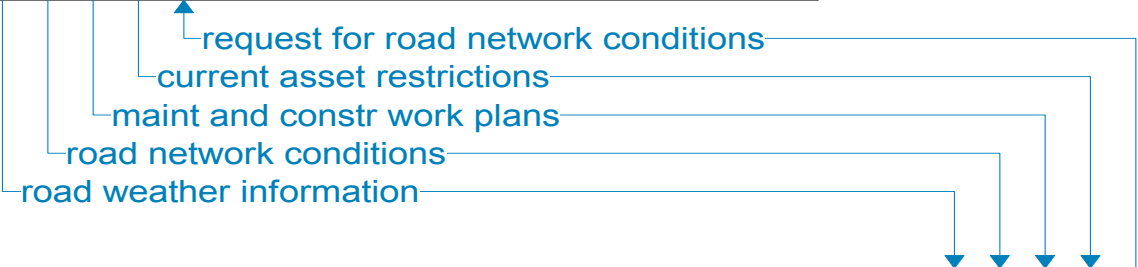
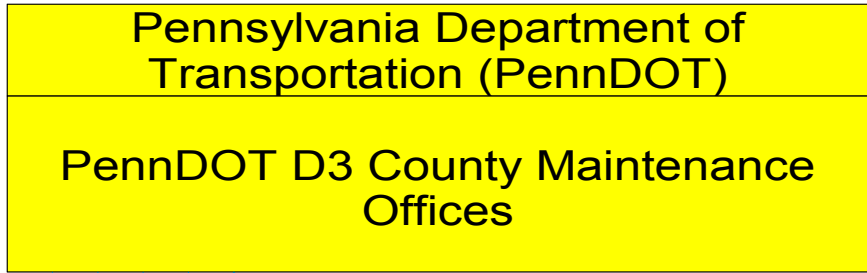
Existing

Planned



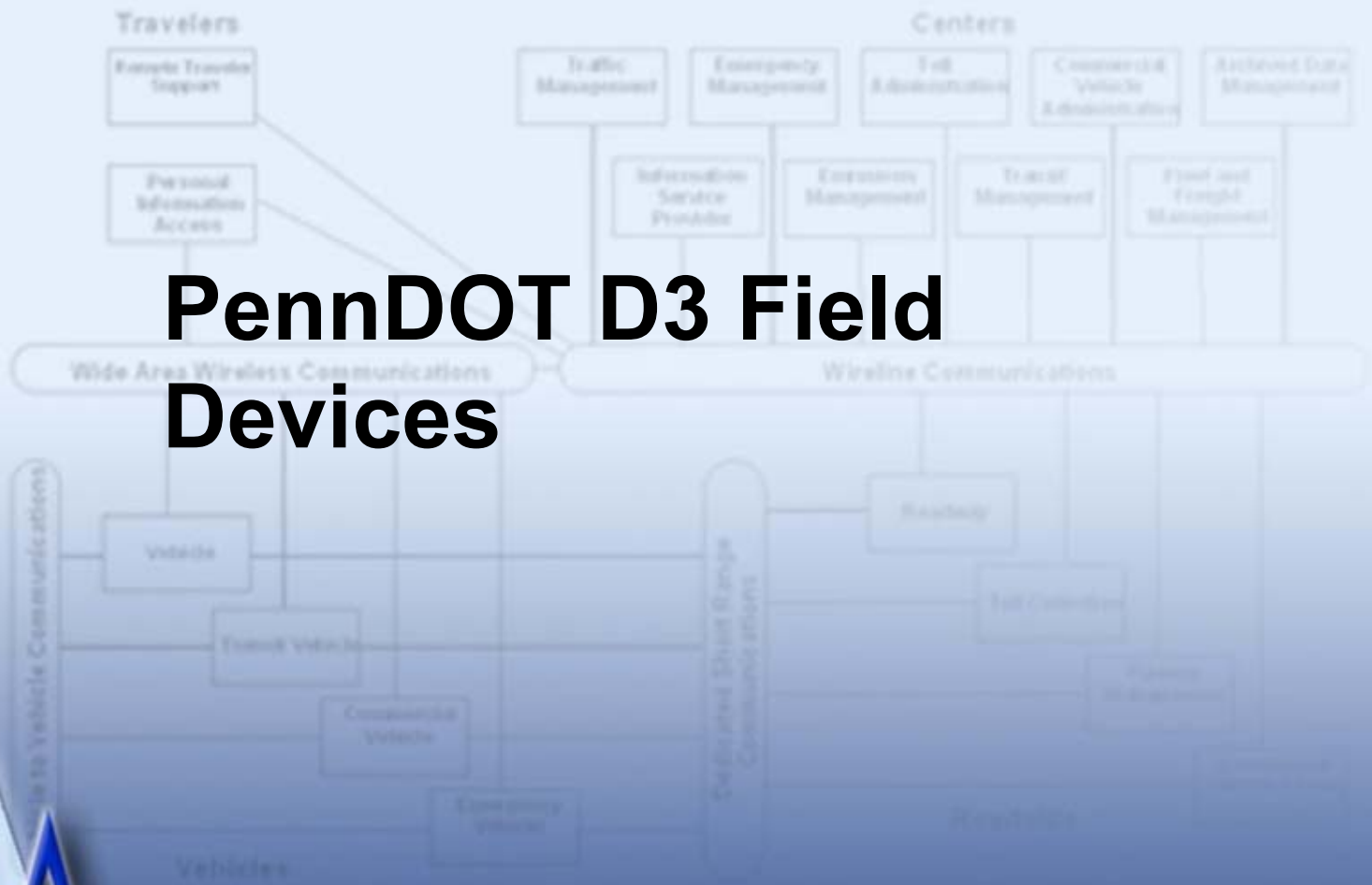
———— Existing

- - - - - Planned



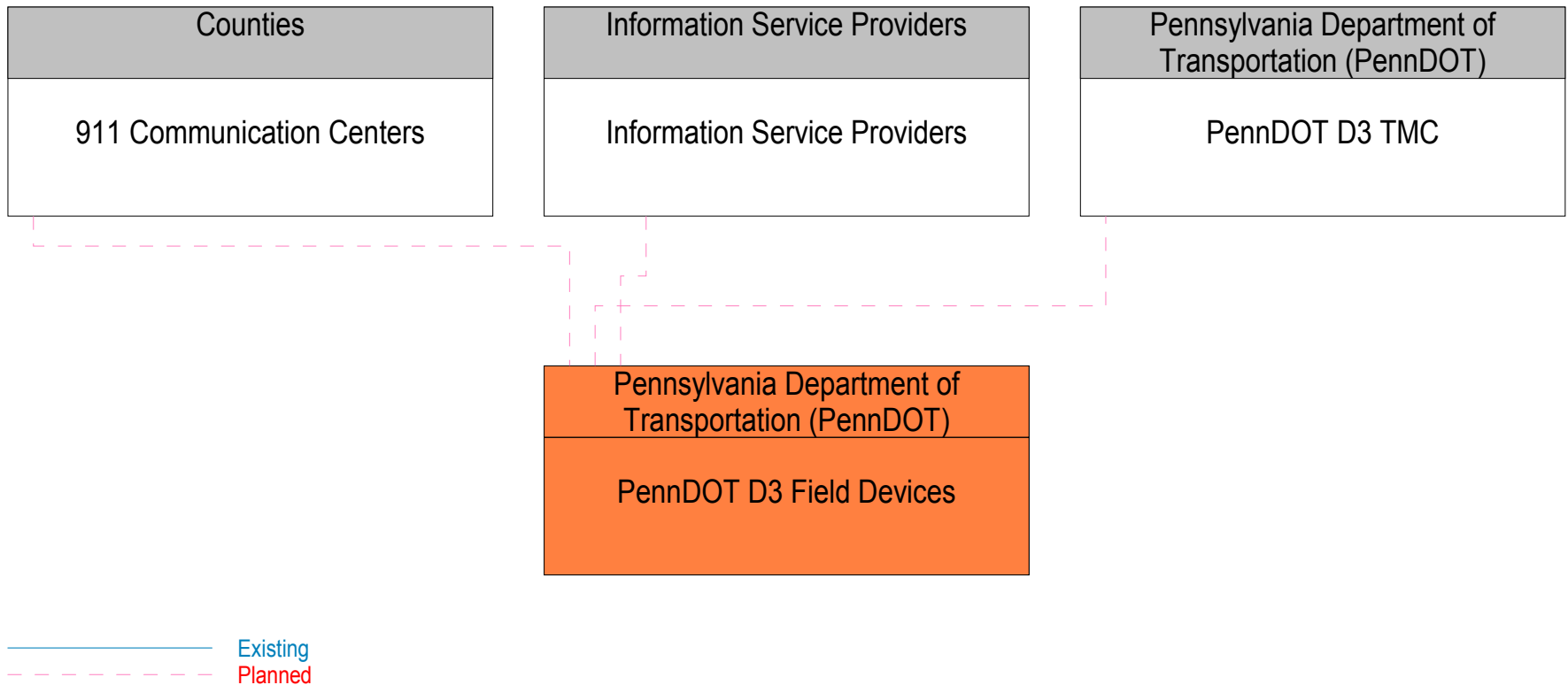
———— Existing  
- - - - - Planned

# PennDOT D3 Field Devices



PA

# PennDOT D3 Field Devices Interconnect Diagram



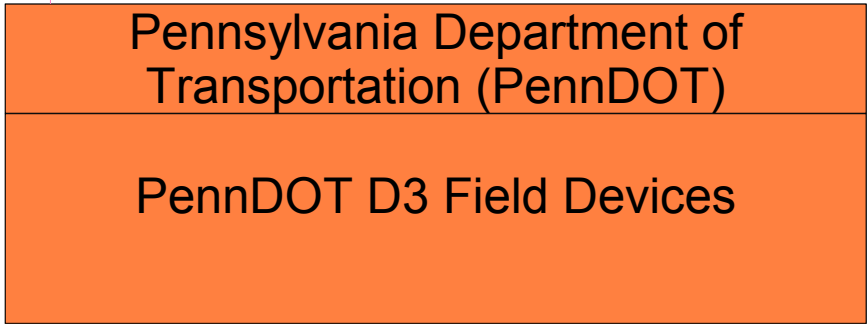
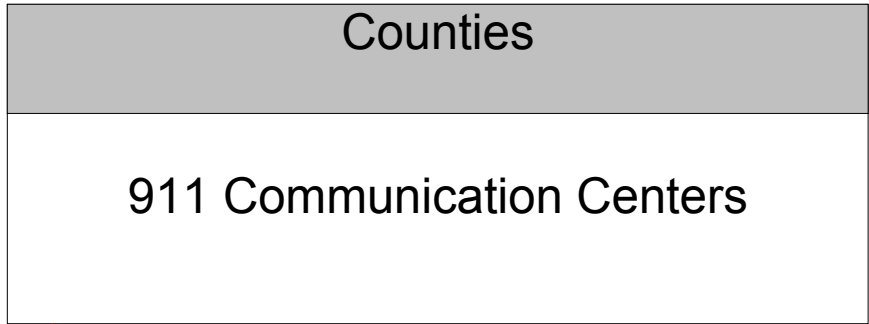


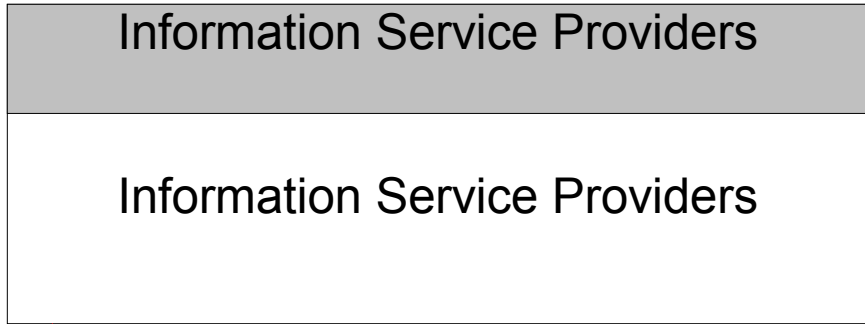
Pennsylvania Department of Transportation (PennDOT)  
PennDOT D3 TMC

- ▲ field device status
- ▲ freeway control status
- ▲ roadway information system status
- ▲ speed monitoring information
- ▲ traffic flow
- ▲ traffic images
- ▲ freeway control data
- ▲ roadway information system data
- ▲ speed monitoring control
- ▲ video surveillance control

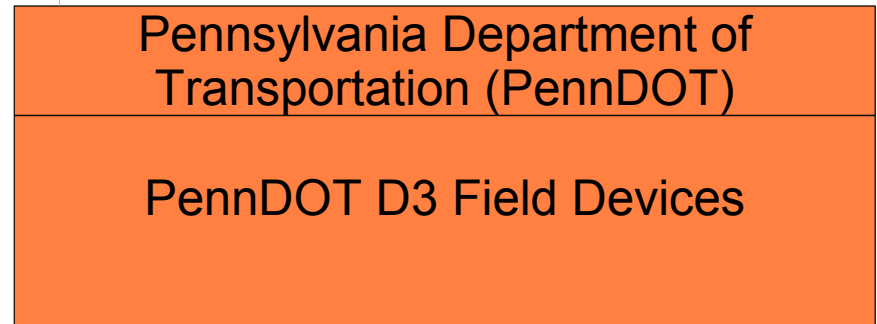
Pennsylvania Department of Transportation (PennDOT)  
PennDOT D3 Field Devices

———— Existing  
- - - - - Planned





traffic images

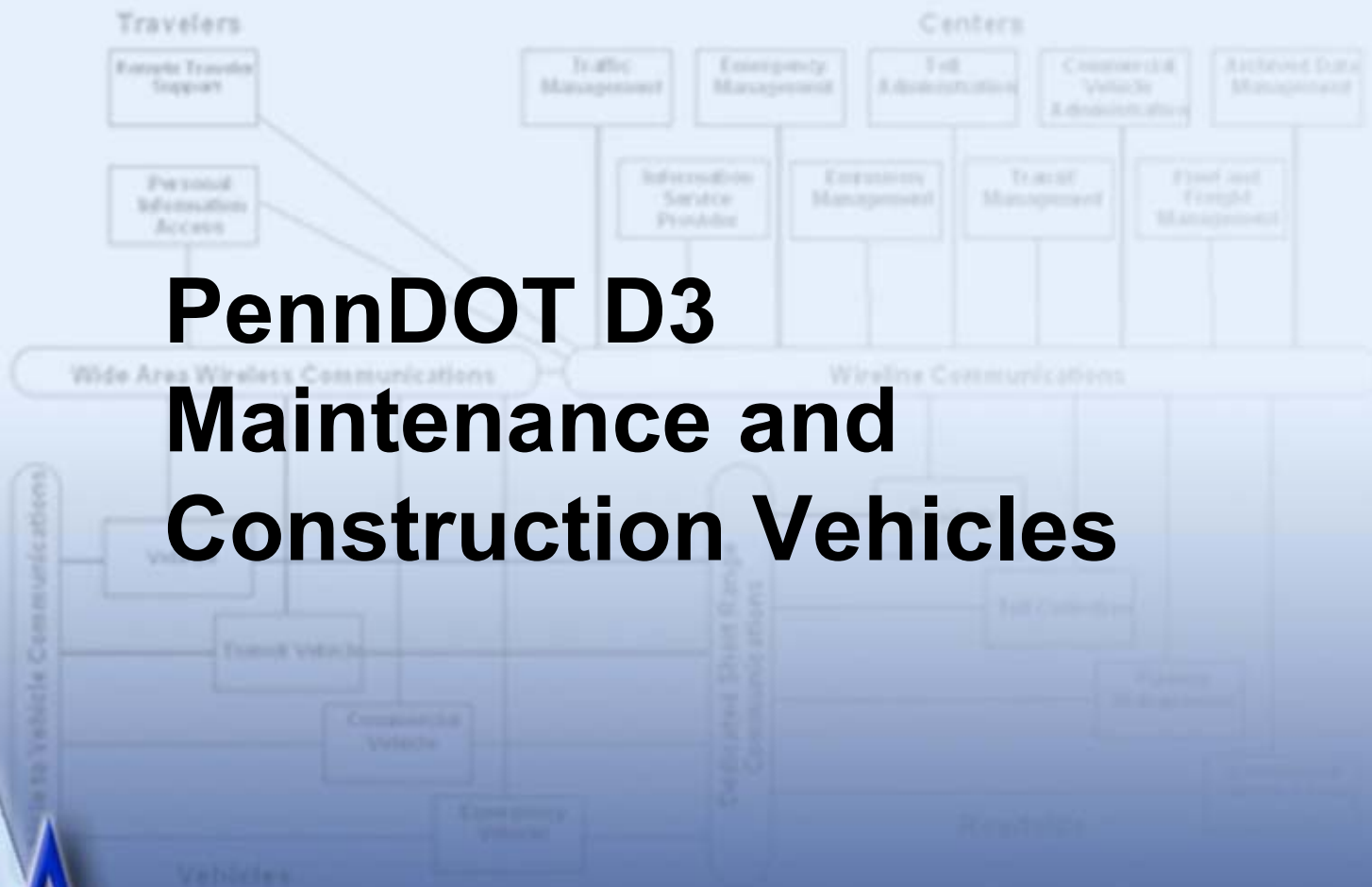


Existing

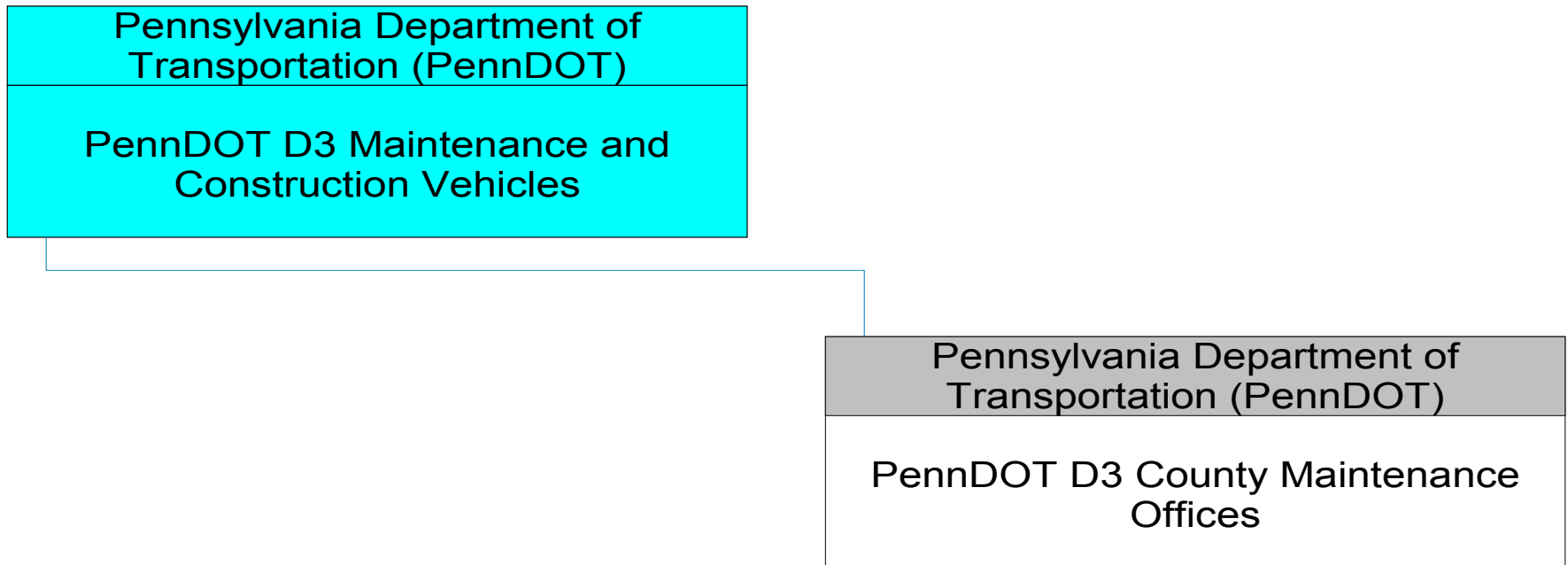


Planned

# PennDOT D3 Maintenance and Construction Vehicles

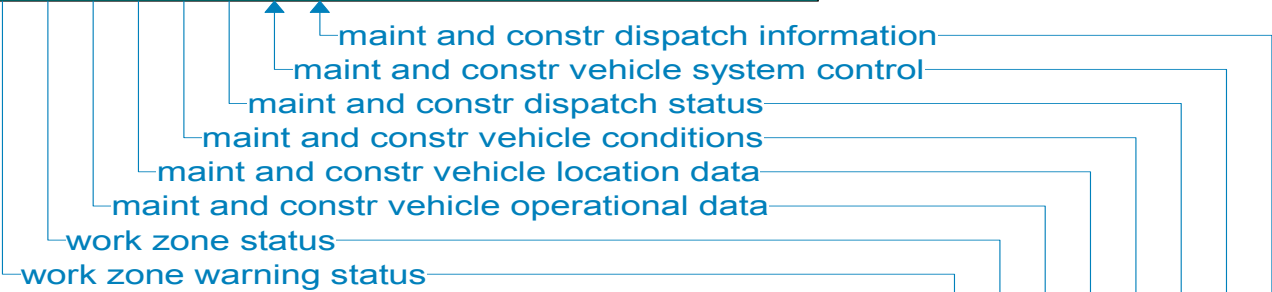


# PennDOT D3 Maintenance and Construction Vehicles Interconnect Diagram



**Pennsylvania Department of  
Transportation (PennDOT)**

**PennDOT D3 Maintenance and  
Construction Vehicles**

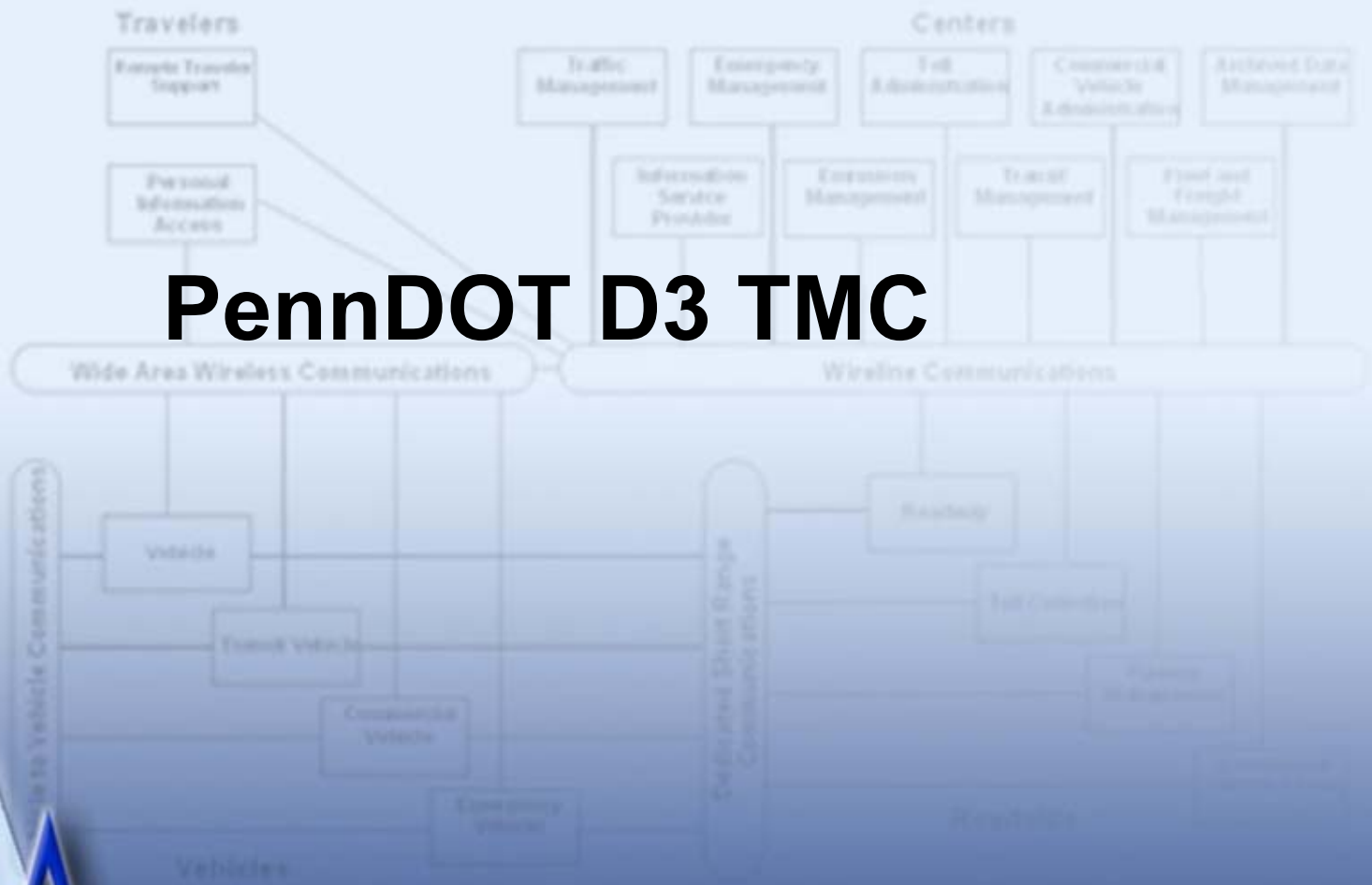


**Pennsylvania Department of  
Transportation (PennDOT)**

**PennDOT D3 County Maintenance  
Offices**

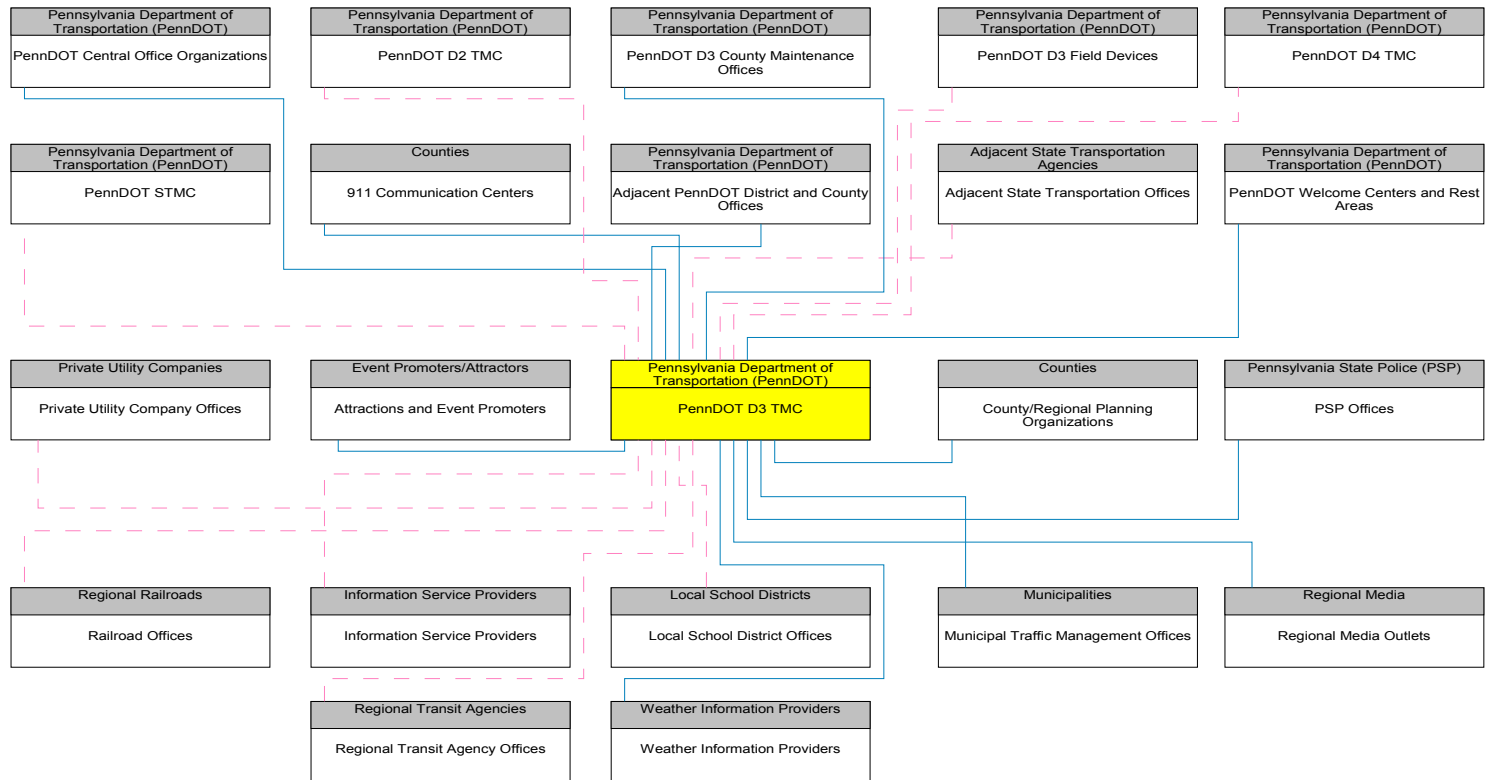
———— Existing  
- - - - - Planned

# PennDOT D3 TMC

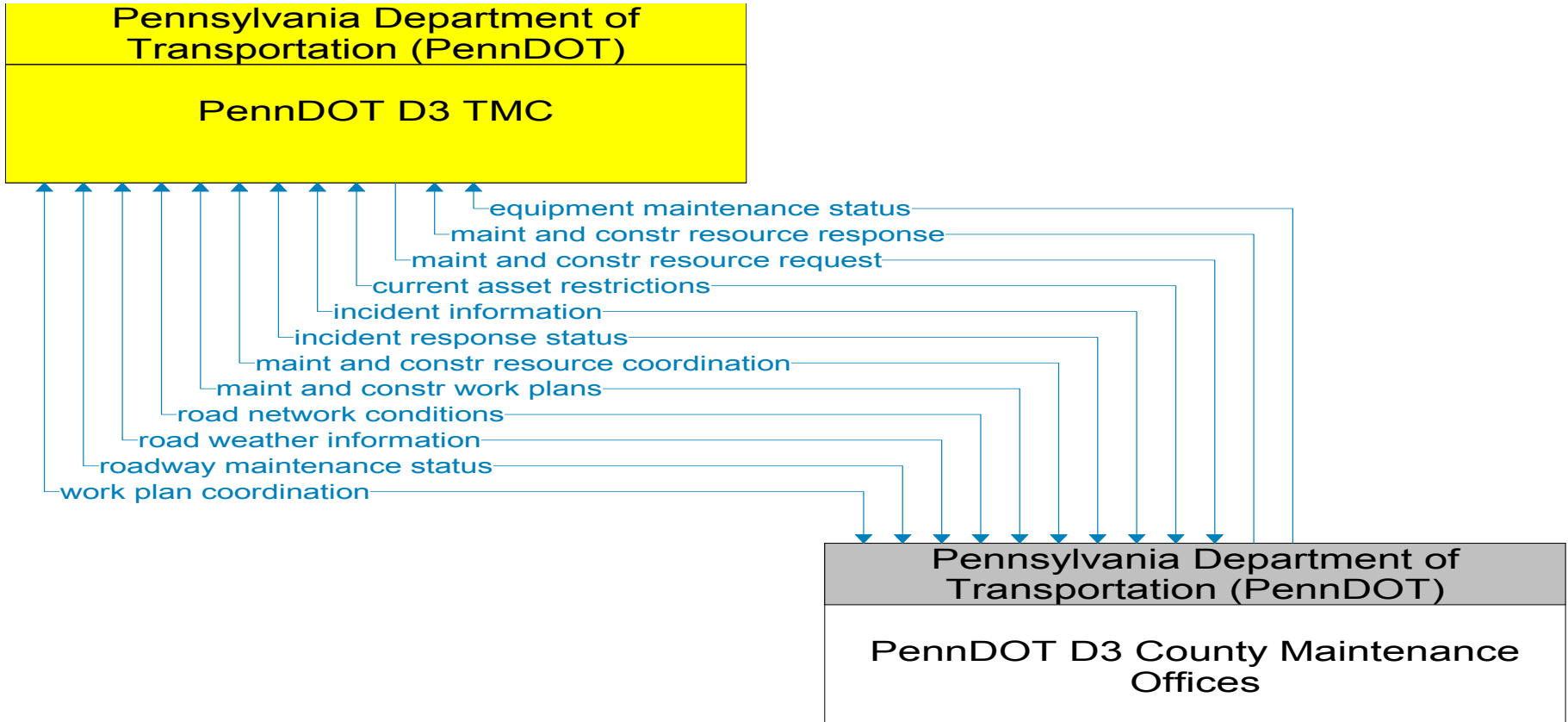


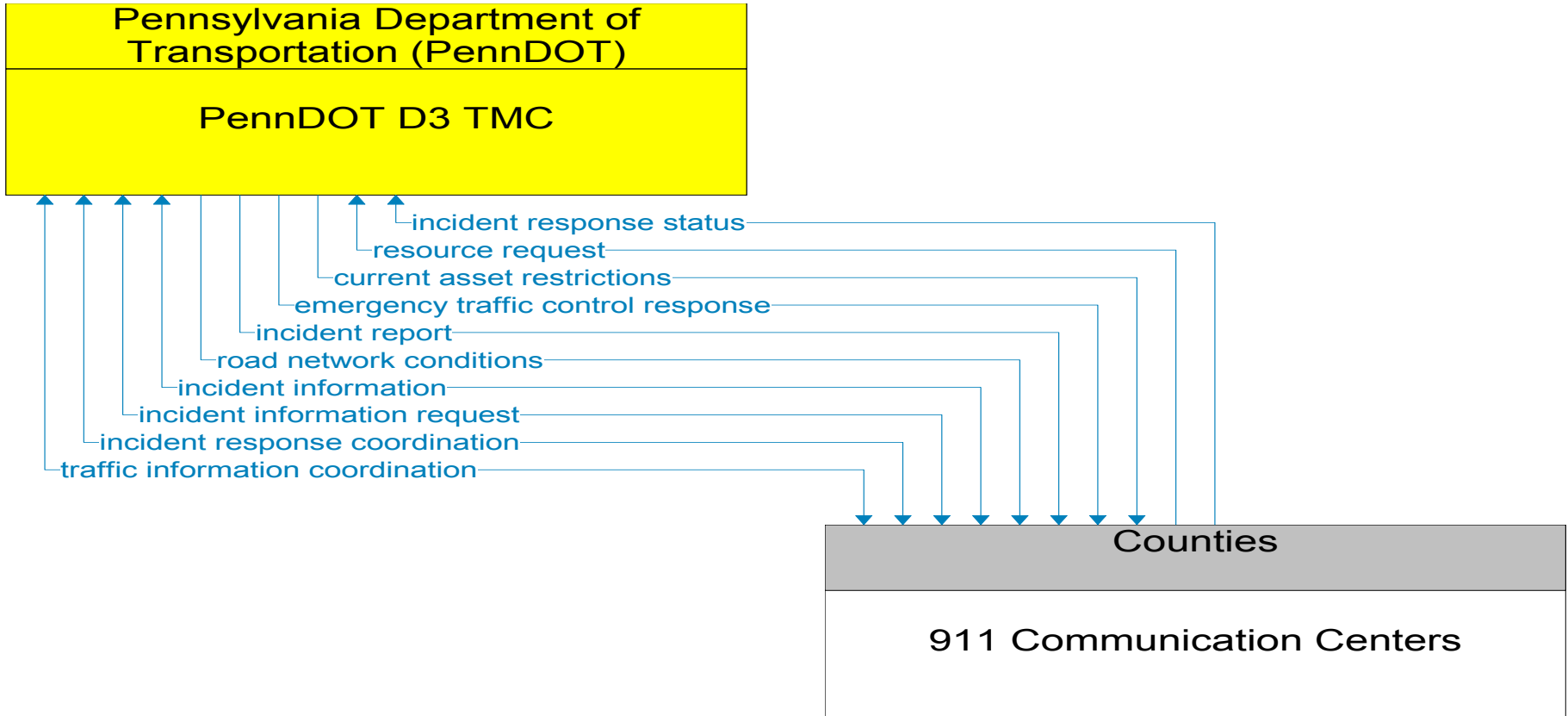
PA

# PennDOT D3 TMC Interconnect Diagram

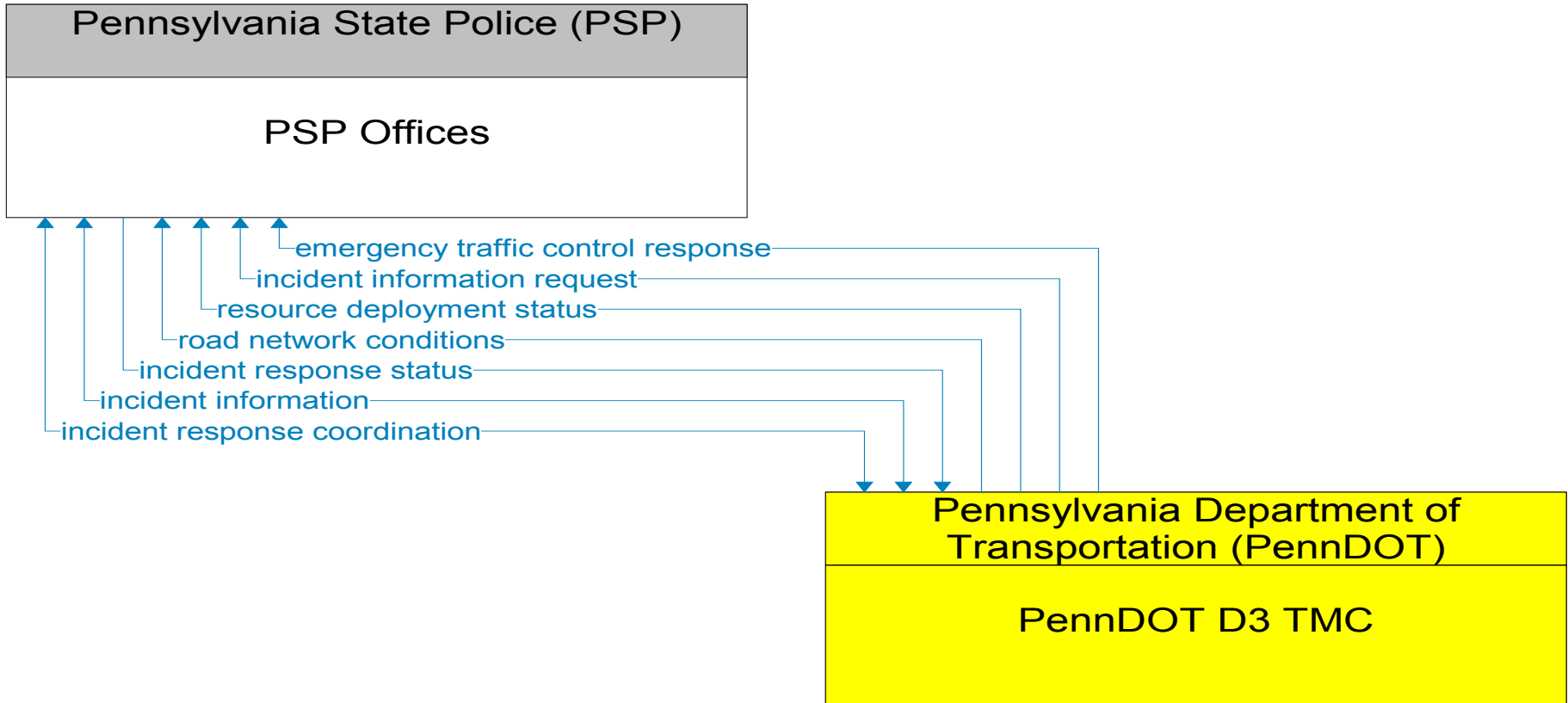




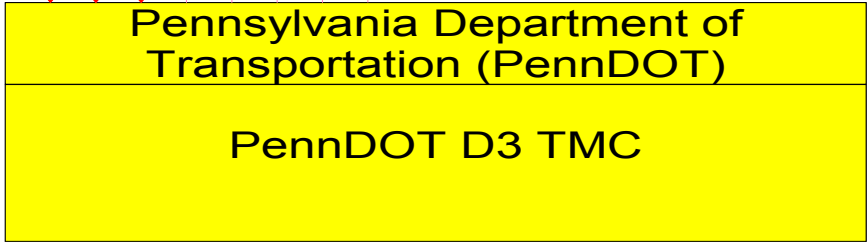
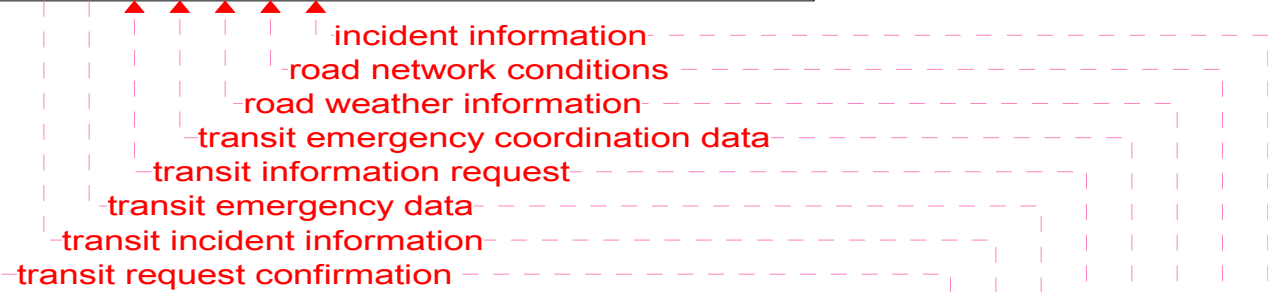
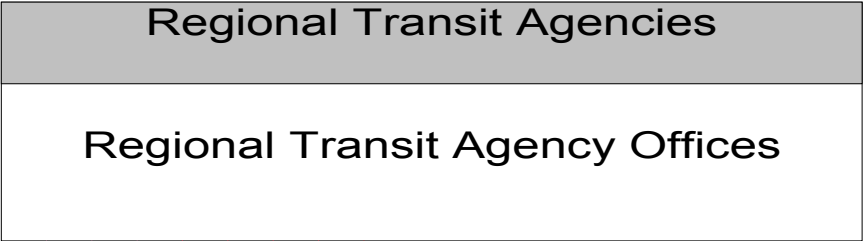




———— Existing  
- - - - - Planned



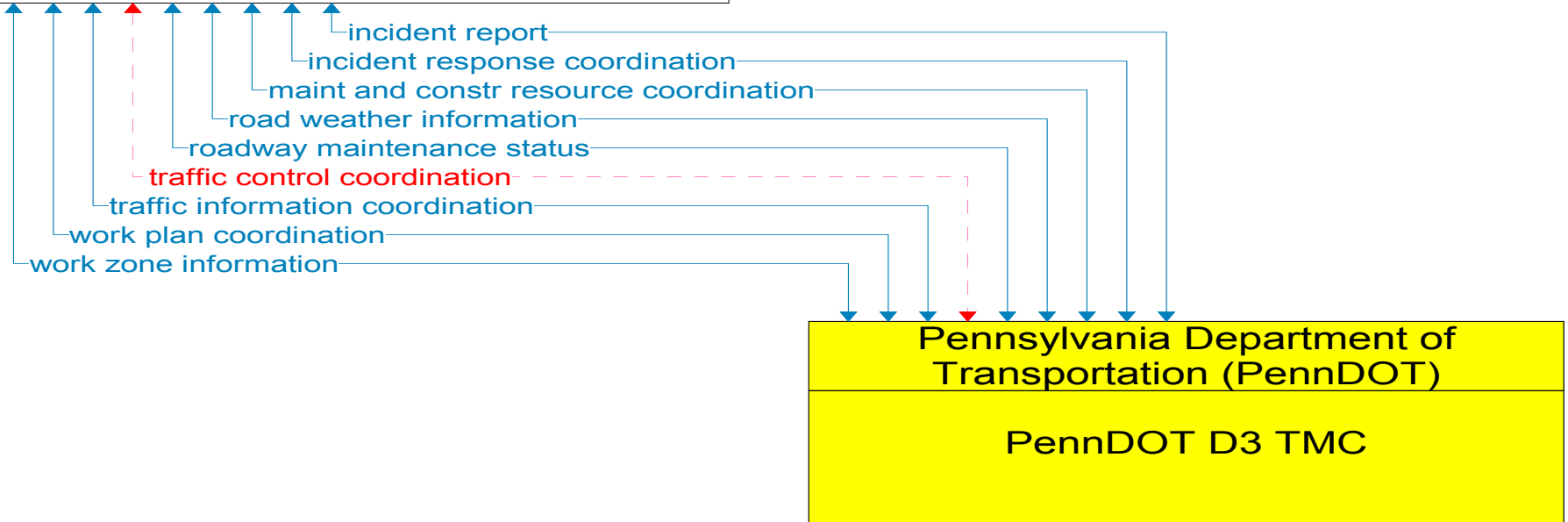
———— Existing  
- - - - - Planned



———— Existing  
- - - - - Planned

Pennsylvania Department of  
Transportation (PennDOT)

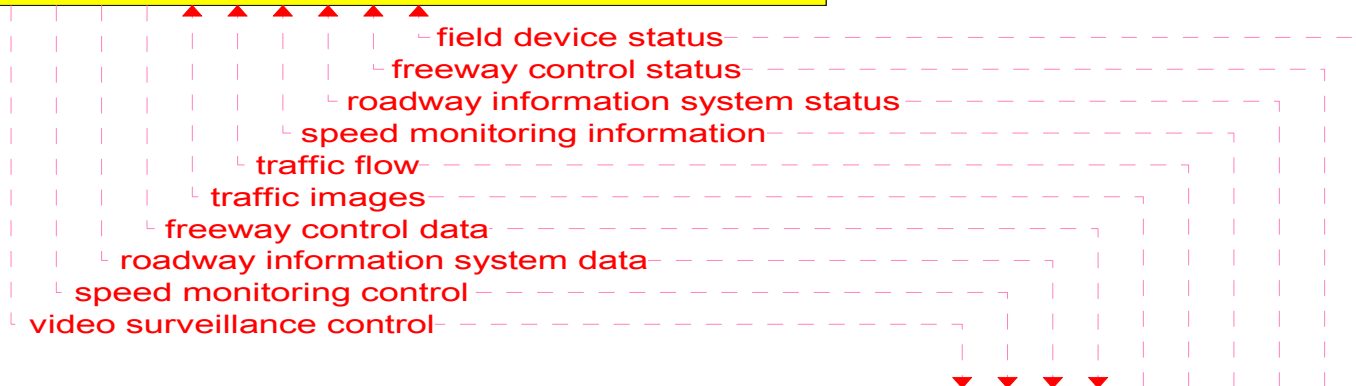
Adjacent PennDOT District and County  
Offices



Existing  
Planned

Pennsylvania Department of  
Transportation (PennDOT)

PennDOT D3 TMC



Pennsylvania Department of  
Transportation (PennDOT)

PennDOT D3 Field Devices

Existing  
Planned

Pennsylvania Department of  
Transportation (PennDOT)

PennDOT Welcome Centers and Rest  
Areas

traveler information  
traveler request

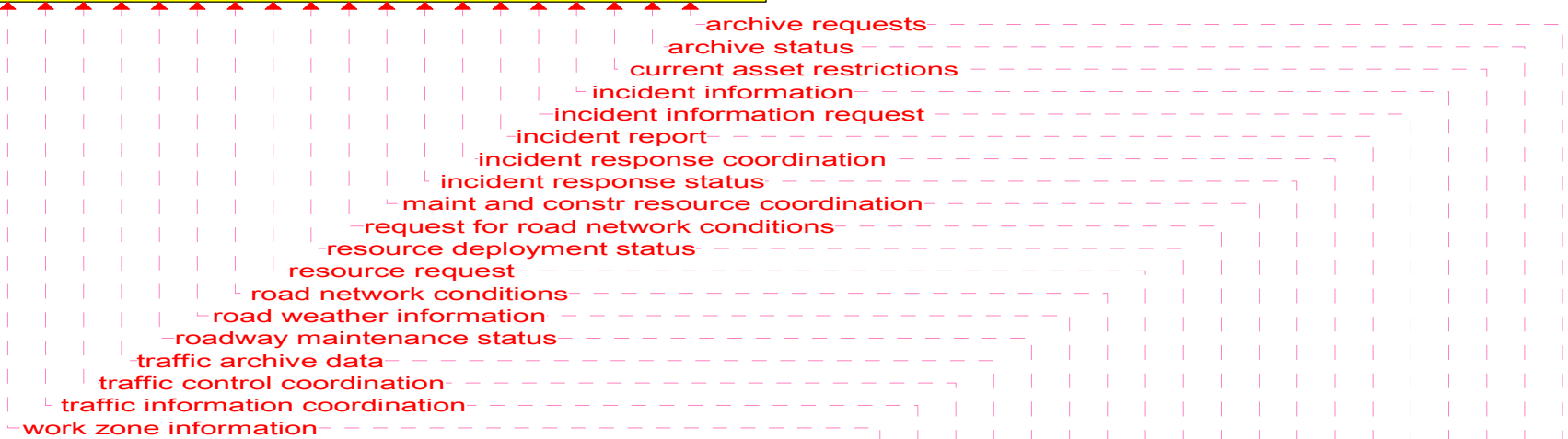
Pennsylvania Department of  
Transportation (PennDOT)

PennDOT D3 TMC

———— Existing  
----- Planned

**Pennsylvania Department of Transportation  
(PennDOT)**

**PennDOT D3 TMC**

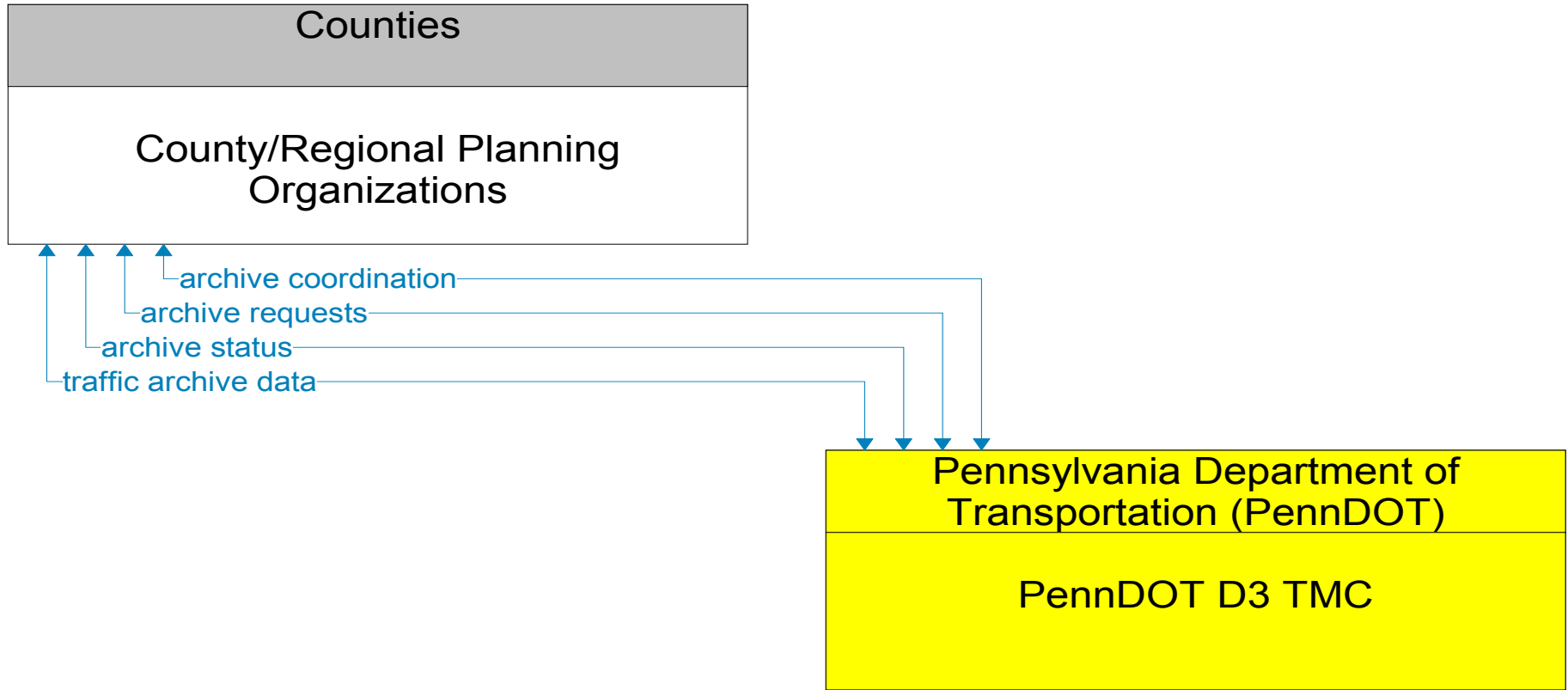


**Pennsylvania Department of Transportation  
(PennDOT)**

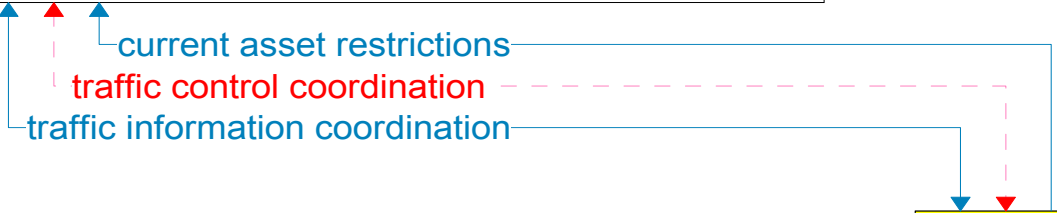
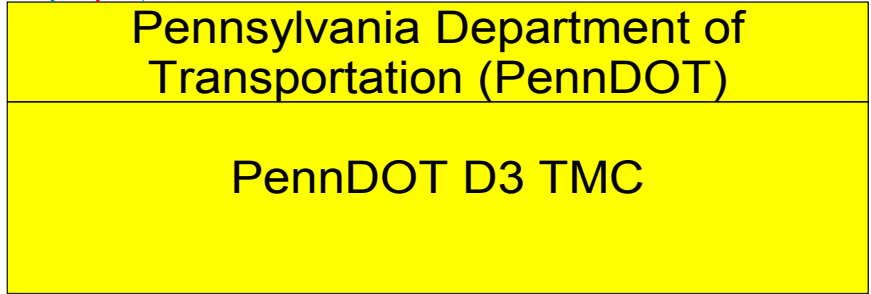
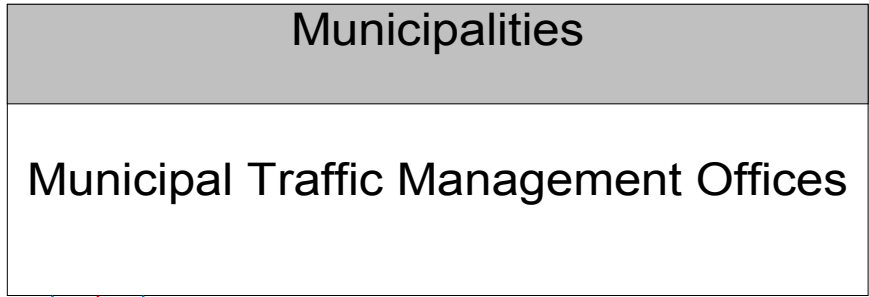
**PennDOT STMC**

———— Existing  
- - - - - Planned

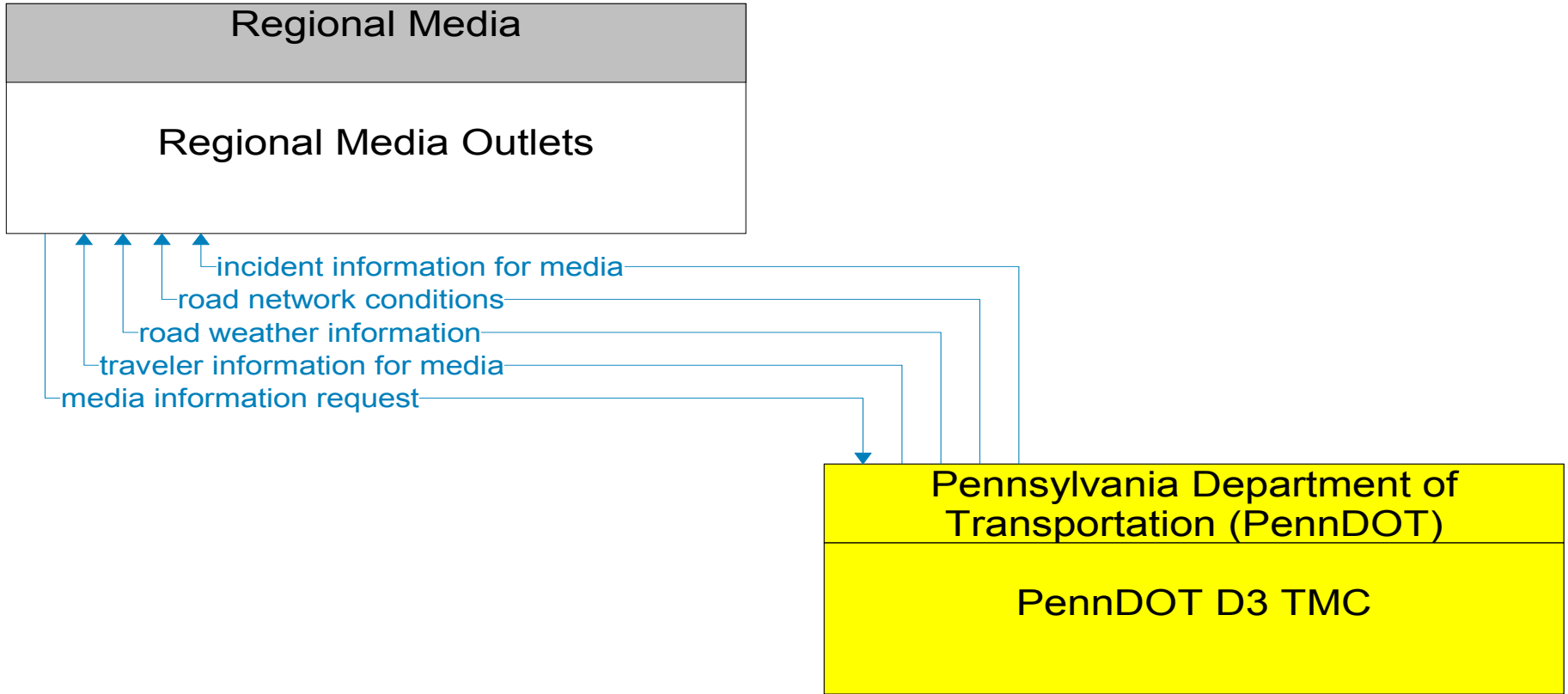




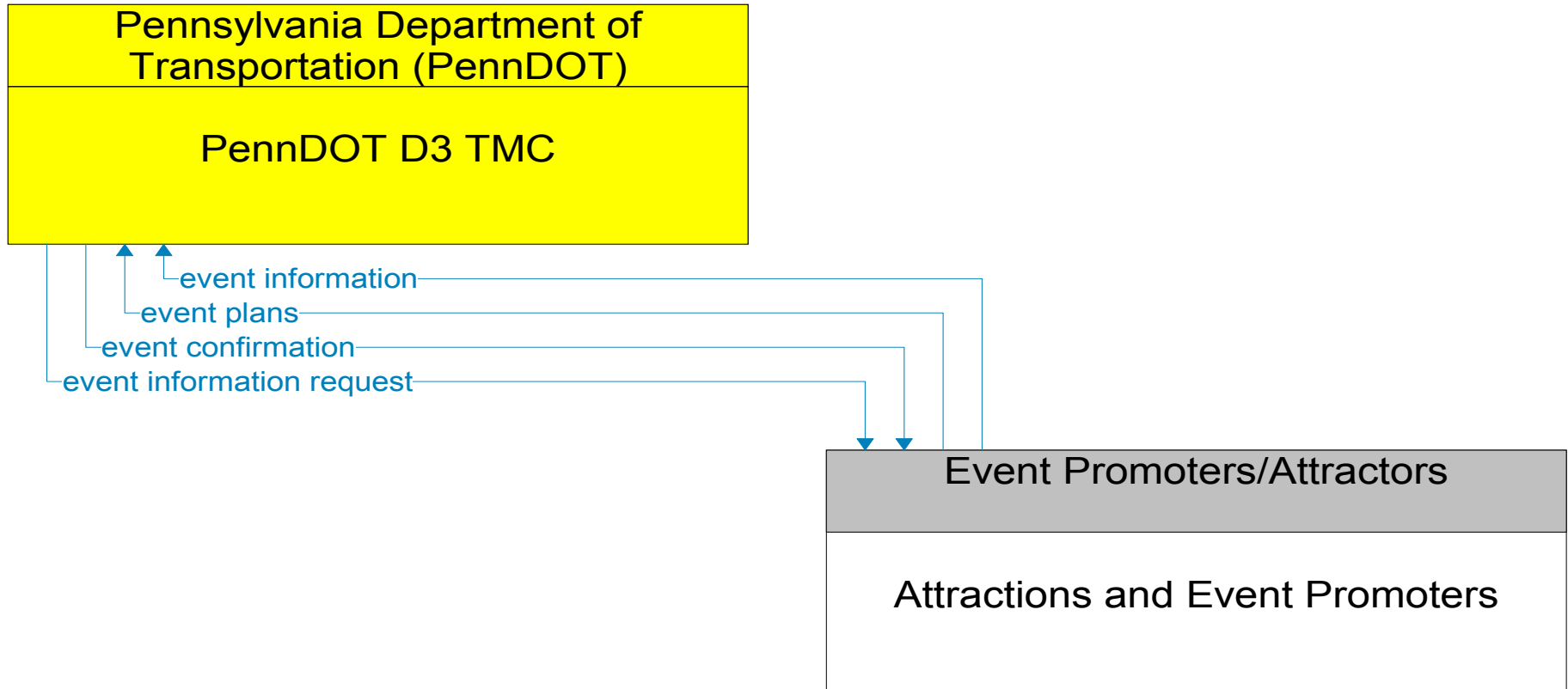
———— Existing  
----- Planned

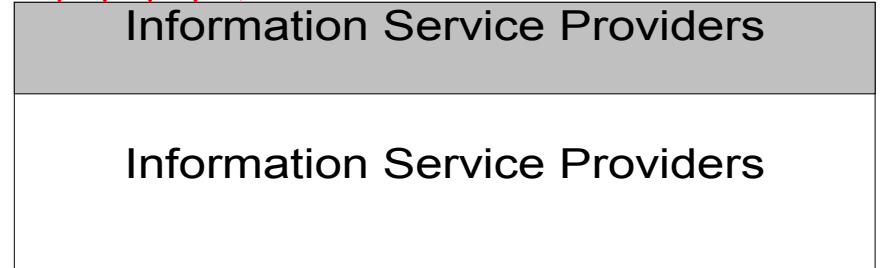
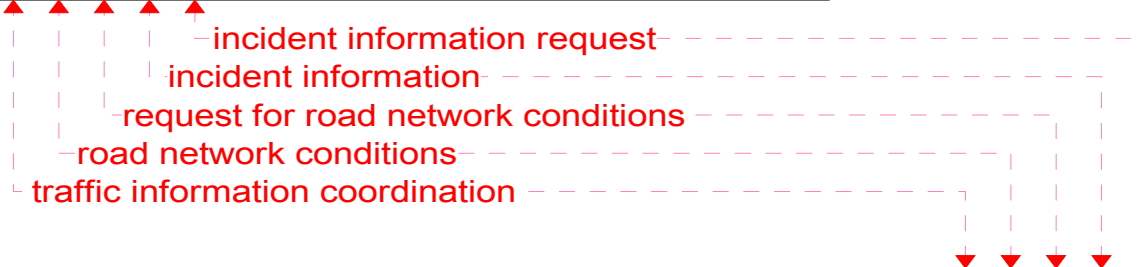
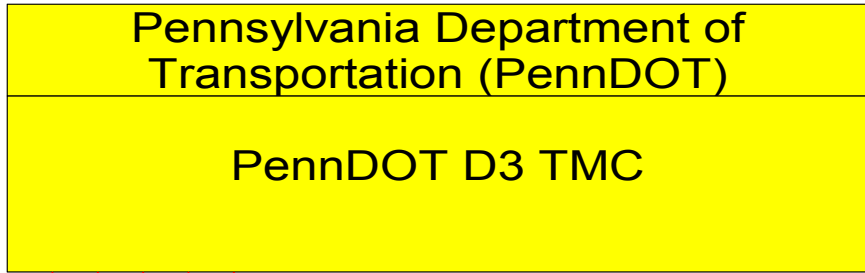


Existing  
Planned

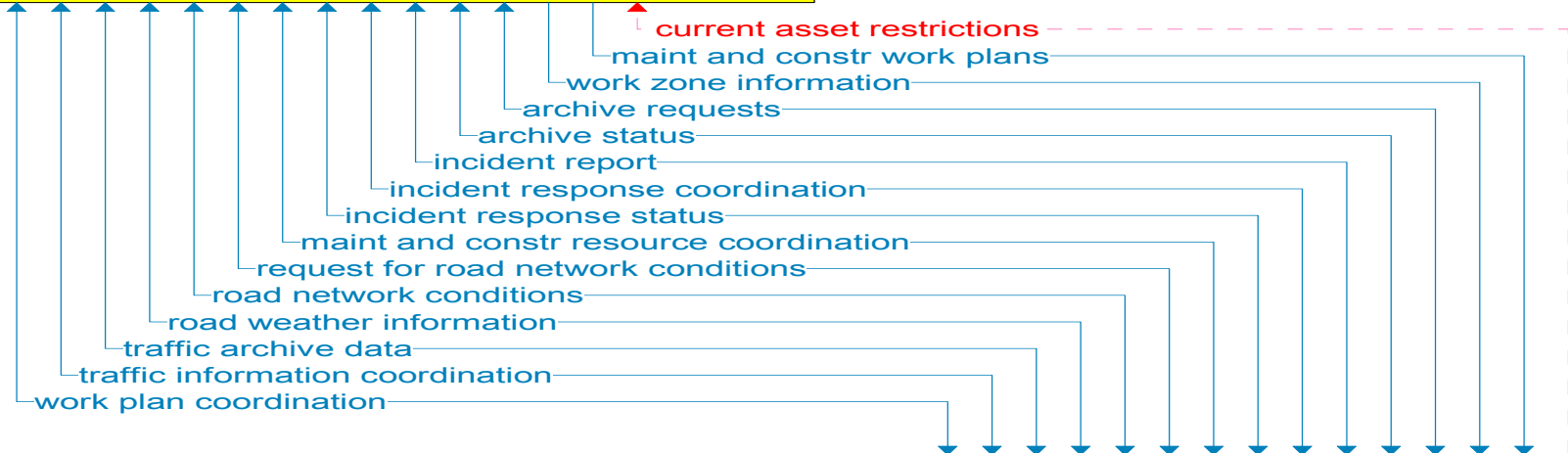


———— Existing  
- - - - - Planned





Pennsylvania Department of Transportation (PennDOT)  
PennDOT D3 TMC



Pennsylvania Department of Transportation (PennDOT)  
PennDOT Central Office Organizations

Existing  
Planned

Pennsylvania Department of  
Transportation (PennDOT)

PennDOT D2 TMC

- incident information
- incident information request
- incident report
- incident response coordination
- incident response status
- resource request
- road network conditions
- road weather information
- traffic control coordination
- traffic information coordination

Pennsylvania Department of  
Transportation (PennDOT)

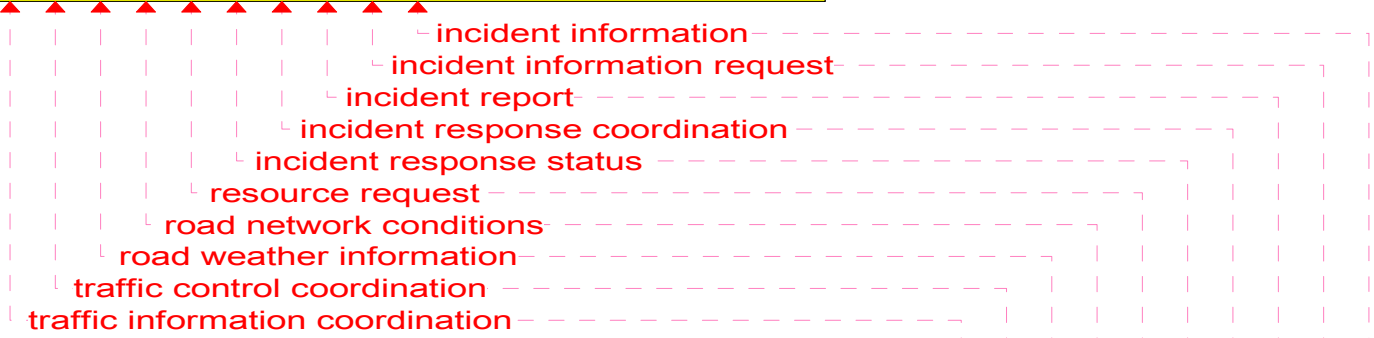
PennDOT D3 TMC

Existing  
Planned

Pennsylvania Department of  
Transportation (PennDOT)

---

PennDOT D3 TMC



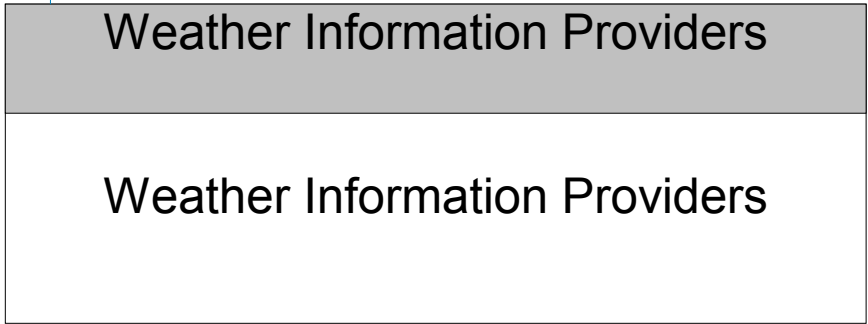
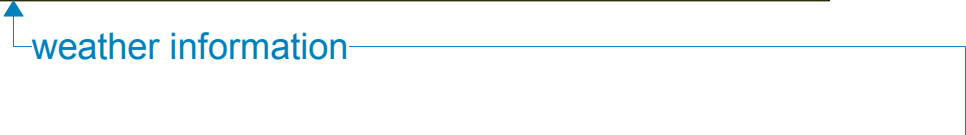
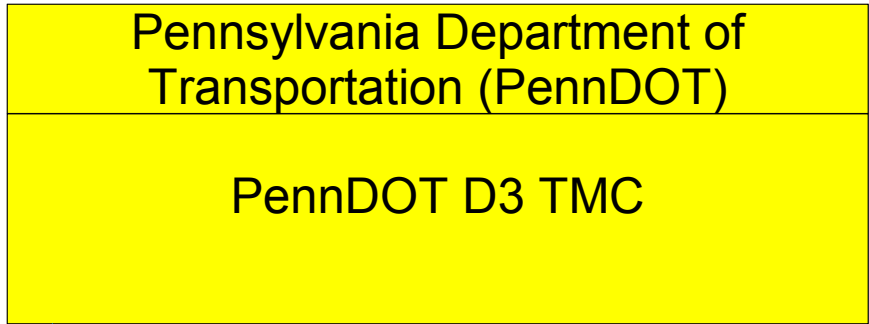
Pennsylvania Department of  
Transportation (PennDOT)

---

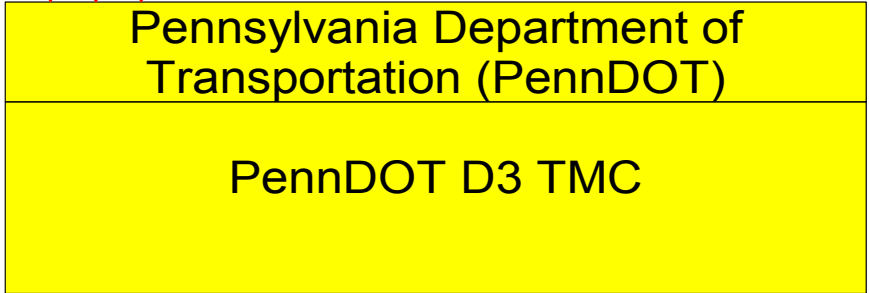
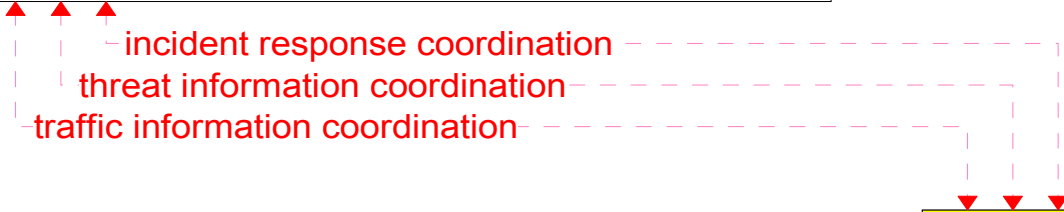
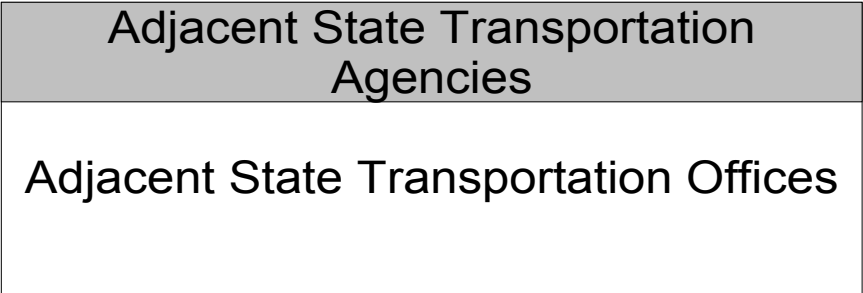
PennDOT D4 TMC

———— Existing  
- - - - - Planned

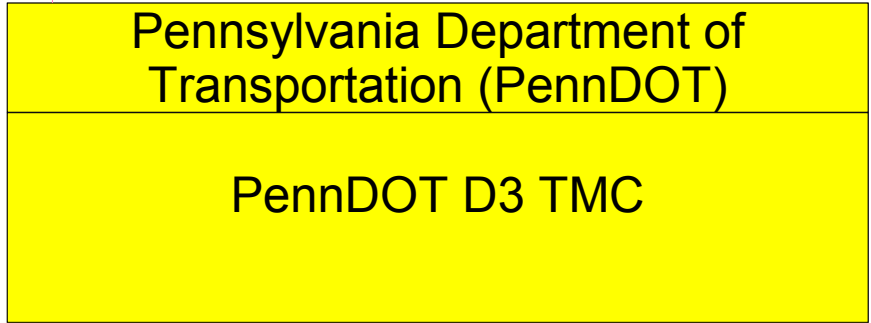
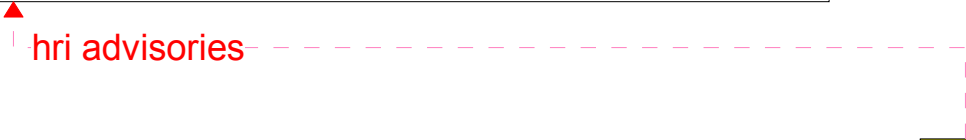
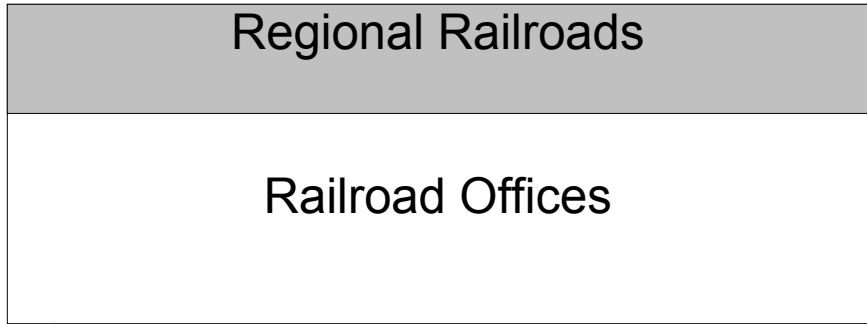


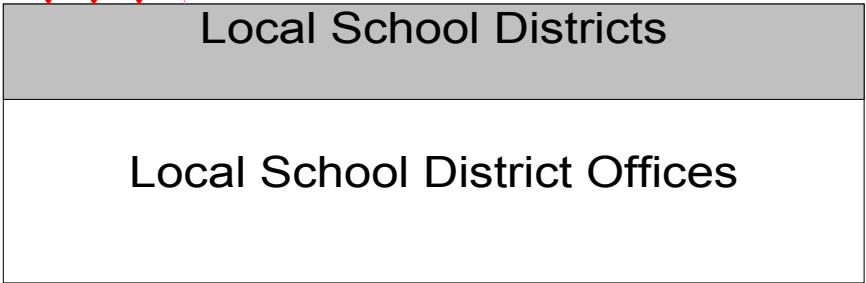
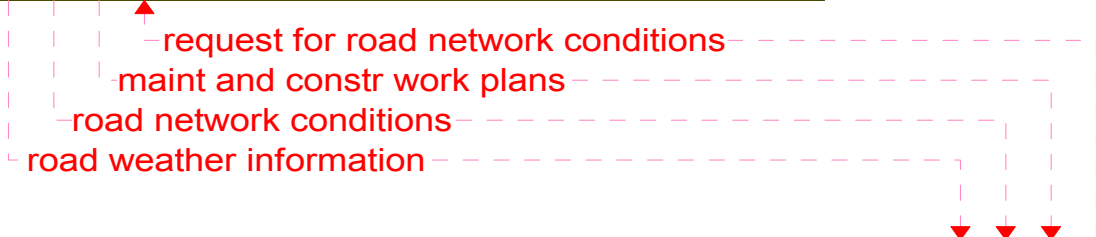
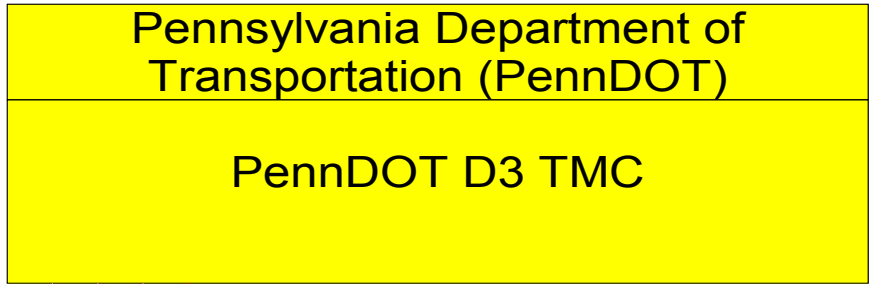


———— Existing  
- - - - - Planned

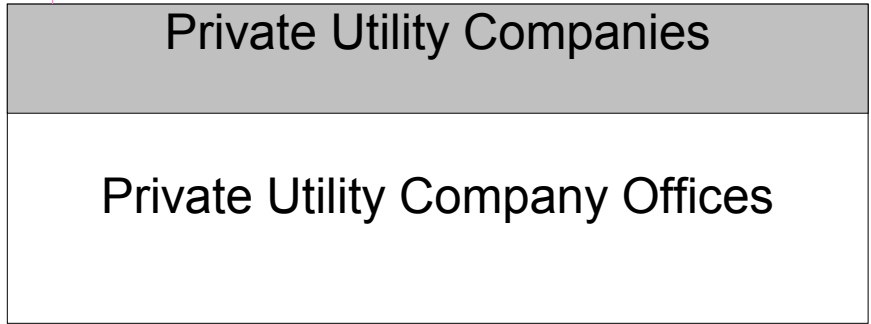
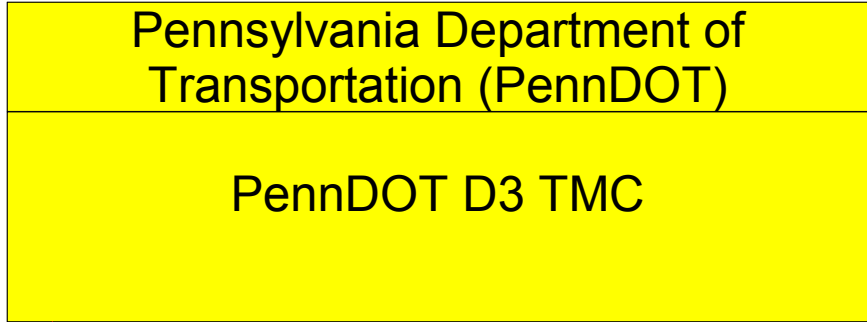


———— Existing  
- - - - - Planned



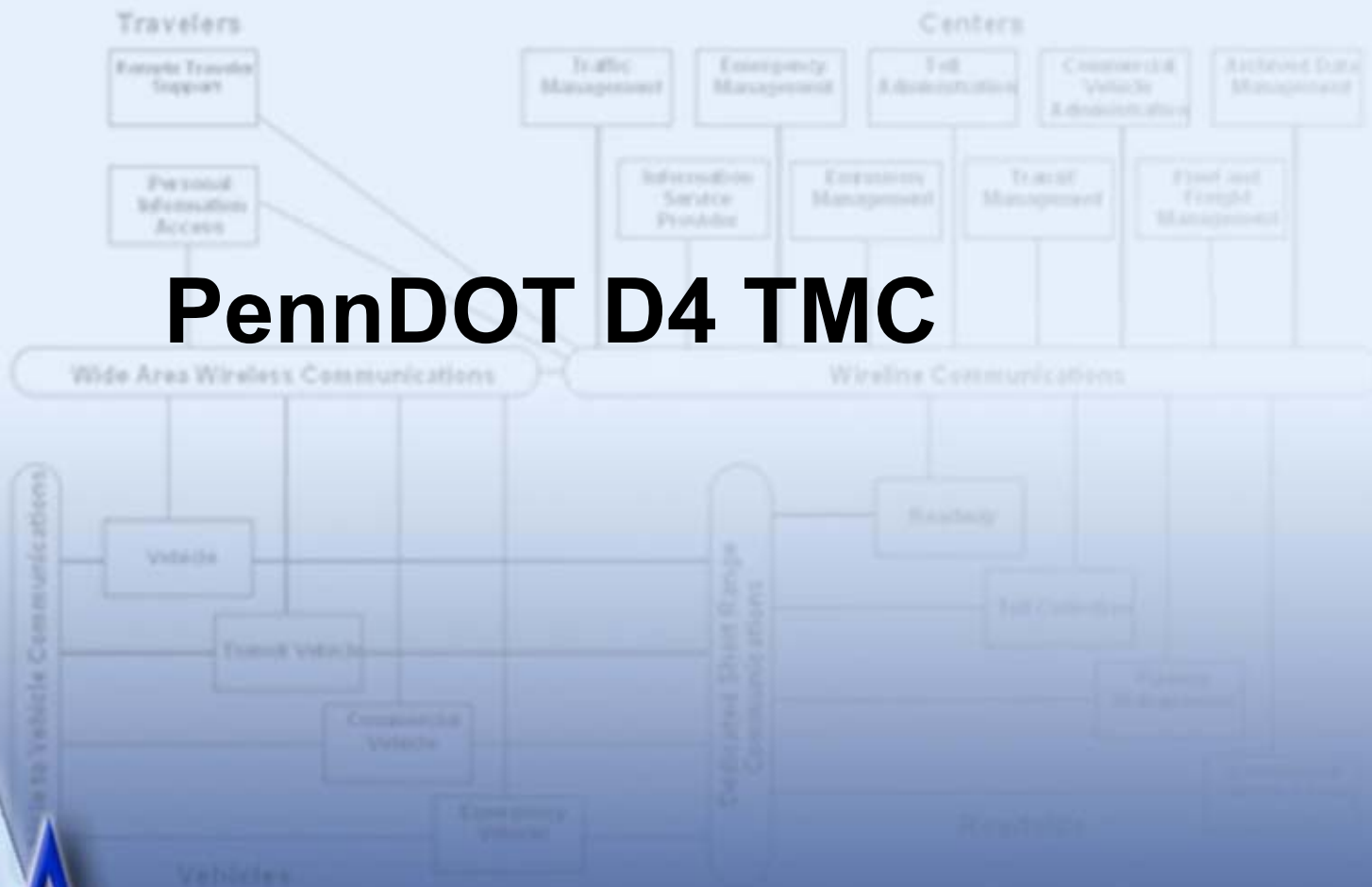


———— Existing  
- - - - - Planned

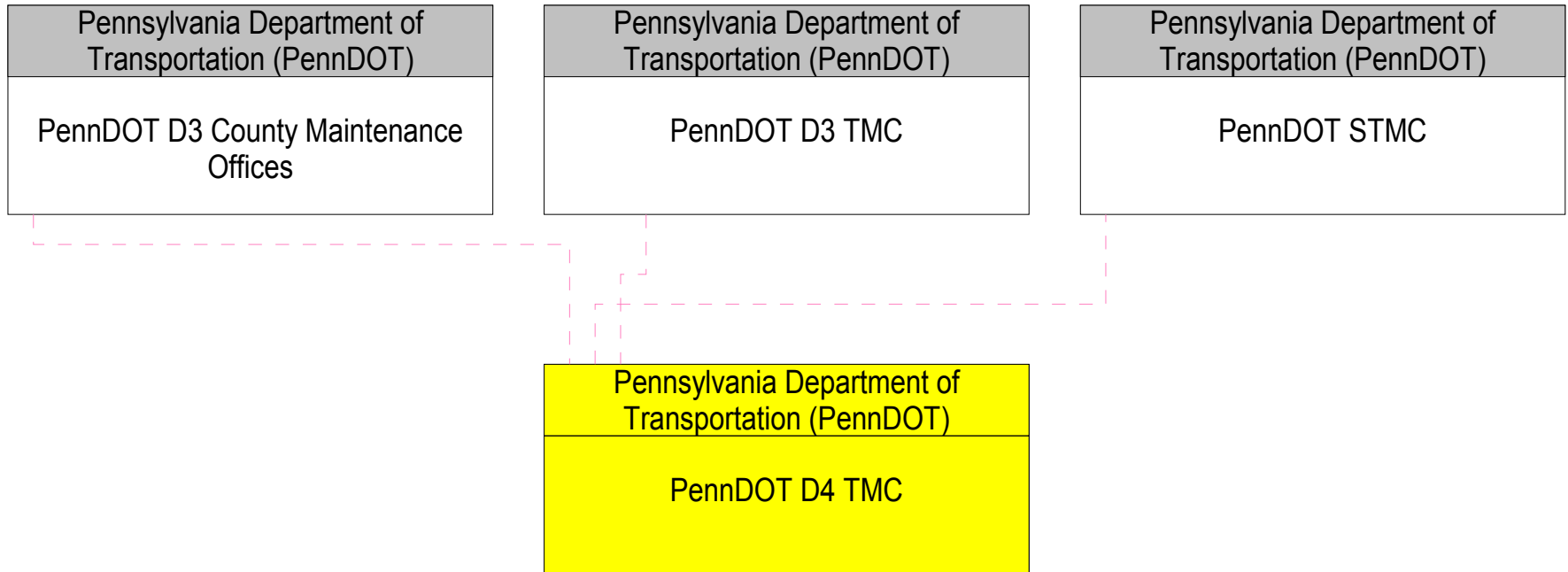


———— Existing  
- - - - - Planned

# PennDOT D4 TMC



# PennDOT D4 TMC Interconnect Diagram



— Existing  
- - - Planned

Pennsylvania Department of  
Transportation (PennDOT)

PennDOT D3 TMC

- ▲ incident information
- ▲ incident information request
- ▲ incident report
- ▲ incident response coordination
- ▲ incident response status
- ▲ resource request
- ▲ road network conditions
- ▲ road weather information
- ▲ traffic control coordination
- ▲ traffic information coordination

Pennsylvania Department of  
Transportation (PennDOT)

PennDOT D4 TMC

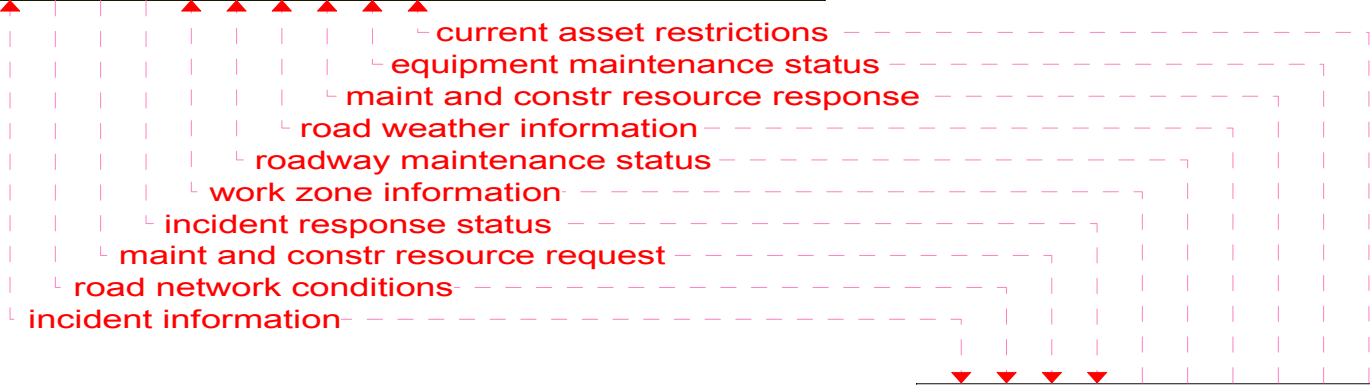
———— Existing  
- - - - - Planned



Pennsylvania Department of  
Transportation (PennDOT)

---

PennDOT D4 TMC



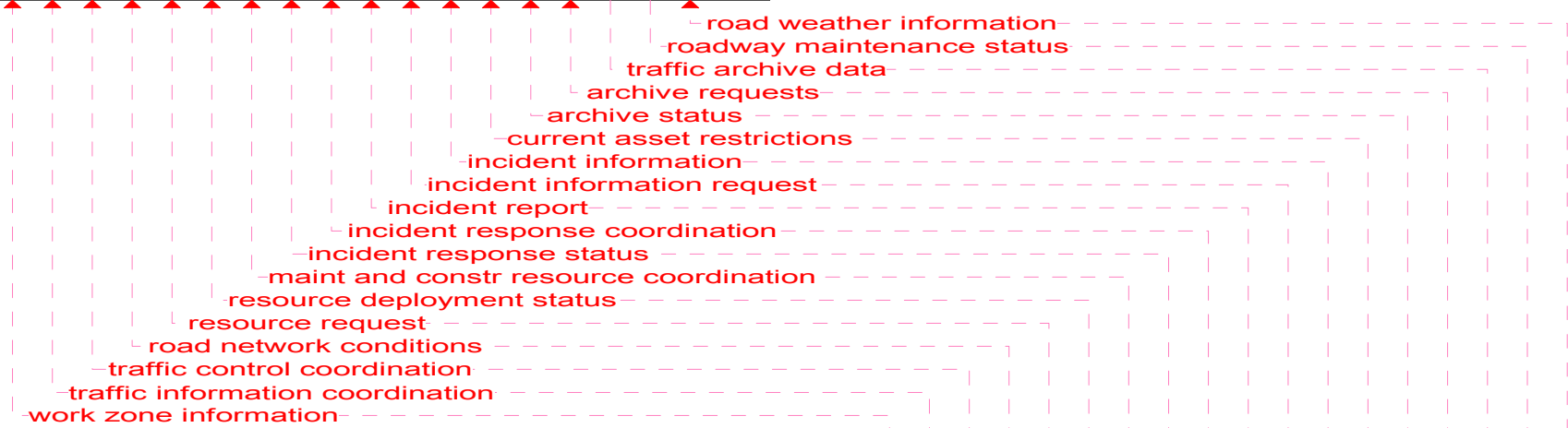
Pennsylvania Department of  
Transportation (PennDOT)

---

PennDOT D3 County Maintenance  
Offices

———— Existing  
- - - - - Planned

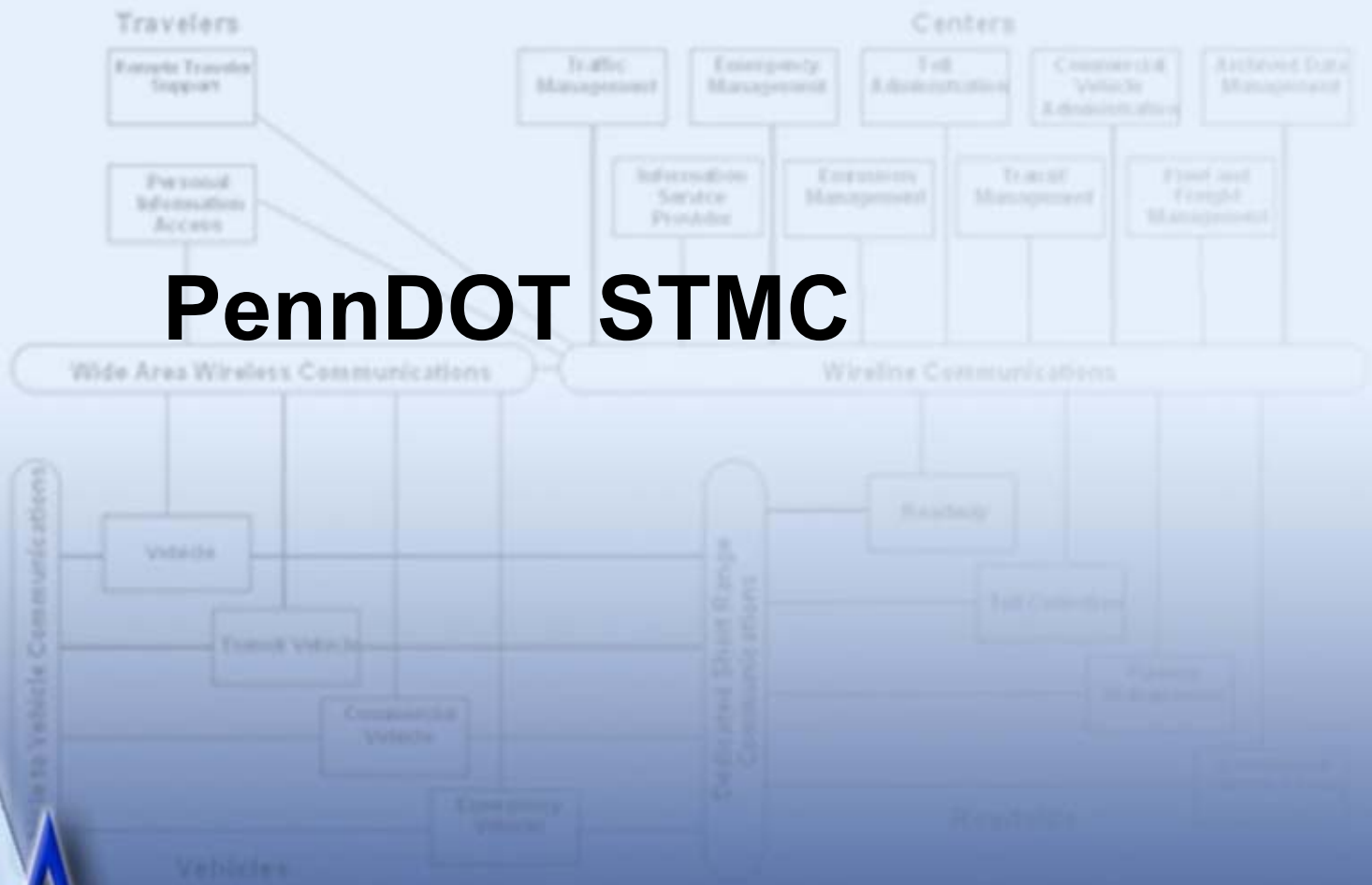
Pennsylvania Department of Transportation (PennDOT)  
PennDOT STMC



Pennsylvania Department of Transportation (PennDOT)  
PennDOT D4 TMC

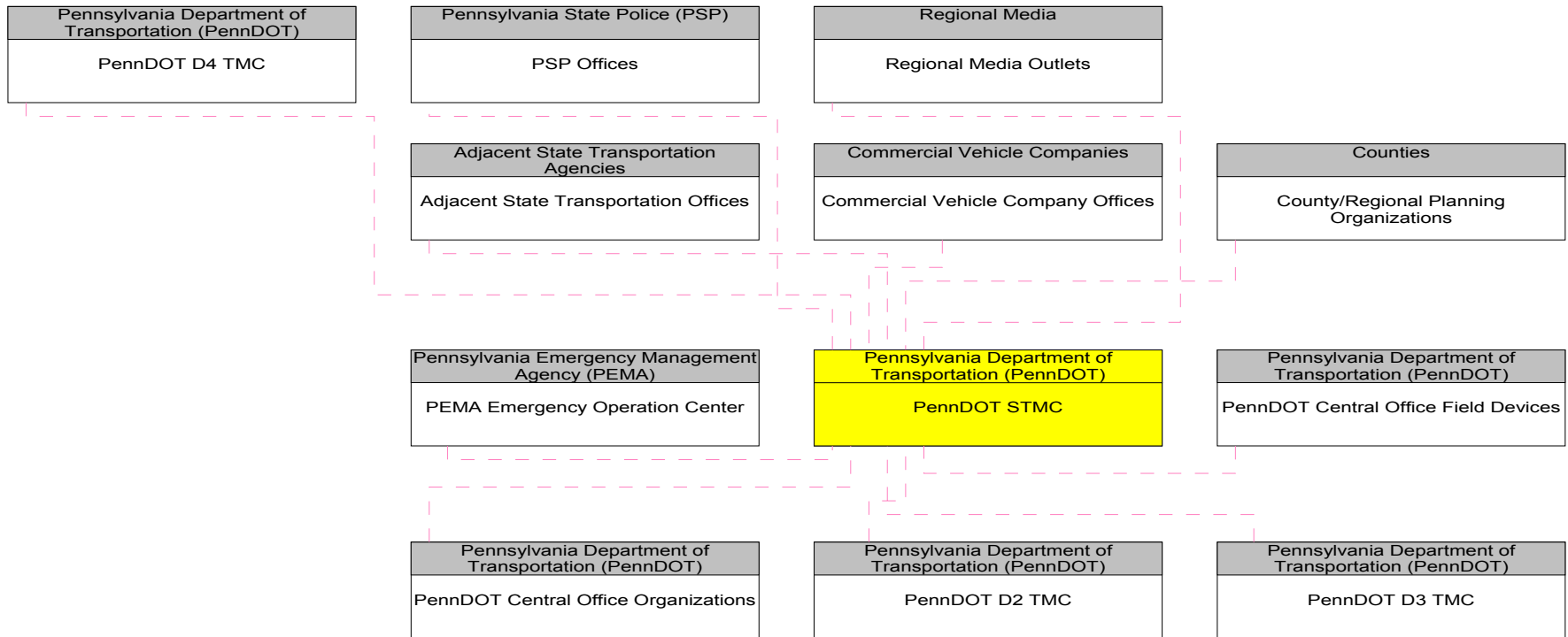
Existing  
Planned

# PennDOT STMC



PA

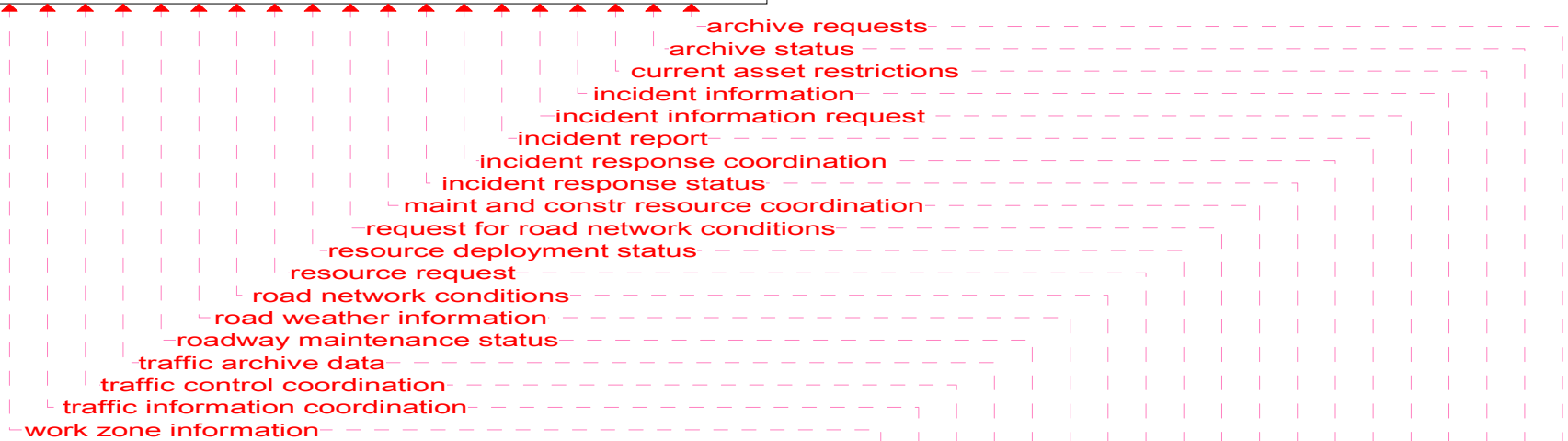
# PennDOT STMC Interconnect Diagram



Existing  
Planned

**Pennsylvania Department of Transportation  
(PennDOT)**

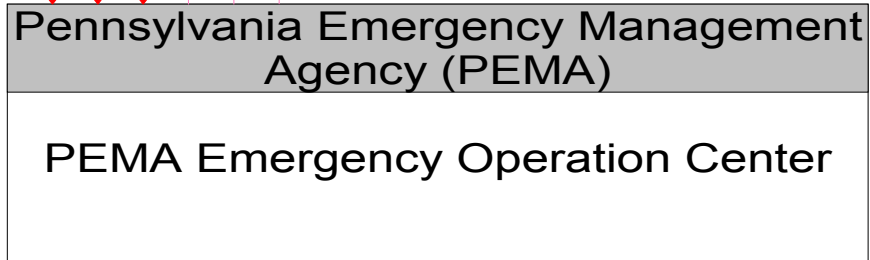
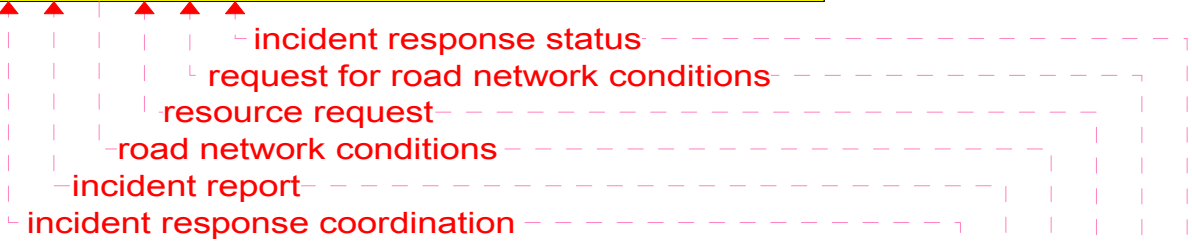
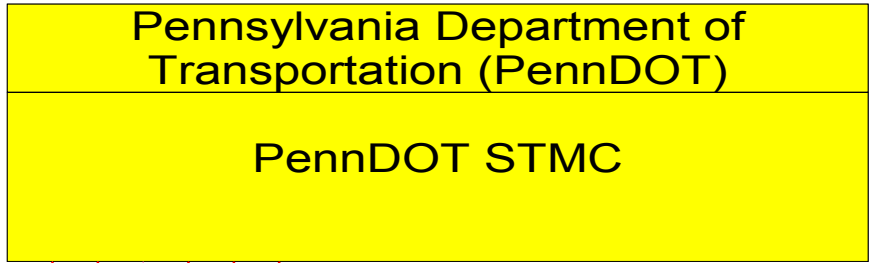
**PennDOT D3 TMC**



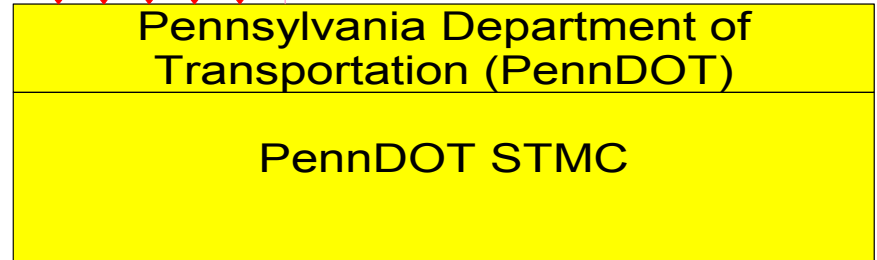
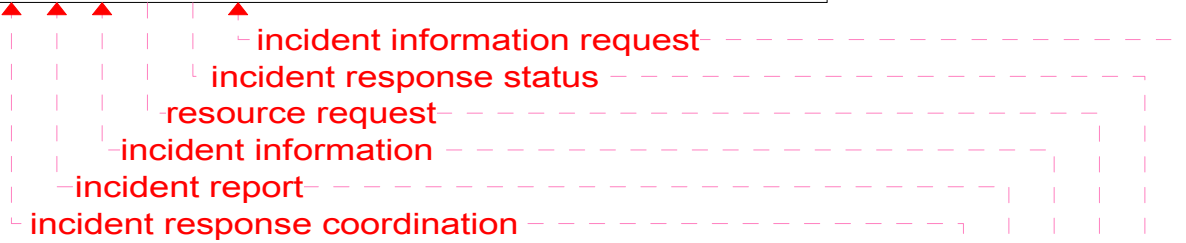
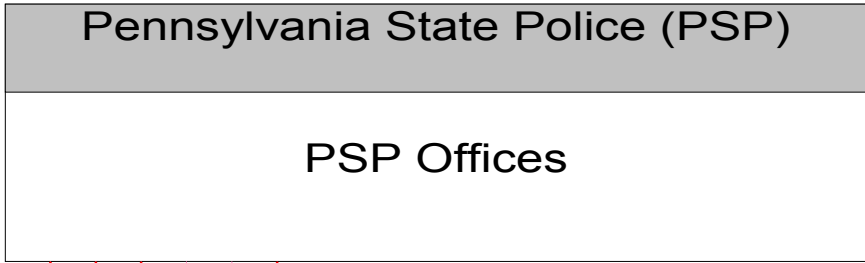
**Pennsylvania Department of Transportation  
(PennDOT)**

**PennDOT STMC**

———— Existing  
- - - - - Planned



———— Existing  
- - - - - Planned

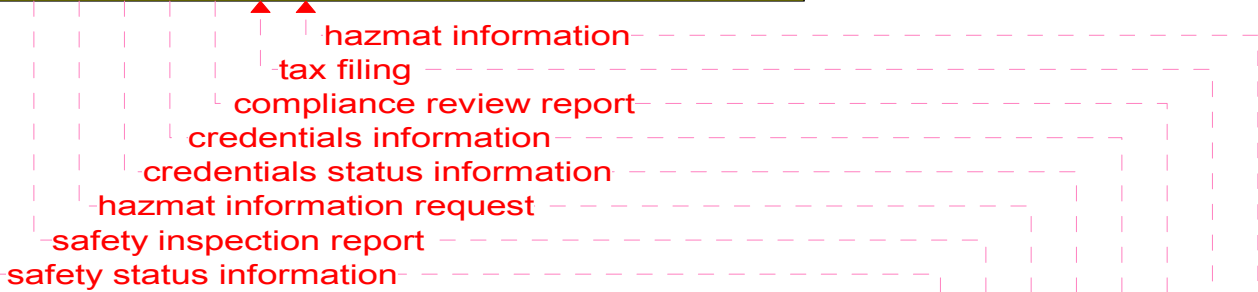


Existing  
Planned

Pennsylvania Department of  
Transportation (PennDOT)

---

PennDOT STMC



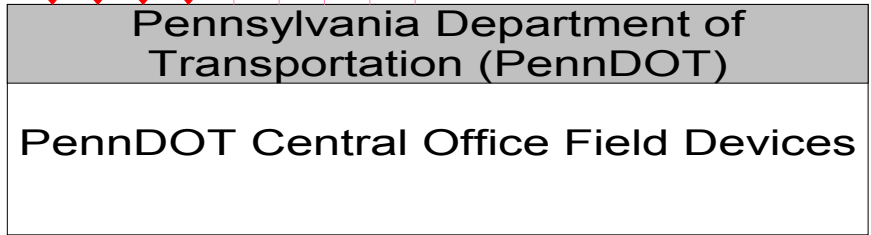
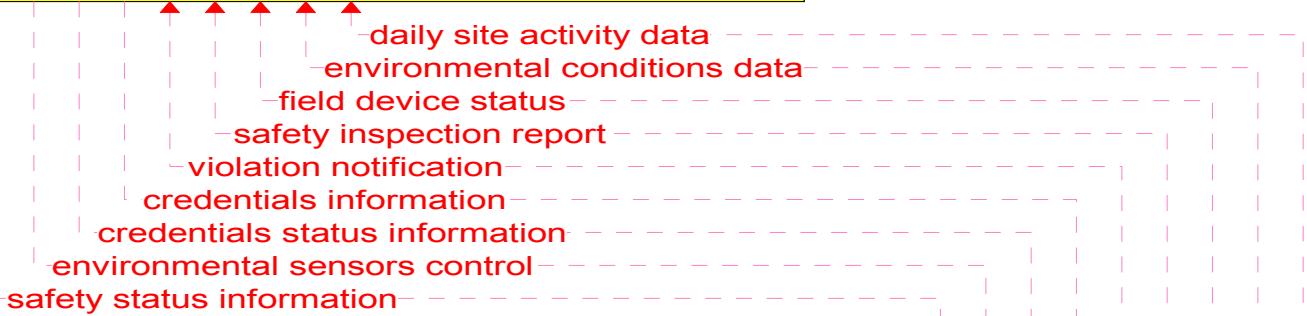
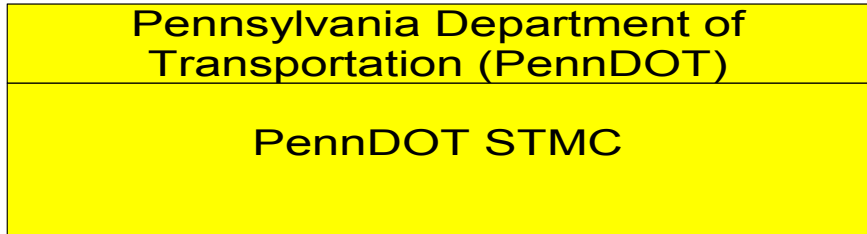
Commercial Vehicle Companies

---

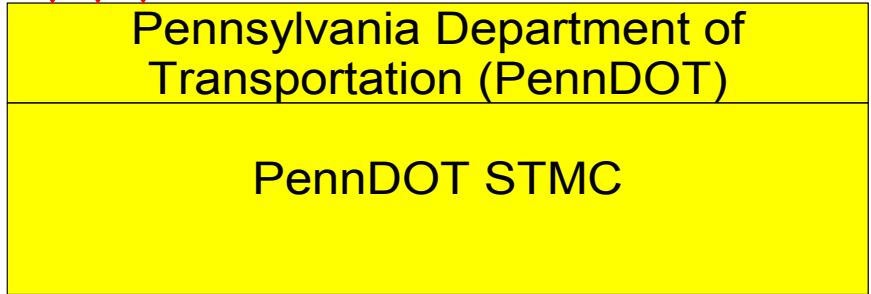
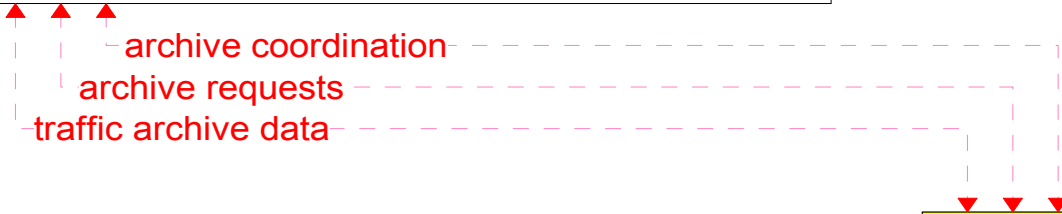
Commercial Vehicle Company Offices

———— Existing  
- - - - - Planned

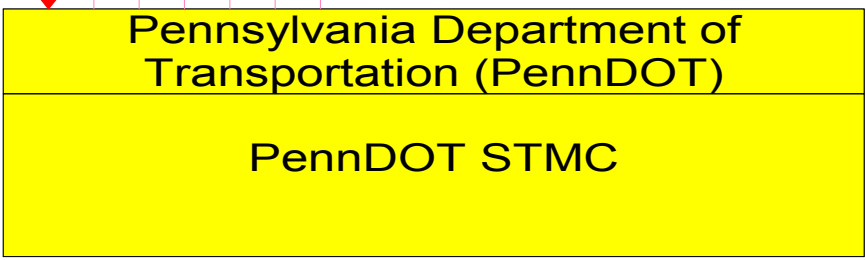
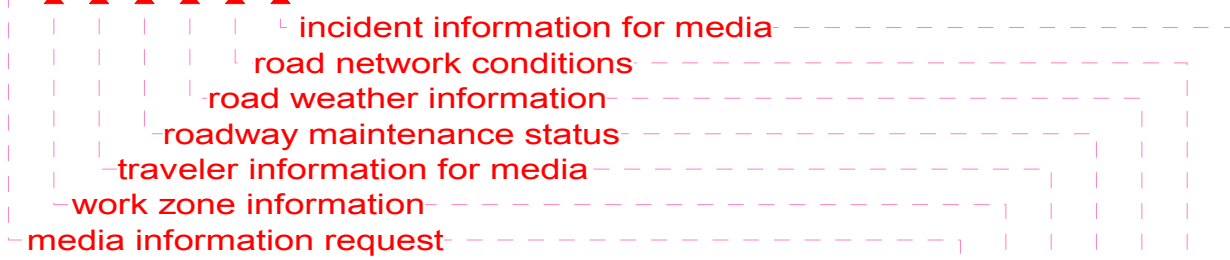
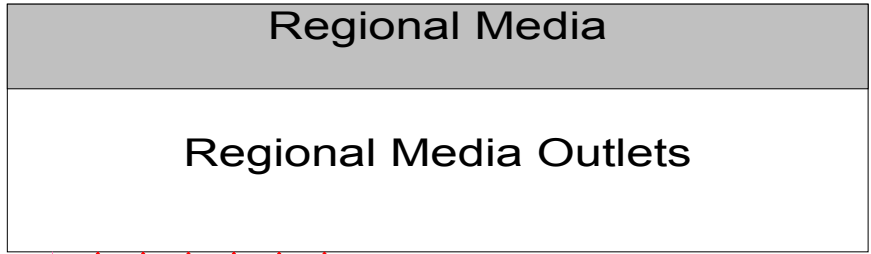




———— Existing  
- - - - - Planned



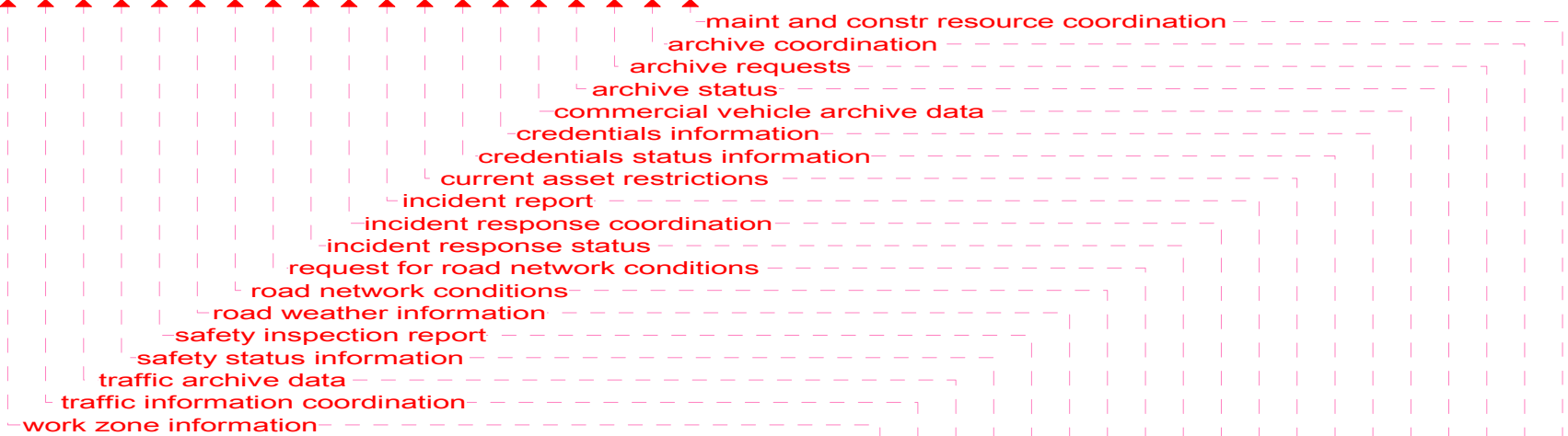
Existing  
Planned



———— Existing  
- - - - - Planned

**Pennsylvania Department of Transportation  
(PennDOT)**

**PennDOT STMC**

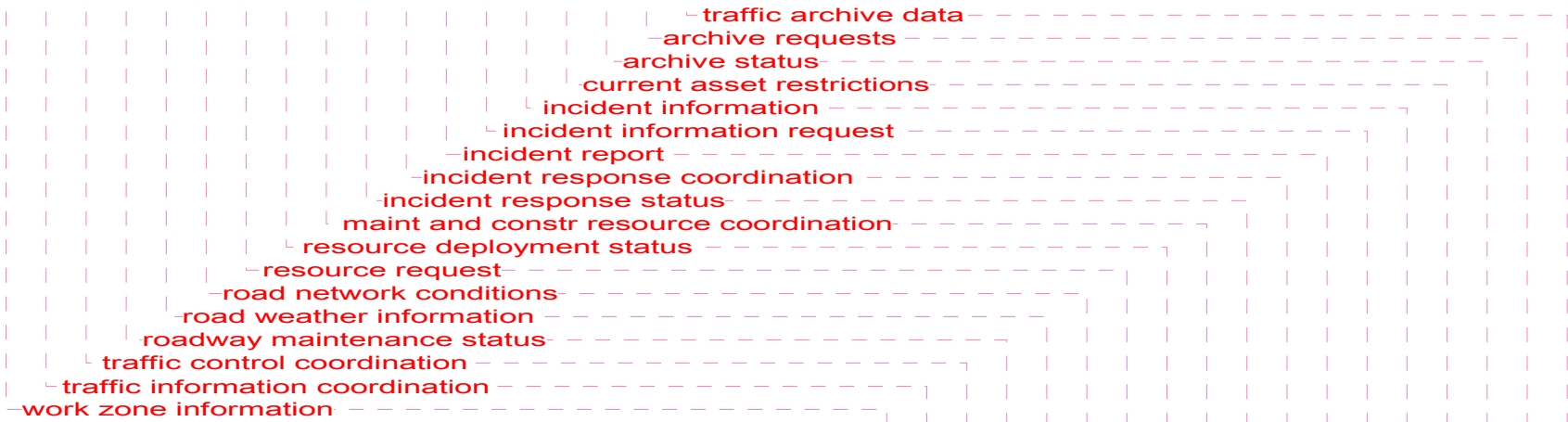


**Pennsylvania Department of Transportation  
(PennDOT)**

**PennDOT Central Office Organizations**

———— Existing  
- - - - - Planned

Pennsylvania Department of Transportation (PennDOT)  
PennDOT D2 TMC



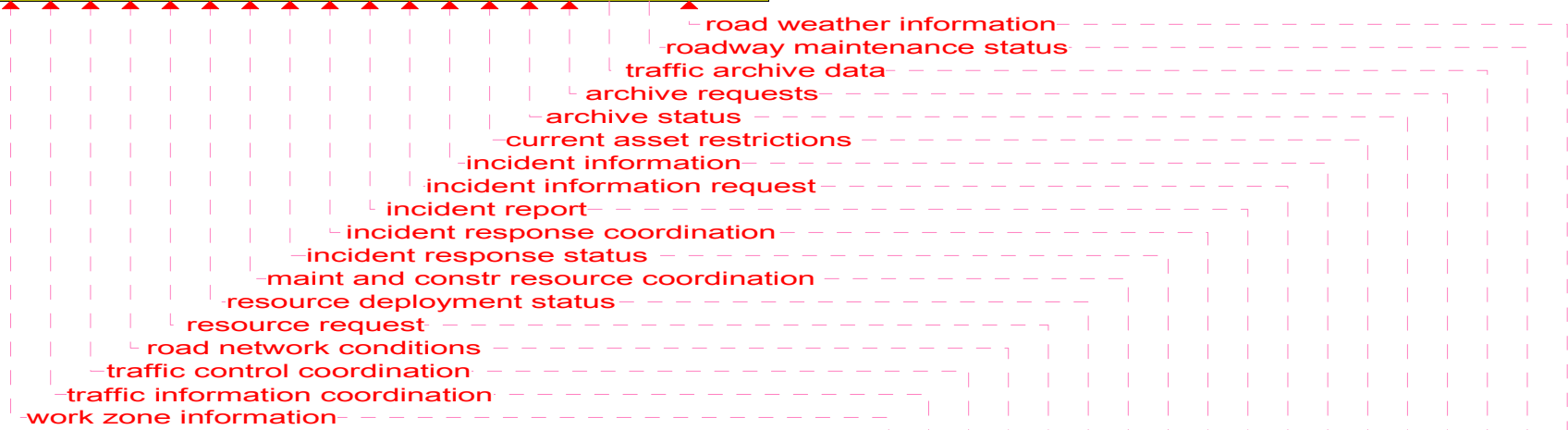
Pennsylvania Department of Transportation (PennDOT)  
PennDOT STMC

Existing  
Planned

Pennsylvania Department of  
Transportation (PennDOT)

---

PennDOT STMC

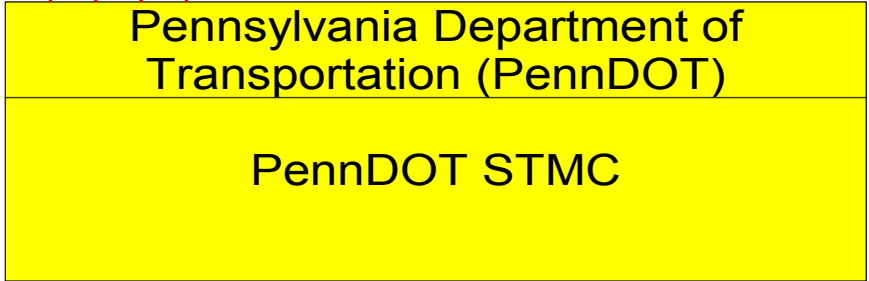
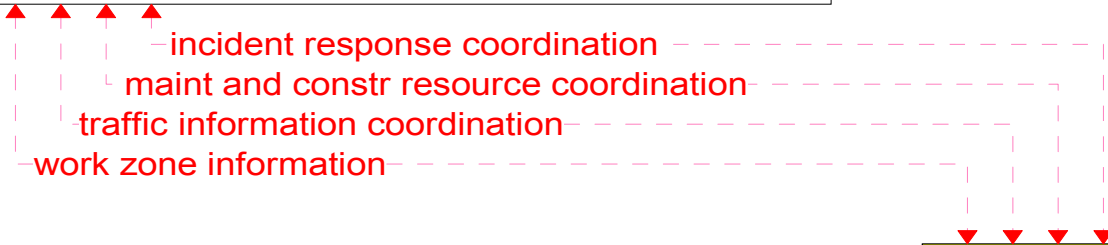


Pennsylvania Department of  
Transportation (PennDOT)

---

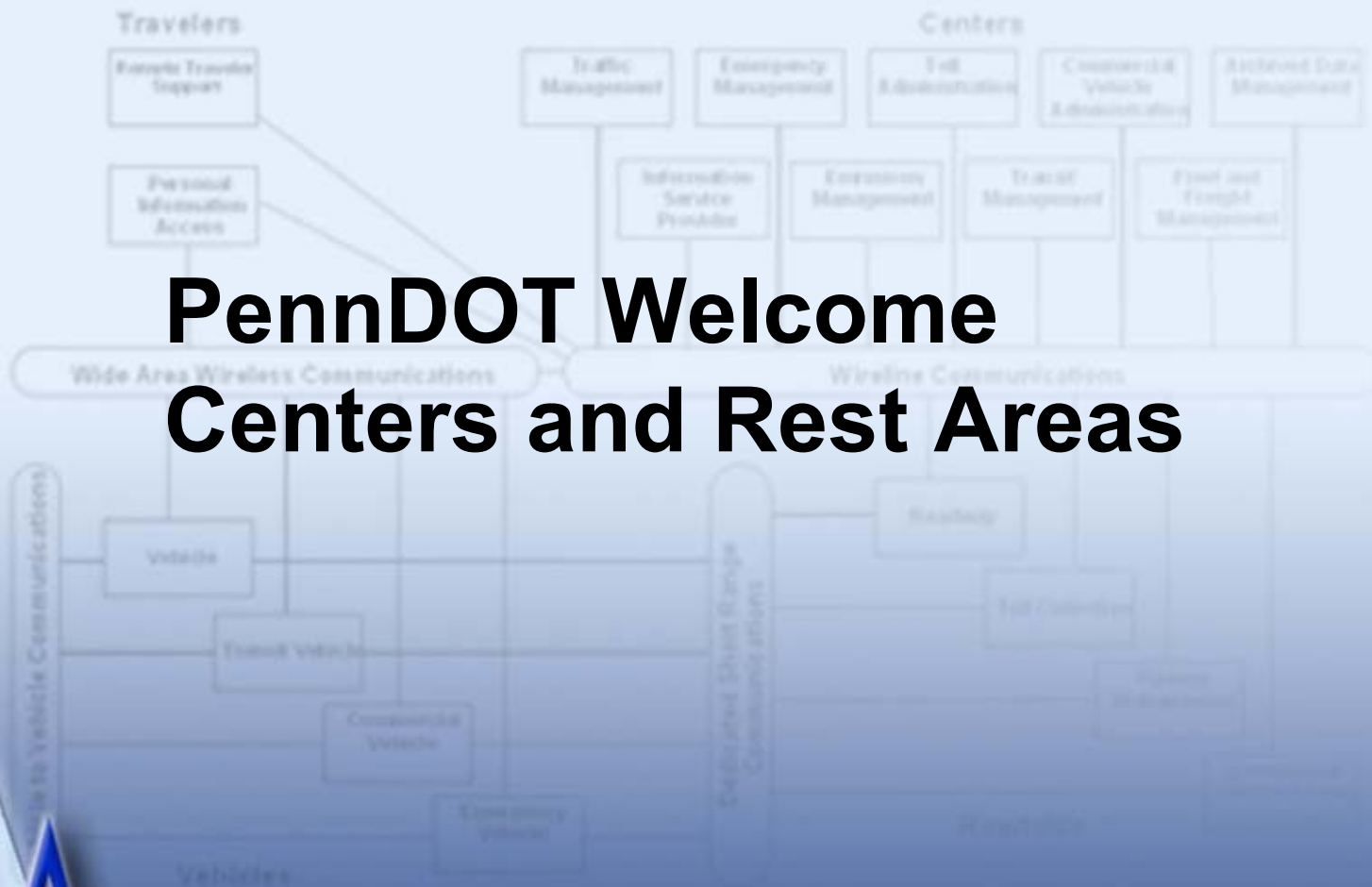
PennDOT D4 TMC

———— Existing  
- - - - - Planned



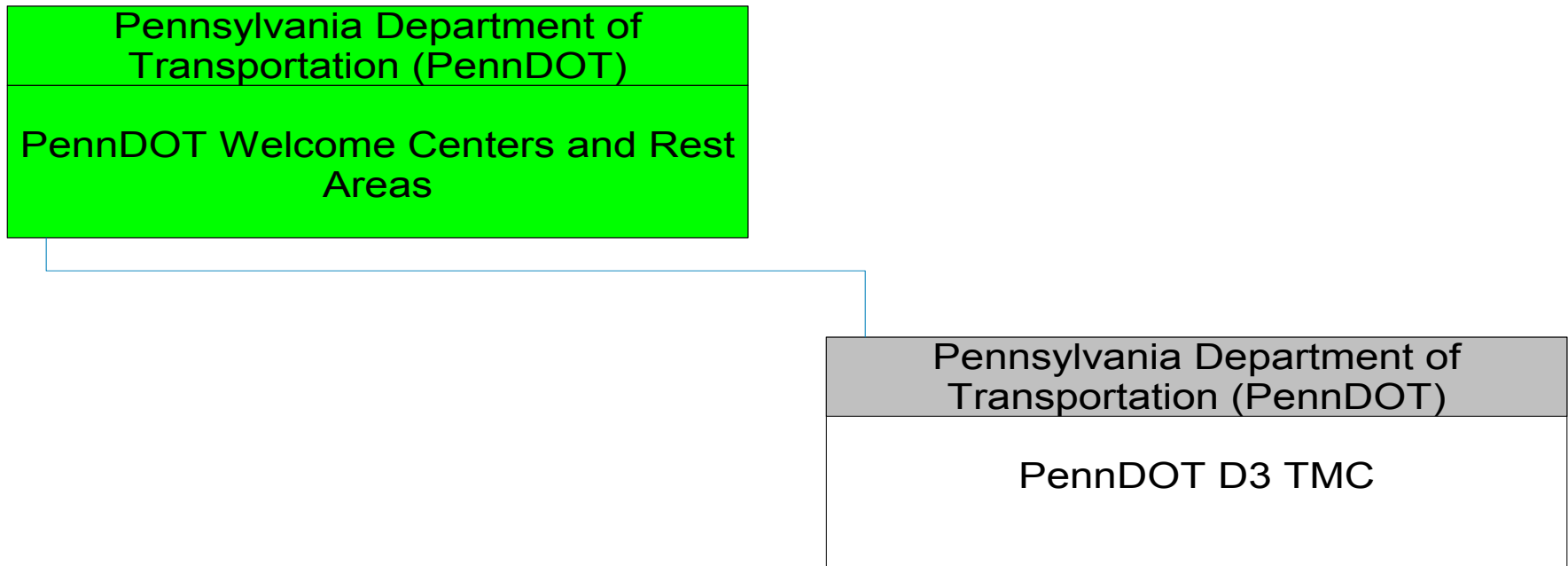
———— Existing  
- - - - - Planned

# PennDOT Welcome Centers and Rest Areas

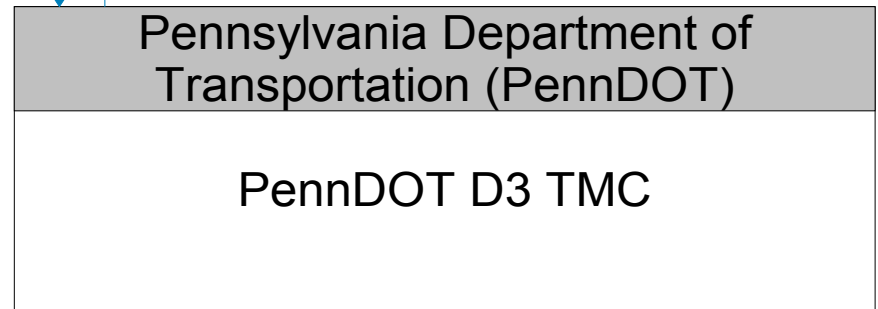
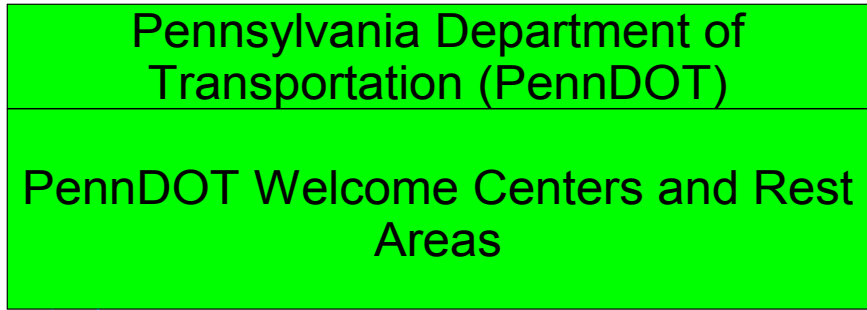




# PennDOT Welcome Centers and Rest Areas Interconnect Diagram



———— Existing  
----- Planned



traveler information

traveler request

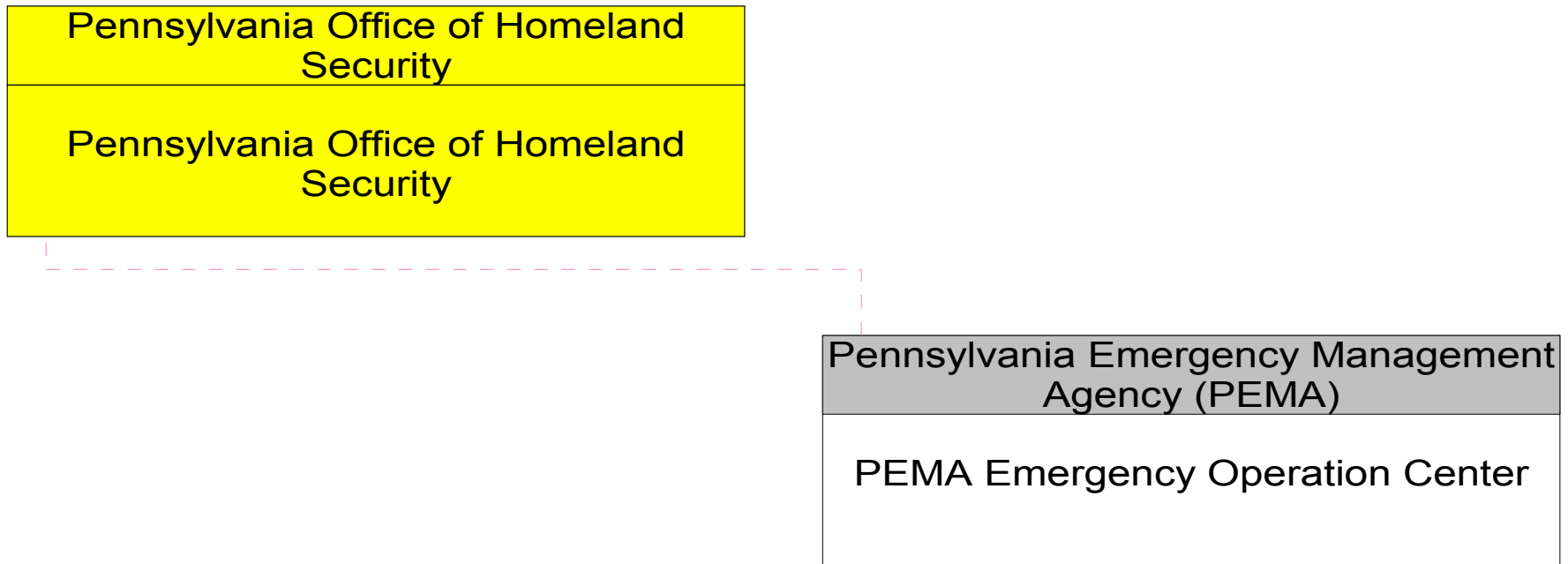
———— Existing

- - - - - Planned

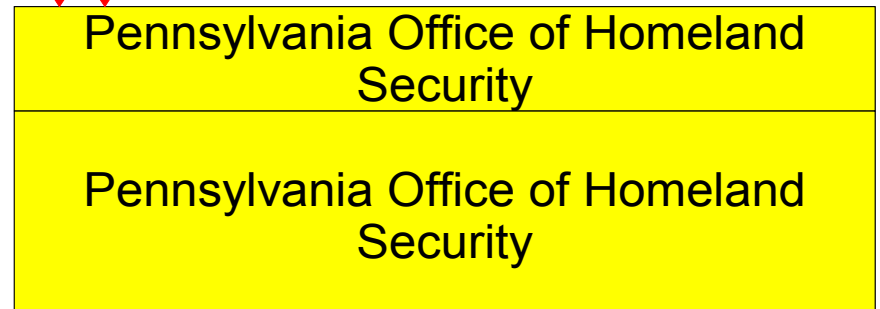
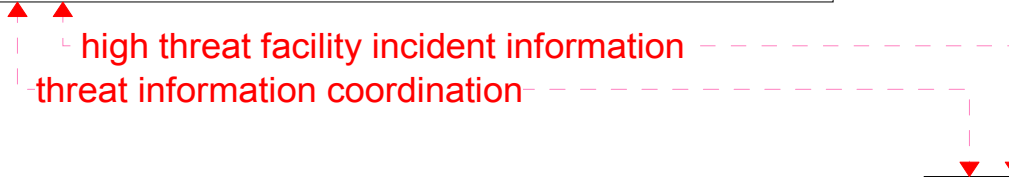
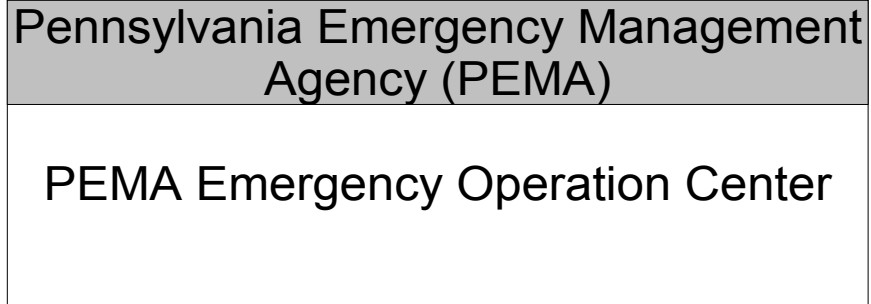
# Pennsylvania Office of Homeland Security



# Pennsylvania Office of Homeland Security Interconnect Diagram

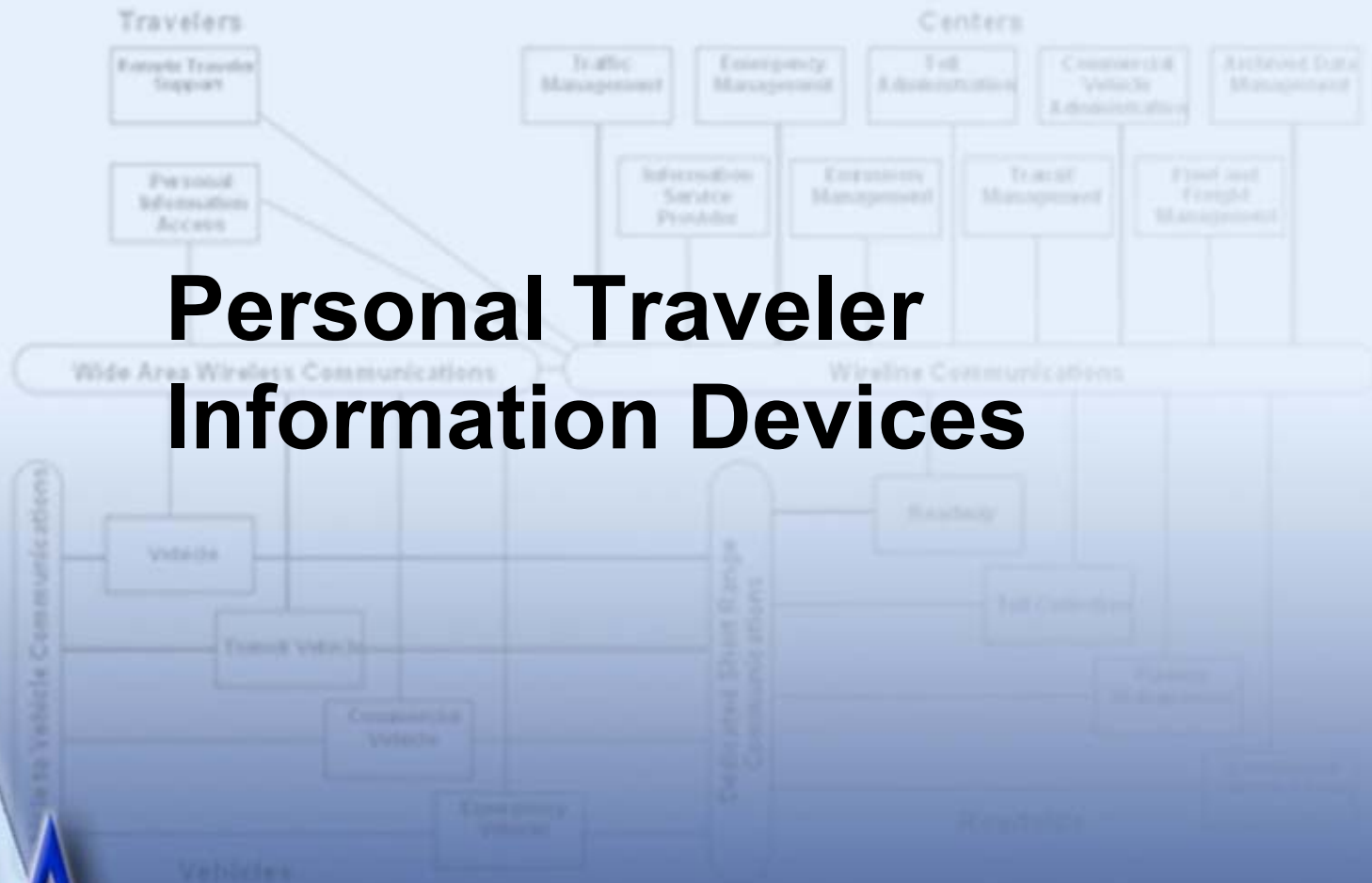


Existing  
Planned



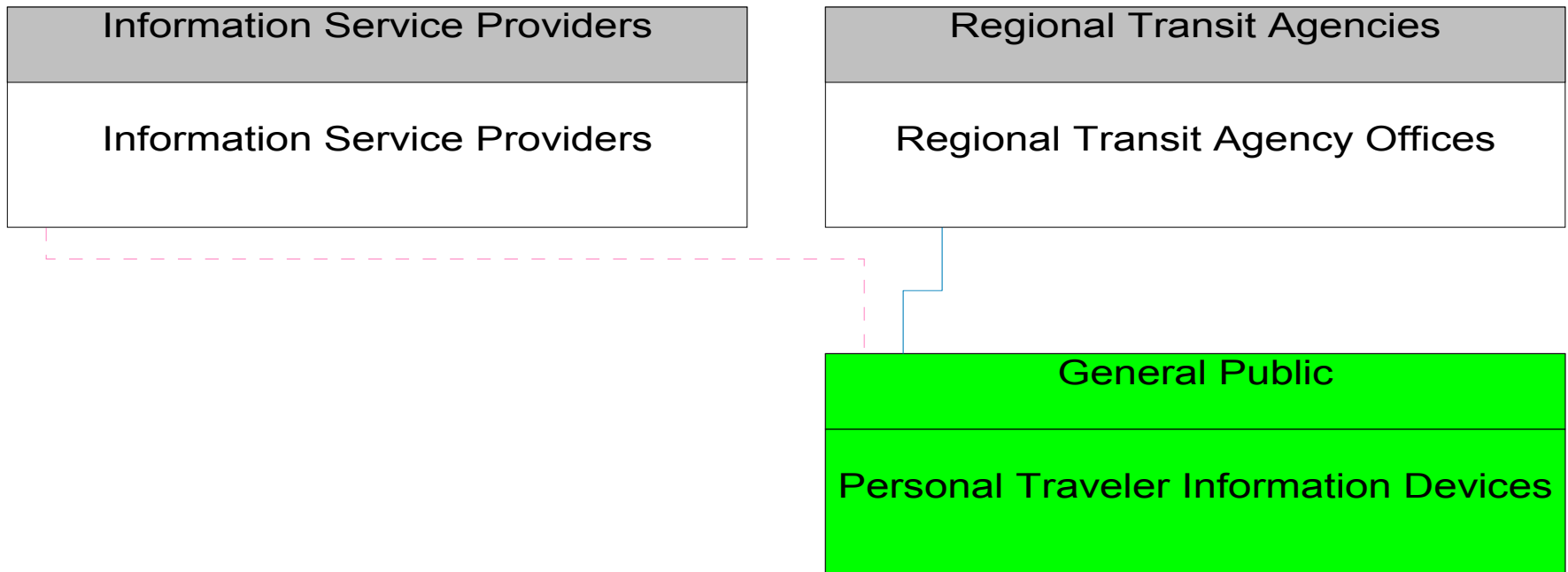
———— Existing  
- - - - - Planned

# Personal Traveler Information Devices

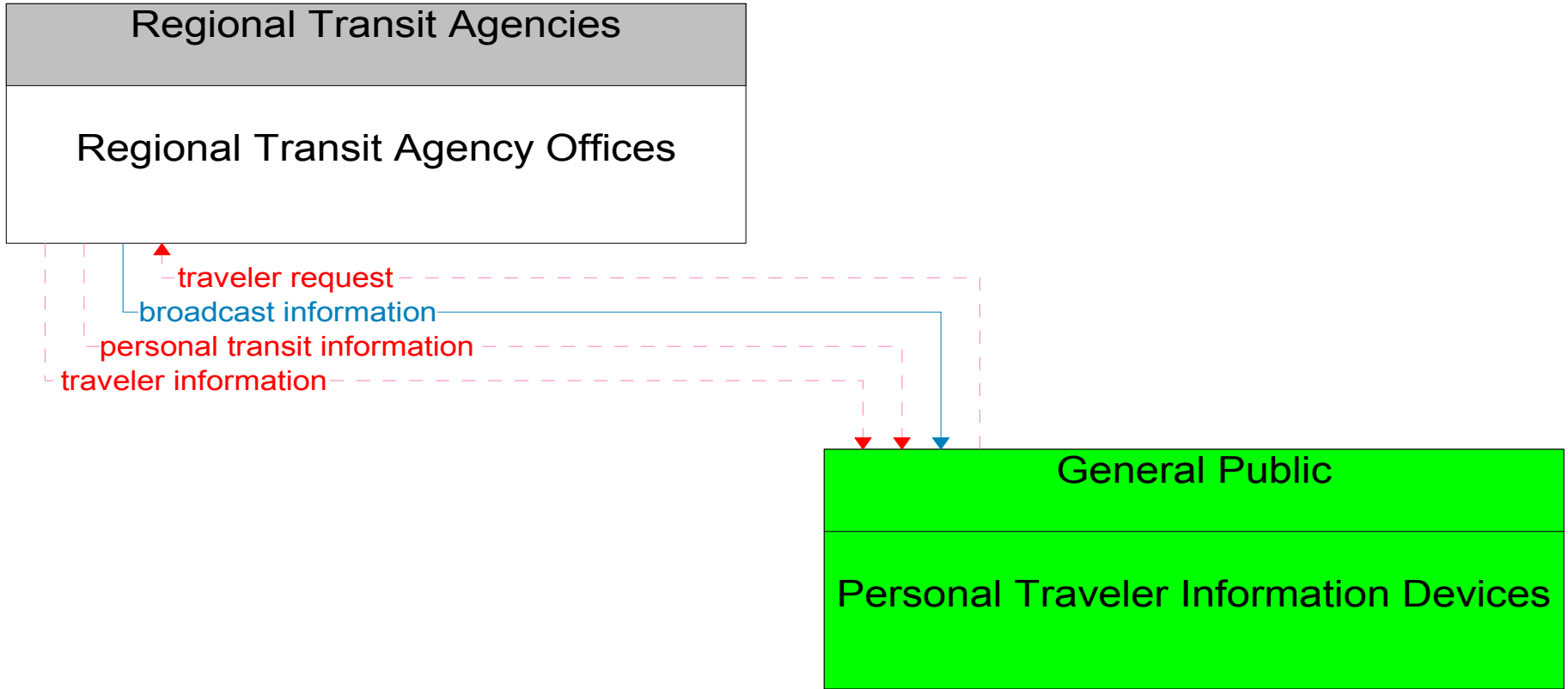


PA

# Personal Traveler Information Devices Interconnect Diagram

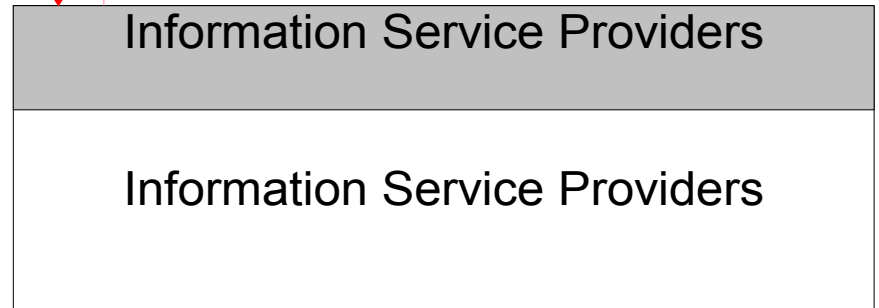
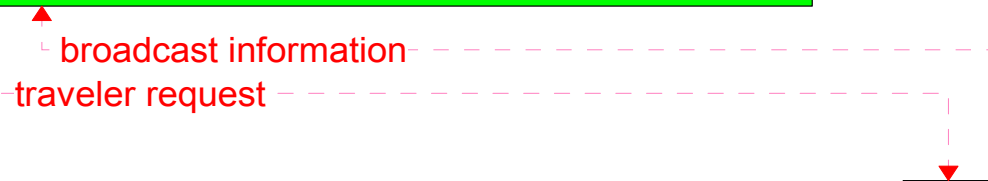
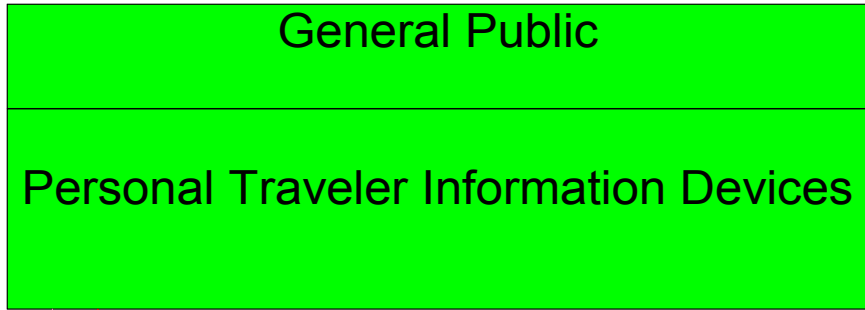


———— Existing  
- - - - - Planned



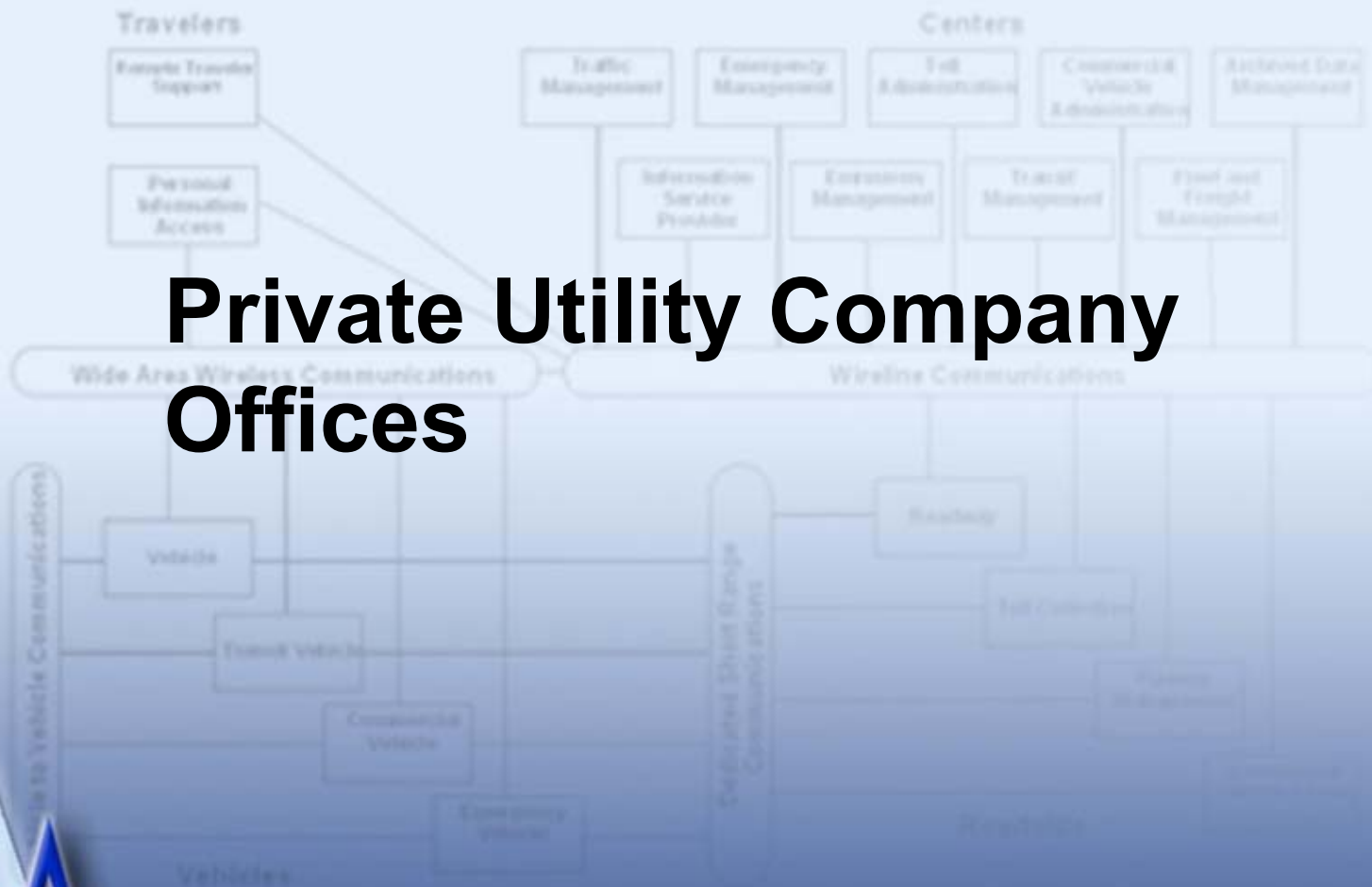
———— Existing  
- - - - - Planned



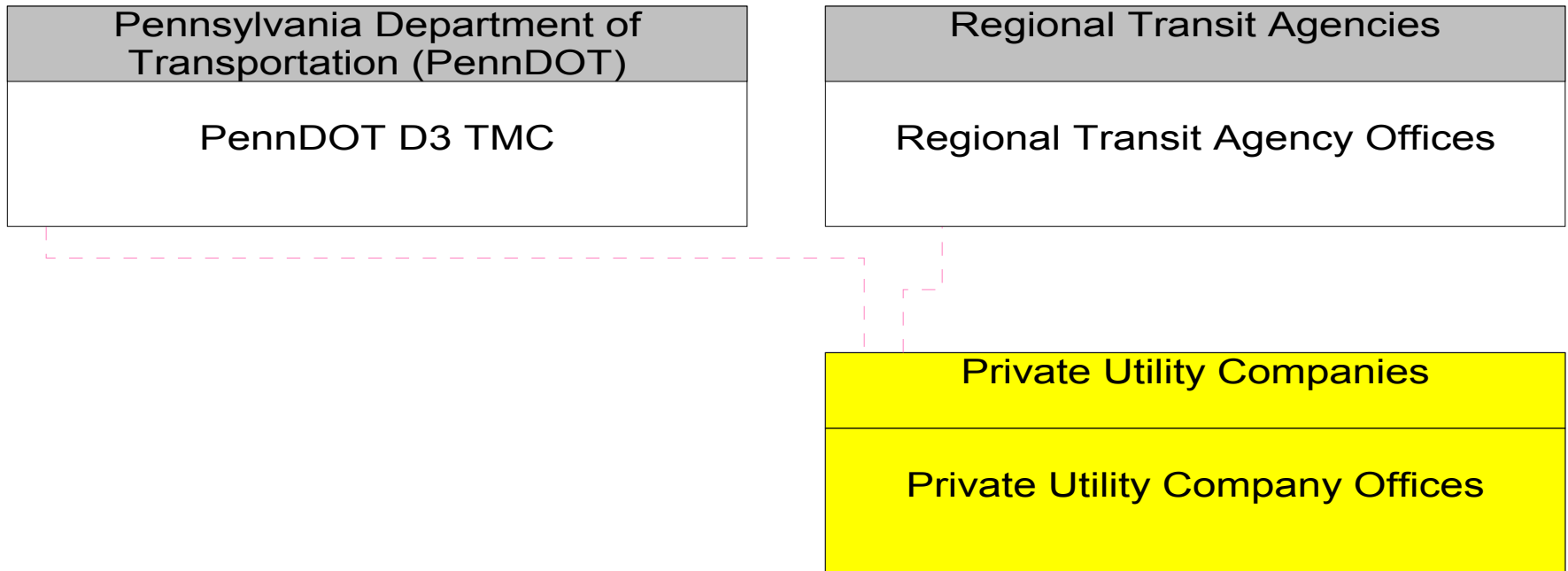


———— Existing  
- - - - - Planned

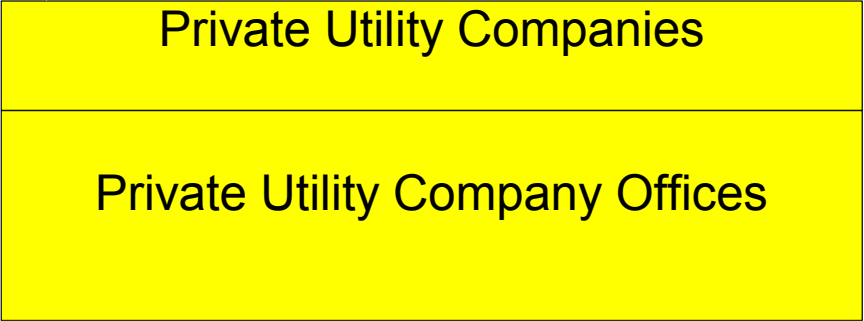
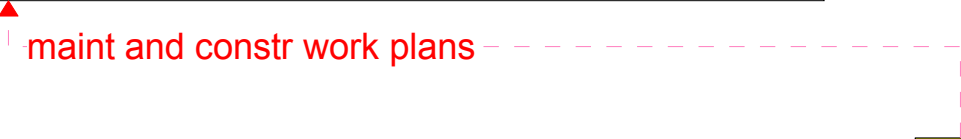
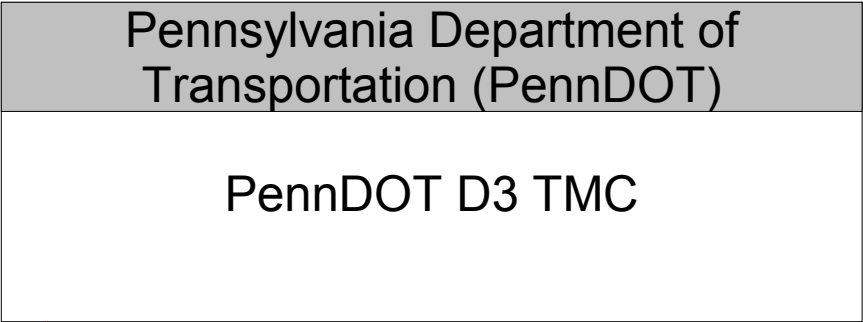
# Private Utility Company Offices



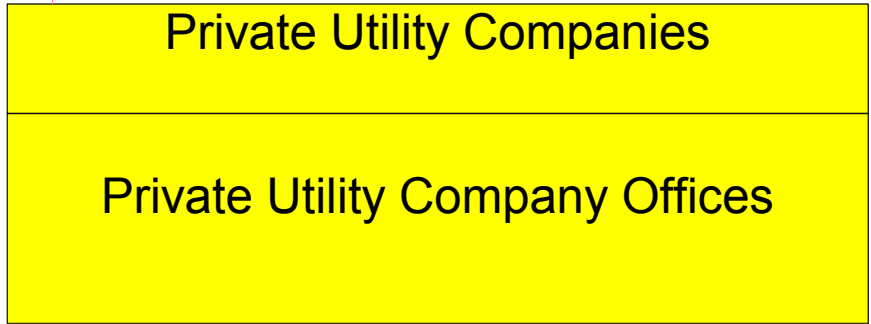
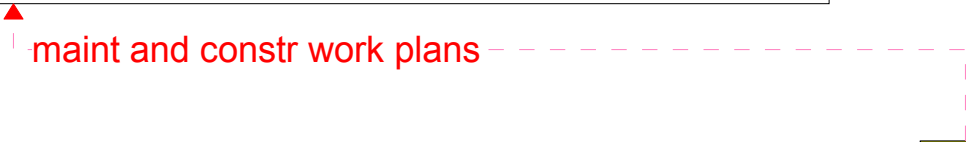
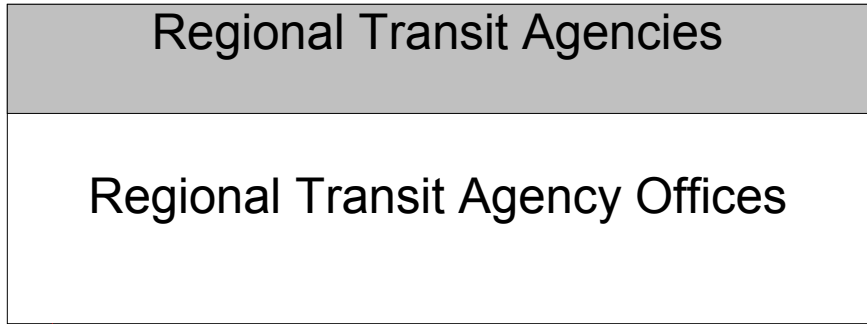
# Private Utility Company Offices Interconnect Diagram



———— Existing  
- - - - - Planned

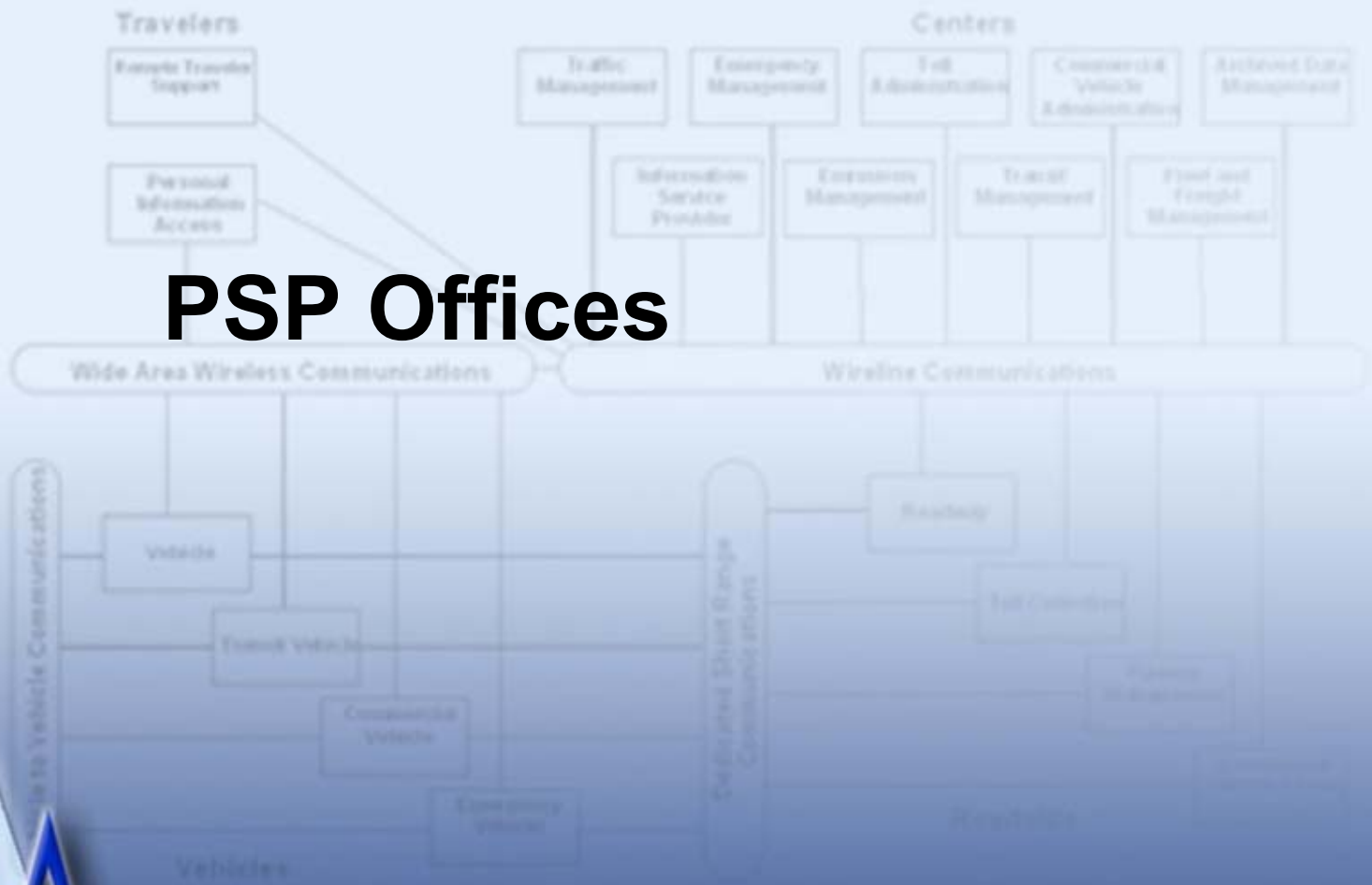


———— Existing  
- - - - - Planned



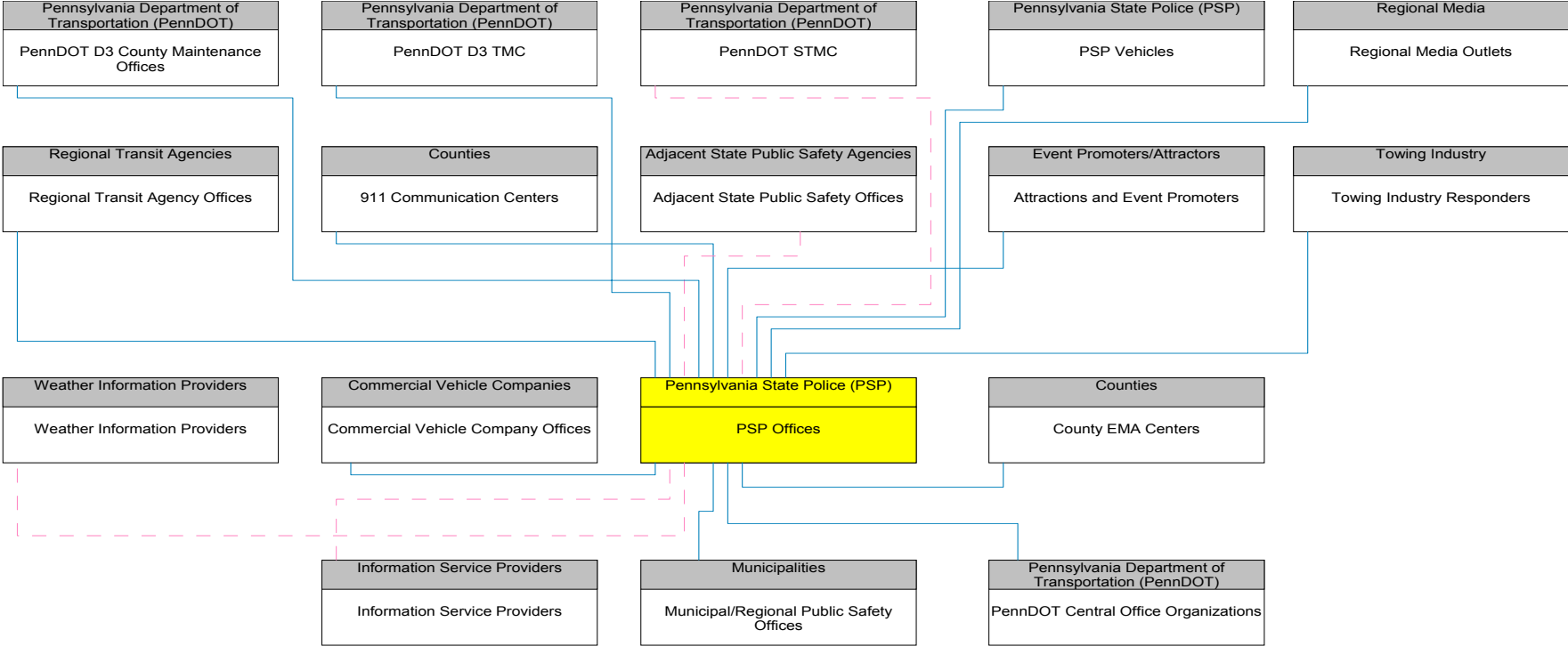
———— Existing  
- - - - - Planned

# PSP Offices

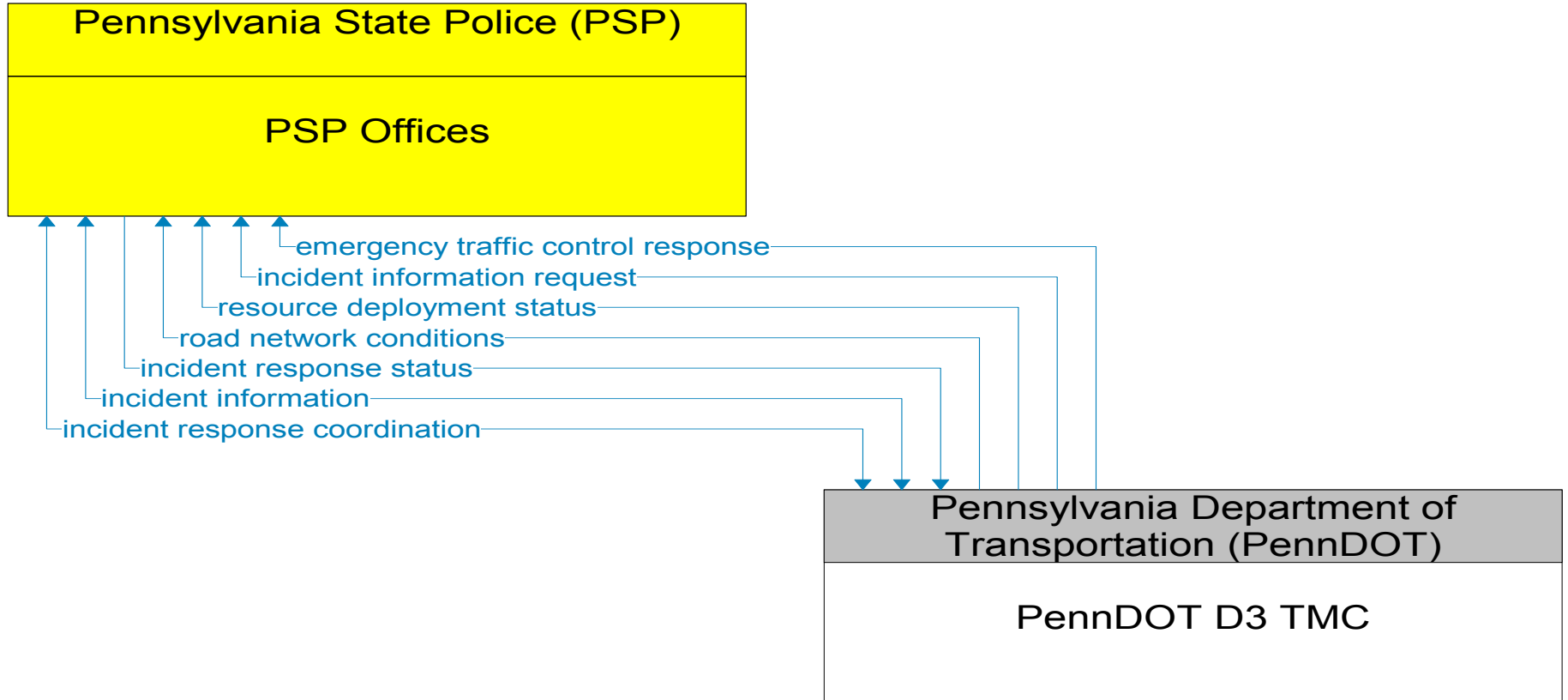


PA

# PSP Offices Interconnect Diagram

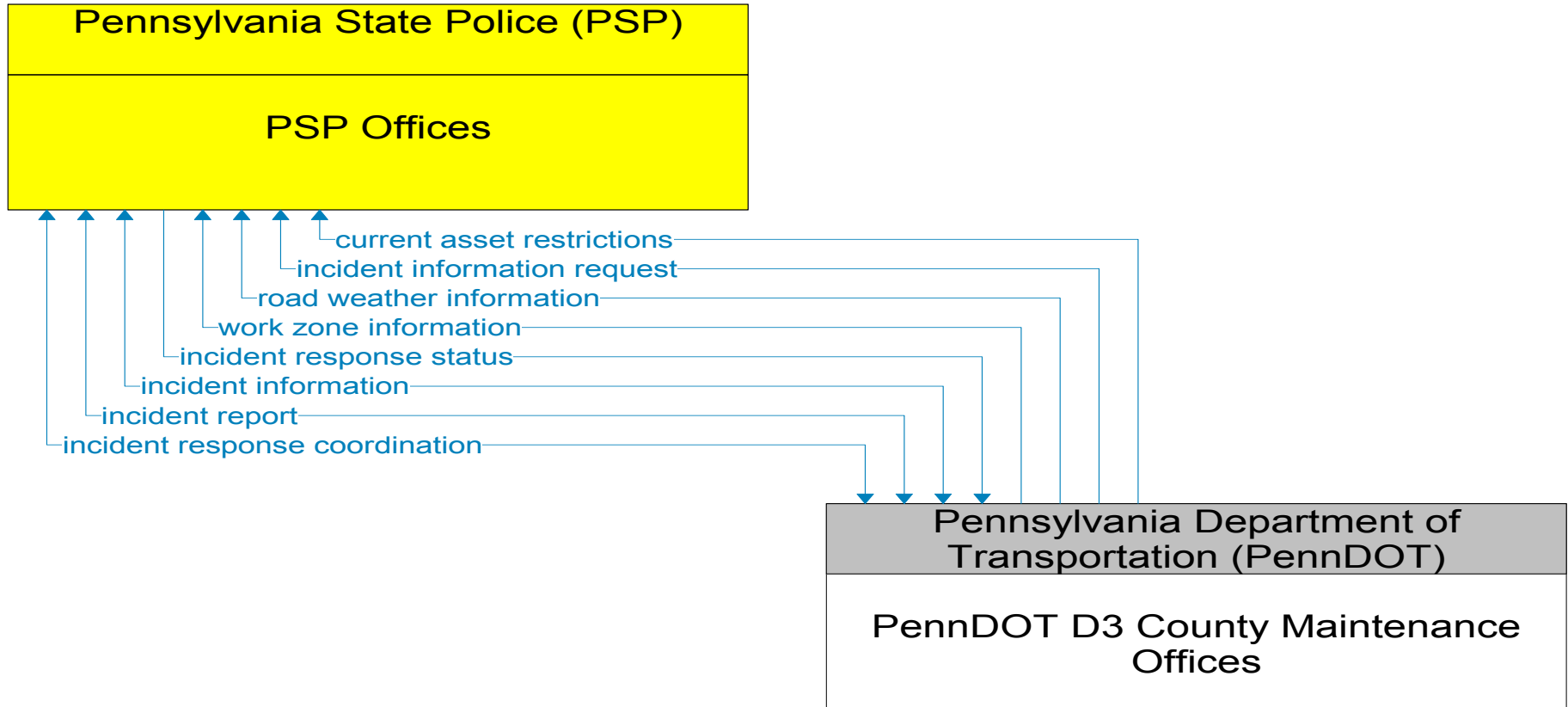


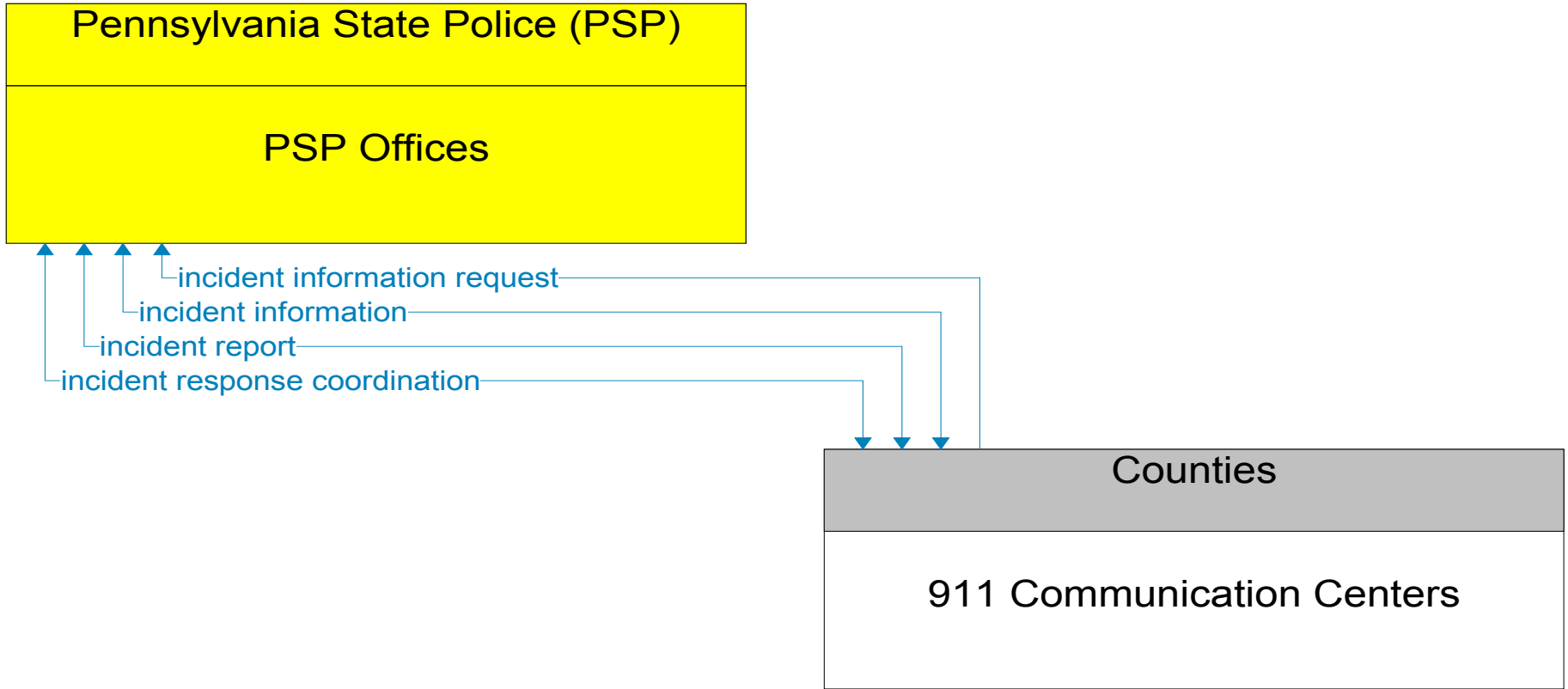
— Existing  
- - - Planned



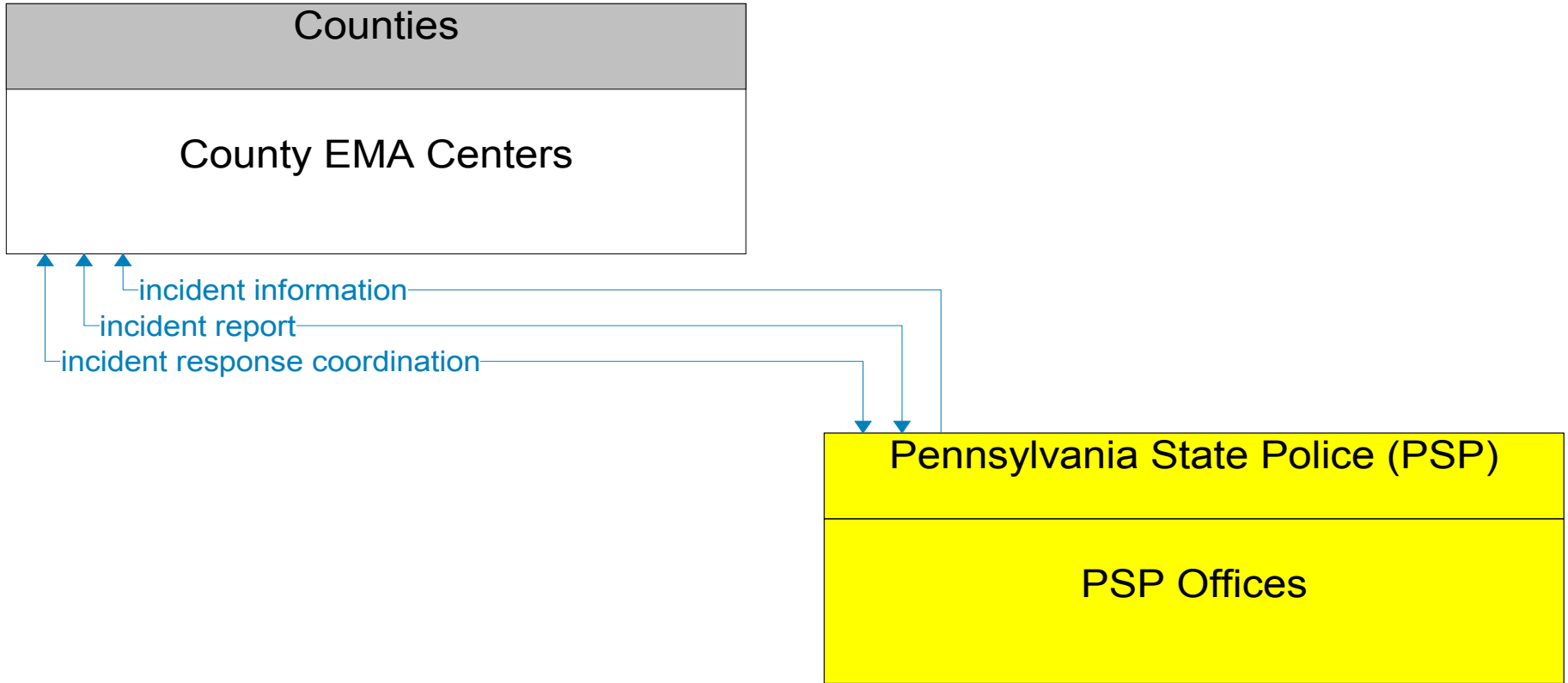
———— Existing  
- - - - - Planned

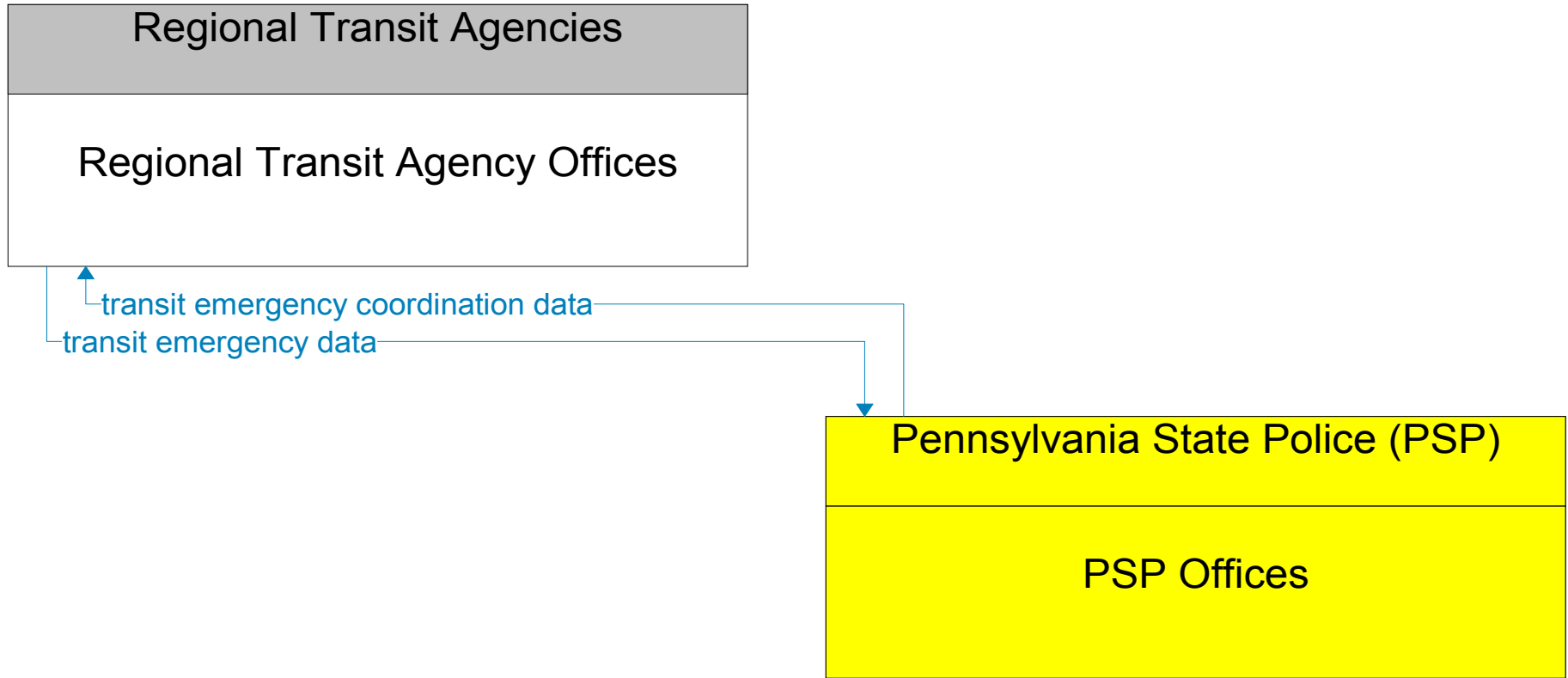




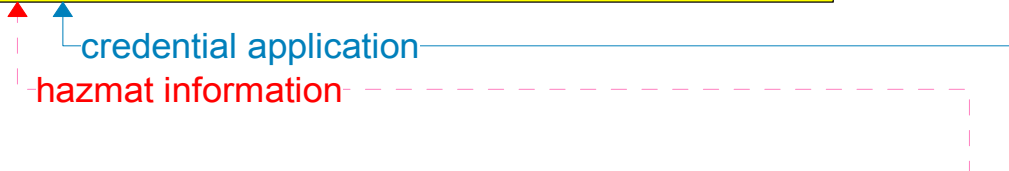
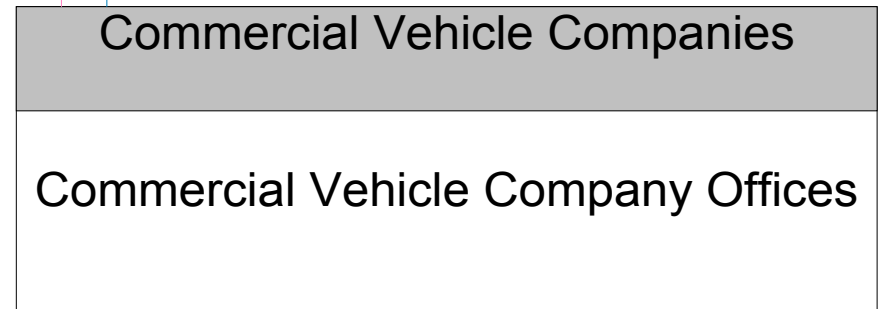
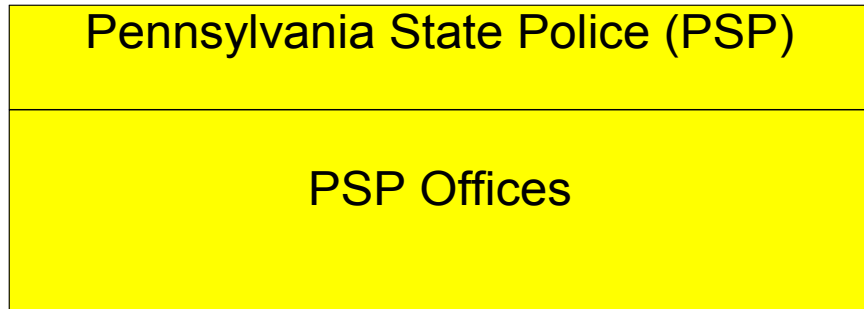


Existing  
Planned

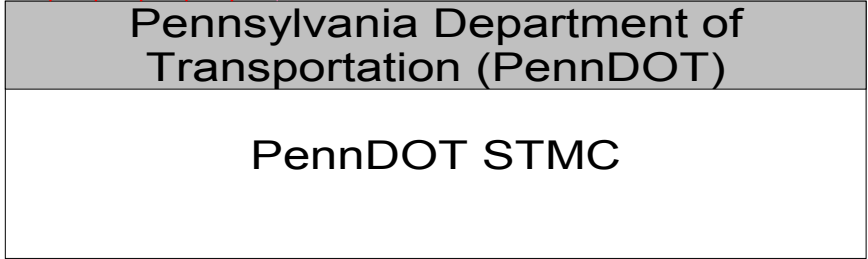
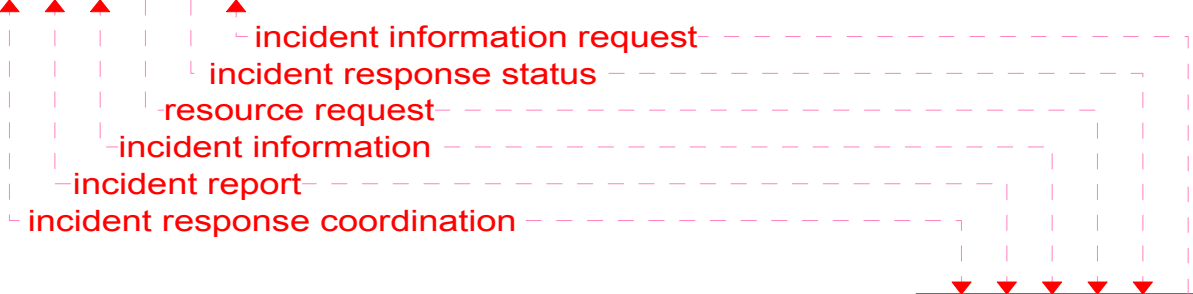
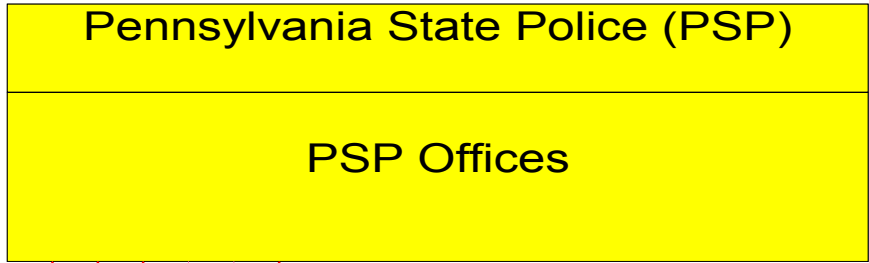




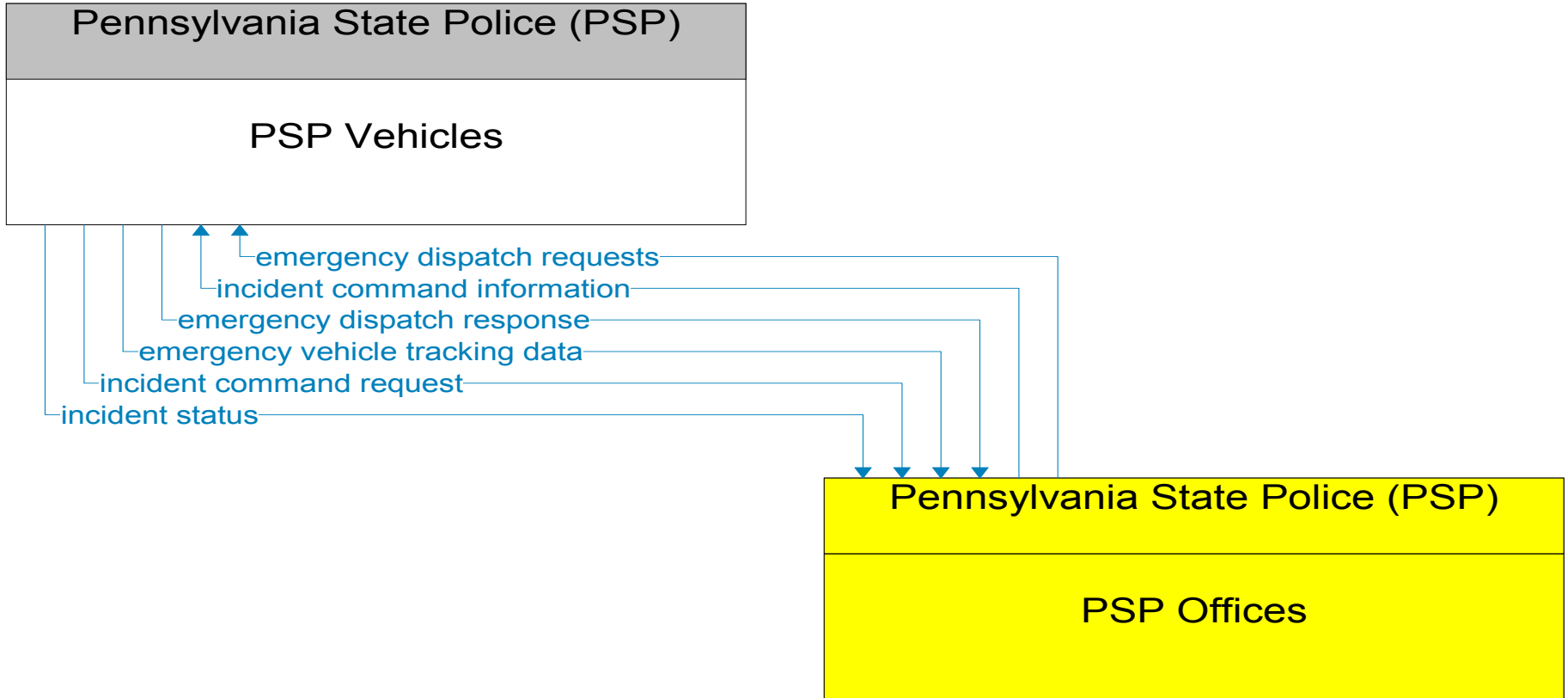
———— Existing  
----- Planned



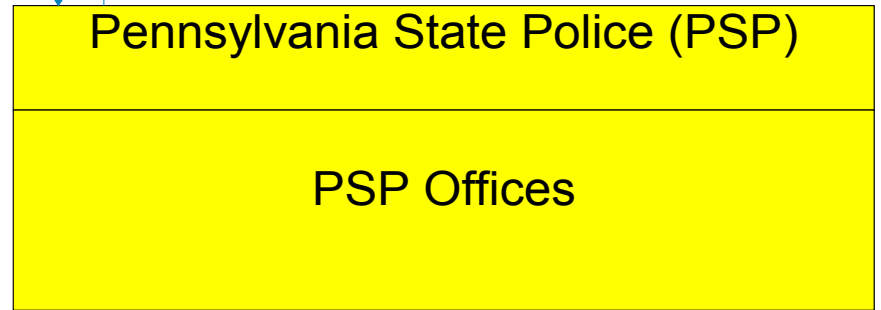
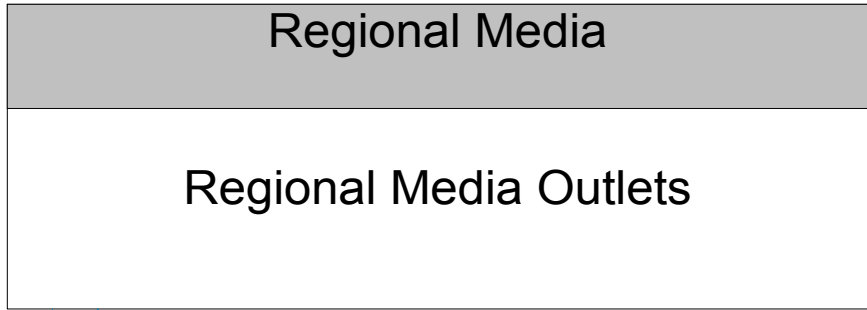
Existing  
Planned



———— Existing  
- - - - - Planned



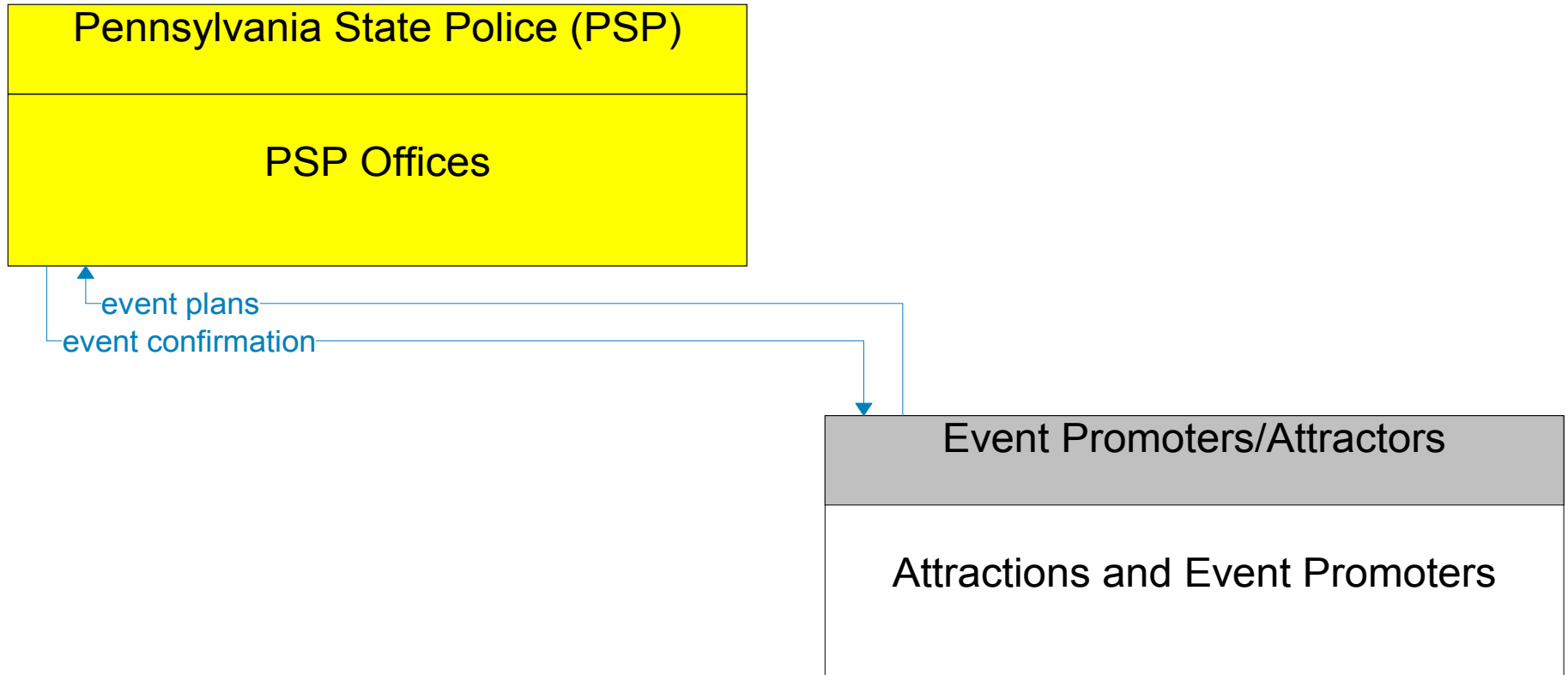
———— Existing  
- - - - - Planned



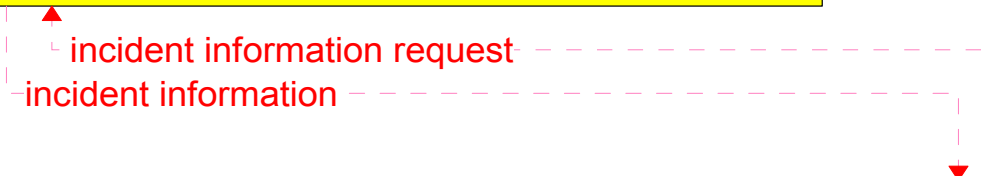
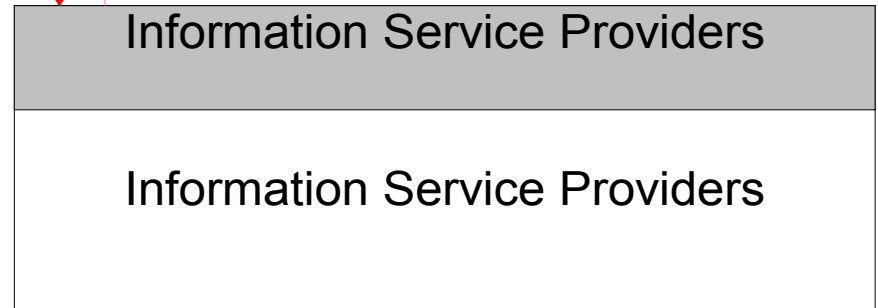
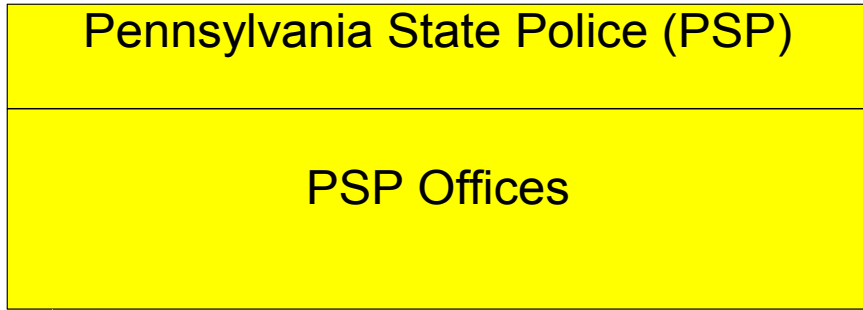
incident information for media  
media information request

Existing  
Planned





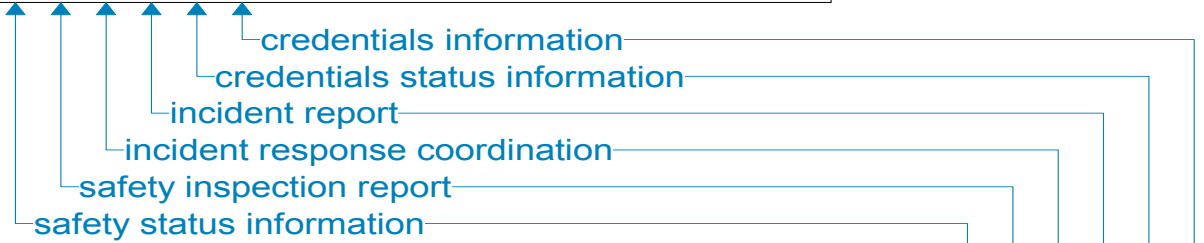
———— Existing  
----- Planned



———— Existing  
- - - - - Planned

Pennsylvania Department of  
Transportation (PennDOT)

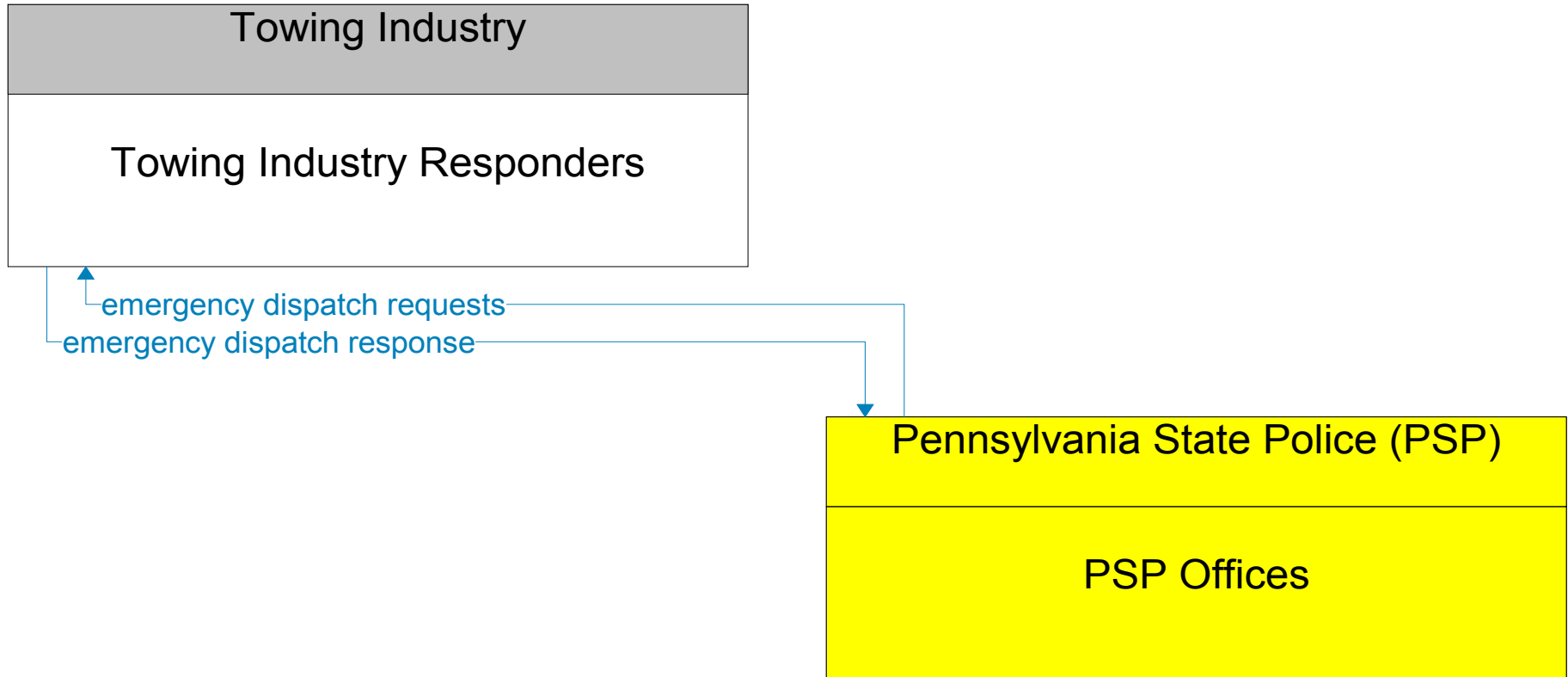
PennDOT Central Office Organizations



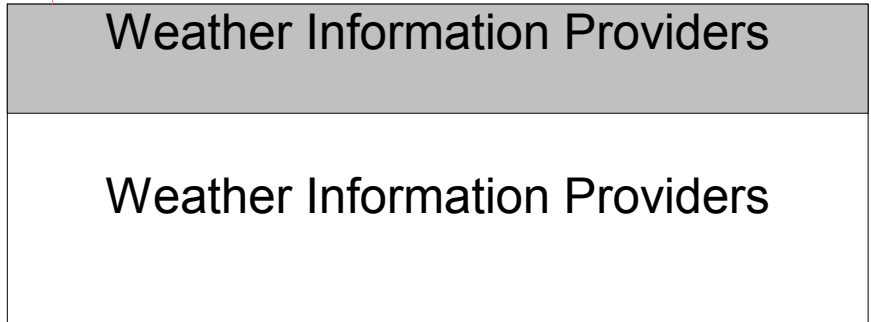
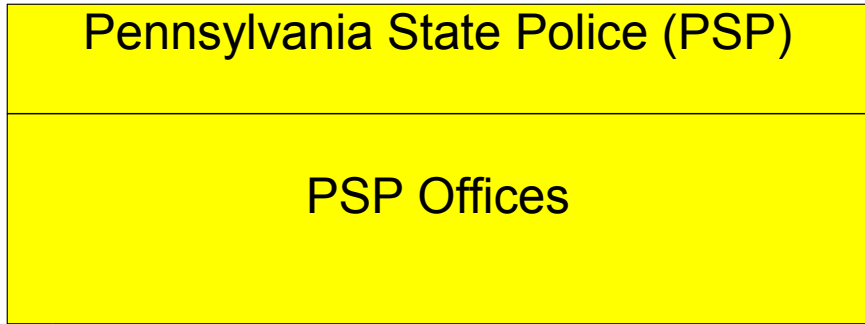
Pennsylvania State Police (PSP)

PSP Offices

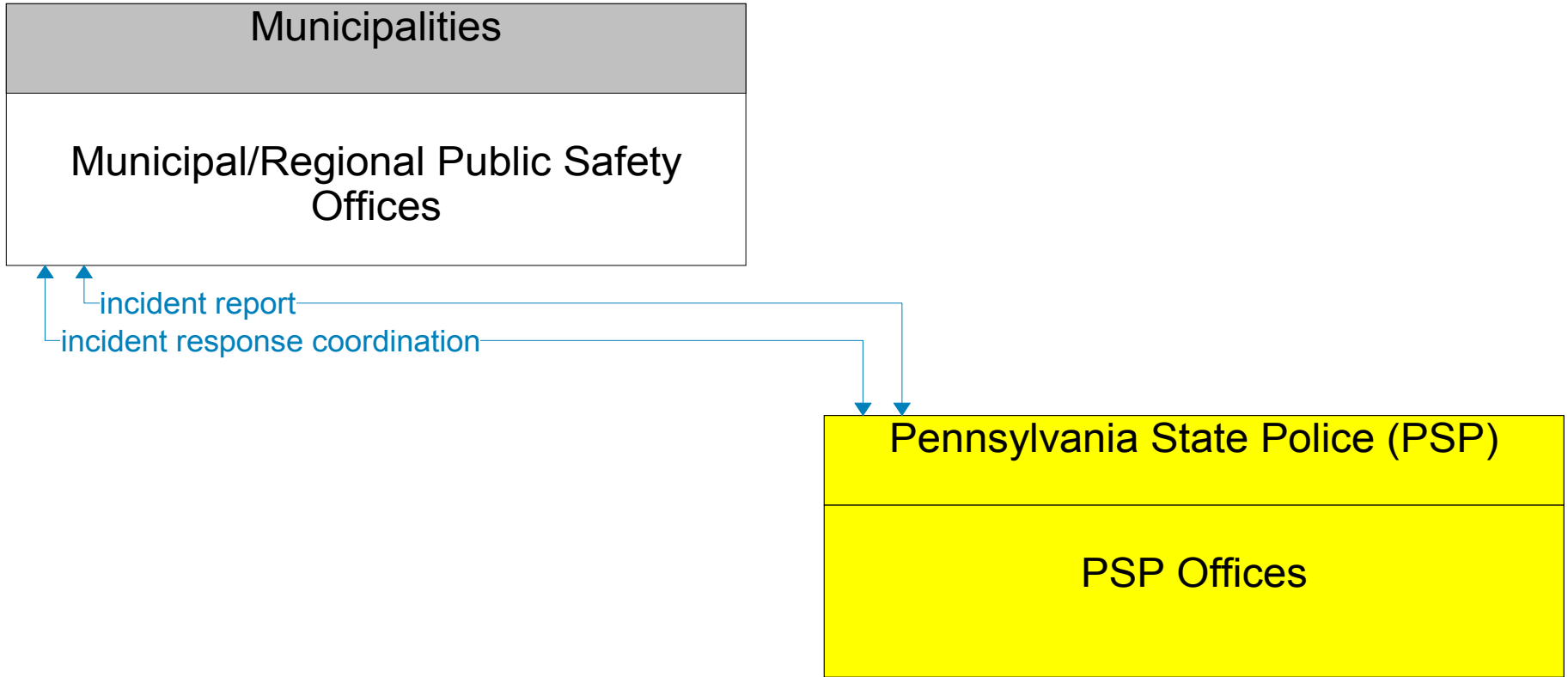
———— Existing  
- - - - - Planned



———— Existing  
- - - - - Planned



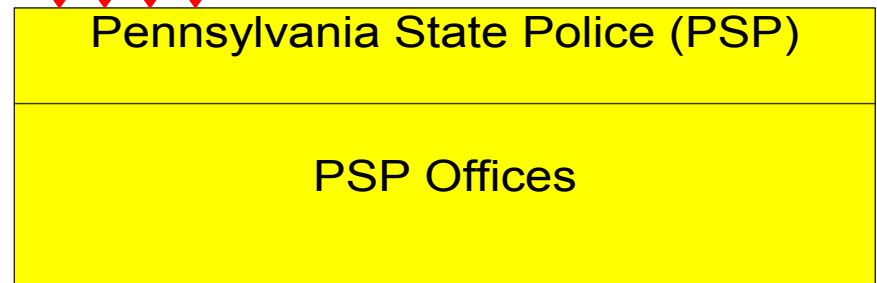
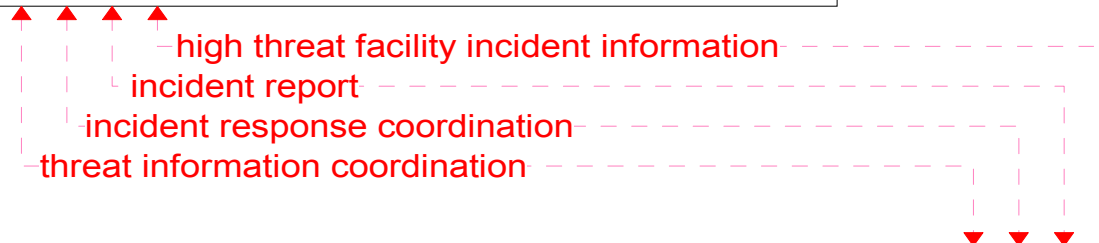
———— Existing  
- - - - - Planned



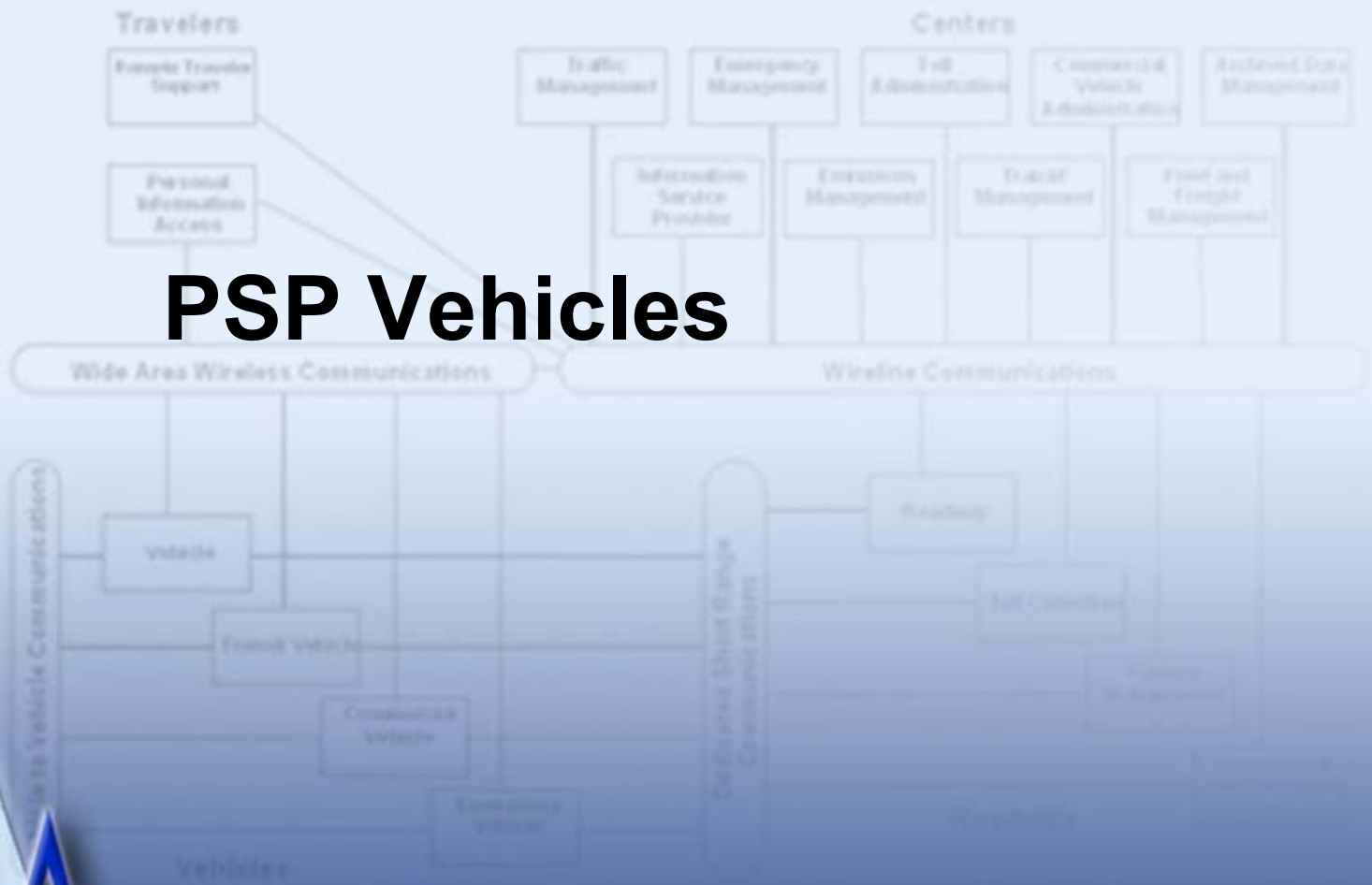
———— Existing  
- - - - - Planned

## Adjacent State Public Safety Agencies

### Adjacent State Public Safety Offices



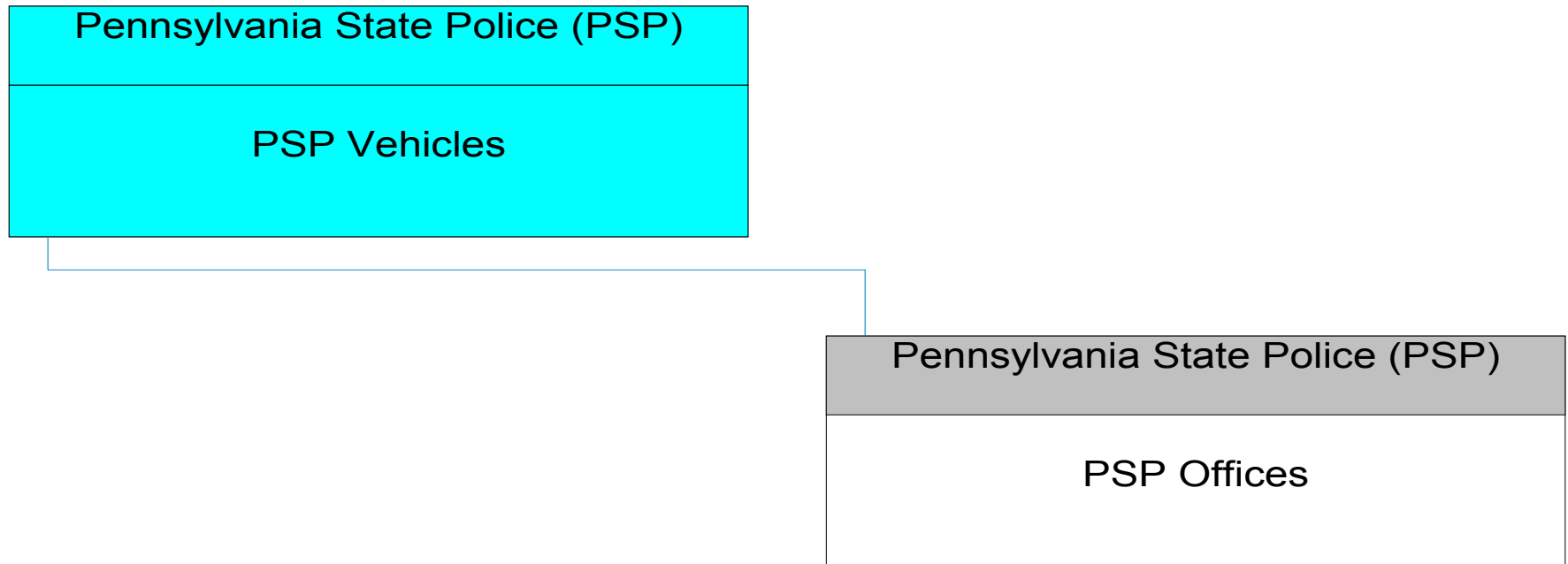
# PSP Vehicles

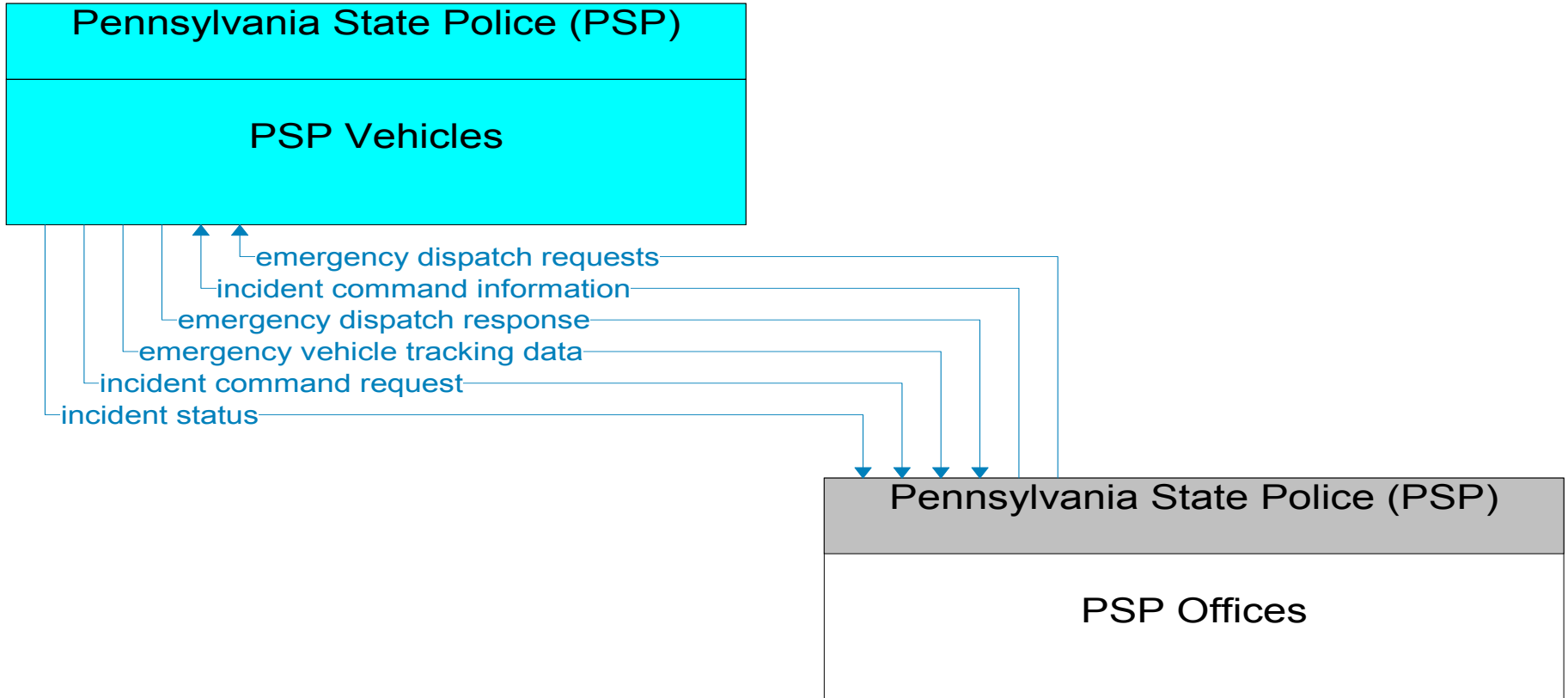


PA



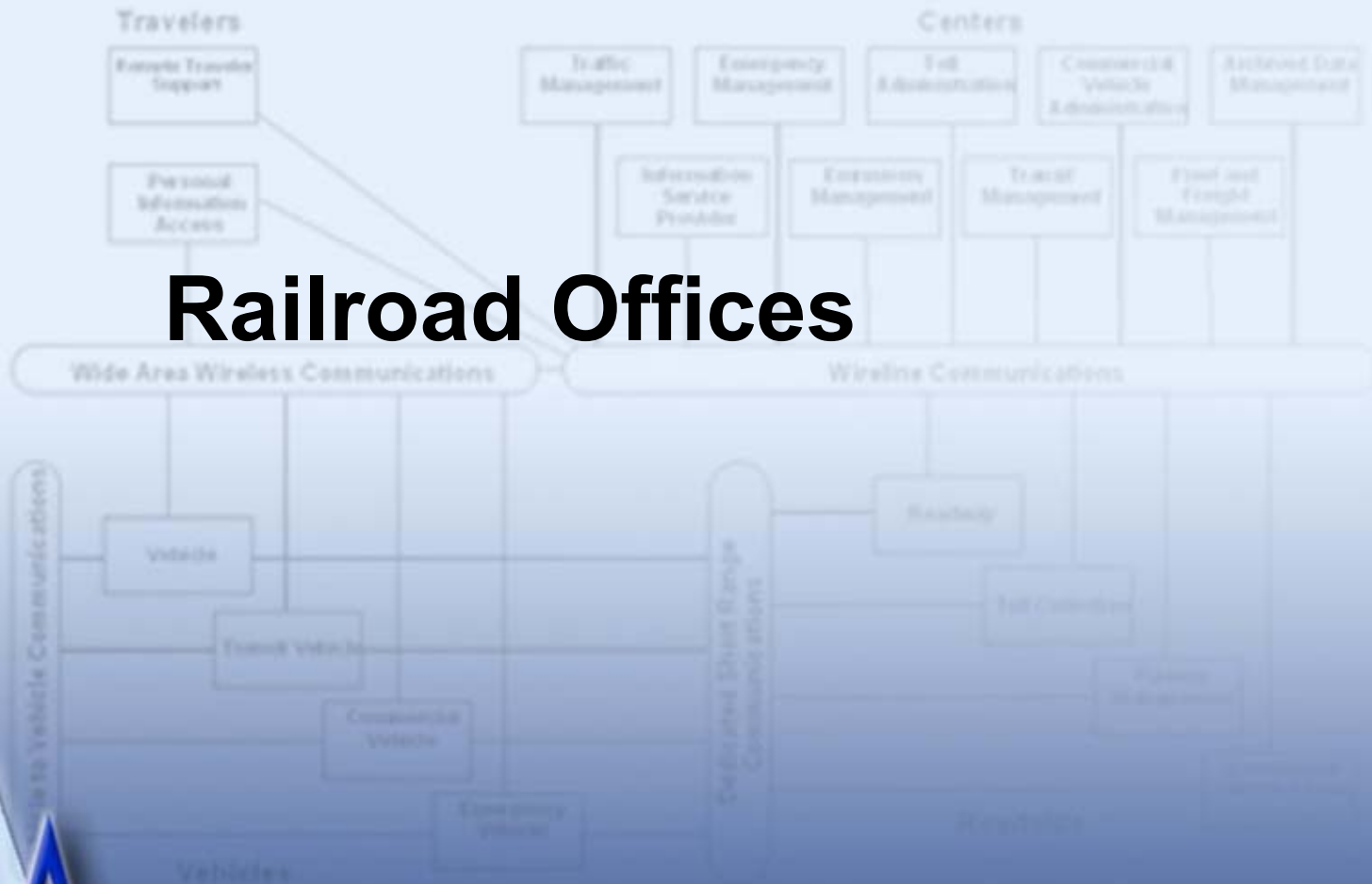
# PSP Vehicles Interconnect Diagram



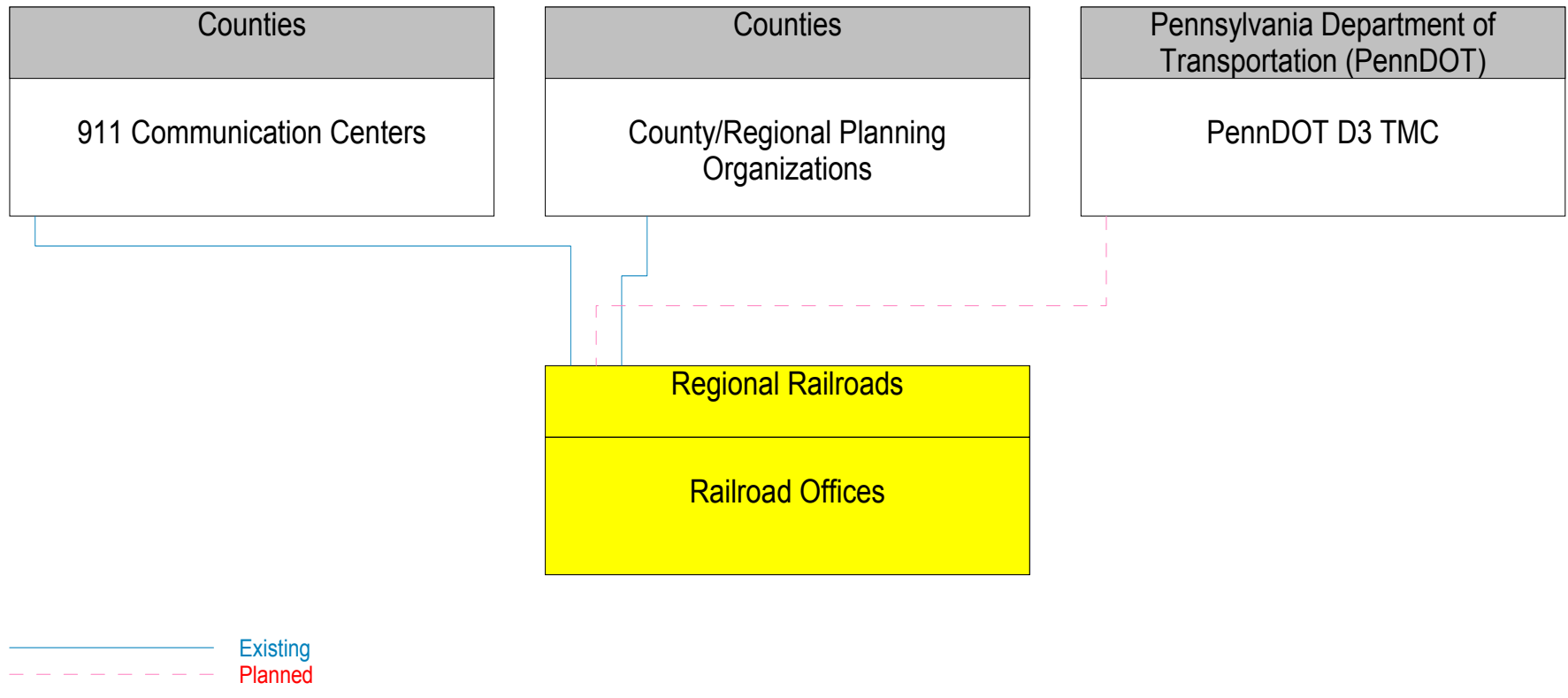


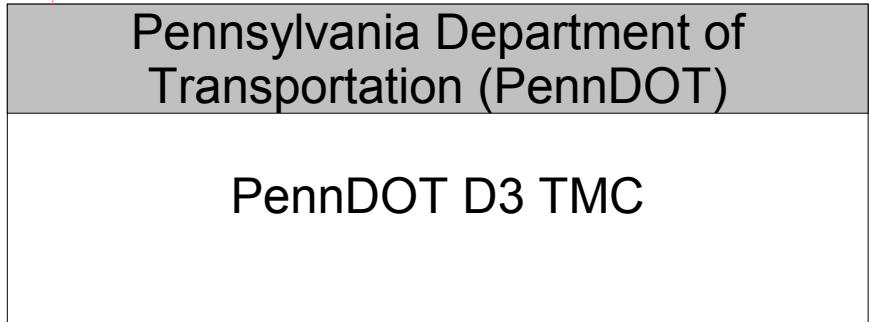
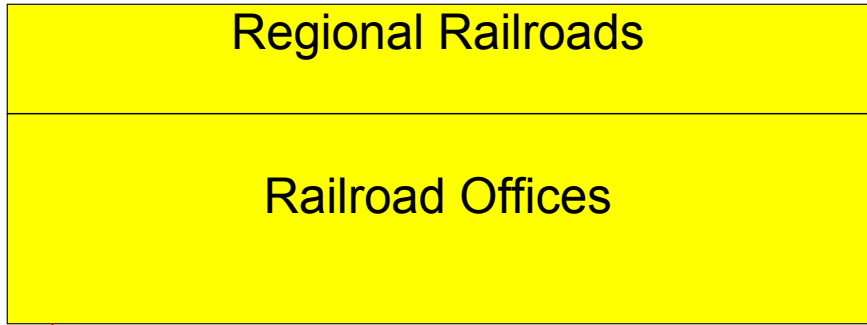
———— Existing  
- - - - - Planned

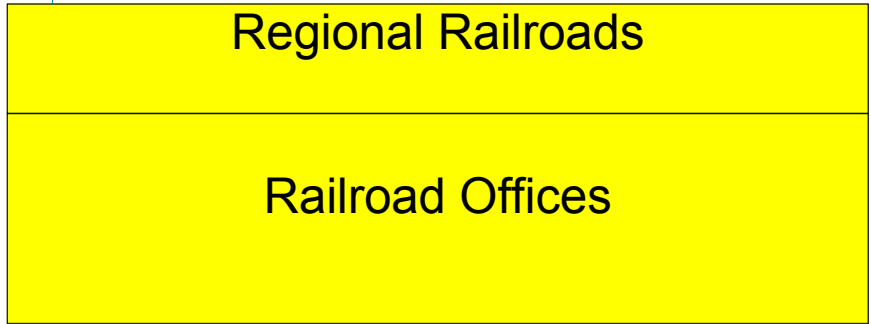
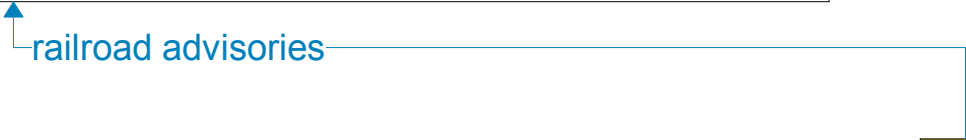
# Railroad Offices



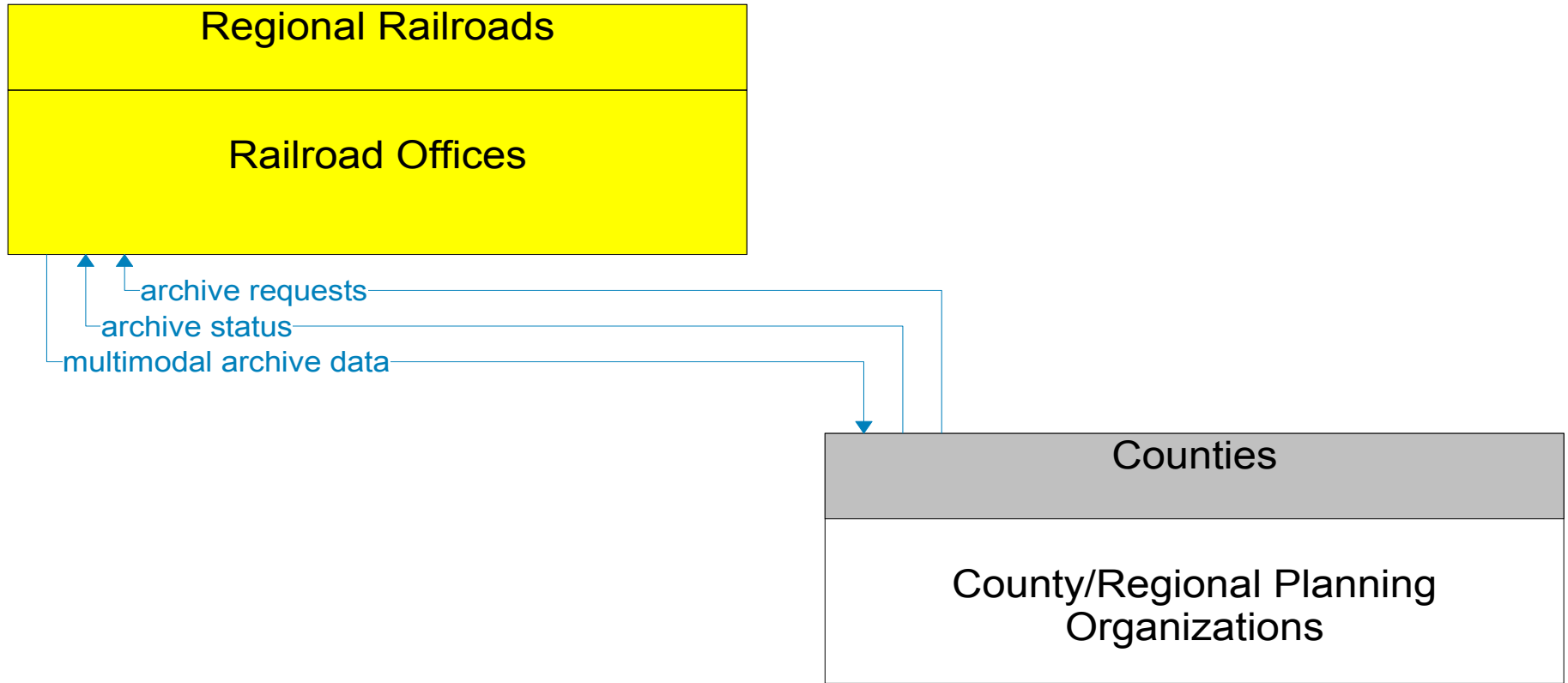
# Railroad Offices Interconnect Diagram







———— Existing  
- - - - - Planned



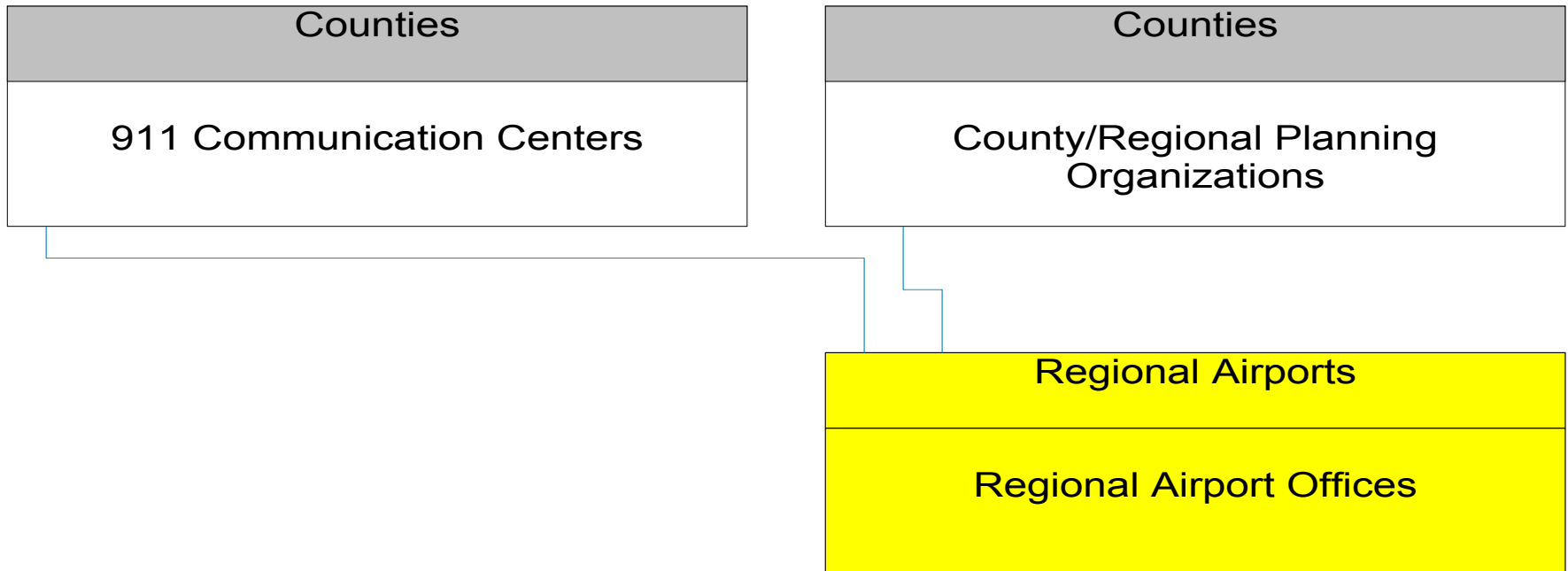
———— Existing  
----- Planned

# Regional Airport Offices

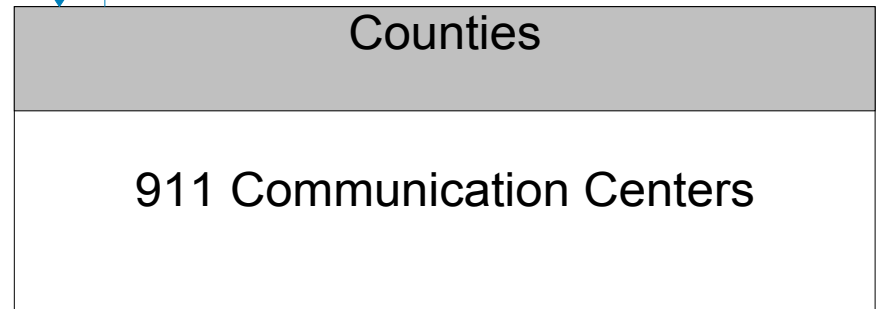
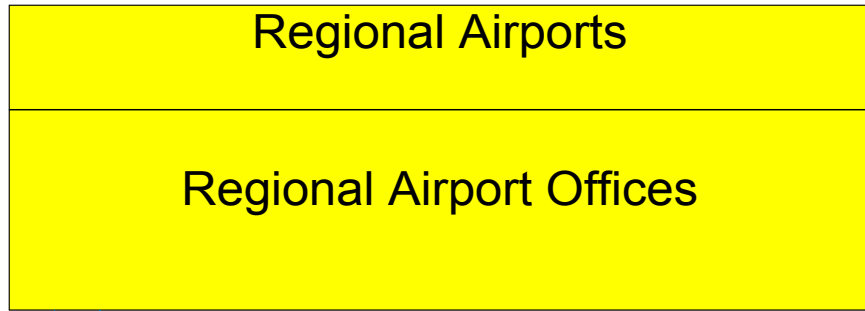




# Regional Airport Offices Interconnect Diagram



———— Existing  
----- Planned

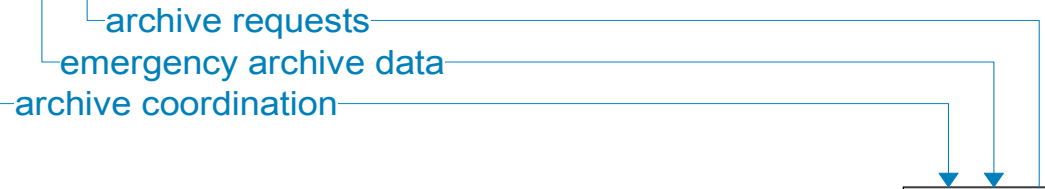
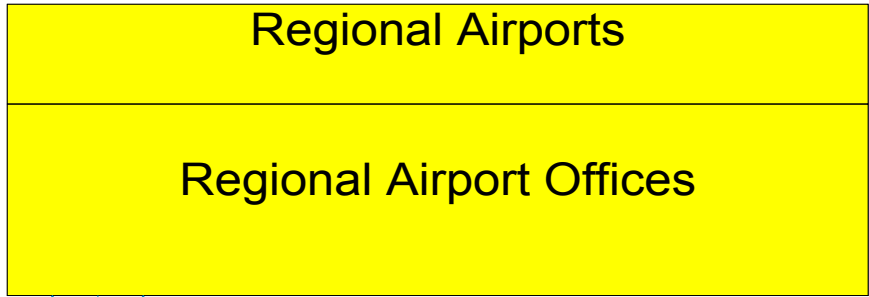


resource deployment status

resource request

Existing

Planned

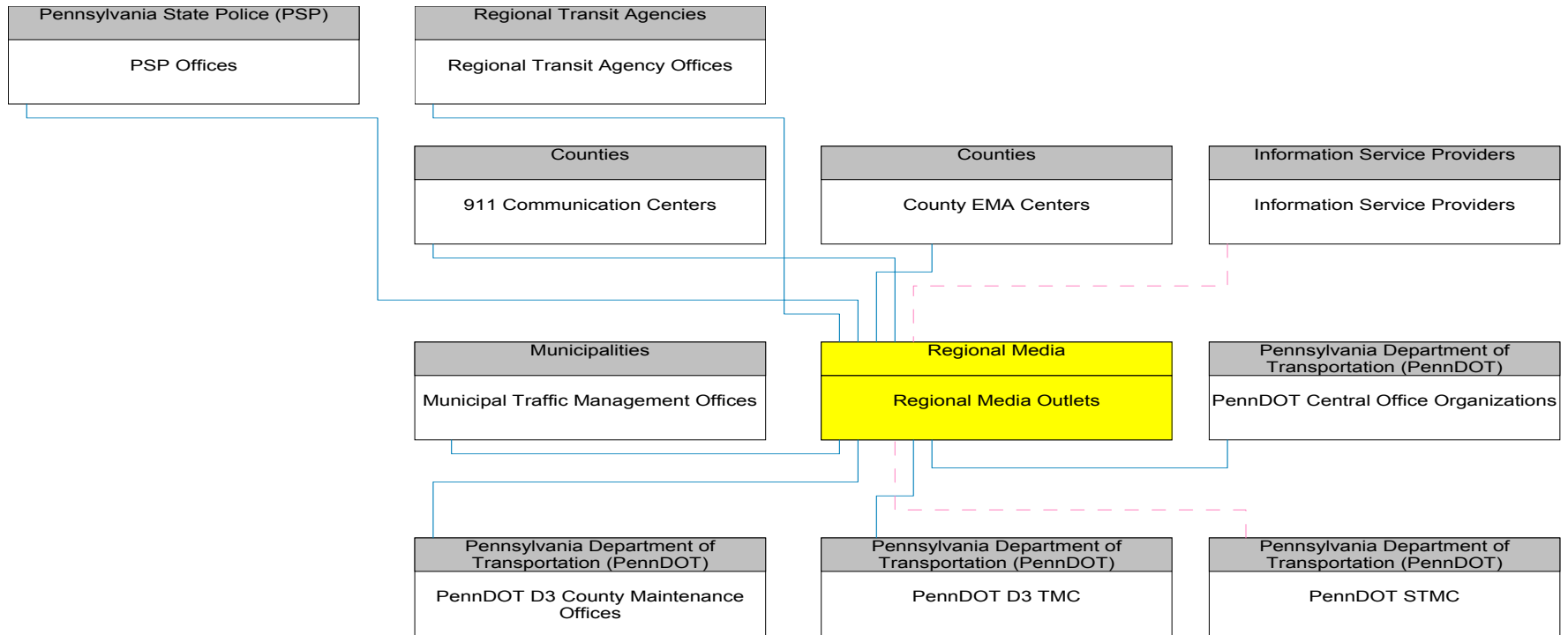


Existing  
Planned

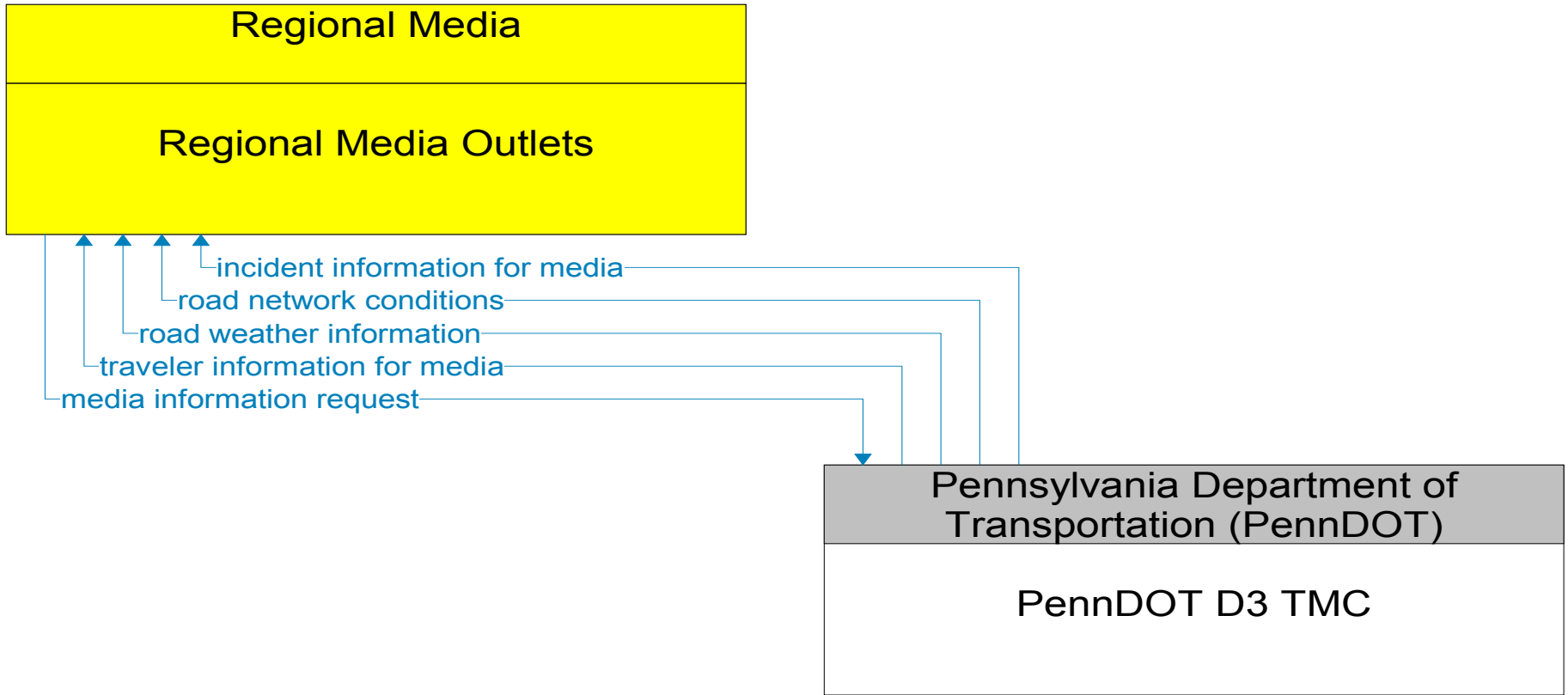
# Regional Media Outlets



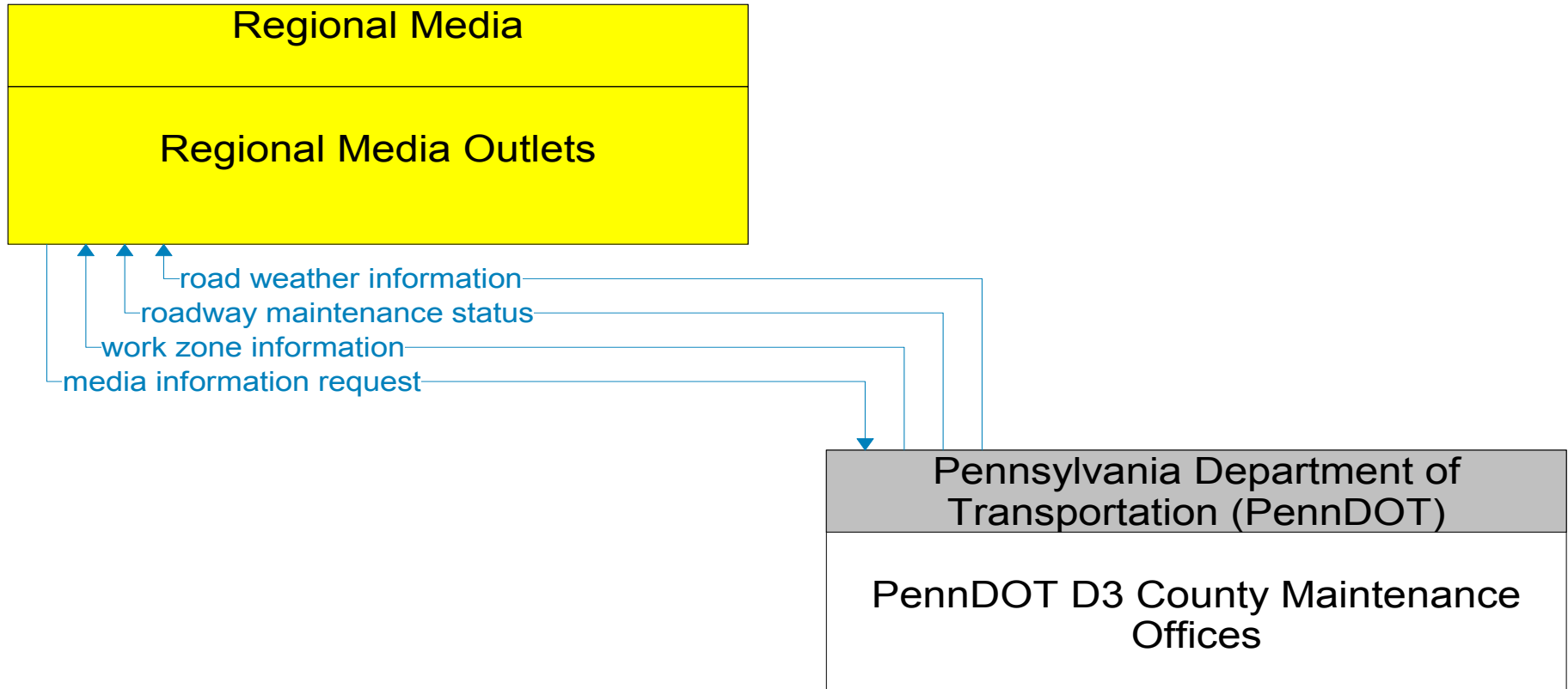
# Regional Media Outlets Interconnect Diagram



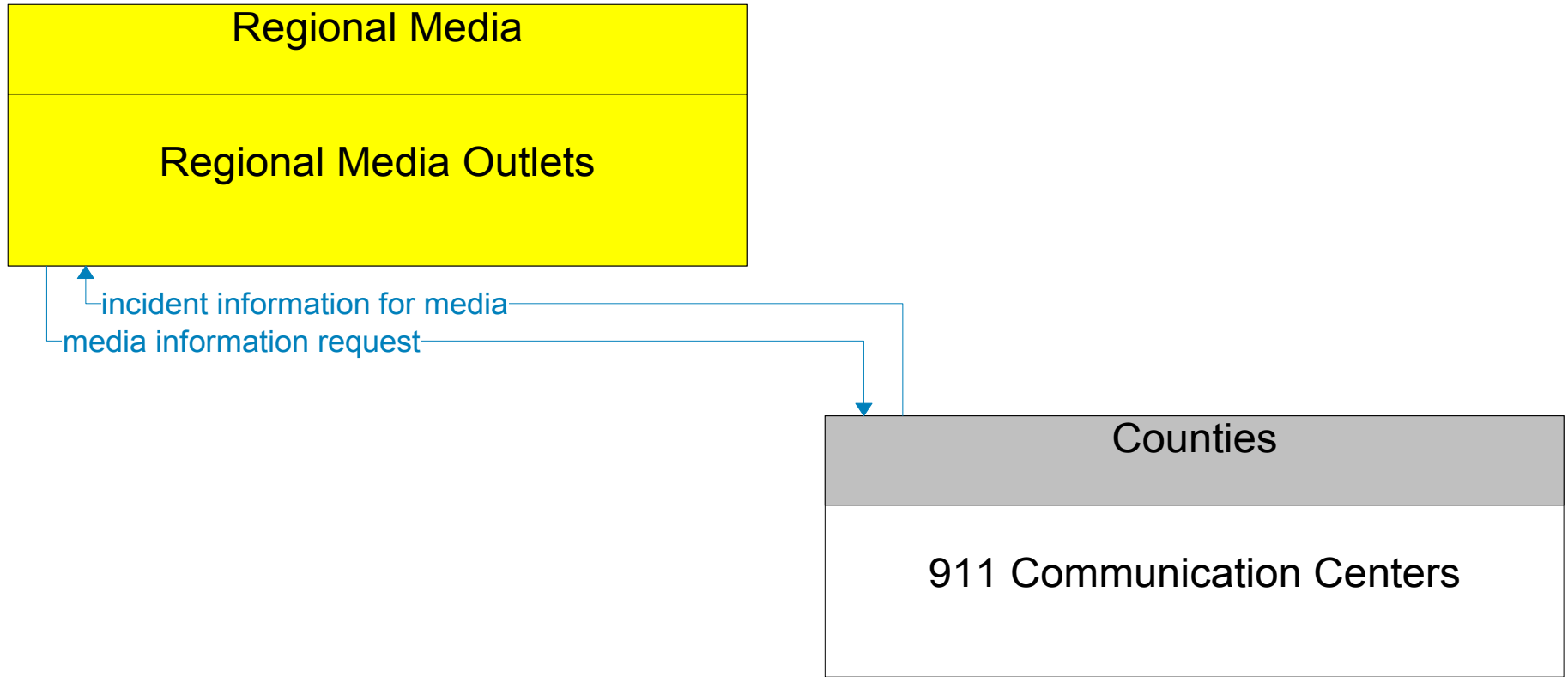
— Existing  
- - - Planned



———— Existing  
- - - - - Planned

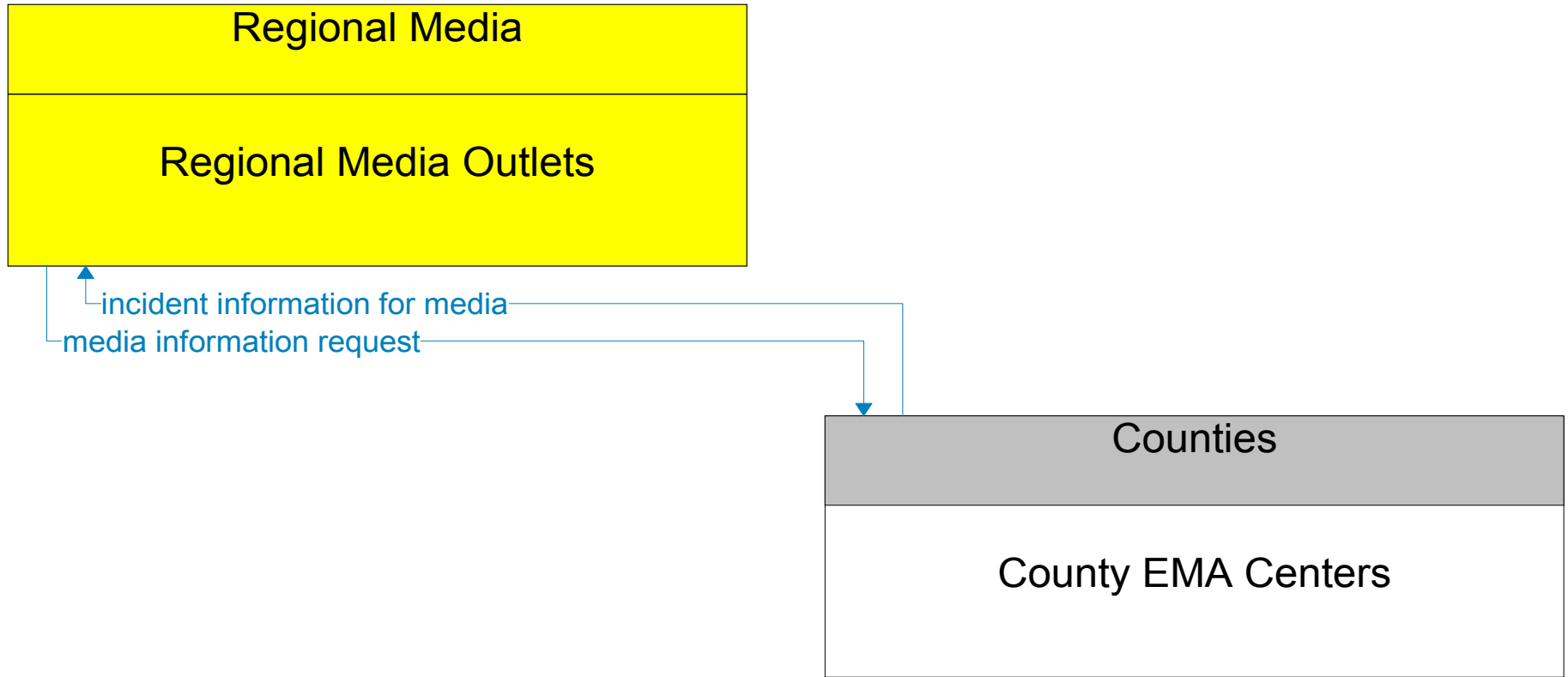


———— Existing  
- - - - - Planned

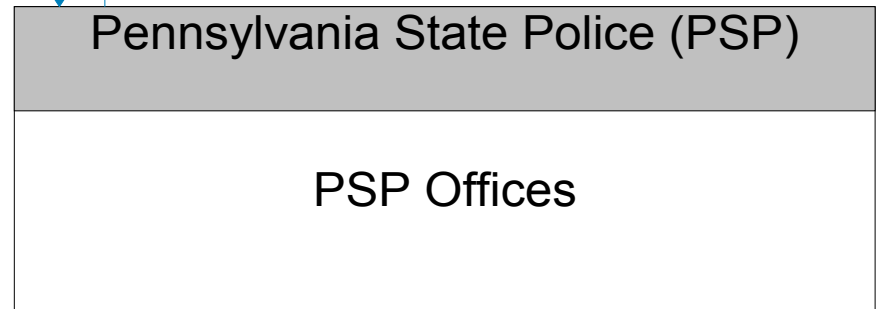


———— Existing  
----- Planned



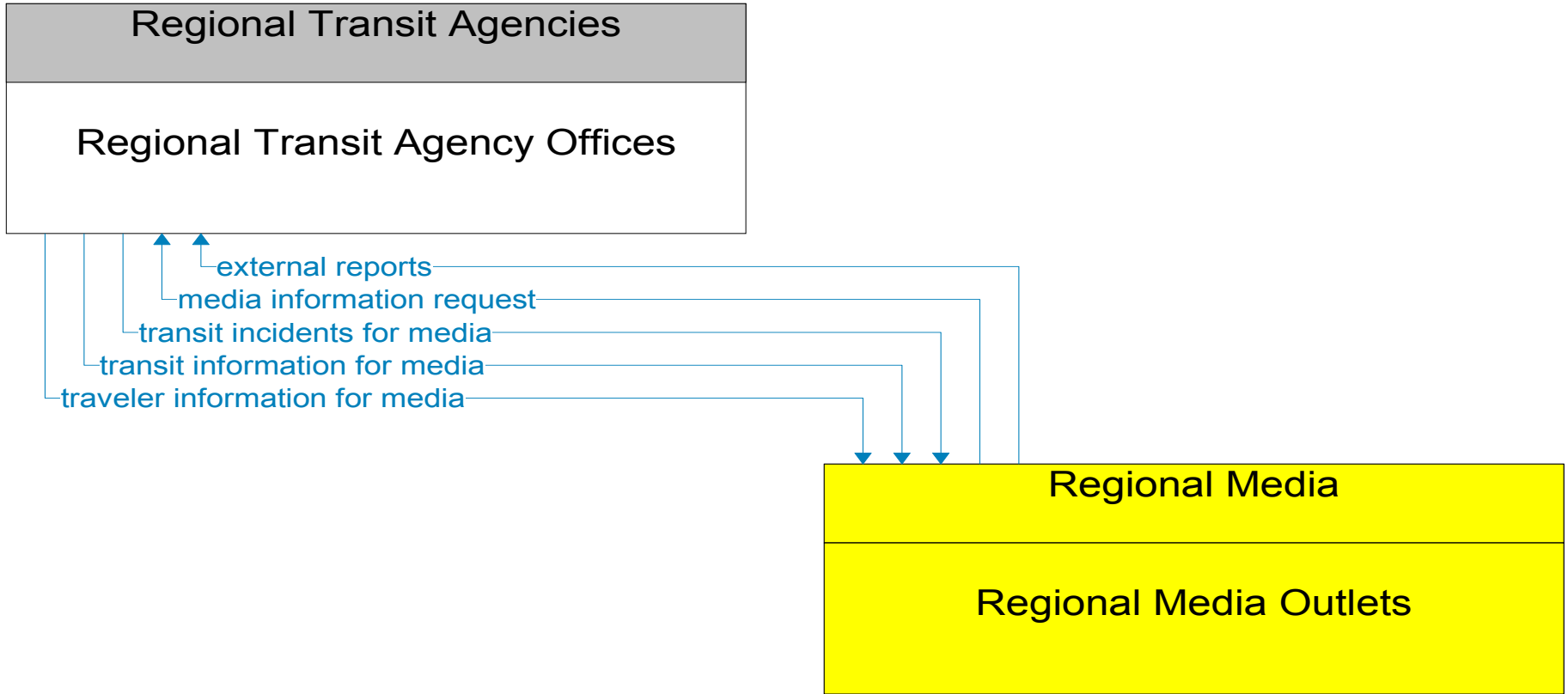


———— Existing  
----- Planned

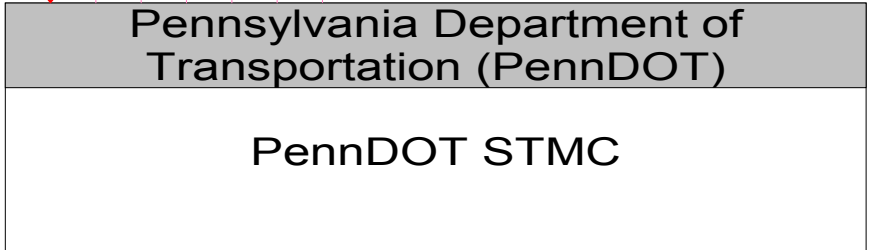
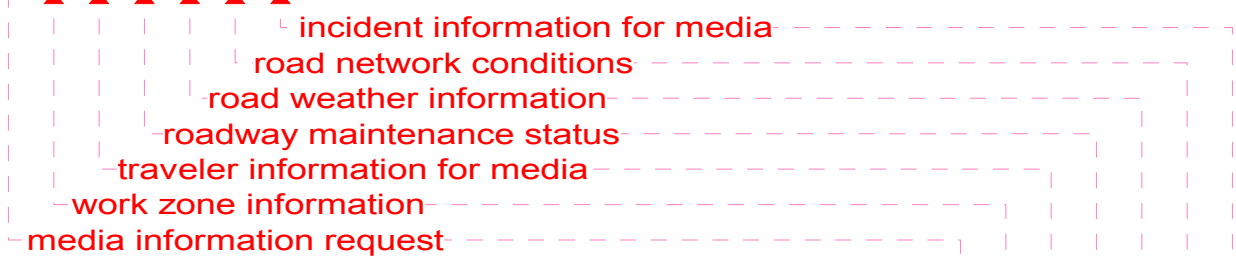


incident information for media  
media information request

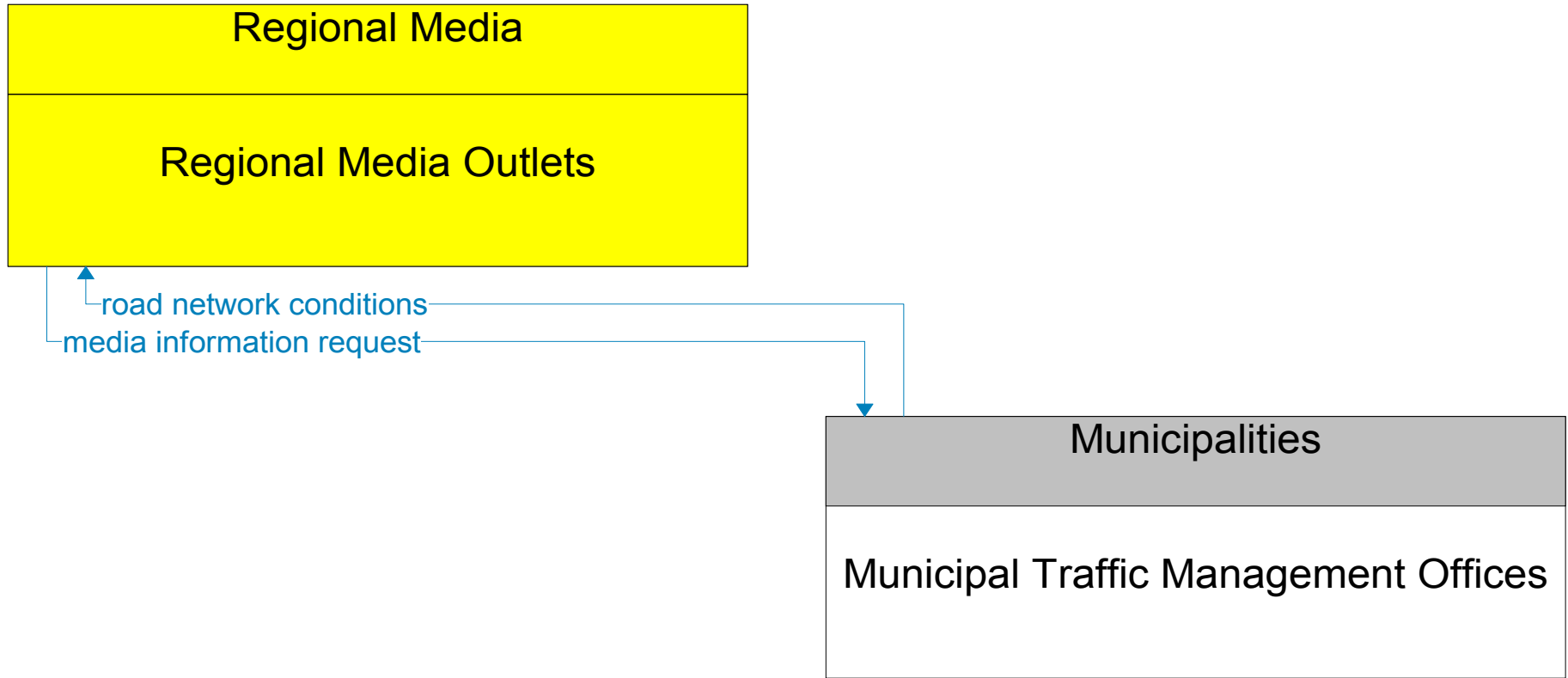
Existing  
Planned



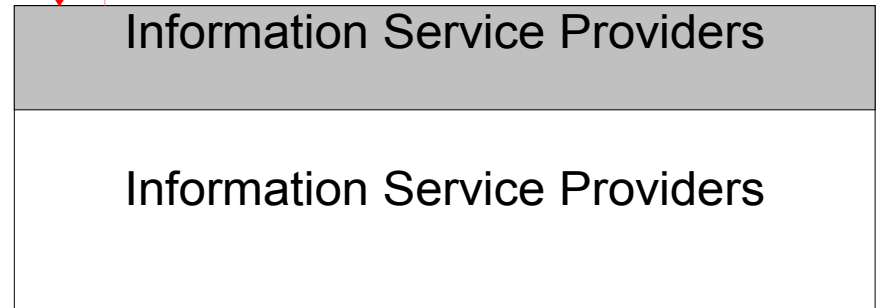
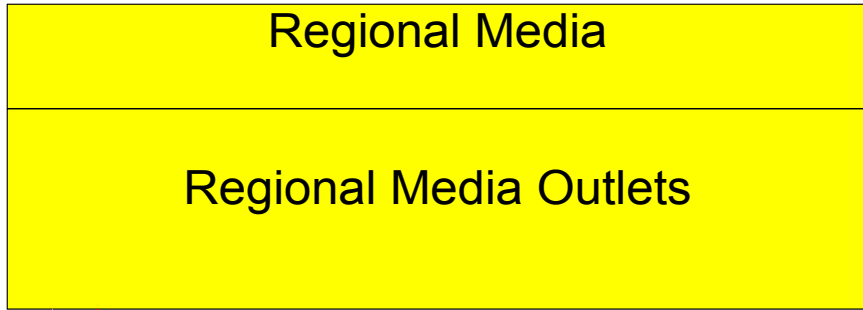
———— Existing  
- - - - - Planned



———— Existing  
- - - - - Planned

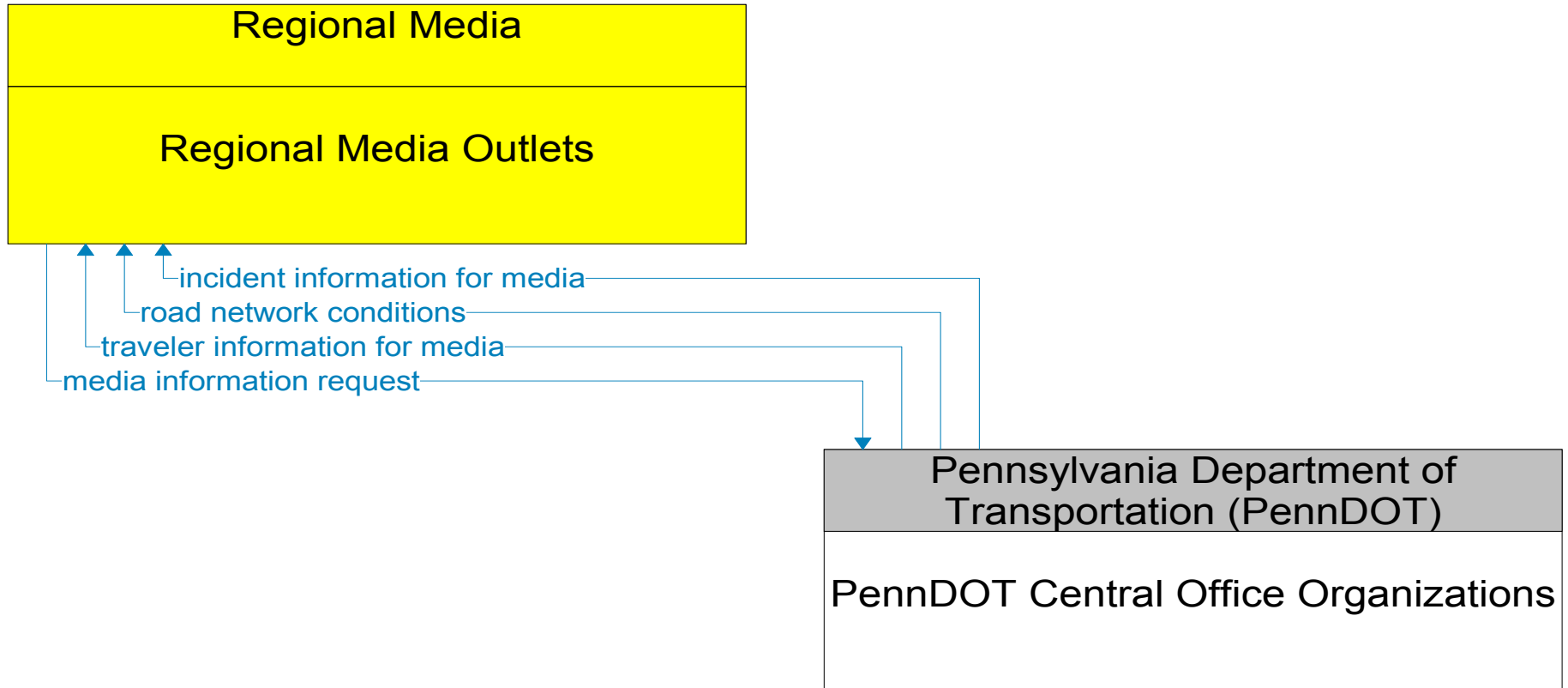


———— Existing  
----- Planned



Existing

Planned



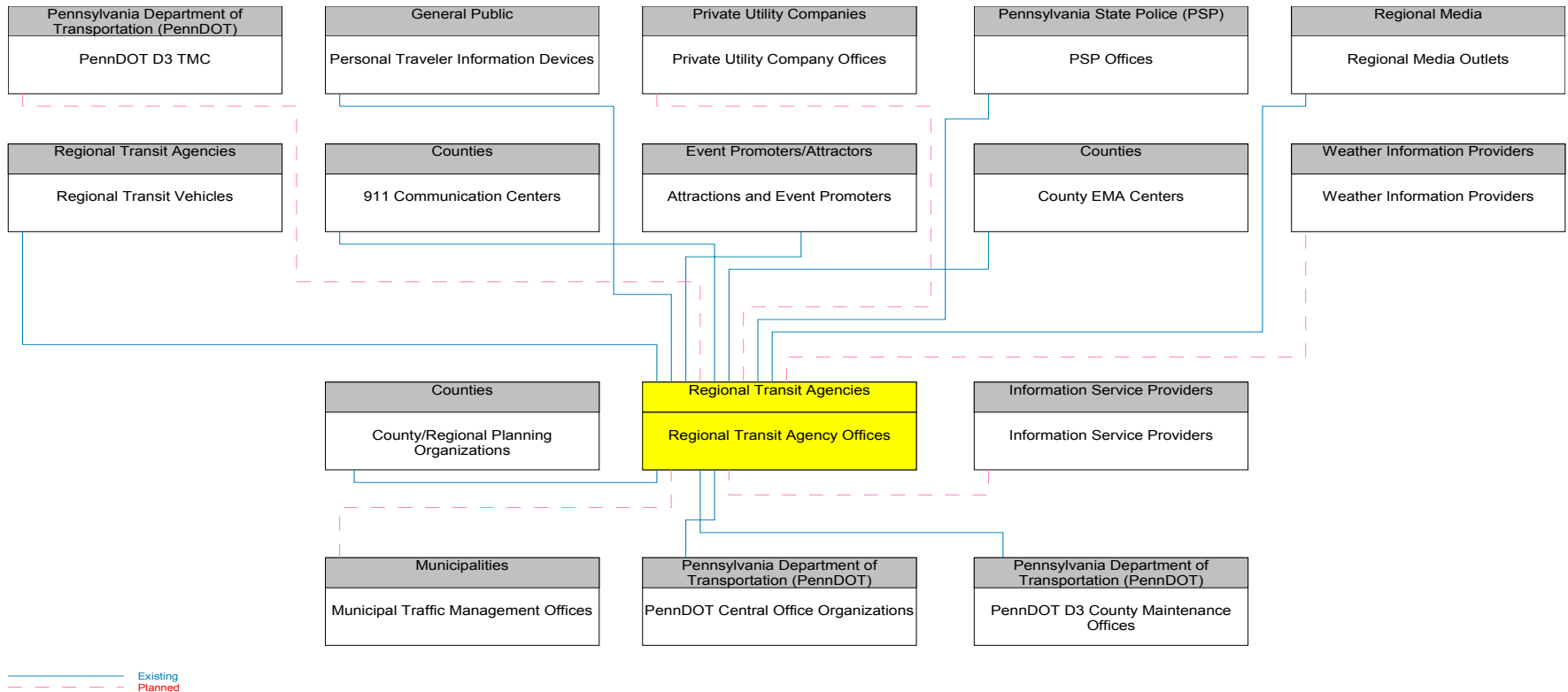
———— Existing  
----- Planned

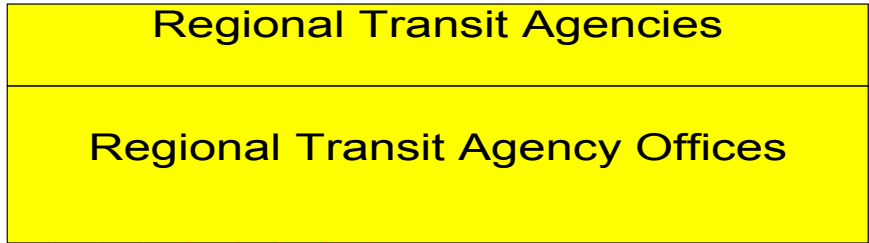
# Regional Transit Agency Offices



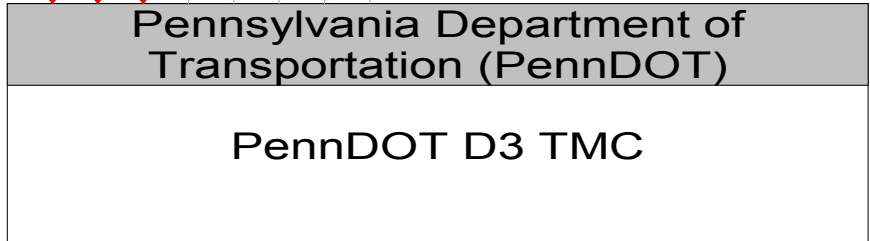


# Regional Transit Agency Offices Interconnect Diagram

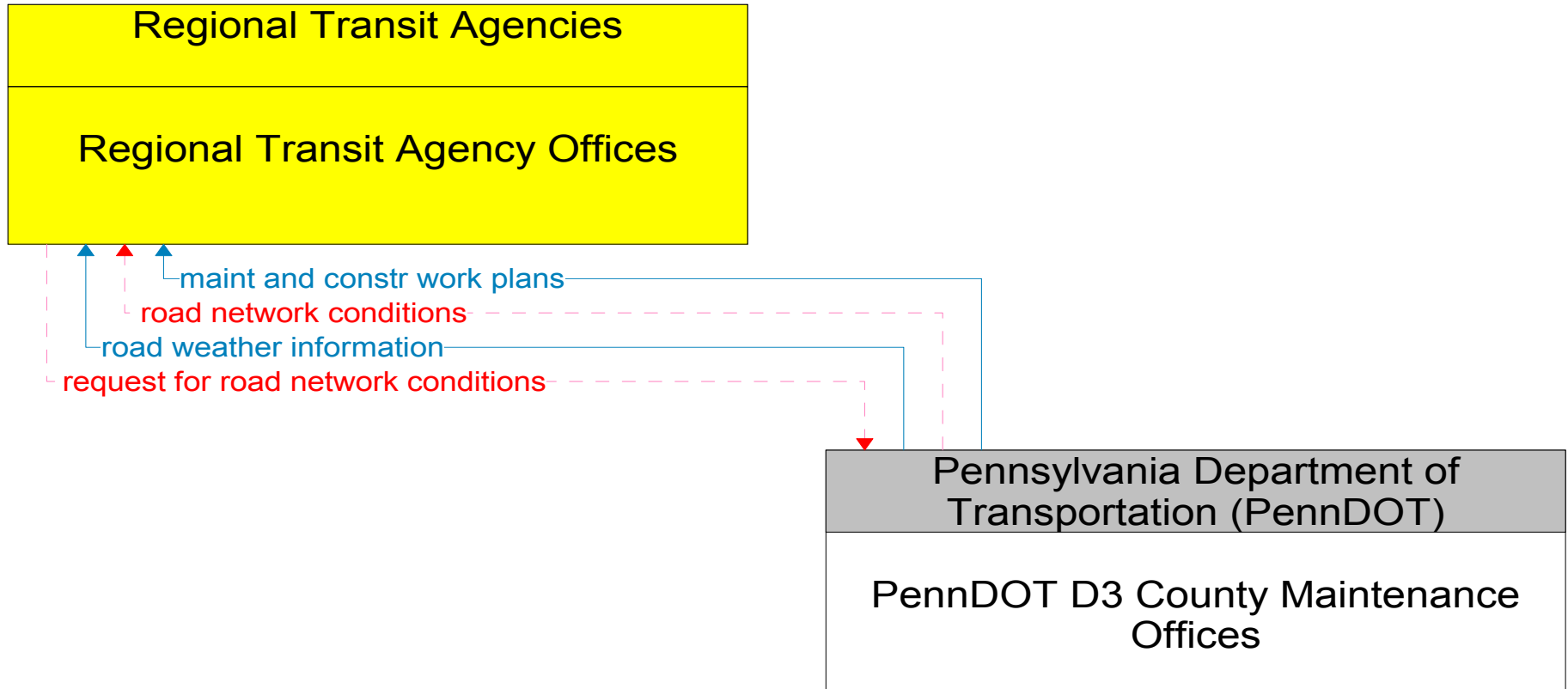




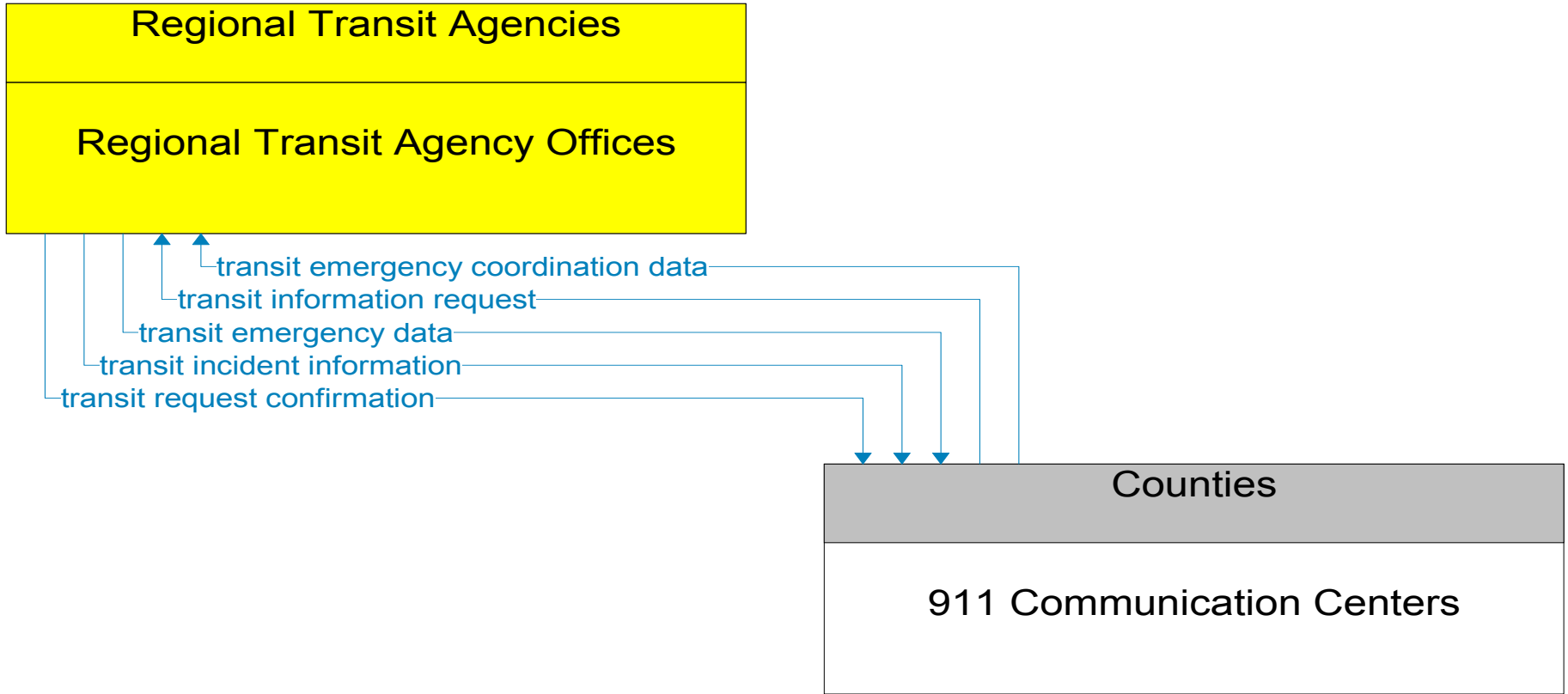
- incident information
- road network conditions
- road weather information
- transit emergency coordination data
- transit information request
- transit emergency data
- transit incident information
- transit request confirmation

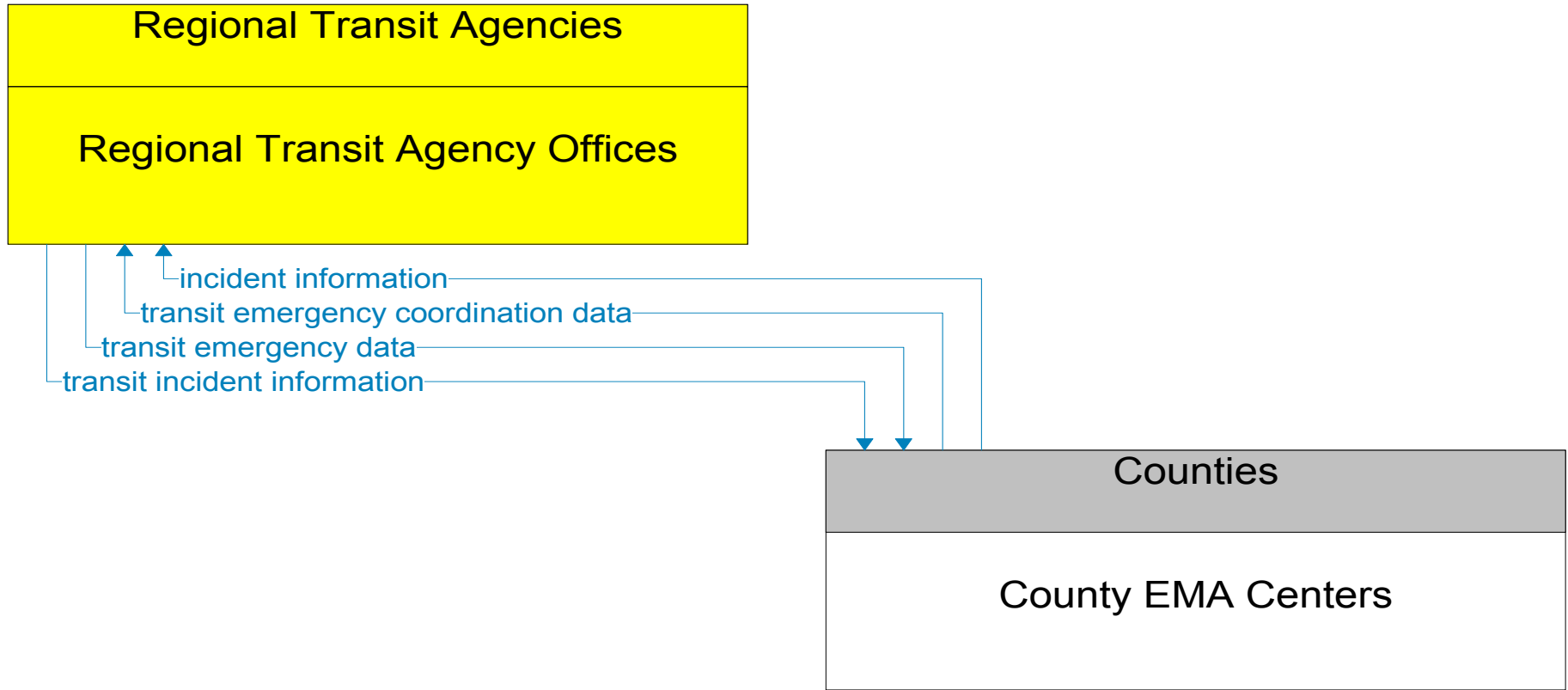


———— Existing  
- - - - - Planned

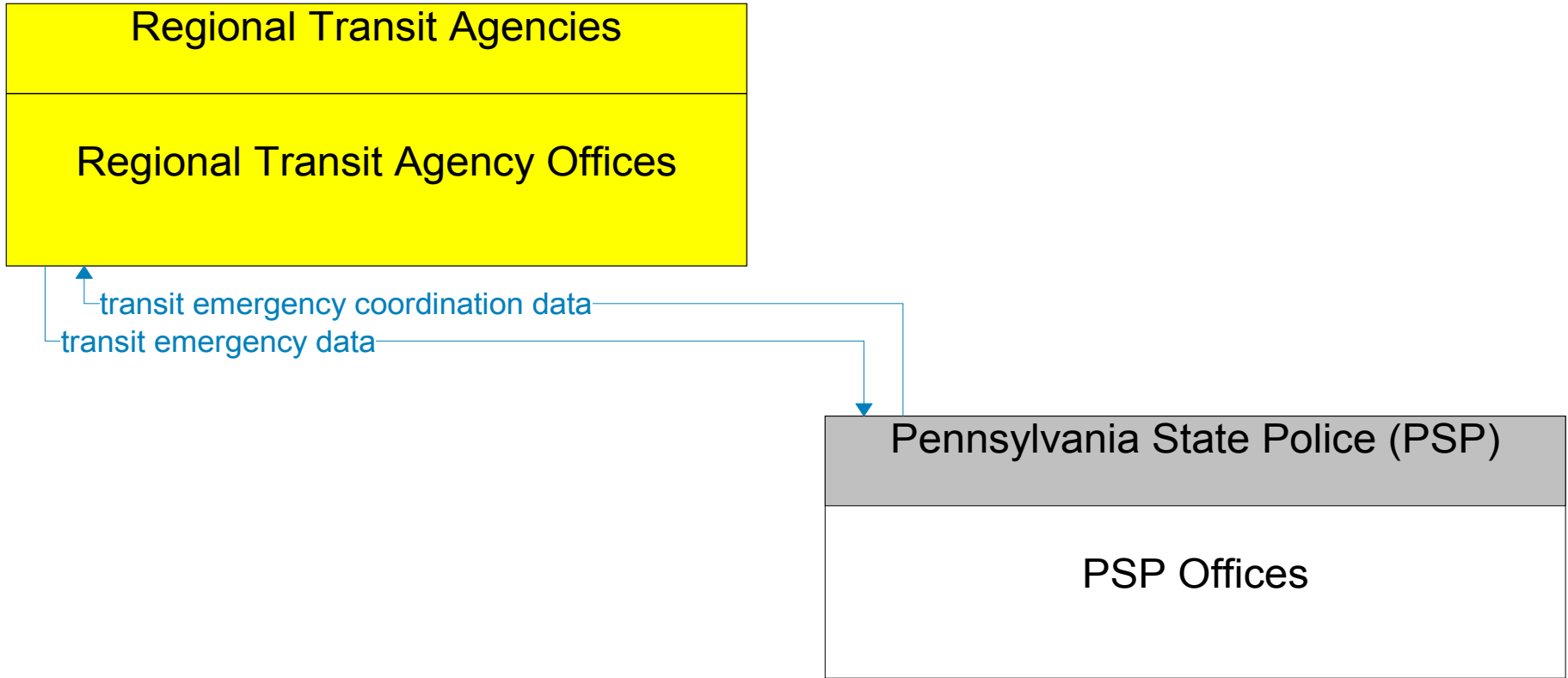


———— Existing  
- - - - - Planned

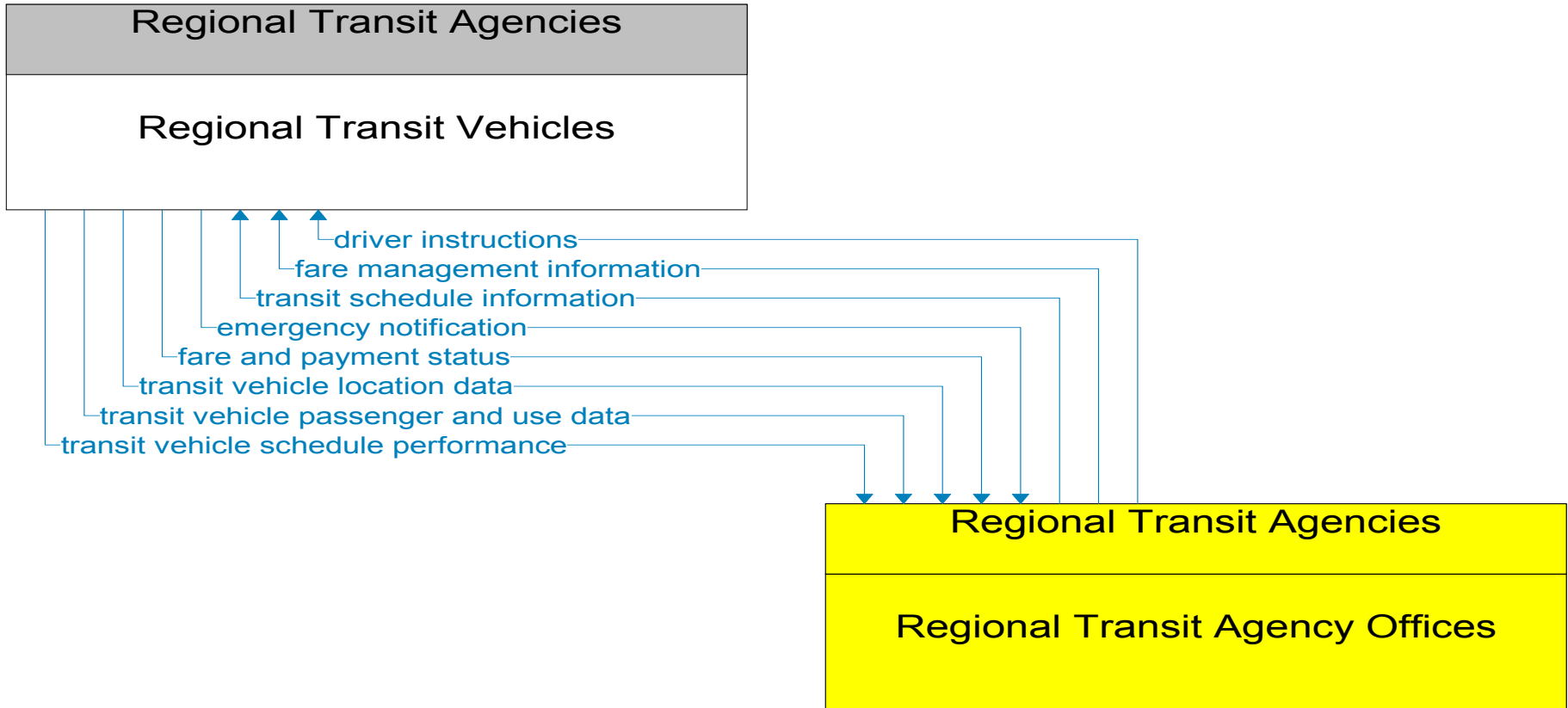




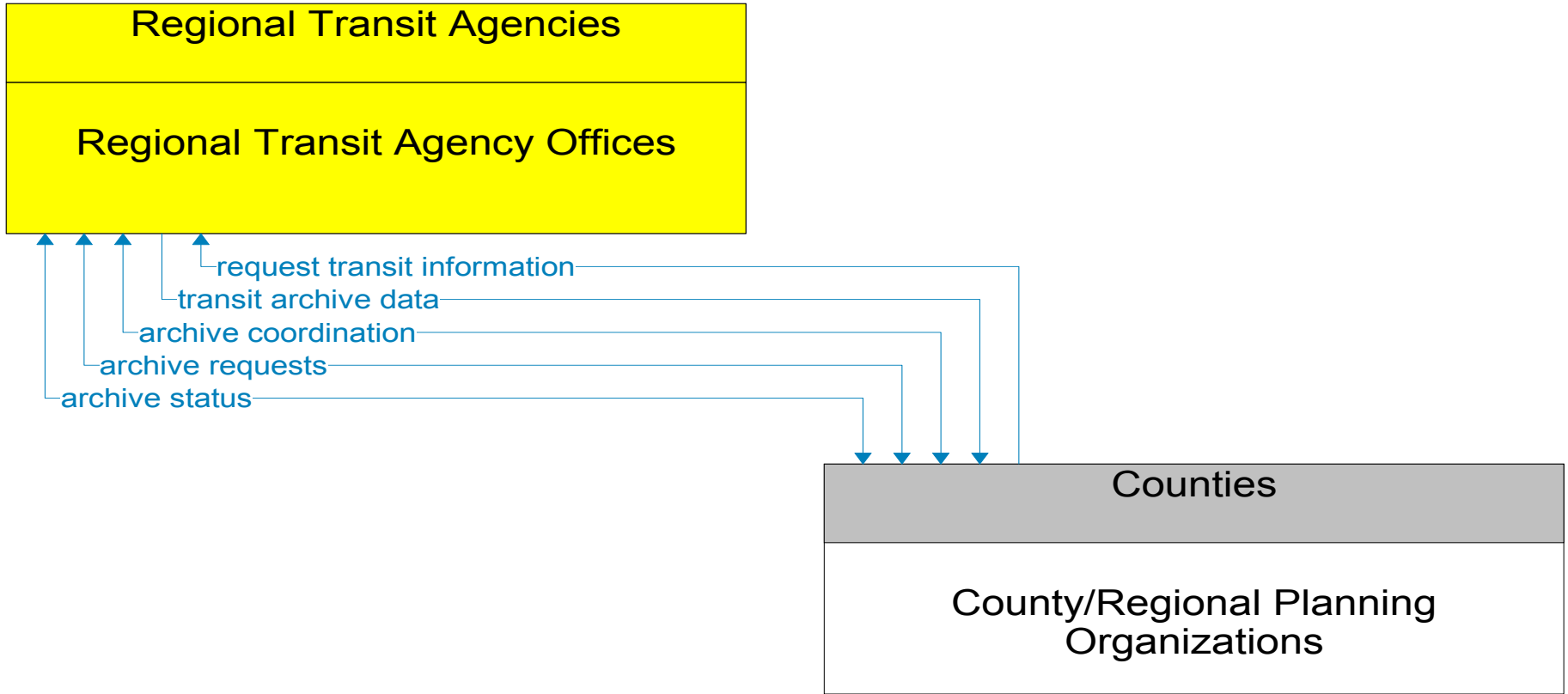
———— Existing  
- - - - - Planned



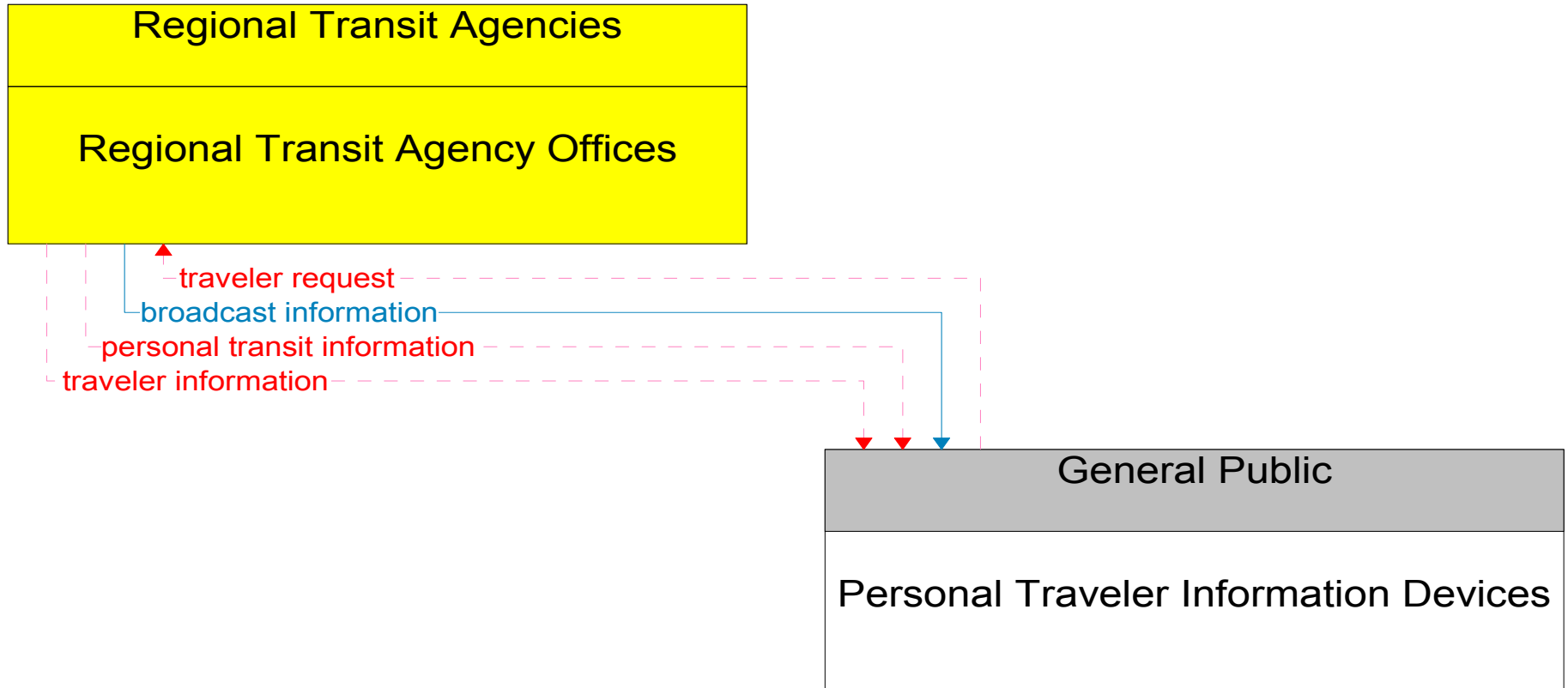
———— Existing  
----- Planned



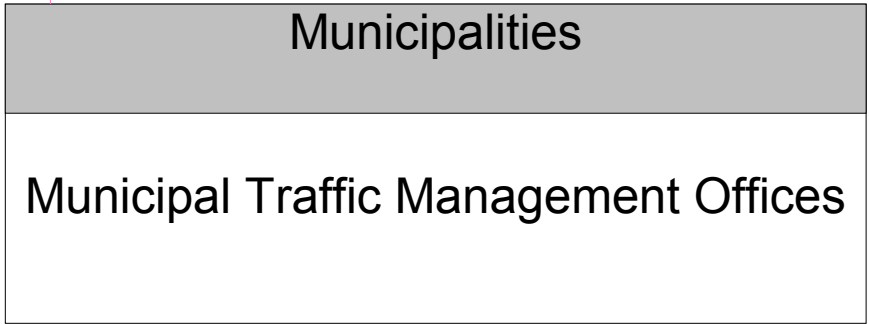
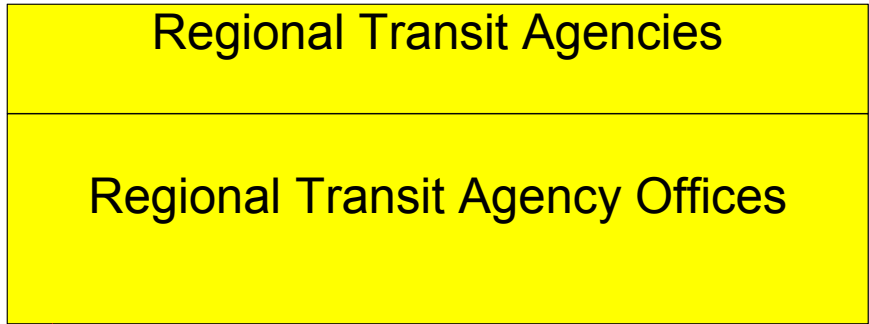
———— Existing  
----- Planned



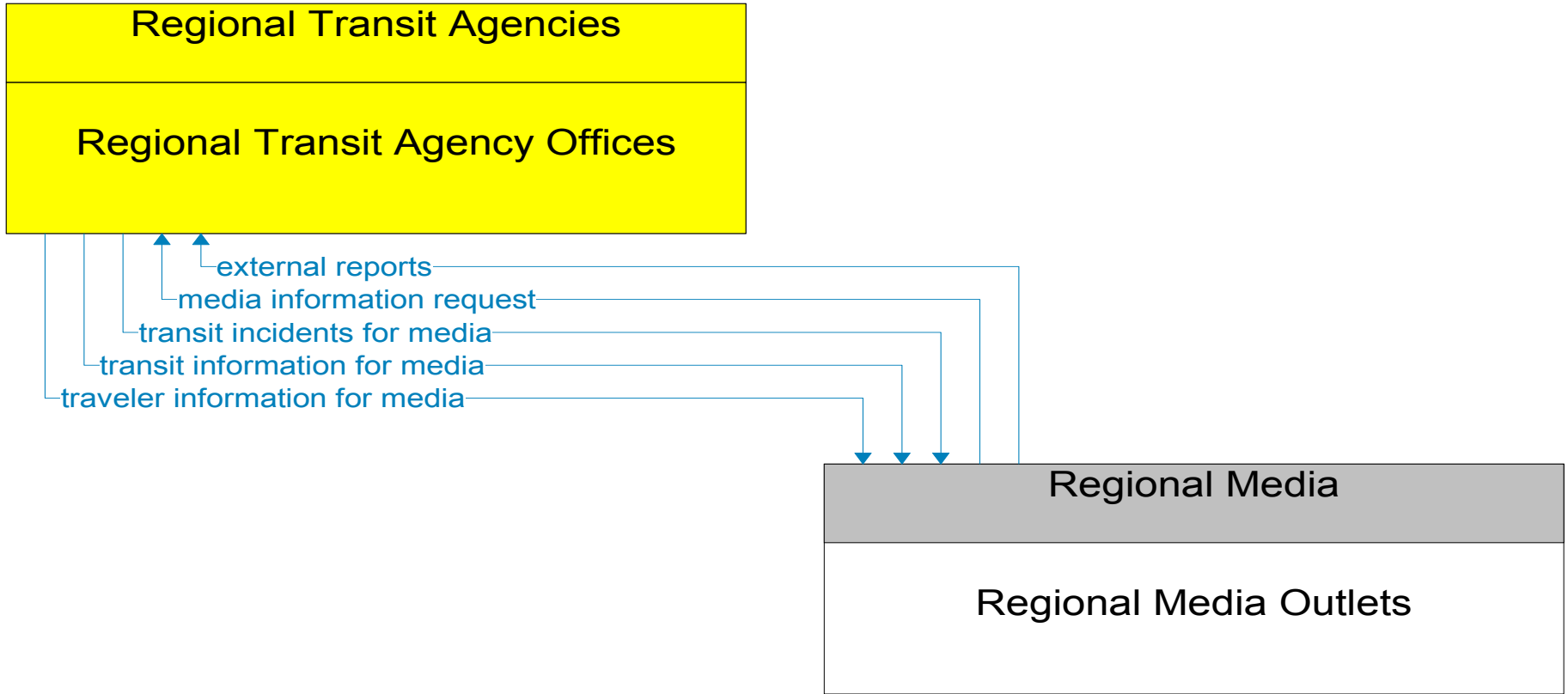




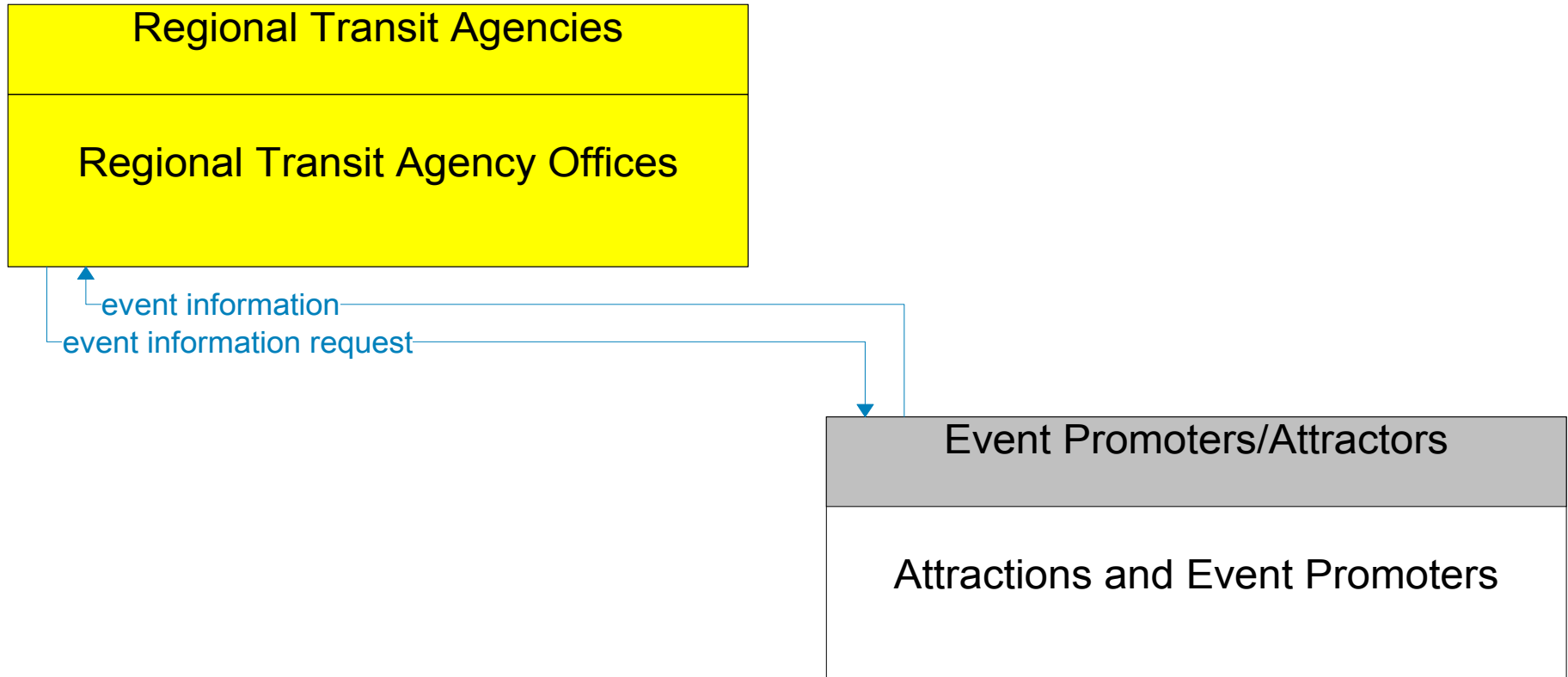
———— Existing  
- - - - - Planned



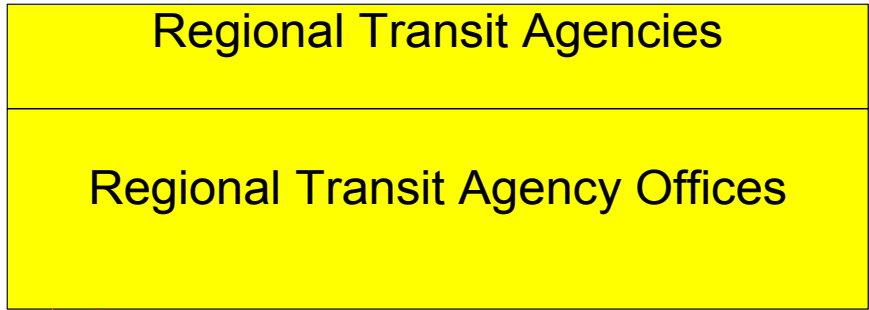
———— Existing  
- - - - - Planned



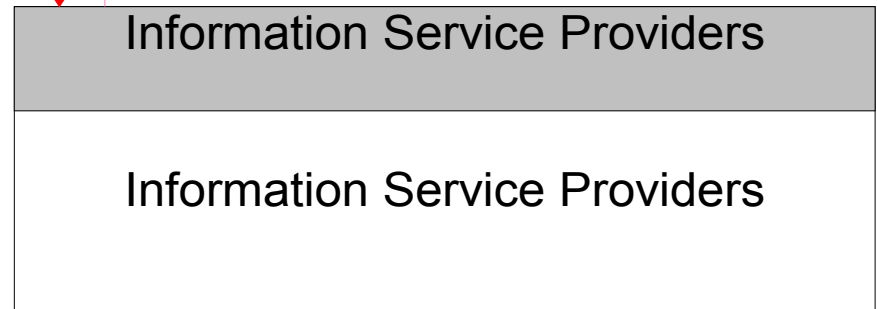
———— Existing  
- - - - - Planned



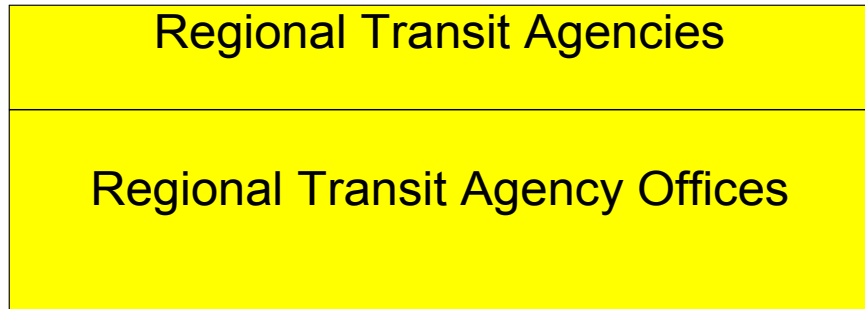
———— Existing  
----- Planned



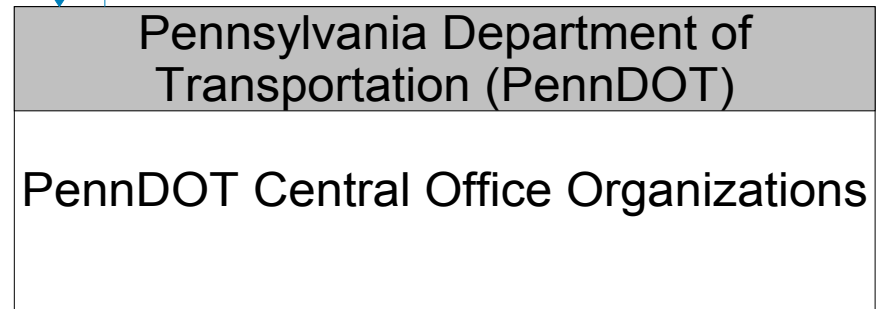
transit information request  
transit incident information



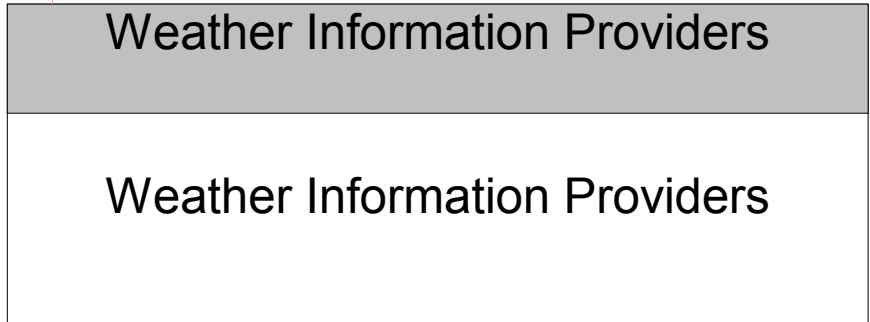
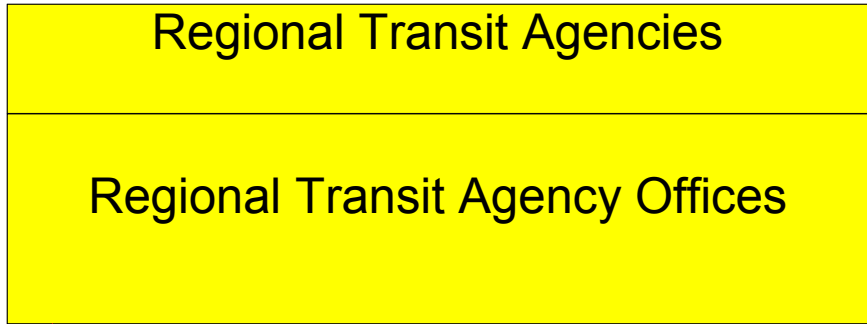
Existing  
Planned

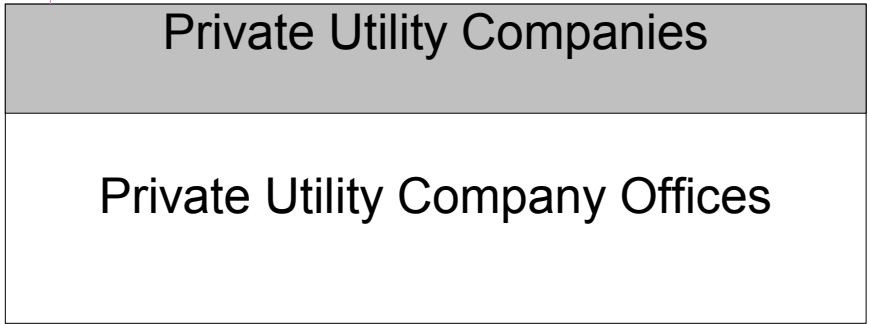
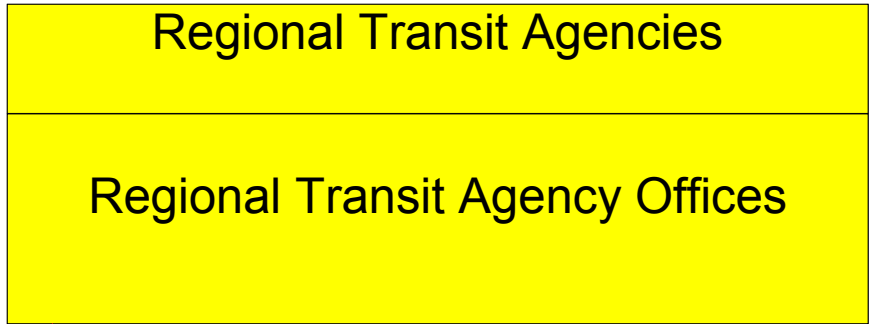


archive requests  
transit archive data



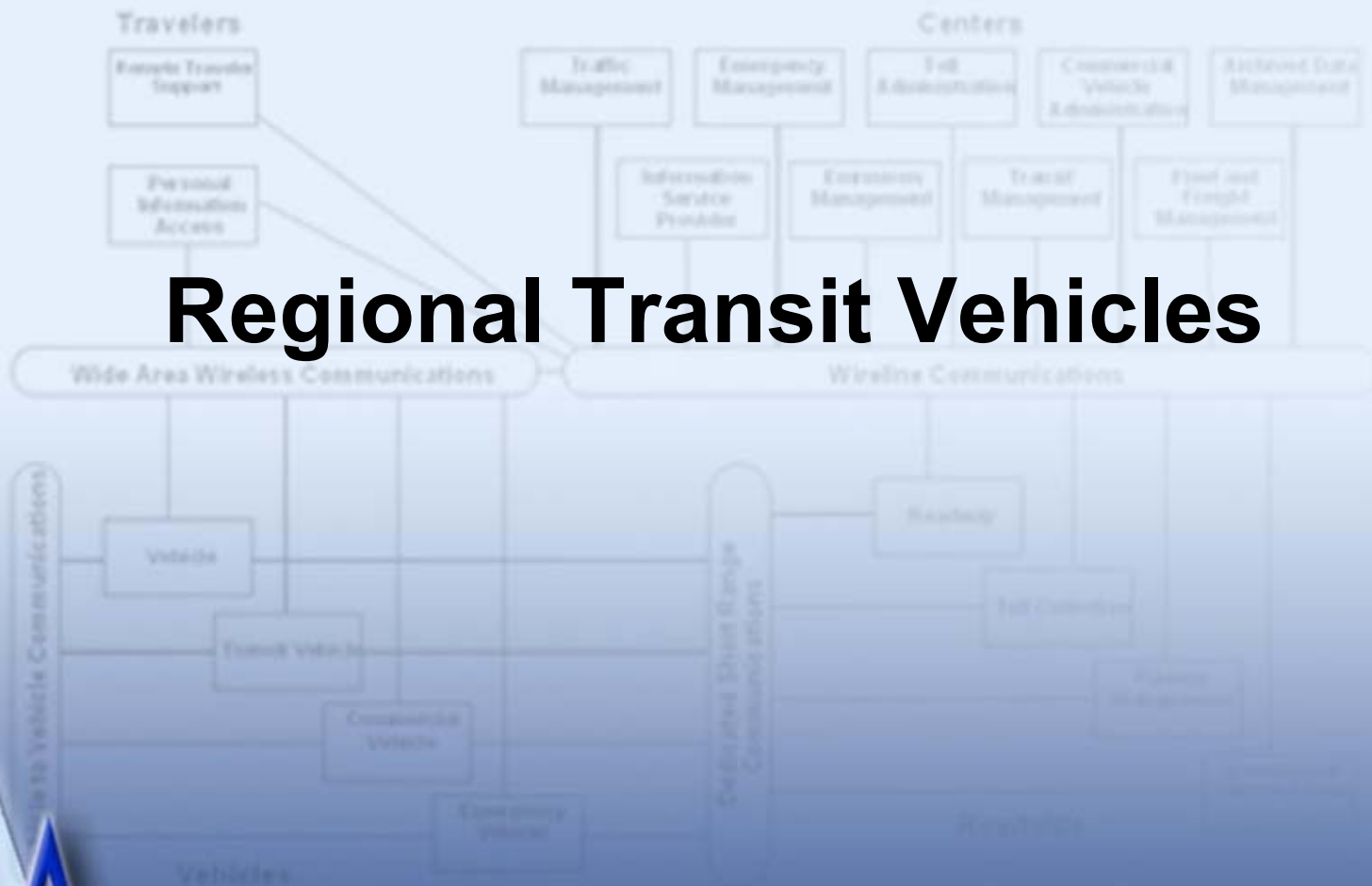
Existing  
Planned



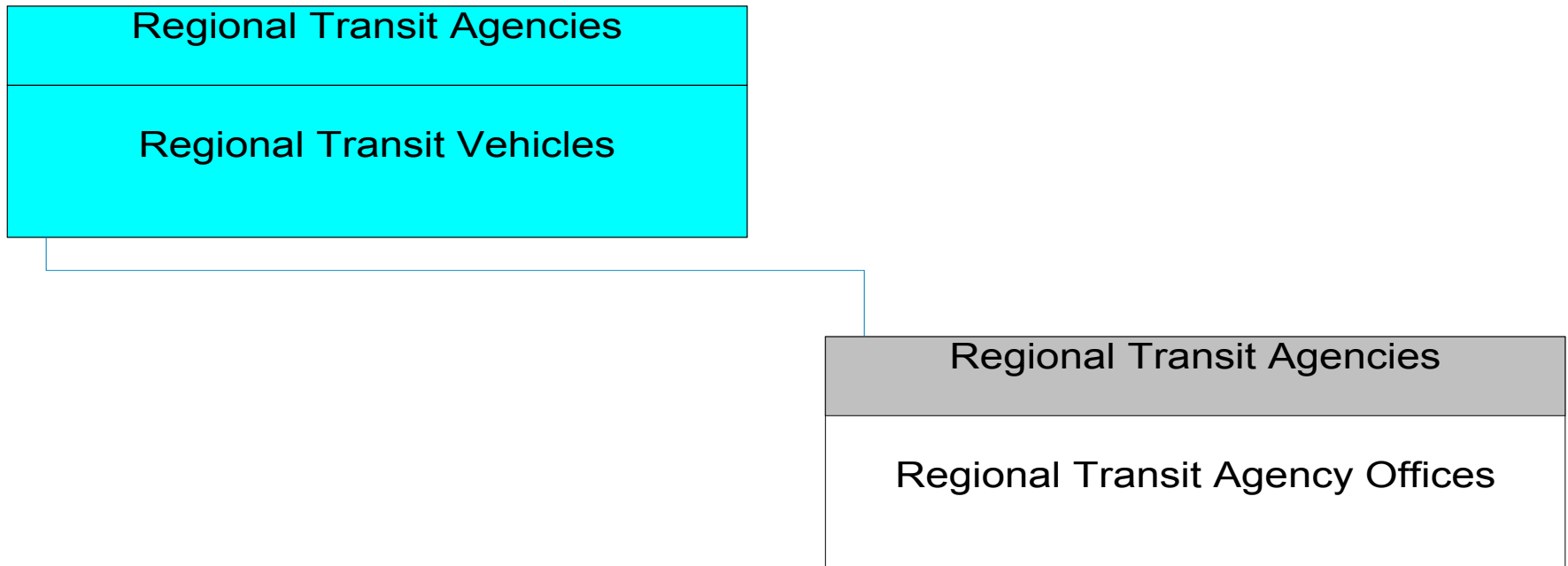




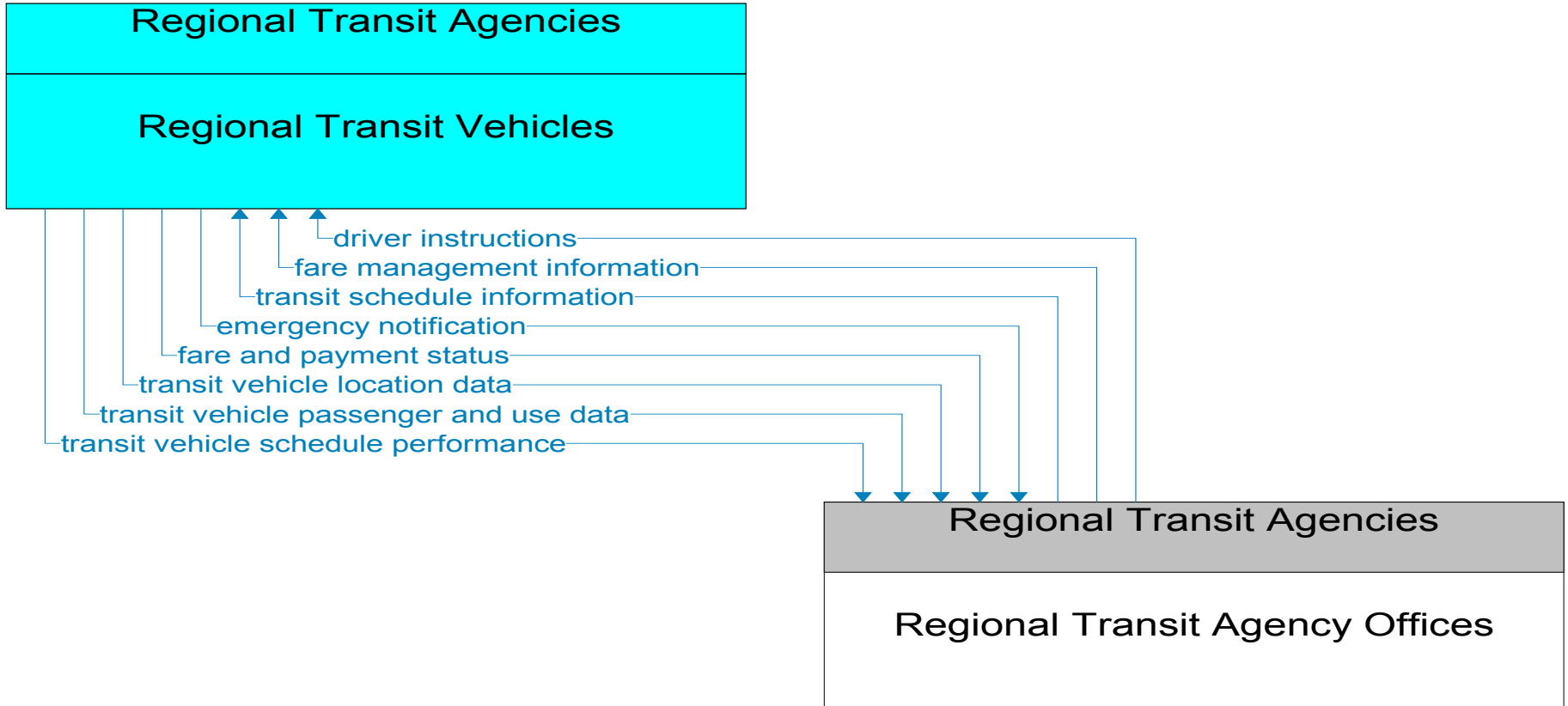
# Regional Transit Vehicles



# Regional Transit Vehicles Interconnect Diagram

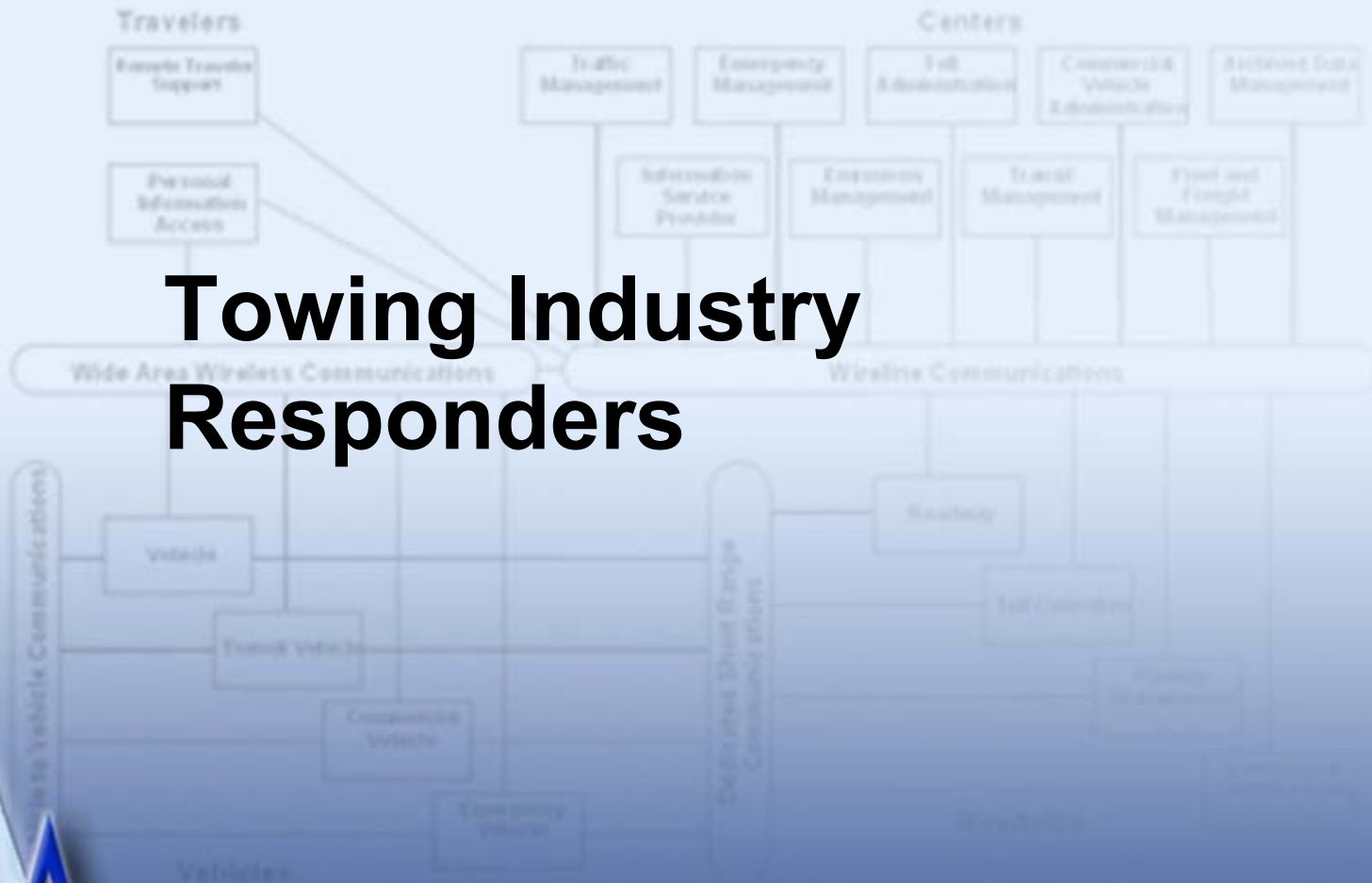


———— Existing  
----- Planned



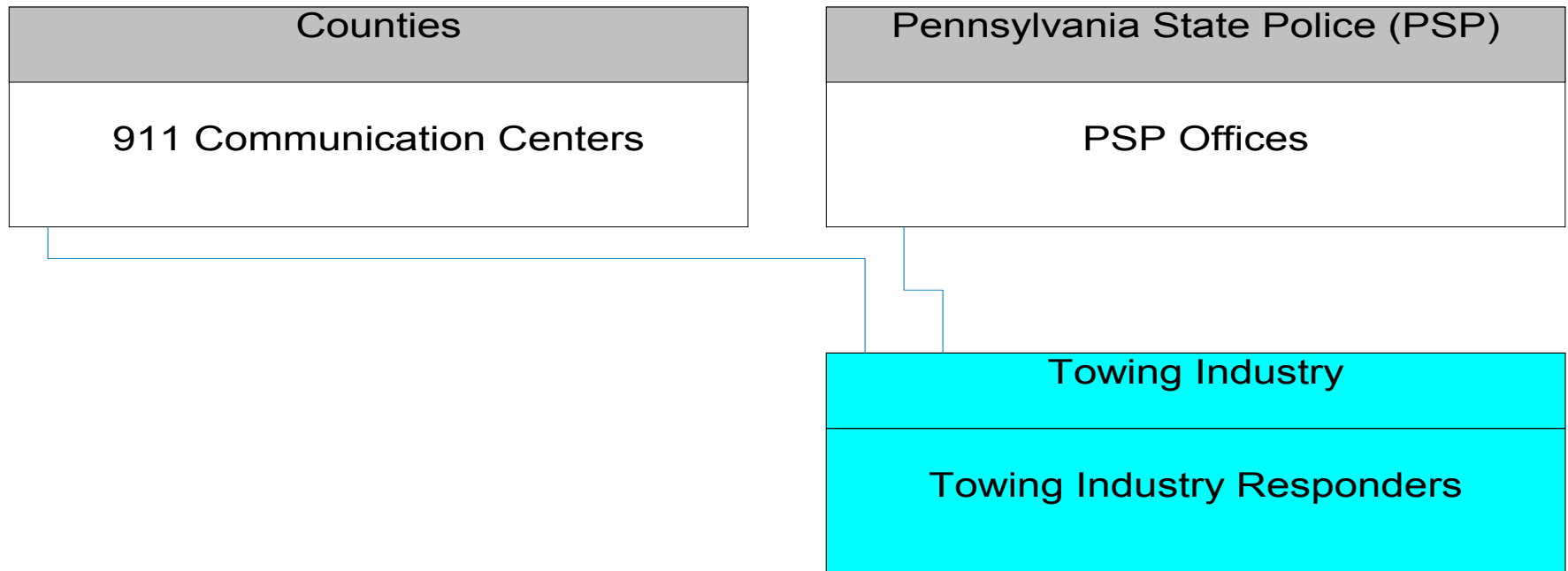
———— Existing  
- - - - - Planned

# Towing Industry Responders



PA

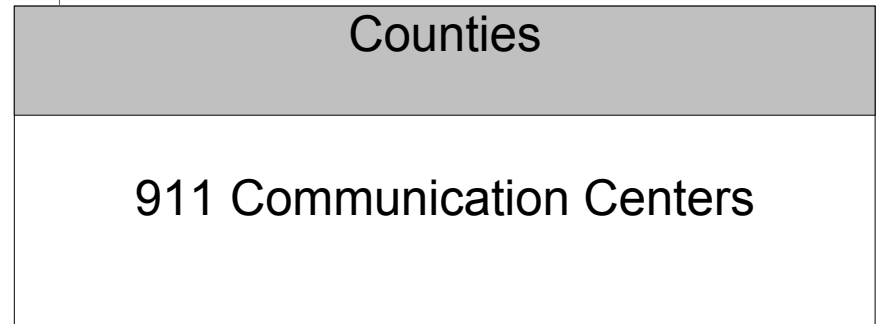
# Towing Industry Responders Interconnect Diagram



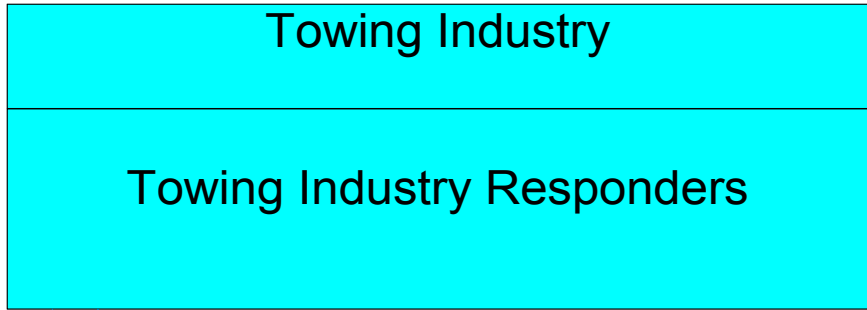
———— Existing  
- - - - - Planned



emergency dispatch requests

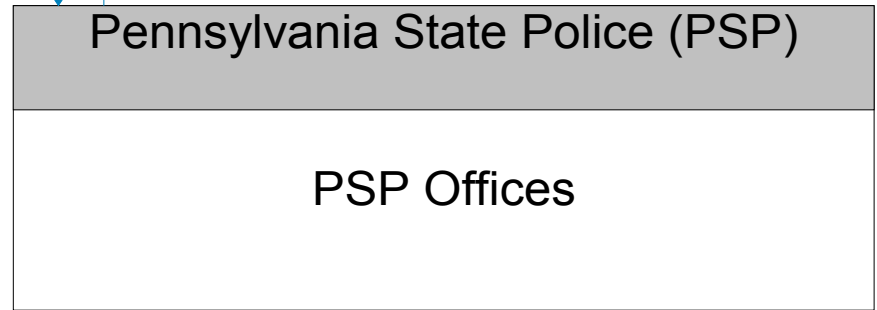


Existing  
Planned



emergency dispatch requests

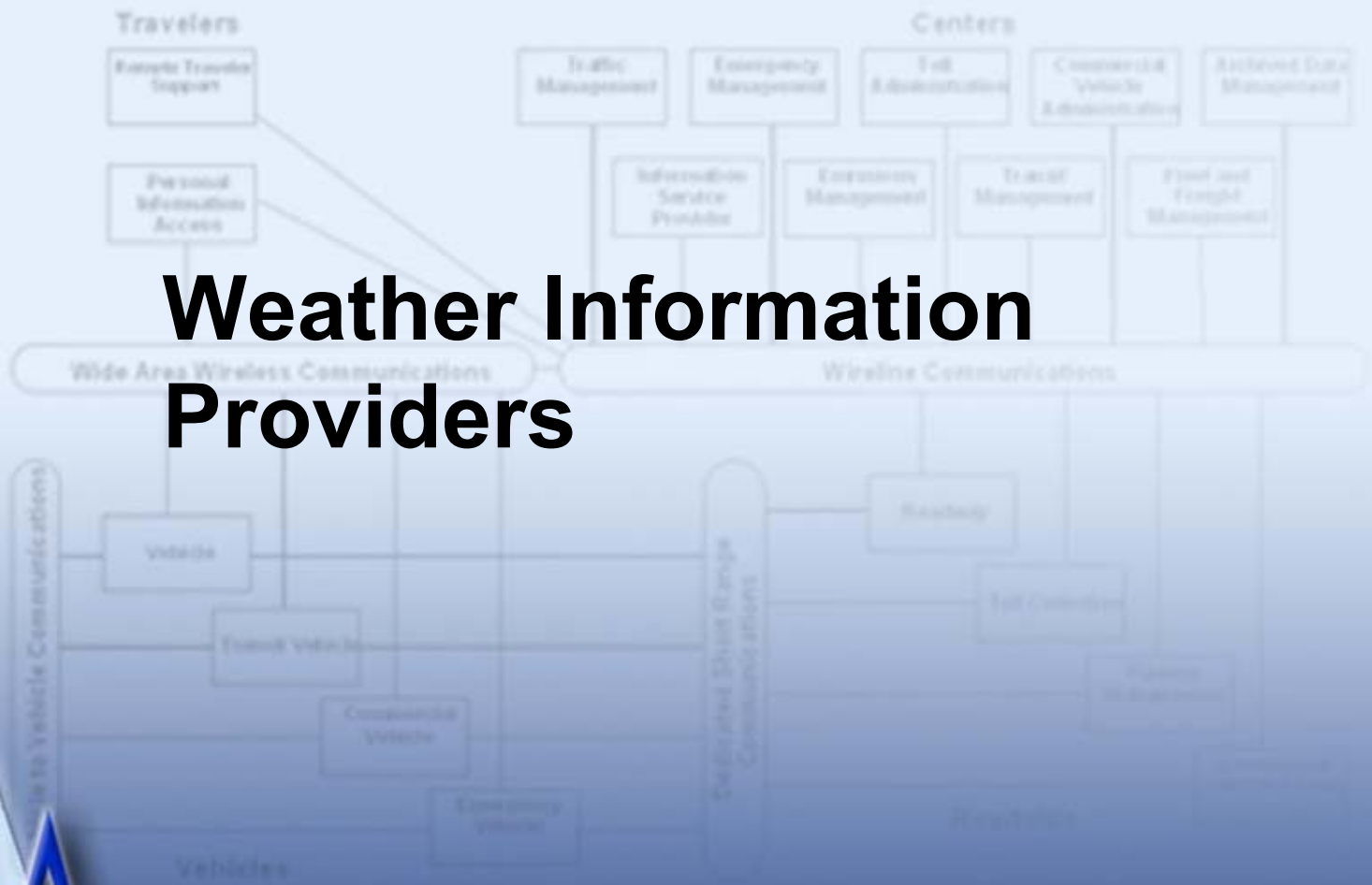
emergency dispatch response



Existing

Planned

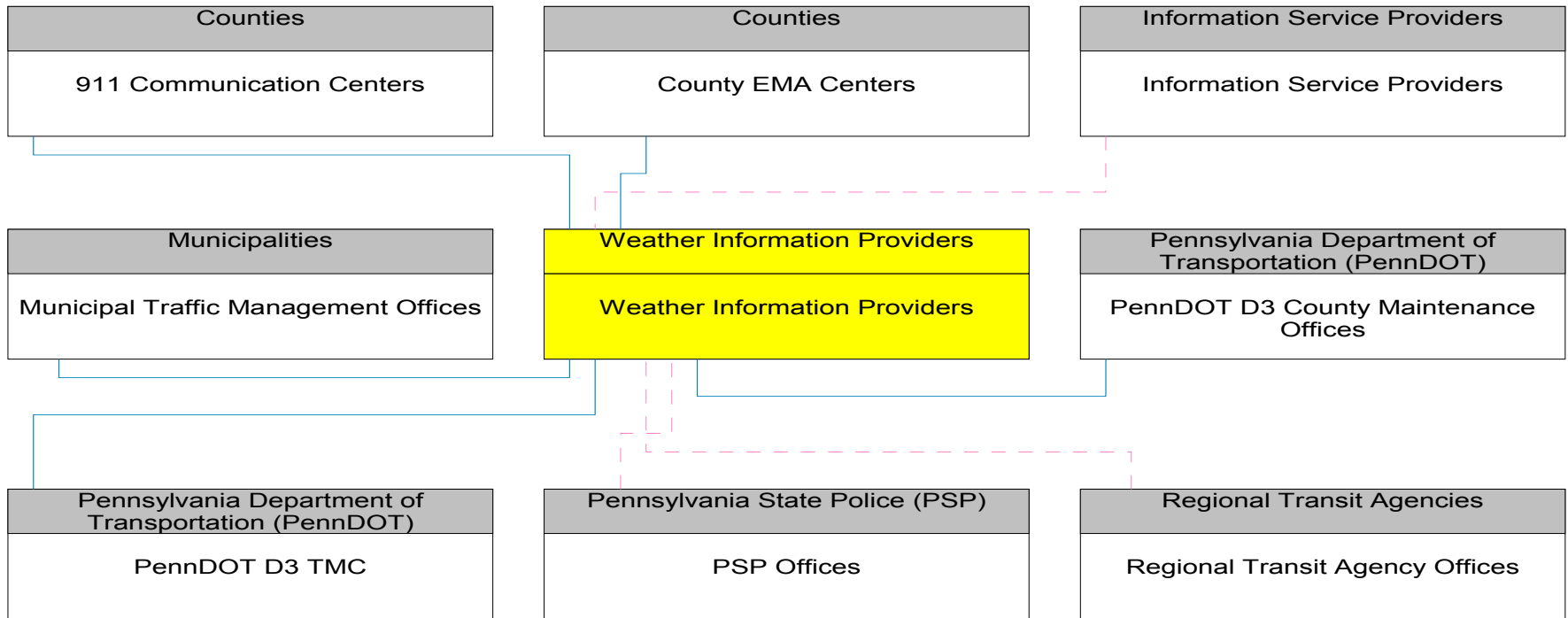
# Weather Information Providers



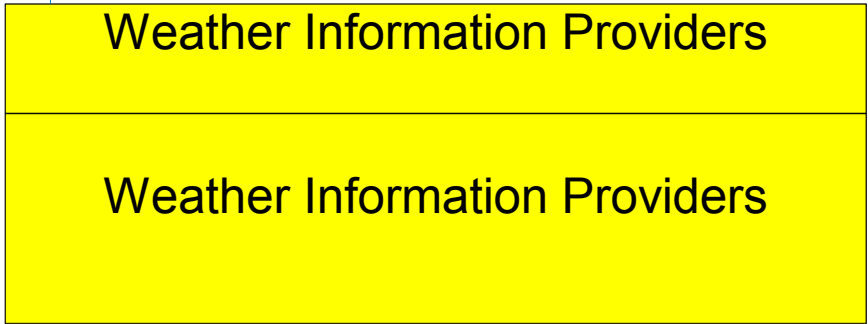
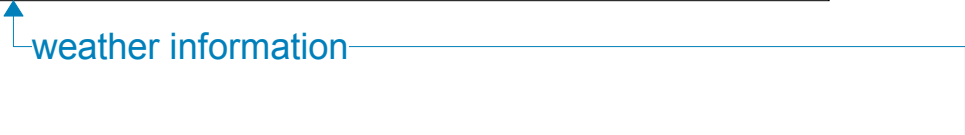
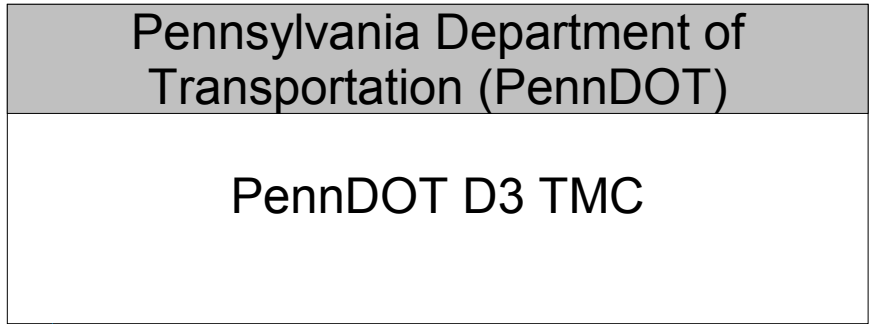
PA



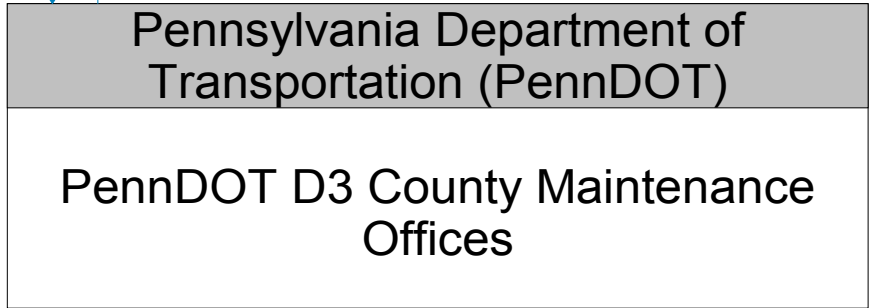
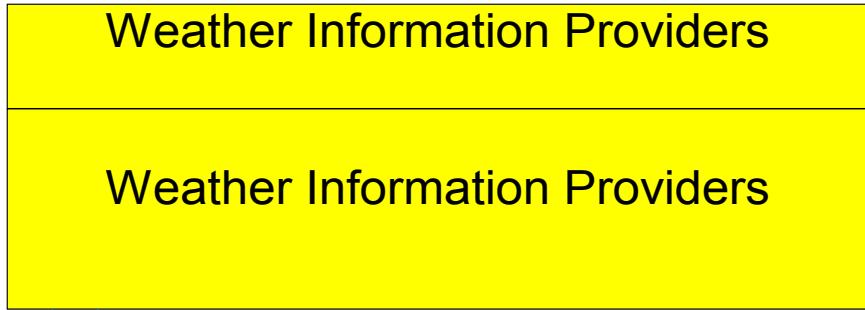
# Weather Information Providers Interconnect Diagram

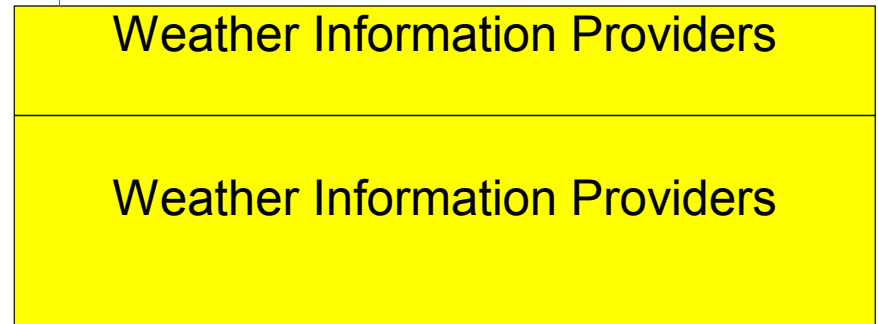
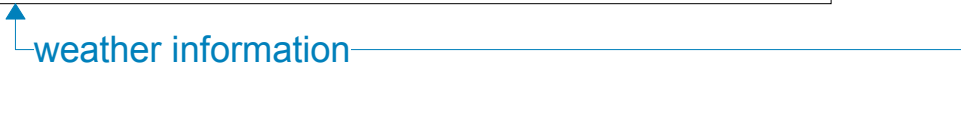
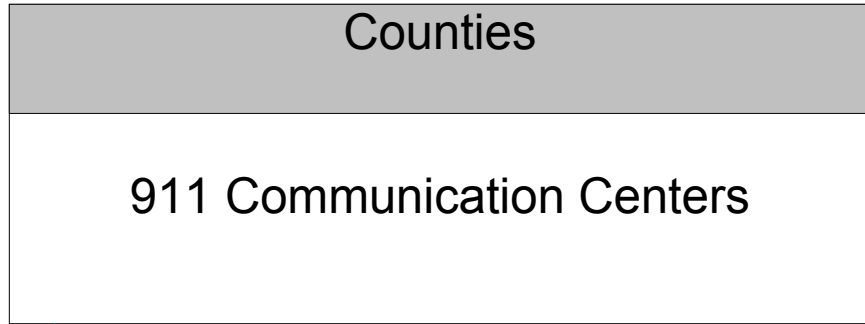


— Existing  
 - - - Planned

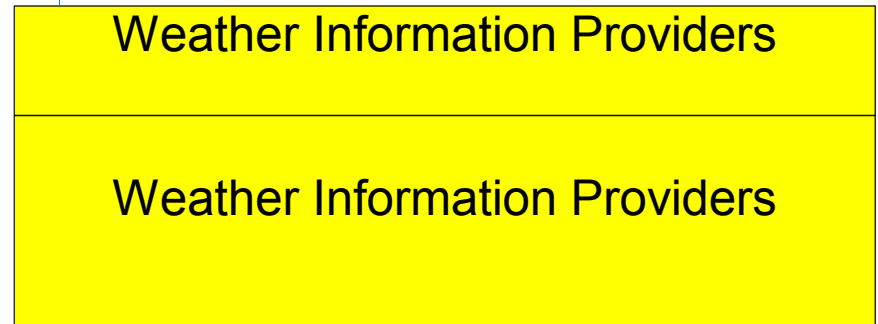
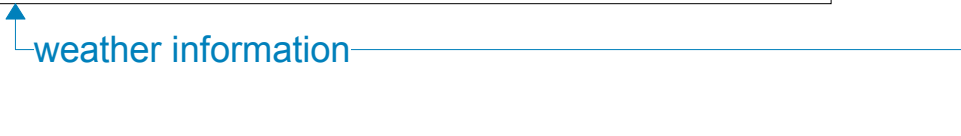
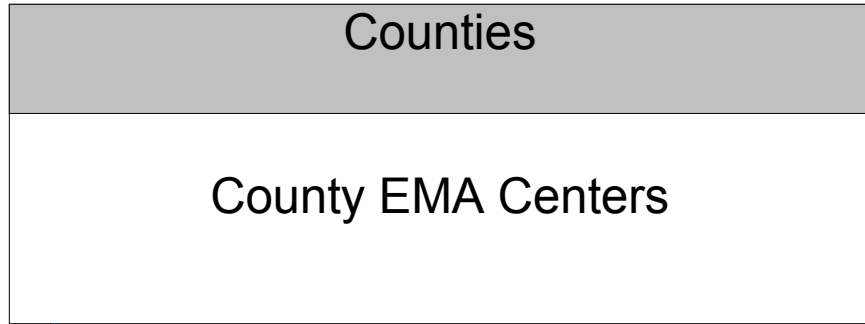


Existing  
Planned

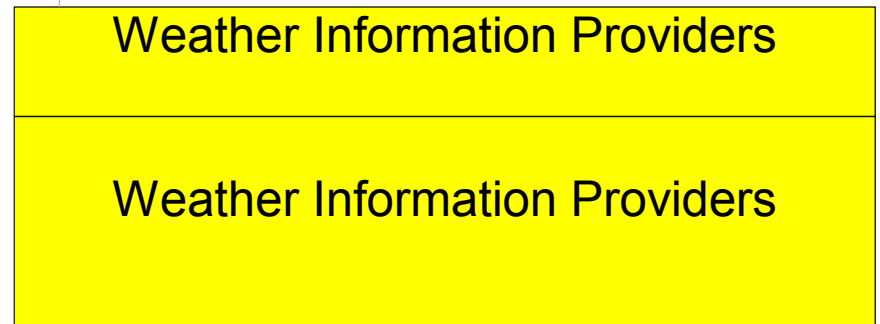
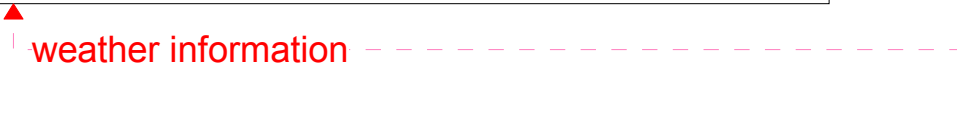
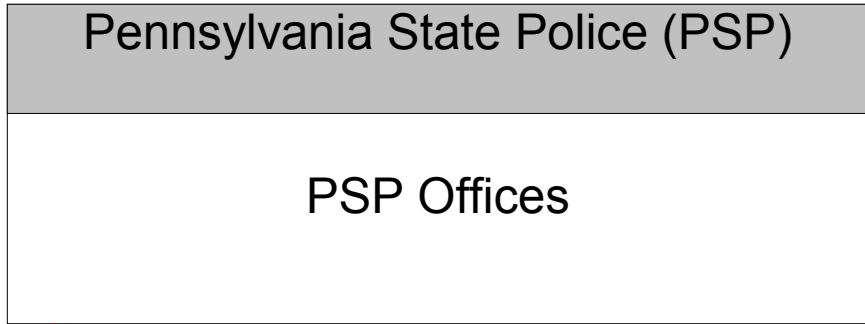




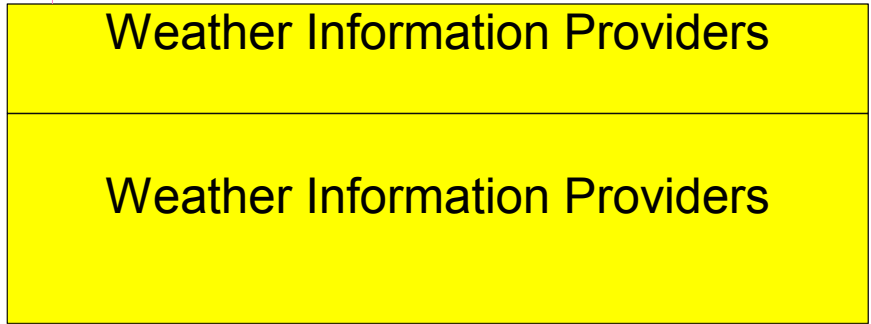
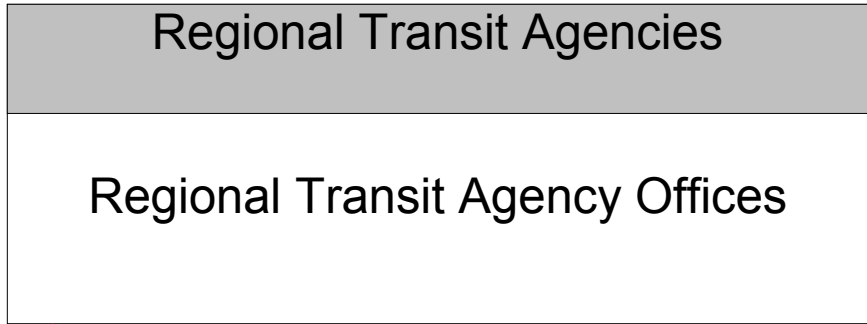
———— Existing  
- - - - - Planned

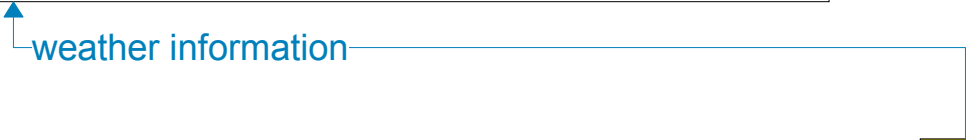
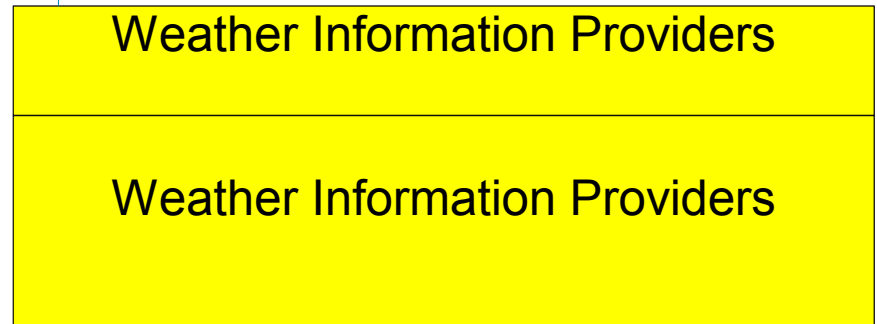
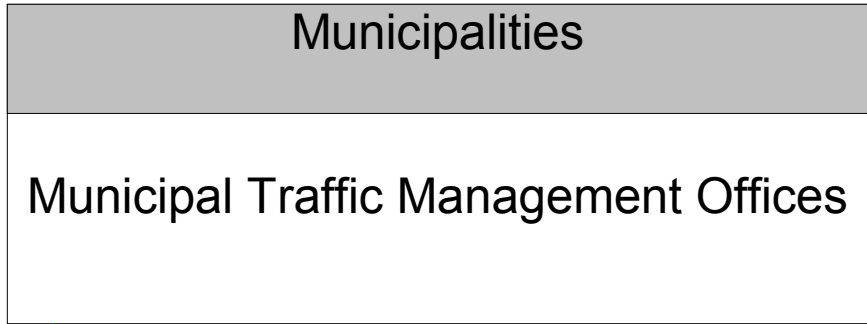


———— Existing  
- - - - - Planned



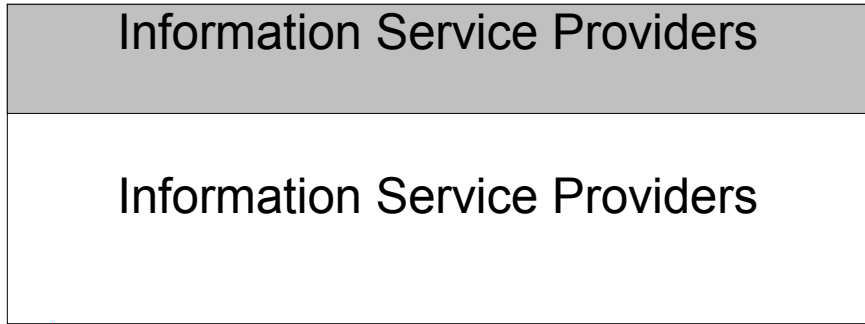
———— Existing  
- - - - - Planned





———— Existing  
- - - - - Planned

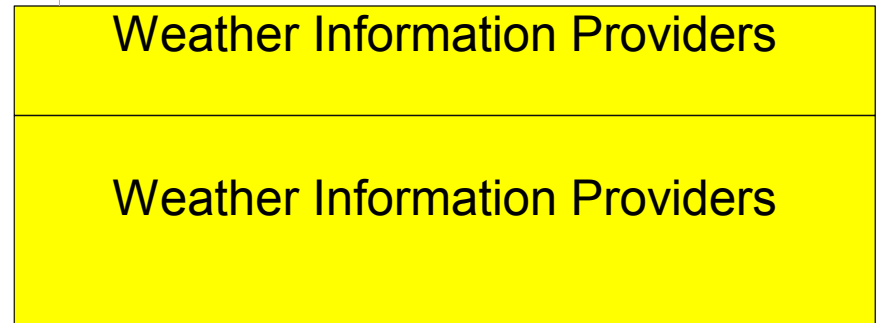




↑ weather information



A dashed red arrow points upwards from the text "weather information" to the bottom-left corner of the top box in the "Information Service Providers" stack.



———— Existing  
- - - - - Planned

## References

The following references were utilized in the development of the North Central ITS Architecture:

- *PennDOT Bureau of Planning and Research – 2002 Highway Statistics.* <http://www.dot.state.pa.us> Last viewed, April 2004.
- *DVRPC Regional ITS Architecture – Version 1.0.* Delaware Valley Regional Planning Commission. Philadelphia, PA. March 2001.
- *National ITS Architecture – Version 4.0.* <http://itsarch.iteris.com/itsarch> Last viewed, April 2004.
- *United States Census Bureau.* <http://www.census.gov> Last viewed, April 2004.
- *Pennsylvania ITS Architecture Phase I – Final Report,* PennDOT, February 2003

## Appendix A: Acronyms

24x7	Twenty Four Hours of Operation, Seven Days a Week
AAA	American Automobile Association
AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
AHS	Automated Highway System
ANSI	American National Standards Institute
ARMS	Automatic Real-Time Messaging
ASTM	American Society of Testing and Materials
ATIS	Advanced Traveler Information System
ATR	Automatic Traffic Recorders
AVL	Automatic Vehicle Location
BHSTE	Bureau of Highway Safety and Traffic Engineering
BOMO	Bureau of Maintenance and Operations
BPR	Bureau of Planning and Research
BRT	Bus Rapid Transit
CCTV	Closed Circuit Television
CDC	Consolidated Dispatch Centers
CDL	Commercial Drivers License
CVC	Commercial Vehicle Check
CVISN	Commercial Vehicle Information Systems and Networks
CVO	Commercial Vehicle Operations
DARC	Data Radio Channel
DMS	Dynamic Message Signs
DOT	Department of Transportation
DSRC	Designated Short Range Communication
DVRPC	Delaware Valley Regional Planning Commission
EMA	Emergency Management Agency
EMS	Emergency Medical Services
ESP	Emergency Service Patrol
ETC	Electronic Toll Collection
FCC	Federal Communication Commission
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GIS	Geographic Information System
GPS	Global Positioning System
HAR	Highway Advisory Radio
HAT	Highway Advisory Telephone System
HAZMAT	Hazardous Materials
HOV	High Occupancy Vehicle
HPT	Hazeltown Public Transit
HRI	Highway Rail Intersection
IEEE	Institute of Electrical and Electronics Engineers
IEN	Information Exchange Network

IM	Incident Management
IIMS	Incident Information Management System
IMMS	Incident Management Message Sets
ISP	Information Service Provider
ITS	Intelligent Transportation System
MCSAP	Motor Carrier Safety Assistance Program
MCTA	Monroe County Transit Authority
MOE	Measures of Effectiveness
MOU	Memorandum of Understanding
m.p.	Milepost
NEMA	National Electrical Manufacturers Association
NHI	National Highway Institute
NTCIP	National Transportation Communications for ITS Protocols
NWS	National Weather Service
OB	Onboard
OER	Octet Encoding Rules
O&M	Operations and Maintenance
OEM	Office of Emergency Management
PDA	Personal Digital Assistant
PEIRS	Pennsylvania Emergency Information Reporting System
PEMA	Pennsylvania Emergency Management Agency
PennDOT	Pennsylvania Department of Transportation
PRISM	Performance and Registration Information Systems Management
PSP	Pennsylvania State Police
PSAP	Public Safety Answering Point
RAP	Regional Advisory Panel
RAPID	Regional Agile Port Intermodal Distribution System
RPO	Rural Planning Organization
RTMC	Regional Transportation Management Center
RWIS	Road Weather Information System
SAFER	Safety and Fitness Electronic Record
SATIN	Service Area Travelers Interactive Network
SCADA	Supervisory Control and Data Acquisition
SCH	Scheduling/Run Cutting
SFA	Strategic Focus Area
STMC	Statewide Transportation Management Center
STMF	Simple Transportation Management Framework
STS	Schuylkill Transportation System
T-1	High Bandwidth Telephone Line
TIP	Transportation Improvement Plan
TMC	Transportation Management Center
WIM	Weigh In Motion

## Appendix B: ITS Definitions

(Source: DVRPC Regional ITS Architecture)

The following definitions for ITS terms may or may not apply specifically to the Region. They are provided as reference material to support ITS terminology found in and outside of this report.

**Automatic Vehicle Location:** This technology is used by various agencies, including transit and emergency management agencies, to constantly monitor the location of their vehicles. Transit agencies utilize AVL as a management tool to track the progress of buses and to determine when remedial action is required if buses are not adhering to schedule. Emergency dispatchers rely upon AVL to help guide their selection of which vehicle to dispatch to a call. AVL technology relies upon GPS or triangulation as the mechanism for locating vehicles.

**Cellular Phone Number for Incident Reporting:** Several toll authorities have reserved cellular phone numbers, such as \*11 for the Pennsylvania Turnpike, for use by motorists to report disabled vehicles or incidents while en-route. The numbers are usually toll-free and go directly to the agency's operations center. Several highway departments have posted signs directing motorists to dial cellular 911 to report incidents.

**Closed Circuit Television:** CCTV is real-time video surveillance equipment, monitored and manipulated by operations personnel. For highways, CCTV's are installed at locations where accident rates and/or congestion levels are known to be high. The cameras dispatch real-time video images to the traffic operation centers so that in emergency situations a quicker response can be provided. Transit agencies deploy CCTV cameras to observe transit passengers for transit management (crowding levels), fare collection, and security purposes.

**Closed Loop Traffic Signal System:** For this system, traffic signals are interconnected along specified corridors to provide for ease in traffic flow. The signals may be monitored by detectors and adjusted according to current traffic conditions, or preprogrammed with a number of signal timing plans that vary by time of day and day of week.

**Commercial Vehicle Electronic Administration Processes:** This process allows commercial vehicle operators to obtain necessary permits via computer and supports the exchange of safety and credentials data among multiple jurisdictions and between agencies within a single jurisdiction.

**Dynamic Message Sign:** The purpose of the DMS's is to provide real-time en-route travel advisories to travelers. For highways, the DMS signs are either centered over travel lanes or placed alongside the roadway. Messages on permanent DMS signs typically originate from a traffic control center. For transit systems, DMS's take the form

of dynamic message boards located in waiting areas and/or platforms to provide information on train arrivals, departures, and platform locations.

**Emergency Call Boxes:** Emergency call boxes permit travelers who do not have cellular phones a mechanism to report accidents and other emergency situations. They are used by both highway and transit travelers. Call boxes are typically located along the side of an expressway at mile or half mile intervals. Transit agencies place them in waiting areas and on platforms to improve the security of passengers.

**E-Z Pass:** E-Z Pass is an electronic toll collection system developed by a consortium of toll agencies located in the northeast United States. When a vehicle passes through an E-Z Pass designated toll lane, an electronic tag, in the form of a small box mounted on a vehicle windshield, is detected by an antenna and the appropriate toll is deducted from the customer's prepaid E-Z Pass account. Because of the alliance, E-Z Pass will eventually be employed on all toll bridges and roads in the region.

**Highway Advisory Radio:** HAR provides travelers with real-time roadway information, including weather information, agency hotline numbers, incident information, and roadway construction advisories, directly over their car radio. The FCC reserves certain AM and FM frequencies specific to whatever jurisdiction in which they are located for public agencies to broadcast these special travel advisories.

**Kiosks:** A number of organizations have plans to install travel information kiosks at tourist centers, government buildings, and highway service areas. Travelers will be able to obtain current traffic and transit information, information about places to visit, route planning information, and hotel reservations. Generally kiosks will be more interactive and offer more choices than the static traveler information services currently available.

**Management Center:** Management centers are the focal point and communications hub of an agency's operation. Almost all transit, highway and bridge agencies in the region have their own control centers. These facilities monitor and control an agency's highway or transit network and are responsible for incident management. While the equipment in each operating center varies by agency, the typical control center consists of any number of computer workstations, radio scanners, TV monitors, audio text recording booths to record HAR messages, and fax machines for broadcasting information to other agencies. Depending on agency needs, a highway control center can include capabilities to operate computerized traffic signal systems, Dynamic message signs and highway advisory radios, monitor CCTV's, manage emergency service patrols, and coordinate incident management response teams. Composition of transit operation centers vary based upon whether rail or bus operations are involved.

**Ramp Metering:** Ramp metering is designed to control the rate of traffic entering a freeway. The objective is to maintain a predetermined level of service on the freeway by adjusting the on-ramp traffic volume with a traffic control signal. Typical waiting times at ramp metering signals are between 5 to 6 seconds per vehicle.

**Road Weather Information System:** RWIS are typically installed at locations that experience a higher-than-average number of accidents attributable to fog, snow or icy conditions. Sensor information can be used to more effectively deploy road maintenance resources, issue weather-specific warnings to drivers and general advisories to motorists. Weather sensors are connected to remote processing units located in the field which measure, collect, and pre-process environmental data and then transmit the information to an operations center where staff can act on the information.

**Signal Priority:** This technology allows transit vehicles to send direct control requests to signalized intersections. These messages result in preemption of the current signal control plan and grants right-of-way to the requesting transit and emergency vehicles.

**Service Patrols:** The Service Patrol program is designed to improve the efficiency of the highway system through the quick resolution of minor incidents, including disabled vehicles, vehicles out of gas, and minor accidents that impact traffic flow. Service Patrol vans patrol along highways and provide assistance to disabled vehicles. Service Patrol operators are equipped to perform minor repairs such as changing a flat tire or providing gasoline. When major repairs are needed, Service Patrol operators can assist the motorist in contacting a towing company to remove the disabled vehicle. Service Patrol's also reduce the risk of secondary accidents by deploying appropriate warning devices.

**Traveler Cards:** This technology provides the capability for the traveler to use a common fare instrument for all surface transportation services (i.e., multiple transit agencies, parking facilities, toll roads), to pay without stopping, and have the payment media automatically identified as invalid or its eligibility verified. In addition, smart cards have the capability to provide expansion into other uses as payment for retail purchases, telephone services and for off-line billing for fares paid to agencies.

**Traveler Information Website:** This type of website is used to access traveler information prior to starting a trip. Currently, most of the existing travel websites in the region offer only construction or special event information. Eventually, real-time, route-specific travel reports will be found on the websites. SmartRoute, under contract to PennDOT, provides real-time travel information on selected highways and transit facilities in the region.

**Weigh-In-Motion Station:** Weight measuring equipment, including fixed sensors embedded in the pavement, can ascertain the weight of a commercial vehicle at highway speeds to ensure the vehicle is operating within legal weight limits. Ultimately, WIM stations will be utilized to assess motor vehicle taxes on commercial carriers.

## Appendix C: Subsystem and Terminator Definitions

(Source: National ITS Architecture)

Appendix C contains the subsystems and terminators from the National ITS Architecture exclusive to the Regional ITS Architecture:

**Archived Data Management:** The Archived Data Management Subsystem collects, archives, manages, and distributes data generated from ITS sources for use in transportation administration, policy evaluation, safety, planning, performance monitoring, program assessment, operations, and research applications. The data received is formatted, tagged with attributes that define the data source, conditions under which it was collected, data transformations, and other information (i.e. meta data) necessary to interpret the data. The subsystem can fuse ITS generated data with data from non-ITS sources and other archives to generate information products utilizing data from multiple functional areas, modes, and jurisdictions. The subsystem prepares data products that can serve as inputs to Federal, State, and local data reporting systems. This subsystem may be implemented in many different ways. It may reside within an operational center and provide focused access to a particular agency's data archives. Alternatively, it may operate as a distinct center that collects data from multiple agencies and sources and provides a general data warehouse service for a region.

**Commercial Vehicle Administration:** The Commercial Vehicle Administration Subsystem will operate at one or more fixed locations within a region. This subsystem performs administrative functions supporting credentials, tax, and safety regulations. It issues credentials, collects fees and taxes, and supports enforcement of credential requirements. This subsystem communicates with the Fleet Management Subsystems associated with the motor carriers to process credentials applications and collect fuel taxes, weight/distance taxes, and other taxes and fees associated with commercial vehicle operations. The subsystem also receives applications for, and issues special Oversize/Overweight and HAZMAT permits in coordination with other cognizant authorities. The subsystem coordinates with other Commercial Vehicle Administration Subsystems (in other states/regions) to support nationwide access to credentials and safety information for administration and enforcement functions. This subsystem supports communications with Commercial Vehicle Check Subsystems operating at the roadside to enable credential checking and safety information collection. The collected safety information is processed, stored, and made available to qualified stakeholders to identify carriers and drivers that operate unsafely.

**Commercial Vehicle Check:** The Commercial Vehicle Check Subsystem supports automated vehicle identification at mainline speeds for credential checking, roadside safety inspections, and weigh-in-motion using two-way data exchange. These capabilities include providing warnings to the commercial vehicle drivers, their fleet managers, and proper authorities of any safety problems that have been identified, accessing and examining historical safety data, and automatically deciding whether to allow the vehicle to pass or require it to stop with operator manual override. The



Commercial Vehicle Check Subsystem also provides supplemental inspection services to current capabilities by supporting expedited brake inspections, the use of operator hand-held devices, on-board safety database access, and the enrollment of vehicles and carriers.

**Commercial Vehicle:** This subsystem resides in a commercial vehicle and provides the sensory, processing, storage, and communications functions necessary to support safe and efficient commercial vehicle operations. The Commercial Vehicle Subsystem provides two-way communications between the commercial vehicle drivers, their fleet managers, and roadside officials, and provides HAZMAT response teams with timely and accurate cargo contents information after a vehicle incident. This subsystem provides the capability to collect and process vehicle, cargo, and driver safety data and status and alert the driver whenever there is a potential safety problem. Basic identification and safety status data are supplied to inspection facilities at mainline speeds.

**Emergency Management:** The Emergency Management Subsystem represents public safety and other allied agency systems that support coordinated traffic incident management and emergency response. The subsystem includes the functions associated with fixed and mobile public safety communications centers includes various public safety call taker and dispatch centers operated by police, fire, and emergency medical services. This subsystem also represents other allied systems including centers associated with towing and recovery, freeway service patrols, HAZMAT response teams, mayday service providers, and security/surveillance services that improve traveler security in public areas. This subsystem interfaces with other Emergency Management Subsystems to support coordinated emergency response involving multiple agencies. The subsystem creates, stores, and utilizes emergency response plans to facilitate coordinated response. The subsystem tracks and manages emergency vehicle fleets using automated vehicle location technology and two way communications with the vehicle fleet. Real-time traffic information received from the other center subsystems is used to further aide the emergency dispatcher in selecting the emergency vehicle(s) and routes that will provide the most timely response. Interface with the Traffic Management Subsystem allows strategic coordination in tailoring traffic control to support en-route emergency vehicles. Interface with the Transit Management Subsystem allows coordinated use of transit vehicles to facilitate response to major emergencies.

**Emergency Vehicle:** This subsystem resides in an emergency vehicle and provides the sensory, processing, storage, and communications functions necessary to support safe and efficient incident response. The subsystem represents a range of vehicles including those operated by police, fire, and emergency medical services. In addition, this subsystem represents other incident response vehicles including towing and recovery vehicles and freeway service patrols. The Emergency Vehicle Subsystem includes two-way communications to support coordinated response to emergencies in accordance with an associated Emergency Management Subsystem. Emergency vehicles are equipped with automated vehicle location capability for monitoring by vehicle tracking and fleet management functions in the Emergency Management Subsystem. Using these capabilities, the appropriate emergency vehicle to respond to

each emergency is determined. Route guidance capabilities within the vehicle enable safe and efficient routing to the emergency. In addition, the emergency vehicle may be equipped to support signal preemption through communications with the Roadway Subsystem.

**Event Promoters:** This terminator represents Special Event Sponsors that have knowledge of events that may impact travel on roadways or other modal means. Examples of special event sponsors include sporting events, conventions, motorcades/parades, and public/political events. These promoters interface to the ITS to provide event information such as date, time, estimated duration, location, and any other information pertinent to traffic movement in the surrounding area.

**Fleet and Freight Management:** The Fleet and Freight Management Subsystem provides the capability for commercial drivers and dispatchers to receive real-time routing information and access databases containing vehicle and cargo locations as well as carrier, vehicle, cargo and driver information. In addition, the capability to purchase credentials electronically shall also be provided, with automated and efficient connections to financial institutions and regulatory agencies, along with post-trip automated mileage and fuel usage reporting. The Fleet Management Subsystem also provides the capability for fleet managers to monitor the safety of their commercial vehicle drivers and fleet. The subsystem also supports application for hazmat credentials and makes information about hazmat cargo available to agencies as required. Within this subsystem lies all the functionality associated with subsystems and components necessary to enroll and participate in international goods movement programs aimed at enhancing trade and transportation safety.

**Information Service Provider:** This subsystem collects, processes, stores, and disseminates transportation information to system operators and the traveling public. The subsystem can play several different roles in an integrated ITS. In one role, the ISP provides a general data warehousing function, collecting information from transportation system operators and redistributing this information to other system operators in the region and other ISPs. In this information redistribution role, the ISP provides a bridge between the various transportation systems that produce the information and the other ISPs and their subscribers that use the information. The second role of an ISP is focused on delivery of traveler information to subscribers and the public at large. Information provided includes basic advisories, traffic and road conditions, transit schedule information, yellow pages information, ridematching information, and parking information. The subsystem also provides the capability to provide specific directions to travelers by receiving origin and destination requests from travelers, generating route plans, and returning the calculated plans to the users. In addition to general route planning for travelers, the ISP also supports specialized route planning for vehicle fleets. In this third role, the ISP function may be dedicated to, or even embedded within, the dispatch system. Reservation services are also provided in advanced implementations. The information is provided to the traveler through the Personal Information Access Subsystem, Remote Traveler Support Subsystem, and various Vehicle Subsystems through available communications links. Both basic one-way (broadcast) and personalized two-way information provision is supported. The subsystem provides the capability for an informational infrastructure to connect

providers and consumers, and gather that market information needed to assist in the planning of service improvements and in maintenance of operations.

**Maintenance and Construction Management:** The Maintenance and Construction Management Subsystem monitors and manages roadway infrastructure construction and maintenance activities. Representing both public agencies and private contractors that provide these functions, this subsystem manages fleets of maintenance, construction, or special service vehicles (e.g., snow and ice control equipment). The subsystem receives a wide range of status information from these vehicles and performs vehicle dispatch, routing, and resource management for the vehicle fleets and associated equipment. The subsystem participates in incident response by deploying maintenance and construction resources to an incident scene, in coordination with other center subsystems. The subsystem manages equipment at the roadside, including environmental sensors and automated systems that monitor and mitigate adverse road and surface weather conditions. The subsystem manages the repair and maintenance of both non-ITS and ITS equipment including the traffic controllers, detectors, dynamic message signs, signals, and other equipment associated with the roadway infrastructure. Additional interfaces to weather information providers (the weather service and surface transportation weather service providers) provide current and forecast weather information that can be fused with other data sources and used to support advanced decision support systems that increase the efficiency and effectiveness of maintenance and construction operations.

The subsystem remotely monitors and manages ITS capabilities in work zones, gathering, storing, and disseminating work zone information to other systems. It manages traffic in the vicinity of the work zone and advises drivers of work zone status (either directly at the roadside or through an interface with the Information Service Provider or Traffic Management subsystems.) It schedules and manages the location and usage of maintenance assets (such as portable dynamic message signs).

Construction and maintenance activities are tracked and coordinated with other systems, improving the quality and accuracy of information available regarding closures and other roadway construction and maintenance activities.

**Maintenance and Construction Vehicle:** This subsystem resides in a maintenance, construction, or other specialized service vehicles or equipment and provides the sensory, processing, storage, and communications functions necessary to support highway maintenance and construction. All types of maintenance and construction vehicles are covered, including heavy equipment and supervisory vehicles. The subsystem provides two-way communications between drivers/operators and dispatchers and maintains and communicates current location and status information. A wide range of operational status is monitored, measured, and made available, depending on the specific type of vehicle or equipment. For example, for a snow plow, the information would include whether the plow is up or down and material usage information. The subsystem may also contain capabilities to monitor vehicle systems to support maintenance of the vehicle itself and other sensors that monitor environmental conditions including the road condition and surface weather information. This subsystem can represent a diverse set of mobile environmental sensing platforms,

including wheeled vehicles and any other vehicle that collects and reports environmental information.

**Media:** This terminator represents the information systems that provide traffic reports, travel conditions, and other transportation-related news services to the traveling public through radio, TV, and other media. Traffic and travel advisory information that are collected by ITS are provided to this terminator. It is also a source for traffic flow information, incident and special event information, and other events which may have implications for the transportation system.

**Multimodal Transportation Service Provider:** This terminator provides the interface through which Transportation Service Providers can exchange data with ITS. They are the operators of non-roadway transportation systems (e.g. airlines, ferry services, passenger carrying heavy rail) and providers of non-motorized transportation facilities. This two-way interface enables coordination for efficient movement of people across multiple transportation modes.

**Personal Information Access** This subsystem provides the capability for travelers to receive formatted traffic advisories from their homes, place of work, major trip generation sites, personal portable devices, and over multiple types of electronic media. These capabilities shall also provide basic routing information and allow users to select those transportation modes that allow them to avoid congestion, or more advanced capabilities to allow users to specify those transportation parameters that are unique to their individual needs and receive travel information. This subsystem shall provide capabilities to receive route planning from the infrastructure at fixed locations such as in their homes, their place of work, and at mobile locations such as from personal portable devices and in the vehicle or perform the route planning process at a mobile information access location. In addition to end user devices, this subsystem may also represent a device that is used by a merchant or other service provider to receive traveler information and relay important information to their customers. This subsystem shall also provide the capability to initiate a distress signal and cancel a prior issued manual request for help.

**Rail Operations:** This is roughly the railroad equivalent to a highway Traffic Management Center. It is (usually) a centralized control point for a substantial segment of a railroad's operations and maintenance activities. It is the source and destination of information that can be used to coordinate rail and highway traffic management and maintenance operations. This terminator would also represent a railroad's management information system, if that system is the source or destination for this information. The use of a single terminator for multiple sources and destination for information exchange with the railroad entity is meant to imply the need for a single, consistent interface between a given railroad's operations and maintenance activities and ITS. In any given implementation, there may be multiple instantiations of this interface. For example, a city like Chicago may have interfaces to 5 or more Rail Operations Centers (e.g. BNSF, CSX, NS, UP, CR, etc.)

**Remote Traveler Support:** This subsystem provides access to traveler information at transit stations, transit stops, other fixed sites along travel routes (e.g., rest stops,

merchant locations), and at major trip generation locations such as special event centers, hotels, office complexes, amusement parks, and theaters. Traveler information access points include kiosks and informational displays supporting varied levels of interaction and information access. At transit stops, simple displays providing schedule information and imminent arrival signals can be provided. This basic information may be extended to include multi-modal information including traffic conditions and transit schedules along with yellow pages information to support mode and route selection at major trip generation sites. Personalized route planning and route guidance information can also be provided based on criteria supplied by the traveler. In addition to traveler information provision, this subsystem also supports public safety monitoring using CCTV cameras or other surveillance equipment and emergency notification within these public areas. Fare card maintenance, and other features which enhance traveler convenience may also be provided at the discretion of the deploying agency.

**Roadway:** This subsystem includes the equipment distributed on and along the roadway which monitors and controls traffic and monitors and manages the roadway itself. Equipment includes traffic detectors, environmental sensors, traffic signals, highway advisory radios, dynamic message signs, CCTV cameras and video image processing systems, grade crossing warning systems, and freeway ramp metering systems. HOV lane management and reversible lane management functions are also available. This subsystem also provides the capability for environmental monitoring including sensors that measure road conditions, surface weather, and vehicle emissions. In adverse conditions, automated systems can be used to apply anti-icing materials, disperse fog, etc. Work zone systems including work zone surveillance, traffic control, driver warning, and work crew safety systems are also included. In advanced implementations, this subsystem supports automated vehicle safety systems by safely controlling access to and egress from an Automated Highway System through monitoring of, and communications with, AHS vehicles. Intersection collision avoidance functions are provided by determining the probability of a collision in the intersection and sending appropriate warnings and/or control actions to the approaching vehicles.

**Traffic Management:** The Traffic Management Subsystem operates within a traffic management center or other fixed location. This subsystem communicates with the Roadway Subsystem to monitor and manage traffic flow. Incidents are detected and verified and incident information is provided to the Emergency Management Subsystem, travelers (through Roadway Subsystem Highway Advisory Radio and Dynamic Message Signs), and to third party providers. The subsystem supports HOV lane management and coordination, road pricing, and other demand management policies that can alleviate congestion and influence mode selection. The subsystem monitors and manages maintenance work and disseminates maintenance work schedules and road closures. The subsystem also manages reversible lane facilities, and processes probe vehicle information. The subsystem communicates with other Traffic Management Subsystems to coordinate traffic information and control strategies in neighboring jurisdictions. It also coordinates with rail operations to support safer and more efficient highway traffic management at highway-rail intersections. Finally, the Traffic Management Subsystem provides the capabilities to exercise control over those devices utilized for AHS traffic and vehicle control.

**Transit Management:** The transit management subsystem manages transit vehicle fleets and coordinates with other modes and transportation services. It provides operations, maintenance, customer information, planning and management functions for the transit property. It spans distinct central dispatch and garage management systems and supports the spectrum of fixed route, flexible route, paratransit services, and bus rapid transit (BRT) service. The subsystem's interfaces allow for communication between transit departments and with other operating entities such as emergency response services and traffic management systems. This subsystem receives special event and real-time incident data from the traffic management subsystem. It provides current transit operations data to other center subsystems. The Transit Management Subsystem collects and stores accurate ridership levels and implements corresponding fare structures. It collects operational and maintenance data from transit vehicles, manages vehicle service histories, and assigns drivers and maintenance personnel to vehicles and routes. The Transit Management Subsystem also provides the capability for automated planning and scheduling of public transit operations. It furnishes travelers with real-time travel information, continuously updated schedules, schedule adherence information, transfer options, and transit routes and fares. In addition, the monitoring of key transit locations with both video and audio systems is provided with automatic alerting of operators and police of potential incidents including support for traveler activated alarms.

**Transit Vehicle:** This subsystem resides in a transit vehicle and provides the sensory, processing, storage, and communications functions necessary to support safe and efficient movement of passengers. The Transit Vehicle Subsystem collects accurate ridership levels and supports electronic fare collection. An optional traffic signal prioritization function communicates with the roadside subsystem to improve on-schedule performance. Automated vehicle location functions enhance the information available to the Transit Management Subsystem enabling more efficient operations. On-board sensors support transit vehicle maintenance. The Transit Vehicle Subsystem also furnishes travelers with real-time travel information, continuously updated schedules, transfer options, routes, and fares.

**Vehicle:** This subsystem provides the sensory, processing, storage, and communications functions necessary to support efficient, safe, and convenient travel. These functions reside in general vehicles including personal automobiles, commercial vehicles, emergency vehicles, transit vehicles, or other vehicle types. Information services provide the driver with current travel conditions and the availability of services along the route and at the destination. Both one-way and two-way communications options support a spectrum of information services from low-cost broadcast services to advanced, pay for use personalized information services. Route guidance capabilities assist in formulation of an optimal route and step by step guidance along the travel route. Advanced sensors, processors, enhanced driver interfaces, and actuators complement the driver information services so that, in addition to making informed mode and route selections, the driver travels these routes in a safer and more consistent manner. Initial collision avoidance functions provide "vigilant co-pilot" driver warning capabilities. More advanced functions assume limited control of the vehicle to maintain safe headway. Ultimately, this subsystem supports completely automated vehicle operation through advanced communications with other vehicles in the vicinity

and in coordination with supporting infrastructure subsystems. Pre-crash safety systems are deployed and emergency notification messages are issued when unavoidable collisions do occur.

**Weather Service:** This terminator provides weather, hydrologic, and climate information and warnings of hazardous weather including thunderstorms, flooding, hurricanes, tornadoes, winter weather, tsunamis, and climate events. It provides atmospheric weather observations and forecasts that are collected and derived by the National Weather Service, private sector providers, and various research organizations. The interface provides formatted weather data products suitable for on-line processing and integration with other ITS data products as well as Doppler radar images, satellite images, severe storm warnings, and other products that are formatted for presentation to various ITS users.

## Appendix D: Architecture Flow Definitions

(Source: National ITS Architecture)

Appendix D contains the architecture flow definitions from the National ITS Architecture exclusive to the Regional ITS Architecture:

**archive coordination:** Catalog data, meta data, published data, and other information exchanged between archives to support data synchronization and satisfy user data requests.

**archive requests:** A request to a data source for information on available data (i.e. "catalog") or a request that defines the data to be archived. The request can be a general subscription intended to initiate a continuous or regular data stream or a specific request.

**archive status:** Notification that data provided to an archive contains erroneous, missing, or suspicious data or verification that the data provided appears valid. If an error has been detected, the offending data and the nature of the potential problem are identified.

**audit data:** Information to support a tax audit.

**broadcast information:** General broadcast information that contains link travel times, incidents, advisories, transit services and a myriad of other traveler information.

**commercial vehicle archive data:** Information describing commercial vehicle travel and commodity flow characteristics. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.

**compliance review report:** Report containing results of carrier compliance review, including concomitant out-of-service notifications, carrier warnings/notifications. The information may be provided as a response to a real-time query or proactively by the source.

**credential application:** Application for commercial vehicle credentials. Authorization for payment is included.

**credentials information:** Response containing full credentials information. "Response" may be provided in reaction to a real-time query or a standing request for updated information. The query flow is not explicitly shown.

**credentials status information:** Credentials information such as registration, licensing, insurance, check flags, and electronic screening enrollment data. A unique identifier is included. Corresponds to the credentials portion of CVISN "snapshots."



**current asset restrictions:** Restrictions levied on transportation asset usage based on infrastructure design, surveys, tests, or analyses. This includes standard facility design height, width, and weight restrictions, special restrictions such as spring weight restrictions.

**daily site activity data:** Record of daily activities at commercial vehicle check stations including summaries of screening events and inspections.

**driver instructions:** Transit service instructions, traffic information, road conditions, and other information for both transit and paratransit drivers.

**driver to fleet request:** Requests from the driver and vehicle for routing, payment, and enrollment information.

**emergency archive data:** Logged incident information that characterizes the identified incidents and provides a record of the corresponding incident response. Content may include a catalog of available information, the actual information to be archived, and associated meta data.

**emergency dispatch requests:** Emergency vehicle dispatch instructions including incident location and available information concerning the incident.

**emergency dispatch response:** Request for additional emergency dispatch information (e.g., a suggested route) and provision of en route status.

**emergency notification:** An emergency request for assistance originated by a traveler using an in-vehicle, public access, or personal device.

**emergency traffic control request:** Special request to preempt the current traffic control strategy in effect at one or more signalized intersections or highway segments. For example, this flow can request all signals to red-flash, request a progression of traffic control preemptions.

**emergency traffic control response:** Status of the special traffic signal control strategy implemented in response to the emergency traffic control request.

**emergency vehicle tracking data:** The current location and operating status of the emergency vehicle.

**environmental conditions data:** Current road conditions (e.g., surface temperature, subsurface temperature, moisture, icing, treatment status) and surface weather conditions (e.g., air temperature, wind speed, precipitation, visibility) as measured and reported by environmental sensors.

**environmental sensors control:** Data used to configure and control environmental sensors.

**equipment maintenance status:** Current status of field equipment maintenance actions.

**event confirmation:** Confirmation that special event details have been received and processed.

**event information:** Special event information for travelers. This would include a broader array of information than the similar "event plans" that conveys only information necessary to support traffic management for the event.

**event information request:** Request for special event information.

**event plans:** Plans for major events possibly impacting traffic.

**external reports:** Traffic and incident information that is collected by the media through a variety of mechanisms (e.g., radio station call-in programs, air surveillance).

**fare and payment status:** Current fare collection information including the operational status of the fare collection equipment and financial payment transaction data.

**fare management information:** Transit fare information and transaction data used to manage transit fare processing on the transit vehicle.

**field device status:** Reports from field equipment (sensors, signals, signs, controllers, etc.) which indicate current operational status.

**fleet to driver update:** Updated instructions to the driver including dispatch, routing, and special instructions.

**freeway control data:** Control commands and operating parameters for ramp meters, mainline metering/lane controls and other systems associated with freeway operations.

**freeway control status :** Current operational status and operating parameters for ramp meters, mainline metering/lane controls and other control equipment associated with freeway operations.

**hazmat information:** Information about a particular hazmat load including nature of the load and unloading instructions. May also include hazmat vehicle route and route update information.

**hazmat information request:** Request for information about a particular hazmat load.

**high threat facility incident information:** Threats regarding transportation infrastructure, facilities, or systems detected by a variety of methods (sensors, surveillance, threat analysis of advisories from outside agencies, etc).

**hri advisories:** Notification of Highway-Rail Intersection equipment failure, intersection blockage, or other condition requiring attention, and maintenance activities at or near highway rail intersections.

**incident command information:** Information that supports local management of an incident. It includes resource deployment status, hazardous material information, traffic, road, and weather conditions, evacuation advice, and other information.

**incident command request:** Request for resources, commands for relay to other allied response agencies, and other requests that reflect local command of an evolving incident response.

**incident information:** Notification of existence of incident and expected severity, location, time and nature of incident.

**incident information for media:** Report of current desensitized incident information prepared for public dissemination through the media.

**incident information request:** Request for incident information, clearing time, severity. The request can be a subscription that initiates as-needed information updates as well as a one-time request for information.

**incident report:** Report of an identified incident including incident location, type, severity and other information necessary to initiate an appropriate incident response.

**incident response coordination:** Incident response procedures, resource coordination, and current incident response status that are shared between allied response agencies to support a coordinated response to incidents.

**incident response status:** Status of the current incident response including traffic management strategies implemented at the site (e.g., closures, diversions, traffic signal control overrides).

**incident status:** Information gathered at the incident site that more completely characterizes the incident and provides current incident response status.

**local signal preemption request:** Direct control signal or message to a signalized intersection that results in preemption of the current control plan and grants right-of-way to the requesting vehicle.

**maint and constr dispatch information:** Information used to dispatch maintenance and construction vehicles, equipment, and crews. This information

includes routing information, traffic information, road restrictions, incident information, environmental information, and decision support information.

**maint and constr dispatch status:** Current maintenance and construction status including work data, operator status, crew status, and equipment status.

**maint and constr resource coordination:** Request for road maintenance and construction resources that can be used in the diversion of traffic (cones, portable signs), clearance of a road hazard, repair of ancillary damage, or any other incident response.

**maint and constr resource request:** Request for road maintenance and construction resources that can be used in the diversion of traffic (cones, portable signs), clearance of a road hazard, repair of ancillary damage, or any other incident response.

**maint and constr resource response:** Current status of maintenance and construction resources including availability and deployment status.

**maint and constr vehicle conditions:** Vehicle diagnostics information that is collected, filtered, and selectively reported by a maintenance and construction vehicle. The information includes engine temperature, mileage, tire wear, brake wear, belt wear, and any warnings or alarms.

**maint and constr vehicle location data:** The current location and related status (e.g., direction and speed) of the maintenance/construction vehicle.

**maint and constr vehicle operational data:** Data that describes the maintenance and construction activity performed by the vehicle. Operational data includes materials usage (amount stored and current application rate), operational state of the maintenance equipment (e.g., blade up/down).

**maint and constr vehicle system control:** Configure and control data that supports remote control of on-board maintenance and construction vehicle systems and field equipment that is remotely controlled by the vehicle. For example, the data can be used to adjust material application rates.

**maint and constr work plans:** Future construction and maintenance work schedules and activities including anticipated closures with anticipated impact to the roadway, alternate routes, anticipated delays, closure times, and durations.

**media information request:** Request from the media for current transportation information.

**multimodal archive data:** Operational information from alternate passenger transportation modes including air, rail transit, taxis, and ferries. Content may include a catalog of available information, the actual information to be archived, and associated

meta data that describes on-board safety data. Safety data measured by on-board sensors. Includes information about the vehicle, vehicle components, cargo, and driver.

**on-board safety request:** Request for on-board vehicle safety data by the roadside equipment.

**on-board vehicle data:** Information about the commercial vehicle stored on-board (for maintenance purposes, gate access, cargo status, lock status, etc.).

**on-board vehicle request:** Request for on-board vehicle data.

**personal transit information:** General and personalized transit information for a particular fixed route, flexible route, or paratransit system.

**railroad advisories:** Real-time notification of railway-related incident or advisory.

**request for road network conditions:** Request for traffic information, road conditions, surface weather conditions, incident information, and other road network status. The request specifies the region/route of interest, the desired effective time period, and other parameters.

**request transit information:** Request for transit service information and current transit status.

**resource deployment status:** Status of traffic management center resource deployment identifying the resources available and their current deployment status.

**resource request:** A request for traffic management resources to implement special traffic control measures, assist in clean up, verify an incident, etc.

**road network conditions:** Current and forecasted traffic information, road and weather conditions, incident information, and other road network status. Either raw data, processed data, or some combination of both may be provided by this architecture flow.

**road weather information:** Road conditions and weather information that are made available by road maintenance operations to other transportation system operators.

**roadway information system data:** Information used to initialize, configure, and control roadside systems that provide driver information (e.g., dynamic message signs, highway advisory radio, beacon systems).

**roadway information system status:** Current operating status of dynamic message signs, highway advisory radios, beacon systems, or other configurable field equipment that provides dynamic information to the driver.

**roadway maintenance status:** Summary of maintenance fleet operations affecting the road network. This includes the status of winter maintenance (snow plow schedule and current status).

**safety inspection record:** Record containing results of commercial vehicle safety inspection.

**safety inspection report:** Report containing results of commercial vehicle safety inspection. The information may be provided as a response to a real-time query or proactively by the source. The query flow is not explicitly shown.

**safety status information:** Safety information such as safety ratings, inspection summaries, and violation summaries. A unique identifier is included. Corresponds to the safety portion of CVISN "snapshots." The status information may be provided as a response to a real-time query.

**screening event record:** Results of CVO electronic screening activity.

**signal control data:** Information used to configure and control traffic signal systems.

**signal control status:** Status of surface street signal controls.

**speed monitoring control:** Information used to configure and control automated speed monitoring, speed warning, and speed enforcement systems.

**speed monitoring information:** System status including current operational state and logged information including measured speeds, warning messages displayed, and violation records.

**tag data:** Unique tag ID and related vehicle information.

**tax filing:** Commercial vehicle tax filing data. Authorization for payment is included.

**threat information coordination:** Sensor, surveillance, and threat data including raw and processed data that is collected by sensor and surveillance equipment located in secure areas.

**traffic archive data:** Information describing the use and vehicle composition on transportation facilities and the traffic control strategies employed. Content may include a catalog of available information, the actual information to be archived, and associated meta data.

**traffic control coordination:** Information transfers that enable remote monitoring and control of traffic management devices. This flow is intended to allow cooperative

access to, and control of, field equipment during incidents and special events and during day-to-day operations.

**traffic flow:** Raw and/or processed traffic detector data which allows derivation of traffic flow variables (e.g., speed, volume, and density measures) and associated information (e.g., congestion, potential incidents).

**traffic images:** High fidelity, real-time traffic images suitable for surveillance monitoring by the operator or for use in machine vision applications. This flow includes the images and the operational status of the surveillance system.

**traffic information coordination:** Traffic information exchanged between TMC's. Normally would include incidents, congestion data, traffic data, signal timing plans, and real-time signal control information.

**transit archive data:** Data used to describe and monitor transit demand, fares, operations, and system performance. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.

**transit emergency coordination data:** Data exchanged between centers dealing with a transit-related incident.

**transit emergency data:** Initial notification of transit emergency at a transit stop or on transit vehicles and further coordination as additional details become available and the response is coordinated.

**transit incident information:** Information on transit incidents that impact transit services for public dissemination.

**transit incidents for media:** Report of an incident impacting transit operations for public dissemination through the media.

**transit information for media:** Report of transit schedule deviations for public dissemination through the media.

**transit information request:** Request for transit operations information including schedule and fare information. The request can be a subscription that initiates as-needed information updates as well as a one-time request for information.

**transit request confirmation:** Confirmation of a request for transit information or service.

**transit schedule information:** Current and projected transit schedule adherence.

**transit vehicle conditions:** Operating conditions of transit vehicle (e.g., mileage).

**transit vehicle location data:** Current transit vehicle location and related operational conditions data provided by a transit vehicle.

**transit vehicle passenger and use data:** Data collected on board the transit vehicle pertaining to availability and/or passenger count.

**transit vehicle schedule performance:** Estimated times of arrival and anticipated schedule deviations reported by a transit vehicle.

**traveler information:** Traveler information comprised of traffic status, advisories, incidents, payment information and many other travel-related data updates and confirmations.

**traveler information for media:** General traveler information regarding incidents, unusual traffic conditions, transit issues, or other advisory information that has been desensitized and provided to the media.

**traveler request:** Request by a traveler to summon assistance, request information, make a reservation, or initiate any other traveler service.

**trip identification number:** The unique trip load number for a specific cross-border shipment.

**trip log:** Driver's daily log, vehicle location, mileage, and trip activity (includes screening, inspection and border clearance event data as well as fare payments).

**trip log request:** Request for trip log.

**video surveillance control:** Information used to configure and control video surveillance systems.

**violation notification:** Notification to enforcement agency of a violation. The violation notification flow describes the statute or regulation that was violated and how it was violated (e. g., overweight on specific axle by xxx pounds or which brake was out of adjustment).

**weather information:** Accumulated forecasted and current weather data (e.g., temperature, pressure, wind speed, wind direction, humidity, precipitation, visibility, light conditions, etc.).

**work plan coordination:** Coordination of work plan schedules and activities between maintenance and construction organizations or systems. This information includes the work plan schedules and comments and suggested changes that are exchanged as work plans are coordinated.

**work zone information:** Summary of maintenance and construction work zone activities affecting the road network including the nature of the maintenance or



construction activity, location, impact to the roadway, expected time(s) and duration of impact, anticipated delays, etc.

**work zone status:** Current work zone status including current location (and future locations for moving work zones), impact to the roadway, required lane shifts, expected time(s) and duration of impact, anticipated delays, alternate routes, and suggested speed limits.

**work zone warning status:** Status of a work zone safety monitoring and warning devices. This flow documents system activations and includes additional supporting information (e.g., an image) that allows verification of the alarm.

## **Appendix E: Operations Coverage**

The following table summarizes the operations on key highway facilities within the Region. Operations centers, whether they are a personal computer or an entire building, accommodate the intelligence for the majority of ITS applications. The location and operation of the TMC's within the Commonwealth of Pennsylvania are currently being explored through other statewide efforts. This section takes roadways of regional significance developed by the RAP in each work plan (prior project working document) and assigns ITS operations coverage for the primary and secondary role. This section although useful for other Statewide ITS effort, was not needed for the creation of the Regional ITS Architecture.

<b>County</b>	<b>Highway Corridor</b>	<b>Primary Operations</b>	<b>Secondary Operations</b>
Bradford	US-6	PennDOT District 3-0	
	US-220	PennDOT District 3-0	
Columbia	I-80	PennDOT District 3-0	
	US-11	PennDOT District 3-0	
	SR-54	PennDOT District 3-0	
	SR-2002	PennDOT District 3-0	
Lycoming	I-180	PennDOT District 3-0	
	US-15	PennDOT District 3-0	
	US-220	PennDOT District 3-0	
	US-973 / Lycoming Creek Road	PennDOT District 3-0	
Montour	I-80	PennDOT District 3-0	
	US-11	PennDOT District 3-0	
Northumberland	I-80	PennDOT District 3-0	
	I-180	PennDOT District 3-0	
	US-11	PennDOT District 3-0	
	SR-54	PennDOT District 3-0	
	SR-61	PennDOT District 3-0	
Snyder	US-11	PennDOT District 3-0	
	US-15	PennDOT District 3-0	
	US-522	PennDOT District 3-0	

<b>County</b>	<b>Highway Corridor</b>	<b>Primary Operations</b>	<b>Secondary Operations</b>
	SR-61	PennDOT District 3-0	
Sullivan	US-220	PennDOT District 3-0	
Tioga	US-6	PennDOT District 3-0	
	US-11	PennDOT District 3-0	
	US-15 Business / US-2005	PennDOT District 3-0	
Union	I-80	PennDOT District 3-0	
	US-11	PennDOT District 3-0	
	US-15	PennDOT District 3-0	

## Appendix F: Bookend I Meeting I Minutes

Date: Thursday, December 18, 2004

Meeting: PennDOT District 3-0 Stakeholders' Meeting – First Regional Meeting

Location: Genetti Hotel – Williamsport, PA

### Presentation

- Sandra Tosca, PennDOT Assistant District Executive for Maintenance–Engineering District 3-0, began the presentation with a welcome. She identified some of the agencies involved in the process. This includes the planning offices, townships, partnership organizations, enforcement community, transit, counties, emergency management agencies, and economic development agencies. Sandra described the “North Central” Region which consists of nine counties with one MPO’s and two RPO’s. The Region borders New York State and is predominantly rural in nature. To date, the Region, has made limited investment in ITS. The Regional Long-Range Transportation Plan are currently being developed. She described the transportation challenges in North-Central Pennsylvania. The Region strives to manage a safe, accessible, and environmentally-sound intermodal transportation network that provides for the efficient movement of people and goods across the Region. They also want to furnish road and traffic conditions data, transit data, travel advisories, routing information, etc. to travelers and commuters. Sandra presented slides on why stakeholders’ help was needed. The stakeholders’ knowledge is required to validate critical baseline information. Within the stakeholder group, there are some who operate a piece of the transportation system, some who are involved in planning and programming for regional transportation, and still others who help set transportation policy in the Region. Everyone in the Region has a stake in transportation conditions and performance in North-Central Pennsylvania. Sandra stated that PennDOT needs the stakeholders to attend meeting on this effort, to validate the work presented, to champion ITS, to outreach to other stakeholders, and to continue the ITS regional dialogue beyond this effort.
- Michael Harris from PB Farradyne continued the presentation with a few slides defining ITS and ITS Architecture. ITS is “simply technology being used in the transportation environment.” It is used to improve safety, maximize mobility, fulfill traveler needs, support enhanced security, and manage capacity. Types of ITS include CCTV, freeway service patrol, advanced signal systems, automated transit dispatching, incident management, and electronic payment. ITS Architecture is “the plan for design and construction.” Mike showed two diagrams placing ITS Architecture in the context of the planning process and the systems engineering process. Furthermore, the federal mandate states, “Regional ITS Architecture must be completed in partnership with the State and regional planning partners by April 8, 2005 for use of Federal funds for ITS.” The expectation for this process is that the mandates’ conditions are made and a process is put in place for initial Architecture development and for revisiting and updating the Regional Architecture as necessary. Regional benefits

- include interoperability enhancement, implementation for planning ITS integration, ensuring institutional agreement among ITS stakeholder agencies, establishing a common framework for future ITS operations across the region and state, and allowing integration options to be considered before investments are made.
- Lieutenant Thomas McDaniel of the Pennsylvania State Police spoke on incident management and ITS. He began talking about highway incident management and the various tools the police use. He talked about detection of various incidents, verification when it is critical, the importance of response, scene management and detours, and clearance of the incident. Cell phones are the eyes and ears of the police. Once the incident is verified, the precise location of the incident and the nature of the incident are determined. Furthermore, they decide which resource agencies are needed, such as fire, EMS, or towing. Safety is their biggest concern during incident scene management and they try to ensure safety for responders, the public, and the injured. This may include clearing the lanes of debris and removal of responders from lanes. They also need to be aware of secondary crashes and traffic control. The unified command training and highway incident scene safety and traffic control training helps them to do this. The five functional sections of the ICS consists of command, operations, planning, logistics, and finance/administration. Since all this is costly, they do need to use their resources wisely. Information is disseminated to the motorists through VMS, the district TMC, upstream traffic diversion, and local media traffic reporting. Pre-planning and coordination for special events includes going to incident management meetings and establishing detour routes for major highways.
  - Michael Pack from PennDOT Central Office came in lieu of Craig Reed and Dennis Lebo. First, he presented a statewide vision of ITS Architecture. He talked about the history of transportation, the current transportation problem, and how ITS Architecture will be part of the solution. The Region cannot afford to build them out of congestion. However, efficiency in the transportation system is required for economic vitality. Transportation operation challenges for today and the foreseeable future consist of safety, security, and mobility. Congestion solution includes building capacity, better managing capacity, and reducing demand. Regional ITS Architecture is a tool to use for the purposes of forming the building blocks of transportation operations and for supporting a balanced look at congestion improvement investments. The statewide vision includes building TMC's in each Region, incident management software and programs on all interstate highways, ITS integration, and PA mobility (congestion management operations) strategy with 24X7 operations. Michael Pack also showed a slide of a ITS house labeled safety, mobility, and security. It is built on software, telecommunications/hardware, and staffing. The foundation of the house is planning and funding. ITS Architecture is involved in laying this foundation properly. The statewide vision through transportation operations and ITS will provide the Region with a safe, secure, and efficient system which will enhance the economic vitality of the state and improve the quality of life for all Pennsylvanians.

Michael Pack continued the presentation by giving an overview of ITS and statewide planning. He talked about using the mandate as a planning opportunity for creating a framework for regional and statewide integration, establishing a basis for sound investments, creating a regional forum for stakeholders to address ITS/Operational issues, and advancing the issue of ITS to better manage the transportation system. Maps were presented to show that the Regional Architecture boundaries will closely follow the PennDOT district map while taking the planning organizations into consideration. Subsequent slides identified the objectives and scope of the ITS Architecture program. The project objective is to “complete Regional ITS Architectures in partnership with planning organizations throughout the state to meet the federal mandate by April 8, 2005 for use of Federal funds for ITS operations. The scope of work will include aspects of operations and planning”. Also, Michael Pack helped to answer questions such as “How will this be used?” and “What will we need to do?” in the slides. Michael talked about how ITS Architecture will help determine what investments would be made in transportation. PennDOT will need to produce a statewide ITS strategic plan and Regional ITS implementation plan.

- Theresa McClain from PennDOT D3-0 talked about regional ITS operations. She gave an overview of ITS in the D3-0 Region. Theresa said that the Region has several variable message signs (VMS), some of which are portable. The district also has three portable highway advisory radio units which can be programmed and placed in operation by county personnel. Furthermore, there are 5 RWIS units within District 3-0. These units are equipped with cameras. The installation of roadside cameras is an option for the future.
- Joel Ticatch from PB Farradyne talked about the context for regional planning. As stated previously, the North-Central Region is predominantly rural. Williamsport is the urban center of the Region. Other demographic statistics include the population being older than the national average and family size smaller than the national average. Significant tourist travel destinations exist within the state. I-80 E/W and I-99/US-15 N/S exists for transportation outside of the Region. Several recent large-scale incidents on I-80 emphasized the need for rapid, accurate, and informative communications with the motorists. To date, there is limited focus on ITS. Current works in development include US-15/I-99 limited access highway, the Central Susquehanna Valley Transportation, and Market Street Bridge (Williamsport). In the future, focus will need to shift from building additional system capacity to improving operations. Potential regional benefits of ITS include increased capacity of the transportation infrastructure without building significant new facilities. Transportation operations would be managed better daily. There would be improved communications with travelers during incidents and emergencies. The attractiveness of public transit as a transportation mode would be enhanced. All these things would support the economic vitality of the North-Central Region.

Then, Joel talked about the validation outreach. He presented the characteristics of the ITS Architecture. It helps to identify the ITS projects and activities throughout the Region. The process of generating the ITS Architecture helps to inventory existing and planning ITS systems. The inter-relationships among the Region's ITS systems are described. Then, Joel discussed the ITS Strawman Architecture process and talked about the characteristics of the document. The Strawman is a draft document and is temporary, only to be replaced by a refined and permanent document. The Strawman gives stakeholders a common baseline to react to. Joel went on to describe what was in the validation packets. He described what the diagrams were and how they fit into the bigger picture. Joel also talked about the validation effort, which consisted of two large stakeholder meetings and then small validation meetings by functional area. The validation meeting schedule was posted on a slide. He gave examples of what will happen at the validation meetings and discussed some diagrams briefly. The planned regional actions include input to support adoption, to continue to advance ITS element of regional long range plans, to continue ITS regional dialogue beyond this effort, and to develop the Regional ITS Implementation Plan.

### **Questions and Answers**

- Alan Kellar from PennDOT 3-0 facilitated the Question and Answer portion of the presentation. He talked about the need for real-time traffic information on I-80. Also, when there are night time road closures on I-80, non-locals need to receive information in advance. Locals can detour themselves, but motorists unfamiliar with the area can get lost or be stuck in a very long queue.
- Lt. Carey mentioned that Amber Alerts work very well with ITS.
- Cindy Zerbe asked who the Regional Advisory Board was comprised of. Joel said that the Regional Advisory Panel (RAP) was made up of people from planning, airport authority, terrorist task force, municipal transit. This information is also on the website at [www.paits.org](http://www.paits.org).
- Joel commented on how the progress of this Region compares with the rest of the state. He said that their progress is consistent and compatible with the other Regions. This Region is a bit late and their process will end in February. PennDOT is unique in that it has coordinated this as a state effort with the Region's supporting each other.

**List of Attendees**

<b>Last Name</b>	<b>First Name</b>	<b>Agency</b>	<b>Email</b>	<b>Phone</b>
Alling	Janet	Lycoming-Clinton Counties Commission for Community Action (STEP)	<a href="mailto:jalling@stepcorp.org">jalling@stepcorp.org</a>	570-326-0587
Artley	Dennis	South Williamsport Area School District	<a href="mailto:dartley@mounties.k12.pa.us">dartley@mounties.k12.pa.us</a>	570-327-1581
Aungst	Bob	Columbia County Commissioner's Office of Planning and Development	<a href="mailto:raungst@columbiapa.org">raungst@columbiapa.org</a>	570-389-9146
Baker	Brian	Northern Tier Regional Planning and Development Committee		
Bower	Jim	Susquehanna Trailways		570-323-8534
Carey	Lt.James	Pennsylvania State Police		570-368-5611
Clark	Dennis	Susquehanna Health System	<a href="mailto:dclark2@shscares.org">dclark2@shscares.org</a>	570-321-3750
Conner	Betty	PennDOT Columbia/Montour County Maintenance Office	<a href="mailto:beconner@state.pa.us">beconner@state.pa.us</a>	570-387-4250
Daniels	Marley	Montour County Transit	<a href="mailto:monttran@ptd.net">monttran@ptd.net</a>	570-271-0833
Dressler	Nevin	PPL Susquehanna Nuclear Plant	<a href="mailto:gndressler@pplweb.net">gndressler@pplweb.net</a>	570-542-3627
Edwards	Ed	Columbia Montour Chamber of Commerce	<a href="mailto:eedwards@columbiamontourchamber.com">eedwards@columbiamontourchamber.com</a>	570-784-2522



Last Name	First Name	Agency	Email	Phone
Eisemann	David	Jersey Shore Area School District	<a href="mailto:deisemann@jsasd.k12.pa.us">deisemann@jsasd.k12.pa.us</a>	570-398-5057
Foust	Sherry	Montour County Transit		
Harmon	Fern	Pennsylvania Emergency Management Agency	<a href="mailto:fharmont@state.pa.us">fharmont@state.pa.us</a>	800-272-7362
Herman	Steve	SEDA-Council of Governments	<a href="mailto:sherman@seda-cog.org">sherman@seda-cog.org</a>	570-524-4491
Hickox	Robert	Central Pennsylvania Chamber of Commerce	<a href="mailto:bhickox@centpa.com">bhickox@centpa.com</a>	570-742-7341
Holgate	Kenneth	Con-Way Central Express	<a href="mailto:holgate.kenneth@con-way.com">holgate.kenneth@con-way.com</a>	570-538-1103
Hufnagel	Michael	Sullivan County Planning Commission	<a href="mailto:mhuf@epix.net">mhuf@epix.net</a>	570-946-5207
Huntington	Bob	Columbia County Planning		570-389-9146
Hutchins	Barry	Lycoming County 911 Centers		570-329-4060
Kebblitsch	Joseph	Wyalusing Area School District	<a href="mailto:jkeblitsch@wyalusingrams.com">jkeblitsch@wyalusingrams.com</a>	570-746-1605
Keller	Alan	PennDOT Engineering District 3-0	<a href="mailto:alakeller@state.pa.us">alakeller@state.pa.us</a>	570-368-4260
Mahosky	Guy	PennDOT Tioga County Maintenance Office	<a href="mailto:gmahosky@state.pa.us">gmahosky@state.pa.us</a>	570-724-4142

Last Name	First Name	Agency	Email	Phone
McClain	Teresa	PennDOT Engineering District 3-0	<a href="mailto:temcclain@state.pa.us">temcclain@state.pa.us</a>	570-368-4250
McDaniel	Thomas	Pennsylvania State Police		
McGeehan	Ed	Yellow Transportation Inc.	<a href="mailto:ed.mcgeehan@yellowcorp.com">ed.mcgeehan@yellowcorp.com</a>	717-560-3300
McLaughlin	Sgt. Tom	Pennsylvania State Police	<a href="mailto:tmclaughli@state.pa.us">tmclaughli@state.pa.us</a>	570-368-5611
McLaughlin	Shawn	Union County Planning Commission	<a href="mailto:smclaughlin@unionco.org">smclaughlin@unionco.org</a>	570-368-5611
Miller	Sandra	Lycoming-Clinton Counties Commission for Community Action (STEP)	<a href="mailto:smiller@stepcorp.org">smiller@stepcorp.org</a>	570-389-5731
Mutchler	Steve	PennDOT Engineering District 3-0	<a href="mailto:smutchler@state.pa.us">smutchler@state.pa.us</a>	570-368-4248
Neuner	Al	Geisinger System Services		
Pack	Michael	PennDOT Central Office	<a href="mailto:mpack@state.pa.us">mpack@state.pa.us</a>	570-326-2500
Pheasant	Pam	Southern Columbia Area School District	<a href="mailto:ppheasant@scolumbiasd.k12.pa.us">ppheasant@scolumbiasd.k12.pa.us</a>	570-356-2331
Piatt	William	NYS DOT	<a href="mailto:wpiatt@dot.state.ny.us">wpiatt@dot.state.ny.us</a>	607-324-8412
Robbins	Clyde	Bradford County Airport Authority		570-265-4900

Last Name	First Name	Agency	Email	Phone
Schreiber	Terry	Jersey Shore Hospital	<a href="mailto:lditzel@jsh.org">lditzel@jsh.org</a>	570-398-0100
Shields	Gary	North Shore Railroad/Lycoming Valley Railroad	<a href="mailto:gshields@nshr.com">gshields@nshr.com</a>	570-473-7949
Stolinas	Raymond	Bradford County Planning Office		
Strouse	Dennis	Geisinger System Services		
Thorne	Robert	PennDOT Bradford County Maintenance Office	<a href="mailto:rthorne@state.pa.us">rthorne@state.pa.us</a>	570-265-2181
Tosca	Sandra	PennDOT Engineering District 3-0	<a href="mailto:stosca@state.pa.us">stosca@state.pa.us</a>	570-368-4259
Turner	Connie	Lycoming County 911	<a href="mailto:connie.turner@lyco.org">connie.turner@lyco.org</a>	
Wirth	Doug	Susquehanna Trailways		
Zerbe	Cindy	Union-Snyder Transportation Alliance	<a href="mailto:czerbe@ustatrans.org">czerbe@ustatrans.org</a>	570-522-1390

# Pennsylvania Intelligent Transportation Systems (ITS) Architecture

North-Central Region  
Stakeholders' Meeting  
November 18, 2004



## Welcome

**Sandra Tosca**  
Pennsylvania Department of Transportation Assistant  
District Executive for Maintenance  
Engineering District 3-0



## Agenda

- Welcome – Sandra Tosca, PennDOT District 3-0
- Background – Michael Harris, PB Farradyne
- Enforcement Approach - Lt. Thomas McDaniel, Pennsylvania State Police
- Statewide Vision and Statewide Planning – Michael Pack, PennDOT Central Office
- Regional Operations – Teresa McClain, PennDOT District 3-0
- Regional ITS Planning and Validation of the ITS Architecture – Joel Ticatch, PB Farradyne
- Questions and Answers – Alan Keller, PennDOT District 3-0



## Representation

- PennDOT
- PSP
- Transit
- Counties
- Municipalities
- Emergency Management Agencies
- Planning Offices
- Enforcement Community
- Media
- Tourism and Event Destinations
- Economic Development Agencies
- School Districts
- Policymakers



## North-Central Pennsylvania Regional Description

- PennDOT District 3-0 Region
  - 9 County Region; 1 MPO, 2 RPO's
  - Borders New York State
  - Predominantly rural in nature
  - Regional Long-Range Transportation Plans currently being developed
  - ITS Architecture required to meet Federal Mandate, enabling the Region to use Federal funds for ITS
  - Region, to date, has made limited investment in ITS
  - Regions and State responsible for preparing ITS Architectures



## North-Central Pennsylvania Transportation Challenges

- Use ITS to improve safety, enhance mobility, and support economic development
- Manage a safe, accessible, and environmentally-sound intermodal transportation network that provides for the efficient movement of people and goods across the Region
- Identify and respond, safely and efficiently, to roadway emergencies and incidents
- Furnish road and traffic conditions data, transit data, travel advisories, routing information, etc. to travelers and commuters



## We need your help because...

- **Your knowledge is required to validate critical baseline information**
- Your insights and perspectives on regional conditions and activities are needed
- Some of you operate a piece of the transportation system
- Some of you are involved in planning and programming for regional transportation
- Some of you help set transportation policy in the Region
- **All of you have a stake in transportation conditions and performance in the Region**



## What we need from you...

- Attend meetings on this effort
- Validate the work presented to you
- Champion ITS
- Outreach to other stakeholders and organizations about ITS
- Continue the ITS regional dialogue beyond this effort



## Background

**Michael Harris**  
PB Farradyne



## ITS?

Intelligent Transportation Systems (ITS) is simply technology being used in the transportation environment

ITS:

- Improves Safety
- Maximizes Mobility
- Fulfills Traveler Needs
- Supports Enhanced Security
- Manages Capacity



## Types of ITS

- Freeway
  - Highway Advisory Radio
  - Dynamic Message Signs
  - 511
  - CCTV
  - HOV
  - Freeway Service Patrol
- Arterial
  - Advanced Signal Systems
- Transit
  - Advanced Vehicle Location
  - Automated Dispatching



## Types of ITS

- Emergency
  - Incident Management
  - E911
- Road Weather Information
- Electronic Payment
  - EZPass
  - Smart Cards



## Architecture?

Architecture – the *plan* for design and construction

Deploying ITS technology is good, but we need to do it efficiently through better *planning*, coordination, and integration



PA  
rchitecture  
PB

## In context



Projects



PA  
rchitecture  
PB

## In context

### ITS Project



PA  
rchitecture  
PB

## At Issue ...

- ITS investments are made before plans are set
- Lack of interoperability of ITS systems
- Limited forum for regional agencies to plan for ITS capital and ITS Operations and Maintenance
- Federal mandate



PA  
rchitecture  
PB

## An Opportunity ...

- Conduct Regional ITS Architectures to:
  - Provide a framework for regional integration
  - Create a forum for stakeholders to address ITS operations and functions to validate how operations will interconnect and why
  - Allow integration options to be considered before investment decisions are made
  - Conform to Federal mandate



PA  
rchitecture  
PB

## The Federal Mandate

Regional ITS Architectures must be completed in partnership with the State and regional planning partners by April 8, 2005 for use of Federal funds for ITS



PA  
rchitecture  
PB

## The Expectation ...

- The State and metropolitan planning organizations are ultimately responsible for ensuring that the mandate's conditions are met
- A process must be put in place for initial Architecture development and for revisiting and updating the Regional Architecture as necessary



PA  
r e a r c h i t e c t u r e

PB

## Regional Benefits

- Ensures institutional agreement among ITS stakeholder agencies
- Implements a process for planning ITS integration
- Enhances interoperability



PA  
r e a r c h i t e c t u r e

PB

## Regional Benefits

- Allows integration options to be considered before investments are made
- Ensures that ITS activities are consistent with State and metropolitan planning processes
- Establishes a common framework for future ITS operations across the Region & State



PA  
r e a r c h i t e c t u r e

PB

## Pennsylvania State Police

Lt. Thomas McDaniel



PA  
r e a r c h i t e c t u r e

PB

## Incident Management & ITS



PA  
r e a r c h i t e c t u r e

PB

## Highway Incident Management

- Detection
- Verification
- Response
- Scene Management & Info to Motorists
- Clearance & Restoration



PA  
r e a r c h i t e c t u r e

PB

## Detection

- Cell Phones (911)
- ITS Technology
  - Microwave or Loop Detectors
  - CCTV
- Freeway Service Patrols
- "Eyes on the Road"



## Verification

- Determine precise location of the incident
- Determine nature of incident
- What resource agencies are needed



## Response

- Law Enforcement
- Fire & Rescue
- EMS
- Transportation
- Towing & Recovery



## Incident Scene Management

- Safety (responders, public and injured)
- Stabilize the incident scene
- Traffic Control (backlogs & secondary crashes)
- Investigation and evidence preservation
- Clear the lanes of crash debris
- Removal of responders from lanes



## Scene Management

- Motorcycle Patrols
- Clear the Lane
- Crash Investigation
- Secondary Crashes
- Unified Command Training (PSP participation & trainers)
- Highway Incident Scene Safety and Traffic Control Training



## The Five Functional Sections of the ICS

- Command
- Operations
- Planning
- Logistics
- Finance/Administration





## Information to Motorists

- VMS
- District TMC
- Upstream traffic diversion (ahead of the detour point)
- Local media/traffic reporting



## Clearance & Restoration

- Clear the lanes of:
  - Crashes
  - Crash debris (T&R, may be done off-peak)
  - Roadway infrastructure damage repair
  - Other hazards (apply non-skid material)
- Restore traffic to normal flow conditions



## Pre-Planning & Coordination

- Detour routes for major highways
- Special Events
- Incident Management meetings
  - Regions and Corridors
  - IM Plans
  - IM Plans for construction projects



## Statewide Vision & Planning

**Michael Pack**  
PennDOT Central Office



## Statewide Operations Vision



## Transportation

- Industry evolution
  - Build
  - Build and Maintain
  - Build, Maintain, and Operate
- Efficiency is required for economic vitality
  - Results focused on transportation operations



## Transportation Operations

- Safety
- Security
- Mobility (Congestion)

*All are challenges for today and the foreseeable future*



PA

architecture

PB

## Congestion Solution

- Comprehensive, coordinated, and long-term commitment to balanced investment in:
  - Building Capacity
  - Better Managing Capacity
  - Reducing Demand, through modal alternatives and changes in land-use patterns



PA

architecture

PB

## Regional Tool

- Regional ITS Architectures
  - Form the building blocks of transportation operations
  - ITS supports managing capacity and improves safety and security
  - Supports a balanced look at congestion improvement investments

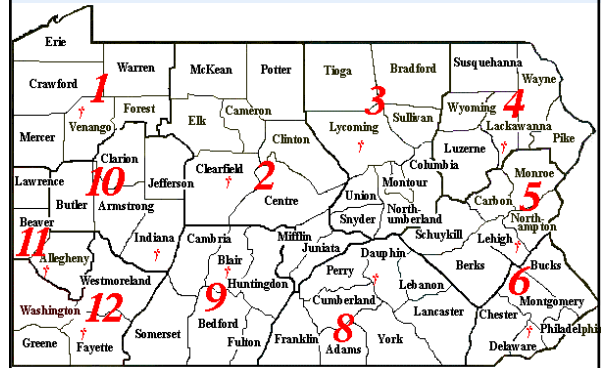


PA

architecture

PB

## PennDOT District Map



## Statewide Vision

- Transportation Management Centers in each Region
- Incident Management and Reporting Software
- Incident Management Program for All Interstate Highways
- ITS Data Integration and Information Sharing
  - Voice
  - Data
  - Video
- PA Mobility (Congestion Management) Strategy
- 24 X 7 Operations

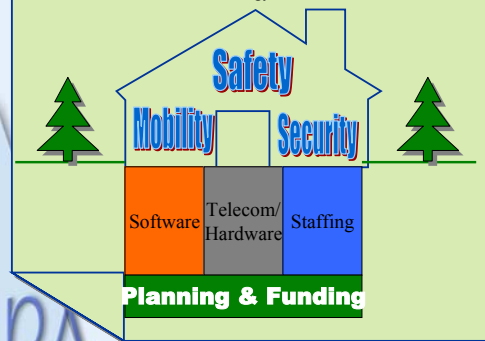


PA

architecture

PB

ITS Technology & Services

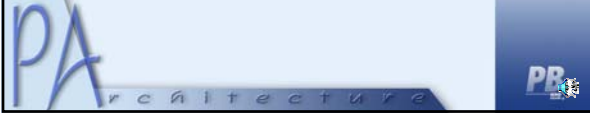


PA

architecture

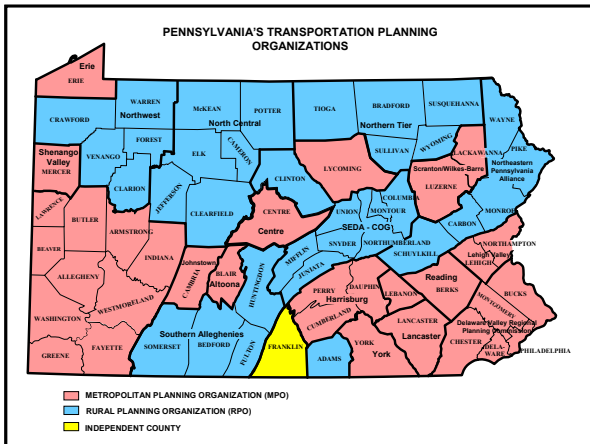
PB

## ITS & Statewide Planning



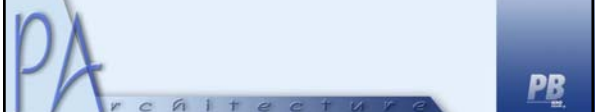
## Statewide Planning Opportunity

- Create a framework for regional and statewide integration
- Establish a basis for sound investments
- Create a regional forum for stakeholders to address ITS/Operational issues
- Advance the use of ITS to better manage our transportation system



## Project Objective

Complete Regional ITS Architectures in partnership with planning organizations throughout the State to meet the Federal mandate by April 8, 2005 for use of Federal funds for ITS operations



## Scope of Work

- Champions
- Regional Advisory Panels
- "Strawman"
- Validation
- Regional Meetings
- Finalize

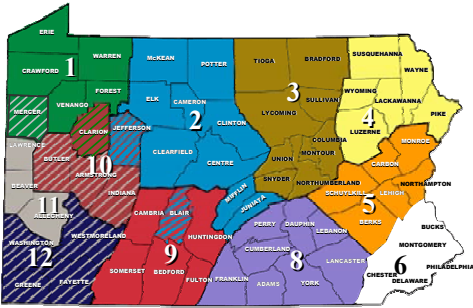


## Project Organization

- Guided by a Statewide Working Group
- Each Region is led by a Regional Advisory Panel (RAP)
- Each Region has identified ITS Architecture Champions



## Regional Architecture Boundaries



## How will the Architecture be used?

- Provides a foundation for future ITS investment discussions among stakeholders
- Provides a State business case for ITS investment in:
  - Long-range plans
  - Transportation improvement programs
  - Annual work programs



## What we will have ...

- Validated, accepted ITS Architecture for every Region in the State
- List of projects for each Region
- Working groups/stakeholders discussing ITS per Region
- ITS Champions in every Region
- Federal Partnership



## What we will need to do ...

- PENNDOT Transportation Systems Operation Plan (TSOP)
  - ITS Architectures as "inputs"
  - Prioritize projects
  - Draft TSOP to be completed by May 2005
- Regional Plans/Programs
  - Prioritize Projects
  - Incorporate into MPO/RPO Long-Range Plans and TIP's



## Regional Operations

**Teresa McClain**  
 Pennsylvania Department of Transportation  
 Assistant Traffic Engineer/ITS Coordinator  
 Engineering District D3-0



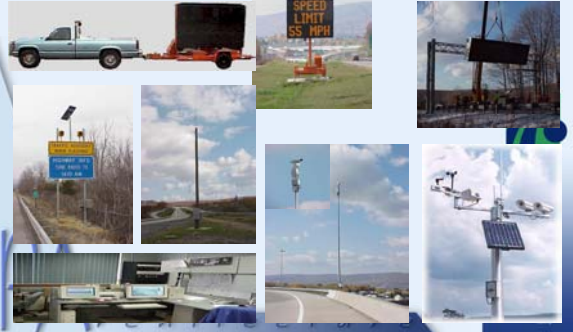
## PENNDOT District 3-0 ITS Operations



## District 3-0 Region



## Intelligent Transportation Systems (ITS)



## Portable & Permanent VMS

(Variable Message Signs)



Currently there are close to two dozen movable VMS units which can be programmed and placed in operation by county personnel.

There are 4 movable VMS units permanently mounted along the District's Interstate system.



One post-mounted VMS unit is operational in Northumberland County along I-80.



## HAR

(Highway Advisory Radio)



PORTABLE HAR

Source: [www.pennstate.edu](http://www.pennstate.edu)

The District has three portable Highway Advisory Radio units (beacons and transmitters) which can be programmed and placed in operation by county personnel. No permanent units are currently installed.

TRANSMITTER



PERMANENT BEACON

(530AM, 1610AM, and 1640AM)



## Cameras

The installation of cameras within District 3-0, to monitor roadway conditions and status, is an option for the future.



## RWIS

(Roadway Weather Information System)



There are 5 RWIS units located within District 3-0. These units are also equipped with still cameras.



SR 15 Bloss Mt., Tioga Co.



## Incident Management Trailer



## PennDOT Traffic Management Centers



District 4-0



District 6-0



## Other ITS Activities

- Improved incident/emergency management and coordination using ITS.
- Advanced traffic signal systems (municipalities) – PennDOT permits.
- Electronic information dissemination (e-mail and web-based).
- Pre-assigned detour routes.



## Regional ITS Planning & Validation of the Architecture

Joel Ticatch  
PB Farradyne



## Context for Regional Planning



## Regional Demographics

- The North-Central Region is predominantly rural
  - Total regional population is approximately 487,000
- Williamsport is the Region's central urban area
  - Williamsport population is 30,700
  - Lycoming County population is 120,000
- The Region's population is older than the national average
- The Region's mean family size is smaller than the national average



## Regional Transportation

- Significant travel destinations exist within the Region
- Significant traffic travels through the Region to external destinations
  - I-80 east-west
  - I-99/US-15 north-south
- Several recent large-scale incidents on I-80
  - Emphasized the need for rapid, accurate, and informative communications with motorists
- The use of public transportation in the Region is extremely limited, equating to less than one percent of all commuter trips



## Regional Transportation Focus

- Limited focus on Intelligent Transportation Systems to date
- Currently working on developing major infrastructure elements:
  - US-15/I-99 limited access highway
  - Central Susquehanna Valley Transportation
  - Market Street Bridge (Williamsport)
- In the future, the focus will need to shift from building additional system capacity to preservation/operational improvements



## Potential Regional Benefits of ITS

- Increase capacity of the transportation infrastructure without building significant new facilities
  - Better manage day-to-day transportation operations
  - Improve communications with travelers during incidents and emergencies
  - Enhance the attractiveness of public transit
  - Support the economic vitality of the Region
- **The Regional ITS Architecture defines the operations and technology infrastructure for coordinated implementation of these improvements**



## Architecture Validation & Outreach



## ITS Strawman Architecture Process

1. Prepare Work Plan
2. Appoint Regional Advisory Panel and ITS Regional Champion to Oversee Process
3. Inventory Systems and Gather Information on Existing and Planned ITS Activities
4. Generate ITS Strawman Architecture
5. **Validate ITS Architecture**
6. Finalize ITS Architecture



## Characteristics of the ITS Architecture

- Identifies the ITS projects and activities across the Region
- Inventories the ITS systems – both existing and planned – associated with those projects
- Describes the inter-relationships among the Region's ITS systems:
  - Which systems are linked?
  - What types of information pass over these links?
  - In which direction(s) does the information flow?



## Characteristics of the Strawman Document

- The *Strawman* is a draft document
- The *Strawman* is a temporary – ephemeral – document to be refined and eventually replaced by a more permanent document
- The *Strawman* is designed to be “knocked down,” reconstituted, and reconfigured
- The *Strawman* gives stakeholders a common baseline to react to



## We Need Your Help Because...

- **Your knowledge is required to validate the contents of the Strawman Architecture**
- Your insights and perspectives on regional conditions and activities are needed
- Some of you operate a piece of the transportation system
- Some of you are involved in planning and programming for regional transportation
- Some of you help set transportation policy in the Region
- **All of you have a stake in transportation conditions and performance in the Region**



## Regional Validation Sessions

- Large-Group Stakeholder Meetings (2)
  - November 2004 & February 2005
- Small-Group Validation Meetings (5)
  - December 2004



## Validation Meeting Schedule

### Day 1

- *Traffic Management* December 15, 9:00AM
- *Emergency/Incident Management* December 15, 1:00PM

### Day 2

- *Transit Management* December 16, 9:00AM
- *Transportation Planning* December 16, 1:00PM
- *Traveler Information/Tourism* December 16, 3:00PM



## Validation Meeting Activities

- Review pertinent ITS Architecture diagrams
- Help identify and clarify:
  - *Interconnections*: Who do you connect with, or want to connect with in the future?
  - *Information flows*: What information do you pass over the connection, or want to pass in the future?
  - *Directional flow*: In what direction(s) does the information flow – now and in the future?
- Brainstorm about potential ITS projects for the Region



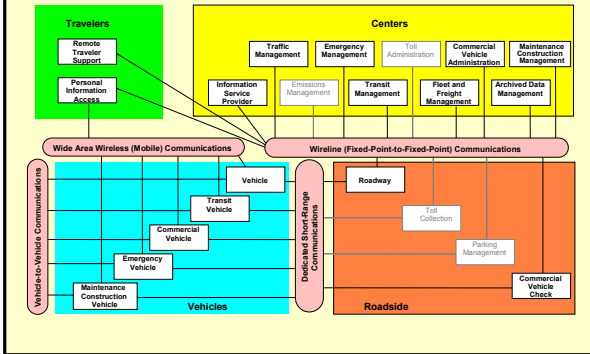
## Sample Diagrams

### 911 Communication Centers

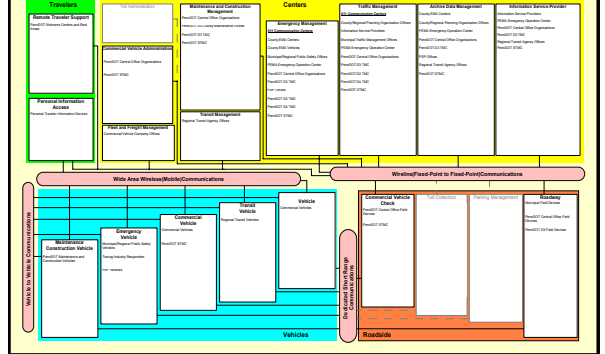




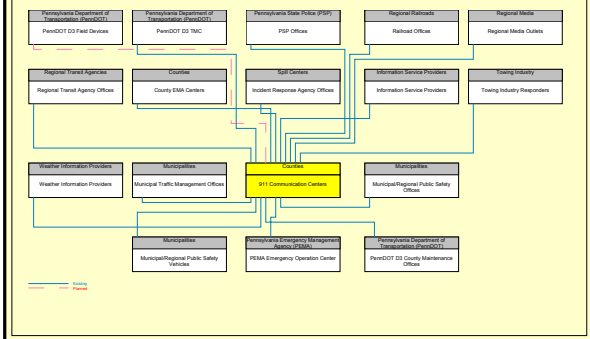
## PennDOT District 3-0 Regional ITS Architecture Framework



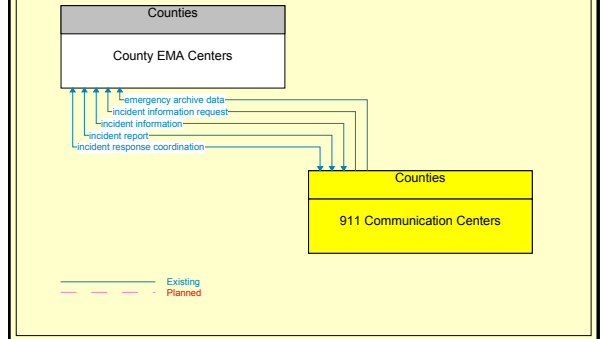
## PennDOT District 3-0 Architecture Framework by Elements



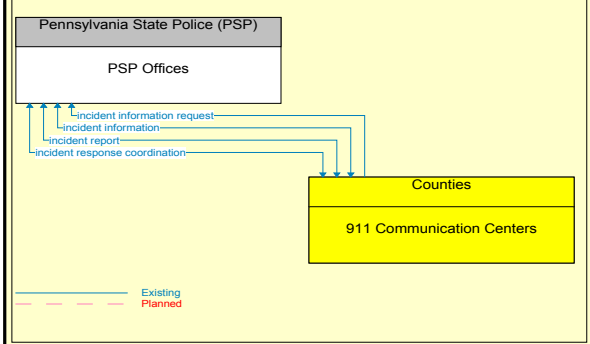
## 911 Communication Centers Interconnect Diagram



## 911 Communication Centers & County EMA Centers Information Flow Diagram

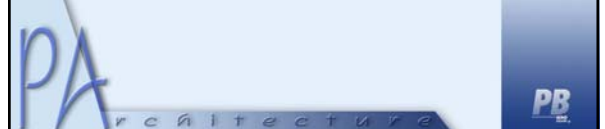


## 911 Communication Centers & PSP Offices Information Flow Diagram



## Next Steps

- Determine the Validation Meetings you will attend
- RSVP for the Validation Meetings
- Bring today's packet to the Validation Meetings
- Attend the Validation Meetings on December 15 or 16



## Moving Forward

- Consolidate Validation Meeting inputs and comments
- Reconcile conflicts with the Regional Advisory Panel
- Finalize ITS Architecture
- Convene 2nd Stakeholder Session (February 2005)



## Planned Regional Actions

- Utilize ITS concepts and projects in Regional Long-Range Plans
- Continue the ITS regional dialogue
- Institutionalize ITS
- Develop an ITS Implementation Plan for the Region



## Contacts

- **Teresa McClain, PENNDOT D3-0**  
Phone: 570-368-4250  
Email: temclain@state.pa.us
- **Joel Ticatch, PB Farradyne**  
Phone: 703-742-5973  
Email: Ticatch@pbworld.com
- **Joseph Barr, PB Farradyne**  
Phone: 215-209-1251  
Email: Barr@pbworld.com



## Questions & Answers

**Alan Keller**  
PennDOT D3-0



## Appendix G: Validation Meeting Minutes

**Date:** December 15, 2004

**Location:** PennDOT Engineering District 3-0 Headquarters, Montoursville, PA

**Attendees:** Alan Keller, PennDOT District 3-0  
Michael Kerstetter, PennDOT District 3-5  
Guy Mahosky, PennDOT District 3-7  
Rick Mason, PennDOT District 3-0  
Teresa McClain, PennDOT District 3-0  
Steve Mutchler, PennDOT District 3-0  
Michael Pack, PennDOT Central Office  
Raymonf Perritt, PennDOT District 3-2/3-6  
Bob Thorne, PennDOT District 3-9  
Sandy Tosca, PennDOT District 3-0  
Joel Ticatch, Parsons Brinckerhoff  
Joseph Barr, Parsons Brinckerhoff

**Prepared By:** Joseph Barr, Parsons Brinckerhoff

---

A meeting was held on December 15, 2004 from 9:00am to 11:30am at the PennDOT Engineering District 3-0 Headquarters, to validate the following elements of the District 3-0 Regional ITS Architecture:

- Adjacent PennDOT District and County Office
- Adjacent State TMCs
- Municipal Field Devices
- Municipal Traffic Management Offices
- PennDOT D2 TMC
- PennDOT D3 County Maintenance Offices
- PennDOT D3 Field Devices
- PennDOT D3 TMC
- PennDOT D3 TMC
- PennDOT Maintenance and Construction Vehicles

For each of the elements, a validation package was developed showing the interconnect diagram and the information flow diagrams associated with that element. The packages for each of the elements were then combined into a single PowerPoint presentation, which was reviewed with the stakeholders in attendance.

The meeting began with a welcome by J. Ticatch, along with a review of the process to date and the steps that have been taken to get to this point. He also provided an overview of the purpose and format of the meeting, and distributed additional handouts to aid stakeholders in the validation process. He also requested that stakeholders provide input regarding potential future ITS projects in the region, without worrying about issues such as funding or detailed feasibility.

The following is a list of comments that we're provided at the meeting. General comments are noted first, followed by the specific change, additions, and deletions that were suggested for each element.

### **General Comments**

- M. Pack noted that District 3-0 has been approved for funding to develop an ITS Strategic Plan and a Concept of Operations.
- A stakeholder mentioned that communication between the D3 TMC and the County Maintenance Offices is two-way, for maintenance and construction information.
- A stakeholder noted that it is important to obtain detailed local contact information for emergency and incident response, because time is of the essence in these types of communications.

### **Adjacent PennDOT District and County Offices**

#### Changes

None

#### Additions

None

#### Deletions

None

### **Adjacent State TMCs**

#### Changes

None

Additions

None

Deletions

None

**Municipal Field Devices**

Changes

None

Additions

None

Deletions

None

**Municipal Traffic Management Offices**

Changes

1. Change name of element to "Municipal Office"
2. All flows to/from Information Service Providers – *Planned*

Additions

1. Incident Information Request to/from PSP Offices – *Existing*
2. Incident Information to/from PSP Offices – *Existing*

Deletions

None

**PennDOT D2 TMC**

Changes

None

Additions

None

Deletions

None

**PennDOT D3 County Maintenance Offices**

Changes

1. Current Asset Restrictions to PennDOT D3 TMC – *Two Way*
2. Equipment Maintenance Status to PennDOT D3 TMC – *Two Way*
3. Maint and Constr Resource Response to PennDOT D3 TMC – *Two Way*
4. Maint and Constr Work Plans to PennDOT D3 TMC – *Two Way*
5. Incident Response Status from PennDOT D3 TMC – *Two Way*
6. Main and Constr Resource Request from PennDOT D3 TMC – *Two Way*
7. Road Network Conditions from PennDOT D3 TMC – *Two Way*
8. Work Plan Coordination from PennDOT D3 TMC – *Two Way*
9. Road Weather Information to 911 Communication Centers – *Two Way*
10. Road Weather Information to PSP Offices – *Two Way*
11. Incident Response Status from PSP Office – *Two Way*
12. Weather Information from Weather Information Providers – *Two Way*

Additions

1. Road Network Conditions to Local/Regional School District Offices – *Planned*
2. Maint and Constr Work Plans to Local/Regional School District Offices – *Planned*
3. Emergency Notification to Local/Regional School District Offices – *Planned*
4. Weather Information to Local/Regional School District Offices – *Planned*
5. Road Network Conditions to/from 911 Communication Centers – *Existing*
6. Media Information Request from Regional Media Outlets – *Existing*

Deletions

1. All flows to/from Regional Transit Agency Offices

## **PennDOT D3 Field Devices**

### Changes

None

### Additions

None

### Deletions

None

## **PennDOT D3 TMC**

### Changes

1. Current Asset Restrictions from PennDOT D3 County Maintenance Office – *Two Way*
2. Maint and Constr Work Plans from PennDOT D3 County Maintenance Office – *Two Way*
3. Incident Response Status to PennDOT D3 County Maintenance Office – *Two Way*
4. Road Network Conditions to PennDOT D3 County Maintenance Office – *Two Way*
5. Work Plan Coordination to PennDOT D3 County Maintenance Office – *Two Way*
6. Incident Response Status from PEMA Emergency Operation Center – *Two Way*
7. All flows to/from Regional Transit Agency Offices – *Planned*
8. Field Device Status from PennDOT D3 Field Devices – *Planned*
9. Freeway Control Status from PennDOT D3 Field Devices – *Planned*
10. Traffic Flow from PennDOT D3 Field Devices – *Planned*
11. Traffic Images from PennDOT D3 Field Devices – *Planned*
12. Freeway Control Data to PennDOT D3 Field Devices – *Planned*
13. Video Surveillance Control PennDOT D3 Field Devices – *Planned*
14. Traveler Information to PennDOT Welcome Centers and Rest Areas – *Existing*

Additions

1. Traffic Information Coordination to 911 Communications Center – *Existing*
2. Maint and Constr Work Plans to Local/Regional School Districts – *Planned*
3. Emergency Notification to Local/Regional School Districts – *Planned*
4. HRI Request to Railroad Offices – *Planned*
5. HRI Status from Railroad Offices – *Planned*
6. Maint and Constr Work Plans from Private Utility Company Offices – *Planned*
7. Roadway Information System Data to PennDOT D3 Field Devices – *Planned*

Deletions

1. Road Weather Information to Adjacent PennDOT District and County Offices
2. All flows to/from Incident Response Agency Offices
3. Incident Information Request from Municipal Traffic Management Offices
4. Road Network Conditions from Municipal Traffic Management Offices
5. Incident Response Status from Municipal Traffic Management Offices
6. Incident Information from Municipal Traffic Management Offices

**PennDOT D4 TMC**

Changes

None

Additions

None

Deletions

None

**PennDOT Maintenance and Construction Vehicles**

Changes

None



Additions

None

Deletions

None

**Potential Projects**

- Toll-free information number for the general public.
- Video displays of information from Community Relations Coordinator, located at roadside rest areas and PennDOT Welcome Centers.
- Roadside beacons to let travelers know that up-to-date traveler information is available (similar to HAR beacons).
- Database of operations-related information (including personnel contact information) that is automatically updated as changes happen.
- Detailed listing of operational procedures for incident response (including set of Standard Operating Procedures).

**Date:** December 15, 2004

**Location:** PennDOT Engineering District 3-0 Headquarters, Montoursville, PA

**Attendees:** Scott Bitting, Geisinger Health System  
Dave Dietz, PennDOT District 3-5/3-8  
G. Nevin Dressler, PPL  
Alan Keller, PennDOT 3-0  
Teresa McClain, PennDOT 3-0  
Steve Mutchler, PennDOT 3-0  
Michael Pack, PennDOT Central Office  
Terry Schreiber, Jersey Shore Hospital  
Jim Shunbet, Susquehanna Health System  
Brian Toseki, PennDOT 3-0  
Connie Turner, Lycoming County Department of Public Safety/911 Center  
Joel Ticatch, Parsons Brinckerhoff  
Joseph Barr, Parsons Brinckerhoff

**Prepared By:** Joseph Barr, Parsons Brinckerhoff

---

A meeting was held on December 15, 2004 from 1:00pm to 3:30pm at the PennDOT Engineering District 3-0 Headquarters, to validate the following elements of the District 3-0 Regional ITS Architecture:

- 911 Communication Centers
- Adjacent State Public Safety/Emergency Management Centers
- County EMA Centers
- County EMA Vehicles
- Municipal/Regional Public Safety Offices
- Municipal/Regional Public Safety Vehicles

For each of the elements, a validation package was developed showing the interconnect diagram and the information flow diagrams associated with that element. The packages for each of the elements were then combined into a single PowerPoint presentation, which was reviewed with the stakeholders in attendance.

The meeting began with a welcome by J. Ticatch, along with a review of the process to date and the steps that have been taken to get to this point. He also provided an overview of the purpose and format of the meeting, and distributed additional handouts to aid stakeholders in the validation process. He also requested that stakeholders

provide input regarding potential future ITS projects in the region, without worrying about issues such as funding or detailed feasibility.

The following is a list of comments that we're provided at the meeting. General comments are noted first, followed by the specific change, additions, and deletions that were suggested for each element.

### **General Comments**

- Communication between the D3 TMC and 911 Centers is limited; most of the flows actually go from the 911 Centers to/from the County Maintenance Offices.
- The 911 Centers and the EMA Centers are sometimes the same agency and sometimes not the same agency, although in all cases, they are tightly integrated/coordinated.
- Communications between 911 Centers and High Threat Facilities is for fire and medical assistance. All other communications are with the EMA Center.
- Emergency and alarm information are communicated from regional hospitals to 911 Centers. 911 Centers also sometimes notify hospitals in advance of major incidents that will affect them.
- Several stakeholders mentioned the FRED (Facility Response Emergency Dispatch) system that is run by the EMS Council, which is activated for emergency notification in the event of major facility emergencies which will heavily impact regional hospitals.
- One stakeholder mentioned the new National Emergency Management System that is being developed, and asked how this is being represented. J. Ticatch responded that the connections to the homeland security agencies is developing very rapidly, and this will therefore be an area to monitor as a basis for updating the architecture.
- 911 representatives noted that the Lycoming County 911 Center dispatches the fire apparatus at Williamsport Regional Airport (IPT).

### **911 Communication Centers**

#### Changes

1. Incident Information Request to/from PSP Offices – *Two Way*
2. Incident Report from Incident Response Agency Office – *Reverse Flow*
3. All Flows to/from Municipal/Regional Public Safety Vehicles – *Two Way*
4. External Reports from Regional Media Outlets – *Reverse Flow*

Additions

1. Flows to/from PennDOT D3 County Maintenance Offices – *Ensure that flows match those to/from PennDOT D3 TMC*
2. Emergency Dispatch Response to Regional Airports – *Existing*
3. Emergency Dispatch Requests from Regional Airports – *Existing*
4. Emergency Operations Status to/from County EMA Centers – *Existing and Two Way*
5. Emergency Data Request to/from County EMA Centers – *Existing and Two Way*
6. Emergency Acknowledge to/from County EMA Centers – *Existing and Two Way*
7. Emergency Notification to/from County EMA Centers – *Existing and Two Way*
8. Emergency Dispatch Request to PSP Office – *Planned*
9. Emergency Dispatch Response from Regional Transit Agency Offices – *Existing*
10. Emergency Dispatch Requests to Regional Transit Agency Offices – *Existing*
11. Emergency Dispatch Response from Municipal Traffic Management Offices – *Existing*

Deletions

1. Emergency Traffic Control Request to Municipal (Traffic Management) Offices
2. Emergency Traffic Control Response from Municipal (Traffic Management) Offices
3. All flows to/from Information Service Providers
4. Incident Command Information to Towing Industry Responders
5. Emergency Dispatch Response from Towing Industry Responders
6. Incident Command Request from Towing Industry Responders

**Adjacent State Public Safety/Emergency Management**

Changes

None

Additions

1. Incident Response Coordination to/from PennDOT D3 County Maintenance Offices – *Existing*

Deletions

None

**County EMA Centers**

Changes

1. All Flows to/from Event Promoters – *Planned*
2. Incident Report to/from Incident Response Agency Offices – *One Way (to Incident Response Agency Offices)*

Additions

1. Flows to/from PennDOT D3 County Maintenance Offices – *Ensure that flows match those originally shown to/from PennDOT D3 TMC*
2. High Threat Facility Route Plan to Municipal/Regional Public Safety Offices – *Existing*

Deletions

1. All flows to/from PennDOT D3 TMC
2. Transit Information Request to Regional Transit Agency Offices
3. Transit Request Confirmation from Regional Transit Agency Offices
4. All flows to/from Information Service Providers

**County EMA Vehicles**

Changes

None

Additions

None

Deletions

None

**Municipal/Regional Public Safety Offices**

Changes

None

Additions

1. Emergency Dispatch Requests from 911 Communication Centers – *Existing*
2. Emergency Dispatch Response to 911 Communication Centers – *Existing*

Deletions

1. All flows to/from Municipal/Regional Public Safety Vehicles

**Municipal/Regional Public Safety Vehicles**

Changes

1. Incident Command Information from 911 Communication Centers – *Reverse Flow*
2. Incident Command Request to 911 Communication Centers – *Reverse Flow*
3. Local Signal Preemption Request to Municipal Field Devices – *Existing*
4. Incident Command Information from Municipal/Regional Public Safety Offices – *Reverse Flow*
5. Incident Command Request to Municipal/Regional Public Safety Offices – *Reverse Flow*

Additions

None

Deletions

1. All flows to/from Municipal/Regional Public Safety Offices

**Potential Projects**

- Sharing of traffic video (when available) with 911 Centers (and others).
- Development of an improved incident command structure.
- Lycoming County EMA emergency response unit.
- PennDOT liaison desk located at Lycoming County EMA Office.

**Date:** December 16, 2004

**Location:** PennDOT Engineering District 3-0 Headquarters, Montoursville, PA

**Attendees:** Joe Keblitsch, Wyalusing Area School District  
Kevin Kilpatrick, City Bus/Williamsport Bureau of Transportation  
Teresa McClain, PennDOT District 3-0  
Mark Murawski, Lycoming County Planning Commission  
Gary Shields, Lycoming Valley Railroad Company  
Doug Wirth, Susquehanna Transit Company  
Mike Pack, PennDOT Central Office  
Joel Ticatch, Parsons Brinckerhoff  
Joseph Barr, Parsons Brinckerhoff

**Prepared By:** Joseph Barr, Parsons Brinckerhoff

---

A meeting was held on December 16, 2004 from 9:00am to 11:00am at the PennDOT Engineering District 3-0 Headquarters, to validate the following elements of the District 3-0 Regional ITS Architecture:

- Railroad Offices
- Regional Transit Agency Offices
- Regional Transit Vehicles

For each of the elements, a validation package was developed showing the interconnect diagram and the information flow diagrams associated with that element. The packages for each of the elements were then combined into a single PowerPoint presentation, which was reviewed with the stakeholders in attendance.

The meeting began with a welcome by J. Ticatch, along with a review of the process to date and the steps that have been taken to get to this point. He also provided an overview of the purpose and format of the meeting, and distributed additional handouts to aid stakeholders in the validation process. He also requested that stakeholders provide input regarding potential future ITS projects in the region, without worrying about issues such as funding or detailed feasibility.

The following is a list of comments that we're provided at the meeting. General comments are noted first, followed by the specific change, additions, and deletions that were suggested for each element.

### **General Comments**

- Some of the stakeholders asked how the information flows that are shown in the ITS Architecture develop into actual projects. J. Ticatch used an example of

how a flow showing traveler information from a transit agency to a customer could then turn into a project to install an Automatic Vehicle Location system.

- School district representatives asked about how information travels from the county maintenance offices to the local stockpiles, for road clearance and maintenance. PennDOT representatives indicated that this take place through voice and data communications that are already in place. For the purposes of the architecture, these local stockpiles are not explicitly represented, but are instead simply included as part of the county maintenance offices element.
- G. Shields indicated that his railroad is testing a system that uses GPS-equipped cell phones to provide location information for trains.
- M. Murawski provided a description of the coordination process that currently takes place between transit agencies and county planning agencies, which can be expanded to include ITS issues. He also mentioned that WATS is currently performing a freight study that is looking at moving freight from truck to rail, to mitigate some of the problems that are created by increasing truck movements.
- Lycoming County is currently developing its comprehensive plan, which will include targeted growth areas, mostly along the river corridors.

### **Local/Regional School District Offices**

#### Changes

None

#### Additions

1. Driver Instructions to Local/Regional School District Vehicles – *Existing*
2. Transit Emergency Data from Local/Regional School District Vehicles – *Existing*
3. Transit Vehicle Conditions from Local/Regional School District Vehicles – *Existing*
4. Transit Vehicle Location Data from Local/Regional School District Vehicles – *Planned*

#### Deletions

None

### **Local/Regional School District Vehicles**

#### Changes

None



Additions

1. Transit Emergency Data to 911 Communications Centers – *Existing*
2. Transit Emergency Data to County EMA Centers – *Existing*
3. Maint and Constr Work Plans from PennDOT D3 County Maintenance Offices – *Planned*

Deletions

None

**Railroad Offices**

Changes

None

Additions

None

Deletions

None

**Regional Transit Agency Offices**

Changes

1. Transit Emergency Coordination Data from PennDOT D3 TMC – *Planned*
2. Transit Emergency Data from PennDOT D3 TMC – *Planned*
3. Road Weather Information from PennDOT D3 County Maintenance Offices – *Two Way*
4. All flows to/from Information Service Providers – *Planned*
5. All flows to/from Weather Information Providers – *Planned*

Additions

1. Maint and Constr Works Plans from Private Utility Company Offices – *Planned*
2. Maint and Constr Work Plans from Municipal Traffic Management Offices – *Planned*
3. Road Weather Information to/from PennDOT D3 TMC – *Planned and Two Way*

4. Road Network Conditions to/from PennDOT D3 County Maintenance Offices – *Planned and Two Way*
5. Archive Management Request from PEMA Emergency Operation Center – *Existing*
6. Archive Management Data to PEMA Emergency Operation Center – *Existing*
7. Archive Coordination to/from PEMA Emergency Operation Center – *Existing*
8. Incident Notification from 911 Communication Centers – *Planned*
9. Incident Notification to 911 Communication Centers – *Existing*
10. Emergency Notification from 911 Communication Centers – *Planned*
11. Emergency Notification to 911 Communication Centers – *Existing*
12. Archive Management Data to/from PennDOT STMC – *Planned*
13. Archive Management Request to/from PennDOT STMC – *Planned*

Deletions

1. Transit Emergency Coordination Data from PEMA Emergency Operation Center
2. Transit Information Request from PEMA Emergency Operation Center
3. Transit Emergency Data to PEMA Emergency Operation Center
4. Transit Incident Information to PEMA Emergency Operation Center
5. Transit Request Confirmation to PEMA Emergency Operation Center

**Regional Transit Vehicles**

Changes

None

Additions

None

Deletions

None

**Potential Projects**

- Improve dissemination of information about emergency conditions that impact public transit operators.
- Improved communication of emergency information from 911 Centers to bus companies.
- Better communication between local school districts and county/regional planning agencies regarding transportation improvement needs.
- Improve communication between PennDOT and local school districts (both offices and vehicles) regarding roadway conditions.
- Improved coordination between railroads and county/regional planning agencies.
- Improved transit service to Jersey Shore.
- Better coordination between transit agencies and local school districts.

**Date:** December 16, 2004

**Location:** PennDOT Engineering District Headquarters, Montoursville, PA

**Attendees:** Brian Baker, Northern Tier Regional Planning and Development Commission  
Rick Biery, Northern Tier Regional Planning and Development Commission  
Brian Leighton, PennDOT District 3-0  
Teresa McClain, PennDOT District 3-0  
Sandra Miller, STEP, Inc.  
Mark Murawski, Lycoming County Planning Commission  
Joel Ticatch, Parsons Brinckerhoff  
Joseph Barr, Parsons Brinckerhoff

**Prepared By:** Joseph Barr, Parsons Brinckerhoff

---

A meeting was held on December 16, 2004 from 1:00pm to 2:30pm at the PennDOT Engineering District 3-0 Headquarters, to validate the following elements of the District 3-0 Regional ITS Architecture:

- County/Regional Planning Organization Offices

For each of the elements, a validation package was developed showing the interconnect diagram and the information flow diagrams associated with that element. The packages for each of the elements were then combined into a single PowerPoint presentation, which was reviewed with the stakeholders in attendance.

The meeting began with a welcome by J. Ticatch, along with a review of the process to date and the steps that have been taken to get to this point. He also provided an overview of the purpose and format of the meeting, and distributed additional handouts to aid stakeholders in the validation process. He also requested that stakeholders provide input regarding potential future ITS projects in the region, without worrying about issues such as funding or detailed feasibility.

The following is a list of comments that were provided at the meeting. General comments are noted first, followed by the specific change, additions, and deletions that were suggested for each element.

### **General Comments**

- The planning stakeholders noted that the Strawman Architecture does not clearly define the planning-related information flows, and requested that changes be made to reflect those flows. Note that upon subsequent review of the flows that are available within the Version 4.0 of the National ITS Architecture, it became clear that beyond the archive flows that are already included in the Architecture, there are no flows available to represent the

exchange of planning information (mainly because the National ITS Architecture is intended to represent transportation operations). As a result, it was not possible to explicitly represent these planning flows. However, this is a topic to address in the future, both within the Regional Architecture and within the National ITS Architecture.

- One of the stakeholders asked who would take over responsibility for the functions of the D3 TMC in case of a major emergency, J. Ticatch responded that other Regional TMCs and /or the STMC would be able to take over responsibility from the D3 TMC.
- The stakeholders also noted that there are interactions with regional airports, in terms of both planning and programming and airport incident management (this had also been noted during the incident/emergency management validation session).

The meeting also included a discussion of the institutional issues involved in maintaining the Regional ITS Architecture and moving forward with ITS implementation, particularly given that the Region is divided among three different Planning Partners.

- Based on the conversations during the meeting, the Planning Partners appeared to be comfortable moving forward with ITS planning and implementation based on existing institutional relationships. In the future, there may be a need to formalize the regional ITS planning process more, but the existing coordination process between Planning Partners works well and should be able to deal with these issues in the short- to medium-term.
- All of the Planning Partners signaled their interest in continuing these ITS planning activities and not losing the momentum that has been gained through the process of developing the Regional ITS Architecture. They indicated a willingness to have the MPOs and RPOs officially adopt the Regional Architecture, as a basis for moving forward with more detailed planning, in coordination with PennDOT.

## **County Planning Organization Offices**

### Changes

1. Archive Coordination from PennDOT D3 TMC – *Two Way*
2. Archive Requests to Regional Transit Agency Offices – *Two Way*
3. Archive Status to Regional Transit Agency Offices – *Two Way*
4. All flows to/from Municipal Traffic Management Offices – *Two Way*
5. Commercial Vehicle Archive Data from PennDOT Central Office Organizations – *Planned*

6. Archive Requests to Railroad Offices – *Two Way*

Additions

1. Archive Management Data from Local/Regional School Districts – *Planned*
2. Archive Management Request to Local/Regional School Districts – *Planned*
3. Archive Coordination to/from Local/Regional School Districts – *Planned and Two Way*
4. Archive Management Data from Regional Airports – *Existing*
5. Archive Management Request to Regional Airports – *Existing*
6. Archive Coordination to/from Regional Airports – *Existing and Two Way*
7. Archive Coordination to/from Regional Transit Agency Offices – *Existing and Two Way*
8. Archive Coordination to/from Municipal Traffic Management Offices – *Existing and Two Way*

Deletions

None

**Potential Projects**

Better organization/coordination of public transit agencies, particularly the multiple agencies operating in Lycoming County.

**Date:** December 16, 2004

**Location:** PennDOT Engineering District 3-0 Headquarters, Montoursville, PA

**Attendees:** Teresa McClain, PennDOT District 3-0  
Steve Mutchler, PennDOT District 3-0  
Joel Ticatch, Parsons Brinckerhoff  
Joseph Barr, Parsons Brinckerhoff

**Prepared By:** Joseph Barr, Parsons Brinckerhoff

---

A meeting was held on December 16, 2004 from 3:00pm to 4:30pm at the PennDOT Engineering District 3-0 Headquarters, to validate the following elements of the District 3-0 Regional ITS Architecture:

- Event Promoters/Attractors
- Information Service Providers
- PennDOT Welcome Centers and Rest Areas
- Regional Media Outlets
- Weather Information Providers

For each of the elements, a validation package was developed showing the interconnect diagram and the information flow diagrams associated with that element. The packages for each of the elements were then combined into a single PowerPoint presentation, which was reviewed with the stakeholders in attendance. In addition, the validation packages were also reviewed off-line by Rick Mason from PennDOT (the District 3-0 Community Relations Coordinator) and Jason Fink from the Lycoming County Chamber of Commerce.

The meeting began with a welcome by J. Ticatch, along with a review of the process to date and the steps that have been taken to get to this point. He also provided an overview of the purpose and format of the meeting, and distributed additional handouts to aid stakeholders in the validation process. He also requested that stakeholders provide input regarding potential future ITS projects in the region, without worrying about issues such as funding or detailed feasibility.

The following is a list of comments that we're provided at the meeting. General comments are noted first, followed by the specific change, additions, and deletions that were suggested for each element.

### **General Comments**

- The stakeholders in attendance asked that the statewide flows between ISPs and PSP Offices be checked to determine which connections currently exist, so that these can be reflected in the District 3-0 Architecture.

## **Event Promoters/Attractors**

### Changes

1. All flows to/from Information Service Providers – *Planned*

### Additions

None

### Deletions

None

## **Information Service Providers**

### Changes

1. Because there are no ISPs that currently operate in District 3-0, all flows that are not currently shown as *Planned* should be changed to *Planned* (unless there is a statewide flow that exists)

### Additions

None

### Deletions

None

## **PennDOT Welcome Centers and Rest Areas**

### Changes

1. Element Description needs to be updated to reflect correct information about District 3-0; there is one PennDOT Welcome Center located along US 15, and four roadside rest areas located along I-80
2. Traveler information from PennDOT D3 TMC - *Existing*

### Additions

None

### Deletions



1. Yellow Pages Information from PennDOT D3 TMC
2. Yellow Pages Request to PennDOT D3 TMC

## **Regional Media Outlets**

### Changes

1. All flows to/from Information Service Providers – *Planned*

### Additions

1. Media Information Request to PennDOT D3 County Maintenance Offices –  
*Existing*

### Deletions

None

## **Weather Information Providers**

### Changes

1. All flows to/from Information Service Providers – *Planned*

### Additions

None

### Deletions

None

## **Potential Projects**

Better defining the roles and jurisdictional boundaries of PennDOT and other public agencies with respect to traveler information.

## Appendix H: Bookend II Meeting Minutes

Date: Thursday, February 24, 2005  
Meeting of: PennDOT North Central Region – Second Regional Meeting  
Location: Williamsport, PA

### Presentation

- Alan Keller, PennDOT District 3-0, welcomed everyone to the meeting. Mr. Keller explained that this meeting is the final regional stakeholder meeting of the ITS Architecture effort. The first regional meeting was held in November 2004; it was followed by a series of smaller working meetings in September and December 2004. Material from the first regional meeting is available upon request, or via the web at [www.paits.org](http://www.paits.org). Mr. Keller added the purposes of the meeting includes concluding the ITS Architecture effort, meeting the federal mandate for architecture conformity, discussing next steps, and discussing continuing regional operations dialogue stressing that the ITS Architecture is a living document. He reviewed the agenda for the meeting including, Joel Ticatch from PB would give an overview of the ITS Architecture; Noah Goodall, also from PB, would describe the website and how users would access information and provide input for updating the architecture; Dennis Lebo from PennDOT would talk about next steps; Mark Murawski LCRPC, would then explain the role of the planning region; and Mr. Lebo would facilitate discussion at the end of the presentations.
- Joel Ticatch, from PB, began his section on ITS Architecture by showing an outline of some of the questions that he would be answering during his part of the presentation. The first slide listed the needs for a North-Central PA Regional ITS Architecture. Mr. Ticatch explained that a regional ITS Architecture would provide structure for ITS planning and deployment. Additionally, the architecture establishes an institutional mechanism that promotes development and deployment of ITS and Interoperability is promoted and efficient investment is encouraged. Mr. Ticatch also stressed the need to maintain the architecture to retain its value. Maintenance issues will include such topics as the stakeholders, elements of the architecture, systems inventory, needs and services, architecture flows, and applicable standards. Beyond developing the architecture document is the need to mainstream the information about and use of ITS. The process of mainstreaming allows exposure to decision-makers, inclusion of ITS in long term planning, modification of TIP project selection, and synergy through regional committees and task forces coordinating ITS/operations. Mr. Ticatch shared a variety of examples of how participants can assist in the mainstreaming efforts including educational scanning tours, utilizing new technologies, and trying new approaches to planning. Furthermore, the federal mandate which states "Regional architecture must be completed in partnership with the state and regional planning partners, including regional stakeholders by April 8, 2005 for use of Federal funds for

ITS,” must be satisfied. The mandate for conformity is reflected in this statement “The Intelligent Transportation System Architecture and Standards final rule issued by the Federal Highway Administration (FHWA), USDOT, Section: 940.5 (and 49 CFR Part 613 and 621) has been met for this region in Pennsylvania”. This means that federal rules from FTA and FHWA have been met and federal funds can continue to be used for ITS projects in the Northeastern Region because the regional ITS Architecture has been successfully completed. Mr. Ticatch then explained the process for creating the ITS Architecture starting with the Regional boundaries through presenting a map with nine PennDOT regions and identifying the boundaries of the North-Central Region. The process for developing the regional ITS Architecture involved the following steps: identifying District champions; formulating a regional advisory panel (RAP); developing a “strawman” architecture based on RAP inputs; validating the “strawman” architecture through validation meetings; and finalization of the ITS Architecture based on validation meeting inputs. The ITS Architecture will be finalized later this month. Currently, this region has an ITS architecture that can support regional stakeholder planning for ITS projects and funding, regional and statewide planning processes, and regional and statewide ITS project development and design. Additionally, it can support ITS integration, interoperability of ITS systems, and architecture updates. Finally it can provide a forum for regional agencies to collaborate on ITS capital, operations, and maintenance.

- Mr. Ticatch highlighted the chapters in the North-Central PA Regional ITS Architecture Document noting the newest sections – Using the Architecture Document; ITS Standards; Utility of the Architecture; Maintenance of the Architecture; and Moving Forward – Institutionalizing ITS. The first chapter introduces the architecture development process and gives instructions on how to use the document. This chapter states that the architecture will be maintained by PennDOT Central Office and Regional Stakeholder Participation. Recurring and long-term effort will require familiarity with national ITS architecture and knowledge of turbo architecture software tool. The architecture will be updated every 4 years. The planning for the update should begin one year prior to the update. The first update is scheduled for Fall 2008. Elements that will be maintained include the following: a description of the region, stakeholders, ITS architecture elements, system inventory, needs and services, interconnect diagrams, architecture flows, and applicable ITS standards. The ITS Architecture will be maintained through the website. To move forward and institutionalize ITS, the regional stakeholders and PennDOT Central Office ITS Partnership will work together. They will work to get transportation technology issues in front of decision makers, incorporate ITS in long range plans, modify TIP project selection criteria to more fairly evaluate technology and ITS, give regular updates to elected officials, and set up regional ITS/Operations Coordination Committees. Furthermore, educational training courses may be provided to introduce practitioners to systems engineering, ITS procurement, and managing traffic incidents for roadway emergencies. A helpful website for the training is [www.nhi.fhwa.dot.gov](http://www.nhi.fhwa.dot.gov). Educational scanning tours may also be

provided to county commissioners, executive boards, managers, operations staff, and public safety officials.

Chapter 2 of the ITS Architecture document summarizes the scope and magnitude of the architecture. Stakeholders and projects are identified in this chapter. Chapter 3 titled “Regional Systems, Inventory, Needs and Services” contains the “building blocks” of the architecture, and defines the elements, systems inventory and links elements, stakeholders and project, needs and services that establish architecture flows among elements. Chapter 4 contains a graphical display of the architectures, which includes the regional interconnect diagrams, and the architecture flows. Mr. Arch explained the ITS architecture using an example of an interconnect diagram and architecture flows in the following slide. Furthermore, ITS Standards are industry consensus standards that define the operations of the system components within a consistent framework. Interoperability is promoted, and participating standards development organizations include AASHTO, ANSI, ASTM, IEEE, ITE, NEMA, and SAE.

- Noah Goodall of PB provided a demonstration for using the website to update the ITS Architecture. The website will become the historical library and also will provide forms for filling out new information on stakeholder and project updates. Noah used a sample scenario to demonstrate the use of the website through a deployment project to explain how the Architecture website can be used to identify the stakeholders who might be interested in the project, identify the information flows among the interested stakeholders, and identify the ITS standards applicable to the information flows. He also explained the process of updating the architecture website using the “Architecture Update Form”.
- Mr. Ticatch continued his presentation to help the participants understand where the effort goes from this point, how best to get ITS in front of decision-makers, integrated into TIPs and STIPs, and compete for funding.
- Dennis Lebo from the PennDOT Central Office, Center for Program Development and Management talked about next steps. He began with a picture identifying the various planning bodies within Pennsylvania. Then, he explained the role of ITS Architecture in the context of planning. For regional next steps, he suggested that each MPO/RPO in the region needs to formally adopt the ITS Architecture. The region needs to prioritize projects documented in the architecture, and incorporate projects into regional long range plans and the transportation improvement program. For PennDOT, the next step is to develop a Statewide Mobility Plan (SMP). The SMP will focus mainly on mobility. Developing a Transportation System Operations Plan (TSOP) is one of the components of the SMP. Prioritized statewide PennDOT projects are focused in incident management, telecommunications, ITS and operations. The draft of the TSOP may be available as early as May 2005. A regional outreach on this plan is proposed to identify the Statewide priorities.

- Mark Murawski, Lackawanna County Regional Planning Commission, continued the discussion about the Role of the Regional Planning Bodies. To move forward, the region must adopt the ITS architecture and incorporate it into their long range plan. The region needs to support the ITS/Operations project in the TIP and the PennDOT statewide TSOP. The region should continue the RAP meetings and evolve to address ITS/operations at the regional level; a RAP meeting was scheduled immediately following the morning session. The MPO's/RPO's must also adopt the Regional ITS Architecture and then a Regional ITS Committee will be established with representatives from the Region's MPO's and RPO's, PennDOT District 4-0, and other stakeholders. Mr. Murawski also noted the importance of continuing dialogue regarding ITS and Operations. Upon adoption of the Regional Architecture, a regional meeting will soon be scheduled.
- Dennis Lebo, facilitated the open discussion thanking the participants for helping the team to successfully complete the Regional ITS Architecture as well as congratulating them on their important accomplishment. Mr. Lebo emphasized the themes that the ITS Architecture document is a living document, and it needs everyone's support in the region. One participant noted the importance of each participant acting as liaison to their respective agencies and peers as well as continuing the dialogues started through this effort. Lastly, the RAP meeting scheduled to immediately follow the morning session was announced. Meeting adjourned.

**List of Attendees**

<b>Last Name</b>	<b>First Name</b>	<b>Agency</b>	<b>Email</b>	<b>Phone</b>
Biery	Rick	Northern Tier Regional Planning and Development Committee	<a href="mailto:biery@northerntier.org">biery@northerntier.org</a>	570-265-9103
Bower	Jim	Susquehanna Trailways		570-323-8534
Bowman	George	Milton Transportation	<a href="mailto:gbowman@miltontrans.com">gbowman@miltontrans.com</a>	570-742-8774
Boyle	Tom	North Central Counter Terrorism Task Force		570-323-6845
Carey	James	Pennsylvania State Police		570-368-5611
Cohick	Dave	Tioga County EMS Coordinator	<a href="mailto:tclepc@epix.net">tclepc@epix.net</a>	
Dietz	Dave	PennDOT Snyder County Maintenance Office	<a href="mailto:dadietz@state.pa.us">dadietz@state.pa.us</a>	570-374-8123
Dupani	Ted			
Edwards	Ed	Columbia Montour Chamber of Commerce	<a href="mailto:eedwards@columbiamontourchamber.com">eedwards@columbiamontourchamber.com</a>	570-784-2522
Gruver	Les	Lycoming County EMS Coordinator	<a href="mailto:ema@lyco.org">ema@lyco.org</a>	

Last Name	First Name	Agency	Email	Phone
Hart	Tom	Williamsport Regional Airport	<a href="mailto:thart@suscom.net">thart@suscom.net</a>	570-368-2444
Hunter	Todd	Lycoming Valley RR	<a href="mailto:toddh@nshr.com">toddh@nshr.com</a>	570-473-7949
Huntington	Bob	Columbia County Planning		570-389-9146
Jones	Norm	WNEP-TV	<a href="mailto:norm.jones@wnep.com">norm.jones@wnep.com</a>	570-516-6435
Keller	Alan	PennDOT Engineering District 3-0	<a href="mailto:alakeller@state.pa.us">alakeller@state.pa.us</a>	570-368-4260
Kertettler	Mike	PennDOT Snyder/Union County Maintenance Office	<a href="mailto:mkerstette@state.pa.us">mkerstette@state.pa.us</a>	570-374-8123
Kilpatrick	Kevin	Williamsport Bureau of Transportation	<a href="mailto:kkilpatrick@citybus.org">kkilpatrick@citybus.org</a>	570-326-2500
Lebo	Dennis	PennDOT Central Office	<a href="mailto:dlebo@state.pa.us">dlebo@state.pa.us</a>	
Mahosky	Guy	PennDOT Tioga County Maintenance Office	<a href="mailto:gmahosky@state.pa.us">gmahosky@state.pa.us</a>	570-724-4142
Mason	Rick	PennDOT District 3-0 Engineering	<a href="mailto:rmatukoni@state.pa.us">rmatukoni@state.pa.us</a>	570-368-4259
McClain	Teresa	PennDOT District 3-0 Engineering	<a href="mailto:temcclain@state.pa.us">temcclain@state.pa.us</a>	570-368-4250

Last Name	First Name	Agency	Email	Phone
McLaughlin	Mike	Pennsylvania State Police	<a href="mailto:tmclaughli@state.pa.us">tmclaughli@state.pa.us</a>	570-368-5611
Murawski	Mark	Williamsport Area Transportation Study	<a href="mailto:mark.murawski@lyco.org">mark.murawski@lyco.org</a>	570-320-2138
Pack	Michael	PennDOT Central Office	<a href="mailto:mpack@state.pa.us">mpack@state.pa.us</a>	570-326-2500
Perritt	Raymond	PennDOT Lycoming/Sullivan County Maintenance Office	<a href="mailto:rperritt@state.pa.us">rperritt@state.pa.us</a>	570-368-4281
Petter	Philip	North-Central Counter-Terrorism Task Force	<a href="mailto:ppetter@chilitech.net">ppetter@chilitech.net</a>	570-323-6845
Piatt	William	NYS DOT	<a href="mailto:wpiatt@dot.state.ny.us">wpiatt@dot.state.ny.us</a>	607-324-8412
Price	Joe	Columbia Planning and Development	<a href="mailto:jprice@columbiapa.org">jprice@columbiapa.org</a>	
Prowant	Jeff	Federal and State Parks	<a href="mailto:jprowant@state.pa.us">jprowant@state.pa.us</a>	570-327-3450
Stover	Jeff	SEDA-COG Joint Rail Authority	<a href="mailto:jstover@seda-cog.org">jstover@seda-cog.org</a>	570-524-4491
Stroehmann	Jeff	Moran Industries		570-538-5558
Synder	Ronald	Petro All American	<a href="mailto:petro64pa@hotmail.com">petro64pa@hotmail.com</a>	570-742-2663



Last Name	First Name	Agency	Email	Phone
Tosca	Sandra	PennDOT Engineering District 3-0	<a href="mailto:stosca@state.pa.us">stosca@state.pa.us</a>	570-368-4259
Toseki	Brian	PennDOT Engineering District 3-0	<a href="mailto:btoseki@state.pa.us">btoseki@state.pa.us</a>	570-368-4266
Turner	Connie	Lycoming County 911	<a href="mailto:connie.turner@lyco.org">connie.turner@lyco.org</a>	
Updegraff	Mark	Updegraff Mark Trucking, Inc.	<a href="mailto:MEUpdegraff@suscon.net">MEUpdegraff@suscon.net</a>	570-322-4320
Wirth	Doug	Susquehanna Trailways		

# Pennsylvania ITS Architecture: Update and Next Steps

North-Central Region  
Second Stakeholders' Meeting  
February 24, 2005



## Welcome

Alan Keller  
PennDOT District 3-0



## Welcome

- PennDOT
- PSP
- Transit
- Counties
- Municipalities
- Emergency Management Agencies
- Planning Offices
- Partnership Organizations
- Enforcement Community
- Media
- Tourism and Event Destinations
- Economic Development Agencies
- School Districts
- Policymakers



## Meeting Series

- This is the final regional stakeholder meeting of the ITS Architecture effort
  - The first Regional Stakeholders' Meeting convened in November 2004
  - A series of smaller, working-group Validation Meetings were conducted in September and December 2004
- Presentation materials from the first Regional Meeting are available on the web at:  
<http://www.paits.org/>



## Meeting Purpose

- Conclude the ITS Architecture effort
- Satisfy the Federal mandate for Architecture Conformity
- Identify next steps
- Discuss ongoing regional ITS planning and operations



## Topics

- **Welcome**  
Alan Keller, PennDOT District 3-0
- **ITS Architecture Overview**  
Joel Ticatch, PB
- **ITS Architecture Web Site**  
Noah Goodall, PB
- **Next Steps**  
Dennis Lebo, PennDOT
- **Role of the Regional Planning Bodies**  
Mark Murawski, Lycoming County Planning Commission
- **Discussion**  
Dennis Lebo, PennDOT



# ITS Architecture Overview

Joel Ticatch  
Parsons Brinckerhoff



# Mandate Conformity

## Conformity Statement

The North-Central Region of the Commonwealth of Pennsylvania is in compliance with the requirements of the "Intelligent Transportation System Architecture and Standards" final rule, as promulgated by the U.S. Department of Transportation.

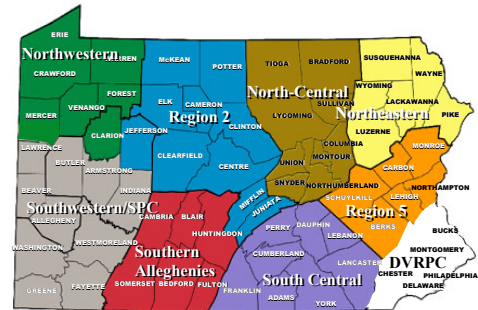


# Significance of Meeting the Conformity Requirements

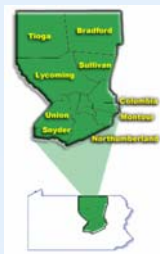
- FHWA's Federal rule (23 CFR 940.5) and FTA's policy objectives have been addressed
- Federal funds can continue to be used for ITS projects in this Region
- ITS projects in the Region will be capable of adhering to the Regional Architecture
- The Region has succeeded in its ITS Architecture endeavors



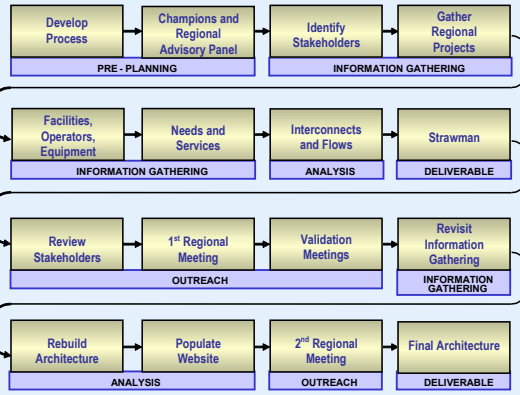
# Regional Architecture Boundaries



# North-Central Regional Map



# ITS Architecture Process



## Final Architecture Document

TABLE OF CONTENTS	
1	1 INTRODUCTION..... 1
1.1	1.1 Introduction..... 1
1.2	1.2 Objectives..... 2
1.3	1.3 Scope..... 3
1.4	1.4 Organization..... 4
1.5	1.5 Glossary..... 5
1.6	1.6 Abbreviations..... 6
1.7	1.7 References..... 7
2	2 ARCHITECTURE SCOPE..... 29
2.1	2.1 System Boundaries..... 29
2.2	2.2 System Objectives..... 30
2.3	2.3 System Architecture..... 31
2.4	2.4 System Components..... 32
2.5	2.5 System Interfaces..... 33
2.6	2.6 System Constraints..... 34
3	3 REGIONAL SYSTEMS INVENTORY, NEEDS, AND SERVICES..... 34
3.1	3.1 System Inventory..... 34
3.2	3.2 System Needs..... 35
3.3	3.3 System Services..... 36
4	4 REGIONAL ITS ARCHITECTURE..... 47
4.1	4.1 System Architecture..... 47
4.2	4.2 System Components..... 48
4.3	4.3 System Interfaces..... 49
4.4	4.4 System Constraints..... 50
5	5 REFERENCES..... 487
APPENDIX A	APPENDIX A: ACRONYMS..... 488
APPENDIX B	APPENDIX B: ITS DEFINITIONS..... 489
APPENDIX C	APPENDIX C: SUBSYSTEM AND TERMINATOR DEFINITIONS..... 490
APPENDIX D	APPENDIX D: ARCHITECTURE PLAN DEFINITIONS..... 491
APPENDIX E	APPENDIX E: OPERATIONS COVERAGE..... 492
APPENDIX F	APPENDIX F: BOARDING / EXITING / BOARDING..... 493
APPENDIX G	APPENDIX G: TRAINING MEETING MINUTES..... 494
APPENDIX H	APPENDIX H: BOARDING / EXITING MINUTES..... 495



PB

## Additional Materials Added to the Architecture

- Using the Architecture Document
- Utility of the Architecture
- ITS Standards
- Maintaining the Architecture
- Mainstreaming ITS



PB

## Using the Regional ITS Architecture

- The Architecture is a resource instrument
- The Architecture identifies stakeholders and projects
- The Architecture describes interrelationships
- The Architecture identifies *who* and *what* need to connect, not *how*
- The Architecture is a planning tool
- The North-Central Regional Architecture will be accessible on-line



PB

## Utility of the Regional Architecture

- Provides structure for ITS planning and deployment
- Establishes an institutional mechanism that promotes development and deployment of ITS
- Promotes interoperability
- Encourages efficient investment
- Satisfies the Federal mandate



PB

## ITS Standards

- Constitute industry-consensus standards
- Define how system components operate within a consistent framework
- Promote interoperability
- Participating standards development organizations include AASHTO, ANSI, ASTM, IEEE, ITE, NEMA, SAE
- The Pennsylvania Regional ITS Architectures utilize more than 50 standards



PB

## ITS Architecture Maintenance

- When – The Regional ITS Architectures will be updated every four (4) years, with the first update completed by Fall 2008
- Who – To ensure statewide consistency, the Architecture updates are expected to be led and coordinated by the PennDOT Central Office



PB

## ITS Architecture Maintenance

What will be maintained?

- Description of the Region
- Stakeholders
- Elements
- Systems Inventory
- Needs and Services
- Interconnect Diagrams
- Architecture Flows
- Applicable ITS Standards



PB

## Mainstreaming ITS

Strategies for Regional Stakeholders:

- Expose decision-makers to transportation technology issues
- Include ITS projects and concepts in long-range plans
- Modify TIP project selection criteria to better evaluate technology and ITS
- Routinely update elected officials on ITS activities
- Create regional committees and task forces for coordinating ITS/operations



PB

## Mainstreaming ITS

Offer Pertinent Regional Training Courses:

- Introduction to Systems Engineering
- Managing Traffic Incidents for Roadway Emergencies
- ITS Procurement
- Others

➤ National Highway Institute

<http://www.nhi.fhwa.dot.gov/>



PB

## Mainstreaming ITS

Educational Scanning Tours:

- County Commissioners
- Executive Boards
- Managers
- Operations Staff
- Public Safety Officials
- Others



PB

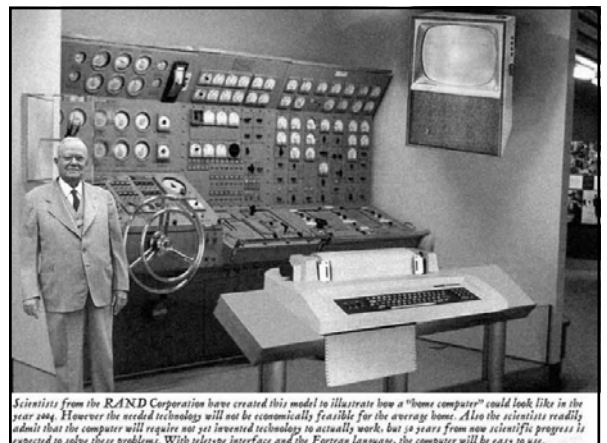
## Mainstreaming ITS

Try Out New Strategies:

- Think creatively "outside the box"
- Bring new approaches to transportation planning
- Utilize technology and operational enhancements, when appropriate
- Search out new ways to optimize roadway capacity
- Look for and implement rapid-term solutions
- Resolve to inform and better serve your customers
- Dare to imagine the possibilities!



PB



Scientists from the RAND Corporation have created this model to illustrate how a "home computer" could look like in the year 2000. However the needed technology will not be economically feasible for the average home. Also the scientists readily admit that the computer will require new yet invented technology to actually work, but 20 years from now scientific progress is expected to solve these problems. With tele-type interface and the Fortran language, the computer will be easy to use.

# ITS Architecture Web Site



**Noah Goodall  
Parsons Brinckerhoff**




# How to Use the Architecture

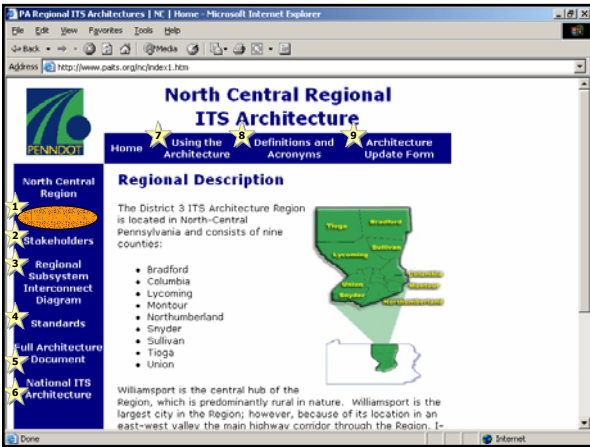
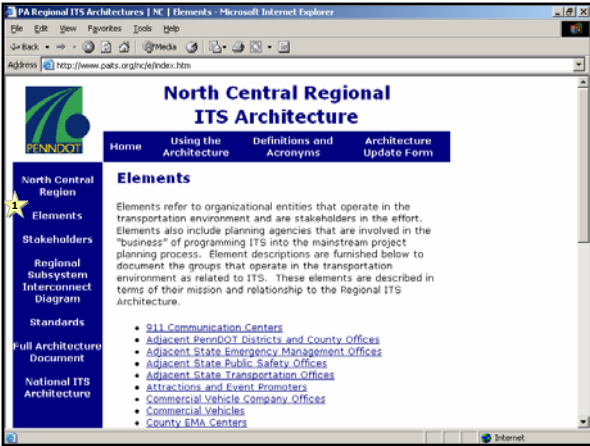
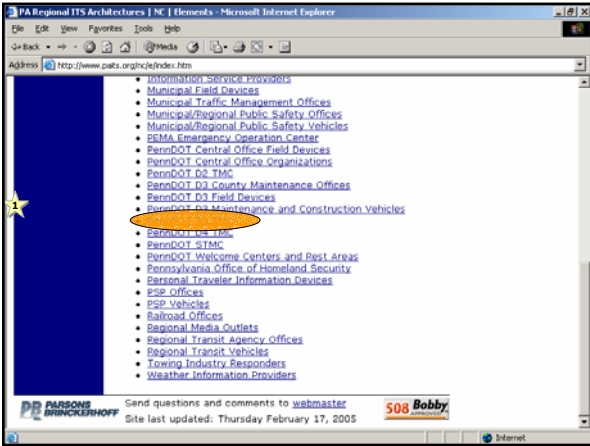
- Web-based option
- Easy-to-use
- Will serve as the historical library
- Submittal form for new information
  - Stakeholder updates
  - Project updates

<http://www.paits.org/>

# PA ITS Architecture Web Site Example Slides...



PA Regional ITS Architectures | NC | PennDOT D3 TMC - Microsoft Internet Explorer

Address: http://www.pats.org/nc/36.htm

## North Central Regional ITS Architecture

Home Using the Architecture Definitions and Acronyms Architecture Update Form

### PennDOT D3 TMC

North Central Region

Elements

Stakeholders

Regional Subsystem Interconnect Diagram

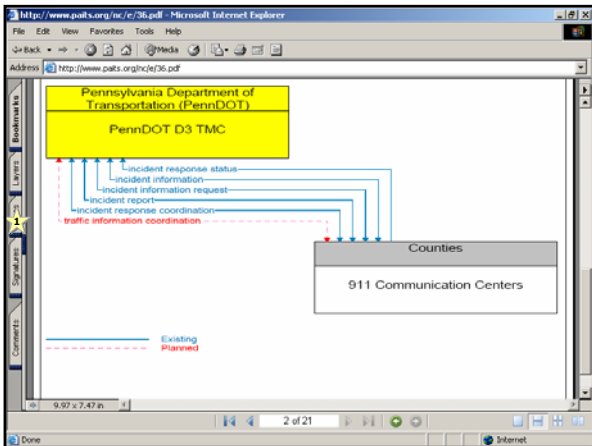
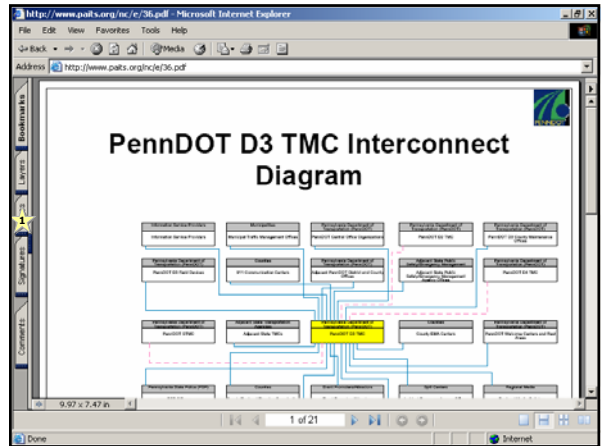
Standards

Full Architecture Document

National ITS Architecture

PARSONS BRINCKERHOFF

Send questions and comments to [webmaster](#) **S08 Bobby**



PA Regional ITS Architectures | NC | Stakeholders - Microsoft Internet Explorer

Address: http://www.pats.org/nc/stake/index.htm

## North Central Regional ITS Architecture

Home Using the Architecture Definitions and Acronyms Architecture Update Form

### Stakeholders

North Central Region

Elements

Regional Subsystem Interconnect Diagram

Standards

Full Architecture Document

National ITS Architecture

PARSONS BRINCKERHOFF

Stakeholders are mainly identified as agencies and then individuals responsible in those agencies for policy and operations.

- Adjacent State Emergency Management Agencies
- Adjacent State Public Safety Agencies
- Adjacent State Transportation Agencies
- Attractions and Event Promoters
- Commercial Vehicle Companies
- Counties
- General Public
- Information Service Providers
- Municipalities
- Pennsylvania Emergency Management Agency (PEMA)
- Pennsylvania Office of Homeland Security
- Pennsylvania State Police (PSP)
- Regional Media
- Regional Railroads
- Regional Transit Agencies

PA Regional ITS Architectures | NC | Pennsylvania Department of Transportation - Microsoft Internet Explorer

Address: http://www.pats.org/nc/stake/penndot.htm

## North Central Regional ITS Architecture

Home Using the Architecture Definitions and Acronyms Architecture Update Form

### Pennsylvania Department of Transportation (PennDOT)

North Central Region

Elements

Stakeholders

Regional Subsystem Interconnect Diagram

Standards

Full Architecture Document

National ITS Architecture

PARSONS BRINCKERHOFF

The Pennsylvania Department of Transportation is the Commonwealth's statewide transportation agency responsible for building, maintaining, and operating the state's roads, bridges and tunnels. PennDOT consists of a single Central Office and 11 District Offices throughout the state.

PennDOT's Central Office consists of several divisions, including the Bureau of Maintenance and Operations (BOMO), Bureau of Planning and Research (BPR), Bureau of Highway Safety and Traffic Engineering (BHSTE), and the Motor Carrier Division. PennDOT's Central Office oversees statewide operations and is responsible for coordination of transportation services between the 11 Districts.

PennDOT's District Offices are responsible for the design, operation, maintenance, and construction of state highways and

PA Regional ITS Architectures | NC | Pennsylvania Department of Transportation - Microsoft Internet Explorer

Address: http://www.pats.org/nc/stake/penndot.htm

### Standards

Full Architecture Document

National ITS Architecture

PARSONS BRINCKERHOFF

PennDOT's Central Office consists of several divisions, including the Bureau of Maintenance and Operations (BOMO), Bureau of Planning and Research (BPR), Bureau of Highway Safety and Traffic Engineering (BHSTE), and the Motor Carrier Division. PennDOT's Central Office oversees statewide operations and is responsible for coordination of transportation services between the 11 Districts.

PennDOT's District Offices are responsible for the design, operation, maintenance, and construction of state highways and bridges in their respective districts.

### Elements

- Adjacent PennDOT Districts and County Offices
- PennDOT Central Office Field Devices
- PennDOT Central Office Organizations
- PennDOT D2 TMC
- PennDOT D3 County Maintenance Offices
- PennDOT D3 Field Devices
- PennDOT Maintenance and Construction Vehicles
- PennDOT TMC
- PennDOT STMC
- PennDOT Welcome Centers and Rest Areas

Send questions and comments to [webmaster](#) **S08 Bobby**

Site last updated: Thursday February 17, 2005

PA Regional ITS Architectures | NC | PennDOT D3 TMC - Microsoft Internet Explorer

Address: http://www.pats.org/nc/d3.htm

## North Central Regional ITS Architecture

Home Using the Architecture Definitions and Acronyms Architecture Update Form

**PennDOT D3 TMC**

North Central Region

Elements

Stakeholders

Regional Subsystem Interconnect Diagram

Standards

Full Architecture Document

National ITS Architecture

PARSONS BRINCKERHOFF

Send questions and comments to [webmaster](#) **508 Bobby**

PA Regional ITS Architectures | NC | Regional Subsystem Interconnect Diagram - Microsoft Internet Explorer

Address: http://www.pats.org/nc/diagram/

## North Central Regional ITS Architecture

Home Using the Architecture Definitions and Acronyms Architecture Update Form

### Regional Subsystem Interconnect Diagram

Click on the subsystem category (in the white boxes) for a listing of the category's elements.

PARSONS BRINCKERHOFF

Send questions and comments to [webmaster](#) **508 Bobby**

PA Regional ITS Architectures | NC | Traffic Management - Microsoft Internet Explorer

Address: http://www.pats.org/nc/diagram/trafm.htm

## North Central Regional ITS Architecture

Home Using the Architecture Definitions and Acronyms Architecture Update Form

### Traffic Management

The Traffic Management Subsystem operates within a traffic management center or other fixed location. This subsystem communicates with the Roadway Subsystem to monitor and manage traffic flow. Incidents are detected and verified and incident information is provided to the Emergency Management Subsystem, travelers (through Roadway Subsystem Highway Advisory Radio and Dynamic Message Signs), and to third party providers. The subsystem supports HOV lane management and coordination, road pricing, and other demand management policies that can alleviate congestion and influence mode selection. The subsystem monitors and manages maintenance work and disseminates maintenance work schedules and road closures. The subsystem also manages reversible lane facilities, and processes probe vehicle information. The subsystem communicates with other Traffic Management Subsystems to coordinate traffic information and control strategies neighboring jurisdictions. It also coordinates with rail operations to support safer and more efficient highway traffic management at highway-rail intersections. Finally, the Traffic Management Subsystem provides the capabilities to

PARSONS BRINCKERHOFF

Send questions and comments to [webmaster](#) **508 Bobby**

PA Regional ITS Architectures | NC | Traffic Management - Microsoft Internet Explorer

Address: http://www.pats.org/nc/diagram/trafm.htm

## North Central Regional ITS Architecture

Home Using the Architecture Definitions and Acronyms Architecture Update Form

### Traffic Management

Regional Subsystem Interconnect Diagram

Standards

Full Architecture Document

National ITS Architecture

Elements

- Municipal Traffic Management Offices
- PennDOT Central Office Organizations
- PennDOT LTL TMC
- PennDOT STMC

PARSONS BRINCKERHOFF

Send questions and comments to [webmaster](#) **508 Bobby**

Site last updated: Thursday February 17, 2005

PA Regional ITS Architectures | NC | PennDOT D3 TMC - Microsoft Internet Explorer

Address: http://www.pats.org/nc/d3.htm

## North Central Regional ITS Architecture

Home Using the Architecture Definitions and Acronyms Architecture Update Form

**PennDOT D3 TMC**

North Central Region

Elements

Stakeholders

Regional Subsystem Interconnect Diagram

Standards

Full Architecture Document

National ITS Architecture

PARSONS BRINCKERHOFF

Send questions and comments to [webmaster](#) **508 Bobby**

PA Regional ITS Architectures | NC | Full Architecture Document - Microsoft Internet Explorer

Address: http://www.pats.org/nc/document/index.htm

## North Central Regional ITS Architecture

Home Using the Architecture Definitions and Acronyms Architecture Update Form

### Full Architecture Document

The North Central Regional ITS Architecture Final Report is available for download in PDF format by clicking the link below.

Warning: File size is very large. Right click on the link and select "Save As" to save to your hard drive for easier viewing.

[North Central Regional ITS Architecture Final Report \(3.4MB PDF\)\\*](#)

The same architecture can be navigated via the web by clicking on Elements, Stakeholders, or Regional Subsystem Interconnect Diagram on the left side bar.

\*Viewing the architecture flows requires Adobe Reader, a free software for downloading PDF documents. [Click here](#) to download Adobe Reader.


PARSONS BRINCKERHOFF

Send questions and comments to [webmaster](#) **508 Bobby**



PA Regional ITS Architectures | NC | Help - Microsoft Internet Explorer

Address http://www.pats.org/nc/help.htm



## North Central Regional ITS Architecture

Home Using the Architecture **7** Architecture Update Form

**Using the Architecture**

This section will help guide you through the Regional ITS Architecture website to find the information you want.

**Searching by Elements**

An element is the basic building block of the Architecture, and is used by stakeholders to describe a system or piece of a system. If you know your element's name, click on "Elements" on the left side of the page. This will take you to an alphabetical listing of all elements. Choose yours and go to the element's homepage, from which you can find a link to a PDF file with detailed information about the element's information flows to other elements.

**Searching by Stakeholders**


A stakeholder is a public agency, private organization, or the traveling public with a vested interest in the transportation elements of the Architecture. If you know the name of your stakeholder, you may click on "Stakeholders" on the left side of the page.

North Central Region  
Elements  
Stakeholders  
Regional Subsystem Interconnect Diagram  
Standards  
Full Architecture Document  
National ITS Architecture

Done Internet

PA Regional ITS Architectures | NC | Definitions and Acronyms - Microsoft Internet Explorer

Address http://www.pats.org/nc/definitions/index.htm



## North Central Regional ITS Architecture

Home Using the Architecture **8** Definitions and Acronyms Architecture Update Form

**Definitions and Acronyms**

Definitions are grouped into four categories. Choose yours from the list below.

- Acronyms** - An alphabetical listing of all acronyms and their meanings.
- DOT Work Elements** - The information flows between elements.
- ITS Definitions** - Terms that relate specifically to the Intelligent Transportation Systems (ITS) field.
- Subsystem and Terminator Definitions** - The individual pieces of the Intelligent Transportation System as defined by the National ITS Architecture.


North Central Region  
Elements  
Stakeholders  
Regional Subsystem Interconnect Diagram  
Standards  
Full Architecture Document  
National ITS Architecture

Send questions and comments to [webmaster](#) **CNR Bobby**

Done Internet

PA Regional ITS Architectures | NC | Architecture Flow Definitions - Microsoft Internet Explorer

Address http://www.pats.org/nc/definitions/def-flows.htm



## North Central Regional ITS Architecture

Home Using the Architecture **9** Definitions and Acronyms Architecture Update Form

**Architecture Flow Definitions**

(Source: National ITS Architecture)

Below are the architecture flow definitions from the National ITS Architecture exclusive to the Regional ITS Architecture:

**accident report:** Report of commercial vehicle safety accident. The information may be provided as a response to a real-time query or proactively by the source. The query flow is not explicitly shown.

**archive analysis requests:** A user request that initiates data mining, analytical processing, aggregation or summarization, report formulation, or other advanced processing and analysis of archived data.


**archive analysis results:** Processed information products, supporting meta data, and any associated transaction information resulting from data mining, analytical processing, aggregation or summarization, report formulation, or other advanced processing and analysis of archived data.

North Central Region  
Elements  
Stakeholders  
Regional Subsystem Interconnect Diagram  
Standards  
Full Architecture Document  
National ITS Architecture

Done Internet

PA Regional ITS Architectures | NC | Architecture Flow Definitions - Microsoft Internet Explorer

Address http://www.pats.org/nc/definitions/def-flows.htm



## North Central Regional ITS Architecture

Home Using the Architecture **9** Definitions and Acronyms Architecture Update Form

**Architecture Flow Definitions**

(Source: National ITS Architecture)

Below are the architecture flow definitions from the National ITS Architecture exclusive to the Regional ITS Architecture:

**accident report:** Report of commercial vehicle safety accident. The information may be provided as a response to a real-time query or proactively by the source. The query flow is not explicitly shown.

**archive analysis requests:** A user request that initiates data mining, analytical processing, aggregation or summarization, report formulation, or other advanced processing and analysis of archived data.


**archive analysis results:** Processed information products, supporting meta data, and any associated transaction information resulting from data mining, analytical processing, aggregation or summarization, report formulation, or other advanced processing and analysis of archived data.

North Central Region  
Elements  
Stakeholders  
Regional Subsystem Interconnect Diagram  
Standards  
Full Architecture Document  
National ITS Architecture

Done Internet

PA Regional ITS Architectures | NC | Architecture Update Form - Microsoft Internet Explorer

Address http://www.pats.org/nc/update.htm



## North Central Regional ITS Architecture

Home Using the Architecture Definitions and Acronyms **9** Architecture Update Form

**Updating the Architecture**

To suggest an update to the architecture, such as a new project, fill out the form below as thoroughly as possible. All suggestions will be reviewed by a moderator and added to the updated list.

All forms are time-stamped and retained as part of the architecture's Configuration Management (CM) process. The Configuration Management process will create a historical record of the proposed changes to the architecture. For more information on Configuration Management, visit the Federal Highway Administration's information page: <http://www.ops.fhwa.dot.gov/Travel/traffic/cm/index.htm>

**View all updates since December 2001**

**Contact Information**

Name of Submitter:  Submission Date:


Organization:  Phone Number:

North Central Region  
Elements  
Stakeholders  
Regional Subsystem Interconnect Diagram  
Standards  
Full Architecture Document  
National ITS Architecture

Done Internet

PA Regional ITS Architectures | NC | Architecture Update Form - Microsoft Internet Explorer

Address http://www.pats.org/nc/update.htm



## North Central Regional ITS Architecture

Home Using the Architecture Definitions and Acronyms **9** Architecture Update Form

**Updating the Architecture**

To suggest an update to the architecture, such as a new project, fill out the form below as thoroughly as possible. All suggestions will be reviewed by a moderator and added to the updated list.

All forms are time-stamped and retained as part of the architecture's Configuration Management (CM) process. The Configuration Management process will create a historical record of the proposed changes to the architecture. For more information on Configuration Management, visit the Federal Highway Administration's information page: <http://www.ops.fhwa.dot.gov/Travel/traffic/cm/index.htm>

**View all updates since December 2001**

**Contact Information**

Name of Submitter:  Submission Date:

Organization:  Phone Number:

Email Address:

North Central Region  
Elements  
Stakeholders  
Regional Subsystem Interconnect Diagram  
Standards  
Full Architecture Document  
National ITS Architecture

Done Internet

PA Regional ITS Architectures | NC | Architecture Update Form - Microsoft Internet Explorer

Address: http://www.pats.org/nc/update.htm

### New ITS Project

Project Name: 911, TMC Info Sharing      Project Stakeholder: Union County Emerg

Stakeholders Involved:  
 Union County Emergency Services, PennDOT District 3-0 TMC

Funding:  
 Local Funding  
 State Funding  
 Federal Funding  
 Details: None

Location: Union County, PennDOT D3      Deployment Date: June 2005

Project Description:  
 Union County Emergency Services (911) will share incident information directly with the PennDOT District 3-0 TMC to better facilitate response.

New Stakeholder

PA Regional ITS Architectures | NC | Architecture Update Form - Microsoft Internet Explorer

Address: http://www.pats.org/nc/update.htm

### New Stakeholder

Stakeholder Name: None

Status:  Existing  Planned

Stakeholder Description: None

### New Element

Element Name: None      Stakeholder: None

Status:  Existing  Planned

Element Description: None

### Other Changes

Other Changes:

PA Regional ITS Architectures | NC | Architecture Update Form - Microsoft Internet Explorer

Address: http://www.pats.org/nc/update.htm

### New Element

Element Name: None      Stakeholder: None

Status:  Existing  Planned

Element Description: None

### Other Changes

Other Changes: None

Reset

Send questions and comments to [webmaster](#)  
 Site last updated: Monday January 24, 2005

508 Bobby

PA Regional ITS Architectures | NC | Current Update List - Microsoft Internet Explorer

Address: http://www.pats.org/nc/display-updates.htm

## North Central Regional ITS Architecture

Home    Using the Architecture    Definitions and Acronyms    Architecture Update Form




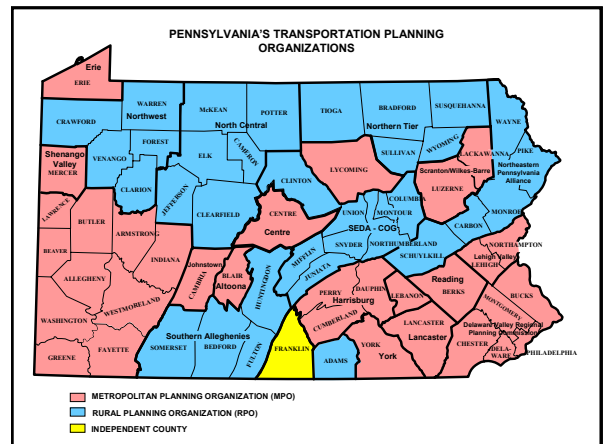
### Current Architecture Update List

The following list includes all of the suggested updates to the architecture to date since January 2005.

<b>Contact Information</b>	
Date Submitted	February 24, 2005
Submitter	Tom Hess
Organization	Union County Emergency Services
Email	<a href="mailto:thess@unionco.org">thess@unionco.org</a>
<b>New ITS Project</b>	
Project Name	911, TMC Info Sharing
Project Stakeholder	Union County Emergency Services
Stakeholders	Union County Emergency Services

# Moving Forward – Next Steps

Dennis Lebo  
 PennDOT Center for Program Development and Management

## Business Context



Projects



PB

## Regional Next Steps

- Adopt Architectures at Each MPO/RPO
- Regionally prioritize projects documented in Architecture
- Incorporate into regional long range plans
- Incorporate into regional transportation improvement programs (TIP)



PB

## PennDOT Next Steps

- Statewide Mobility Plan (SMP)
  - One of these components of the SMP is the Transportation Systems Operations Plan (TSOP)
    - Prioritized statewide PennDOT projects focused in:
      - Incident Management
      - Telecommunications
      - ITS and Operations
    - Draft TSOP by May 2005
  - Regional outreach on this plan is proposed



PB

## Regional Planning and Operations Dialogue

Mark Murawski  
Lycoming County Planning  
Commission



PB

## Regional ITS Planning Overview

- Adopt the Regional ITS Architecture (WATS, SEDA-COG, NTRPDC)
- Incorporate the ITS Architecture into the Region's long-range plans
- Support ITS/Operations projects in the TIP
- Mainstream ITS elements into other transportation projects
- Continue regional and statewide dialogues to address ITS, operations, and mobility at the regional level



PB

## Next Steps

- MPO's/RPO's adopt the Regional ITS Architecture
- Continue Regional ITS Committee with representation from the Region's MPO's and RPO's, PennDOT District 3-0, and expand to include other stakeholders
- Continue the regional ITS/Operations dialogue—meet routinely
- Regional Meeting—To be scheduled after adoption of the Regional Architecture



PB

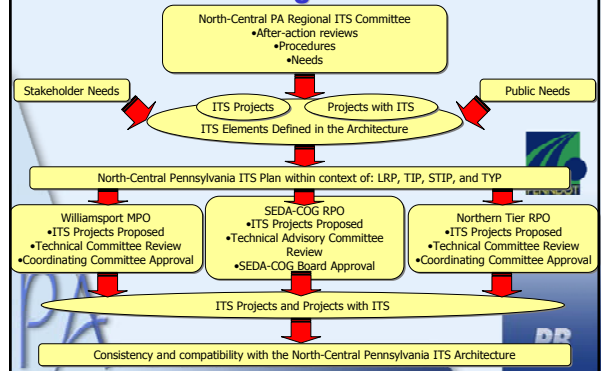
## Regional ITS Committee

Regional meetings are expected to focus on:

- **Planning:**
  - Identify current and future ITS/operations needs
  - Identify and prioritize potential ITS projects
  - Examine funding (options and availability)
- **Operations:**
  - After-action reviews
  - Review of standards and procedures
  - Discuss current and future ITS/operations needs



## North-Central Pennsylvania ITS Planning Framework



## Regional Challenges/Opportunities

- Ensure that the appropriate stakeholders are involved in ITS program decision-making and oversight consistent with communication linkages identified in the architecture
- Coordinate among the Region's MPO and both RPO's
- Define an ITS vision and regional ITS strategies
- Prioritize projects based on limited resources
- Mediate competition and funding among projects
- Ensure that funding is in place for important systems and integration projects
- Ensure timely project delivery
- Communicate to stakeholders and the public that improved operations are necessary to optimize safety and economic vitality



## Discussion

Dennis Lebo  
PennDOT Center for Program  
Development and Management

