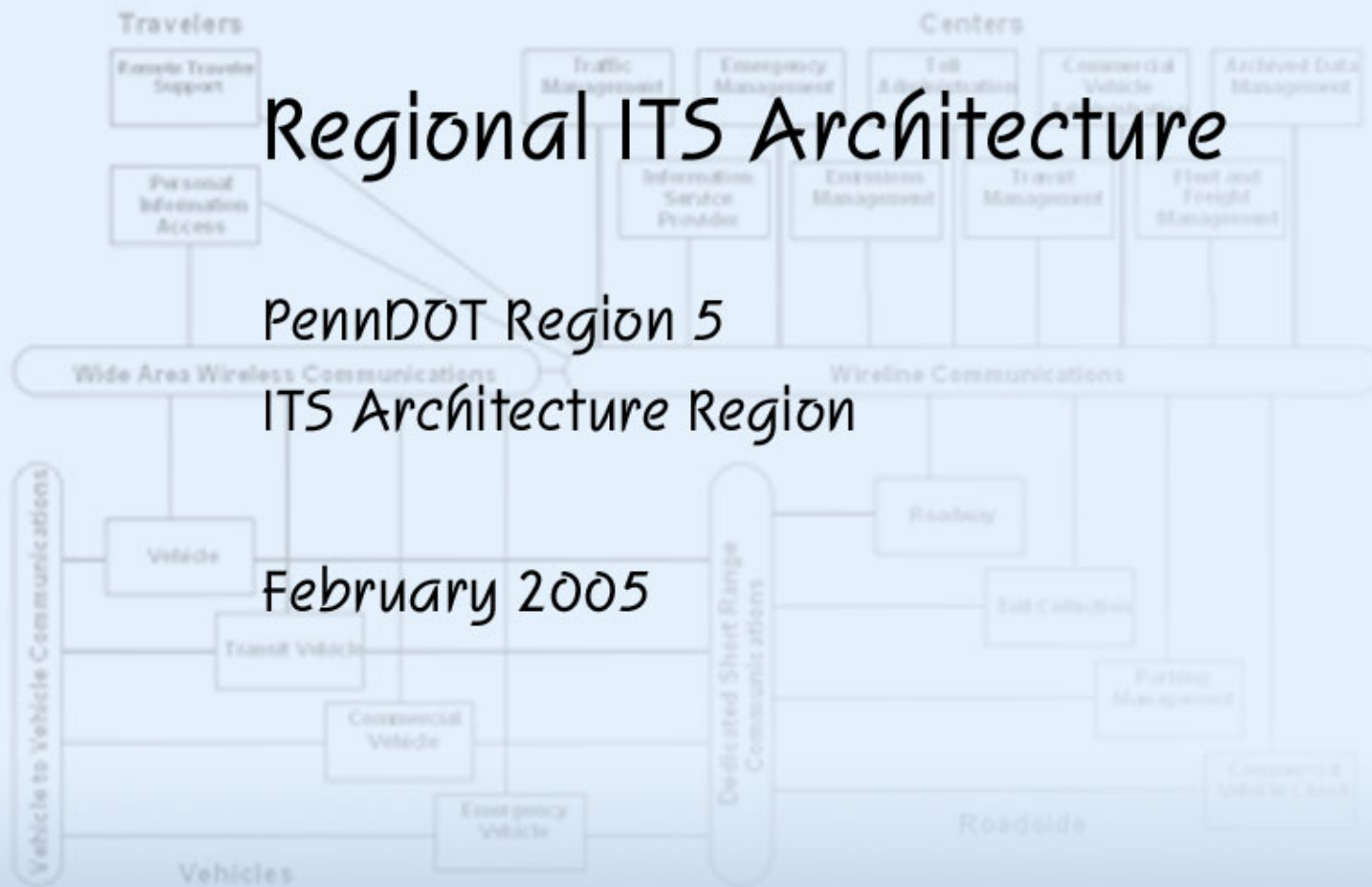


Regional ITS Architecture

PennDOT Region 5
ITS Architecture Region

February 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



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**Lehigh Valley Planning Commission – Metropolitan
Planning Organization**

Pending adoption by the Coordinating Committee on April 20, 2005

**Northeastern Pennsylvania Alliance – Rural Planning
Organization**

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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:

Dennis Toomey – PennDOT District 5-0

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.

Alan Baranski – Northeastern
Pennsylvania Alliance (NEPA)

Lt. David Miller – Pennsylvania State
Police (PSP)

Alan Piper – Berks County Planning
Commission

Steve Mittman – Metro Traffic Control, Inc.

Armand Greco – Lehigh and
Northampton Transit Authority (LANTA)

Fred Osifat – Carbon County Planning

Art Kaplan – Schuylkill County Emergency
Management Agency

Eric Reinert – WFMZ-TV

Chris Bartleson – Bethlehem Township

Mathilda Sheptak – Poconos Vacation
Bureau

Kurt Bauman – Northeastern
Pennsylvania Alliance (NEPA)

John Townsend – PennDOT District 5-0

MaryKay Bernosky – Schuylkill County
Planning

Dick Teasdale – Northampton County 911
Center

Mike Donchez – Lehigh Valley Planning
Commission (LVPC)

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Police (PSP)

Joe Gurinko – Lehigh Valley Planning
Commission (LVPC)

Thomas Walter – PennDOT District 5-0

J.C. Kelleer – Metro Traffic Control, Inc.

John Woodling – Monroe County Planning

Dave Kilmer – Berks and Reading Transit
Authority (BARTA)

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

Larry Bankert – PB Farradyne – Region 5 Lead

JD Schneeberger – PB Farradyne – Turbo and Region 5 Support

Conformity Statement

Region 5 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.”

Region 5’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 Region 5, which is comprised of six counties in the east-central part of the state. Region 5 encompasses PennDOT Engineering District 5-0. The document is the result of intensive data-gathering, research, and planning activities conducted between March 2003 and February 2005. The current version of the ITS Architecture was generated in February 2005.

The Region 5 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 Region 5 ITS Architecture is one of nine Regional Architectures being developed across the Commonwealth of Pennsylvania, as shown in Figure 1-1, below:

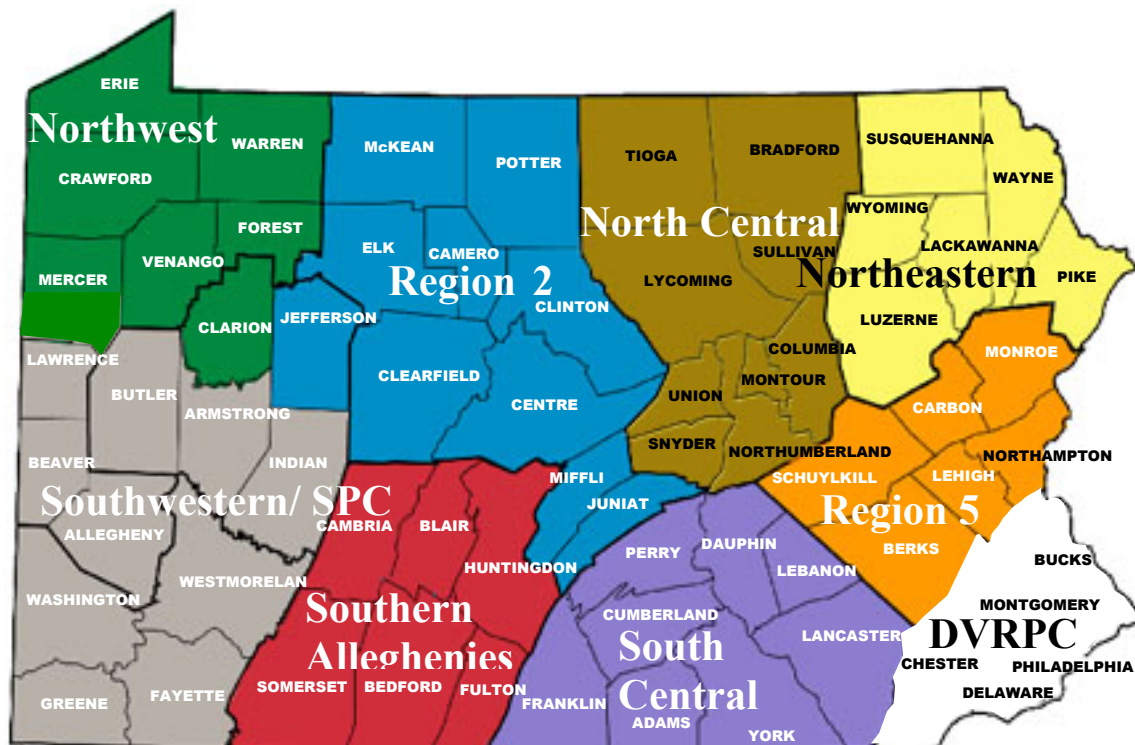


Figure 1-1: PennDOT ITS Architecture Regions

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:

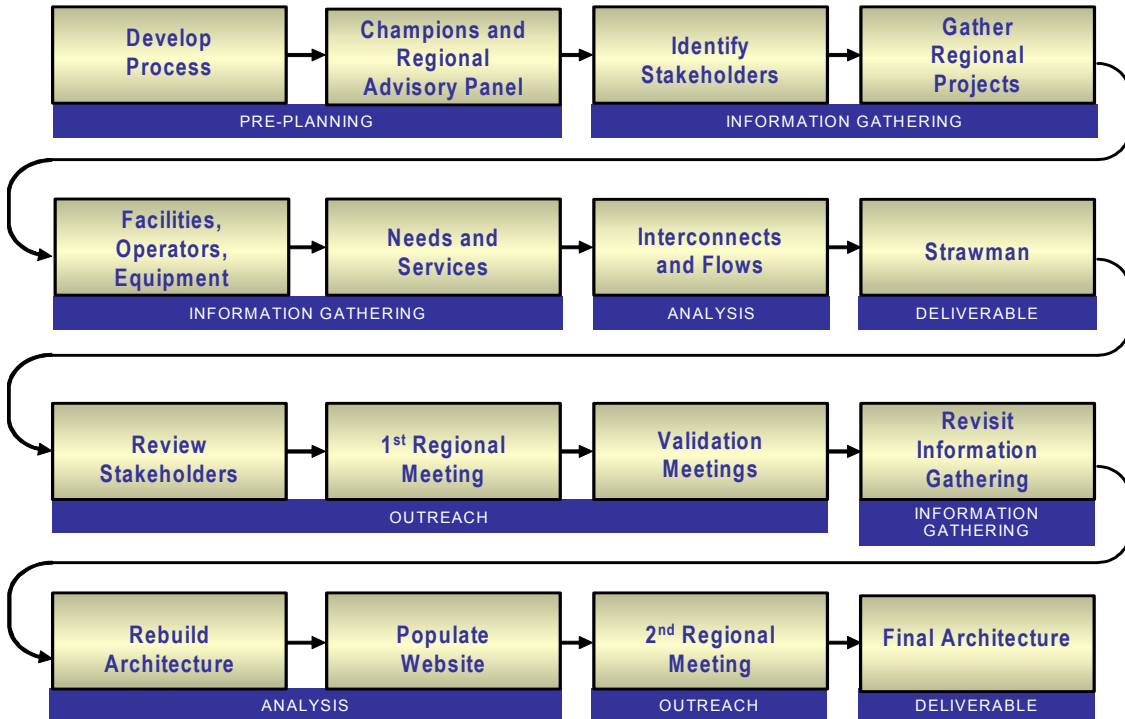


Figure 1-2: Pennsylvania ITS Architecture Process Schematic

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 Region 5, 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 Region 5 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 Region 5 Architecture, go to:

www.paits.org/region5

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

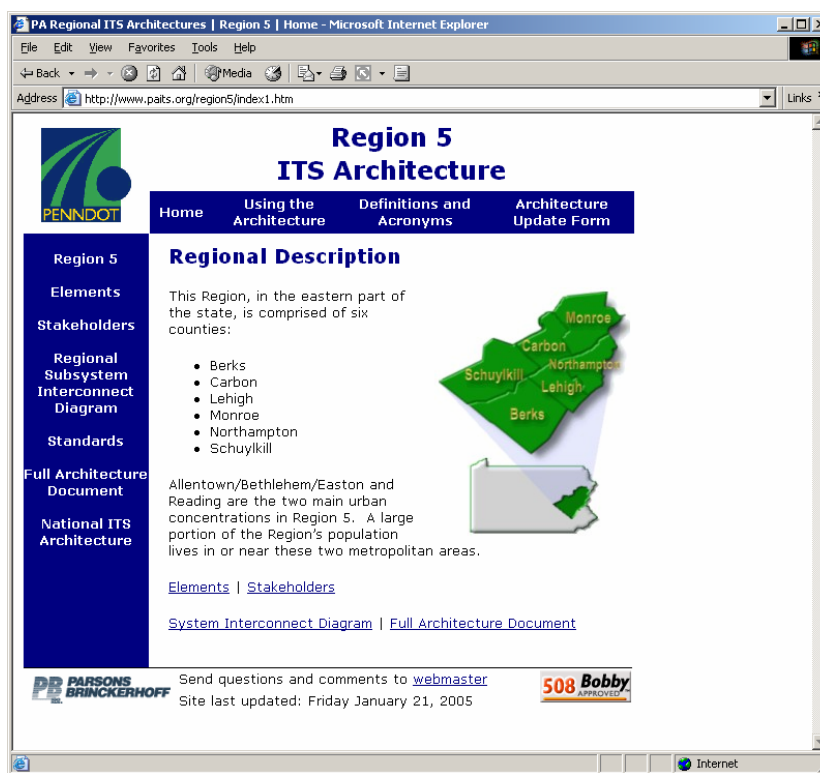


Figure 1-3: Pennsylvania ITS Architecture Web Site

From the Region 5 ITS Architecture Homepage (www.paits.org/region5), 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 or www.ntcip.org.

To identify ITS standards applicable to the Region 5 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 Region 5 ITS Architecture user can access applicable ITS standards by:

1. Viewing the information flow diagrams in the Region 5 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 Region 5, *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 Region 5 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 Region 5 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) 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 Region 5 ITS Architecture Homepage (www.paits.org/region5) 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/region5/update.htm>.

Region 5 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 Region 5 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.

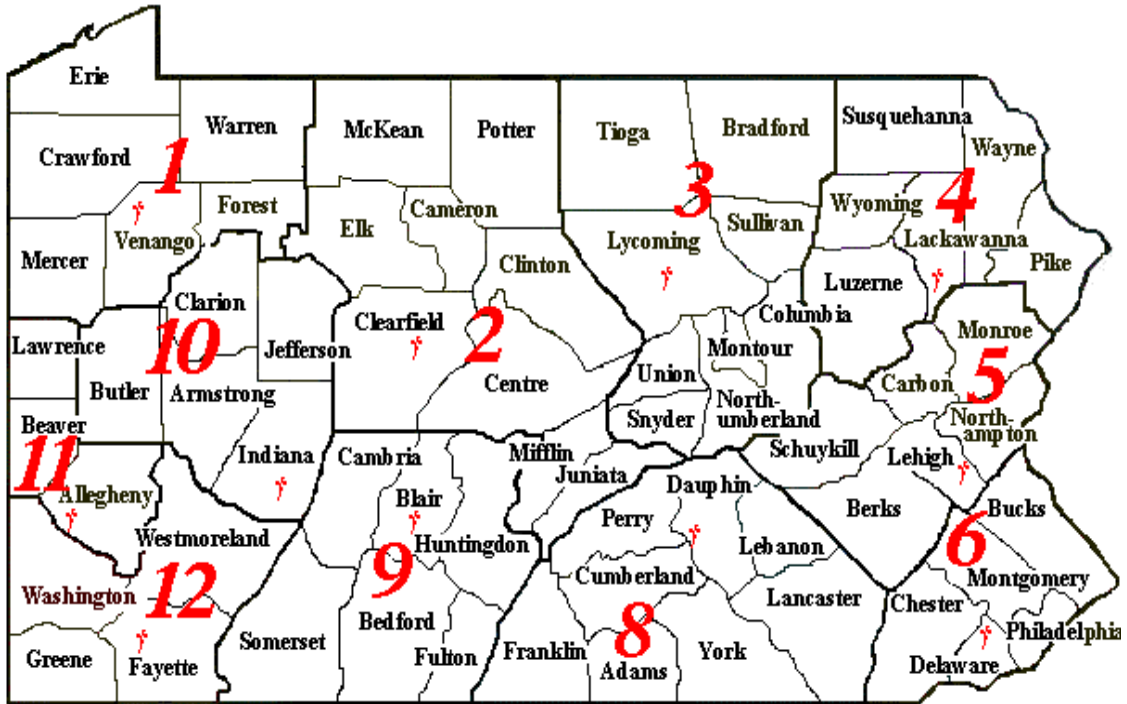


Figure 1-4: PennDOT District Map

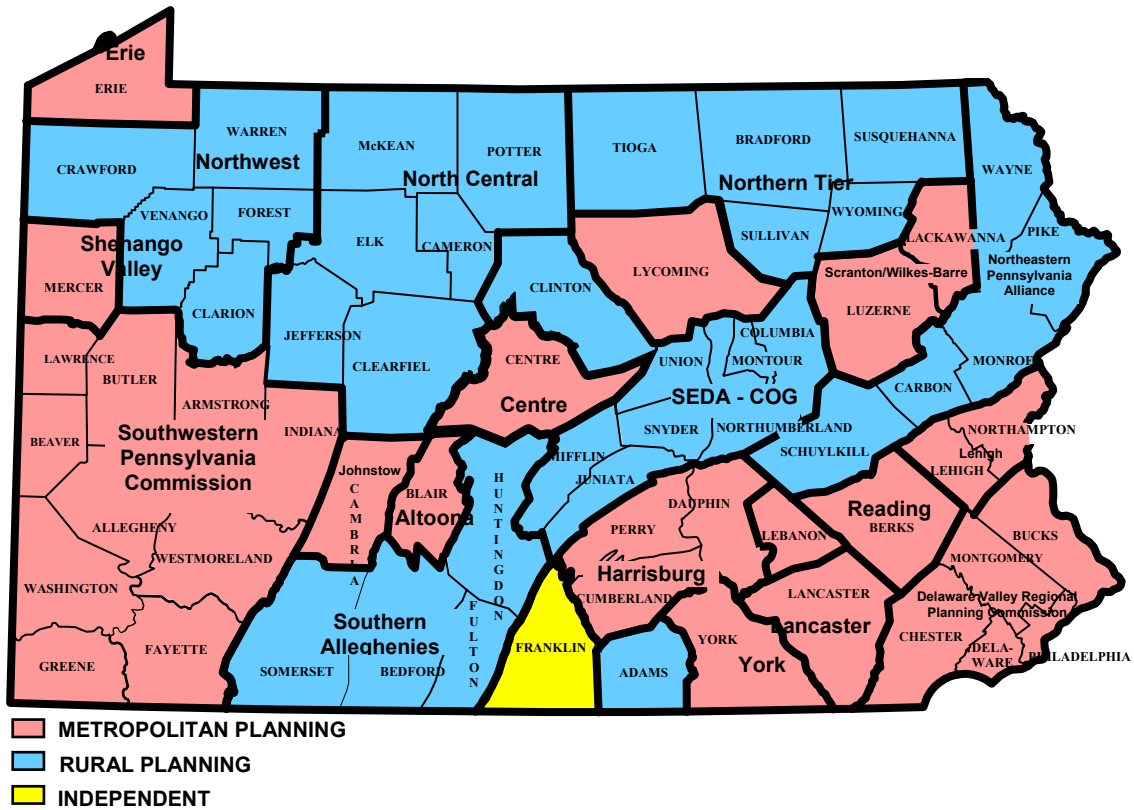


Figure 1-5: Pennsylvania MPO/RPO Map

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 Region 5, 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 Region 5 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 Region 5 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 Region 5 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?)
<p>Define the Regional Architecture Scope</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Description-of-region map and text, that includes: <ul style="list-style-type: none"> ✓ Geographic area (Districts, Counties, Cities, Corridors) ✓ Service boundaries, major roadway systems ✓ Relationship among jurisdictions within Region ✓ Relationship to adjacent Regions and jurisdictions <input checked="" type="checkbox"/> Existing projects matrix (key projects only), that includes: <ul style="list-style-type: none"> ✓ Project description ✓ Impacts on Region ✓ ITS components ✓ Timetables <input checked="" type="checkbox"/> Scope of services summary (If Not Previously Developed), that includes: <ul style="list-style-type: none"> ✓ Regional stakeholders list ✓ Owners and operators of ITS systems in Region ✓ Entities with stake or interest in Regional transportation issues ✓ Conformity requirements matrix 	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Has a Regional Champion been identified? <input checked="" type="checkbox"/> Have traditional, existing, transportation planning documentation been reviewed? <input checked="" type="checkbox"/> Is there consistency between regional scope and transportation plans? <input checked="" type="checkbox"/> Is there consistency between Regional scope and National ITS Architecture

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

Checklist Table #3

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

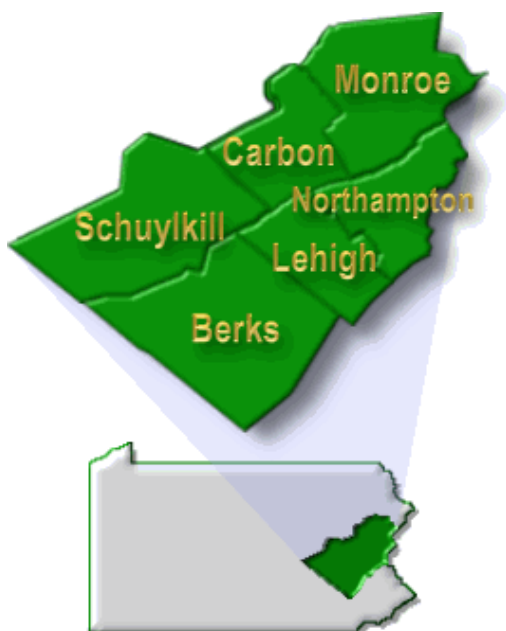
Checklist Table #4

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

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>
Finalize the Regional Architecture	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Final Regional ITS Architecture Document <input checked="" type="checkbox"/> Statewide Operations Framework Input <ul style="list-style-type: none"> ✓ Regional Architecture overview ✓ High-level Regional operations summary ✓ Relationship between Region and State 	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Is there consistency and compatibility among the Regional ITS Architectures?

2.3 Description of the Region



This Region, in the eastern part of the state, is comprised of six counties: Berks, Carbon, Lehigh, Monroe, Northampton, and Schuylkill. Region 5 encompasses PennDOT Engineering District 5-0. The Region is depicted in Figure 2-1.

Allentown/Bethlehem/Easton and Reading are the two main urban concentrations in Region 5. A large portion of the Region’s population lives in or near these two metropolitan areas.

Figure 2-1: District 5-0 ITS Architecture Region

(Source: PennDOT District 5-0 Web site)

Table 2-1 reveals that over 1.3 million people — or approximately eleven percent of statewide residents of the Commonwealth of Pennsylvania — live in Region 5. Approximately three quarters of the Region’s population resides in Berks, Lehigh, and Northampton Counties, with the remainder scattered among the other three counties of the Region.

Table 2-1: Region 5 ITS Architecture Region Population by County

County	% Population
Berks	28%
Carbon	5%
Lehigh	24%
Monroe	10%
Northampton	21%
Schuylkill	12%
Total Population in Region 5	1,300,619

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

Table 2-2 compares specific population traits in Region 5 to those across Pennsylvania and the U.S. generally. For instance, the Region is nominally more homogeneous than either the statewide or national populations — 10.1 percent of Region 5 residents are classified as minorities. The Region’s population skews older than the state or national averages — the median age of Region 5 residents is 38.4, as compared to 38 years statewide and 35 years nationally. Mean family size and per capita income resemble those across Pennsylvania and the United States.

Table 2-2: Comparison of Key Population Demographics Region 5 ITS Architecture Region, Pennsylvania, and the United States

Demographic Factor	Region 5	Pennsylvania	United States
Total Population	1,300,619	12,281,054	281,421,906
% Minority Population	10.1%	14.6%	24.9%
Median Age (In Years)	38.4	38.0	35.3
Mean Family Size	3.02	3.04	3.14
Per Capita Income	\$20,708	\$20,880	\$21,587

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

Table 2-3 examines commuting patterns in the Region to the state and national commuting conditions. Four-out-of-five Region 5 workers drive to work alone, higher than the state and national “drive-alone” rates. Ten percent of workers in the Region carpool to work, which is comparable to the statewide average. One percent of workers use public transportation; considerably less than state and national transit usage trends. The average one-way commute time for Region 5 workers is 25 minutes, which compares to the 25-26 minutes for Pennsylvania and U.S. workers generally.

Table 2-3: Comparison of Commuting Patterns Among Workers 16 & Over Region 5 ITS Architecture Region, Pennsylvania, and the United States

Commuting Pattern	Region 5	Pennsylvania	United States
Total Workers 16 & Over	602,272	5,556,311	128,279,228
% Commuters Driving Alone	81.0%	76.5%	75.7%
% Commuters Carpooling	10.6%	10.4%	12.2%
% Commuters Using Public Transportation	1.5%	5.2%	4.7%
Mean Travel Time to Work (Minutes)	24.7	25.2	25.5

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

As shown in Table 2-4, Region 5 encompasses a substantial network of roadways. As reported in PennDOT's *2002 Highway Statistics*, the Region contains 11,266.5 linear miles of roadway, signifying 9.4 percent of the Commonwealth's total linear mileage. This includes 3,300.7 linear miles of roadway maintained by PennDOT, with the remaining road miles maintained by the municipalities, etc.

Table 2-4: PennDOT Region 5 ITS Architecture Region Linear Miles

County	PennDOT Linear Miles	Total Linear Miles
Berks	882.9	3,255.1
Carbon	268.0	724.3
Lehigh	529.8	1,966.0
Monroe	520.7	1,521.5
Northampton	501.1	1,911.4
Schuylkill	598.2	1,888.2
Regional Total	3,300.7	11,266.5
Statewide Total	39,905.5	120,297.7

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 32.0 million miles. The DVMT on PennDOT roadways was approximately 25.0 million miles.

Table 2-5: PennDOT Region 5 Daily Vehicle Miles of Travel

County	PennDOT DVMT	Total DVMT
Berks	7,015,385	8,701,656
Carbon	1,138,374	2,009,222
Lehigh	5,313,381	7,702,941
Monroe	3,777,578	4,260,074
Northampton	4,347,049	5,433,204
Schuylkill	3,446,350	3,952,455
Regional Total	25,038,117	32,059,552
Statewide	217,331,036	287,203,348

Region 5 contains a range of important highway corridors. The most significant corridors are depicted in Figure 2-6.

Table 2-6: Significant Highway Corridors

Interstates	United States (U.S.) Routes	Pennsylvania (PA) Routes
Interstate 76 (I-76)	US Route 22 (US-22)	PA Route 33 (PA-33)
Interstate 78 (I-78)	US Route 209 (US-209)	PA Route 61 (PA-61)
Interstate 80 (I-80)	US Route 222 (US-222)	PA Route 309 (PA-309)
Interstate 81 (I-81)	US Route 422 (US-422)	PA Route 611 (PA-611)
Interstate 176 (I-176)		
Interstate 380 (I-380)		
Interstate 476 (I-476)		

Region 5 contains intermodal facilities and service providers that support passenger and freight, including:

- Allentown Piggy-Back Yard,
- Beth Intermodal Transloading Center,
- Hellertown (Route 412) Park-and-Ride Facility, and
- Lehigh Valley International Airport.

Region 5 contains tourist attractions and travel destinations, including:

- Pocono Mountain ski areas,
- Alpine Mountain ski resort,

- Blue Mountain ski resort,
- Cabella's retail store,
- Camelback ski resort,
- Eagle Rock ski resort,
- Pocono Raceway,
- Dorney Park and Wild Water Kingdom,
- Outlet Malls in Reading and Tannersville,
- Vanity Fair Outlets in Berks County, and
- Crayola Factory in Easton.

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

- Berks Area Reading Transit Authority (BARTA),
- Hazelton Public Transit (HPT),
- Lehigh and Northampton Transit Authority (LANTA),
- Monroe County Transit Authority (MCTA),
- Schuylkill Transportation System (STS), and
- Several on-demand paratransit and senior transit service providers.

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.

Attractions and Event Promoters: Regional tourist destination and locations, venues, facilities, and businesses within the Region that attract major trip-making, thereby creating impacts on the transportation system. This element includes **Pocono Mountain ski areas/resorts, Cabella's retail store, Pocono Raceway, Dorney Park and Wild Water Kingdom, Outlet Malls in Reading and Tannersville, Vanity Fair Outlets in Berks County, Crayola Factory in Easton, and other attractions.**

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: Berks, Carbon, Lehigh, Monroe, Northampton, and Schuylkill county government operations are included within the 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.



Delaware River Joint Toll Bridge Commission (DRJTBC):

The Delaware River Joint Toll Bridge Commission (DRJTBC) is an independent agency responsible for operating, maintaining, and managing a total of twenty bridges crossing the Delaware River between Pennsylvania and New Jersey, two of which connect to the

Region (Milford-Montague Toll Bridge and Delaware Water Gap Toll Bridge). More information about the DRJTBC is available on their website (<http://www.drjtbc.org>).

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). Major municipalities within the Region include Scranton, Wilkes-Barre, and Hazleton, along with 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.

New Jersey Department of Transportations (NJDOT): The New Jersey Department of Transportation is the statewide transportation agency responsible for building, maintaining, and operating the state's roads, bridges and tunnels. NJDOT is operations are divided into three Regions: North, Central, and South. For more information, visit the NJDOT website (<http://www.state.nj.us/transportation>).





New Jersey Emergency Management Agency

(NJEMA): The NJEMA represents all coordinators and resources connected to the Office of Emergency Management (OEM) serving the state of New Jersey. Its purpose is to promote the efforts of its members in a common goal and to protect the property and lives of all residents within the geographical limits of New Jersey and, whenever necessary against any enemy or natural disaster for the preservation of our Local and National Security. For more

information, visit the NJEMA website (<http://www.njema.org>).

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



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>).



Pennsylvania Turnpike Commission (PTC): The Pennsylvania Turnpike Commission maintains and operates the 531-mile Pennsylvania Turnpike. The Pennsylvania Turnpike is a key transportation route within the state and a vital link in the transportation network of the eastern United States. The Turnpike contains 57 fare-collection facilities, 21 service plazas and two traveler information centers, 21 maintenance facilities, 8 State Police barracks, and 5 tunnels. For more information, visit the PTC's website (<http://www.paturnpike.com>).

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 Transit Agencies: Public agencies and private companies operating public transportation services within the Region, including Berks Area Reading Transit Authority (BARTA), Hazelton Public Transit (HPT), Lehigh and Northampton Transit Authority (LANTA), Monroe County Transit Authority (MCTA), Schuylkill Transportation System (STS), and several on-demand paratransit and senior transit service providers.

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.

TRANSCOM: TRANSCOM is a coalition of 16 transportation and public safety agencies in the New York-New Jersey-Connecticut metropolitan region. It was created in 1986 to provide a cooperative, coordinated approach to regional transportation management. For more information, visit TRANSCOM's website (<http://www.xcm.org/index.html>)

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

Stakeholder	Project	Status	Project Description
Commercial Vehicle Companies	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.
Commercial Vehicle Companies	Private Carrier Fleet Maintenance Management	Existing	This program provides capabilities to administer preventive maintenance schedules.
Commercial Vehicle Companies	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.
Counties	911 Communication Centers	Existing	911 Communication Centers have been established throughout the Region to dispatch and manage resources for incidents.
Counties	County Emergency Management Centers	Existing	In the case of an emergency, County EMA's serve as an emergency operations center that can be activated to coordinate incident actions. These centers have been established throughout Region 5.
Counties	County 911 Communication Centers – Geographic Information Systems (GIS)	Existing	Regional 911 Communication Centers utilize a GIS-based mapping system to manage 911 calls. The GIS helps to provide automatic location of cellular and wireline calls.

Stakeholder	Project	Status	Project Description
Counties	Geographic Information Systems (GIS)	Existing	Planning agencies utilize GIS systems for planning purposes. GIS information is shared with various stakeholders in the Region.
Counties	GIS Based Traffic Count System	Planned 2	This project would result in a regional GIS-based tool providing traffic count and crash data. GIS maps and aerial photographs would be made available for sharing.
Delaware River Joint Toll Bridge Commission (DRJTBC)	DRJTBC E-Z Pass Electronic Toll Collection	Existing	E-Z Pass is an electronic toll collection system used on the Pennsylvania Turnpike and other toll roads in the Commonwealth. E-Z Pass allows passenger vehicles to pay tolls at toll both without stopping. E-Z Pass provides electronic toll capabilities on the Delaware River Joint Toll Bridge and the Pennsylvania Turnpike.
General Public	Personal Traveler Information Devices	Existing	Includes personal computers, PDA's, cell phones, and other devices allowing users to access transportation related information.
General Public	In-Vehicle Technology	Existing	Existing in-vehicle ITS systems such as navigation systems, adaptive cruise control, and OnStar services.
Information Service Providers	Traffic Works Station (TWS)	Existing	An incident reporting workstation, Traffic Works Station (TWS) is used to report incident information. Metro Networks broadcasts this information over the internet on www.autos.msn.com .

Stakeholder	Project	Status	Project Description
Information Service Providers	Traffic Works Station (TWS) Information Sharing	Planned 2	This project would enable 911 Communication Centers and PennDOT District 5-0 TMC to access traffic reports from Metro Network's Traffic Works Station.
Municipalities	Traffic Signal Systems	Existing and Planned 2	Traffic Signals provide for improved control of major highways in the Region including major arterials. Future intersection traffic signal upgrades and coordination will improve safety and operations.
Municipalities	Emergency Vehicle Preemption	Existing	Emergency vehicles have traffic signal preemption capabilities on selected major arterials in Region 5.
Municipalities	Shared Traffic Signal Control	Planned 2	911 Communication Centers, PennDOT, and the Pennsylvania State Police would like the capability to control traffic signals to assist in managing incidents.
Municipalities	Traffic Signal CCTV Deployment and Video Sharing	Planned 2	Various stakeholders in Region 5 would like access to video images from CCTV cameras positioned on traffic signals.
PennDOT (Central Office)	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.

Stakeholder	Project	Status	Project Description
PennDOT (Central Office)	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.
PennDOT (Central Office)	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.
PennDOT (Central Office)	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.
PennDOT (Central Office)	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.
PennDOT (Central Office)	PennDOT "Wizard" Work Zone Alert Radio	Planned 1	The alert radio alerts truck drivers to work zone conditions.
PennDOT (Central Office)	Statewide Telecommunication	Planned 2	This project would develop a statewide telecommunication system

Stakeholder	Project	Status	Project Description
PennDOT (Central Office)	Construction Projects (current and future)	Existing	This projects allows for road closure, work zone and construction information dissemination through PennDOT website.
PennDOT (Central Office)	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.
PennDOT (Central Office)	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.
PennDOT (Central Office)	Statewide GIS based Incident Detour Map	Planned 2	<p>This project would develop a statewide GIS based incident detour map for various major interstate routes.</p> <p>The statewide GIS based data would be consistent with the Counties' GIS data.</p>
PennDOT (Central Office)	Video Sharing	Planned 2	This project would involve sharing of video images among various PennDOT Districts, PSP, PEMA, and other coordinating agencies.

Stakeholder	Project	Status	Project Description
PennDOT (Central Office)	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.
PennDOT (District 5-0)	PennDOT D5 Transportation Management Center (TMC)	Existing	The District 5-0 Traffic Management Center is the focal point of District operations. The TMC operates ITS devices and is responsible for coordinating incident response.
PennDOT (District 5-0)	CHIPS Operating System	Existing	PennDOT District 5-0 Transportation Management Center uses CHIPS software to operate ramp metering, HAR, and DMS in the Region.
PennDOT (District 5-0)	Automatic Traffic Recorder (ATR) Stations (I-78, Route 22, and PR 33)	Existing	PennDOT owns ATR stations throughout Lehigh and Northampton Counties, which record traffic volumes. Five loop detectors are located on Route 22, Route 78 has two, and Route 309 and Route 33 each have 1 station.
PennDOT (District 5-0)	Traffic Control Incident Management System and Queue Detection System (Route 22)	Existing	The system employs various ITS elements for incident management as well as providing real-time traffic condition information to travelers by various means such as HAR, DMS, and the Internet.
PennDOT (District 5-0)	Permanent Dynamic Message Signs (DMS)	Existing	Changeable Message Signs allow PennDOT to provide motorists with real-time travel information.

Stakeholder	Project	Status	Project Description
PennDOT (District 5-0)	Portable Dynamic Message Signs (DMS)	Existing	Portable Dynamic Message Signs allow PennDOT to provide motorists with real-time travel information. These signs are located on trailers and can be moved throughout the Region.
PennDOT (District 5-0)	Permanent Highway Advisory Radio (HAR) Systems (SR 100/SR 22, SR 33/SR 22, I-78/309)	Existing	HAR systems are composed of radio transmitters used to provide real-time travel information to motorists. Several permanent stations are deployed throughout the Lehigh Valley.
PennDOT (District 5-0)	Portable Highway Advisory Radio (HAR) Systems (SR 100/SR 22, SR 33/SR 22, I-78/309)	Existing	HAR systems are composed of radio transmitters used to provide real-time travel information to motorists. Portable HAR can be relocated throughout the Region.
PennDOT (District 5-0)	Ramp Metering Systems (Route 22)	Existing	Ramp metering operates on a pre-timed basis and the Master Traffic Control Center's computer via FCC-licensed radio communication controls. Upon the detection of a major incident either PennDOT personnel or the PSP have the ability to close ramps individually.
PennDOT (District 5-0)	Freeway Service Patrol (I-78 and Route 22)	Existing	The Freeway Service Patrol provides for the expeditious removal of disabled or accident vehicles, and small non-hazardous debris from the freeway; thus reducing traffic delays and congestion that results from breakdowns, crashes, and spills.

Stakeholder	Project	Status	Project Description
PennDOT (District 5-0)	CCTV Systems	Existing	CCTV systems are composed of either permanent or portable cameras in the field and used for incident detection, verification, and response.
PennDOT (District 5-0)	Mile Marker System (I-78, Route 22, and PR 33)	Existing	The mile marker system consists of signs along major freeways notating the mile post by tenth of a mile in order to more easily identify motorist location in case of an incident.
PennDOT (District 5-0)	Welcome Centers and Rest Areas	Existing and Planned 2	Welcome Centers act as a travel guide to provide information on surrounding areas including attractions, boarding and lodging, and events occurring in the area. They also provide directional maps. In the future, PennDOT Welcome Centers may be utilized for providing motorists with traveler information.
PennDOT (District 5-0)	Queue Detection System (I-80)	Existing	A ramp queue detection system for an Outlet Mall in Tannersville located on I-80. The system detects queue backup and sends messages to portable signs. The system warns travelers of slow traffic ahead; when appropriate, it can direct drivers to use the next ramp or close both ramps.
PennDOT (District 5-0)	Motorist-Aid Call Box System	Existing	Call boxes have been installed on a portion of I-80 at approximately 1-mile intervals. The call boxes are connected to the nearest PSP facility and allow motorists to request emergency assistance as required.
PennDOT (District 5-0)	"Wizard" Work Zone Alert Radio	Existing	'Wizard' radios are used to alert truck drivers of upcoming work zone conditions.

Stakeholder	Project	Status	Project Description
PennDOT (District 5-0)	Construction Zone Traffic Management System	Existing	This project includes an “on-call” resource of portable, electronic DMS’s to be used in conjunction with HAR in work zones.
PennDOT (District 5-0)	Freeway Work Zone Management	Existing and Planned 1	Currently, PennDOT District 5-0 utilizes CCTV systems to monitor traffic in work zones. In the future in conjunction with PSP, PennDOT District 5-0 plans to deploy CCTV, VSL signs, and RVD systems in order to vary speed limits and automate speed enforcement.
PennDOT (District 5-0)	Communications Backbone and Network Integration	Planned 1	This project will implement the main communications trunk in the Lehigh Valley by integrating all field devices, where needed. The project could include linking Strategic Highway Research System (SHRP) sites in the District. Part of the project is to coordinate with the District 5-0 TMC to ensure communications with field devices is established.
PennDOT (District 5-0)	Interstate Highway Rollover Project	Planned 1	This project involves the installation of a permanent DMS on I-80 that will provide travel advisories to reduce the number of accidents occurring on the roadway segment. Weather and other information could also be provided.
PennDOT (District 5-0)	Cresson Mountain ITS Incident Management Control System	Planned 1	This system will be interfaced with the existing weather monitoring system to provide real-time weather and incident information along this stretch on Route 22.

Stakeholder	Project	Status	Project Description
PennDOT (District 5-0)	Future ITS Equipment Deployment on I-78 and US-22	Planned 1 and Planned 2	PennDOT District 5-0 has plans for deploying additional CCTV and DMS (along with a fiber network) along the I-78 and US-22 corridors.
PennDOT (District 5-0)	PennDOT District 5-0 Video Sharing Project	Planned 2	PennDOT District 5-0 is willing to share CCTV images with the 911 Communication Centers, Pennsylvania State Police, Regional Media, and other stakeholders in Region 5.
PennDOT (District 5-0)	PennDOT District 5-0 Traveler Information Website	Planned 2	As the PennDOT District 5-0 CHIPS software becomes more automated, the PennDOT website may provide traffic information to the general public.
Pennsylvania Emergency Management Agency (PEMA)	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.
Pennsylvania Emergency Management Agency (PEMA)	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.

Stakeholder	Project	Status	Project Description
Pennsylvania Emergency Management Agency (PEMA)	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.
Pennsylvania Emergency Management Agency (PEMA)	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
Pennsylvania State Police (PSP)	Incident Information Management System (IIMS)	Existing	The Incident Information Management System is a database used to provide PSP vehicles incident reporting and dispatching capabilities.
Pennsylvania State Police (PSP)	PSP Dispatch Centers	Existing	PSP Dispatch Centers are responsible for PSP operations. Dispatch Centers dispatch PSP Vehicles to incidents and emergencies on state highways.
Pennsylvania State Police (PSP)	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.
Pennsylvania State Police (PSP)	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.

Stakeholder	Project	Status	Project Description
Pennsylvania State Police (PSP)	PSP CHIPS Enhancement	Existing and Planned 2	The Pennsylvania State Police (Region 5) currently have access to PennDOT District 5-0 TMC CHIPS software. This software provides PSP with the ability to control DMS. This project would enhance the current system.
Pennsylvania Turnpike Commission (PTC)	Pennsylvania Turnpike Field Devices	Existing and Planned 1	Pennsylvania Turnpike Commission existing and planned field devices including: DMS, RWIS, HAR, CCTV, CADS, and TRWS.
Pennsylvania Turnpike Commission (PTC)	PTC ATIS Integration Project	Planned 1	The PTC will integrate DMS, RWIS, HAR, CCTV, and CADS sub-systems into an integrated traffic management system.
Pennsylvania Turnpike Commission (PTC)	PTC *11 Phone Service	Existing	The PTC *11 Phone Service allows motorists to notify the PTC of incidents and emergencies on the Pennsylvania Turnpike.
Pennsylvania Turnpike Commission (PTC)	PTC E-Z Pass Toll Collection System	Existing	E-Z Pass is an electronic toll collection system used on the Pennsylvania Turnpike and other toll roads in the Commonwealth. E-Z Pass allows passenger vehicles to pay tolls at toll both without stopping.
Pennsylvania Turnpike Commission (PTC)	PTC Service Plazas	Existing	PTC Service Plazas serve as a center for traveler information. Service plazas utilize scrolling message boards to broadcast weather and lodging information.

Stakeholder	Project	Status	Project Description
Pennsylvania Turnpike Commission (PTC)	PTC Traffic Operation Center (TOC)	Existing	The PTC Traffic Operation Center, located near Harrisburg, is responsible for detecting, monitoring, managing, operating, dispatching resources in response to incidents, events, construction and maintenance work for the entire length of the Pennsylvania Turnpike.
Regional Media	Regional Media CCTV Systems	Existing	CCTV systems are used for incident detection and verification.
Regional Transit Agencies	Transit Dispatch Centers	Existing	Transit dispatch centers provide fixed route transit service. The center provides operations, maintenance, customer information, planning, and management functions for the transit property. They also provide paratransit services.
Regional Transit Agencies	Transit Automatic Vehicle Location (AVL) Systems	Existing	AVL is the used to track vehicles, in this case transit vehicles, for trip planning, routing, and providing real-time information to customers.
Regional Transit Agencies	Automatic Fare Box Counters	Existing	Automatic fare box counters count money and swipe passes on Regional Transit Vehicles. Information from the fare boxes is downloaded at the Transit garages.
Regional Transit Agencies (and Counties)	Metro Plus GIS Sharing Effort	Existing	LVPC and LANTA are working together on a GIS information sharing effort.
Regional Transit Agencies	'NextBus' Arrival System	Planned 1	The 'NextBus' Arrival System will provide transit users with traveler information.

Stakeholder	Project	Status	Project Description
Regional Transit Agencies	Transit Signal Priority	Planned 2	Signal priority enables transit vehicles to receive the right-of-way at traffic signals. Signal Priority helps to ensure that transit vehicles stay on their predetermined schedules and arrive at bus stops on time.
Regional Transit Agencies	Enhanced Transit Traveler Information Websites	Planned 2	Enhanced transit website will provide the traveling public with dynamic bus schedules, travel times, delays, and other traveler information.
Regional Transit Agencies	AVL Data Sharing (Transit Probe Vehicles)	Planned 2	Regional Transit Agencies are willing to share AVL data with stakeholders in the Region. Transportation agencies would be able to use the transit vehicles as probe vehicles for identifying congestion on arterials and highways.
Towing Industry	Towing Industry Coordination	Planned 2	Region 5 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.
TRANSCOM	Regional Transportation Management	Planned 2	PennDOT District 5-0 TMC would like to connect to the TRANSCOM network. TRANSCOM allows various agencies to share incident and emergency information in the northeast United States.
Various Stakeholders	800 MHz Statewide Communication System	Existing	This project involves the deployment of a statewide 800 MHz wireless communication system for state agencies.

Stakeholder	Project	Status	Project Description
Various Stakeholders	511 Traveler Information Phone System	Planned 2	Project that may be initiated by PennDOT and the PTC to collect and distribute traveler information via a dedicated 511 phone number throughout the state.
Various Stakeholders	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 logical approach to gathering 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 5-0. Includes the PennDOT District 3-0 Office and the District 3-0, 4-0, 6-0, and 8-0 County Maintenance Offices. 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.

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.

County Social Service Offices: County offices responsible for social services in Region 5. This element includes the following offices: Daycare, Mental Health and Retardation, Area Agency of Aging, County Assistance Office, County Human Services, County Grants Office, Career Link, and Occupation Vocational Relocation Services.

DRJTBC Offices: Regional toll bridge agency, with operations and management systems located at their headquarters in Morrisville, PA. DRJTBC Headquarters serve as a central point for traffic management, emergency/incident management, interagency coordination, and toll system management.

DRJTBC Toll Plazas: Existing DRJTBC-operated systems/equipment located at bridge tolling plazas. Toll plazas have electronic toll capabilities using the E-Z Pass system to automatically read in-vehicle tags and collect the appropriate toll. Toll plazas also act as the administrative/management location for each crossing facility.

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. Local School District Offices obtain traffic and roadway information from Municipal Traffic Management Offices.

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.



NJDOT Offices: New Jersey Department of Transportation Offices that coordinate with PennDOT during incident response and construction and maintenance activities.

NJEMA Emergency Operation Center: New Jersey Emergency Management Agency Emergency Operation Center stores, coordinates, and utilizes emergency response and evacuation information/plans to facilitate coordinated emergency response for all responding agencies throughout New Jersey. NJEMA coordinates with PEMA during emergency operations affecting both Maryland and Pennsylvania.

NJSP Offices: Includes all New Jersey Department of State Police Offices. NJSP Offices represent public safety systems that support incident management, disaster response and evacuation, security monitoring, dissemination of incident information and other security and public safety-oriented ITS applications.

Passenger Vehicles: This element consists of systems within all passenger vehicles, excluding commercial vehicles, owned by the general public. The element also encompasses in-vehicle systems used to communicate with other systems such as E-Z Pass toll tags and devices used to communicate with parking facilities.



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 transportation 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 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 D5 County Maintenance Offices: Pennsylvania Department of Transportation District 5-0 County Maintenance Offices located in each of the six 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 D5 Field Devices: Pennsylvania Department of Transportation Engineering District 5-0-operated field devices. Include existing/future Highway Advisory Radio (HAR), Dynamic Message Signs (DMS), traffic flow detection systems, truck rollover warning systems, ramp meters, and queue detection systems.

PennDOT D5 Maintenance and Construction Vehicles: Pennsylvania Department of Transportation Engineering District 5-0-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 vehicles are considered maintenance vehicles, with major construction performed by private contractors.

PennDOT D5 Service Patrol Vehicles: Existing vehicles operated by PennDOT or private contractors that patrol major roadways within the Region and provide traveler assistance and support, as well as assisting in emergency response. This element includes the physical vehicles and personnel, communications and monitoring systems, and traveler information connections.



PennDOT D5 TMC: The Pennsylvania Department of Transportation Engineering District 5-0 Office, in Allentown, PA responsible for Carbon, Berks, Lehigh, Monroe, Northampton, and Schuylkill counties within the Region. This element includes personnel and existing/future systems, housed in the District 5-0 Office, including the Transportation Management Center (TMC) and the Community Relations department. The PennDOT District 5-0 TMC is

responsible for providing traffic management, incident/emergency response, maintenance and construction coordination, and traveler information on PennDOT roadways.

PennDOT D6 TMC: Pennsylvania Department of Transportation Engineering District 6-0 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 6-0 TMC may act as a Regional Transportation Management Center (RTMC) in the future.

PennDOT D8 TMC: Pennsylvania Department of Transportation Engineering District 8-0 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 8-0 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: Region 5 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).



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 Troop T Highspire: Existing Pennsylvania State Police Troop T barracks currently dispatch PSP units on the Pennsylvania Turnpike. PSP Troop T Dispatch Centers represent public safety systems that support incident management, disaster response and evacuation, security monitoring, and other security and public safety-oriented ITS applications for the Pennsylvania Turnpike.

PSP Troop T Vehicles: All existing/future systems within Pennsylvania State Police Troop T 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 agencies' systems. MDT's are currently being integrated with other state agencies (i.e., PEMA) and will be integrated with municipal agencies in the future.



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.

PTC Field Devices: Existing and future Pennsylvania Turnpike Commission Field Devices located within the Region. This element encompasses existing/future traffic detectors, HAR, RWIS, DMS, CCTV cameras, over-height vehicle detection systems, call boxes, truck rollover warning system (TRWS), and other field devices distributed on and along the roadway that monitor, control, and manage traffic.

PTC Maintenance and Construction Vehicles: Pennsylvania Turnpike Commission-operated in-vehicle systems that perform maintenance and construction operations along the Turnpike. Includes existing/planned in-vehicle systems on snowplows and other vehicles for communicating with dispatch centers and tracking maintenance activity.

PTC Offices: The Pennsylvania Turnpike Commission offices consist of systems housed at the Operations Control Center, located in Harrisburg, as well as at all other offices/towers along the Turnpike. The PTC Offices' element serves as the focal point for Turnpike emergency management, traffic management, maintenance and construction management, toll administration, traveler information, and other activities associated with the Pennsylvania Turnpike.

- The PTC Offices support incident management, disaster response and evacuation, security monitoring, and other security and public safety-oriented ITS applications along the Turnpike. It interfaces with other emergency management agencies to support coordinated emergency response.
- Traffic management operations performed by the PTC Offices include monitoring and controlling traffic and the road network. The PTC Offices also coordinate traffic information and control strategies with neighboring agencies, including PennDOT and adjacent states.
- PTC Offices are responsible for monitoring and managing Turnpike roadway infrastructure construction and maintenance activities. The offices also manage equipment at the roadside, including environmental sensors (RWIS), and the repair and maintenance of both non-ITS and ITS equipment.
- PTC Offices also provide toll administration capabilities. Functions include general payment administration and the electronic transfer of authenticated funds from the customer to the Pennsylvania Turnpike Commission.

PTC Service Plazas: Existing/future systems housed in Pennsylvania Turnpike Commission-operated plazas along the Turnpike. The service plazas provide traveler information using scrolling message boards.



PTC Toll Plazas: Existing/future Pennsylvania Turnpike Commission-operated systems/equipment located at tolling plazas. PTC Toll plazas encompass E-Z Pass electronic toll capabilities, ticketed systems, archived toll data, and E-Z Pass video enforcement systems. CVO credentialing at PTC Toll Plazas is planned for the future.

Regional Media Field Devices: Regional Media-owned and operated field devices for private-sector traveler information. Include existing/future CCTV cameras.

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 Remote Traveler Support: Regional Transit Agency-operated remote traveler information and support systems. Includes existing/future electronic displays with dynamic traveler information, as well as surveillance cameras at bus stops/stations.

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.

TRANSCOM Center: An Information Exchange Network (IEN) to report incidents affecting the I-95 corridor to member agencies. The PennDOT District 5-0 Office plans on being a member agency of TRANSCOM.

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

Element	Stakeholder	Functionality	Status	Associated Project(s)
County 911 Communication Centers	Counties	Takes emergency calls for the county	Existing	<ul style="list-style-type: none"> County 911 Communication Centers County 911 Communication Centers – Geographic Information System (GIS) PennDOT District 5-0 Video Sharing Project Amber Alert Coordination 800 MHz Statewide Communication System
		Responsible for dispatching all public safety vehicles (fire, police, and EMS)	Existing	
		All police dispatch is conducted using radio	Existing	
		Dispatches to fire and EMS is done using radio and dispatch two-tone pagers	Existing	
		Contacts PennDOT County and Maintenance Office using telephone to coordinate during incidents/emergencies	Existing	
		Utilizes a GIS to map calls. The GIS provides automatic location of cellular and wire line calls.	Existing	
		Receives information from Onstar	Existing	
		Receives weather information from the internet, Channel 69, and the Weather Channel and share this information with other emergency agencies	Existing	

Element	Stakeholder	Functionality	Status	Associated Project(s)
		911 Centers are required by law to keep call data for 3 years. PEMA requires 911 Center to keep audio files for 30 days	Existing	
		Calls Private Wrecker Units for dispatch (use a rotating list)	Existing	
		ISP's may query 911 Centers for emergency information over the telephone	Existing	
		Coordinates with other agencies during Amber Alert	Existing	
		Utilizes 800 MHz radio system	Existing	
		911 Centers would like to have ISP's send them information	Planned 2	
		There is a possibility for CCTV images to be shared between PennDOT and 911 Centers	Planned 2	
		Would like a video feed into their building from PennDOT District 5-0 TMC	Planned 2	

Element	Stakeholder	Functionality	Status	Associated Project(s)
Adjacent PennDOT District and County Offices	Pennsylvania Department of Transportation (PennDOT)	Provides general coordination of PennDOT functions with District 5-0 Offices. Functions include traffic management, incident management, maintenance and construction management, and traveler information.	Existing	
Attractions and Event Promoters	Event Promoters	Major event promoters in the Region that coordinate with emergency and transportation agencies during large events	Existing	<ul style="list-style-type: none"> 511 Traveler Information Phone System
		Attractions would like to provide information to the Statewide 511 System	Planned 2	
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"> Private Carrier Commercial Vehicle Tracking System Private Carrier Fleet Maintenance Management FHWA Carrier Compliance Review
		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	

Element	Stakeholder	Functionality	Status	Associated Project(s)
		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"> Private Carrier Commercial Vehicle Tracking System Private Carrier Fleet Maintenance Management FHWA Carrier Compliance Review
		Supports devices to communicate with Commercial Vehicle Company Offices. May include the addition of a cell-based radio and equipment	Existing	
		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	
County EMA Centers	Counties	Maintains an emergency operations center that can be activated to coordinate incident actions	Existing	<ul style="list-style-type: none"> County Emergency Management Centers
		Coordinates and sponsors training to all public service agencies in HAZMAT operations and incident command	Existing	

Element	Stakeholder	Functionality	Status	Associated Project(s)
		Involves with HAZMAT, evacuation activity, threats to large population, and large weather events	Existing	
		Coordinates with PEMA and other emergency agencies	Existing	
County/Regional Planning Organizations	Counties	Obtains computerized ATR data from municipalities	Existing	<ul style="list-style-type: none"> Geographic Information Systems (GIS) GIS Based Traffic Count System
		Obtains traffic volume data from PennDOT Central Office	Existing	
		Obtains GIS layers from PennDOT Central Office	Existing	
		Utilizes the PennDOT crash database for long range planning	Existing	
		Utilizes the PennDOT video log for land development studies	Existing	
		Requests transit route and traffic signal maps for planning studies	Existing	

Element	Stakeholder	Functionality	Status	Associated Project(s)
		Requests toll collection data from the PTC and DRJTBC for planning purposes	Existing	
		Requests emissions data from the Department of Environmental Protection (DEP)	Existing	
		Shares GIS data with County EMA and County 911 Communication Centers	Existing	
		Planning Organizations would like to see a regional GIS based traffic count system	Planned 2	
County Social Service Offices	Counties	Transit agencies assist the Social Service Offices during emergency evacuations	Existing	
DRJTBC Offices	Delaware River Joint Toll Bridge Commission (DRJTBC)	Provides general traffic and incident coordination with District 5-0 Offices	Existing	<ul style="list-style-type: none"> • PennDOT District 5-0 Camera Sharing Project • E-Z Pass Toll Collection
		Operates toll plazas (includes E-Z Pass)	Existing	
DRJTBC Toll Plazas	Delaware River Joint Toll Bridge Commission (DRJTBC)	DRJTBC Toll Plazas provides capability to automatically identify the vehicle type using tag reader and automatically perform toll collection	Existing	<ul style="list-style-type: none"> • E-Z Pass Toll Collection

Element	Stakeholder	Functionality	Status	Associated Project(s)
High Threat Facilities	High Threat Facilities	Major facilities that require special security and/or emergency response coordination	Existing	
		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	
		Coordinates with PEMA in case of incidents involving food products	Existing	
Information Service Providers	Information Service Providers (ISP)	PennDOT, County 911 Communication Centers, DRJTBC, PTC, Municipalities, and PSP contact Information Service Providers for traffic data	Existing	<ul style="list-style-type: none"> Traffic Works Station (TWS) Traffic Works Station (TWS) Information Sharing PennDOT District 5-0 Video Sharing Project
		Offer a “tip” line for travelers to call in with incident information	Existing	
		Provides traffic information on www.autos.msn.com	Existing	

Element	Stakeholder	Functionality	Status	Associated Project(s)
		Broadcasts special event and weather information	Existing	
		Provides traffic information to radio and television stations	Existing	
		Information Service Providers would like access to PennDOT CCTV images	Planned 2	
		Potential connection to PennDOT District 5-0 CHIPS system	Planned 2	
Local School District Offices	Local School Districts	Provides transportation for students (K-12) to and from school	Existing	
Municipal Field Devices	Municipalities	Provides coordinated traffic signal control	Existing	<ul style="list-style-type: none"> Traffic Signal Systems Shared Traffic Signal Control Traffic Signal CCTV Deployment and Video Sharing
		CCTV used for detection on traffic signals	Planned 2	
		Video sharing with regional stakeholders	Planned 2	
Municipal Traffic Management Offices	Municipalities	Controls municipality-owned traffic signal systems	Existing	<ul style="list-style-type: none"> Traffic Signal Systems

Element	Stakeholder	Functionality	Status	Associated Project(s)
		Provides centralized traffic control at local intersections; also performs remote data collection functions	Existing	<ul style="list-style-type: none"> Shared Traffic Signal Control Traffic Signal CCTV Deployment and Video Sharing
Municipal/Regional Public Safety Offices	Municipalities	Manages municipal public safety services (fire and police response)	Existing	
Municipal/Regional Public Safety Vehicles	Municipalities	Provides local fire and police response	Existing	<ul style="list-style-type: none"> Emergency Vehicle Preemption
NJDOT Offices	New Jersey Department of Transportation (NJDOT)	PennDOT District 5-0 TMC contacts NJDOT via phone to coordinate on I-78 and I-80	Existing	
NJEMA Emergency Operation Center	New Jersey Emergency Management Association (NJEMA)	Coordinates with PEMA in the event of major disasters	Existing	
NJSP Offices	New Jersey State Police (NJSP)	Coordinates with PSP in the event of major incidents across state boundaries	Existing	

Element	Stakeholder	Functionality	Status	Associated Project(s)
Passenger Vehicles	General Public	Provides the capability for vehicle operators to pay a toll without stopping	Existing	<ul style="list-style-type: none"> • DRJTBC E-Z Pass Electronic Toll Collection • Pennsylvania Turnpike E-Z Pass Toll System • In-Vehicle Technology
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"> • PEMA Emergency Operation Center • PEMA Truck • Pennsylvania Emergency Information Reporting System (PEIRS)
		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	

Element	Stakeholder	Functionality	Status	Associated Project(s)
		Disseminates disaster information to the public	Existing	
		Monitors alerting and advisory systems reported by other emergency agencies	Existing	
		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	
		Plans to control PTC DMS during emergencies	Planned 2	
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"> Roadway Weather Information System (RWIS) PennDOT Commercial Vehicle Information Systems and Networks (CVISN) Project
		Collects Commercial Vehicle safety inspection and violations data	Existing	

Element	Stakeholder	Functionality	Status	Associated Project(s)
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"> • PennDOT Transportation Management Centers (TMC's) • Winter Road Condition Hotline for Interstate Highways • Roadway Weather Information System (RWIS) • PennDOT Commercial Vehicle Information Systems and Networks (CVISN) Project • PennDOT Performance and Registration Information Systems Management (PRISM) • PennDOT Safety and Fitness Electronic Record (SAFER) • PennDOT ITS Transportation Management Approach
		The PennDOT Central Office Press Office communicates traffic-related information to Regional Media Outlets	Existing	
		PennDOT (Motor Carrier Division) maintains commercial vehicle registrations	Existing	
		CVO Supports the exchange of safety credential information across the jurisdictions	Existing	
		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	

Element	Stakeholder	Functionality	Status	Associated Project(s)
		PennDOT Bureau of Planning and Research owns and maintains Automatic Traffic Recorders throughout the state	Existing	<ul style="list-style-type: none"> Construction Projects (current and future) Central Repository Real -time Traffic Information Website Statewide GIS based Incident Detour Map Video Sharing Web site Portal for Assisting Commercial Vehicle Operators Statewide Telecommunication
		RWIS data flows from the RWIS site to Central Office (BOMO) to a public website	Existing	
		RWIS monitors roadway weather conditions and transfers information to PennDOT BOMO	Existing	
		Receives environmental conditions information from various weather sources to aid in scheduling routine maintenance activities	Existing	
		CVO Supports the collection and review of carrier safety data and determines the carrier safety rating	Planned 1	
PennDOT D4 TMC	Pennsylvania Department of Transportation (PennDOT)	Provides proactive incident/congestion management	Planned 2	<ul style="list-style-type: none"> PennDOT Transportation Management Centers (TMC's)
		Assumes control of cross-District TMC's during off-peak periods	Planned 2	

Element	Stakeholder	Functionality	Status	Associated Project(s)
		Provides traveler information/advisories using field devices such as HAR and DMS	Planned 2	
		Monitors the roadway conditions and status using detectors	Planned 2	
		Supports Advanced Traveler Information System (ATIS)	Planned 2	
PennDOT D5 County Maintenance Office	Pennsylvania Department of Transportation (PennDOT)	PSP contacts the District 5-0 County Maintenance Offices which, in turn, contacts the District 5-0 Office/TMC when there is an incident	Existing	<ul style="list-style-type: none"> • “Wizard” Work Zone Alert Radio • Construction Zone Traffic Management System • Freeway Work Zone Management • Interstate Highway Rollover Project
		PSP contacts the County Maintenance Offices for sand trucks, vehicle removals, etc.	Existing	
		District 5-0 County Maintenance Offices must fill out incident information forms (manually) and send them to PennDOT Central office (BHSTE) using email and fax.	Existing	
		Receives real-time RWIS data from RWIS stations	Existing	

Element	Stakeholder	Functionality	Status	Associated Project(s)
		County Maintenance Offices contact the TCC in Harrisburg via fax providing them with roadway conditions, weather information, and crash information	Existing	
		Districts have to provide the TCC with reports on the degree of weather conditions regularly	Existing	
PennDOT D5 Field Devices	Pennsylvania Department of Transportation (PennDOT)	Collects traffic and road information using CCTV and loop detectors for transportation planning purposes	Existing	<ul style="list-style-type: none"> • Permanent Dynamic Message Signs (DMS) • Portable Dynamic Message Signs (DMS) • Permanent Highway Advisory (HAR) Systems • Portable Highway Advisory (HAR) Systems • Ramp Metering Systems • CCTV Systems • Queue Detector System • Motorist-Aid Call Box System
		Provides incident detection capabilities using CCTV and loop detectors	Existing	
		Monitor Traffic Conditions	Existing	
		Disseminates real-time traveler information using HAR and DMS. HAR broadcast incident information, maintenance information, road closures, traffic advisories, and safety messages	Existing and Planned 1	
		'WIZARD' mobile broadcast trailers broadcast information over a CB	Existing	

Element	Stakeholder	Functionality	Status	Associated Project(s)
		Ramp metering systems detect the presence of vehicles and use traffic signals to manage the vehicles entering the highway from ramps.	Existing	
		Operates Queue detector system on I-50 which detects backups and sends messages to portable DMS signs. The system warns travelers of slow traffic ahead; when appropriate, it can direct drivers to use the next ramp or close both ramps.	Existing	
PennDOT D5 Maintenance and Construction Vehicles	Pennsylvania Department of Transportation (PennDOT)	Supports routine winter maintenance on the roadway system	Existing	
		Supports routine non-winter maintenance on the roadway system	Existing	
		Coordinates with PennDOT County Maintenance Offices using CB radio (during an incident)	Existing	
PennDOT D5 Service Patrol Vehicles	Pennsylvania Department of Transportation (PennDOT)	Provides a direct interface between roadway / incident scene and incident management personnel in PennDOT District 5-0 TMC	Existing	<ul style="list-style-type: none"> Freeway Service Patrol
		PennDOT District 5-0 TMC will be receiving reports from operators via cell phones	Existing	

Element	Stakeholder	Functionality	Status	Associated Project(s)
		Patrol vehicles will wait for PSP to instruct them in the case of major incidents	Existing	
		Patrol vehicles will provide assistance for minor incidents (i.e. broken down vehicles)	Existing	
PennDOT D5 TMC	Pennsylvania Department of Transportation (PennDOT)	Collects traffic surveillance data	Existing	<ul style="list-style-type: none"> • PennDOT D5 Transportation Management Center (TMC) • CHIPS Operating System • Automatic Traffic Recorder (ATR) Stations • Queue Detection System • Mile Marker System • “Wizard” Work Zone Alert Radio • Construction Zone Traffic Management System • Interstate Highway Rollover Project • Communications Backbone and Network Integration
		Operates ramp metering systems	Existing	
		Operates Queue Detection System, which employs various ITS elements for incident management. Provides real-time traffic condition information to travelers using HAR and DMS.	Existing	
		PennDOT District 5-0 TMC does not control traffic signals, but has the capability to do so (422 and 222 – AZTEC and Multi-sonic)	Existing	
		CHIPS software operates ramp metering, HAR, and DMS. Automated scenarios are sent out on HAR using CHIPS. This can be done with DMS and ramp metering as well (planned).	Existing and Planned 2	
		CCTV images currently flow from cameras directly to the District 5-0 TMC	Existing	

Element	Stakeholder	Functionality	Status	Associated Project(s)
		PennDOT District 5-0 TMC may be willing to share images with ISP's in the future	Planned 2	<ul style="list-style-type: none"> • Cresson Mountain ITS Incident Management Control System • PennDOT District 5-0 Video Sharing Project • PennDOT District 5-0 Traveler Information Website • PSP CHIPS Enhancement
		PennDOT District 5-0 TMC is open to sharing control of CCTV with the PSP	Planned 2	
		PennDOT District 5-0 TMC receives RWIS information from PennDOT Central Office (BOMO) over the internet (public website)	Existing	
		DMS boards have the capability to conduct speed monitoring using radar, but District 5-0 does not currently do it	Planned 2	
		Operates reversible lanes at Army Depot for directional inbound and outbound traffic	Existing	
		PSP contacts District 5-0 County Maintenance Office, which then contacts District 5-0 TMC when there is an incident	Existing	
		Operates CCTV for incident detection, verification, and response	Existing	
		Operates and disseminates information to the public using DMS (overhead and portable) and HAR	Existing	

Element	Stakeholder	Functionality	Status	Associated Project(s)
		District 5-0 Press Office (Ron Young) notifies the media, radio, ISP's, Transit, Municipalities and other regional stakeholders about major incidents	Existing	
		Coordinates incidents affecting the Pennsylvania Turnpike and PennDOT District 5-0 roadways with the PTC via telephone	Existing	
		Posts messages on DMS's for traffic management during major planned events in the region	Existing	
		District 5-0 Press office notifies the media, radio, and ISP's of major incidents or emergencies	Existing	
		PennDOT District 5-0 website currently includes construction and maintenance information	Existing	
		Supports dispatch and communication with Freeway Service Patrol Vehicles. District 5-0 TMC will be receiving reports from operators via cell phone or Nextel phone calls	Planned 1	

Element	Stakeholder	Functionality	Status	Associated Project(s)
		Potential to share control of District 5-0 DMS near Pennsylvania Turnpike/US 22 Interchange and PTC HAR's in future	Planned 2	
		PennDOT District 5-0 website does not currently contain traffic information, but as the District 5-0 CHIPS system becomes more automated, the website could possibly provide traffic information in the future	Planned 2	
		Provides proactive incident/congestion management.	Planned 2	
		Assumes control of cross-District TMC's during off-peak periods	Planned 2	
		Provides traveler information/advisories using field devices such as HAR and DMS	Planned 2	
		Monitors the roadway conditions and status using detectors and CCTV	Planned 2	
		Supports Advanced Traveler Information System	Planned 2	
PennDOT D6 TMC	Pennsylvania Department of	Provides proactive incident/congestion management	Planned 2	<ul style="list-style-type: none"> • PennDOT Transportation Management Centers

Element	Stakeholder	Functionality	Status	Associated Project(s)
	Transportation (PennDOT)	Assumes control of cross-District TMC's during off-peak periods	Planned 2	(TMC's)
		Provides traveler information/advisories using field devices such as HAR and DMS	Planned 2	
		Monitors the roadway conditions and status using detectors	Planned 2	
		Supports Advanced Traveler Information System (ATIS)	Planned 2	
PennDOT D8 TMC	Pennsylvania Department of Transportation (PennDOT)	Provides proactive incident/congestion management	Planned 2	<ul style="list-style-type: none"> PennDOT Transportation Management Centers (TMC's)
		Assumes control of cross-District TMC's during off-peak periods	Planned 2	
		Provides traveler information/advisories using field devices such as HAR and DMS	Planned 2	
		Monitors the roadway conditions and status using detectors	Planned 2	
		Supports Advanced Traveler Information System (ATIS)	Planned 2	

Element	Stakeholder	Functionality	Status	Associated Project(s)
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"> PennDOT Transportation Management Centers (TMC's) Winter Road Condition Hotline for Interstate Highways Roadway Weather Information System (RWIS) PennDOT Commercial Vehicle Information Systems and Networks (CVISN) Project PennDOT Performance and Registration Information Systems Management (PRISM) PennDOT Safety and Fitness Electronic Record (SAFER) PennDOT ITS Transportation Management Approach Construction Projects
		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	
		May coordinate incident, emergency, and inter/intra-state events	Planned 2	
		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	

Element	Stakeholder	Functionality	Status	Associated Project(s)
		May be responsible for maintaining the state's Motor Carrier Safety Assistance Program (MCSAP) files	Planned 2	(current and future) <ul style="list-style-type: none"> • Central Repository • Real -time Traffic Information Website • Statewide GIS based Incident Detour Map • Video Sharing • Web site Portal for Assisting Commercial Vehicle Operators • Statewide Telecommunication
		May be responsible for conducting roadside inspections	Planned 2	
		May be responsible for conducting weight enforcement activities	Planned 2	
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"> • Welcome Centers and Rest Areas
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	

Element	Stakeholder	Functionality	Status	Associated Project(s)
Personal Traveler Information Devices	General Public	Provides the capability to access traffic information from personal devices including pagers, cell phones, computers, PDA, etc.	Existing	
PSP Offices	Pennsylvania State Police (PSP)	Receives roadway incident notification from the County 911 Centers, PennDOT Offices, and PTC Office	Existing	<ul style="list-style-type: none"> • Pennsylvania State Police Dispatch Centers • Incident Information Management System (IIMS) • Pennsylvania State Police Consolidated Dispatch Center • 800 MHz Statewide Communication System • AMBER Alert Coordination • PennDOT District 5-0 Video Sharing Project • PSP CHIPS Enhancement
		Plans to receive CCTV images from PTC. PTC intends to share CCTV images with PennDOT, PEMA, and other incident management agencies	Planned 1	
		Receives work zone coverage plans and requests for troopers to cover work zones from PennDOT District Offices	Existing	
		Receives forwarded 911 calls from County 911 Communication Centers	Existing	
		Coordinates with other incident response agencies through PennDOT provided radio communication	Existing	
		Coordinates with other agencies in case of major incidents	Existing	

Element	Stakeholder	Functionality	Status	Associated Project(s)
		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. Future enhancements will allow PSP to control PennDOT field devices	Planned 2	
PSP Troop T Highspire	Pennsylvania State Police (PSP)	Dispatches PSP Troop T Vehicles for incidents on the Pennsylvania Turnpike	Existing	<ul style="list-style-type: none"> • Pennsylvania State Police Dispatch Centers • Incident Information Management System (IIMS) • Pennsylvania State Police Consolidated Dispatch Center • 800 MHz Statewide
		Acts as first-responder at an incident site	Existing	
		Tracks and maintains PSP Troop T vehicles	Existing	
		Provides roadway incident notification to the County and Municipal 911 centers if local jurisdiction services are needed on the scene	Existing	

Element	Stakeholder	Functionality	Status	Associated Project(s)
		Gathers/provides specific incident information from/to other PSP troopers	Existing	<ul style="list-style-type: none"> Communication System • AMBER Alert Coordination
PSP Troop T Vehicles	Pennsylvania State Police (PSP)	PSP Troop T Vehicles are dispatched from PTC Offices and PSP Troop T Dispatch Centers	Existing	<ul style="list-style-type: none"> • 800 MHz Statewide Communication System • Emergency Vehicle Traffic Signal Preemption • Mobile Data Terminals (MDT's)
		Responds to incidents on the Pennsylvania Turnpike	Existing	
PSP Vehicles	Pennsylvania State Police (PSP)	Coordinates with PSP CDC in case of incident	Existing	<ul style="list-style-type: none"> • 800 MHz Statewide Communication System • Emergency Vehicle Traffic Signal Preemption • Mobile Data Terminals (MDT's)
		Coordinates with PTC in case of an incident	Existing	
		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	
PTC Field Devices	Pennsylvania Turnpike Commission	Collects traffic and roadway information (vehicle counts, etc.) for transportation planning purposes	Existing	<ul style="list-style-type: none"> • Pennsylvania Turnpike Field Devices

Element	Stakeholder	Functionality	Status	Associated Project(s)
	(PTC)	Disseminates traffic and roadway conditions to the public using DMS, HAR, and other mechanisms	Existing	<ul style="list-style-type: none"> PTC ATIS Integration Project
		Provides incident detection capabilities. The PTC provides call boxes for incident detection/verification	Existing	
		Monitors roadway weather conditions using RWIS that measures temperature, humidity, wind speed and direction, and rain and snow precipitation.	Existing	
PTC Maintenance and Construction Vehicles	Pennsylvania Turnpike Commission (PTC)	Provides on-board systems that support routine winter maintenance on a roadway system	Existing	
PTC Offices	Pennsylvania Turnpike Commission (PTC)	Provides freeway management, including integration of surveillance information for the purpose of information sharing	Existing	<ul style="list-style-type: none"> PTC *11 Phone Service PTC ATIS Integration Project PTC Traffic Operation Center (TOC) PTC E-Z Pass Toll Collection System
		Coordinates traffic and emergency operations with agencies throughout the state	Existing	
		Provides support for special event traffic management	Planned 1	

Element	Stakeholder	Functionality	Status	Associated Project(s)
		Monitors alerts and advisory systems reported by other agencies	Existing	
		Plans to share CCTV camera images with PennDOT Districts, PSP, various emergency management agencies, and others	Planned 1	
		Provides 24x7 capabilities to coordinate traffic and incident management with PennDOT staff	Planned 2	
		Provides incident management services, including the dispatch of emergency and service vehicles and coordinates with appropriate agencies	Existing	
		Detects and verifies incidents. PTC uses a free cell phone service for incident detection.	Existing	
		Provides dispatch of emergency and service vehicles	Existing	
		Tracks PTC emergency service vehicles	Existing	
		Provides detour routes in case of incidents and shares this information with PennDOT and other transportation agencies	Existing	

Element	Stakeholder	Functionality	Status	Associated Project(s)
		Provides capabilities to be contacted by PennDOT Districts in case of major incidents that may affect traffic on Pennsylvania Turnpike	Existing	
		Shares real-time incident information with other transportation agencies, local and state law enforcement and fire and rescue agencies	Existing	
		Provides traffic and incident information to freeway and arterial management agencies, public transit, and safety agencies	Existing	
		Distributes real-time traffic information to the public through dedicated, automated phone service, web sites, email and cell phone/ automated voice methods	Existing	
		Distributes information regarding freeway travel times and speeds, incident information, special events, work zones, weather and road conditions	Existing and Planned 1	
		Stores processed data using an Archived Database Management System. PTC uses archived data for studying the impact due to work zones, capital planning/ analysis, operations planning/ analysis, safety analysis and traffic control.	Existing	

Element	Stakeholder	Functionality	Status	Associated Project(s)
		PTC collects traffic volume, vehicle classification, road conditions, weather conditions and video surveillance information	Existing	
		PTC collects route designations, current work zones, emergency/evacuation routes and procedures and incident information from other agencies	Existing	
		Collects toll collection fees and supports electronic toll collection using E-Z Pass	Existing	
		Collects and stores toll information for operational analysis and determining pricing structure	Existing	
		Monitors current and forecasted weather conditions for issuing general travel advisories	Existing	
		Coordinates with PennDOT County Maintenance Offices to reduce the impact of traffic during work zone activities	Existing	
		Provides monitoring and remote diagnostics of field equipment failures, issues problem reports, and tracks the repairs or replacement of the failed equipment	Existing	

Element	Stakeholder	Functionality	Status	Associated Project(s)
PTC Service Plazas	Pennsylvania Turnpike Commission (PTC)	Provides traveler information on the Pennsylvania Turnpike	Planned 1	<ul style="list-style-type: none"> PTC Service Plazas
		Provides traveler information, weather information centers, and lodging call centers, using scrolling message boards	Existing and Planned 1	
PTC Toll Plazas	Pennsylvania Turnpike Commission (PTC)	Provides capability to automatically identify the vehicle type using tag reader and automatically perform toll collection	Existing	<ul style="list-style-type: none"> PTC E-Z Pass Toll Collection System
		Serves as electronic screening and safety inspection stations for the Pennsylvania Turnpike	Planned 2	
Regional Media Field Devices	Regional Media	CCTV cameras monitor interstates for incidents	Existing	<ul style="list-style-type: none"> Regional Media CCTV Systems
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"> Regional Media CCTV Systems PennDOT District 5-0 Video Sharing Project
		The media would like to engage in a video sharing effort with PennDOT District 5-0 TMC	Planned 2	

Element	Stakeholder	Functionality	Status	Associated Project(s)
Regional Transit Agency Offices	Regional Transit Agencies	Provides ISP information during major events (i.e. snow storms). Messages are sent via fax or phone.	Existing	<ul style="list-style-type: none"> Transit Dispatch Centers Transit Automatic Vehicle Location (AVL) Systems Automatic Fare Box Counters Metro Plus GIS Sharing Effort 'NextBus' Arrival System Enhanced Transit Traveler Information Websites AVL Data Sharing (Transit Probe Vehicles)
		Automatic fare box counters count money and swipe passes. The information is downloaded from the bus at the BARTA Office.	Existing	
		Automatic Passenger Counters (downloaded at the garages)	Existing	
		Regional Transit Agencies may share AVL data with PennDOT	Planned 2	
Regional Transit Remote Traveler Support	Regional Transit Agencies	'NextBus' arrival systems provide travelers arrival times for the next transit vehicle	Planned 1	<ul style="list-style-type: none"> 'NextBus' Arrival System
Regional Transit Vehicles	Regional Transit Agencies	BARTA does not presently have AVL/GPS. AVL is in the Transportation Improvement Plan for fixed-route and paratransit operations in 2006	Planned 1	<ul style="list-style-type: none"> Transit Automatic Vehicle Location (AVL) Systems Automatic Fare Box Counters
		Signal priority	Planned 2	

Element	Stakeholder	Functionality	Status	Associated Project(s)
		LANTA has mobile data terminals (MDT) and AVL on paratransit vehicles	Existing	<ul style="list-style-type: none"> Transit Signal Priority AVL Data Sharing (Transit Probe Vehicles)
		MDT's are used to gather information on the number of people on a paratransit vehicle.	Existing	
		Automatic stop announcement system based on GPS positioning	Existing	
		Fixed-route vehicles will get AVL in 2006 or 2007	Planned 1	
		CCTV and audio system security are planned on buses	Planned 1	
		Transit vehicles may serve as probe vehicles for PennDOT	Planned 2	
		Signal Priority is a possibility	Planned 2	
Towing Industry Responders	Towing Industry	Assists with cleanup at accident sites	Existing	<ul style="list-style-type: none"> Towing Industry Coordination
		Contacted by the PSP and 911 Centers during incidents	Existing	

Element	Stakeholder	Functionality	Status	Associated Project(s)
TRANSCOM Center	TRANSCOM	Provides construction coordination, incident management, and technology development in the New York metropolitan area	Existing	<ul style="list-style-type: none"> Regional Transportation Management
Weather Information Providers	Weather Information Providers	Provides transportation agencies, emergency response agencies, and the general public with forecasts and other weather data	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, Information Service Providers, Municipal Traffic Management Offices, Municipal/Regional Public Safety Offices, PennDOT D5 TMC, PSP Offices, PSP Troop T Highspire, PTC Offices, Regional Media Outlets, Regional Transit Agency Offices
	Traffic conditions	Existing	PennDOT D5 TMC, PTC Offices
	Emergency archived data	Existing	County EMA Centers, County/Regional Planning Organization Offices
	Emergency vehicle dispatch	Existing	Municipal/Regional Public Safety Vehicles, PSP Vehicles, Towing Industry Responders
	Road weather information	Existing	PennDOT D5 County Maintenance Offices
	Weather information	Existing	Weather Information Providers

Element	Need (operation/data inputs from others)	Status	Origin Element
	Maintenance and construction information	Existing	PennDOT D5 County Maintenance Offices
	High-threat information	Existing	High Threat Facilities
	Special event Information	Existing	Attractions and Event Promoters
	Traffic signal video images	Planned 2	Municipal Field Devices
	Traffic information	Planned 2	PennDOT D5 TMC
	Traffic control coordination	Planned 2	PennDOT D5 TMC
Adjacent PennDOT District and County Offices	Maintenance and construction coordination	Existing	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC
	Weather information	Existing	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC
	Work zone coordination	Existing	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC
	Incident response information/coordination	Existing	PennDOT D5 TMC
	Traffic information	Existing	PennDOT D5 TMC

Element	Need (operation/data inputs from others)	Status	Origin Element
	Traffic control coordination	Planned 2	PennDOT D5 TMC
Attractions and Event Promoters	Special event coordination	Existing	911 Communication Centers, County EMA Centers, Information Service Providers, Municipal Traffic Management Offices, Municipal/Regional Public Safety Offices, PennDOT D5 TMC, PSP Offices, PTC Offices, Regional Transit Agency Offices,
Commercial Vehicle Company Offices	Detour route and traffic information	Existing	PTC Offices
	Relaying information from emergency operations to trucking companies	Existing	PTC Offices, PennDOT D5 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, Information Service Providers, Municipal Traffic Management Offices, Municipal/Regional Public Safety Offices, PennDOT D5 TMC, PSP Offices, PSP Troop T Highspire, PTC Offices, Regional Media Outlets, Regional Transit Agency Offices
	Traffic conditions	Existing	PennDOT D5 TMC, PTC Offices
	Emergency archived data	Existing	County EMA Centers, County/Regional Planning Organization Offices
	Emergency vehicle dispatch	Existing	Municipal/Regional Public Safety Vehicles, PSP Vehicles, Towing Industry Responders
	Road weather information	Existing	PennDOT D5 County Maintenance Offices
	Weather information	Existing	Weather Information Providers
	Maintenance and construction information	Existing	PennDOT D5 County Maintenance Offices

Element	Need (operation/data inputs from others)	Status	Origin Element
	High-threat information	Existing	High Threat Facilities
	Special event Information	Existing	Attractions and Event Promoters
	Traffic signal video images	Planned 2	Municipal Field Devices
	Traffic information	Planned 2	PennDOT D5 TMC
	Traffic control coordination	Planned 2	PennDOT D5 TMC
County Social Service Offices	Emergency evacuation coordination	Existing	Regional Transit Agency Offices
County/Regional Planning Organization Offices	Archived data	Existing	911 Communication Centers, County EMA Centers, Municipal Traffic Management Offices, PennDOT Central Office Organizations, PennDOT D5 TMC, PTC Offices, Regional Transit Agency Offices
	Archived data	Planned 2	PennDOT STMC
DRJTBC Offices	Incident response information/coordination	Existing	Municipal Traffic Management Offices, NJDOT Offices, NJSP Offices, PennDOT D5 TMC, PSP Offices

Element	Need (operation/data inputs from others)	Status	Origin Element
	Traffic information	Existing	Municipal Traffic Management Offices, NJDOT Offices, PennDOT D5 TMC
	Tolling information	Existing	DRJTBC Toll Plazas
	Traffic control coordination	Planned 2	Municipal Traffic Management Offices, PennDOT D5 TMC
DRJTBC Toll Plazas	Toll tag data	Existing	Commercial Vehicles, Passenger Vehicles
	Tolling information	Existing	DRJTBC Offices
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, PSP Offices, PTC Offices
Information Service Providers	Incident information	Existing	911 Communication Centers, County EMA Centers, PennDOT D5 TMC, PSP Offices, PTC Offices, Regional Transit Agency Offices

Element	Need (operation/data inputs from others)	Status	Origin Element
	Traffic conditions	Existing	Municipal Traffic Management Offices, PennDOT D5 TMC, PTC Offices
	Incident notification	Existing	Personal Traveler Information Devices
	Special Event Information	Existing	Attractions and Event Promoters
	Weather information	Existing	Weather Information Providers
	Traffic control coordination	Planned 2	Municipal Traffic Management Offices, PennDOT D5 TMC
Local School Districts	Traffic conditions and road closures	Existing	Municipal Traffic Management Offices
Municipal Field Devices	Request for signal priority	Existing	Municipal Public Safety Vehicles, Regional Transit Vehicles
		Planned 2	PSP Vehicles
	Signal control	Existing	Municipal Traffic Management Offices, PennDOT D5 TMC
		Planned 2	911 Communication Centers, Municipal

Element	Need (operation/data inputs from others)	Status	Origin Element
Municipal Traffic Management Offices	Incident response information/coordination	Existing	911 Communication Centers, County EMA Centers, DRJTBC Offices, PennDOT D5 TMC, PTC Offices
		Planned 2	
	Traffic information	Existing	911 Communication Centers, County EMA Centers, DRJTBC Offices, Information Service Providers, PennDOT D5 TMC, PTC Offices
	Road closures	Existing	PTC Offices
	Special event information	Existing	Attractions and Event Promoters
	Archived data	Existing	County/Regional Planning Organization Offices
	Weather Information	Existing	Weather Information Providers
	Traffic control coordination	Existing	PennDOT D5 TMC
Planned 2		911 Communication Centers, County EMA Centers, DRJTBC Offices	

Element	Need (operation/data inputs from others)	Status	Origin Element
	Traffic images	Planned 2	Municipal Traffic Management Offices
Municipal/Regional Public Safety Offices	Incident response information/coordination	Existing	911 Communication Centers, County EMA Centers, Municipal/Regional Public Safety Vehicles, PSP Offices
	Special event information	Existing	Attractions and Event Promoters
	Weather Information	Existing	Weather Information Providers
	AVL data	Planned 2	Municipal/Regional Public Safety Vehicles
	Video images	Planned 2	Municipal Field Devices
Municipal/Regional Public Safety Vehicles	Dispatch Information	Existing	911 Communication Centers, County EMA Centers, Municipal/Regional Public Safety Offices
	Traffic signal priority	Existing	Municipal Field Devices
NJDOT Offices	Incident response coordination	Existing	DRJTBC Offices, PennDOT D5 TMC
		Planned 2	PennDOT STMC

Element	Need (operation/data inputs from others)	Status	Origin Element
	Maintenance and construction coordination	Existing	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC
		Planned 2	PennDOT STMC
	Traffic information	Existing	DRJTBC Offices, PennDOT D5 TMC
		Planned 2	PennDOT STMC
NJEMA Emergency Operation Center	Incident/emergency information and response coordination	Existing	PEMA Emergency Operation Center
NJSP Offices	Incident/emergency information and response coordination	Existing	DRJTBC Offices, PSP Offices
Passenger Vehicles	Request for electronic payment	Existing	DRJTBC Toll Plazas, PTC Toll Plazas
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
	Traffic conditions	Existing	PTC Offices
		Planned 2	PennDOT STMC

Element	Need (operation/data inputs from others)	Status	Origin Element
	Traffic control coordination	Planned 2	PTC Offices
	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 D5 TMC, PTC Offices
		Planned 2	PennDOT STMC
	Incident/emergency response coordination and information	Existing	PEMA Emergency Operation Center, PennDOT D5 TMC, PSP Offices, PTC Offices
		Planned 2	PennDOT STMC
	Work plan coordination	Existing	PennDOT D5 TMC
		Planned 2	PennDOT STMC

Element	Need (operation/data inputs from others)	Status	Origin Element
	Maintenance and construction coordination	Existing	PennDOT D5 TMC
	Traffic information and roadway conditions	Existing	PennDOT D5 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

Element	Need (operation/data inputs from others)	Status	Origin Element
		Planned 2	PennDOT STMC
PennDOT D4 TMC	Incident/emergency information and response coordination	Planned 2	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC, PennDOT STMC
	Traffic information	Planned 2	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC, PennDOT STMC
	Traffic control coordination	Planned 2	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC, PennDOT STMC
	Maintenance and construction coordination	Planned 2	PennDOT D5 County Maintenance Offices, PennDOT STMC
	Road weather information	Planned 2	PennDOT D5 County Maintenance Offices, PennDOT STMC
PennDOT D5 County Maintenance Offices	Incident/emergency information and response coordination	Existing	911 Communication Centers, Adjacent PennDOT District and County Offices, County EMA Centers, Municipal Traffic Management Offices, PennDOT D5 TMC

Element	Need (operation/data inputs from others)	Status	Origin Element
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC
	Maintenance and construction information	Existing	Adjacent PennDOT District and County Offices, Adjacent State Transportation Offices, PTC Offices, Regional Transit Agency Offices, PennDOT D4 TMC, PennDOT D5 TMC, PennDOT D6 TMC, PennDOT D8 TMC, PennDOT D5 Maintenance and Construction Vehicles
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC
	Traffic conditions	Existing	PennDOT D5 TMC
	Work zone information	Existing	Adjacent PennDOT District and County Offices, Adjacent State Transportation Offices, PennDOT D4 TMC , PSP Offices, PTC Offices
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC

Element	Need (operation/data inputs from others)	Status	Origin Element
	Work plan coordination	Existing	Adjacent PennDOT District and County Offices, Adjacent State Transportation Offices, PennDOT D5 TMC, PTC Offices
	Weather information	Existing	Adjacent PennDOT District and County Offices, PennDOT D5 TMC, PSP Offices
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC
	Road closures	Existing	Adjacent PennDOT District and County Offices, PennDOT D5 TMC , PSP Offices
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC
	RWIS data	Existing	PennDOT Central Office Field Devices
	Field device status	Existing	PennDOT D5 Field Devices
PennDOT D5 Field Devices	Field device control	Existing	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC

Element	Need (operation/data inputs from others)	Status	Origin Element
		Planned 2	PSP Offices
PennDOT D5 Maintenance and Construction Vehicles	Maintenance and construction dispatch information	Existing	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC
PennDOT D5 Service Patrol Vehicles	Emergency dispatch request	Existing	PennDOT D5 TMC
PennDOT D5 TMC	Incident/emergency information and response coordination	Existing	911 Communication Centers, Adjacent PennDOT District and County Offices, County EMA Centers, Municipal Traffic Management Offices, NJDOT Offices, PennDOT Central Office Organizations, PennDOT D5 County Maintenance Offices, PennDOT D5 Service Patrol Vehicles, PSP Offices, PTC Offices, Regional Transit Agency Offices
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC, PennDOT STMC

Element	Need (operation/data inputs from others)	Status	Origin Element
	Road closures	Existing	Adjacent PennDOT District and County Offices, Municipal Traffic Management Offices, PennDOT Central Office Organizations, PennDOT D5 County Maintenance Offices
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC, PennDOT STMC
	Maintenance and construction coordination	Existing	Adjacent PennDOT District and County Offices, NJDOT Offices, PennDOT Central Office Organizations, PennDOT D5 County Maintenance Offices, PennDOT D5 Maintenance and Construction Vehicles
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC, PennDOT STMC
	Traffic conditions/information	Existing	Adjacent PennDOT District and County Offices, DRJTBC Offices, Information Service Providers, Municipal Traffic Management Offices, NJDOT Offices, PennDOT Central Office Organizations, PTC Offices, Regional Media Outlets
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC, PennDOT STMC

Element	Need (operation/data inputs from others)	Status	Origin Element
	Work zone information	Existing	Adjacent PennDOT District and County Offices, PennDOT Central Office Organizations, PennDOT D5 County Maintenance Offices
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC, PennDOT STMC
	Resource request	Existing	Adjacent PennDOT District and County Offices, PTC Offices
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC, PennDOT STMC
	Work plan coordination	Existing	Adjacent PennDOT District and County Offices, PennDOT Central Office Organizations, PennDOT D5 County Maintenance Offices, PTC Offices
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC, PennDOT STMC
	Archive data	Existing	County/Regional Planning Organization Offices, PennDOT Central Office Organizations
	Weather information	Existing	Weather Information Providers

Element	Need (operation/data inputs from others)	Status	Origin Element
	Special event information	Existing	Attractions and Event Promoters
	Video images	Planned 2	Municipal Field Devices, Regional Media Field Devices
PennDOT D6 TMC	Incident/emergency information and response coordination	Planned 2	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC, PennDOT STMC
	Traffic information	Planned 2	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC, PennDOT STMC
	Traffic control coordination	Planned 2	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC, PennDOT STMC
	Maintenance and construction coordination	Planned 2	PennDOT D5 County Maintenance Offices, PennDOT STMC
	Road weather information	Planned 2	PennDOT D5 County Maintenance Offices, PennDOT STMC
PennDOT D8 TMC	Incident/emergency information and response coordination	Planned 2	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC, PennDOT STMC

Element	Need (operation/data inputs from others)	Status	Origin Element
	Traffic information	Planned 2	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC, PennDOT STMC
	Traffic control coordination	Planned 2	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC, PennDOT STMC
	Maintenance and construction coordination	Planned 2	PennDOT D5 County Maintenance Offices, PennDOT STMC
	Road weather information	Planned 2	PennDOT D5 County Maintenance Offices, PennDOT STMC
PennDOT STMC	Incident/emergency information and coordination	Planned 2	PEMA Emergency Operation Center, PennDOT Central Office Organizations, PennDOT D5 TMC, PSP Offices, PTC Offices
	Traffic control coordination	Planned 2	PennDOT D5 TMC
	Traffic conditions and information	Planned 2	PEMA Emergency Operation Center, PennDOT Central Office Organizations, PennDOT D5 TMC
	Archived data	Planned 2	PennDOT Central Office Organizations, PennDOT D5 TMC

Element	Need (operation/data inputs from others)	Status	Origin Element
	Weather information	Planned 2	PennDOT Central Office Organizations PennDOT D5 TMC, PennDOT Central Office Field Devices
	Work zone information	Planned 2	PennDOT D5 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 D5 TMC

Element	Need (operation/data inputs from others)	Status	Origin Element
Pennsylvania Office of Homeland Security	High Threat Facility Incident Information	Existing	PEMA Emergency Operation Center
Personal Traveler Information Devices	Traveler information	Existing	PTC Offices
		Planned 2	Regional Transit Agency Offices, Information Service Providers, PennDOT D5 TMC
	Emergency notification	Existing	PennDOT Central Office Organizations
PSP Offices	Incident and emergency information and coordination	Existing	911 Communication Centers, County EMA Centers,, Municipal Public Safety Offices, PennDOT Central Office Organizations, PennDOT D5 TMC, PSP Vehicles, PTC Offices, PSP Troop T Highspire
		Planned 2	PennDOT STMC
	Credentialing and safety inspection information	Existing	PennDOT Central Office Organizations
		Planned 2	PennDOT STMC

Element	Need (operation/data inputs from others)	Status	Origin Element
	Maintenance and Construction information	Existing	PennDOT D5 County Maintenance Offices
		Planned 2	PennDOT STMC
	Traffic conditions	Existing	PennDOT D5 TMC
		Planned 2	PennDOT STMC
	Weather information	Existing	PennDOT D5 TMC
		Planned 2	PennDOT STMC
PSP Troop T Highspire	Incident and emergency information and coordination	Existing	PSP Offices, PTC Offices
	Weather information	Existing	PTC Offices
	Traffic information/conditions	Existing	PTC Offices
PSP Troop T Vehicles	Incident and emergency information on the Pennsylvania Turnpike	Existing	PTC Offices, PSP Troop T Highspire
	Dispatch to incidents on the Pennsylvania Turnpike	Existing	PTC Offices, PSP Troop T Highspire

Element	Need (operation/data inputs from others)	Status	Origin Element
PSP Vehicles	Incident and emergency information on state highways	Existing	PSP Offices
	Dispatch to incidents on state highways	Existing	PSP Offices
PTC Field Devices	DMS and HAR messages	Existing	PTC Offices
	CCTV control	Existing	PTC Offices
	Roadway treatment control	Planned 1	PTC Offices
	RWIS control	Planned 1	PTC Offices
PTC Maintenance and Construction Vehicles	Maintenance dispatch information	Existing	PTC Offices
PTC Offices	Incident and emergency information and coordination	Existing	911 Communication Centers, County EMA Centers, PEMA Emergency Operation Center, PennDOT Central Office Organizations, PennDOT D5 TMC, PSP Offices, PSP Troop T Highspire
		Planned 2	PennDOT STMC

Element	Need (operation/data inputs from others)	Status	Origin Element
	Request for maintenance and construction services	Existing	911 Communication Centers, County EMA Centers
	Maintenance and Construction coordination	Existing	PennDOT D5 County Maintenance Offices
	Traffic control coordination (control of DMS along the Turnpike)	Planned 2	PEMA Emergency Operation Center, PennDOT D5 TMC, PennDOT STMC
	Traffic information and conditions	Existing	PennDOT D5 TMC, PTC Field Devices, PSP Troop T Highspire
		Planned 2	PennDOT STMC
	Weather conditions	Existing	PennDOT Central Office Organizations, PSP Troop T Highspire
	Work zone and plan information	Existing	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC
		Planned 2	PennDOT STMC
	CVO violation information (overweight vehicles)	Existing	PTC Field Devices
	CCTV images	Existing	PTC Field Devices

Element	Need (operation/data inputs from others)	Status	Origin Element
	RWIS and roadway treatment data	Planned 1	PTC Field Devices
	CCTV security monitoring information	Planned 2	PTC Field Devices
	Toll information	Existing	PTC Toll Plazas
	Information for the media	Existing	Regional Media Outlets
	Hazmat information	Existing	Commercial Vehicle Company Offices
	Credentialing information	Existing	Commercial Vehicle Company Offices
PTC Service Plazas	Traveler information	Existing	PTC Offices
PTC Toll Plazas	E-Z Pass tag reader information	Existing	Passenger Vehicles, Commercial Vehicles
Regional Media Field Devices	CCTV control	Existing	PennDOT D5 TMC
		Planned 2	Regional Media Outlets
Regional Media Outlets	Traffic and roadway conditions	Existing	PennDOT D5 TMC, PennDOT Central Office Organizations, Municipal Traffic Management Offices

Element	Need (operation/data inputs from others)	Status	Origin Element
	Incident and emergency information	Existing	911 Communication Centers, Count EMA Centers, DRJTBC Offices, PennDOT D5 TMC, PennDOT D5 County Maintenance Offices, PSP Offices, Regional Transit Agency Offices
	Traveler information	Existing	Information Service Providers, PennDOT Central Office Organizations
	Maintenance and construction information	Existing	PennDOT D5 County Maintenance Offices, PennDOT Central Office Organizations, PennDOT D5 TMC
Regional Transit Agency Offices	Incident and emergency response coordination	Existing	911 Communication Centers, County EMA Centers, PennDOT D5 TMC
	Transit archive information	Existing	County/Regional Planning Organizations
	Passenger count, automated driver logs, and fare payment information from vehicles	Planned 2	Regional Transit Vehicles
	Vehicle diagnostics and maintenance information	Planned 1	Regional Transit Vehicles
	Fare payment information	Planned 2	Regional Transit Vehicles

Element	Need (operation/data inputs from others)	Status	Origin Element
	Vehicle location data	Planned 1	Regional Transit Vehicles
	Road and weather information	Planned 2	PennDOT D5 RTMC
	Maintenance and construction information	Planned 2	PennDOT D5 Maintenance and Construction Offices
	Weather information	Planned 2	Weather Information Providers
Regional Transit Remote Traveler Support	Transit information (i.e. schedules, next bus arrival, etc.)	Planned 2	Regional Transit Offices
Regional Transit Vehicles	Driver dispatch and management information	Existing	Regional Transit Agency Offices
Towing Industry Responders	Dispatch information	Existing	911 Communication Centers, PSP Offices, PTC Offices
TRANSCOM Center	Information coordination	Existing	PEMA Emergency Operation Center, PennDOT Central Office Organizations, PTC Offices
		Planned 2	PennDOT D5 TMC, PennDOT STMC

Element	Need (operation/data inputs from others)	Status	Origin Element
Weather Information Providers	Weather information	Existing	911 Communication Centers, County EMA Centers, Information Service Providers, Municipal Traffic Management Offices, Municipal/Regional Public Safety Offices, PEMA Emergency Operation Center, PennDOT D5 County Maintenance Offices, PennDOT D5 TMC, PTC Offices, Regional Transit Agency 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

Element	Service (operation/data outputs to others)	Status	Destination Element
911 Communication Centers	Incident response information/coordination	Existing	County EMA Centers, Incident Response Agency Offices, Information Service Providers, Municipal Traffic Management Offices, PennDOT D5 County Maintenance Offices, PennDOT D5 TMC, PSP Offices, PSP Troop T Highspire, PTC Offices, Regional Media Outlets, Regional Transit Agency Offices
	Resource request	Existing	Municipal/Regional Public Safety Offices, Municipal Traffic Management Offices, PennDOT D5 TMC, PSP Offices, PTC Offices
	Emergency vehicle dispatch	Existing	Municipal/Regional Public Safety Vehicles, PSP Vehicles, Towing Industry Responders
	Emergency archive data	Existing	County EMA Centers, County/Regional Planning Organization Offices
	Special event information	Existing	Attractions and Event Promoters
	High threat information	Existing	High Threat Facilities

Element	Service (operation/data outputs to others)	Status	Destination Element
	Traffic signal control	Planned 2	Municipal Field Devices
	Traffic information	Planned 2	PennDOT D5 TMC
	Traffic control coordination	Planned 2	PennDOT D5 TMC
Adjacent PennDOT District and County Offices	Incident response information/coordination	Existing	PennDOT D5 TMC
	Traffic information	Existing	PennDOT D5 TMC
	Maintenance and construction coordination	Existing	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC
	Road weather information	Existing	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC
	Work Plan information	Existing	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC
	Work zone information	Existing	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC
	Traffic control coordination	Existing	PennDOT D5 TMC
Attractions and Event Promoters	Special event coordination		911 Communication Centers, County EMA Centers, Information Service Providers, Municipal Traffic Management Offices, Municipal/Regional Public Safety Offices, PennDOT D5 TMC, PSP Offices, PTC Offices
Commercial Vehicle	Credential information	Existing	PTC Offices

Element	Service (operation/data outputs to others)	Status	Destination Element
Company Offices	Hazmat information	Planned 2	PTC Offices, 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	PTC Offices, PSP Offices, 911 Communication Centers, PennDOT D8 TMC
	Electronic toll tag readers	Existing	PTC Toll Plazas
	Safety inspection records	Planned 2	PTC Toll Plazas, PennDOT Central Office Field Devices
County EMA Centers	Incident response information/coordination	Existing	County EMA Centers, Incident Response Agency Offices, Information Service Providers, Municipal Traffic Management Offices, PennDOT D5 County Maintenance Offices, PennDOT D5 TMC, PSP Offices, PSP Troop T Highspire, PTC Offices, Regional Media Outlets, Regional Transit Agency Offices

Element	Service (operation/data outputs to others)	Status	Destination Element
	Resource request	Existing	Municipal/Regional Public Safety Offices, Municipal Traffic Management Offices, PennDOT D5 TMC, PSP Offices, PTC Offices
	Emergency vehicle dispatch	Existing	Municipal/Regional Public Safety Vehicles, PSP Vehicles, Towing Industry Responders
	Emergency archive data	Existing	County EMA Centers, County/Regional Planning Organization Offices
	Special event information	Existing	Attractions and Event Promoters
	High threat information	Existing	High Threat Facilities
	Traffic signal control	Planned 2	Municipal Field Devices
	Traffic information	Planned 2	PennDOT D5 TMC
	Traffic control coordination	Planned 2	PennDOT D5 TMC
County Social Service Offices	Emergency evacuation coordination	Existing	Regional Transit Agency Offices

Element	Service (operation/data outputs to others)	Status	Destination Element
County/Regional Planning Organization Offices	Archived data	Existing	911 Communication Centers, County EMA Centers, Municipal Traffic Management Offices, PennDOT Central Office Organizations, PennDOT D5 TMC, PTC Offices, Regional Transit Agency Offices
		Planned 2	PennDOT STMC
DRJTBC Offices	Incident response information/coordination	Existing	Municipal Traffic Management Offices, NJDOT Offices, NJSP Offices, PennDOT D5 TMC, PSP Offices
	Traffic information	Existing	Municipal Traffic Management Offices, NJDOT Offices, PennDOT D5 TMC
	Tolling information	Existing	DRJTBC Toll Plazas
	Traffic control coordination	Planned 2	Municipal Traffic Management Offices, PennDOT D5 TMC
DRJTBC Toll Plazas	Tolling information	Existing	Commercial Vehicles, DRJTBC Offices, Passenger Vehicles
High Threat Facilities	Threat information coordination	Existing	911 Communication Centers, County EMA Centers

Element	Service (operation/data outputs to others)	Status	Destination Element
Incident Response Agency Offices	Incident response information/coordination	Existing	911 Communication Centers, County EMA Centers, PEMA Emergency Operation Center, PSP Offices, PTC Offices
Information Service Providers	Incident information	Existing	911 Communication Centers, County EMA Centers, PennDOT D5 TMC, PTC Offices, PSP Offices
	Traffic conditions	Existing	Municipal Traffic Management Offices, PennDOT D5 TMC, PTC Offices
	Traveler information	Existing	Personal Traveler Information Devices, Regional Media Outlets
	Traffic control coordination	Planned 2	Municipal Traffic Management Offices, PennDOT D5 TMC
Local School District Offices	Traffic conditions and road closures	Existing	Municipal Traffic Management Offices
Municipal Field Devices	Traffic images	Planned 2	911 Communication Centers, Municipal Traffic Management Offices, PennDOT D5 TMC
Municipal Traffic Management Offices	Incident response information/coordination	Existing	911 Communication Centers, County EMA Centers, DRJTBC Offices, PennDOT D5 TMC, PTC Offices

Element	Service (operation/data outputs to others)	Status	Destination Element
	Traffic information	Existing	DRJTBC Offices, Information Service Providers, PennDOT D5 TMC, PTC Offices
	Road closures	Existing	PennDOT D5 TMC, PTC Offices
	Archived data	Existing	County/Regional Planning Organization Offices
	Traffic control coordination	Existing	PennDOT D5 TMC
		Planned	DRJTBC Offices, Information Service Providers
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
Municipal/Regional Public Safety Vehicles	Emergency dispatch coordination	Existing	911 Communication Centers, Municipal/Regional Public Safety Offices
	Incident command coordination	Existing	Municipal/Regional Public Safety Offices

Element	Service (operation/data outputs to others)	Status	Destination Element
NJDOT Offices	Incident response coordination	Existing	DRJTBC Offices, PennDOT D5 TMC
		Planned 2	PennDOT STMC
	Maintenance and construction coordination	Existing	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC
		Planned 2	PennDOT STMC
	Traffic information	Existing	DRJTBC Offices, PennDOT D5 TMC
		Planned 2	PennDOT STMC
NJEMA Emergency Operation Center	Incident/emergency information and response coordination	Existing	PEMA Emergency Operation Center
NJSP Offices	Incident/emergency information and response coordination	Existing	DRJTBC Offices, PSP Offices
NJDOT Offices	Incident response coordination	Existing	DRJTBC Offices, PennDOT D5 TMC
Passenger Vehicles	Electronic toll tag readers	Existing	DRJTBC Toll Plazas, PTC Toll Plazas

Element	Service (operation/data outputs to others)	Status	Destination Element
PEMA Emergency Operation Center	Incident response coordination	Existing	911 Communication Centers, Adjacent State Emergency Operation Centers, County EMA Centers, Incident Response Agency Offices, PTC Offices, PennDOT Central Office Organizations
		Planned 2	PennDOT STMC
	PIERS Incident data	Existing	911 Communication Centers
	Incident information	Existing	PTC Offices, TRANSCOM Center
	Traffic control coordination	Planned 2	PTC Offices
	CCTV control	Planned 2	PTC Offices
	Threat information coordination	Existing	Pennsylvania Office of Homeland Security
PennDOT Central Office Field Devices	RWIS information	Existing	PennDOT Central Office Organizations, PennDOT D5 County Maintenance Offices
		Planned 2	PennDOT STMC
	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 D5 TMC
		Planned 2	PennDOT STMC

Element	Service (operation/data outputs to others)	Status	Destination Element
	Incident and emergency information and coordination (BHSTE)	Existing	PEMA Emergency Operation Center, PennDOT D5 TMC, PSP Offices
		Planned 2	PennDOT STMC
	Traffic information and conditions (BHSTE)	Existing	PennDOT D5 TMC
		Planned 2	PennDOT STMC
	Work zone information (BOMO)	Existing	PennDOT D5 TMC
		Planned 2	PennDOT STMC
	Maintenance and construction coordination	Existing	PennDOT D5 TMC
		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 D4 TMC	Traffic information	Planned 2
Incident information		Planned 2	PennDOT D5 TMC, PennDOT D5 County Maintenance Offices, PennDOT STMC

Element	Service (operation/data outputs to others)	Status	Destination Element
	Road closures	Planned 2	PennDOT D5 TMC, PennDOT D5 County Maintenance Offices, PennDOT STMC
	Road weather information	Planned 2	PennDOT D5 TMC, PennDOT D5 County Maintenance Offices, PennDOT STMC
	Road conditions	Planned 2	PennDOT D5 TMC, PennDOT D5 County Maintenance Offices, PennDOT STMC
	Maintenance and construction information	Planned 2	PennDOT D5 County Maintenance Offices, PennDOT STMC
	Work zone information	Planned 2	PennDOT D5 County Maintenance Offices, PennDOT STMC
	CCTV control	Planned 2	PennDOT D5 Field Devices
	DMS control	Planned 2	PennDOT D5 Field Devices
PennDOT D5 County Maintenance Offices	Incident/emergency information and response coordination	Existing	911 Communication Centers, Adjacent PennDOT District AND County Offices, County EMA Centers, PennDOT D5 TMC
	Maintenance and construction information/response	Existing	911 Communication Centers, Adjacent PennDOT District and County Offices, County EMA Centers, NJDOT Offices, PennDOT Central Office Organizations, PennDOT D5 TMC, PTC Offices, PSP Offices, Regional Transit Agency Offices, Regional Media Outlets

Element	Service (operation/data outputs to others)	Status	Destination Element
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC
	Work zone information	Existing	Adjacent PennDOT District and County Offices, NJDOT Offices, PennDOT Central Office Organizations, PennDOT D5 TMC, PSP Offices, Regional Media Outlets
	Work plan information	Existing	Adjacent PennDOT District AND County Offices, NJDOT Offices, PennDOT Central Office Organizations, PennDOT D5 TMC, PTC Offices, Regional Transit Agency Offices
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC
	Road weather information	Existing	911 Communication Centers, Adjacent PennDOT District and County Offices, County EMA Centers, PennDOT Central Office Organizations, PennDOT D5 TMC, PSP Offices, Regional Transit Agency Offices, Regional Media Outlets
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC

Element	Service (operation/data outputs to others)	Status	Destination Element
	Maintenance and construction vehicle dispatch	Existing	PennDOT D5 Maintenance and Construction Vehicles
	Road closures	Existing	Adjacent PennDOT District and County Offices, PennDOT Central Office Organizations, PennDOT D5 TMC, PSP Offices
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC
PennDOT D5 Field Devices	Traffic images	Existing	PennDOT D5 TMC
		Planned 2	PennDOT D5 County Maintenance Offices, PSP Offices
	Field devices status	Existing	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC
		Planned 2	PSP Offices
	DMS inputs	Existing	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC
		Planned 2	PSP Offices

Element	Service (operation/data outputs to others)	Status	Destination Element
	Traffic flow information	Existing	PennDOT D5 TMC
	Speed monitoring	Planned 2	PennDOT D5 TMC
PennDOT D5 Maintenance and Construction Vehicles	Maintenance and construction information	Existing	PennDOT D5 County Maintenance Offices, PennDOT D5 TMC
PennDOT D5 Service Patrol Vehicles	Emergency dispatch response	Existing	PennDOT D5 TMC
PennDOT D5 TMC	Incident/emergency information and response coordination	Existing	911 Communication Centers, Adjacent PennDOT District and County Offices, County EMA Centers, Municipal Traffic Management Offices, NJDOT Offices, PennDOT Central Office Organizations, PennDOT D5 County Maintenance Offices, PennDOT D5 Service Patrol Vehicles, PSP Offices, PTC Offices, Regional Transit Agency Offices
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC, PennDOT STMC

Element	Service (operation/data outputs to others)	Status	Destination Element
	Road closures	Existing	Adjacent PennDOT District and County Offices, Municipal Traffic Management Offices, PennDOT Central Office Organizations, PennDOT D5 County Maintenance Offices
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC, PennDOT STMC
	Maintenance and construction coordination	Existing	Adjacent PennDOT District and County Offices, NJDOT Offices, PennDOT Central Office Organizations, PennDOT D5 County Maintenance Offices, PennDOT D5 Maintenance and Construction Vehicles
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC, PennDOT STMC
	Traffic conditions/information	Existing	Adjacent PennDOT District and County Offices, DRJTBC Offices, Information Service Providers, Municipal Traffic Management Offices, NJDOT Offices, PennDOT Central Office Organizations, PTC Offices, Regional Media Outlets
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC, PennDOT STMC

Element	Service (operation/data outputs to others)	Status	Destination Element
	Work zone information	Existing	Adjacent PennDOT District and County Offices, PennDOT Central Office Organizations, PennDOT D5 County Maintenance Offices
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC, PennDOT STMC
	Resource request	Existing	Adjacent PennDOT District and County Offices, PTC Offices
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC, PennDOT STMC
	Work plan coordination	Existing	Adjacent PennDOT District and County Offices, PennDOT Central Office Organizations, PennDOT D5 County Maintenance Offices, PTC Offices
		Planned 2	PennDOT D4 TMC, PennDOT D6 TMC, PennDOT D8 TMC, PennDOT STMC
	Archive data	Existing	County/Regional Planning Organization Offices, PennDOT Central Office Organizations
	Video images		Municipal Traffic Management Office, PSP Offices, Regional Media Outlets

Element	Service (operation/data outputs to others)	Status	Destination Element
PennDOT D6 TMC	Traffic information	Planned 2	PennDOT D5 TMC, PennDOT D5 County Maintenance Offices, PennDOT STMC
	Incident information	Planned 2	PennDOT D5 TMC, PennDOT D5 County Maintenance Offices, PennDOT STMC
	Road closures	Planned 2	PennDOT D5 TMC, PennDOT D5 County Maintenance Offices, PennDOT STMC
	Road weather information	Planned 2	PennDOT D5 TMC, PennDOT D5 County Maintenance Offices, PennDOT STMC
	Road conditions	Planned 2	PennDOT D5 TMC, PennDOT D5 County Maintenance Offices, PennDOT STMC
	Maintenance and construction information	Planned 2	PennDOT D5 County Maintenance Offices, PennDOT STMC
	Work zone information	Planned 2	PennDOT D5 County Maintenance Offices, PennDOT STMC
	CCTV control	Planned 2	PennDOT D5 Field Devices
	DMS control	Planned 2	PennDOT D5 Field Devices
PennDOT D8 TMC	Traffic information	Planned 2	PennDOT D5 TMC, PennDOT D5 County Maintenance Offices, PennDOT STMC

Element	Service (operation/data outputs to others)	Status	Destination Element
	Incident information	Planned 2	PennDOT D5 TMC, PennDOT D5 County Maintenance Offices, PennDOT STMC
	Road closures	Planned 2	PennDOT D5 TMC, PennDOT D5 County Maintenance Offices, PennDOT STMC
	Road weather information	Planned 2	PennDOT D5 TMC, PennDOT D5 County Maintenance Offices, PennDOT STMC
	Road conditions	Planned 2	PennDOT D5 TMC, PennDOT D5 County Maintenance Offices, PennDOT STMC
	Maintenance and construction information	Planned 2	PennDOT D5 County Maintenance Offices, PennDOT STMC
	Work zone information	Planned 2	PennDOT D5 County Maintenance Offices, PennDOT STMC
	CCTV control	Planned 2	PennDOT D5 Field Devices
	DMS control	Planned 2	PennDOT D5 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 D5 TMC, PSP Offices, PTC Offices
	Request for archived data	Planned 2	Adjacent State Transportation Offices, PennDOT Central Office Organizations, PennDOT D5 TMC

Element	Service (operation/data outputs to others)	Status	Destination Element
	Traffic information, restrictions, and conditions	Planned 2	Adjacent State Transportation Offices, PennDOT Central Office Organizations, PennDOT D5 TMC, PTC Offices
	Work zone information	Planned 2	Adjacent State Transportation Offices, PennDOT Central Office Organizations, PennDOT D5 TMC, PTC Offices
	Maintenance and construction coordination	Planned 2	Adjacent State Transportation Offices, PennDOT Central Office Organizations, PennDOT D5 TMC, PTC Offices
	Commercial vehicle enforcement information	Planned 2	PennDOT Central Office Organizations, Commercial Vehicle Company Offices
	Road weather information	Planned 2	PennDOT Central Office Organizations, PennDOT D5 TMC, PTC Offices, 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	Incident notification and information	Existing	911 Communication Centers, PennDOT Central Office Organizations, PTC Offices

Element	Service (operation/data outputs to others)	Status	Destination Element
PSP Offices	Incident and emergency information and coordination	Existing	911 Communication Centers, Adjacent State Transportation Offices, County EMA Centers, Municipal Public Safety Offices, PennDOT Central Office Organizations, PennDOT D4 County Maintenance Offices, PennDOT D4 TMC, PTC Offices, PSP Troop T Highspire
		Planned 2	PennDOT STMC
	Commercial vehicle credentialing and safety information (overweight vehicles)	Existing	PennDOT Central Office Organizations
	Maintenance and Construction information	Existing	PennDOT D4 County Maintenance Offices
	Request for towing	Existing	Towing Industry Responders
	Incident and emergency dispatch of PSP Vehicles	Existing	PSP Vehicles
	Information for the media	Existing	Regional Media Outlets
PSP Troop T Highspire	Incident and emergency information and coordination	Existing	PSP Offices, PTC Offices
	Information for the media	Existing	Regional Media Outlets
	Incident and emergency dispatch of PSP Vehicles	Existing	PSP Troop T Vehicles
PSP Troop T	Emergency dispatch information	Existing	PSP Troop T Highspire, PTC Offices

Element	Service (operation/data outputs to others)	Status	Destination Element
Vehicles	Vehicle tracking	Existing	PSP Troop T Highspire, PTC Offices
PSP Vehicles	Emergency dispatch information	Existing	PSP Offices
	Vehicle tracking	Existing	PSP Offices
PTC Field Devices	CCTV images used for surveillance	Existing	PTC Offices
	Traffic flow information	Existing	PTC Offices
	RWIS data	Planned 2	PTC Offices
	CCTV images used infrastructure monitoring	Planned 2	PTC Offices
PTC Maintenance and Construction Vehicles	Maintenance and construction information	Existing	PTC Offices
PTC Offices	Incident and emergency information and coordination	Existing	911 Communication Centers, County EMA Centers, PEMA Emergency Operation Center, PennDOT Central Office Organizations, PennDOT D4 TMC, PSP Troop T Highspire
		Planned 2	PennDOT STMC
	Request for maintenance and construction services	Existing	911 Communication Centers, County EMA Centers
	Maintenance and Construction coordination	Existing	PennDOT D4 County Maintenance Offices
	Traffic control coordination (control of DMS along the Turnpike)	Planned 2	PEMA Emergency Operation Center, PennDOT D4 TMC, PennDOT STMC

Element	Service (operation/data outputs to others)	Status	Destination Element
	Traffic information and conditions	Existing	PennDOT D4 TMC, PTC Field Devices, PSP Troop T Highspire
		Planned 2	PennDOT STMC
	Weather conditions	Existing	PennDOT Central Office Organizations, PSP Troop T Highspire
	Work zone and plan information	Existing	PennDOT D4 County Maintenance Offices, PennDOT D4 TMC
		Planned 2	PennDOT STMC
	CVO violation information (overweight vehicles)	Existing	PTC Field Devices
	CCTV images	Existing	PTC Field Devices
	RWIS and roadway treatment data	Planned 1	PTC Field Devices
	CCTV security monitoring information	Planned 2	PTC Field Devices
	Toll information	Existing	PTC Toll Plazas
	Information for the media	Existing	Regional Media Outlets
	Hazmat information	Existing	Commercial Vehicle Company Offices
	Credentialing information	Existing	Commercial Vehicle Company Offices
PTC Service Plazas	Traveler information	Existing	Information Service Providers, PTC Offices
PTC Toll Plazas	E-Z Pass tag reader information	Existing	Passenger Vehicles, Commercial Vehicles

Element	Service (operation/data outputs to others)	Status	Destination Element
Regional Media Field Devices	Traffic images	Existing	Regional Media Outlets
		Planned 2	PennDOT D5 TMC
Regional Media Outlets	Traveler information	Existing	Personal Traveler Information Devices
Regional Transit Agency Offices	Incident and emergency response coordination	Existing	911 Communication Centers, County EMA Centers, Information Service Providers, PennDOT D5 TMC, Regional Media Outlets
	Coordination with transit vehicles	Existing	Regional Transit Vehicles
	Transit archive data	Existing	County/Regional Planning Organization Offices, PennDOT Central Office Organizations
	Traveler information	Existing	Personal Traveler Information Devices, Regional Transit Remote Traveler Support
Regional Transit Remote Traveler Support	Next bus arrival times	Planned 2	Regional Transit Offices
Regional Transit	Fare payment information	Existing	Regional Transit Offices

Element	Service (operation/data outputs to others)	Status	Destination Element
Vehicles	Vehicle location data	Existing	Regional Transit Offices
	Passenger counts	Existing	Regional Transit Offices
	Vehicle schedule performance	Existing	Regional Transit Offices
Towing Industry Responders	Emergency dispatch coordination	Existing	911 Communication Centers, PTC Offices, PSP Offices
TRANSCOM Center	Information coordination	Existing	PTC Offices, PEMA Emergency Operation Center, PennDOT Central Office Organizations
		Planned 2	PennDOT D5 TMC, PennDOT STMC
Weather Information Providers	Weather information	Existing	911 Communication Centers, County EMA Centers, Information Service Providers, Municipal Traffic Management Offices, Municipal/Regional Public Safety Offices, PEMA Emergency Operation Center, PennDOT D5 County Maintenance Offices, PennDOT D5 TMC, PTC Offices

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 13, 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 August 25, 2004, a Stakeholders Bookend Meeting convened in Allentown 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, PTC, 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 October and November 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 3, 2005 in Allentown, 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.

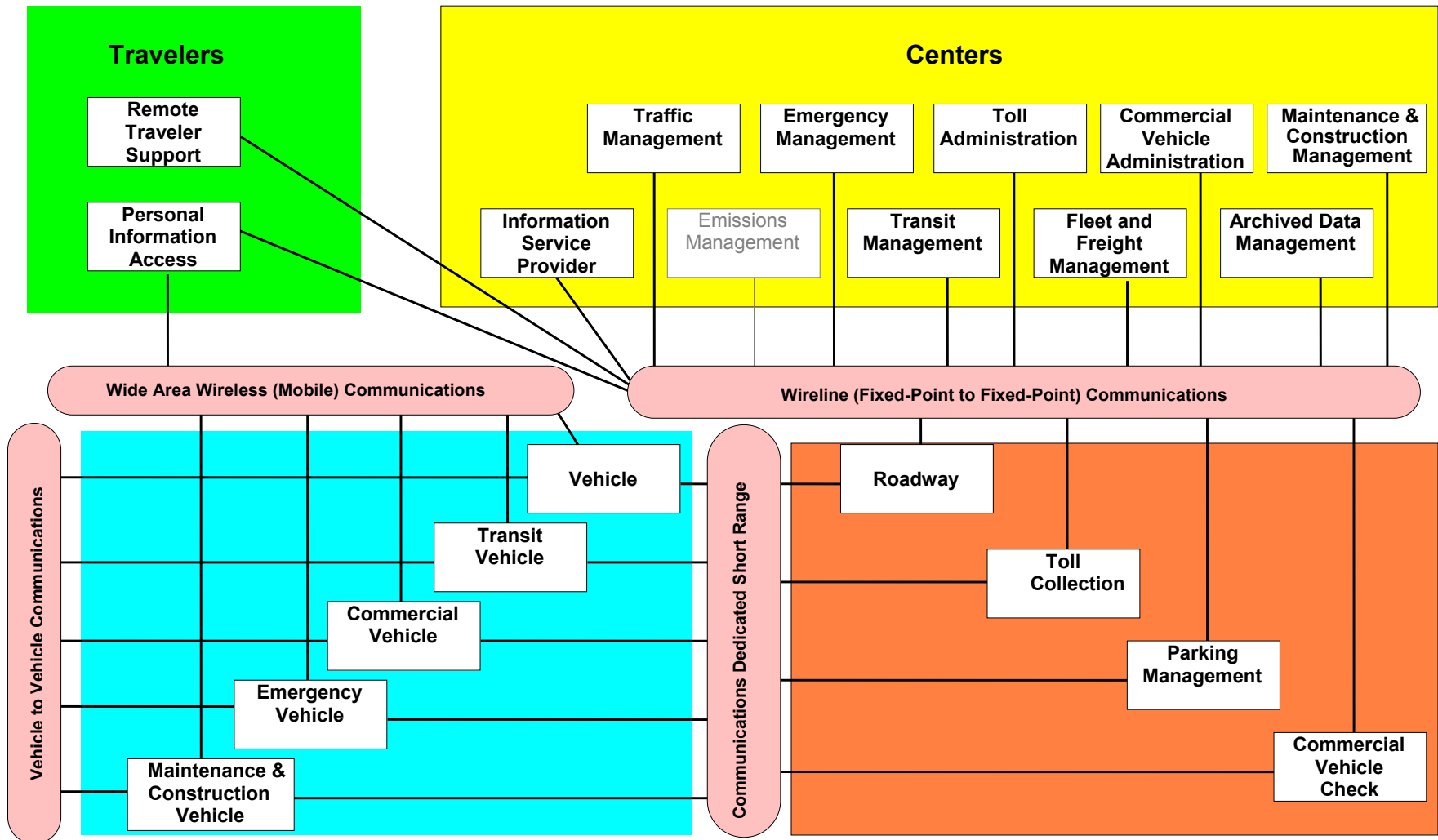


Figure 4-1: Subsystem Interconnect Diagram

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.

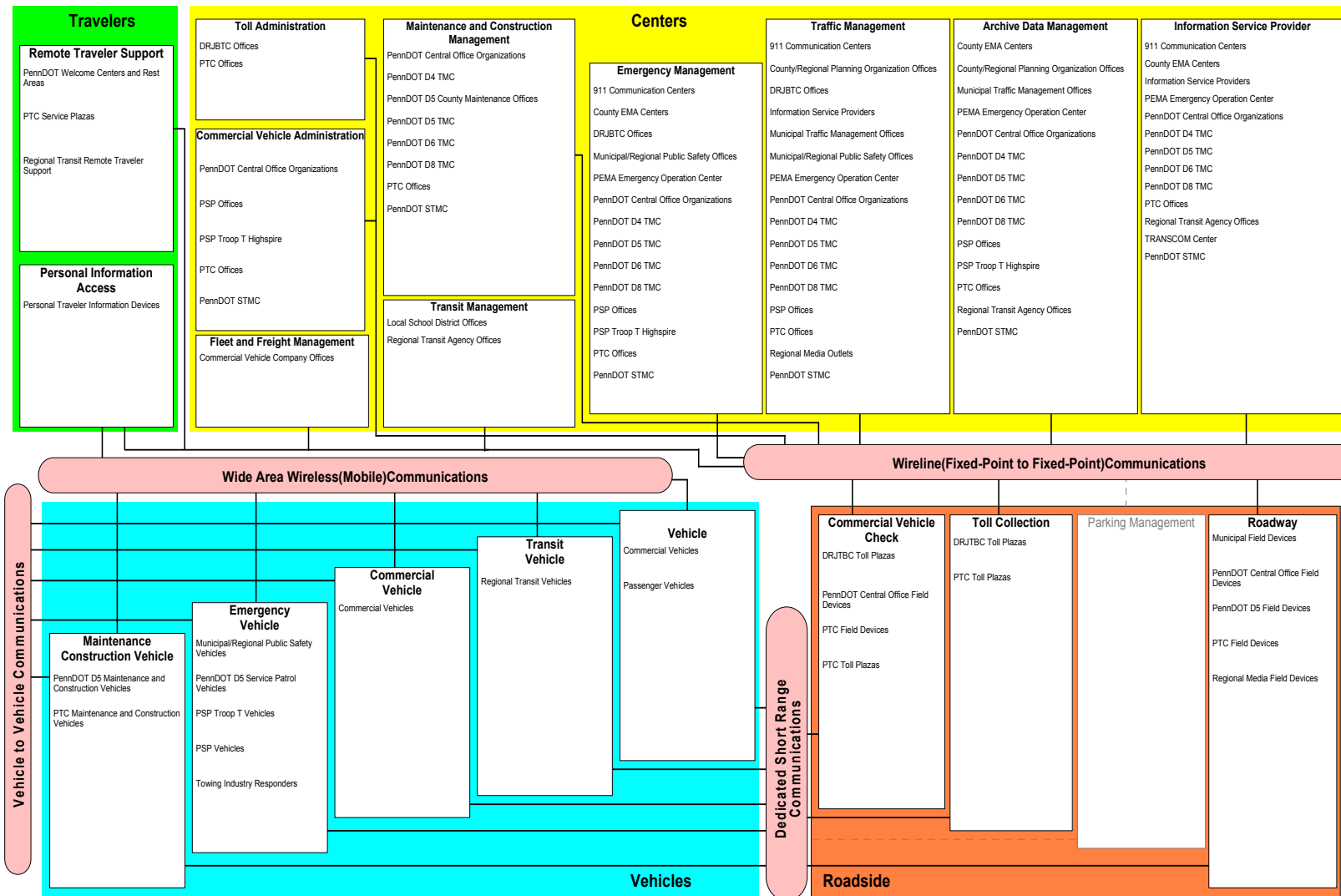


Figure 4-2: Regional Subsystem Interconnect Diagram showing Elements

Table 4-1: Regional Subsystems/Terminators

Element	Subsystem/Terminator mapped to:
911 Communication Centers	Archived Data Management Emergency Management Information Service Provider Traffic Management
Adjacent PennDOT District and County 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 Information Service Provider Traffic Management
County/Regional Planning Organizations	Archived Data Management Traffic Management
County Social Service Offices	Emergency Management
DRJTBC Offices	Emergency Management Toll Administration Traffic Management
DRJTBC Toll Plazas	Toll Collection
High Threat Facilities	Emergency Management
Incident Response Agency Offices	Emergency Management
Information Service Providers	Information Service Provider Traffic Management
Local School District Offices	Transit Management
Municipal Field Devices	Roadway
Municipal Traffic Management Offices	Archived Data Management Traffic Management
Municipal/Regional Public Safety Offices	Emergency Management

Element	Subsystem/Terminator mapped to:
	Traffic Management
Municipal/Regional Public Safety Vehicles	Emergency Vehicle
NJDOT Offices	Emergency Management Information Service Provider Maintenance and Construction Management Traffic Management
NJEMA Emergency Operation Center	Emergency Management
NJSP Offices	Emergency Management
Passenger Vehicles	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 D4 TMC	Archived Data Management Emergency Management Information Service Provider Maintenance and Construction Management Traffic Management
PennDOT D5 County Maintenance Offices	Maintenance and Construction Management
PennDOT D5 Field Devices	Roadway
PennDOT D5 Maintenance and Construction Vehicles	Maintenance and Construction Vehicle
PennDOT D5 Service Patrol Vehicles	Emergency Vehicle
PennDOT D5 TMC	Archived Data Management Emergency Management Information Service Provider

Element	Subsystem/Terminator mapped to:
	Maintenance and Construction Management Traffic Management
PennDOT D6 TMC	Archived Data Management Emergency Management Information Service Provider Maintenance and Construction Management Traffic Management
PennDOT D8 TMC	Archived Data Management Emergency Management Information Service Provider Maintenance and Construction Management 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
PSP Offices	Archived Data Management Commercial Vehicle Administration Emergency Management
PSP Troop T Highspire	Archived Data Management Commercial Vehicle Administration Emergency Management
PSP Troop T Vehicles	Emergency Vehicle
PSP Vehicles	Emergency Vehicle
PTC Field Devices	Commercial Vehicle Check Emergency Telecommunications System Roadway
PTC Maintenance and Construction Vehicles	Maintenance and Construction Vehicle
PTC Offices	Archived Data Management

Element	Subsystem/Terminator mapped to:
	Commercial Vehicle Administration Emergency Management Information Service Provider Maintenance and Construction Management Traffic Management Toll Administration
PTC Service Plazas	Remote Traveler Support
PTC Toll Plazas	Commercial Vehicle Check Toll Collection
Regional Media Field Devices	Roadway
Regional Media Outlets	Media Traffic Management
Regional Transit Agency Offices	Archived Data Management Information Service Provider Transit Management
Regional Transit Remote Traveler Support	Remote Traveler Support
Regional Transit Vehicles	Transit Vehicle
Towing Industry Responders	Emergency Vehicle
TRANSCOM Center	Information Service Provider
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.

	911 Communication Centers	Adjacent PennDOT District and County Offices	Attractions and Event Promoters	Commercial Vehicle Company Offices	Commercial Vehicles	County EMA Centers	County Social Service Offices	County/Regional Planning Organization Offices	DRJBTC Offices	DRJTBC Toll Plazas	High Threat Facilities	Incident Response Agency Offices	Information Service Providers	Local School District Offices	Municipal Field Devices	Municipal Traffic Management Offices	Municipal/Regional Public Safety Offices	Municipal/Regional Public Safety Vehicles	NUDOT Offices	NUJEMA Emergency Operation Center	NUJP Offices	Passenger Vehicles	PEMA Emergency Operation Center	PennDOT Central Office Field Devices	PennDOT Central Office Organizations	PennDOT D4 TMC	PennDOT D5 County Maintenance Offices	PennDOT D5 Field Devices	PennDOT D5 Maintenance and Construction Vehicles	PennDOT D5 Service Patrol Vehicles	PennDOT D5 TMC	PennDOT D6 TMC	PennDOT D8 TMC	PennDOT STMC	PennDOT Welcome Centers and Rest Areas	Pennsylvania Office of Homeland Security	Personal Traveler Information Devices	PSP Offices	PSP Troop T Highspire	PSP Troop T Vehicles	PSP Vehicles	PTC Field Devices	PTC Maintenance and Construction Vehicles	PTC Offices	PTC Service Plazas	PTC Toll Plazas	Regional Media Field Devices	Regional Media Outlets	Regional Transit Agency Offices	Regional Transit Remote Traveler Support	Regional Transit Vehicles	Towing Industry Responders	TRANSCOM Center	Weather Information Providers
PTC Offices	X		X	X		X		X				X	X			X							X	X		X						X			X	X	X	X		X	X	X	X		X			X	X	X				
PTC Service Plazas																							X																X															
PTC Toll Plazas					X																	X																			X													
Regional Media Field Devices																											X																	X										
Regional Media Outlets	X				X								X														X												X	X					X									
Regional Transit Agency Offices	X		X		X	X	X						X												X	X											X		X	X								X						
Regional Transit Remote Traveler Support																																																						
Regional Transit Vehicles																X																														X								
Towing Industry Responders	X				X																																																	
TRANSCOM Center																							X	X					X			X										X												
Weather Information Providers	X				X							X				X	X						X			X					X															X								

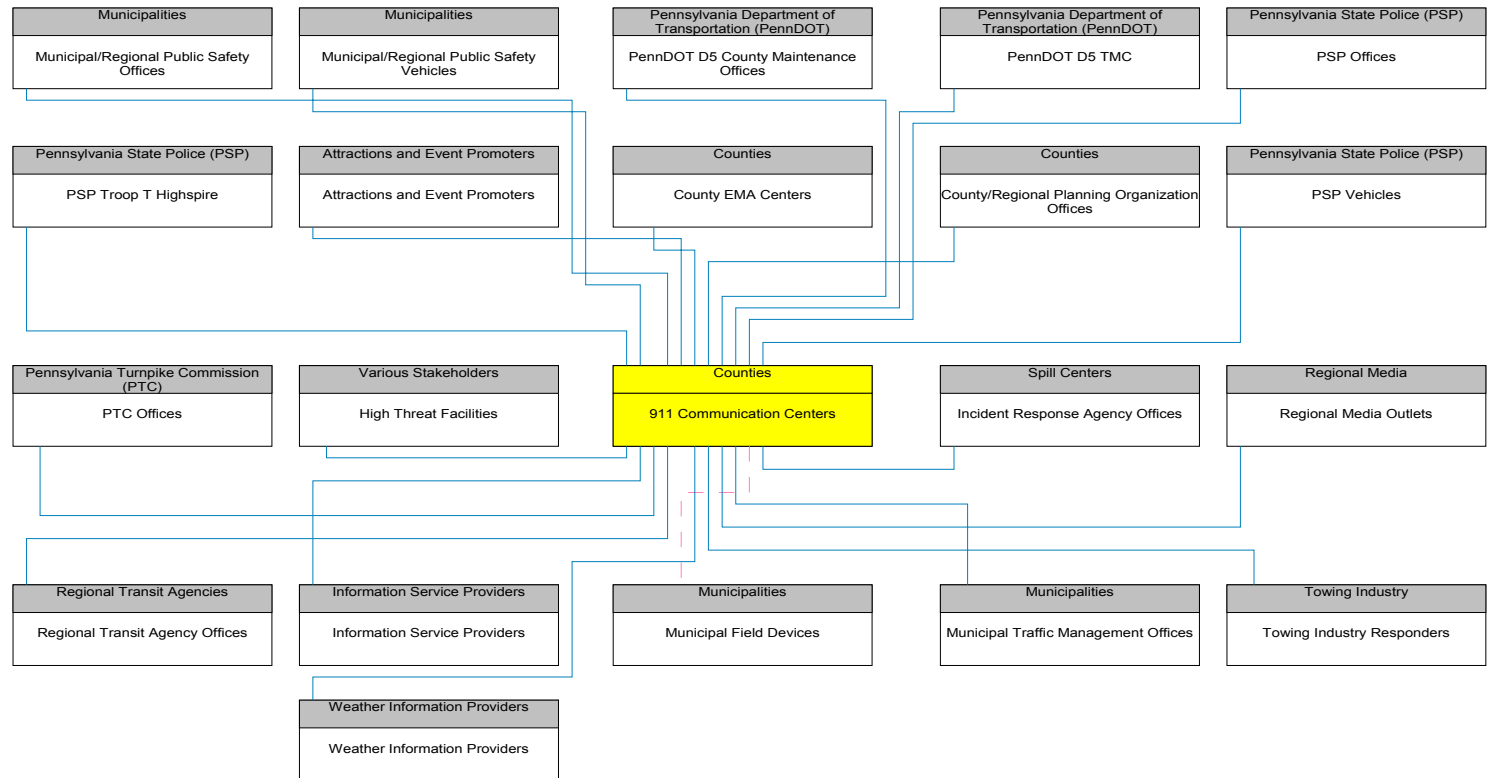
4.4 ITS Architecture

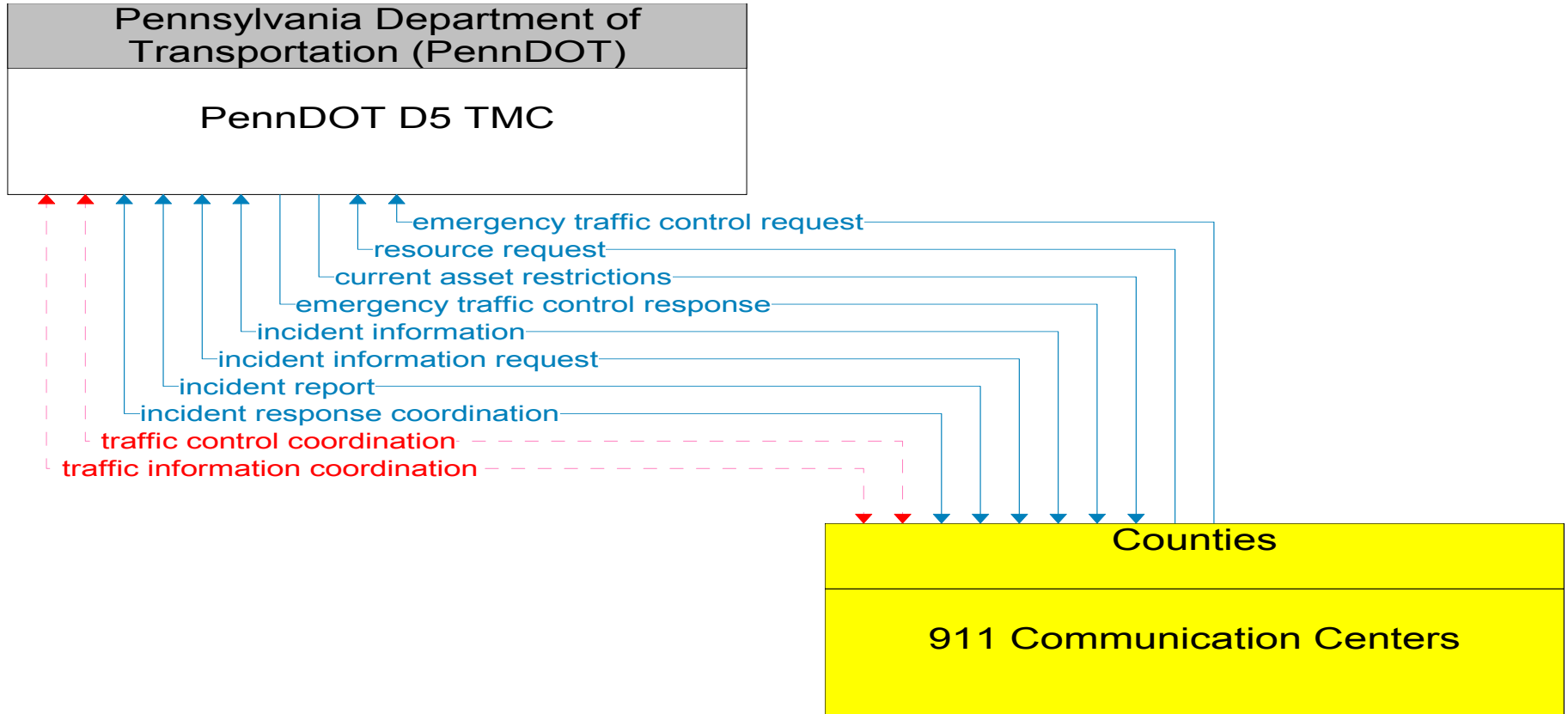
This section documents the “information flow” between the elements. The information flows describe what data or information is passing between one operation and another operation. The section is primarily documented as Turbo software outputs.

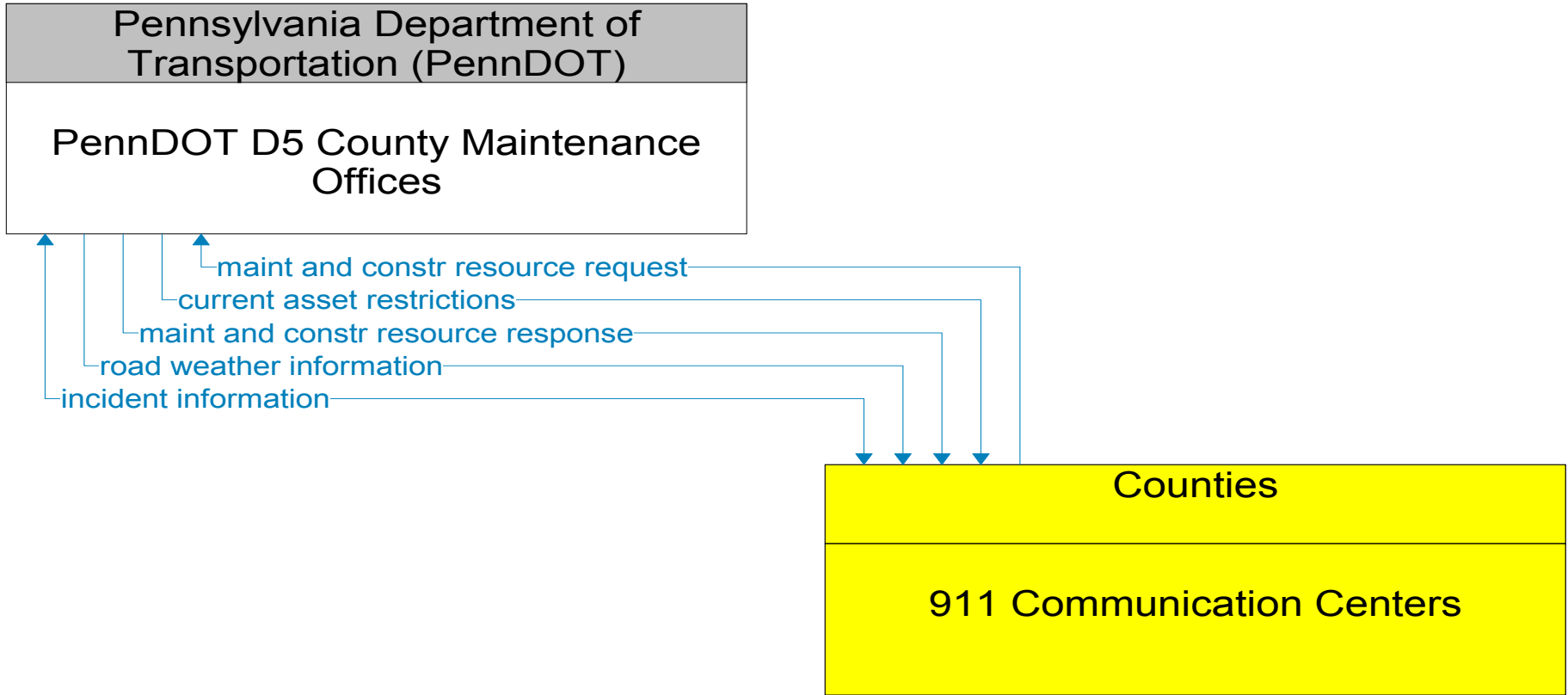
911 Communication Centers



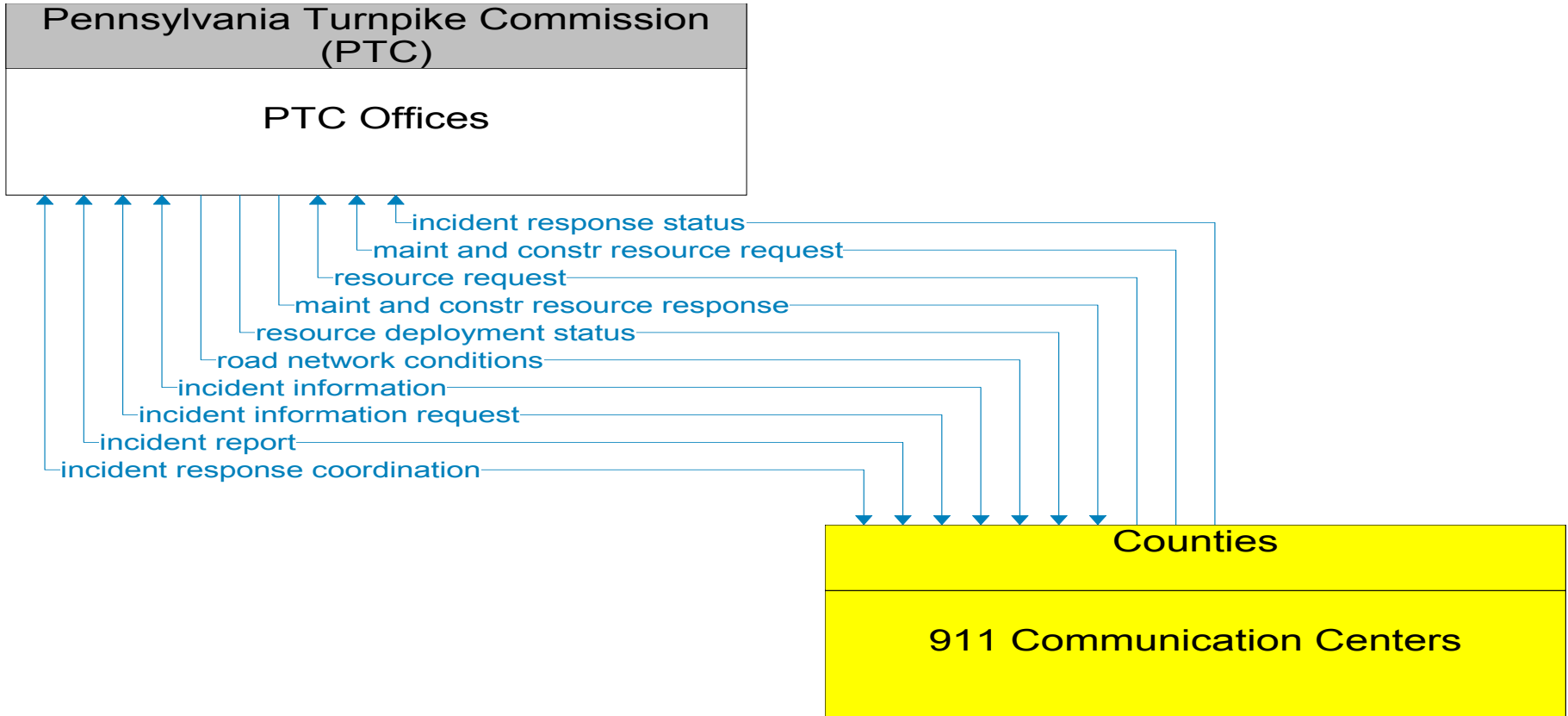
911 Communication Centers Interconnect Diagram

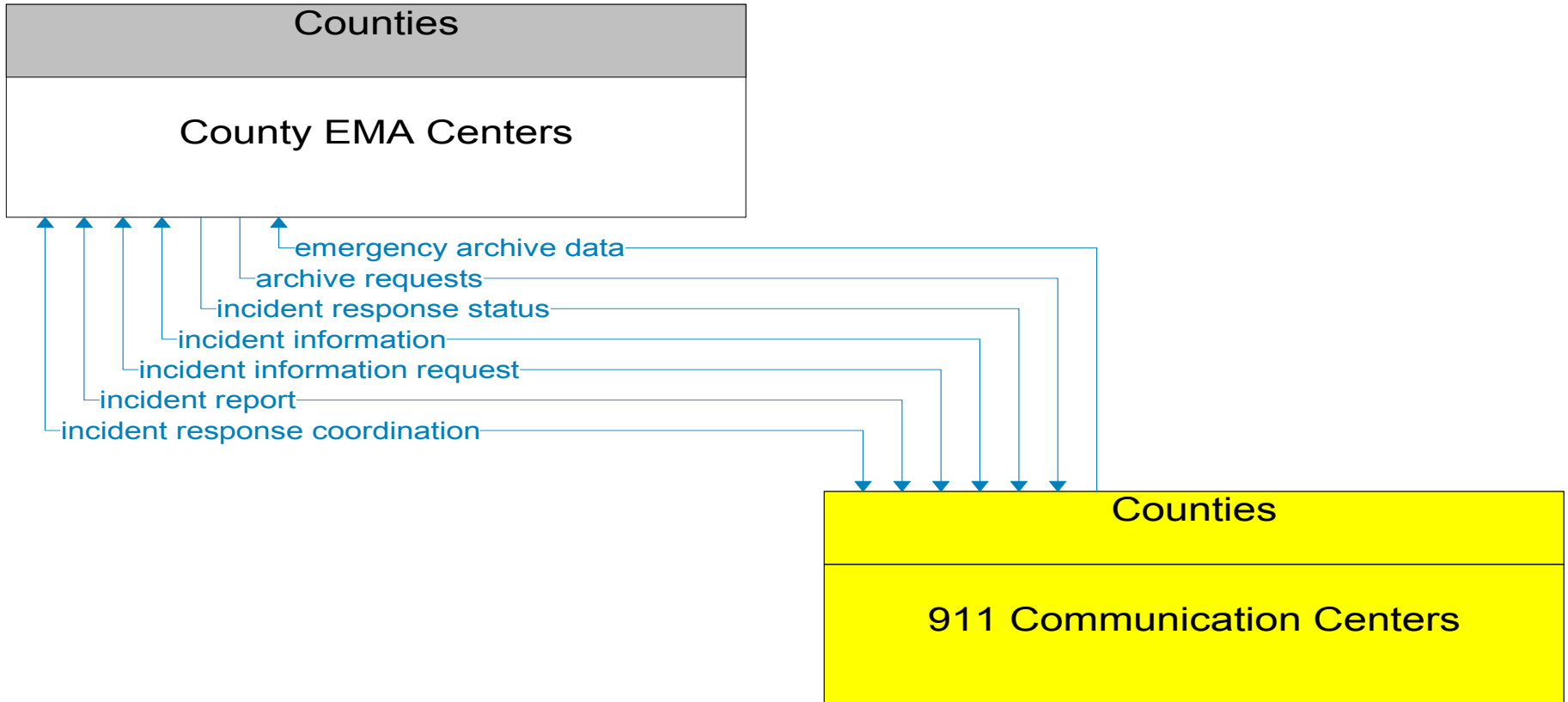




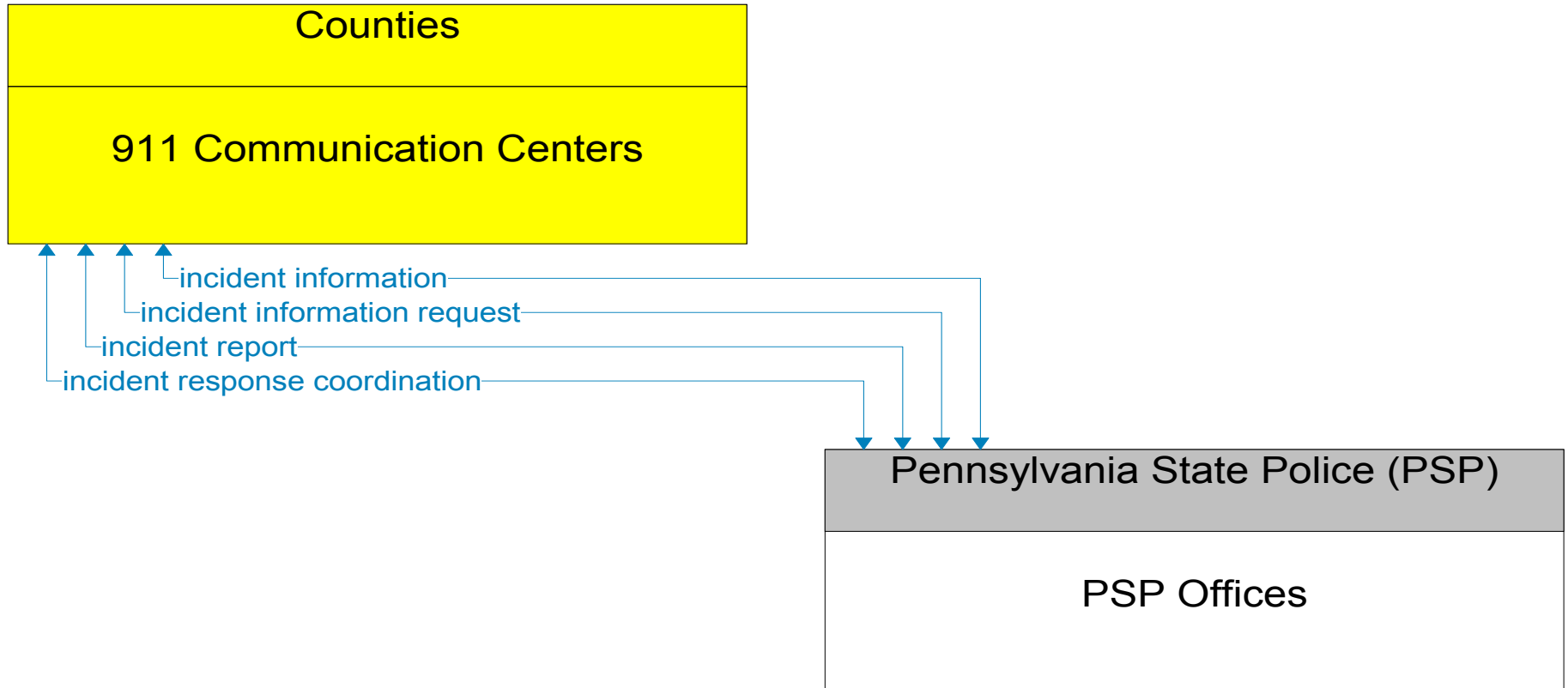


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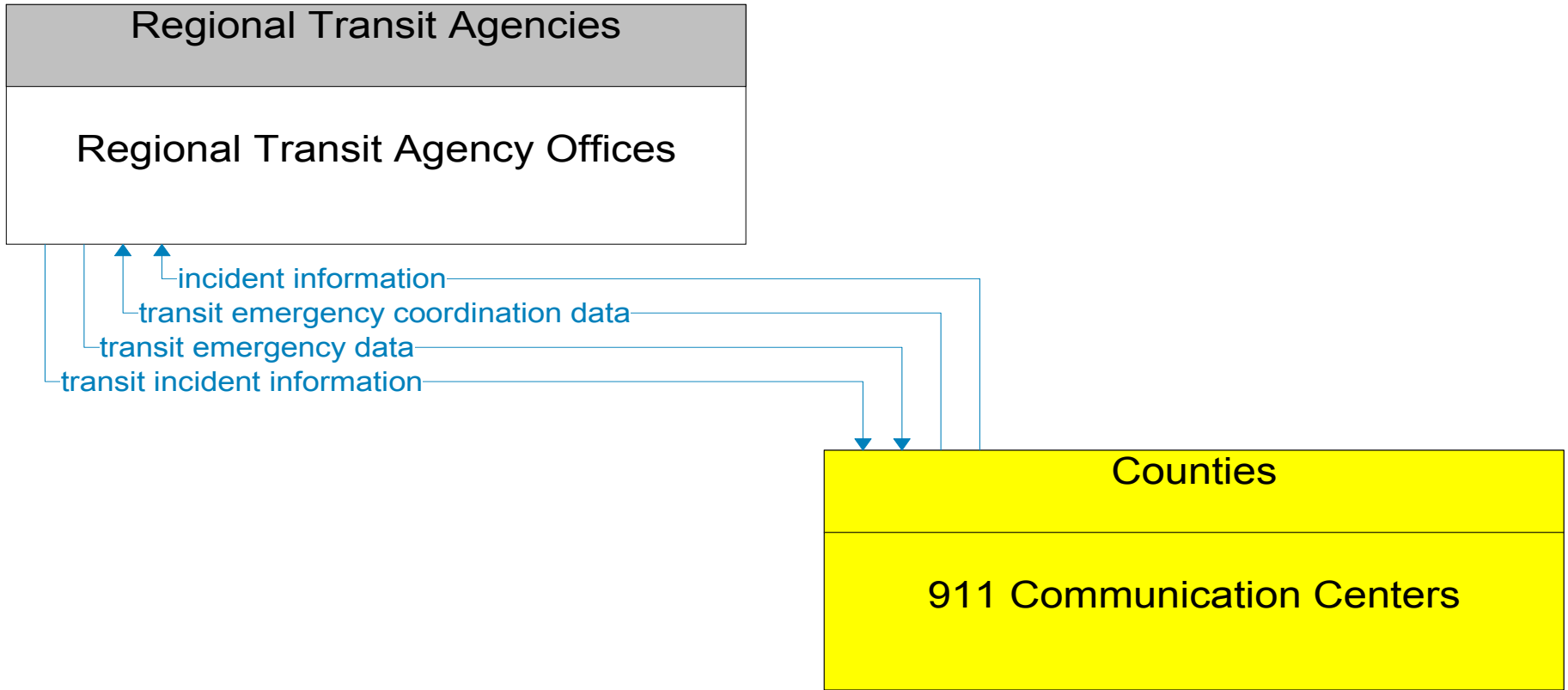




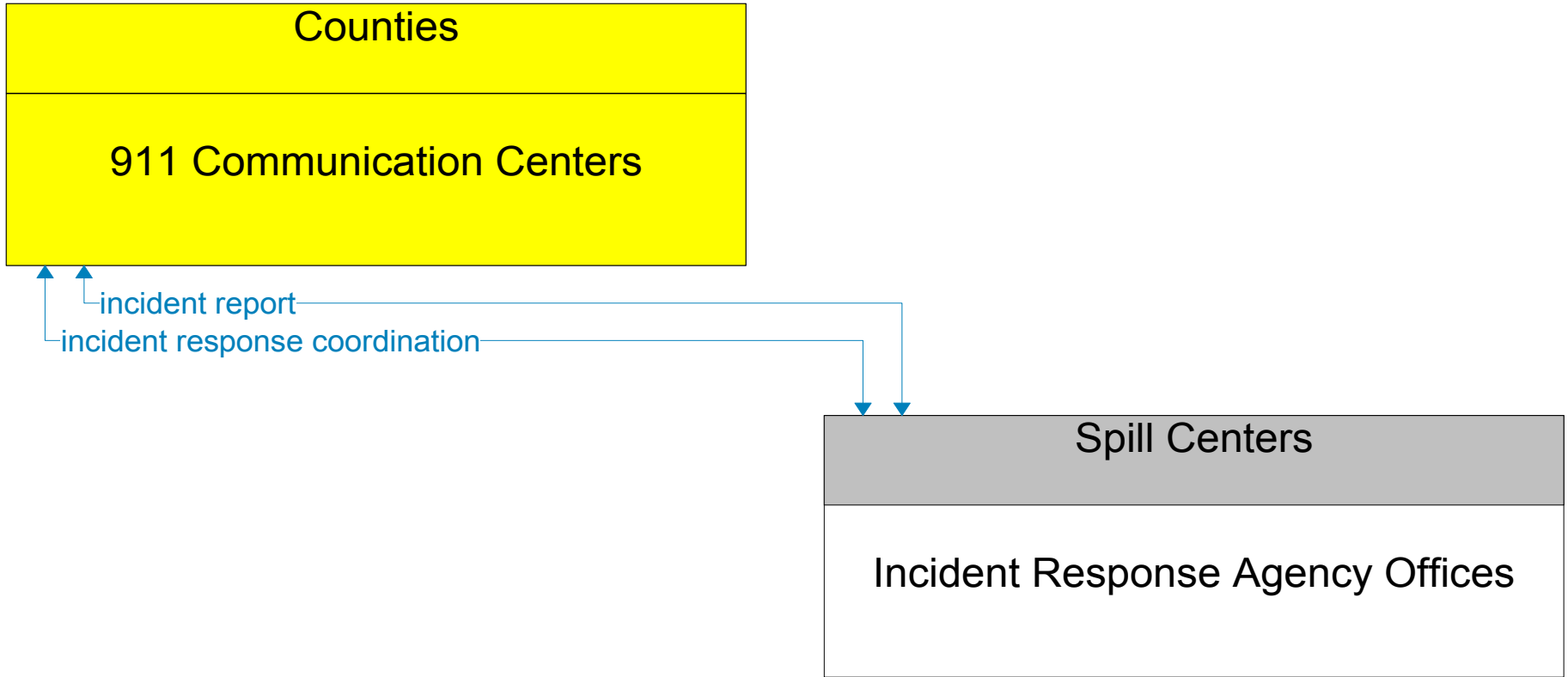
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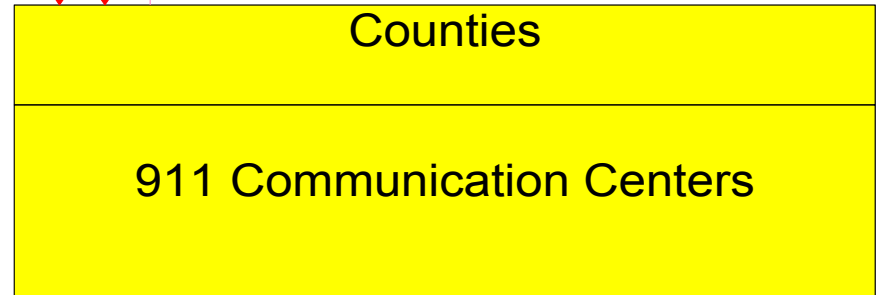
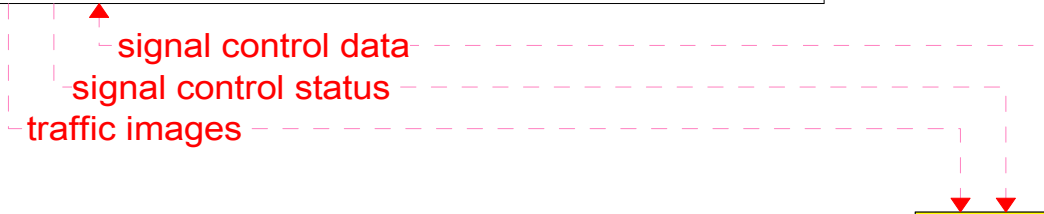
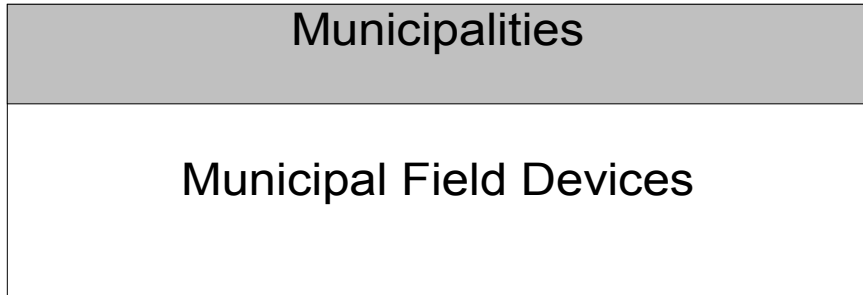
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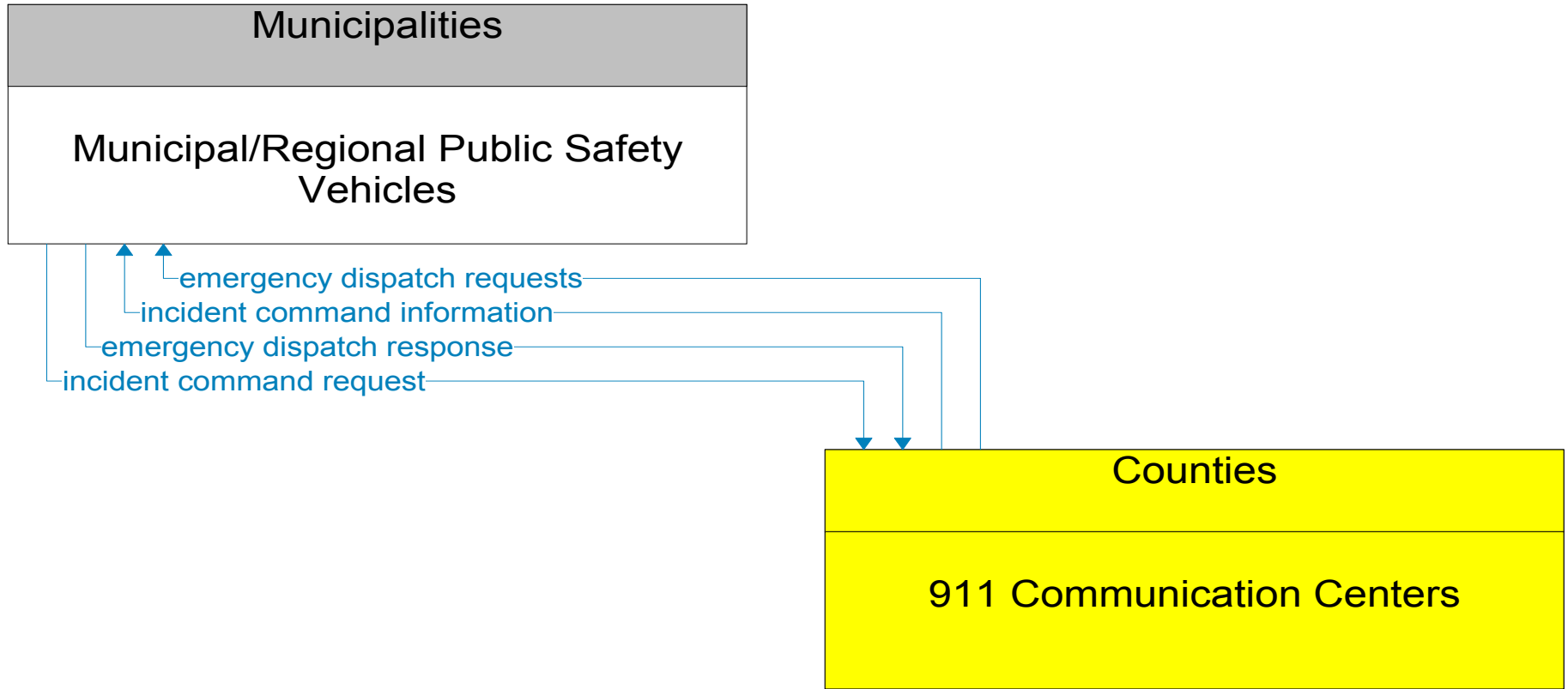


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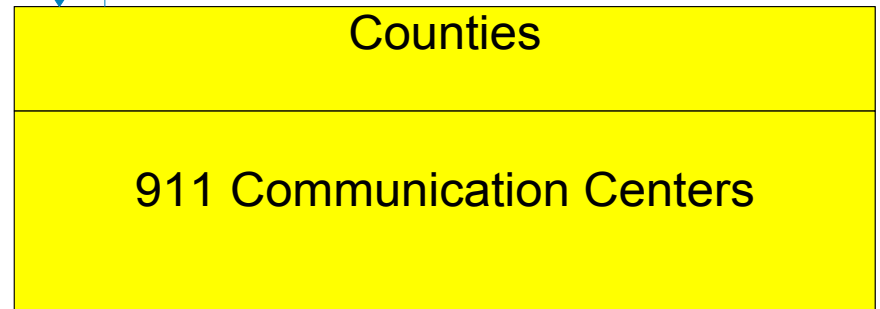
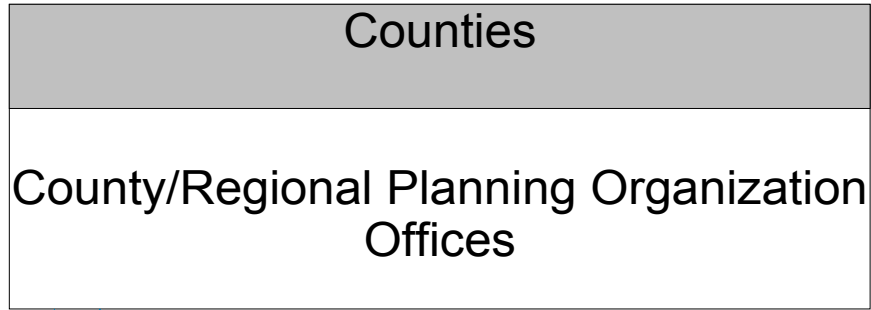


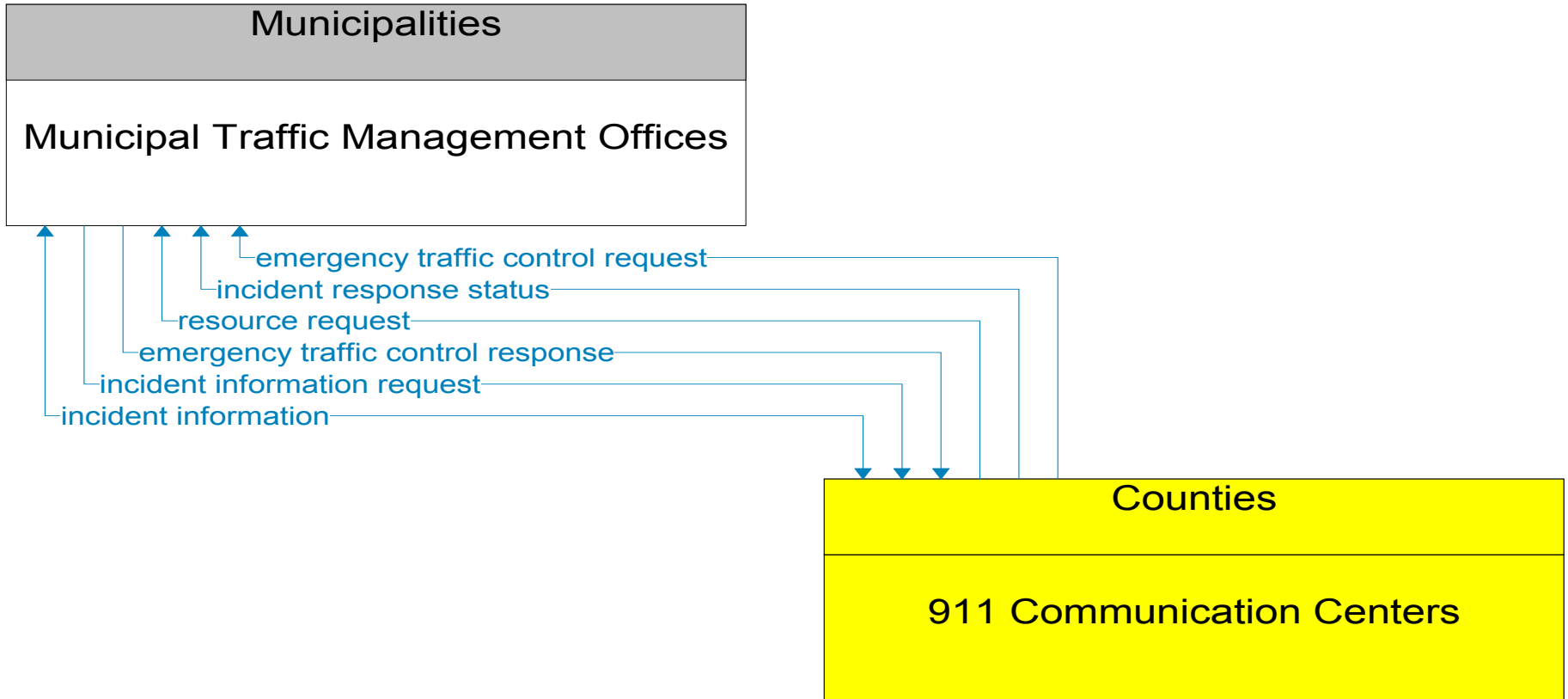
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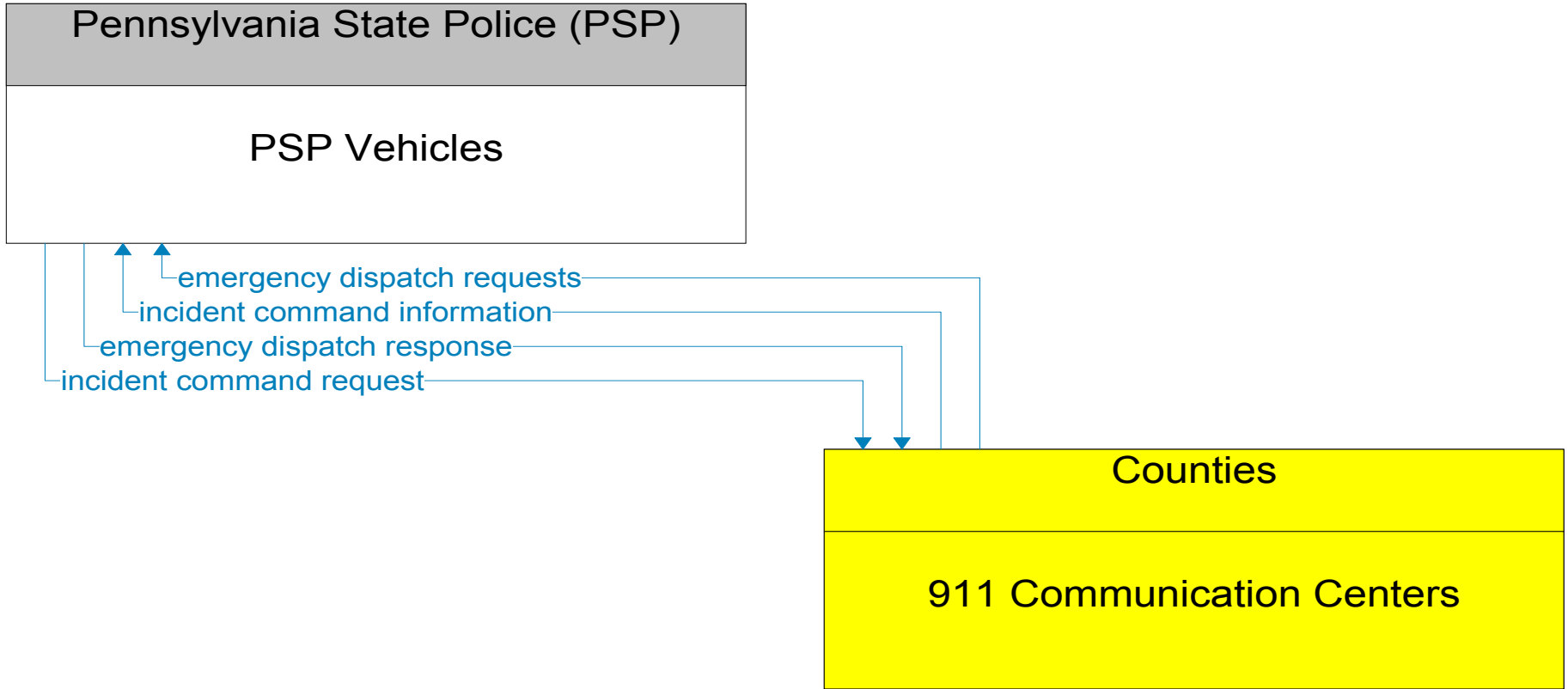


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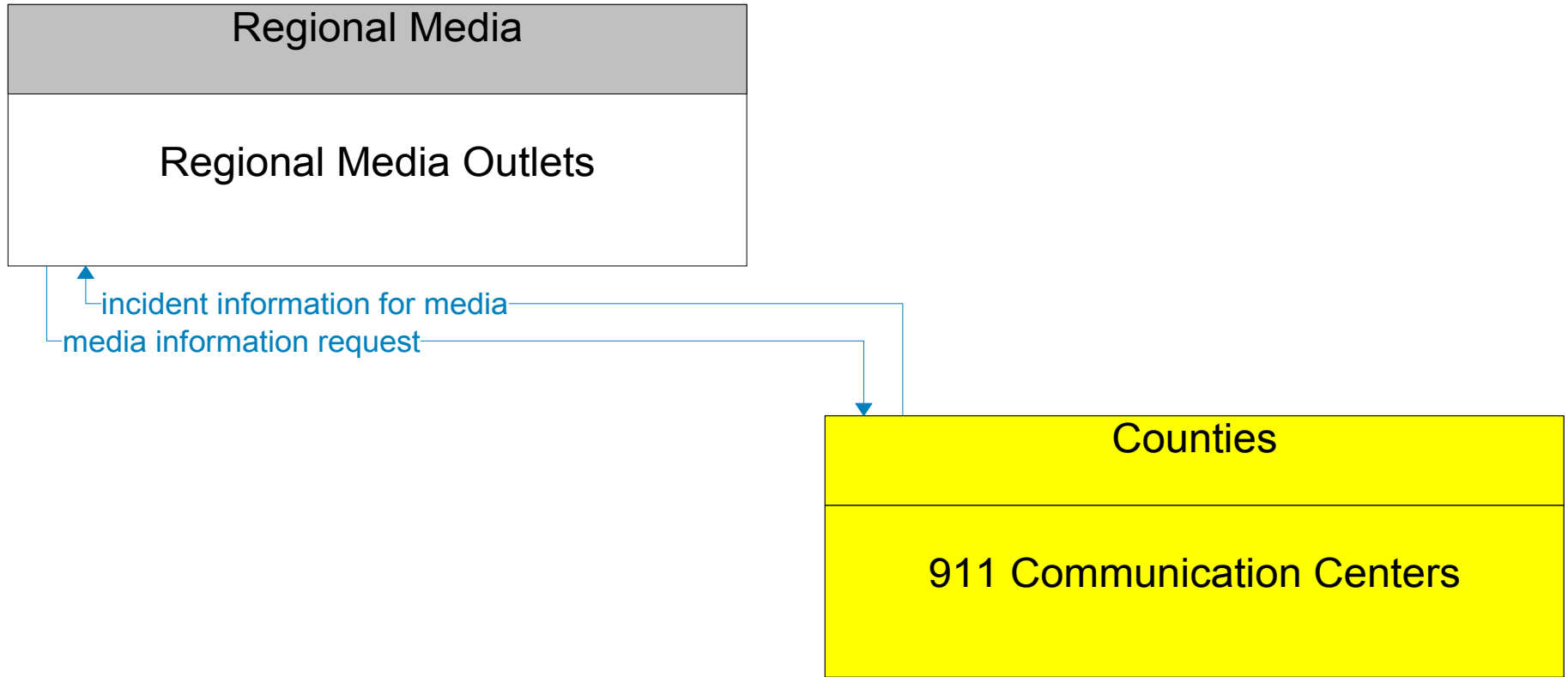




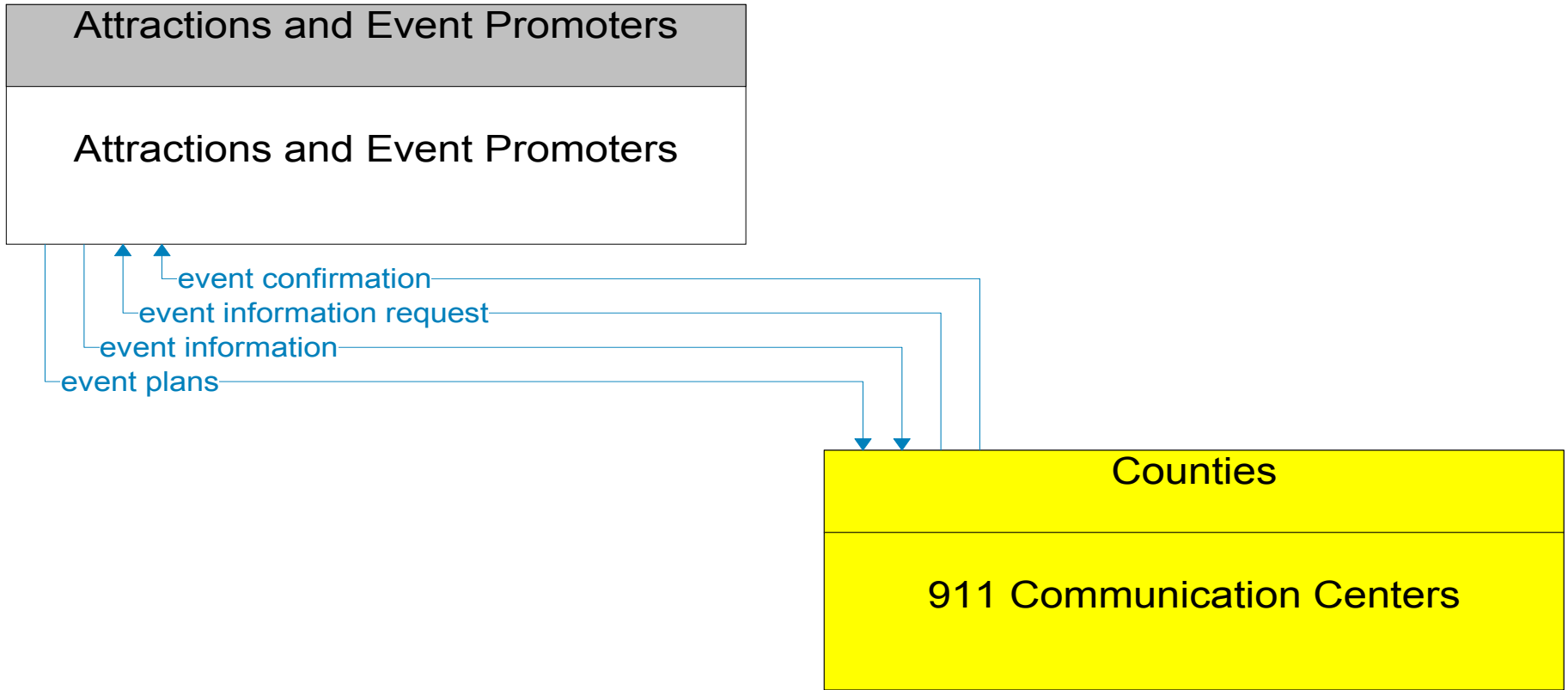
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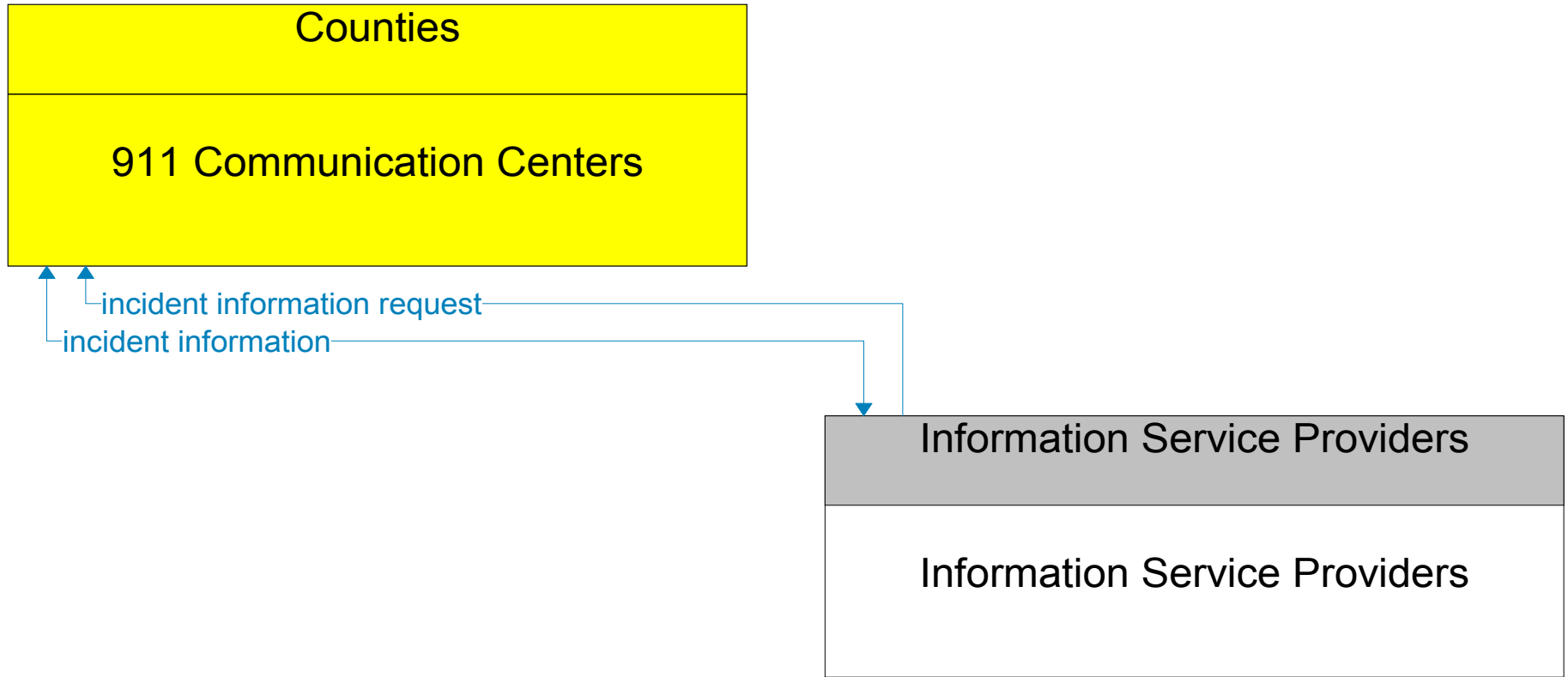
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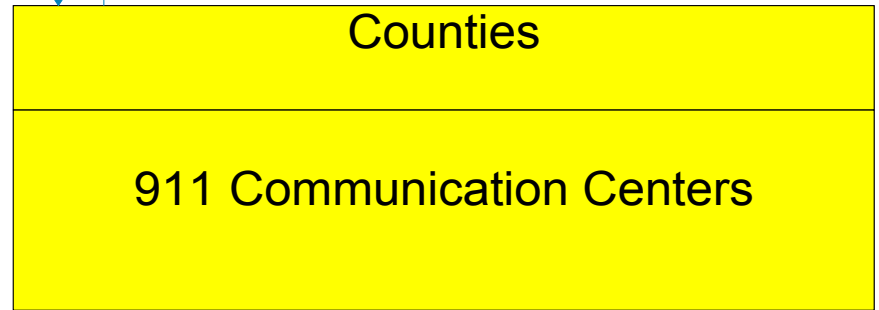
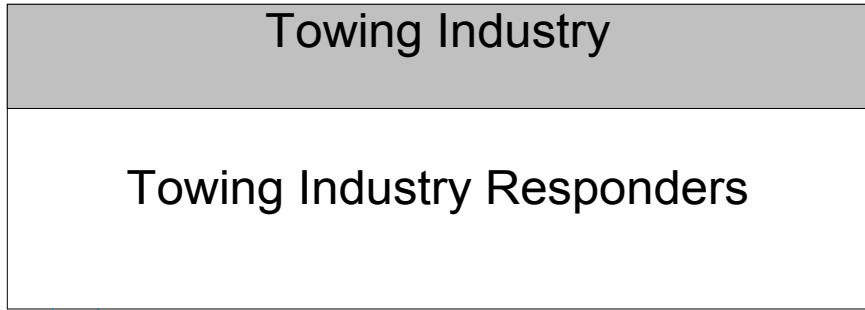


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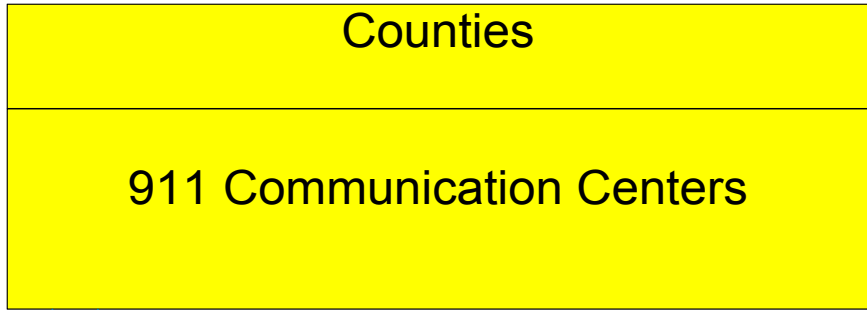


emergency dispatch requests

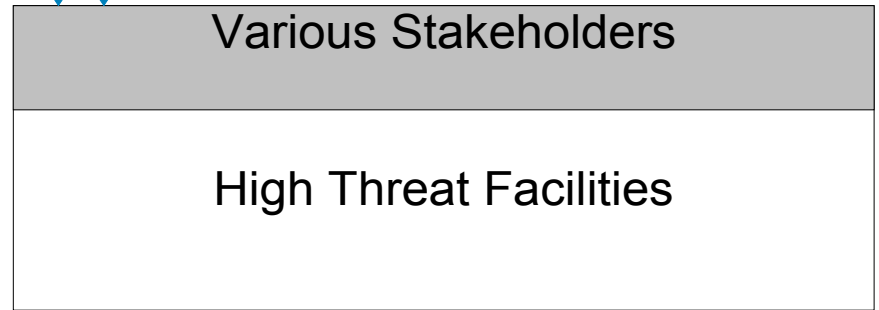
emergency dispatch response

Existing

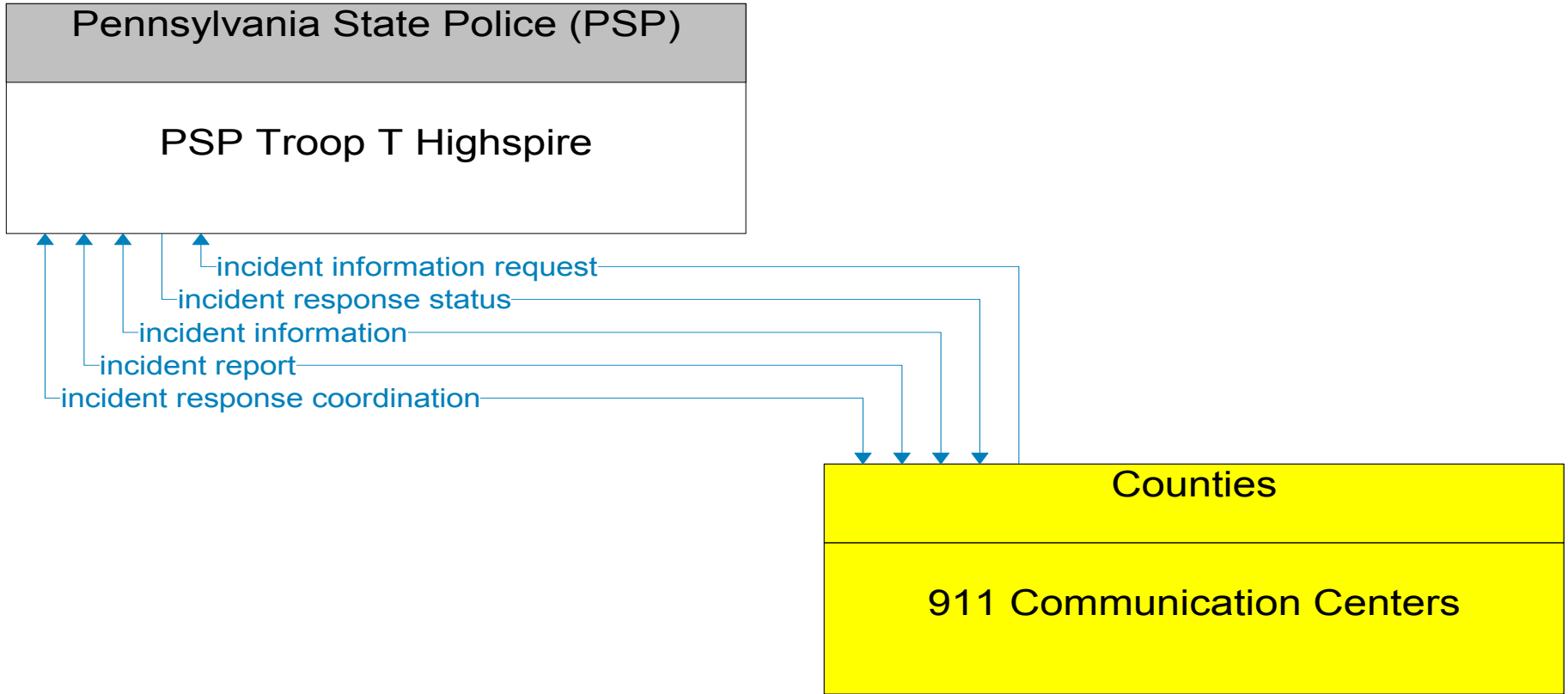
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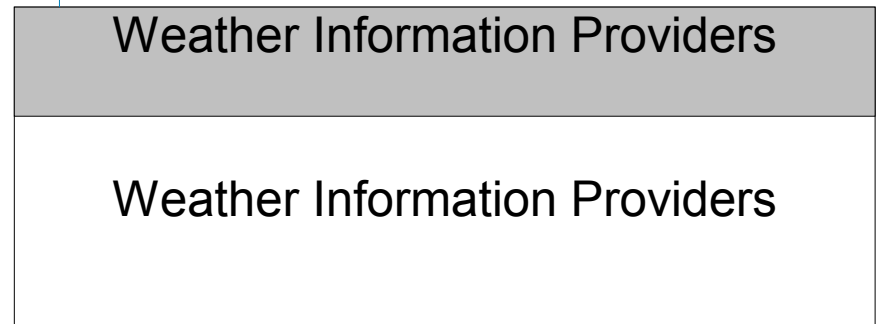
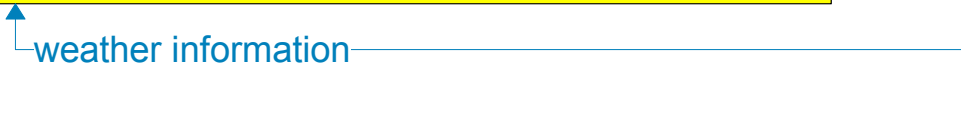
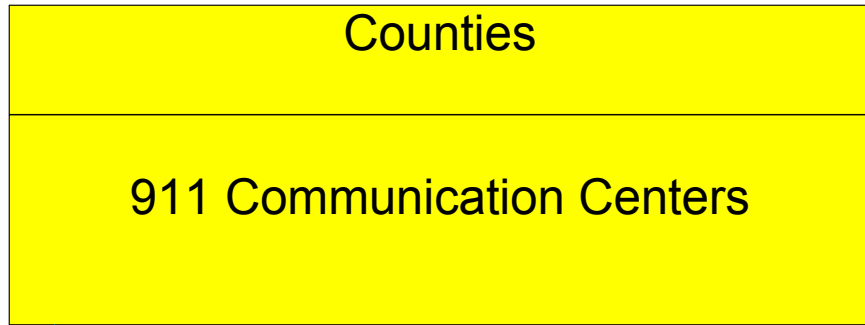
high threat facility incident information
threat information coordination



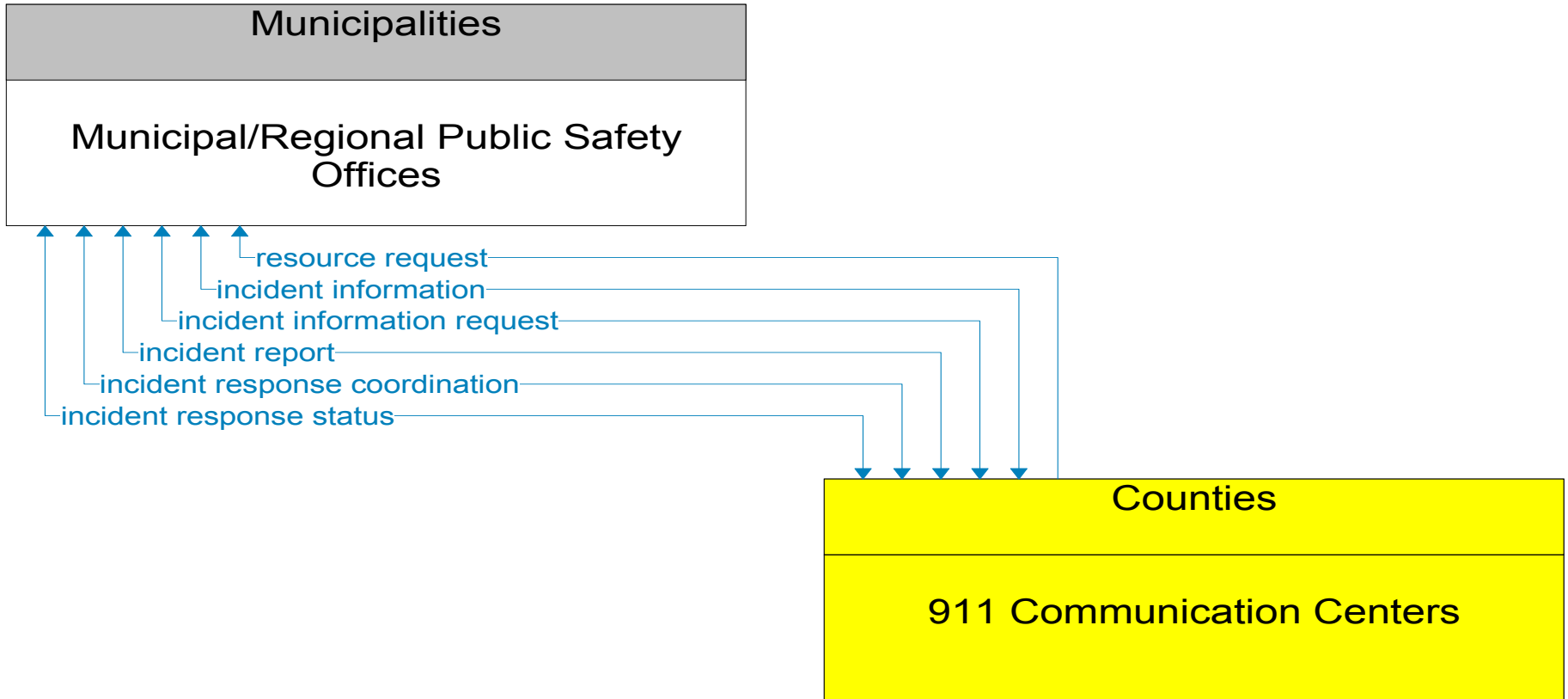
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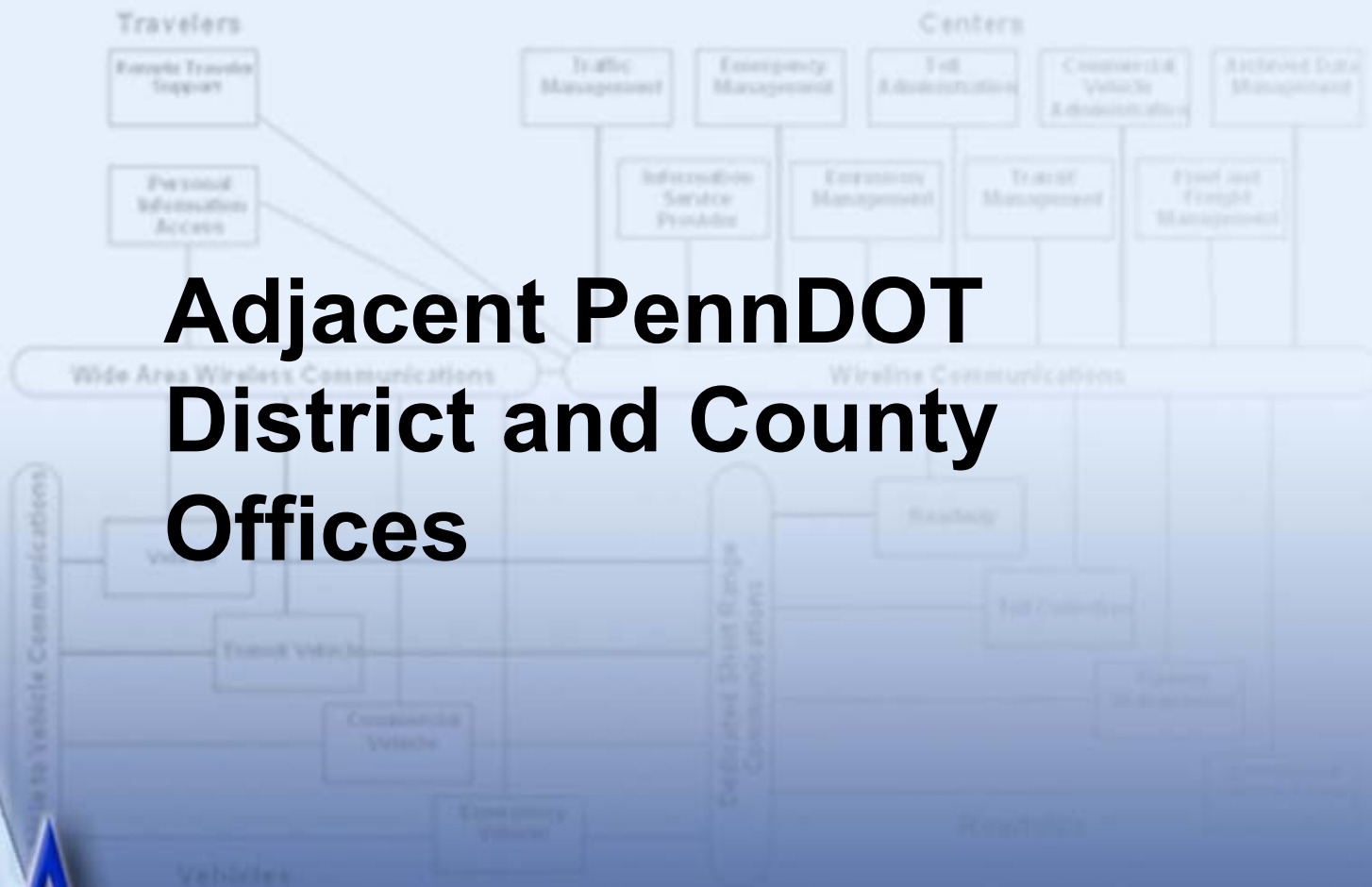


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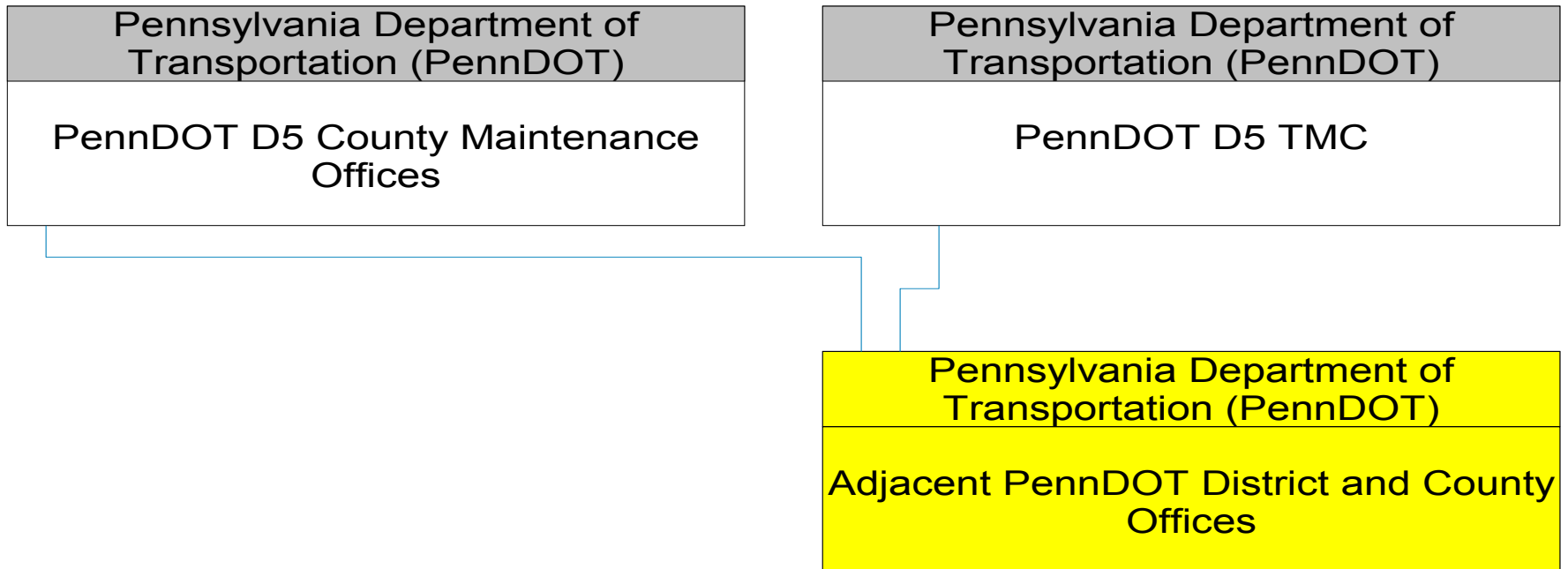


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Adjacent PennDOT District and County Offices



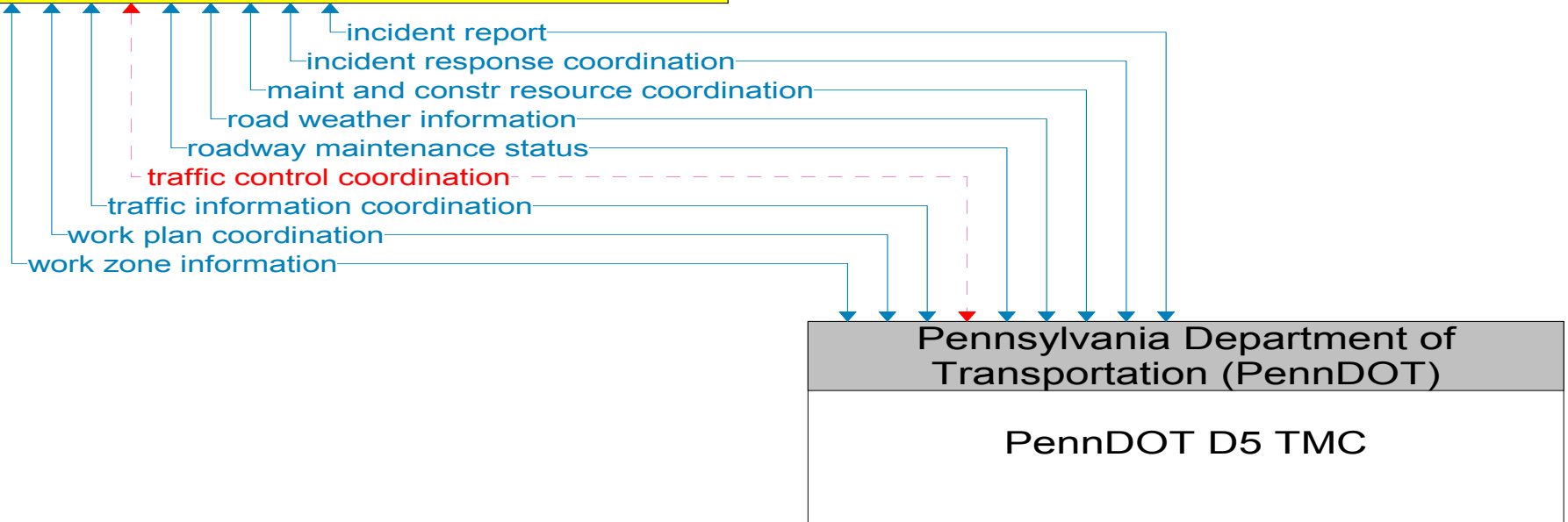
Adjacent PennDOT District and County Offices Interconnect Diagram



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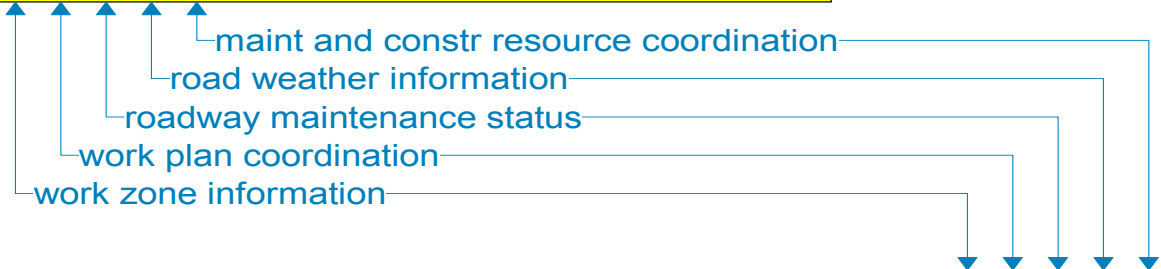
Adjacent PennDOT District and County
Offices



Existing
Planned

Pennsylvania Department of
Transportation (PennDOT)

Adjacent PennDOT District and County
Offices

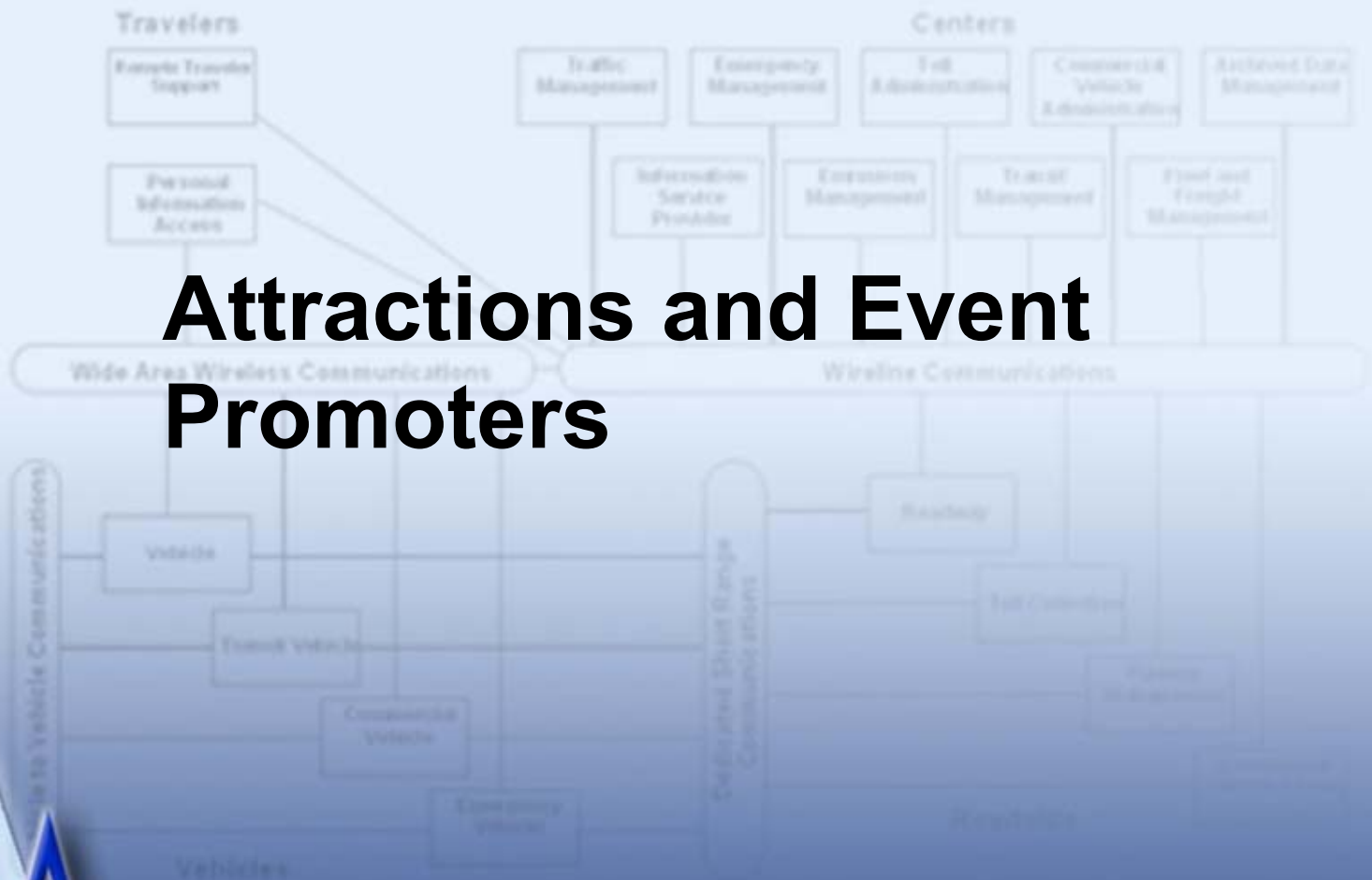


Pennsylvania Department of
Transportation (PennDOT)

PennDOT D5 County Maintenance
Offices

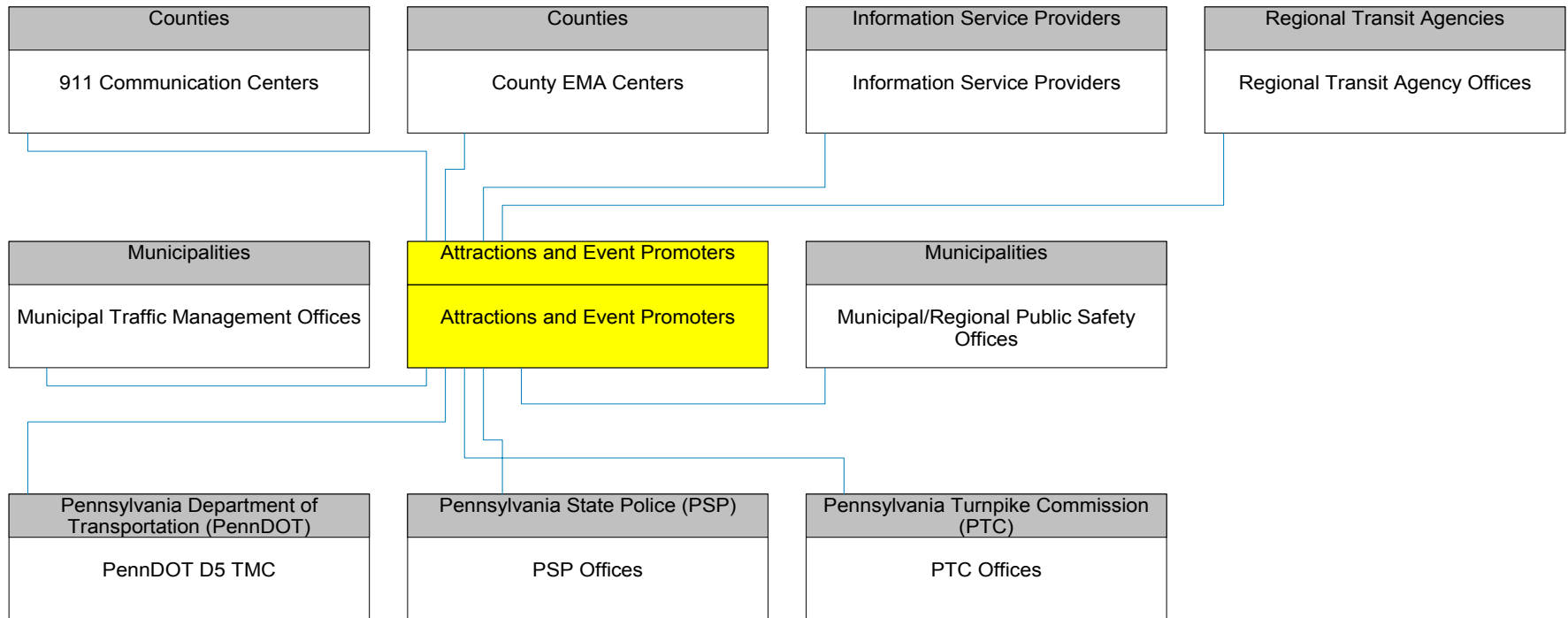
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Attractions and Event Promoters

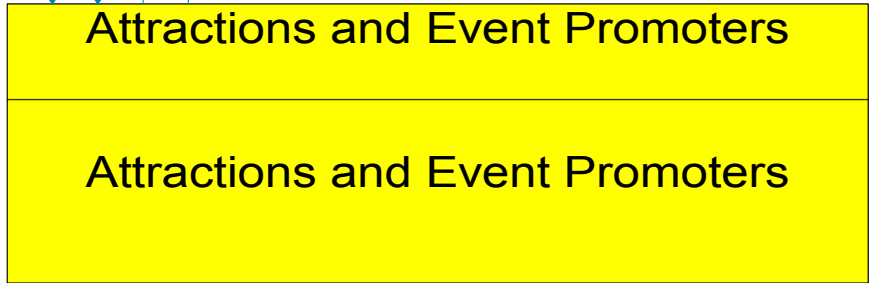
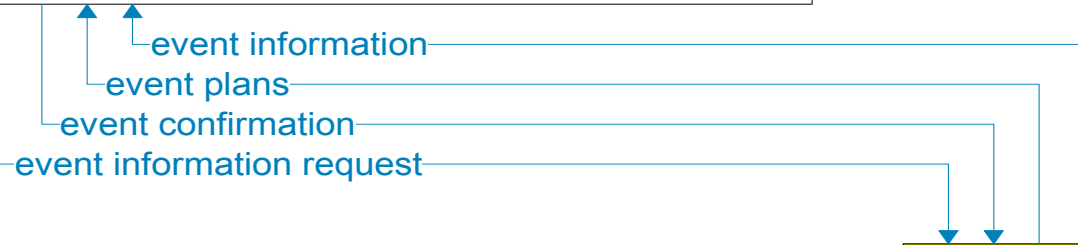
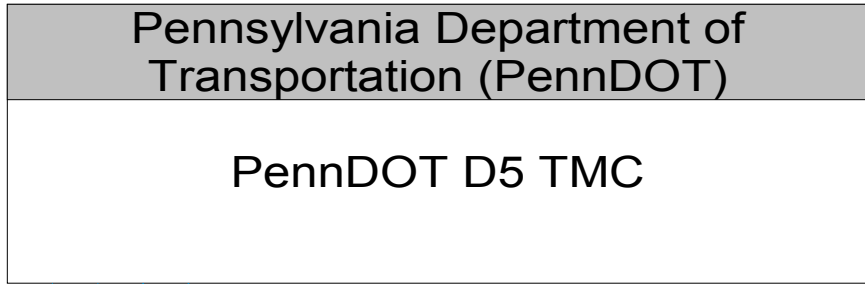


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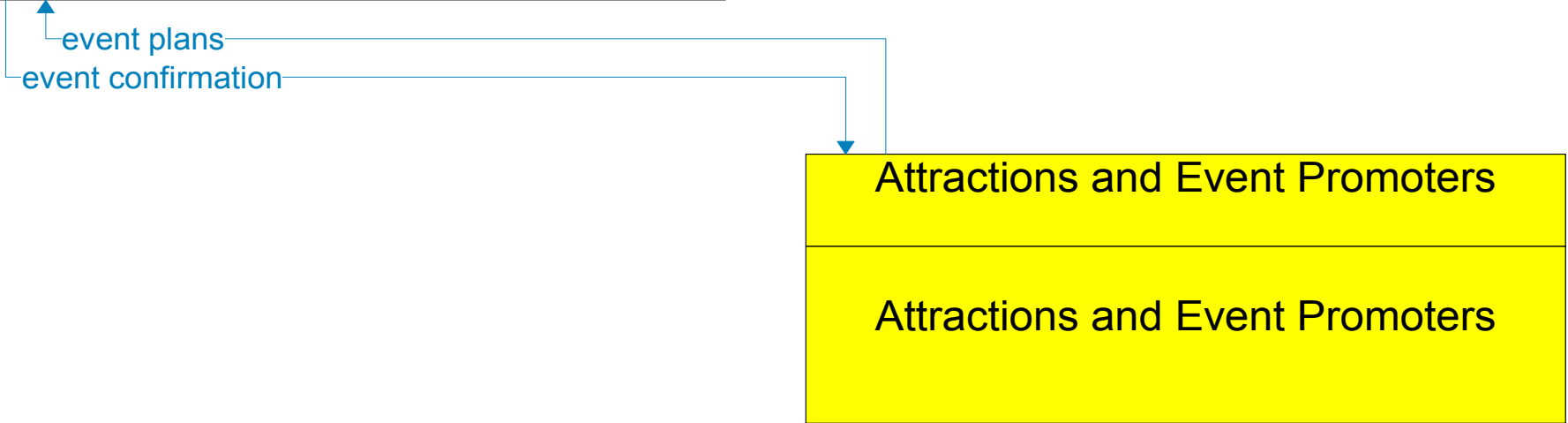
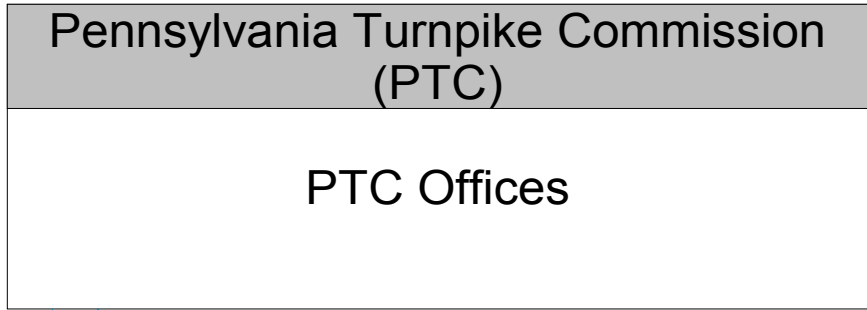
Attractions and Event Promoters Interconnect Diagram



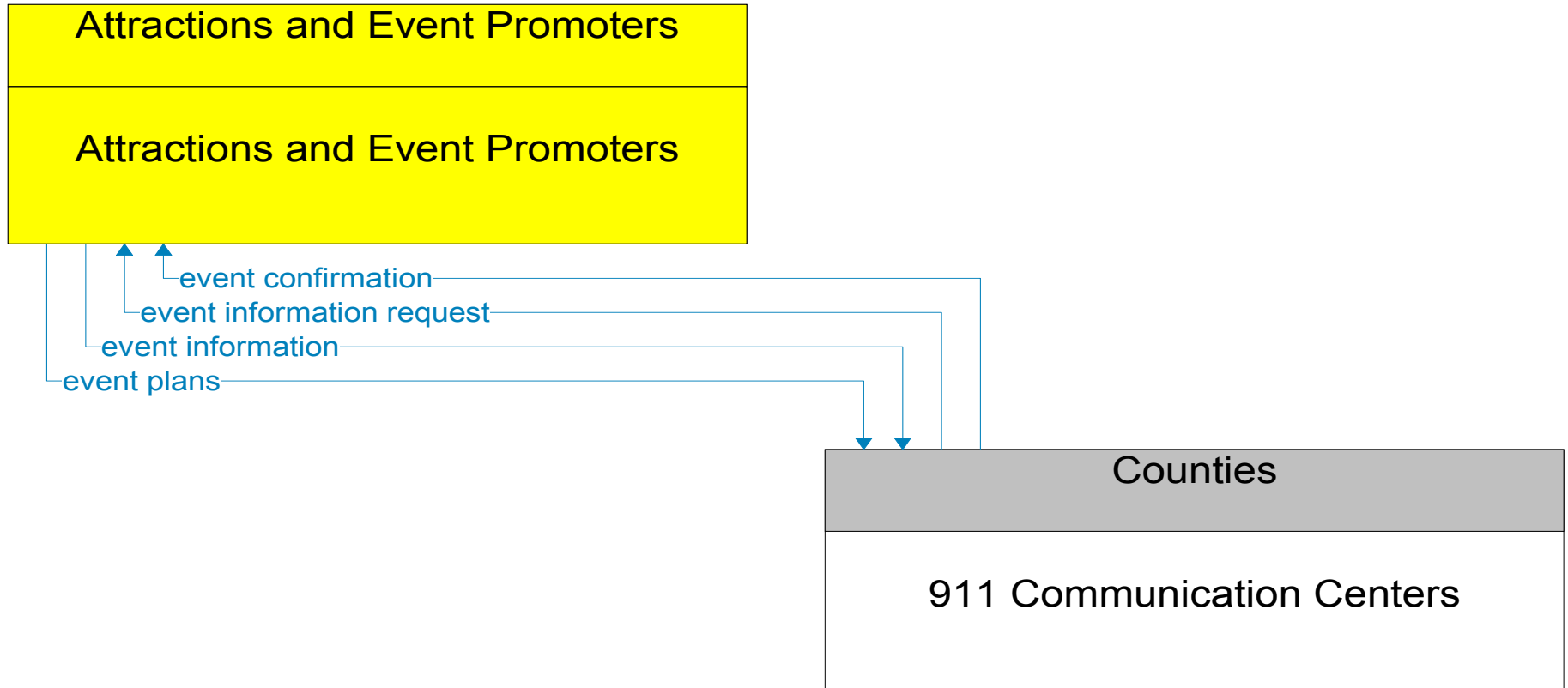
— Existing
 - - - Planned



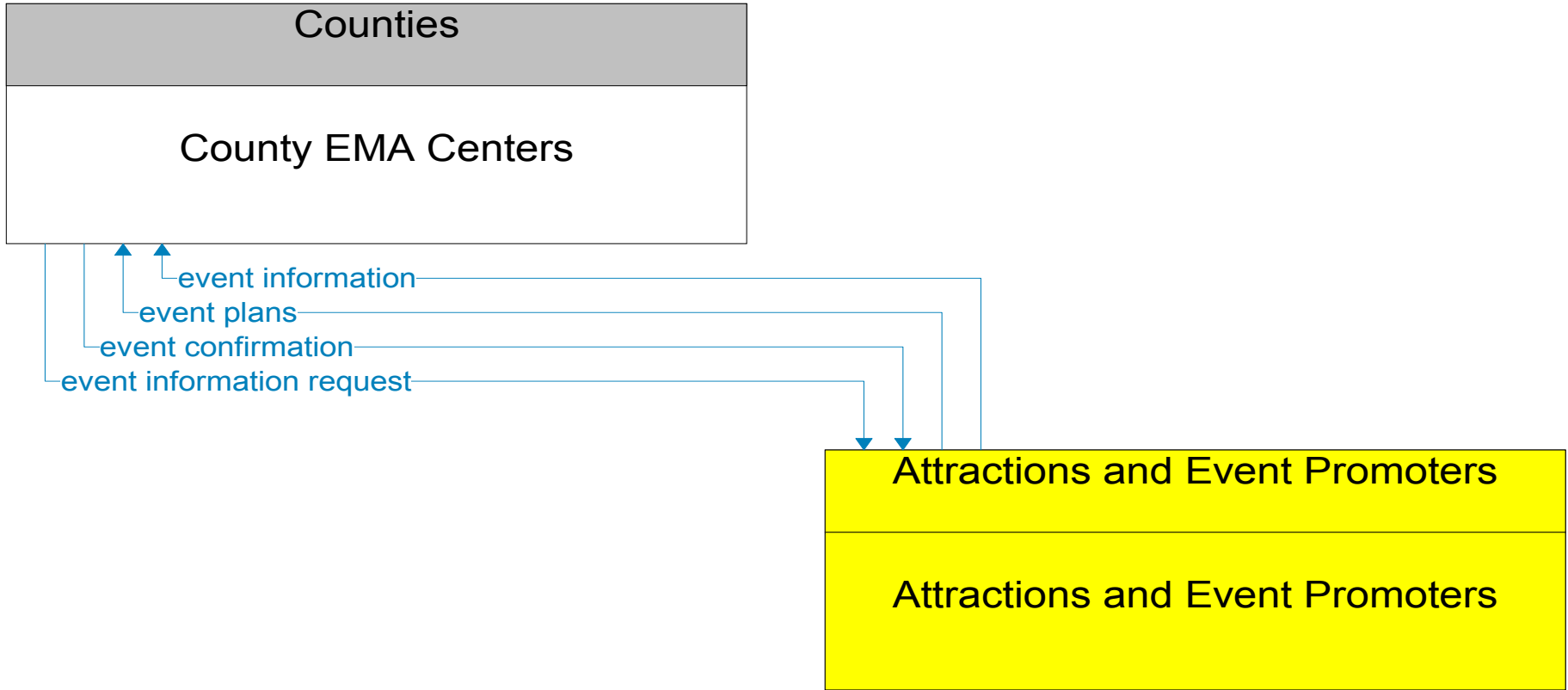
Existing
Planned



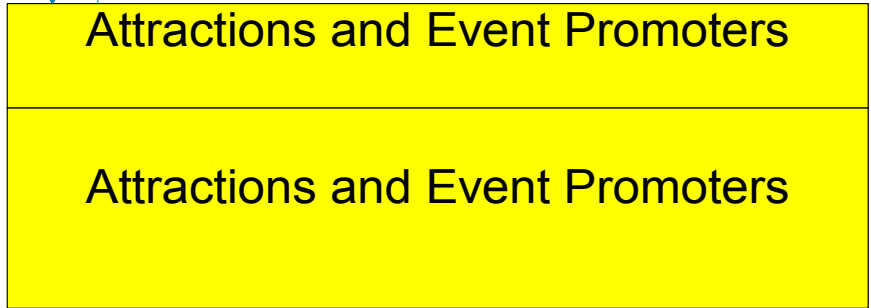
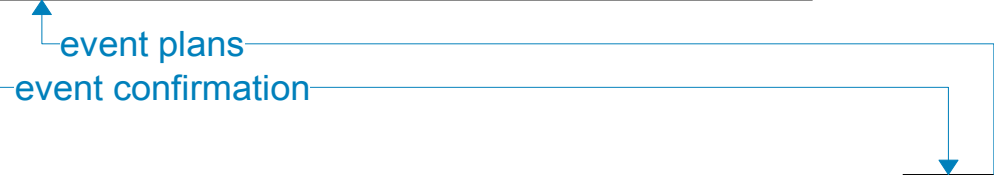
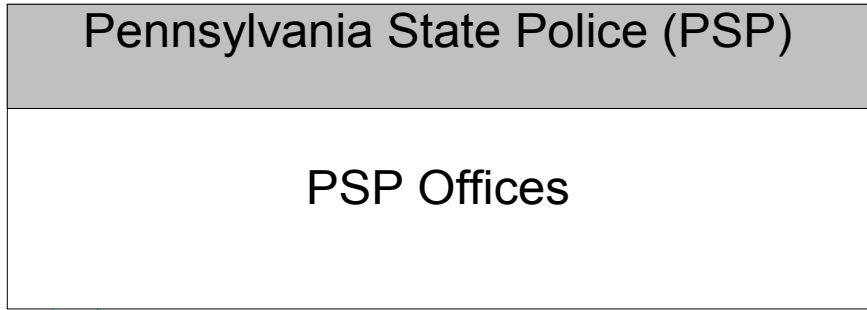
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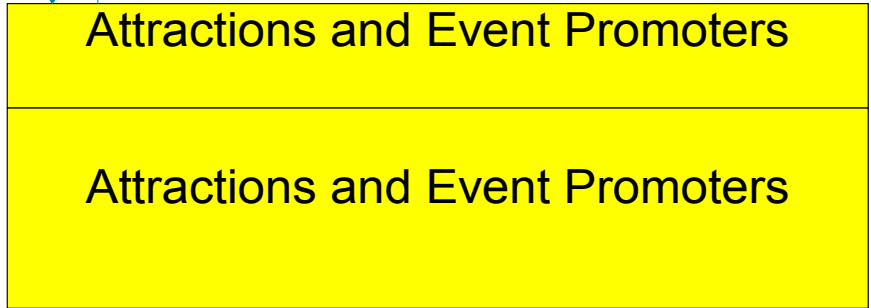
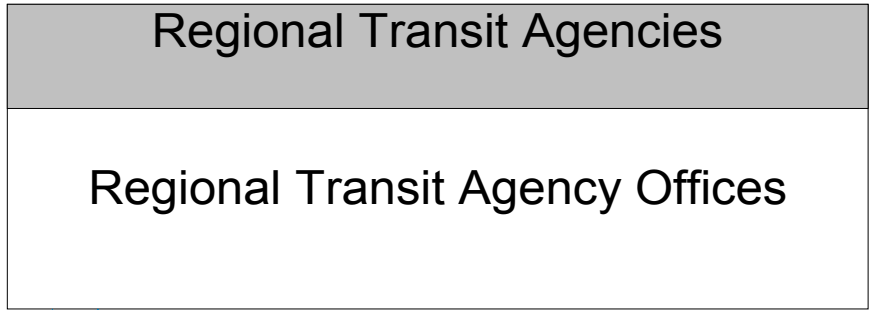
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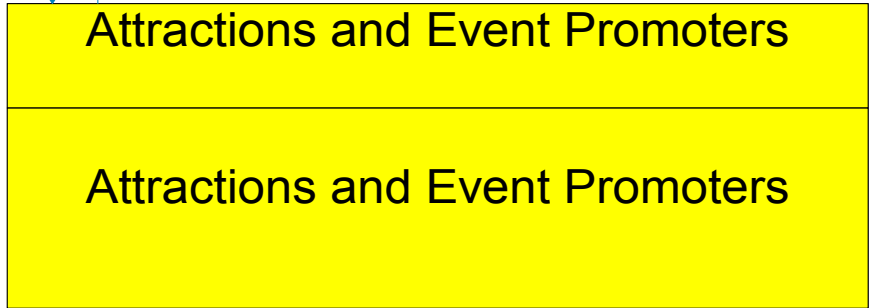
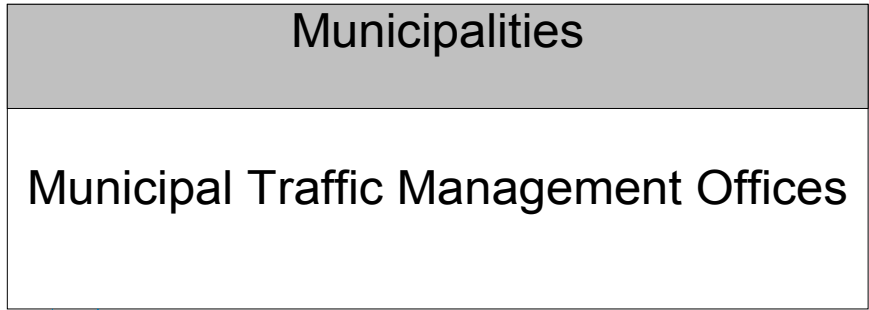


———— Existing
----- Planned



———— Existing
- - - - - Planned

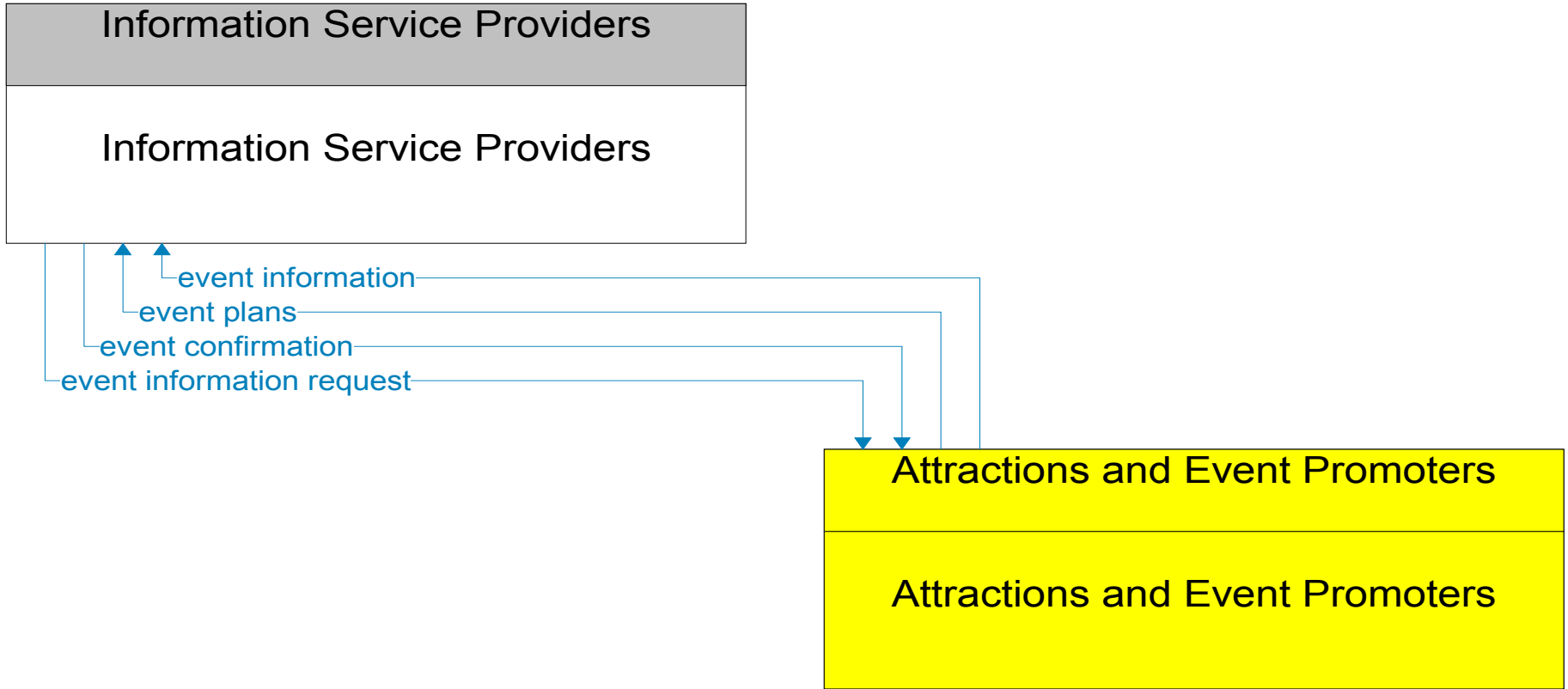




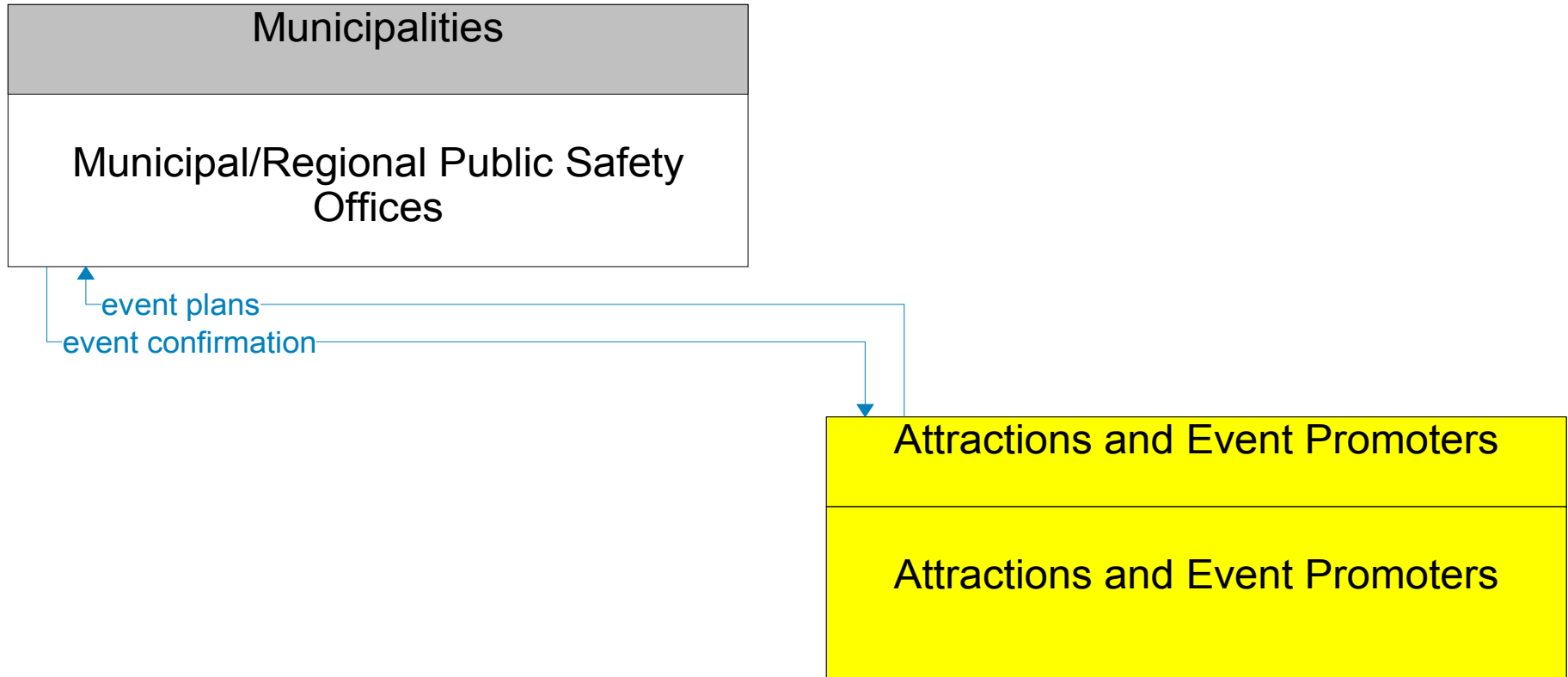
event plans

event confirmation

Existing
Planned

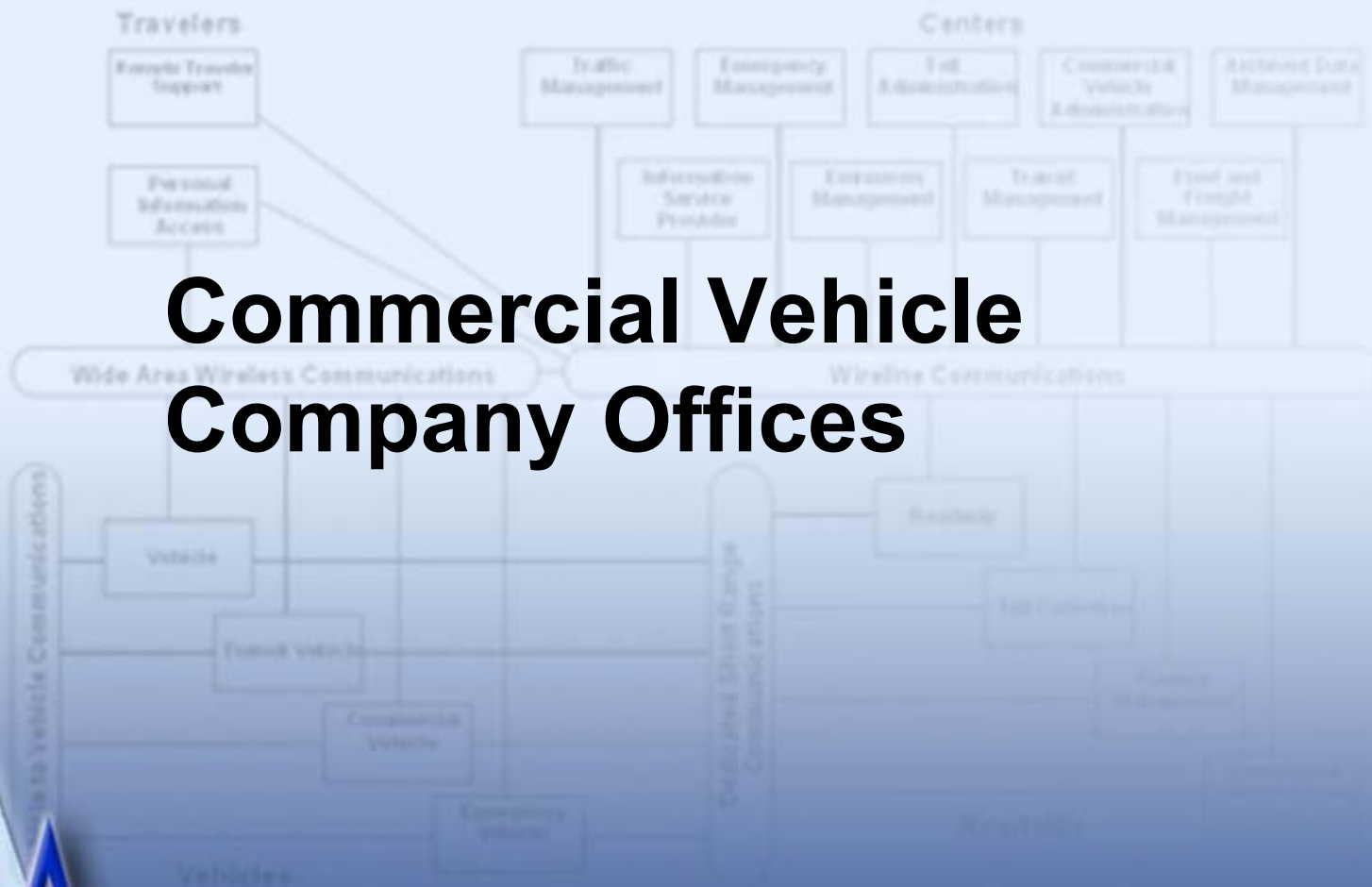


———— Existing
- - - - - Planned

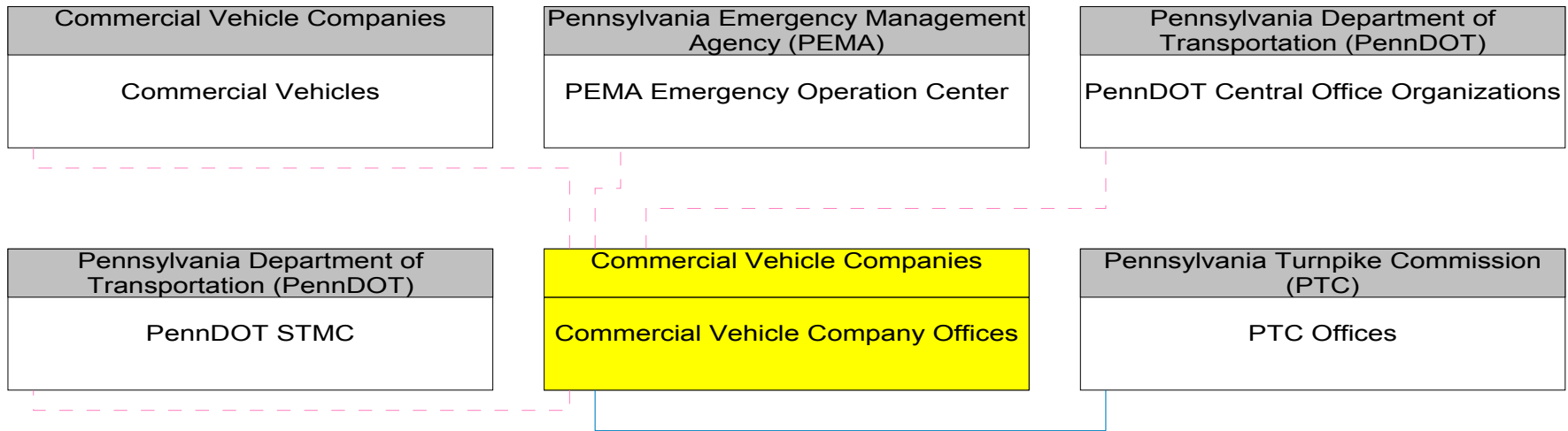


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----- Planned

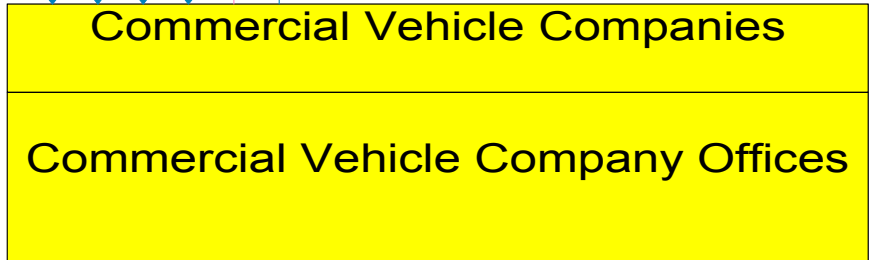
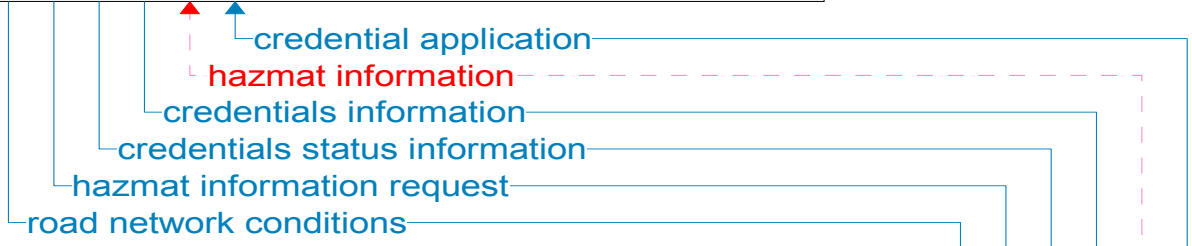
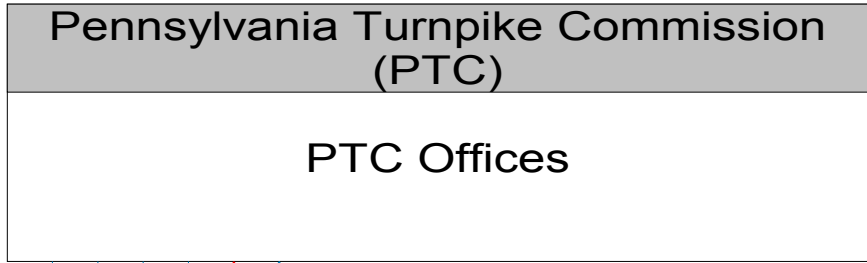
Commercial Vehicle Company Offices



Commercial Vehicle Company Offices Interconnect Diagram



Existing
Planned



Pennsylvania Emergency Management Agency (PEMA)

PEMA Emergency Operation Center

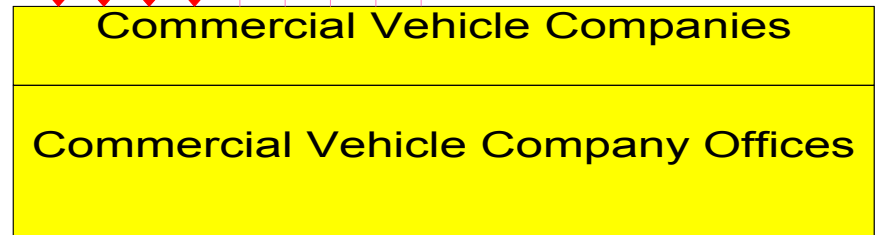
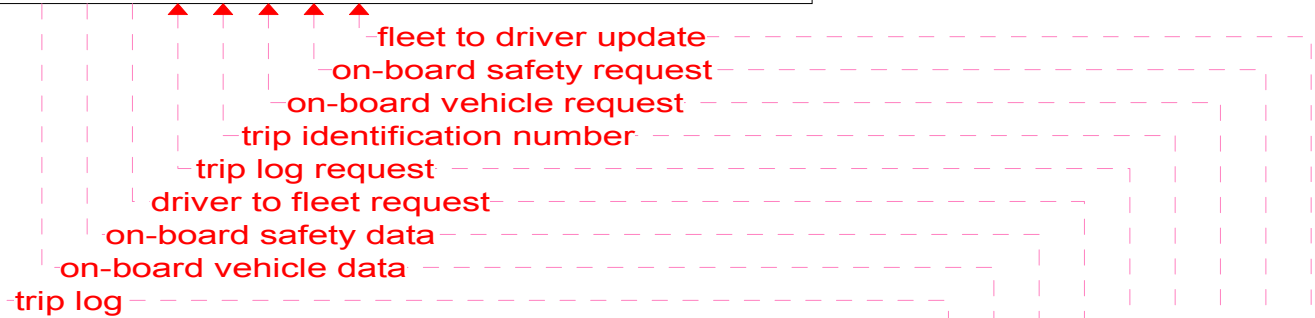
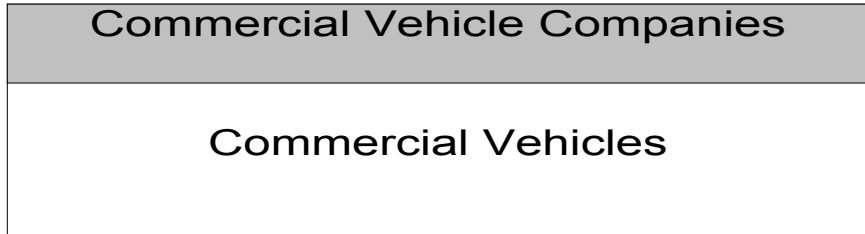


↑ hazmat information

Commercial Vehicle Companies

Commercial Vehicle Company Offices

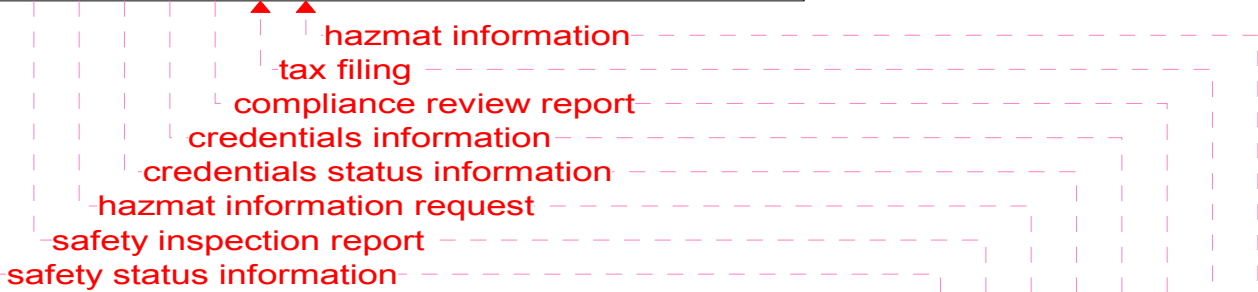
Existing
Planned



———— Existing
- - - - - Planned

Pennsylvania Department of
Transportation (PennDOT)

PennDOT STMC



Commercial Vehicle Companies

Commercial Vehicle Company Offices

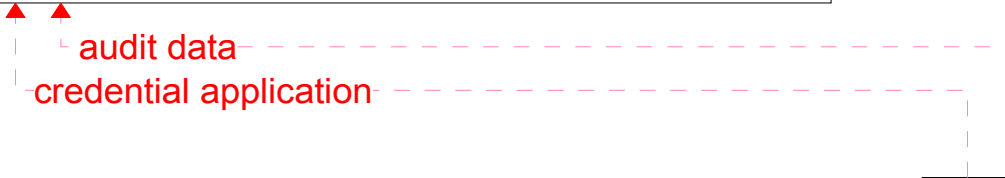
Existing
Planned

Pennsylvania Department of
Transportation (PennDOT)

PennDOT Central Office Organizations

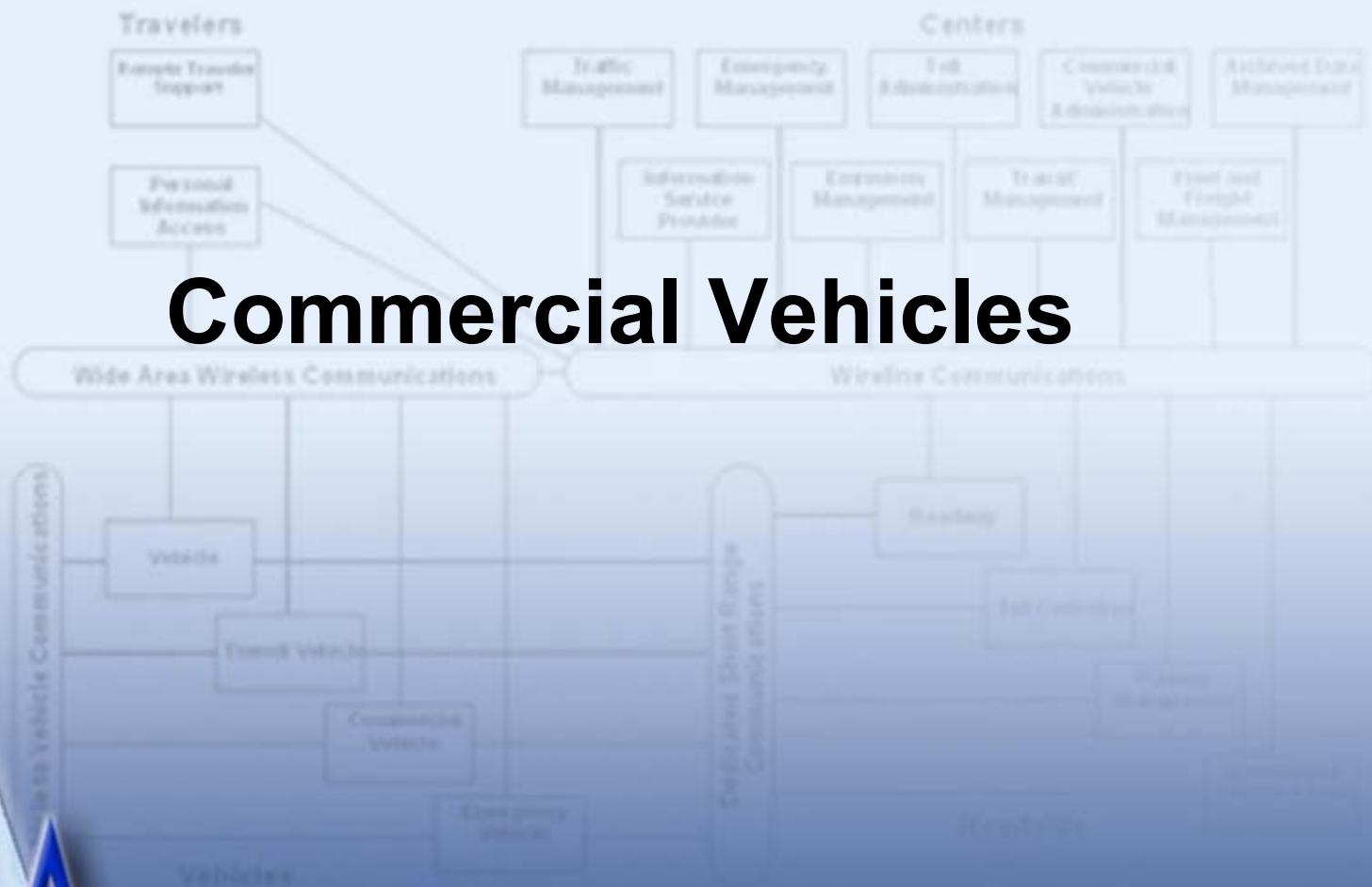
Commercial Vehicle Companies

Commercial Vehicle Company Offices

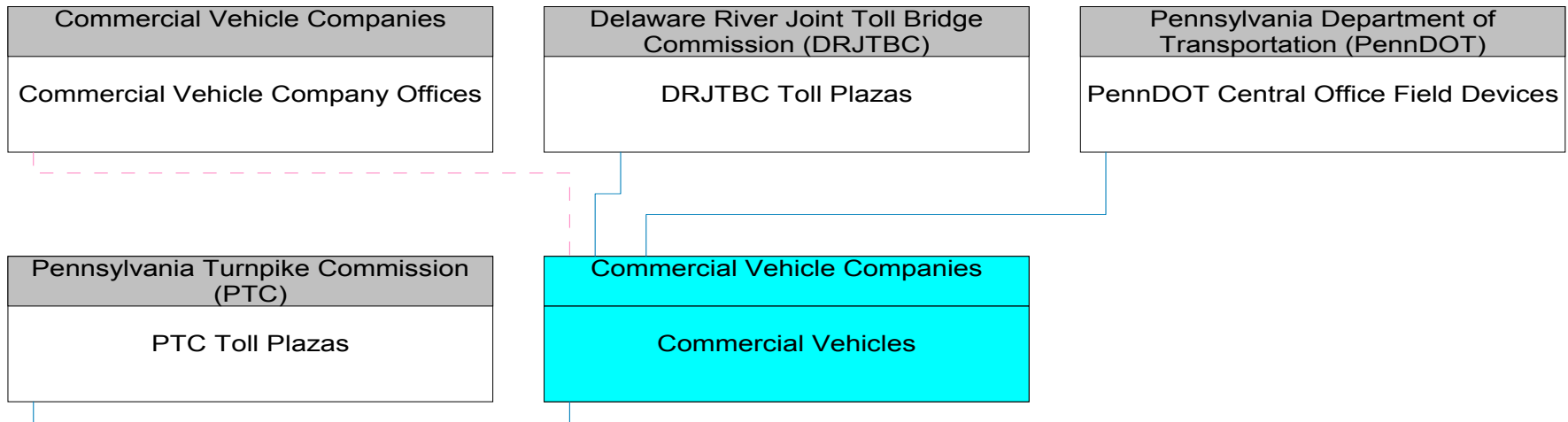


———— Existing
- - - - - Planned

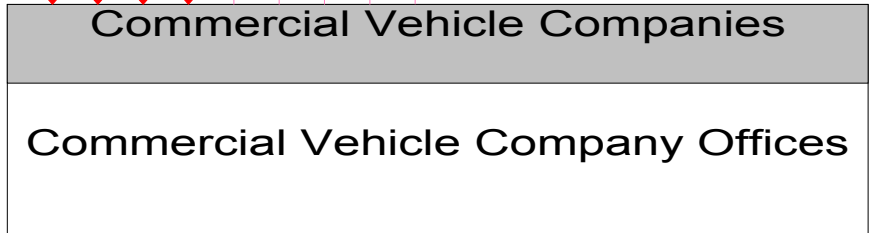
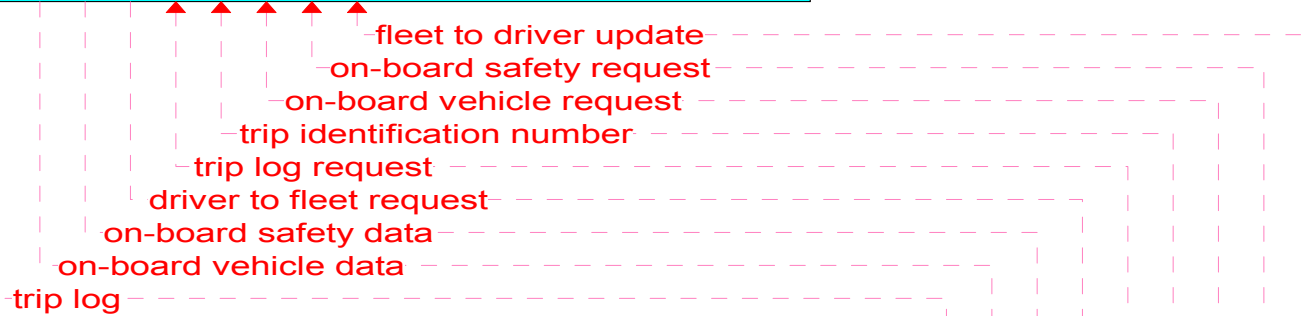
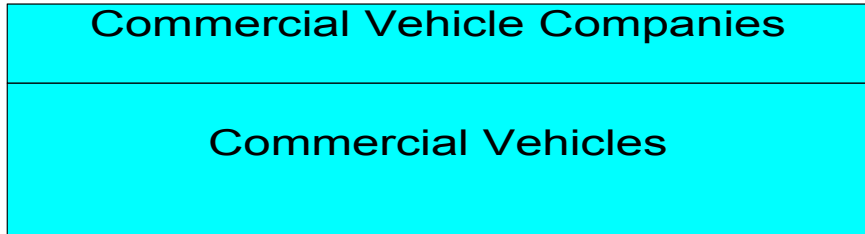
Commercial Vehicles



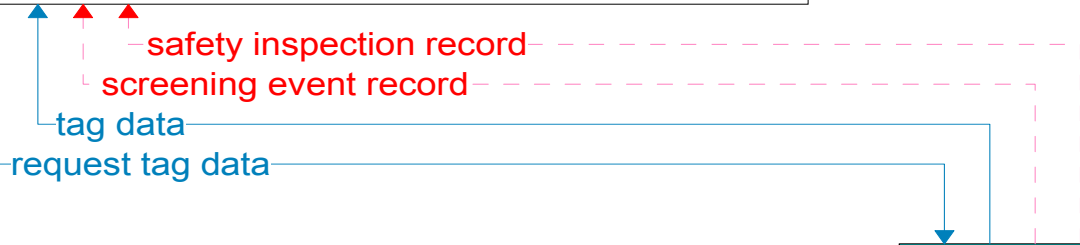
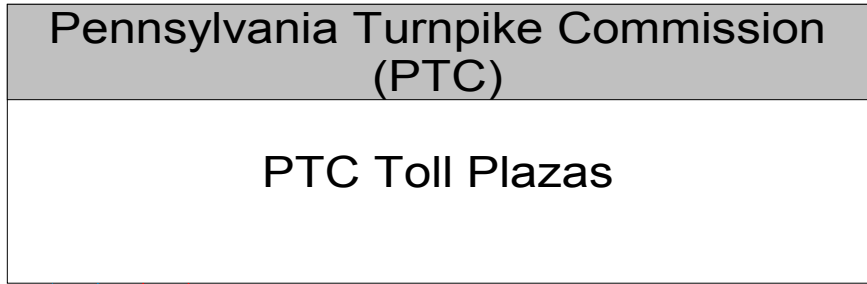
Commercial Vehicles Interconnect Diagram



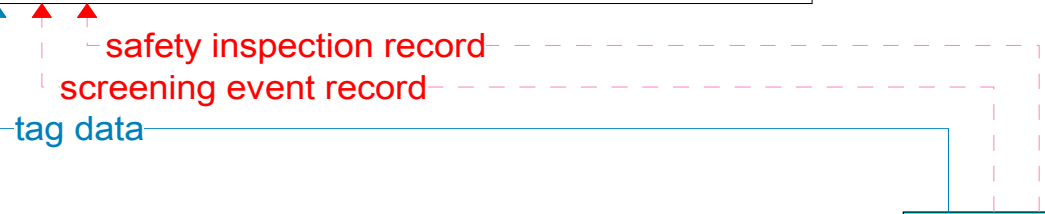
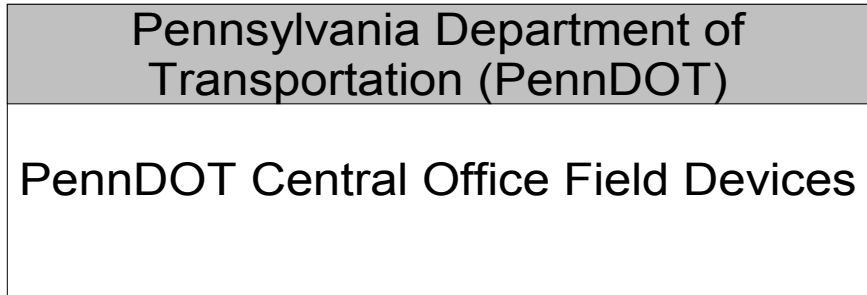
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- - - Planned



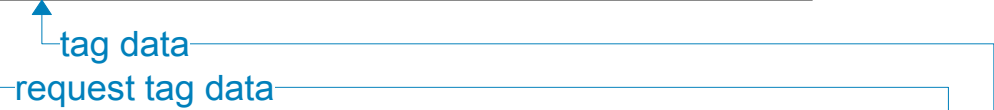
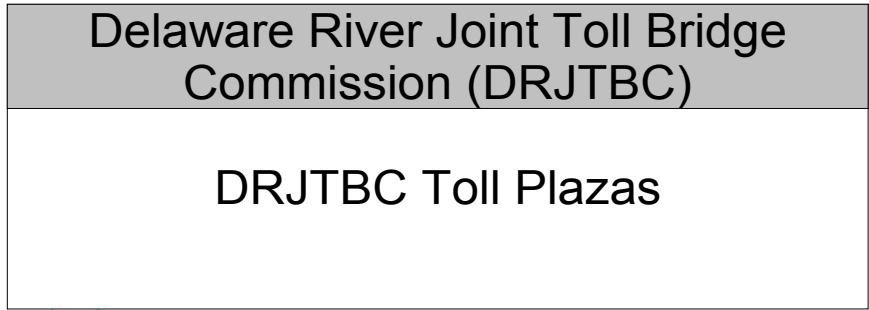
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Planned



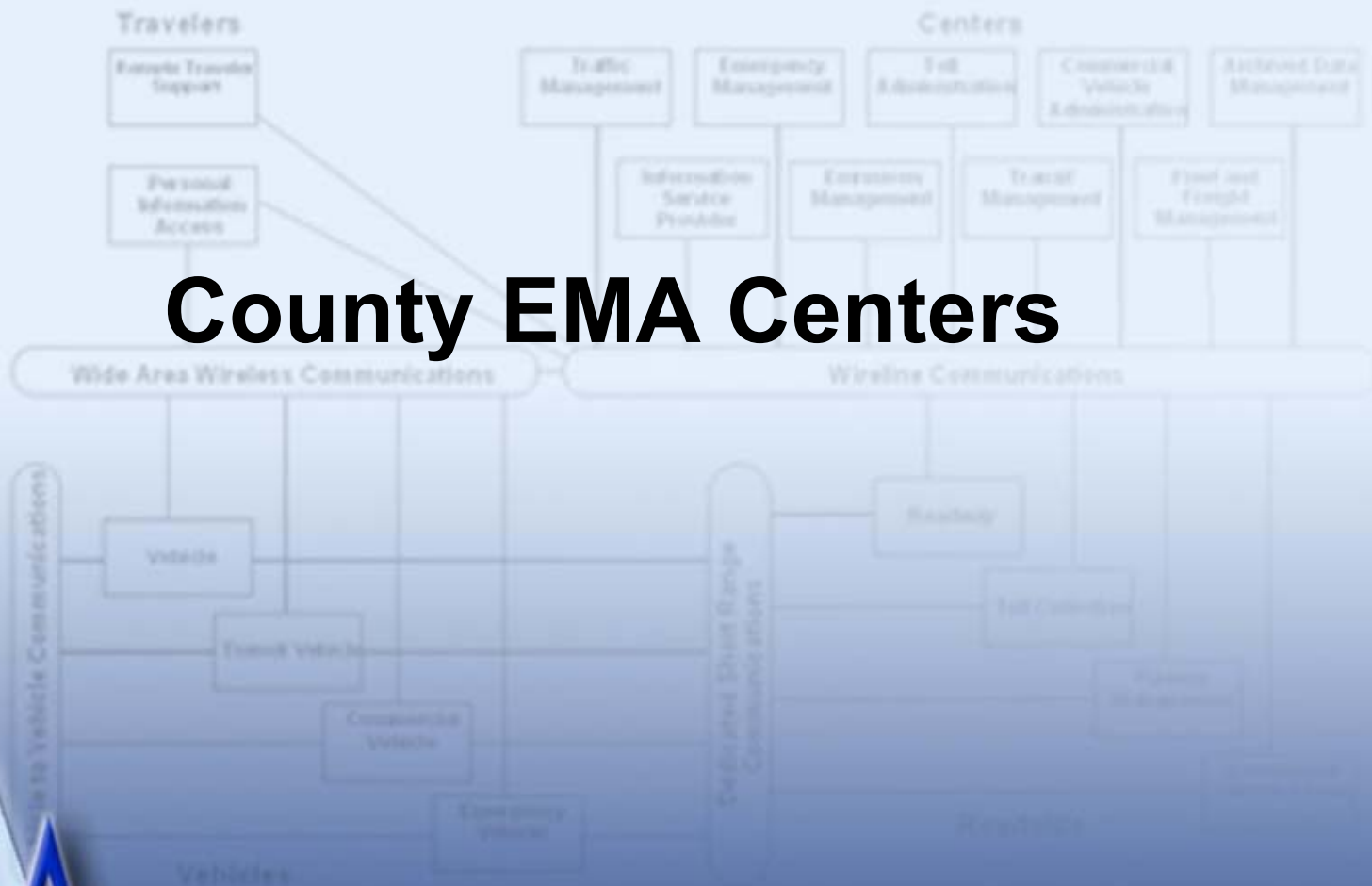
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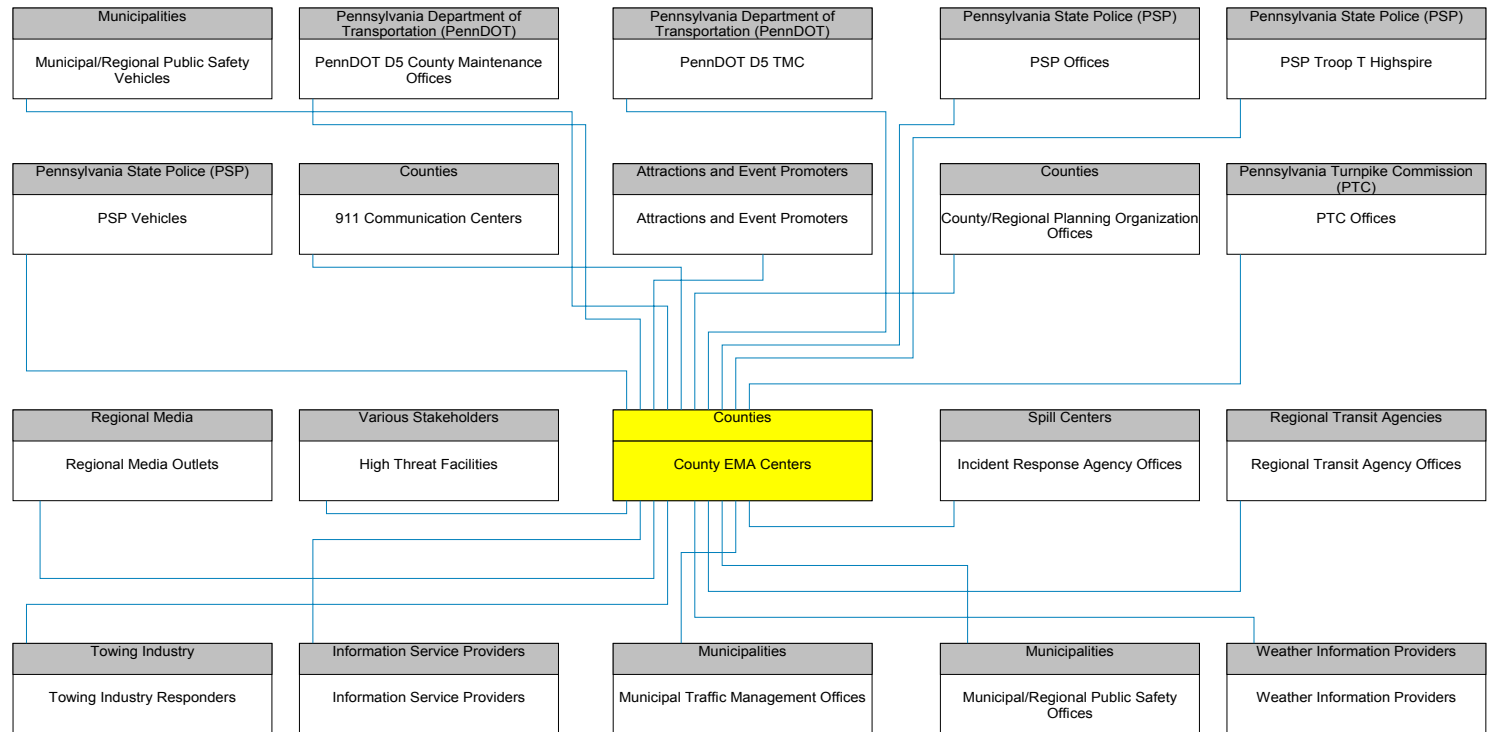
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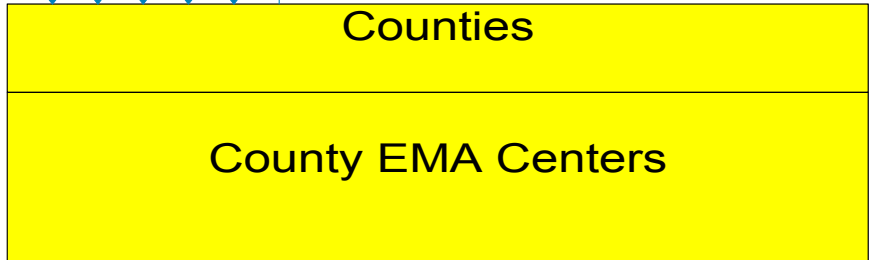
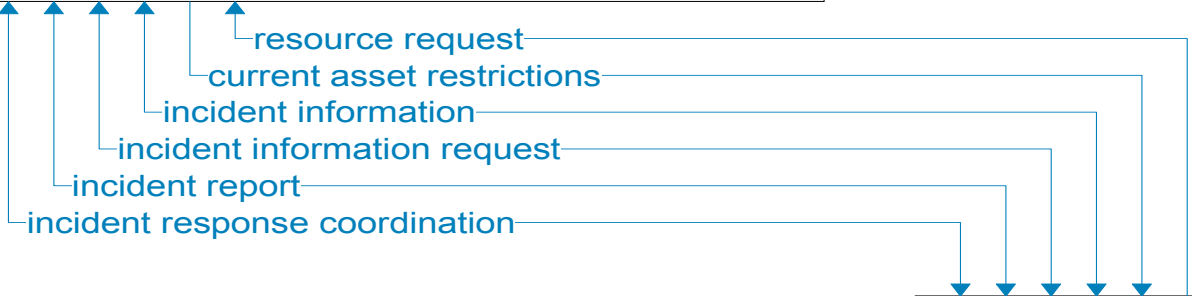
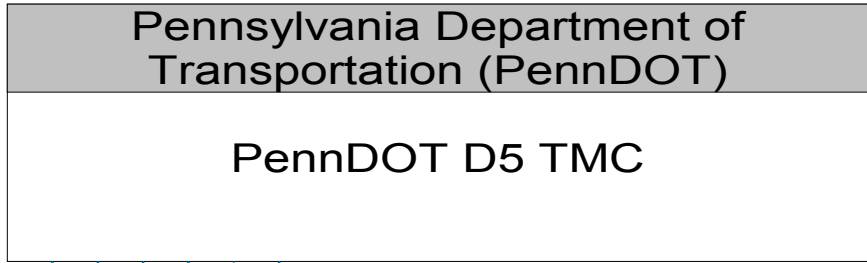
County EMA Centers



County EMA Centers Interconnect Diagram



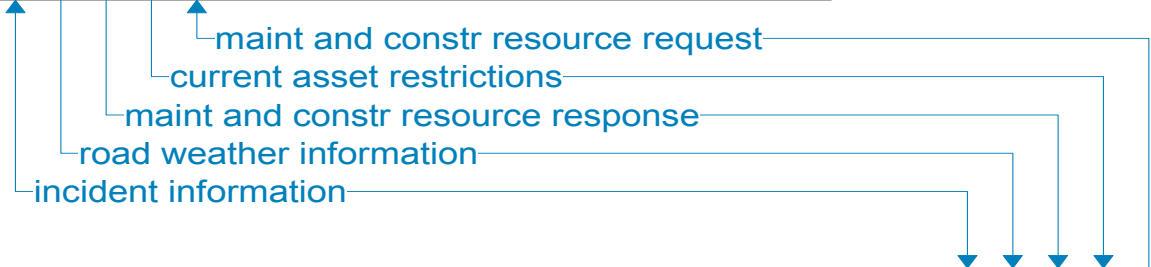
— Existing
- - - Planned



Existing
Planned

Pennsylvania Department of
Transportation (PennDOT)

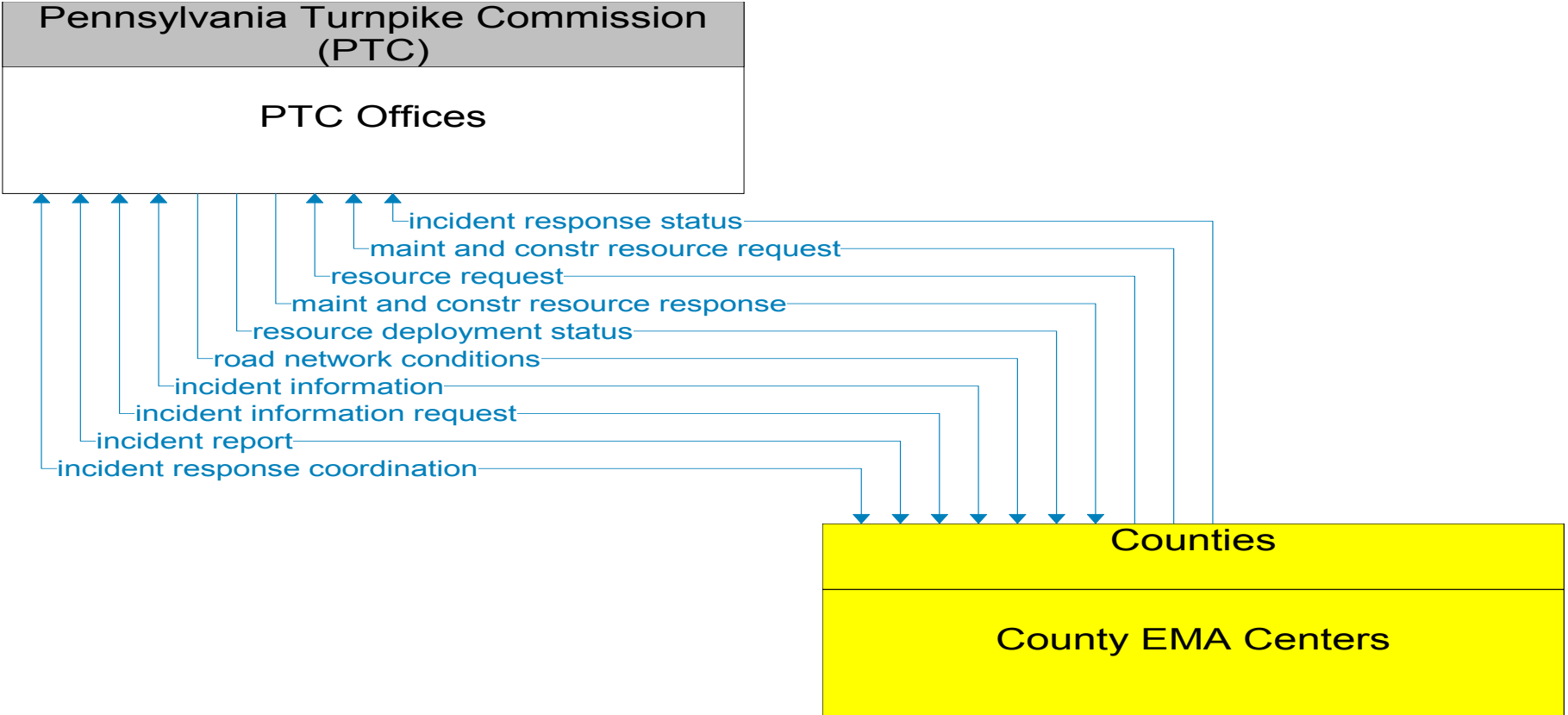
PennDOT D5 County Maintenance
Offices



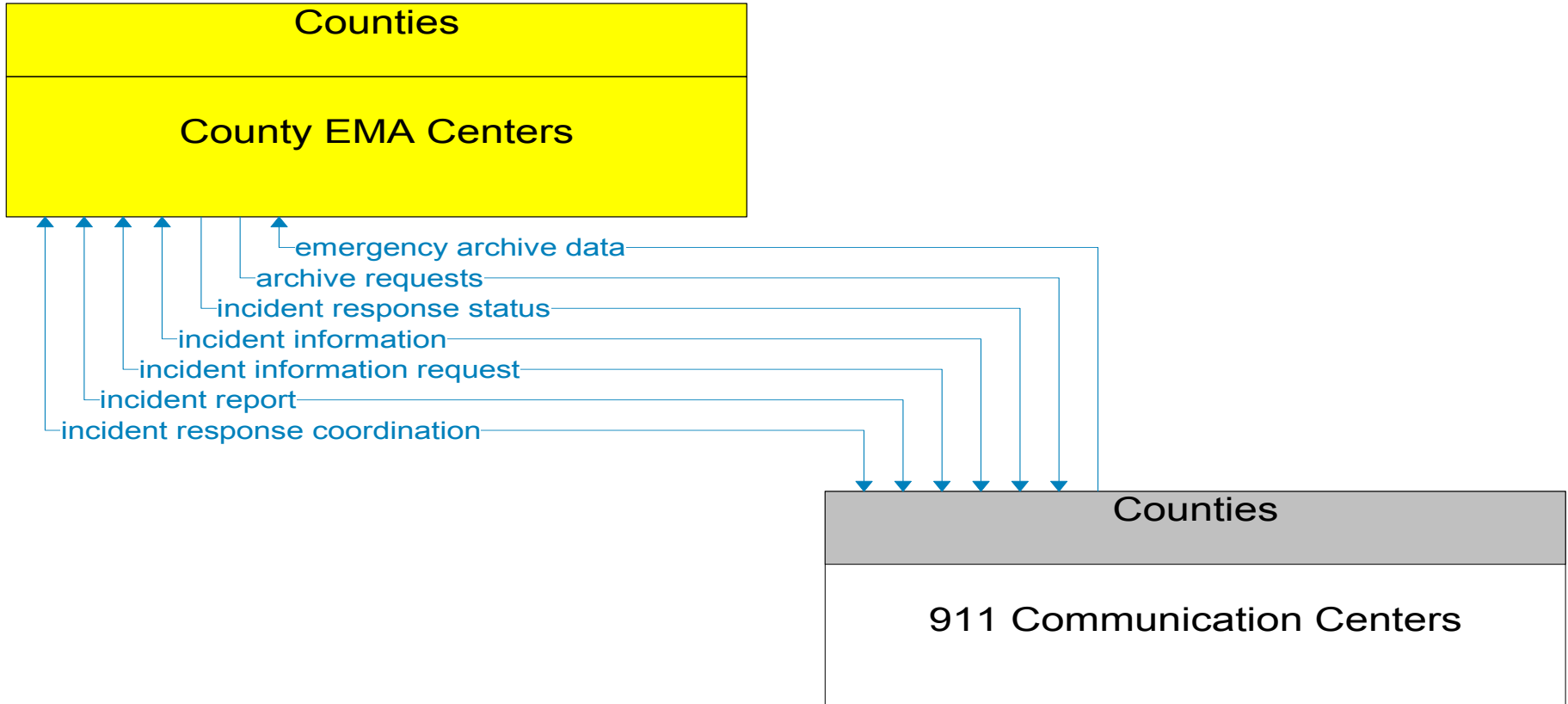
Counties

County EMA Centers

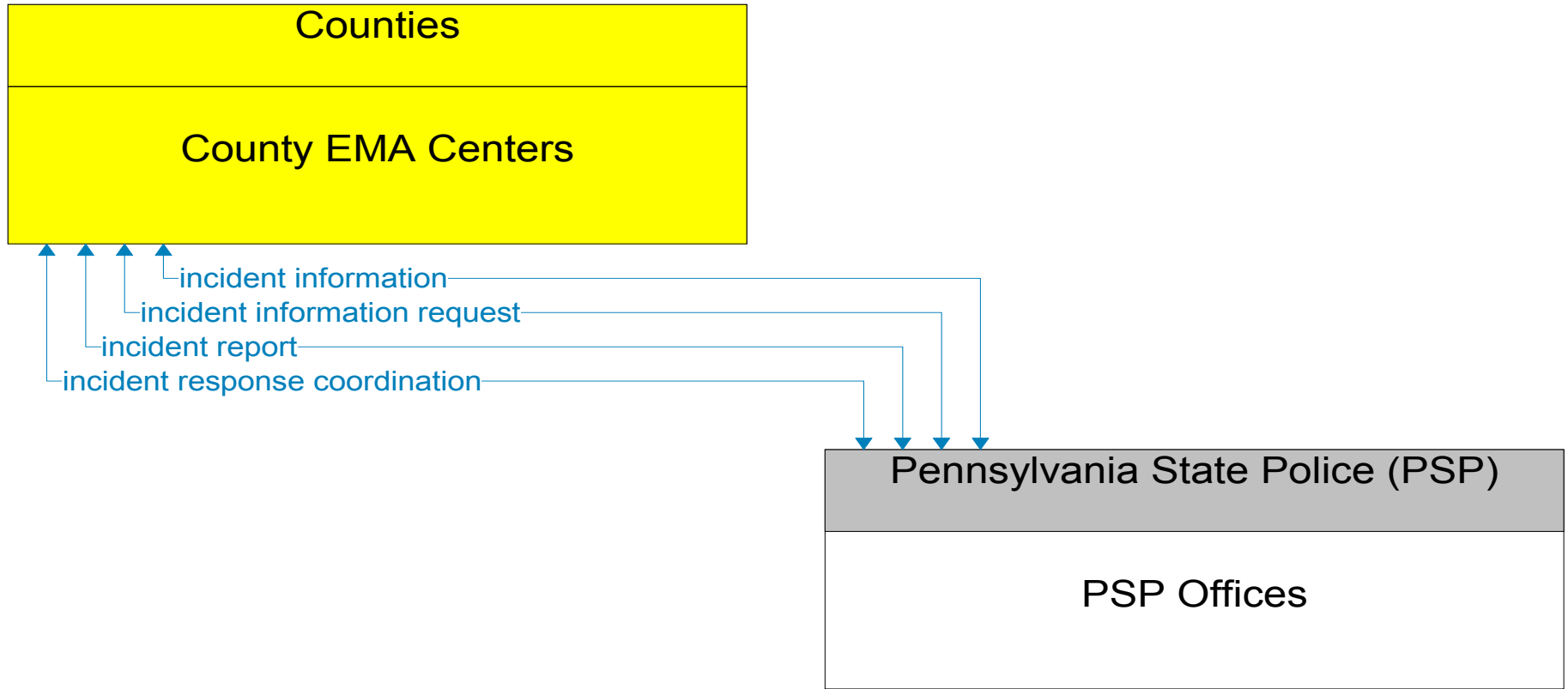
Existing
Planned



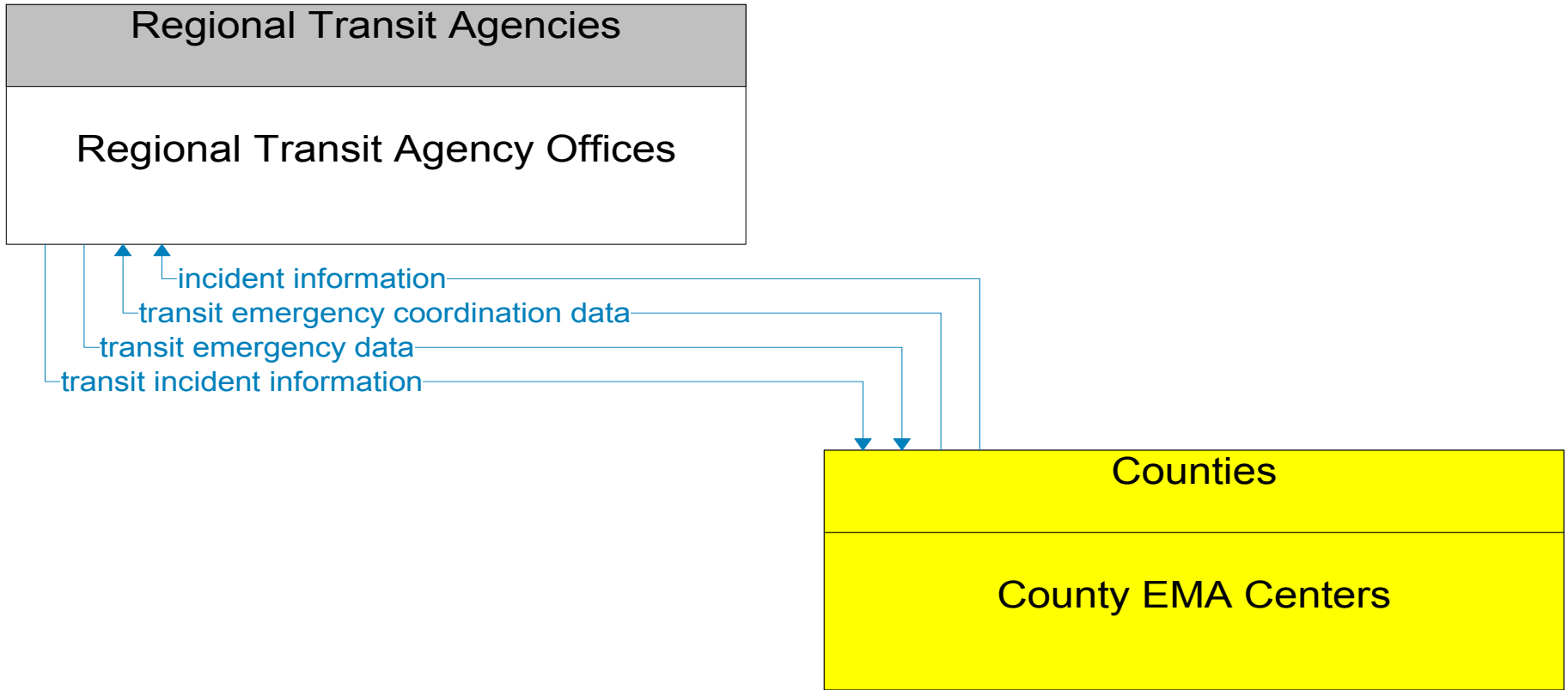
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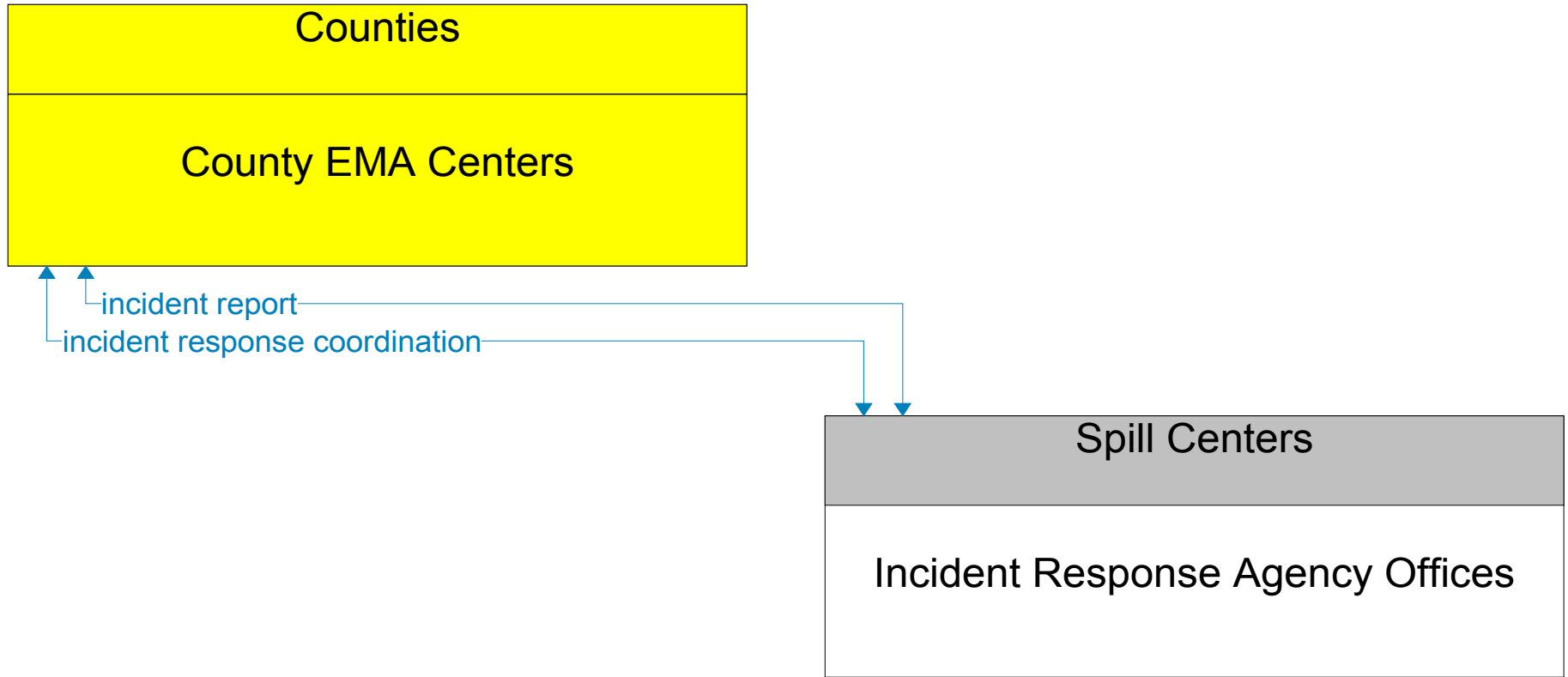
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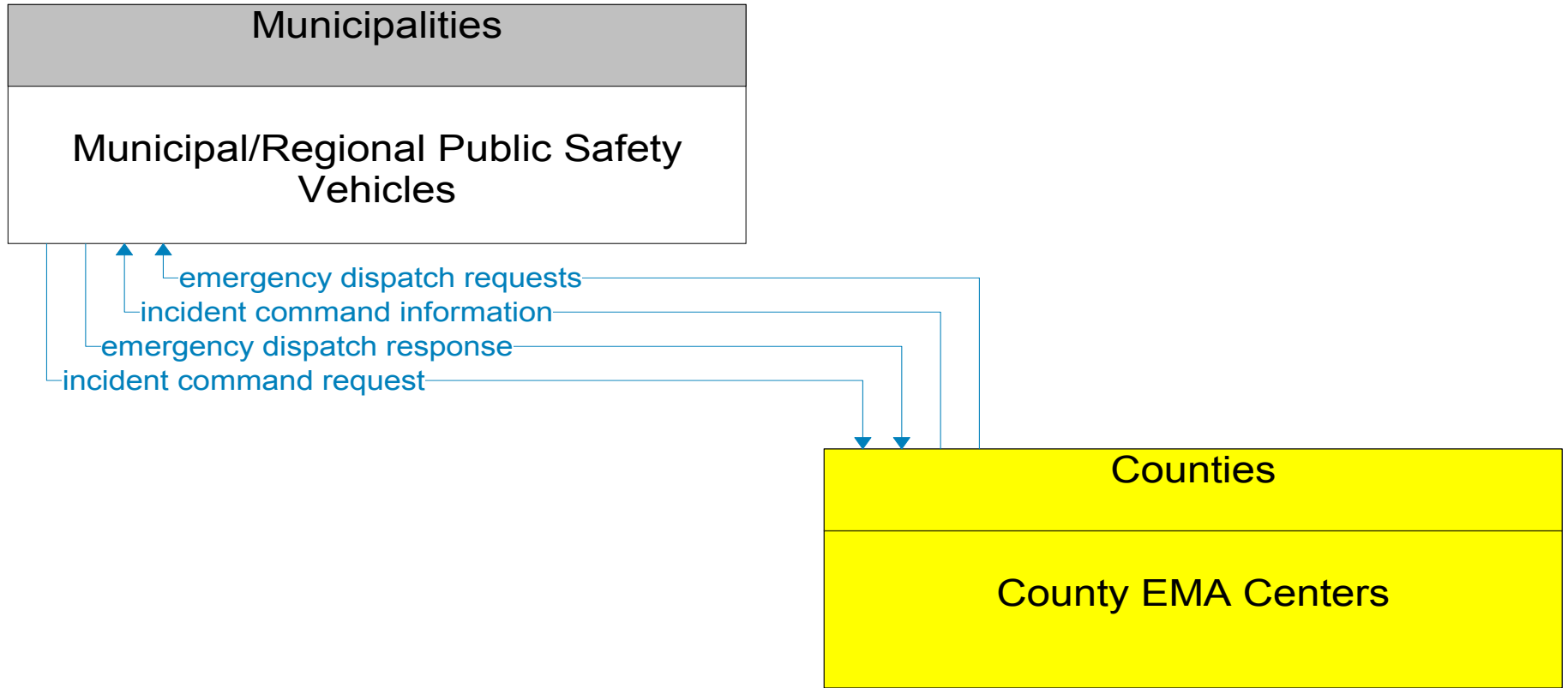
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- - - - - Planned



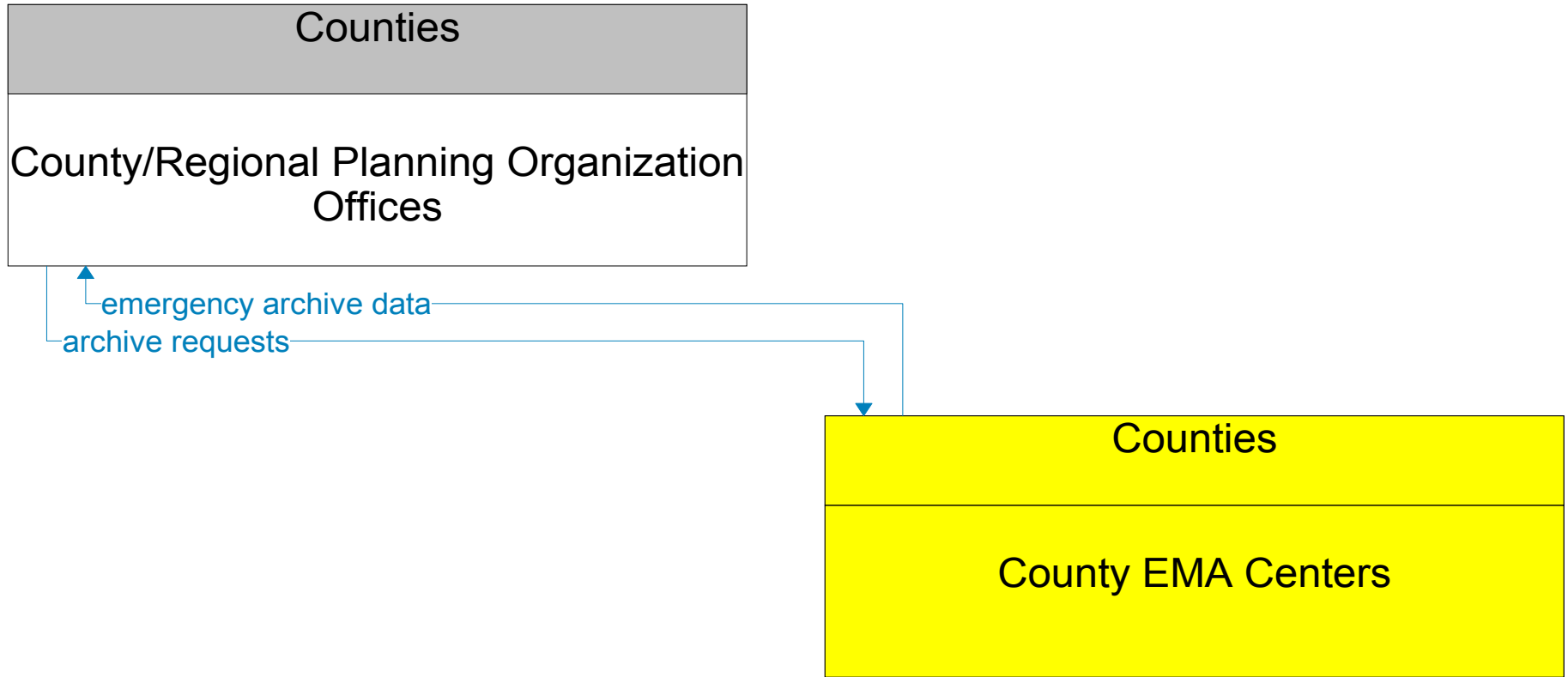
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- - - - - Planned



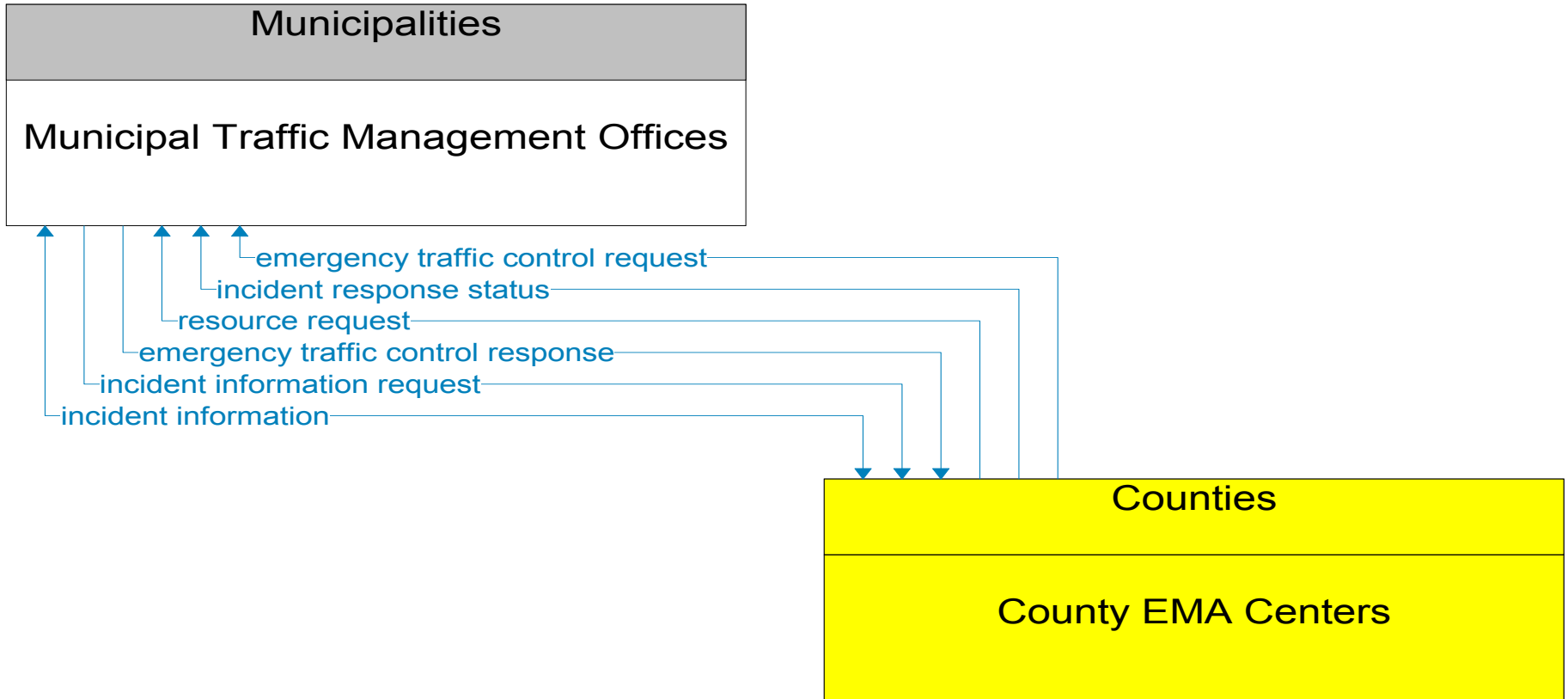
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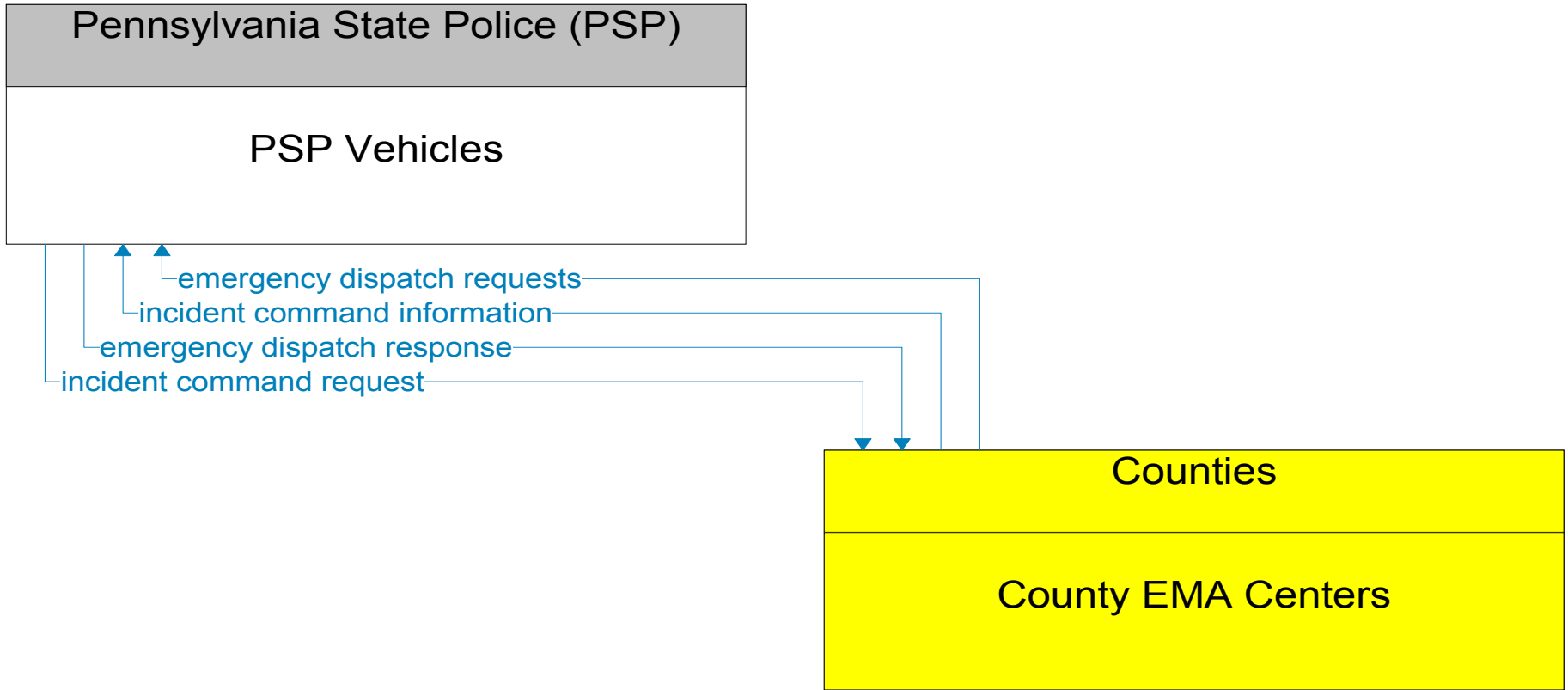
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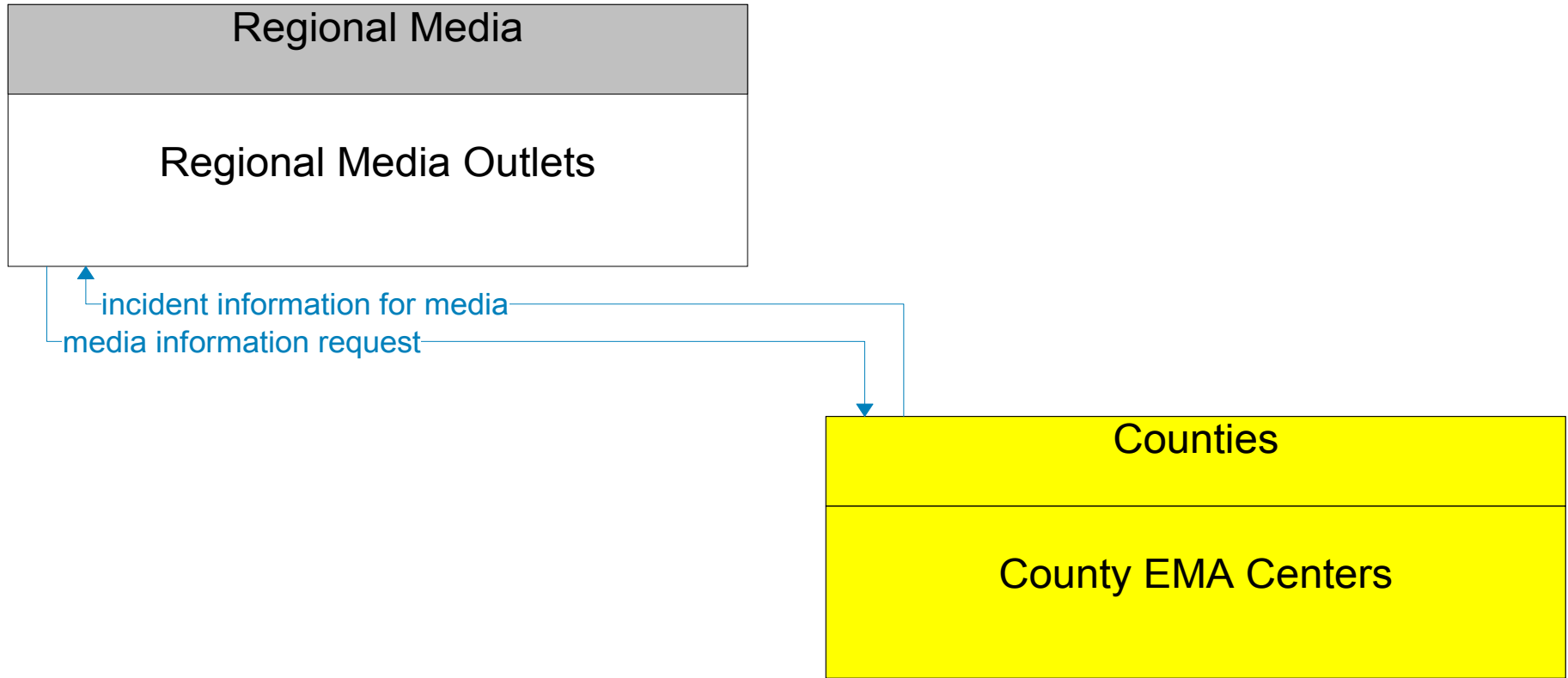


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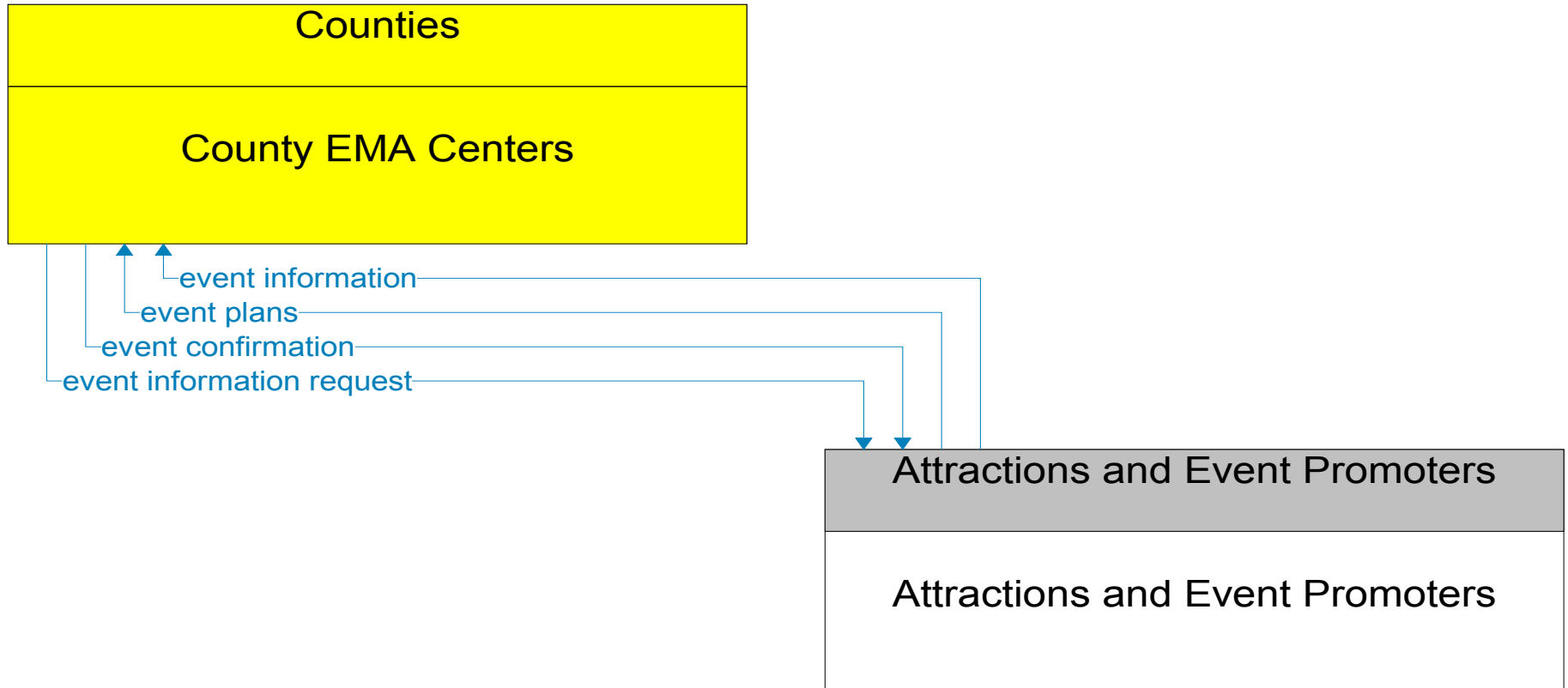


— Existing
- - - Planned

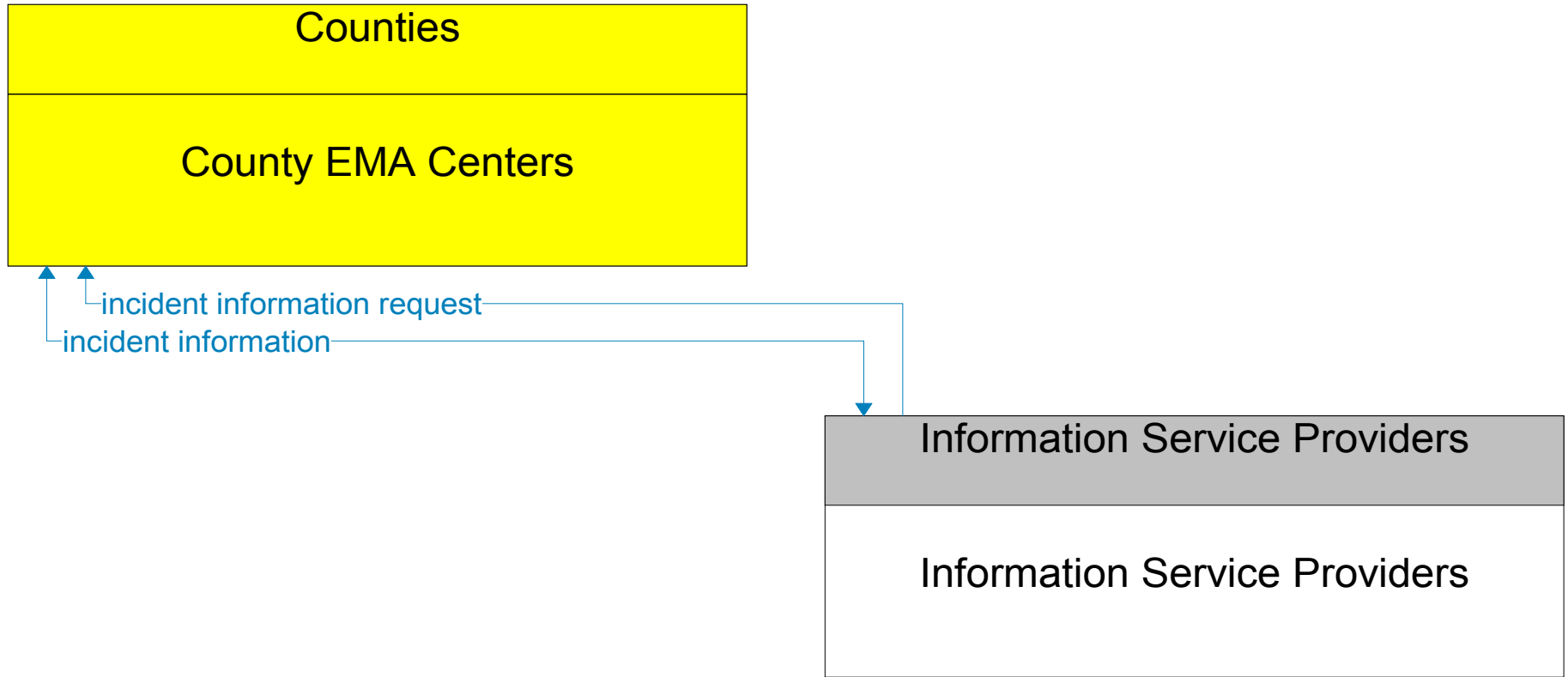




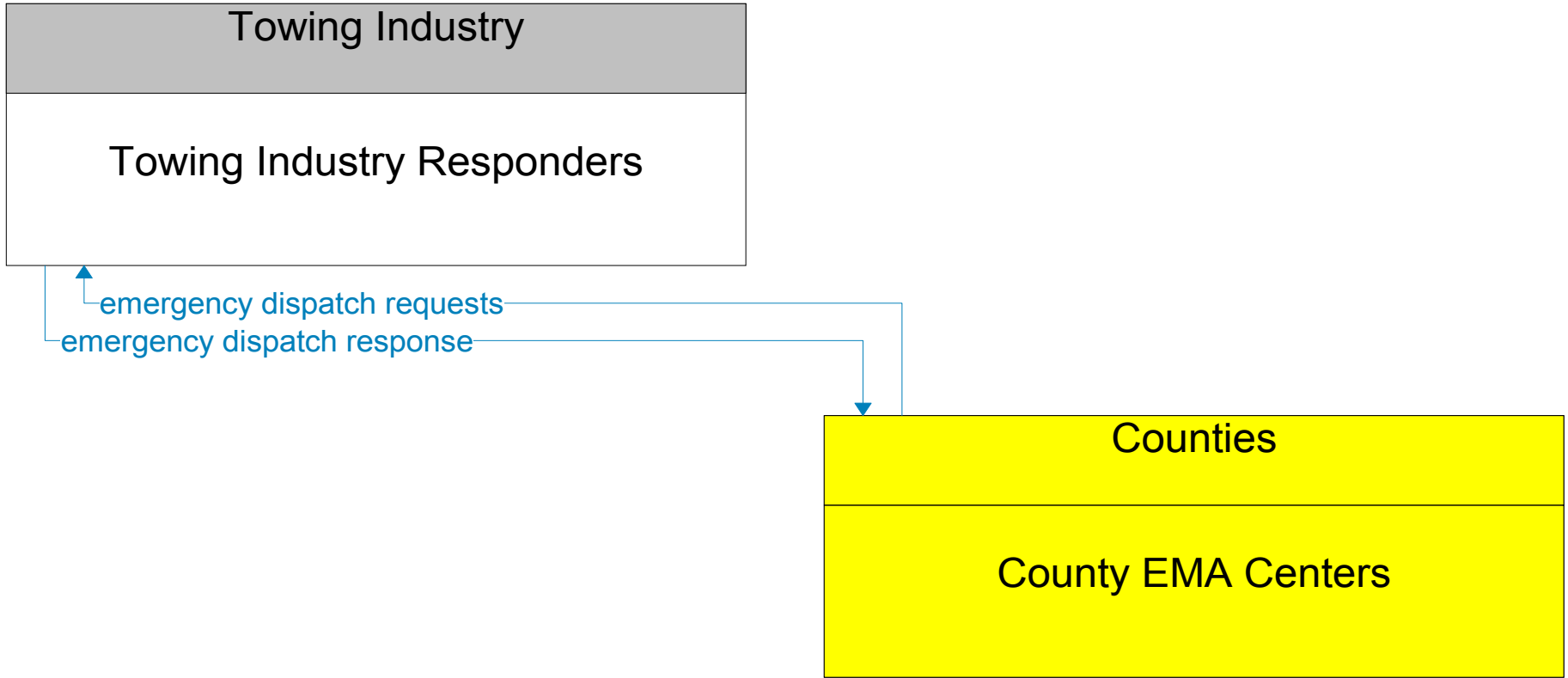
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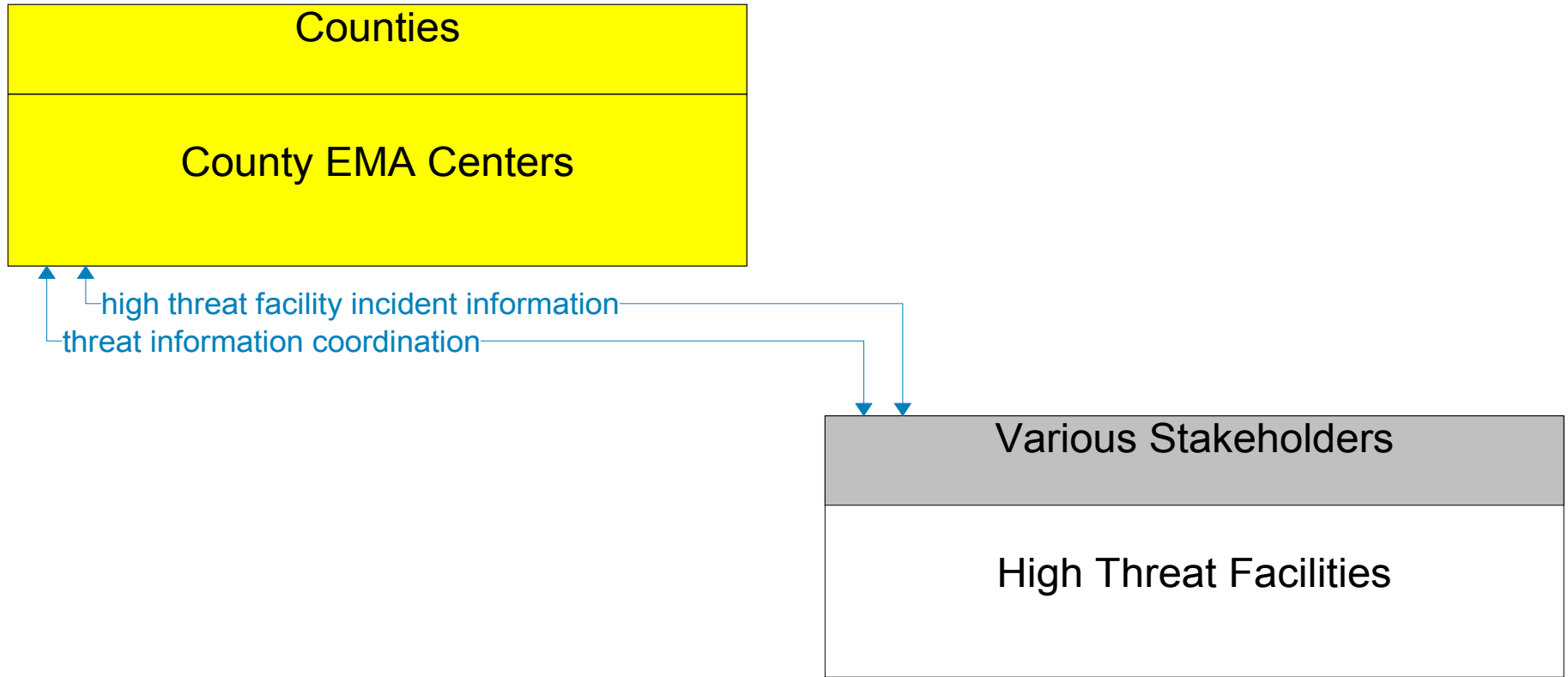
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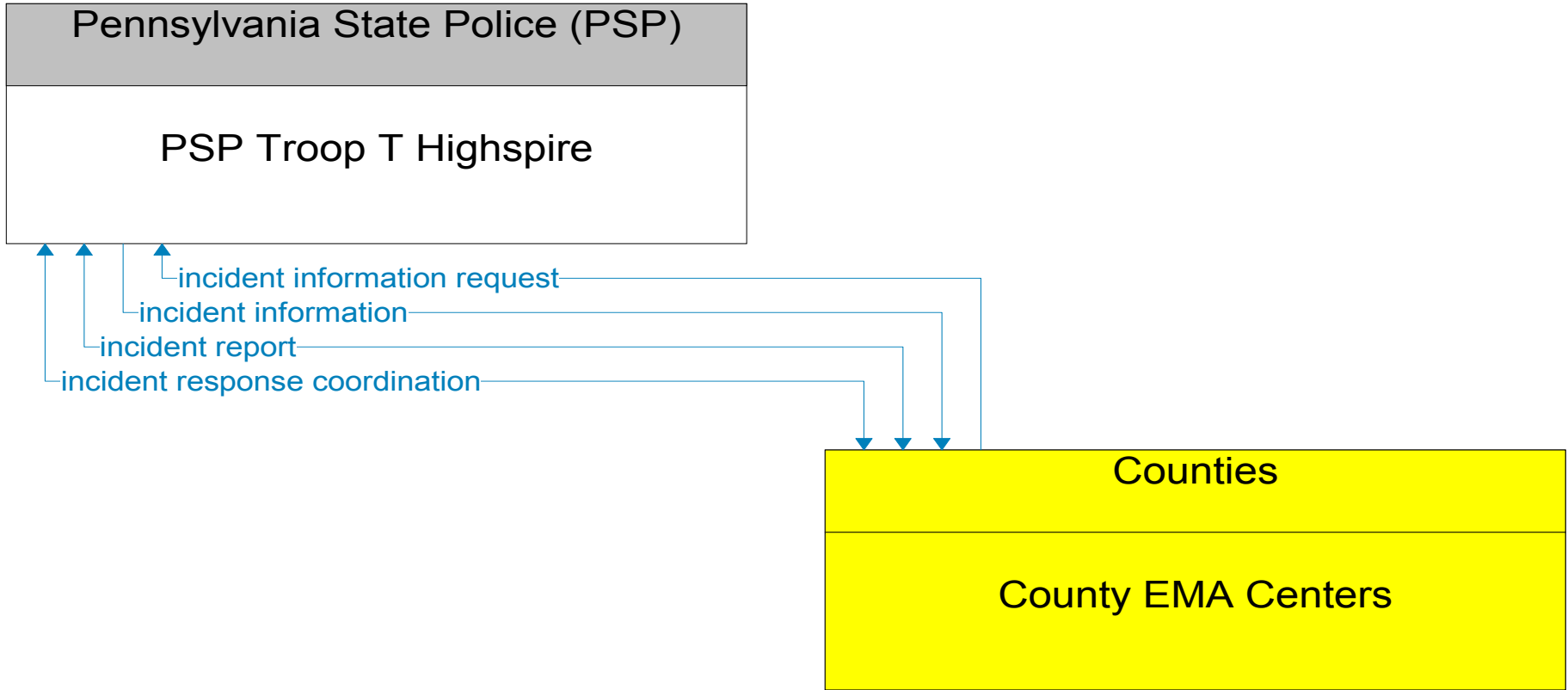


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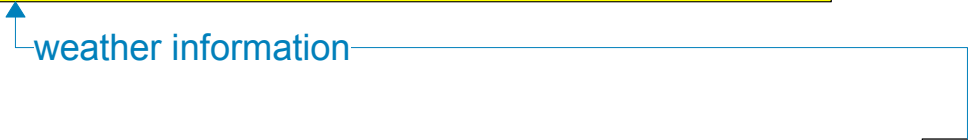
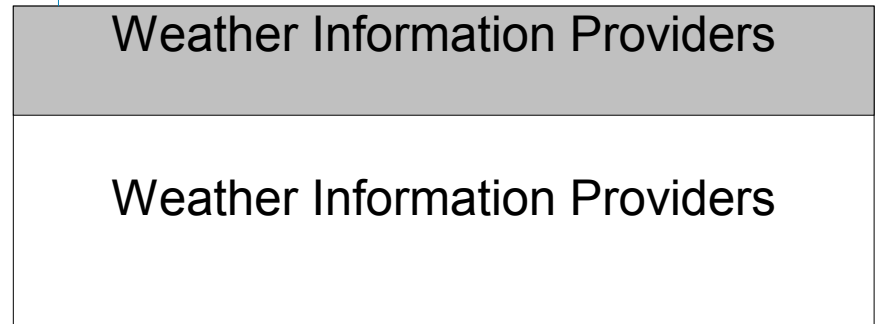
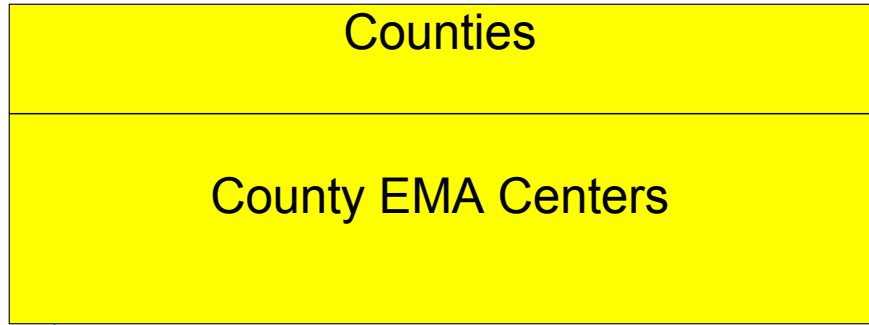


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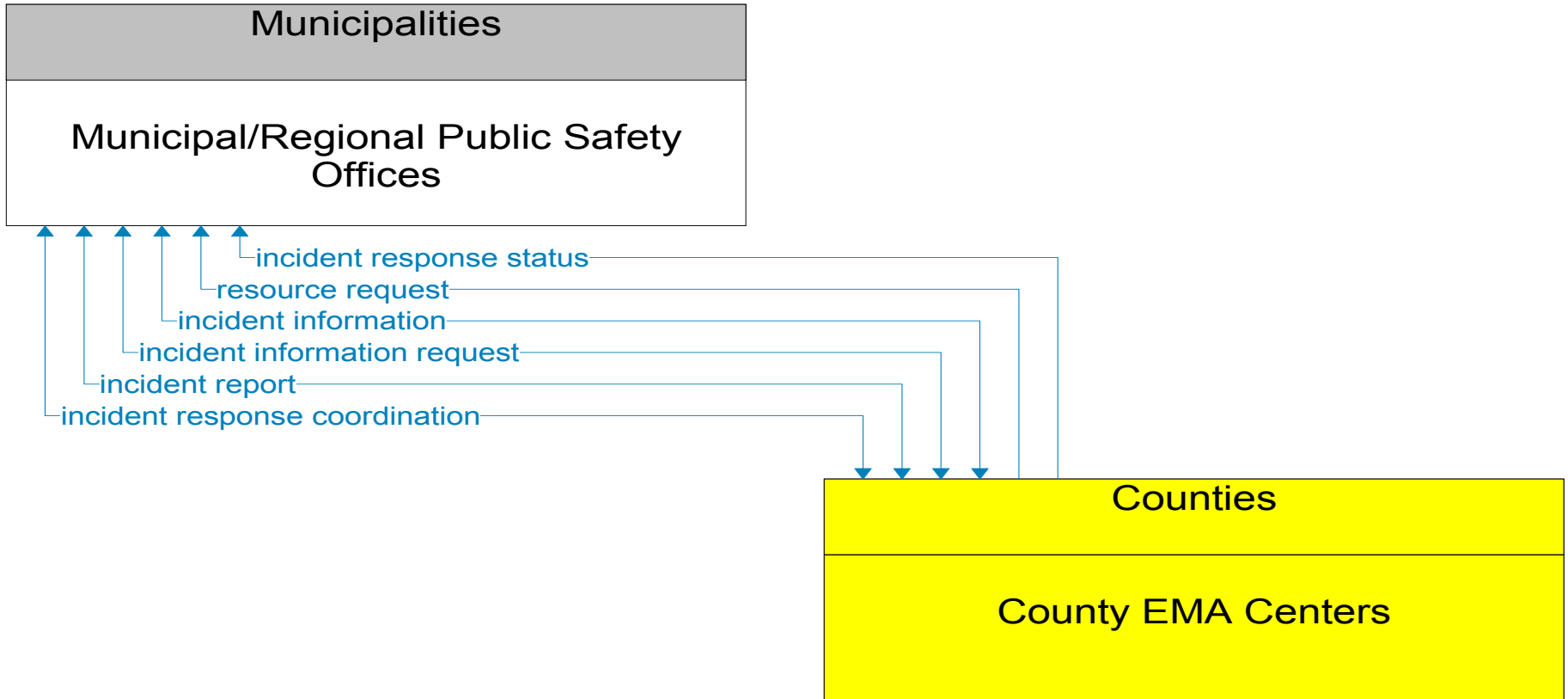




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- - - - - Planned

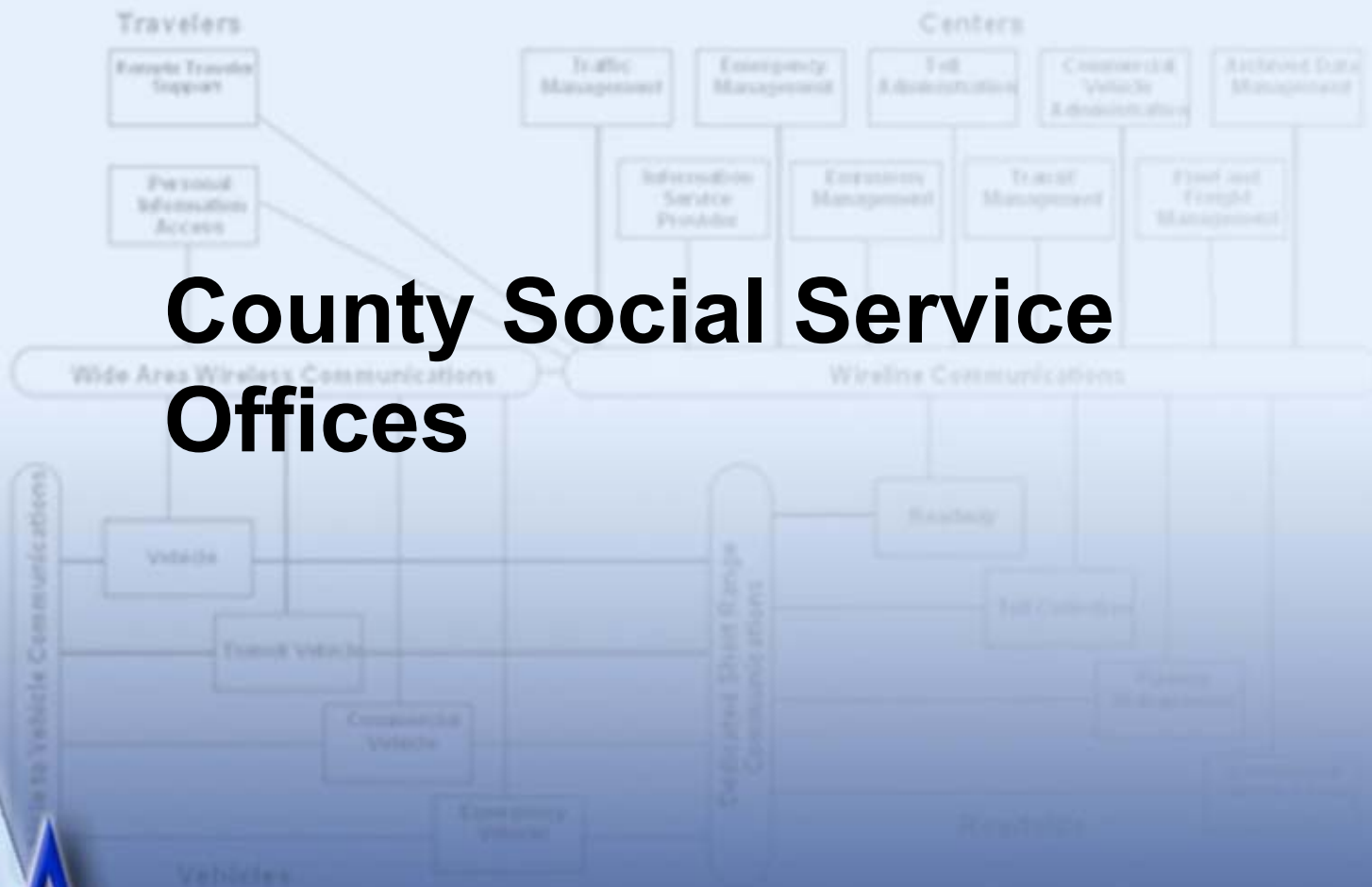


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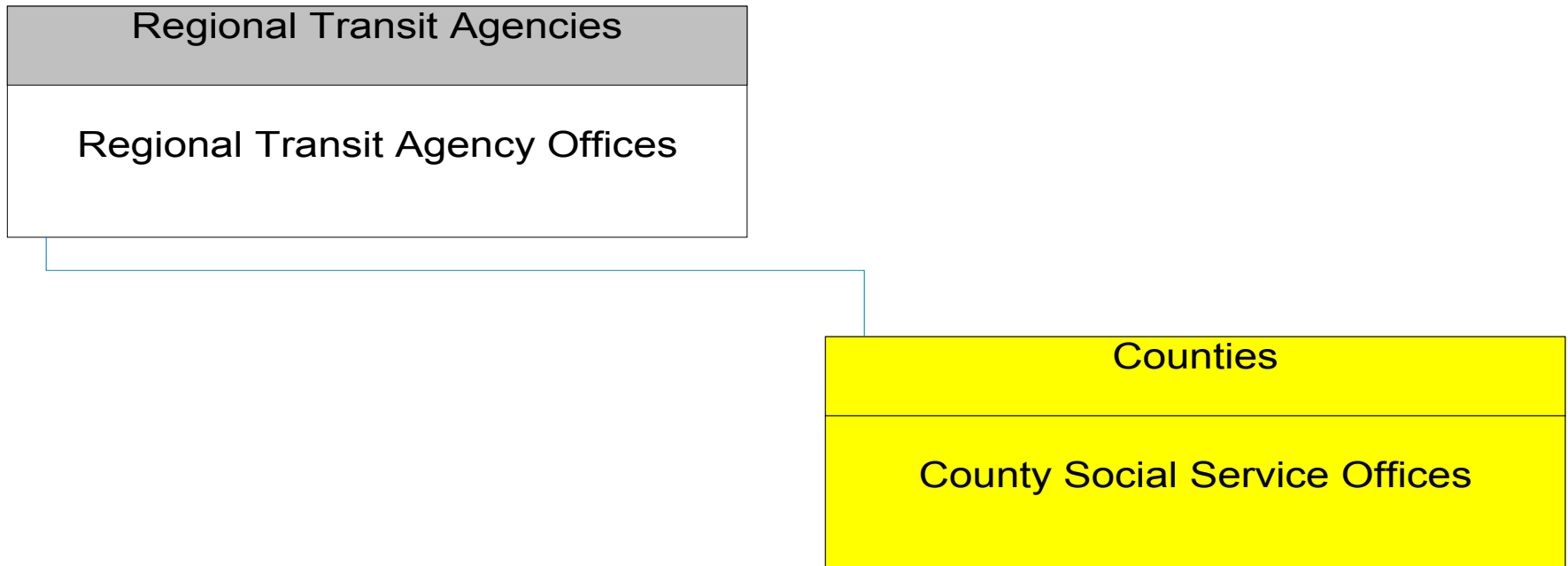


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- - - - - Planned

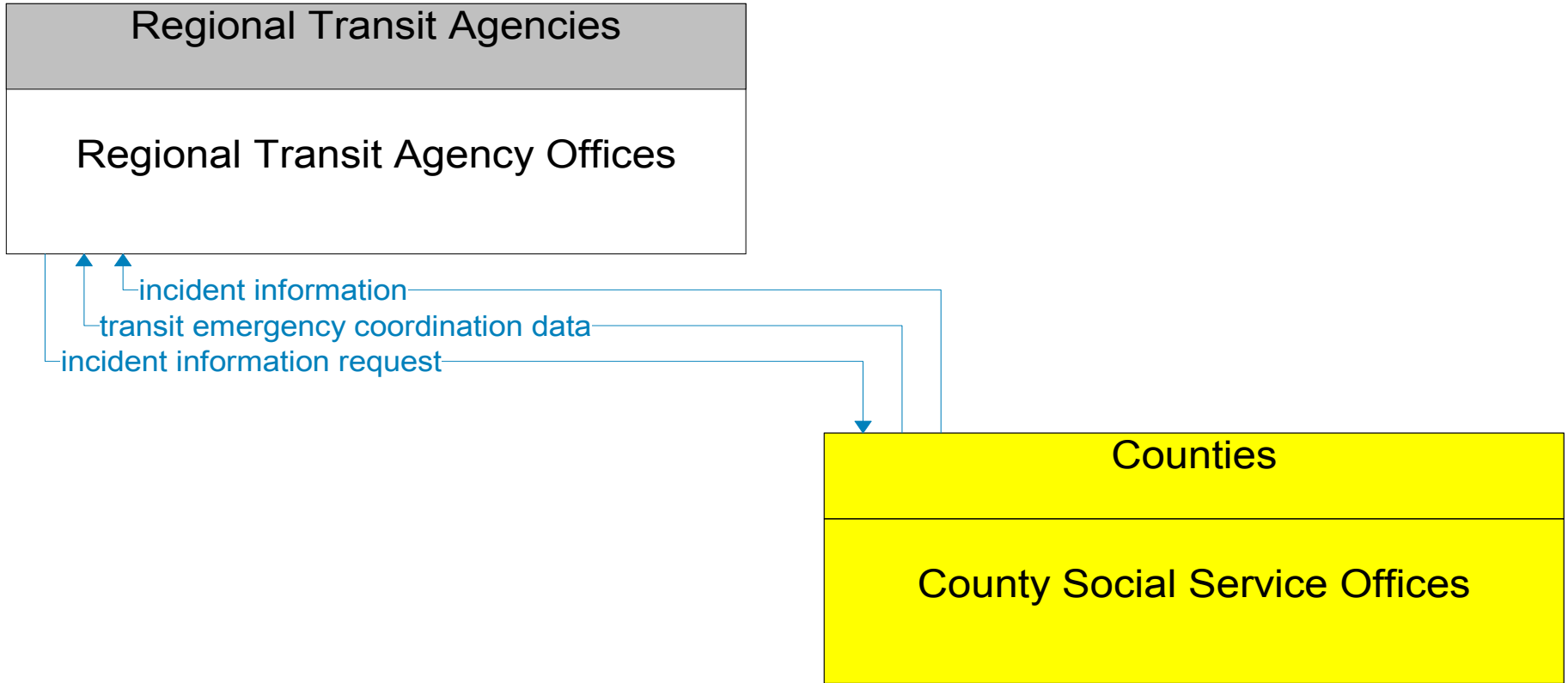
County Social Service Offices



County Social Service Offices Interconnect Diagram

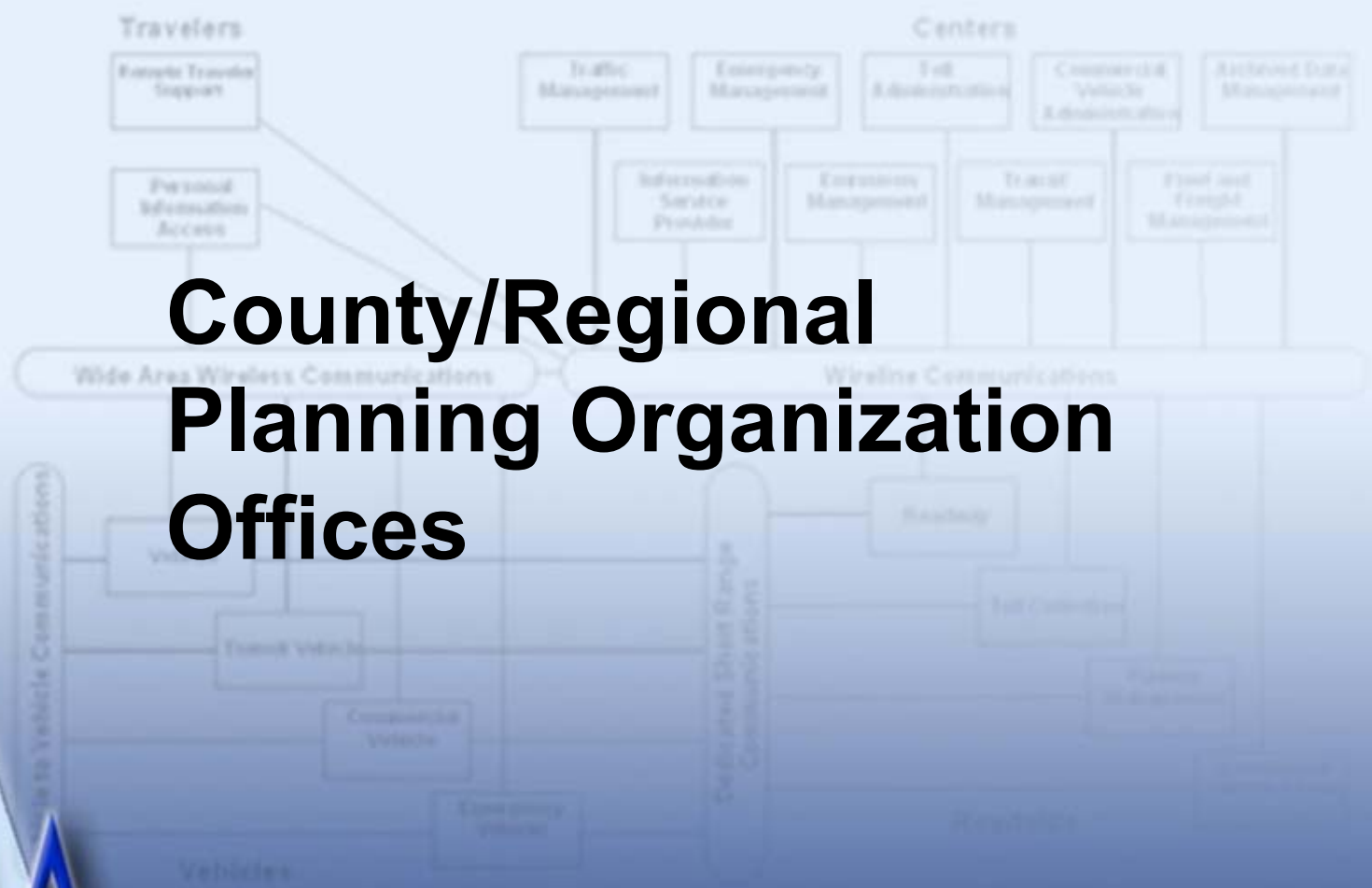


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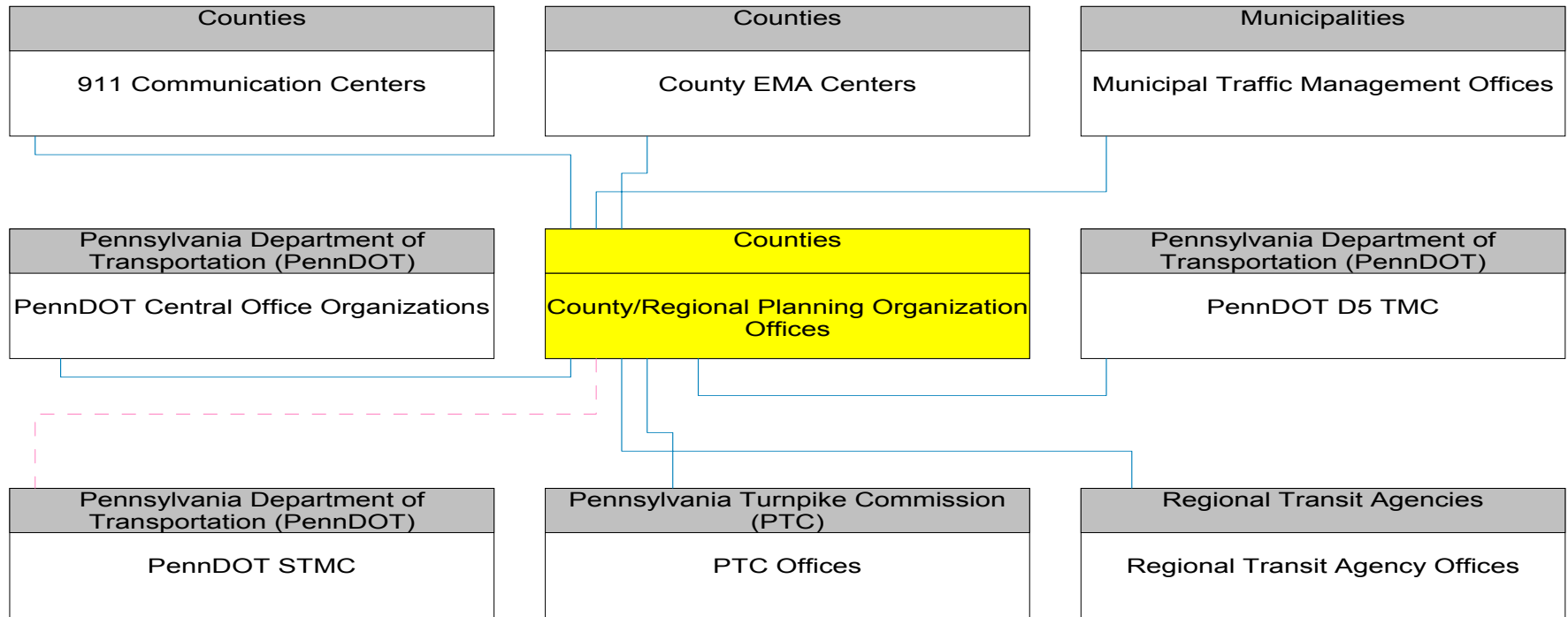


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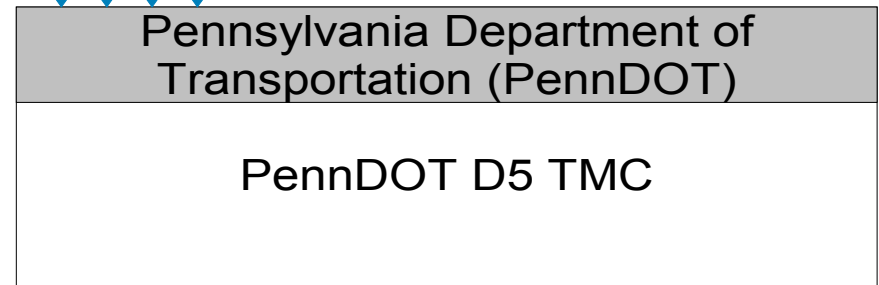
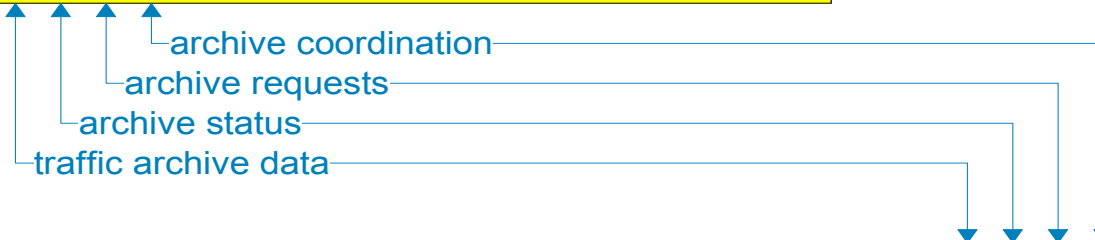
County/Regional Planning Organization Offices



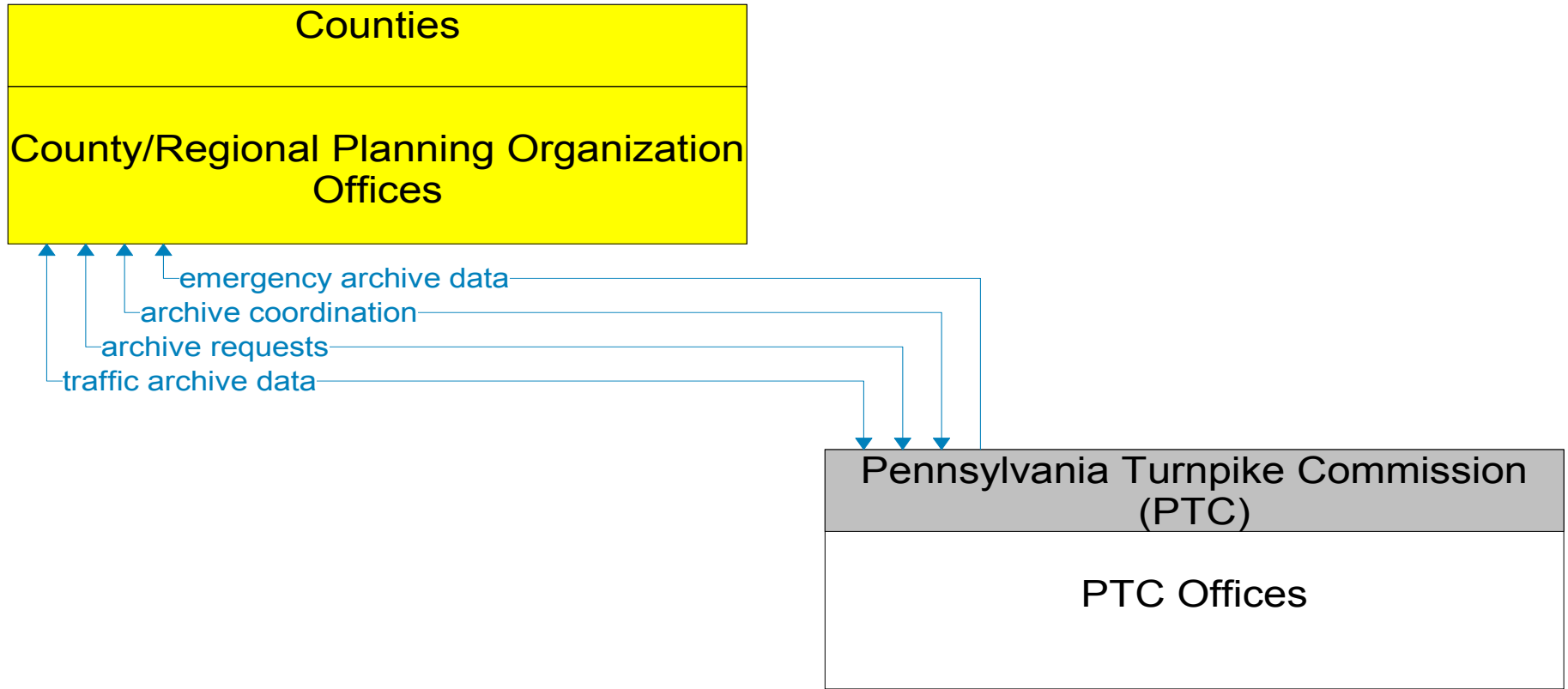
County/Regional Planning Organization Offices Interconnect Diagram



— Existing
- - - Planned



———— Existing
----- Planned



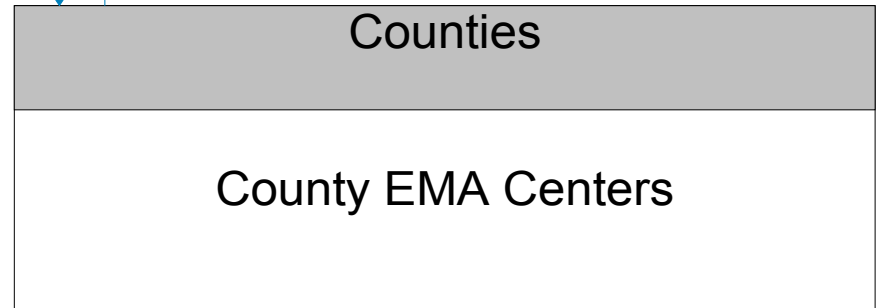
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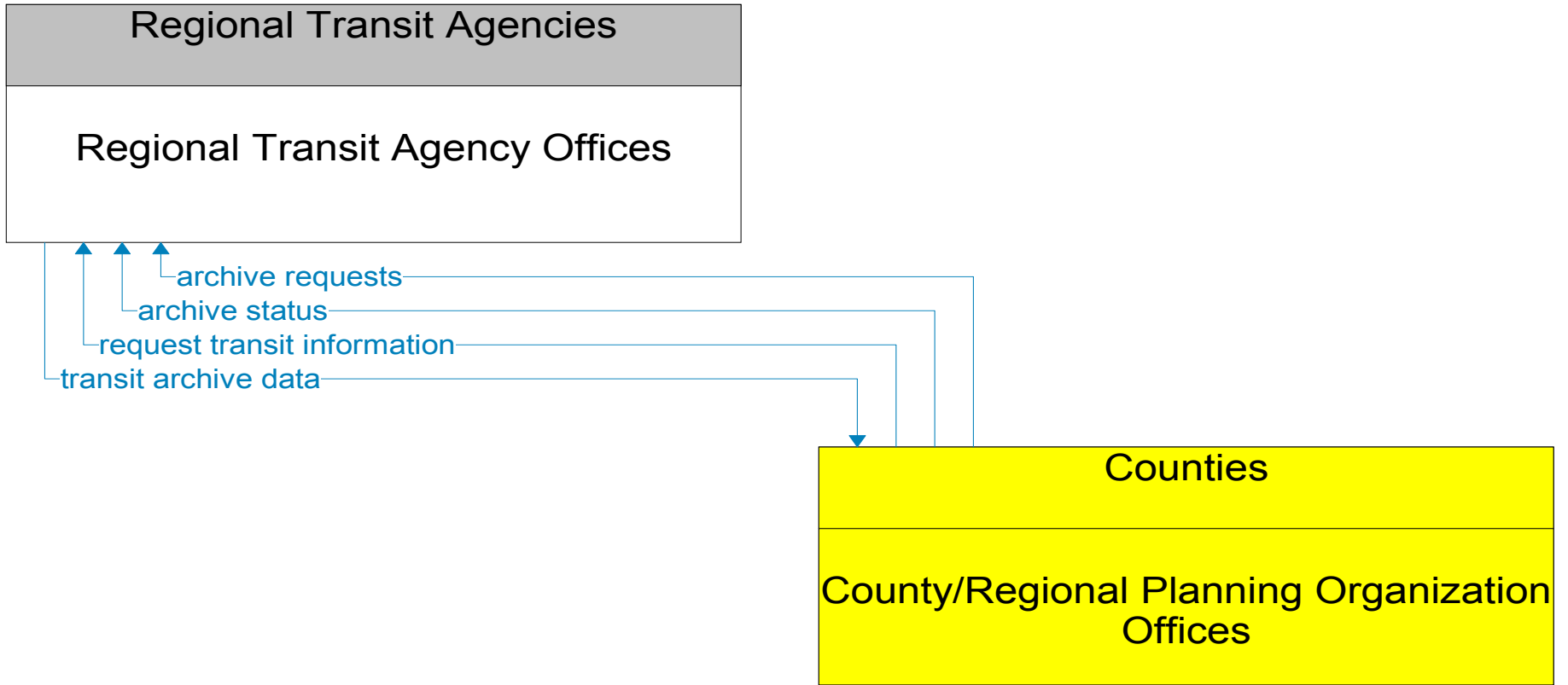


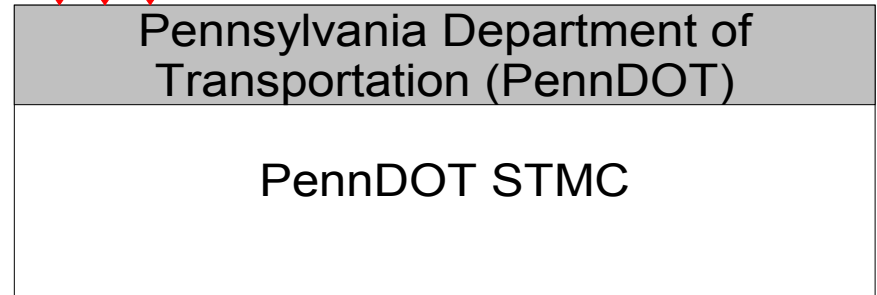
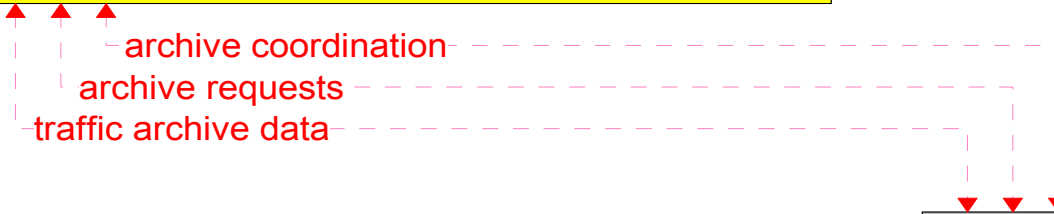
emergency archive data
archive requests



———— Existing
----- Planned

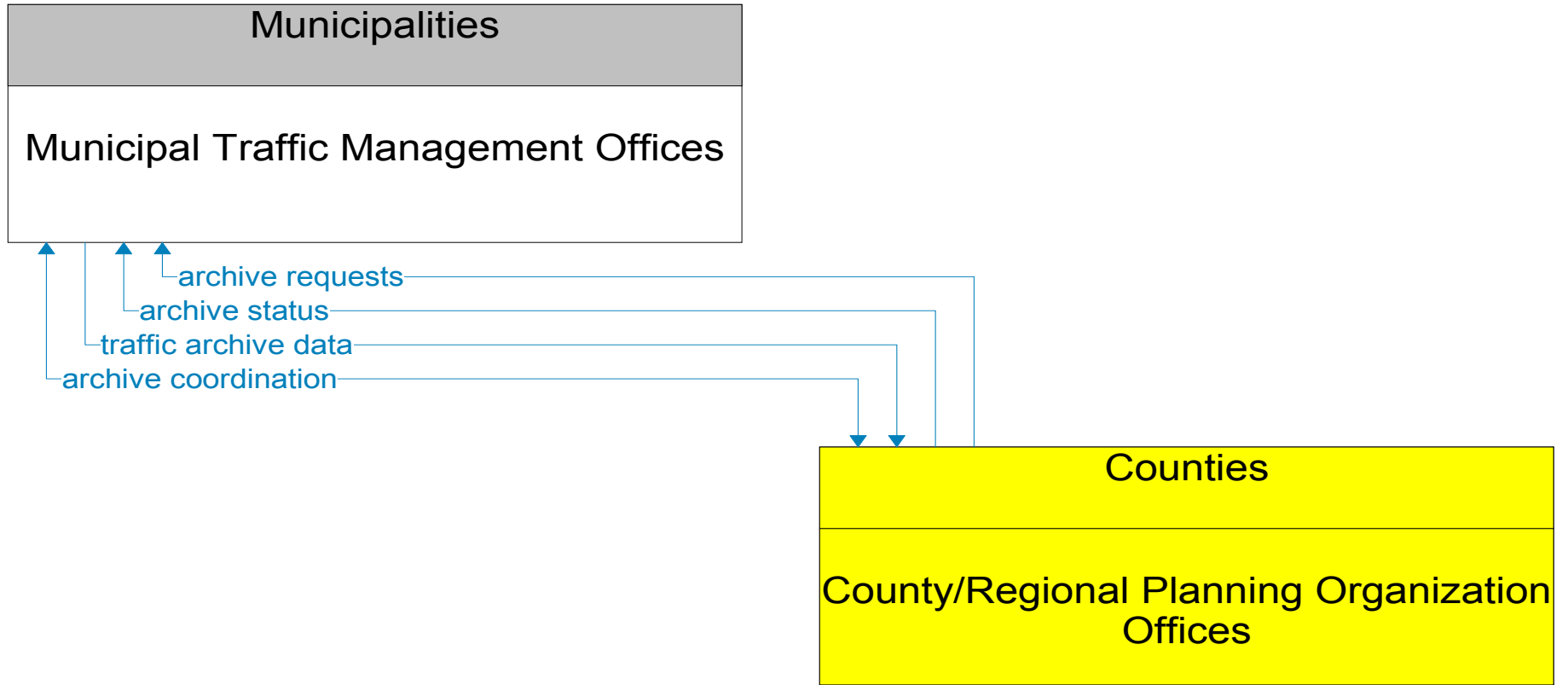




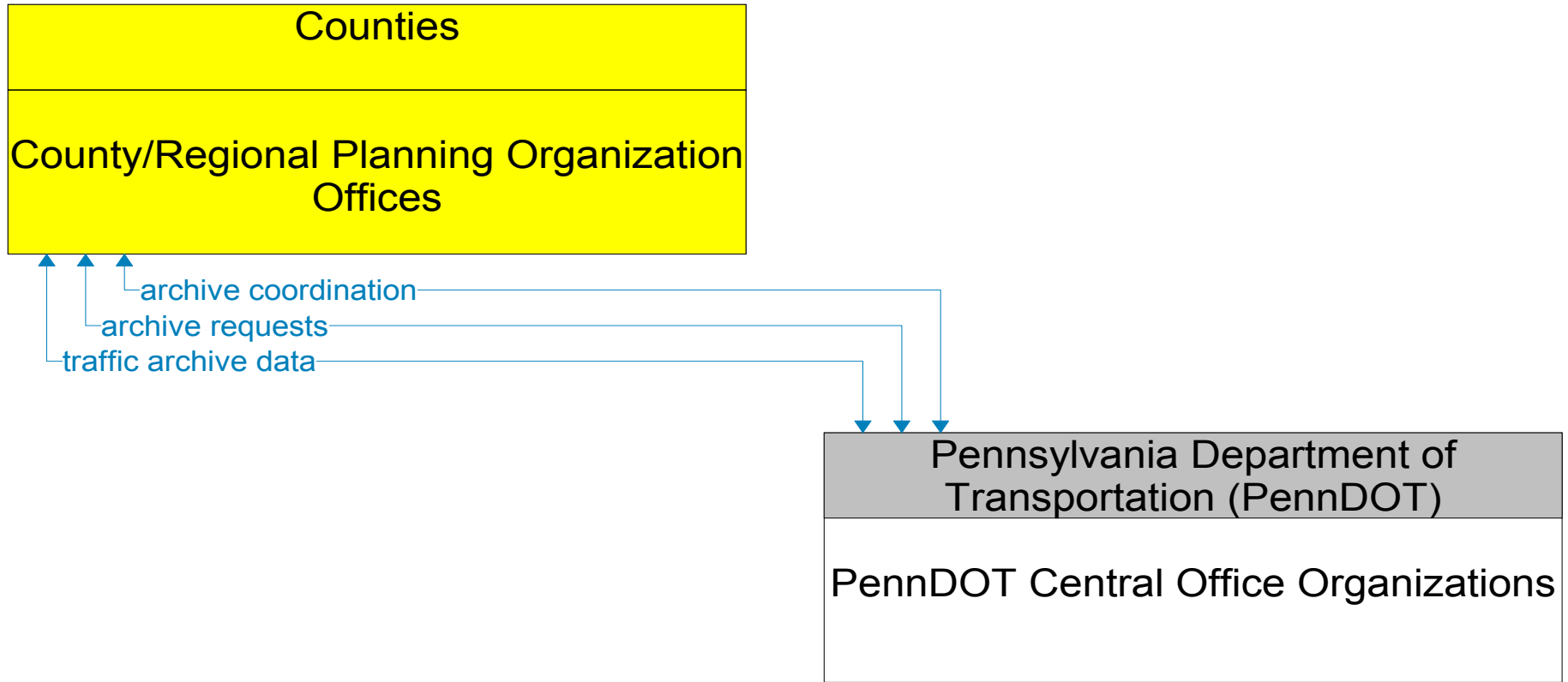


———— Existing

- - - - - Planned

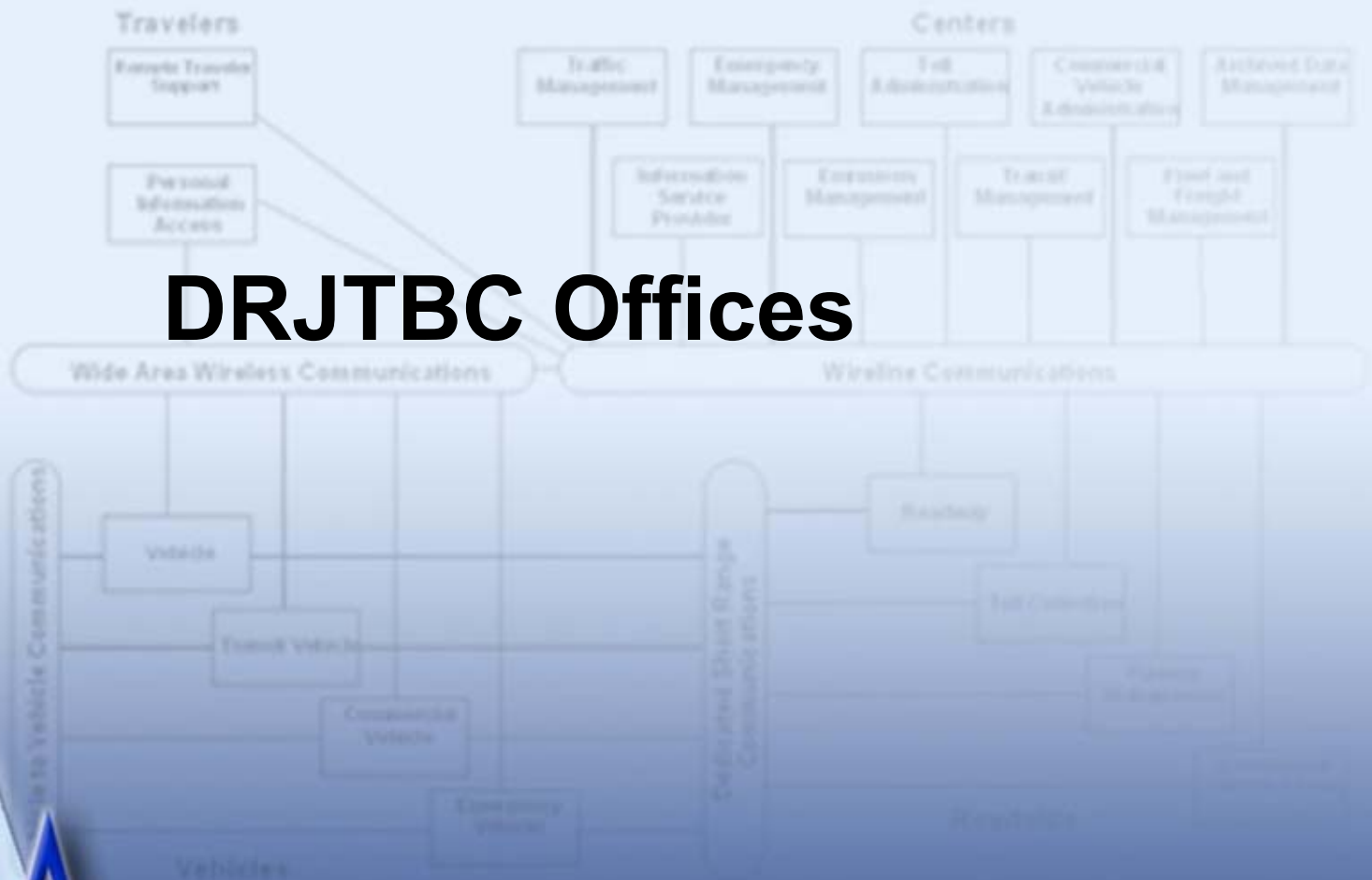


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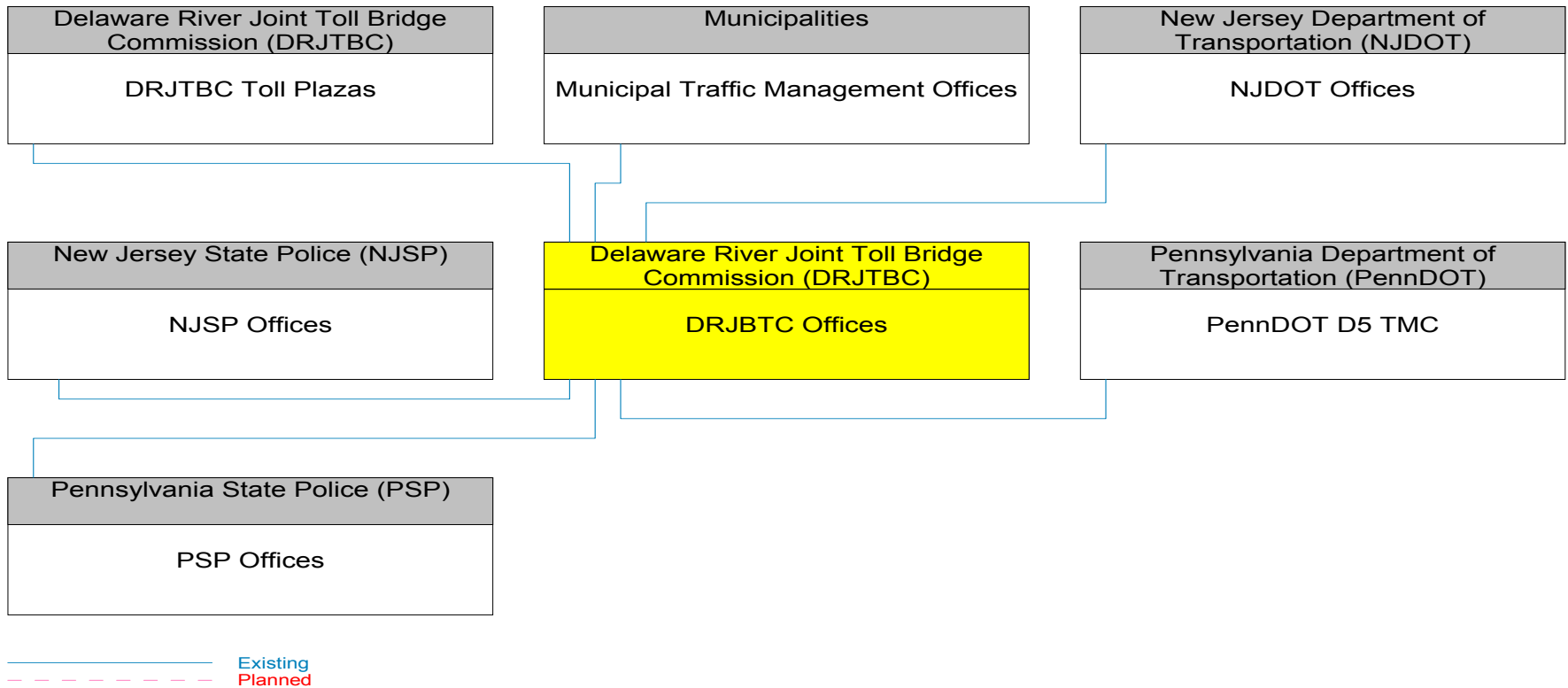


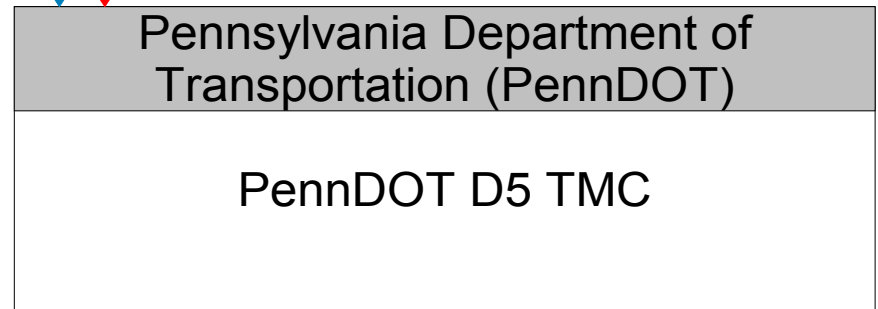
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----- Planned

DRJTBC Offices



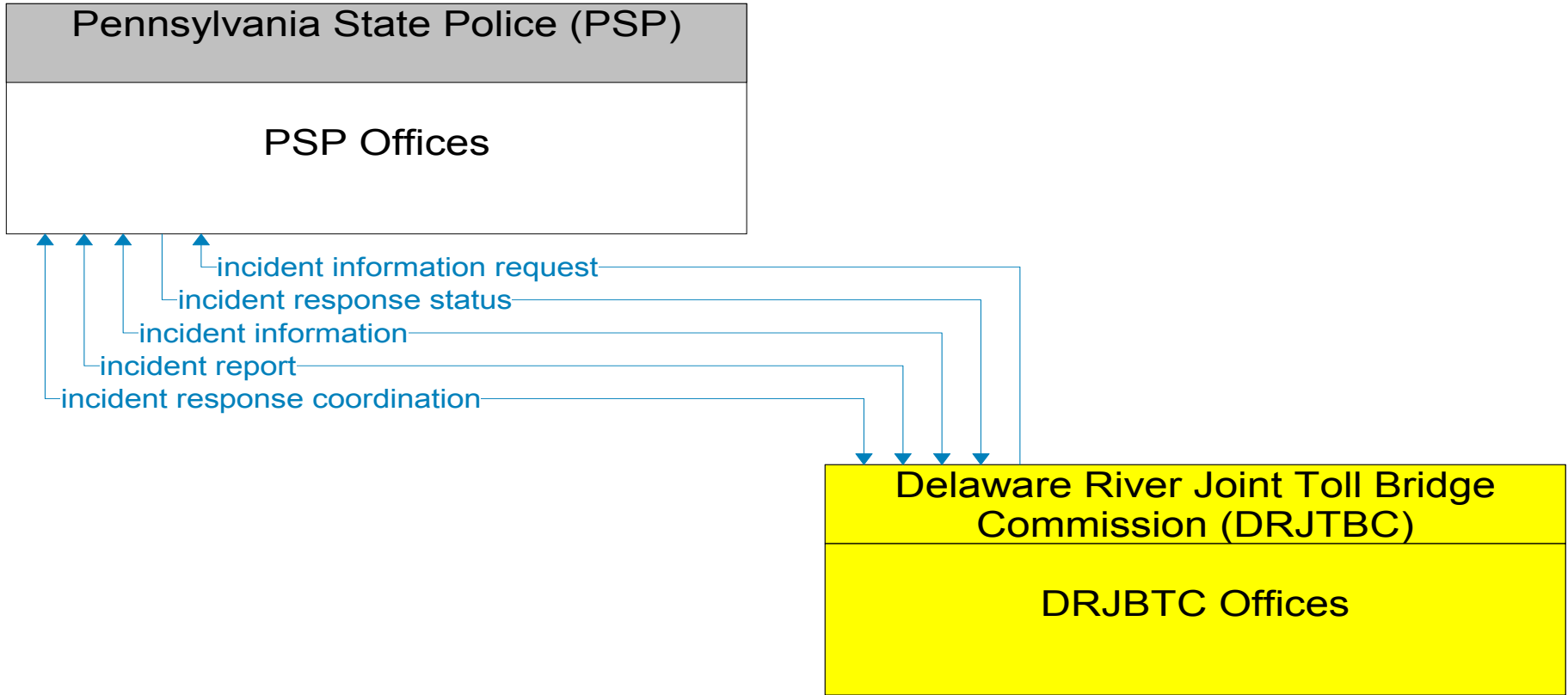
DRJBTC Offices Interconnect Diagram



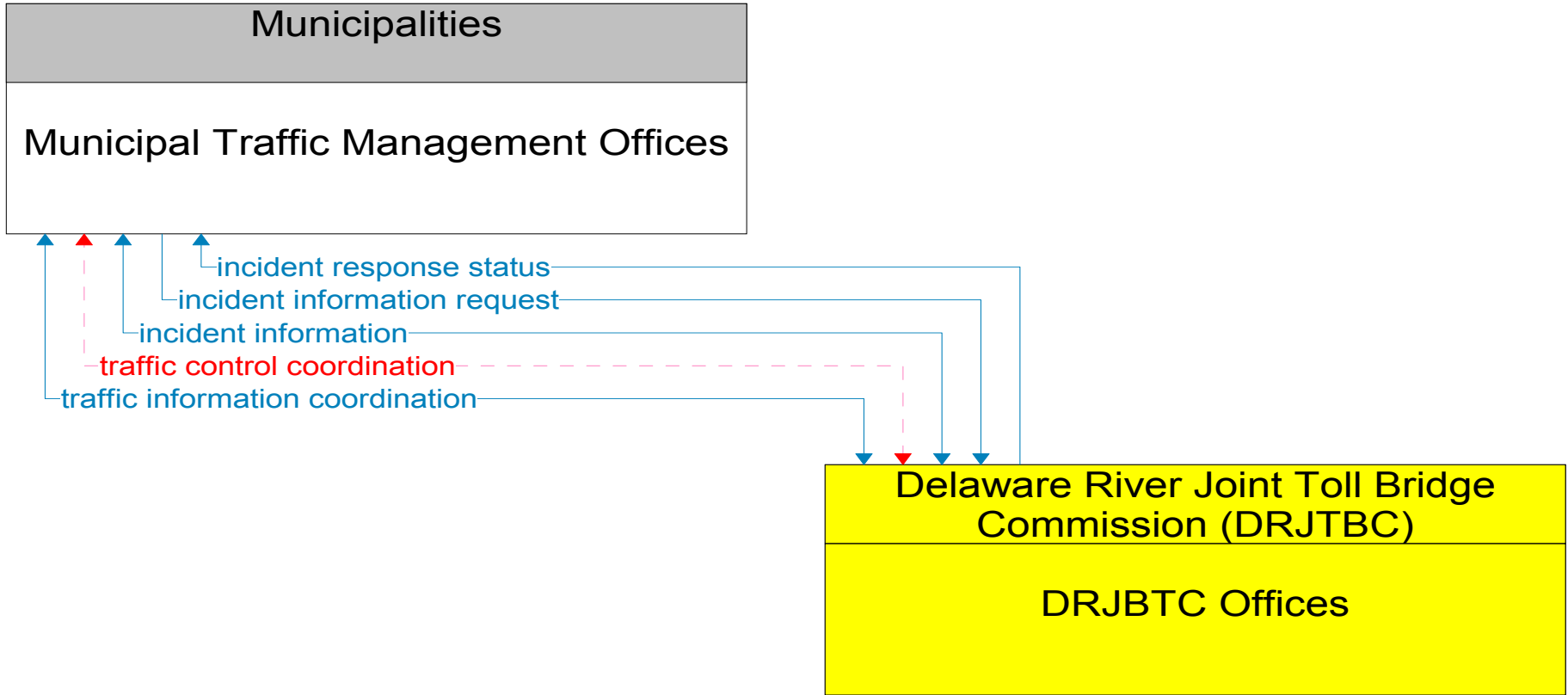


traffic control coordination
traffic information coordination

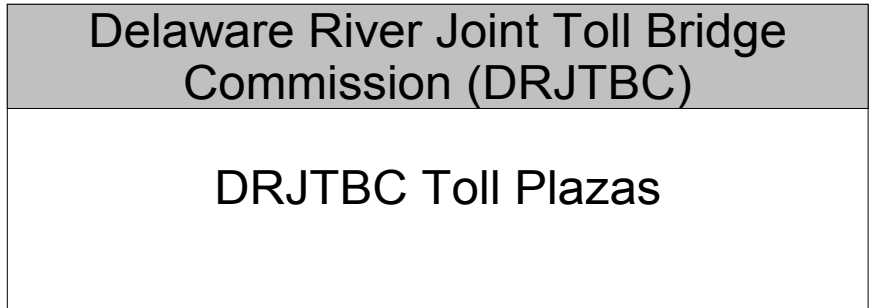
Existing
Planned



———— Existing
- - - - - Planned

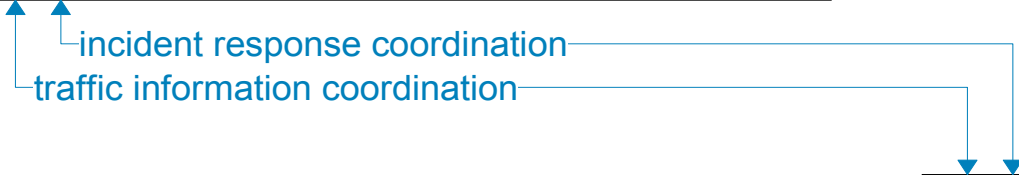
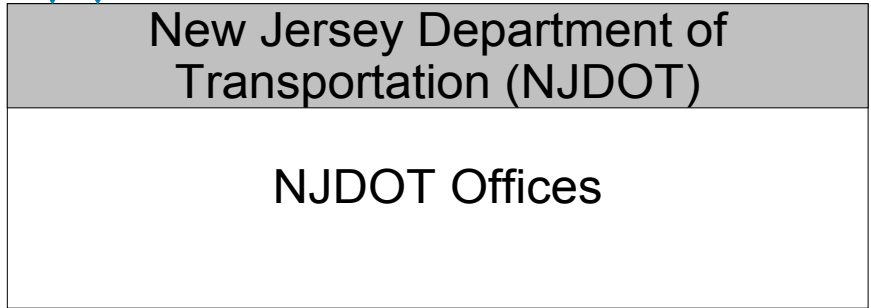
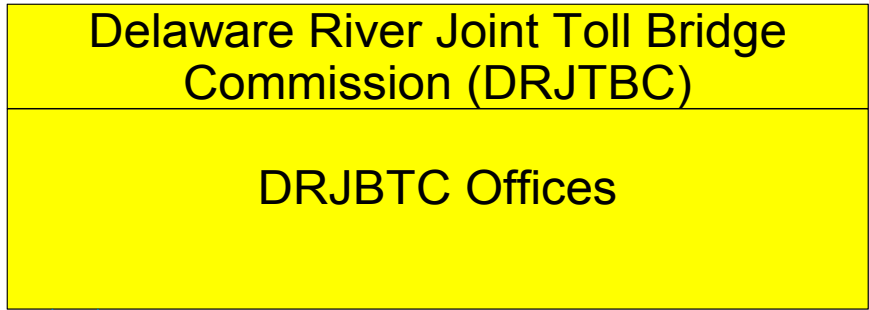


———— Existing
- - - - - Planned

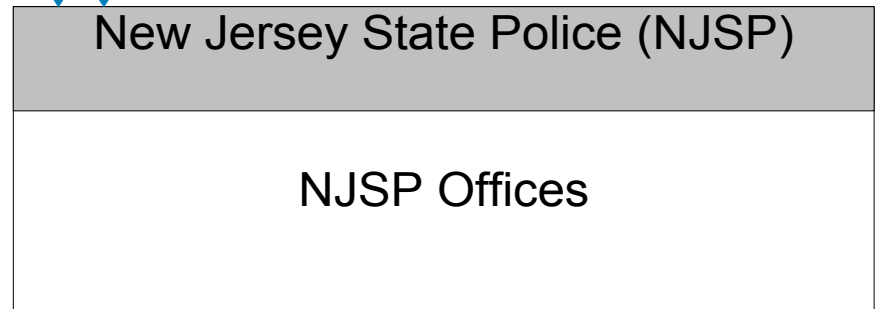


toll instructions
toll transactions

———— Existing
----- Planned

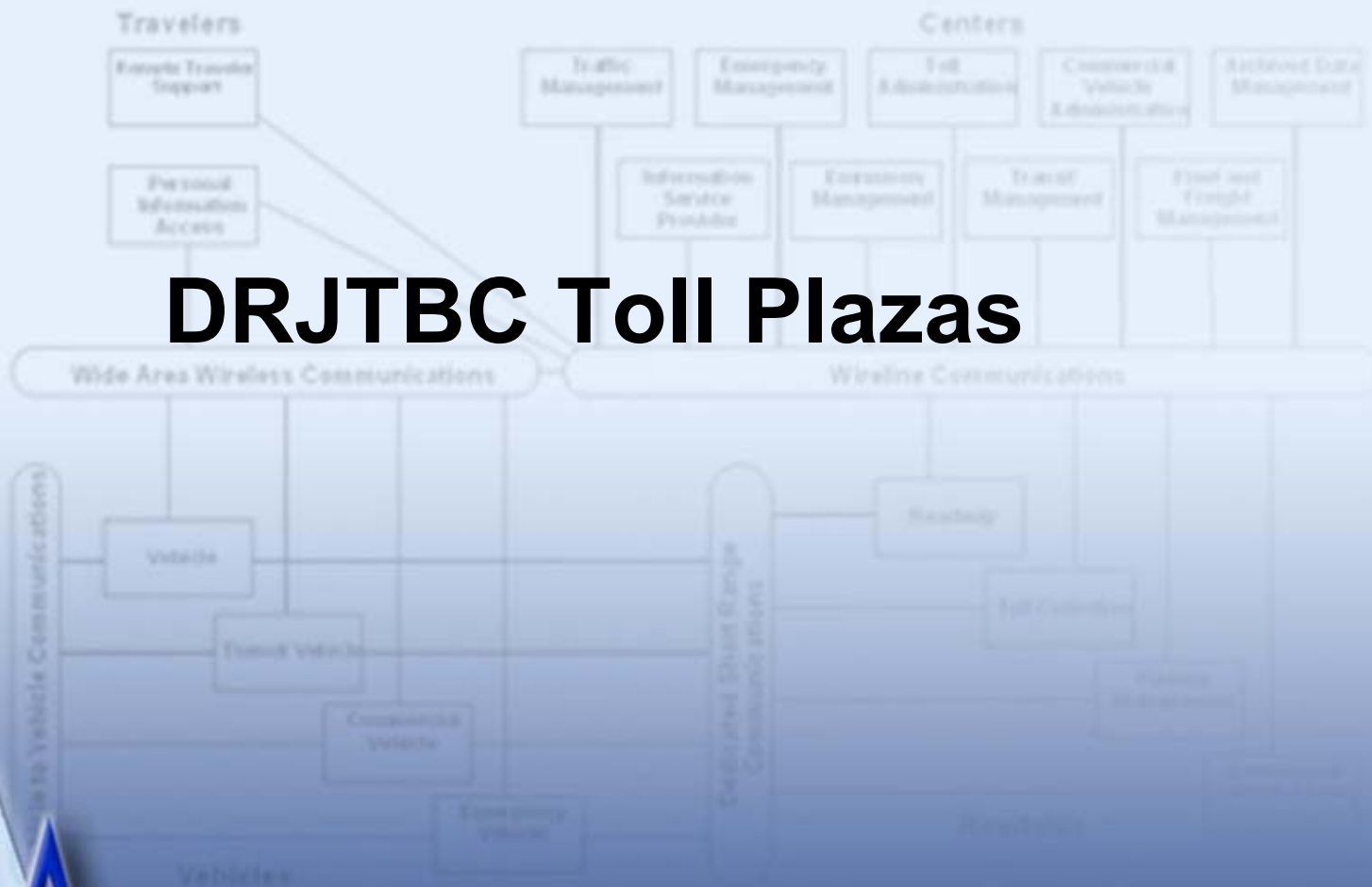


Existing
Planned



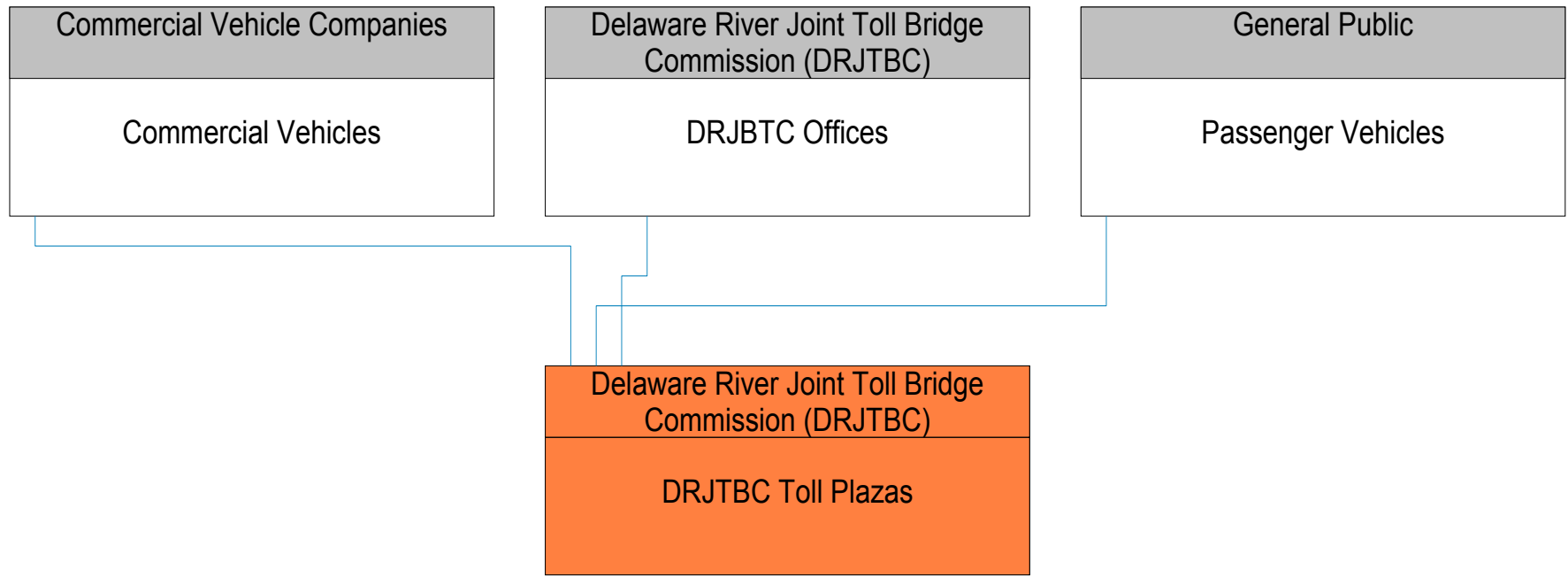
Existing
Planned

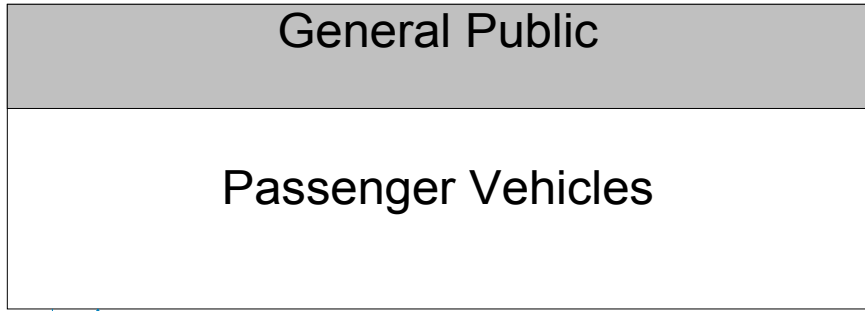
DRJTBC Toll Plazas

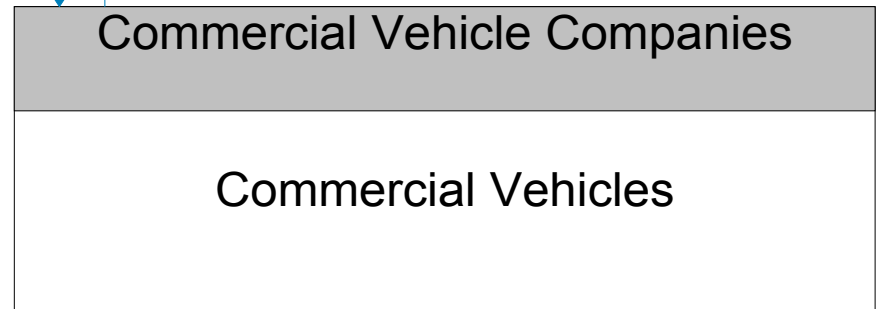
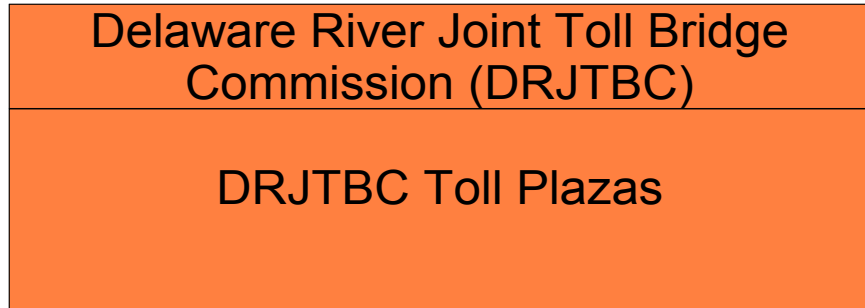


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DRJTBC Toll Plazas Interconnect Diagram

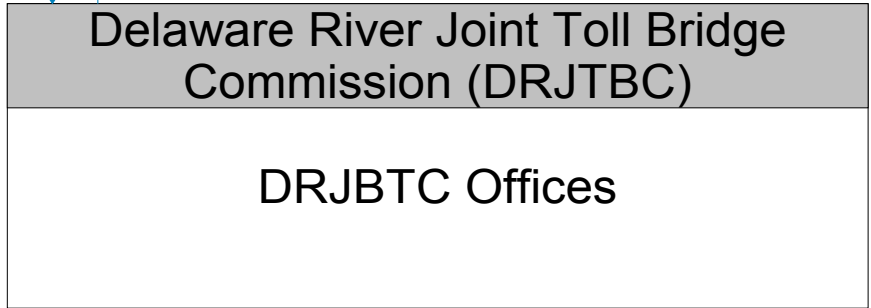






tag data
request tag data

Existing
Planned



toll instructions
toll transactions

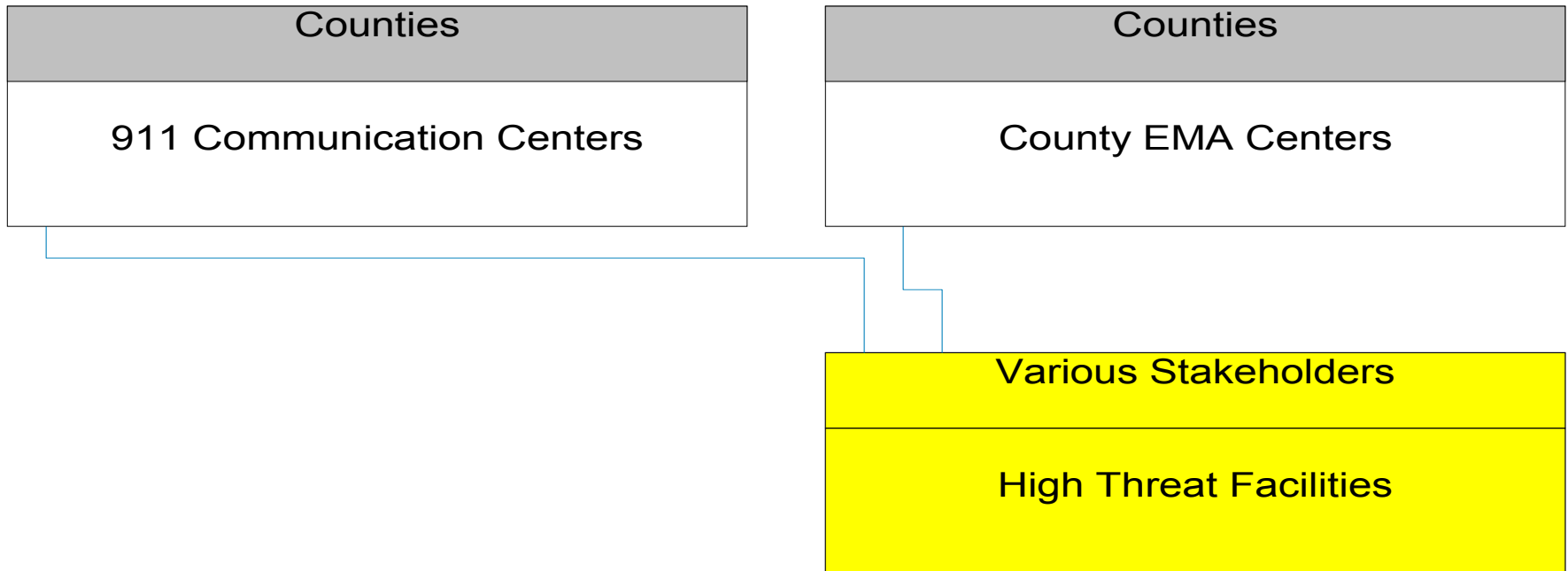
———— Existing
----- Planned

High Threat Facilities

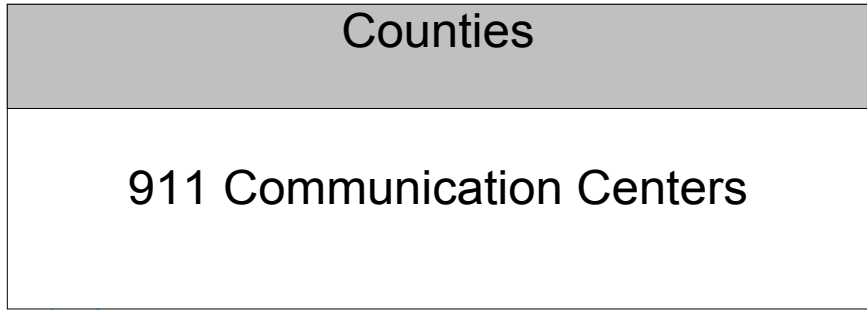


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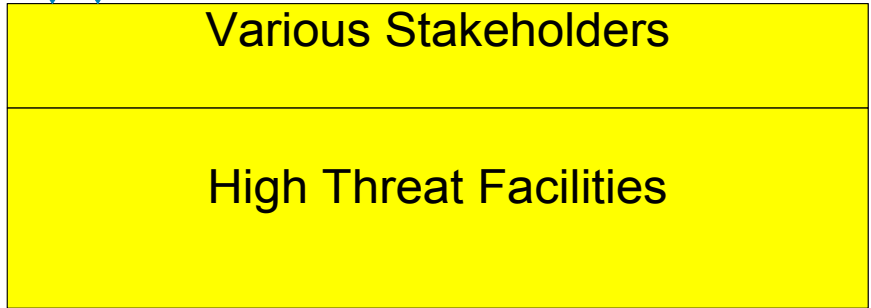
High Threat Facilities Interconnect Diagram



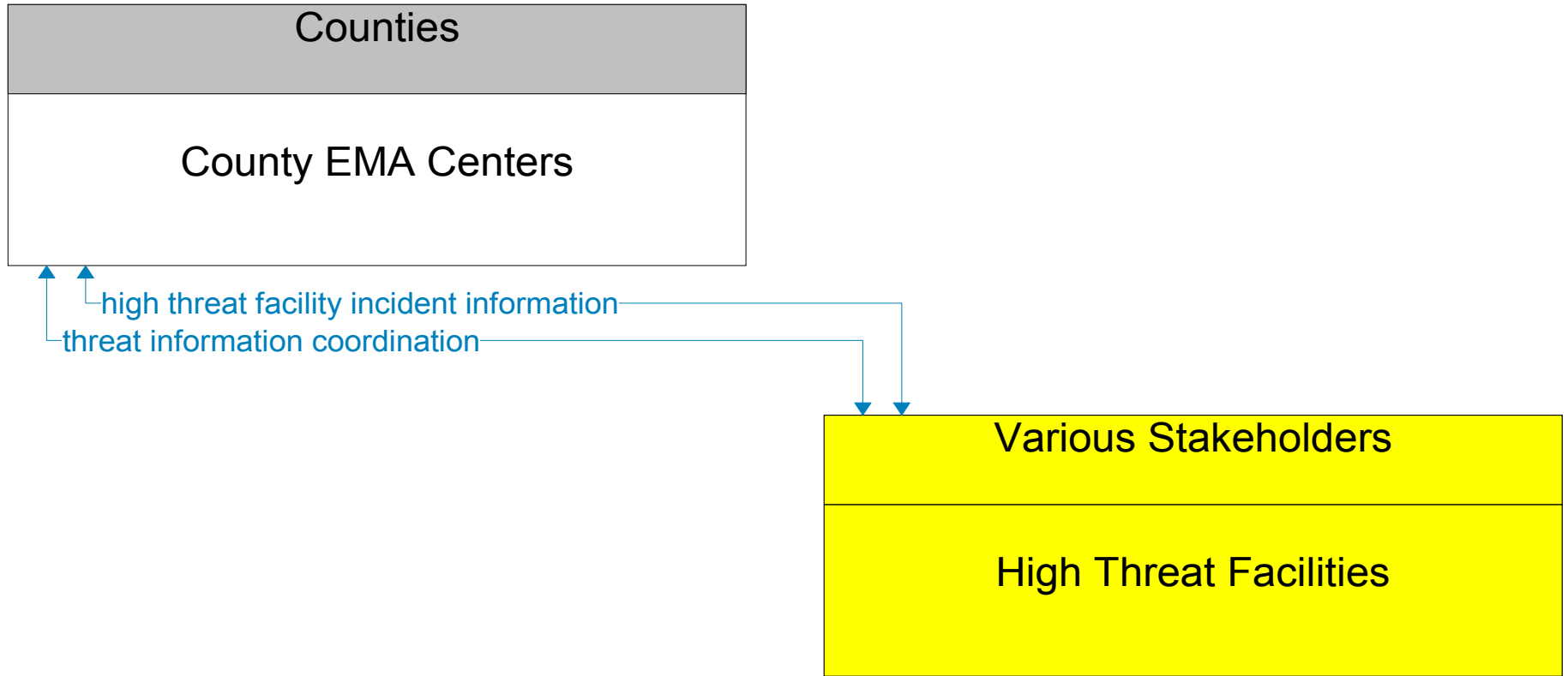
———— Existing
----- Planned



high threat facility incident information
threat information coordination

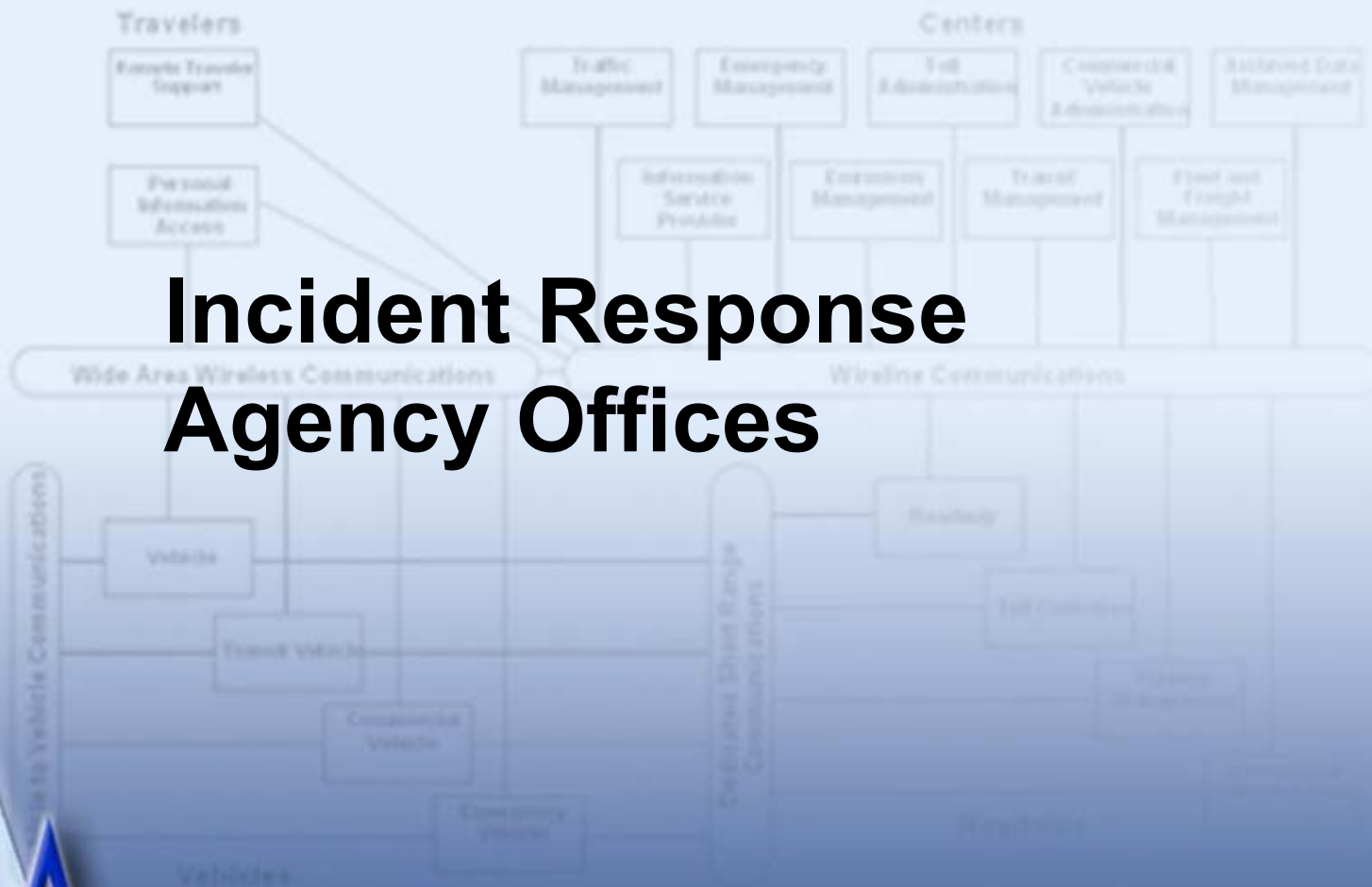


Existing
Planned

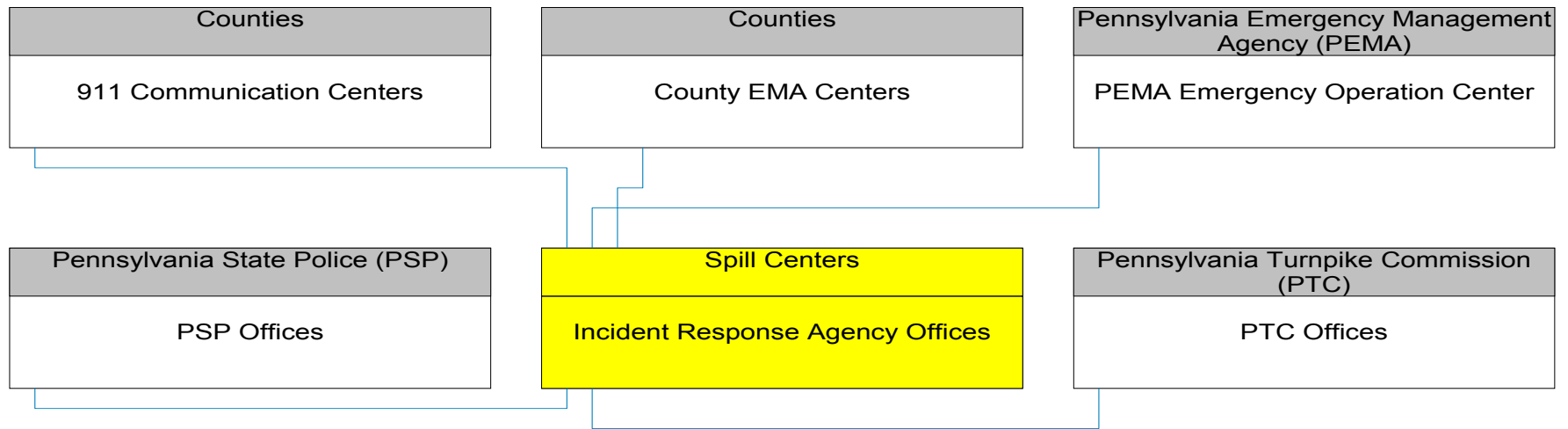


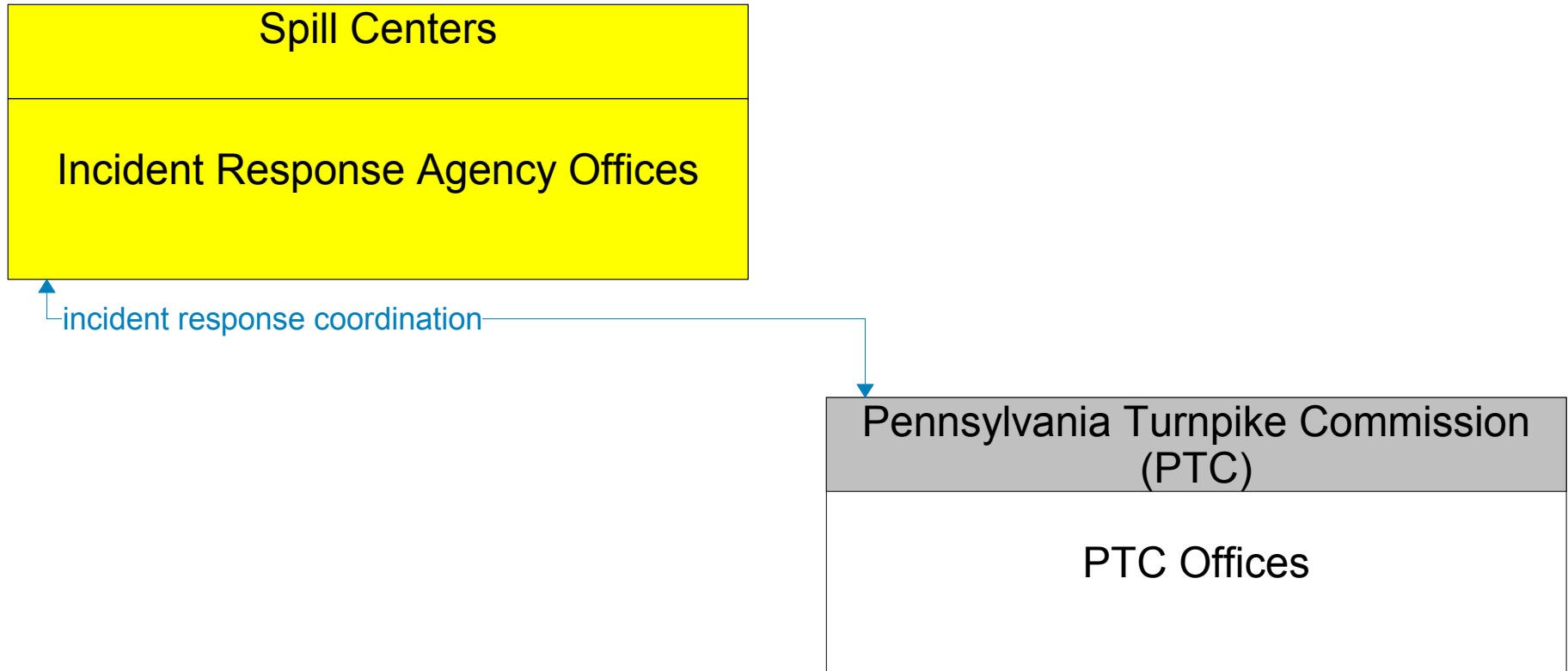
———— Existing
----- Planned

Incident Response Agency Offices

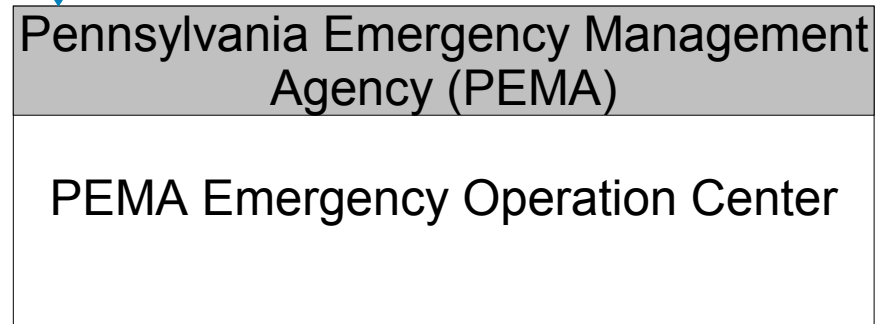
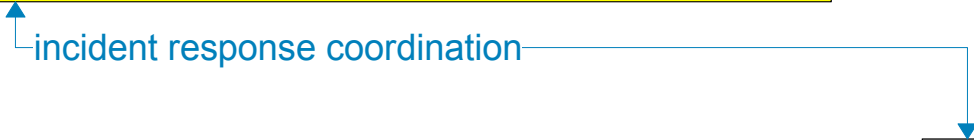
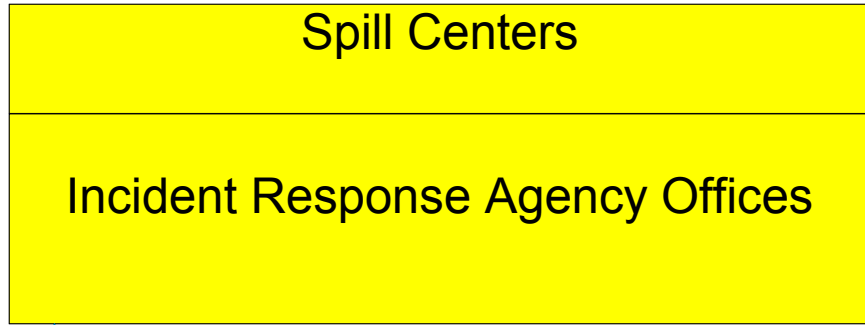


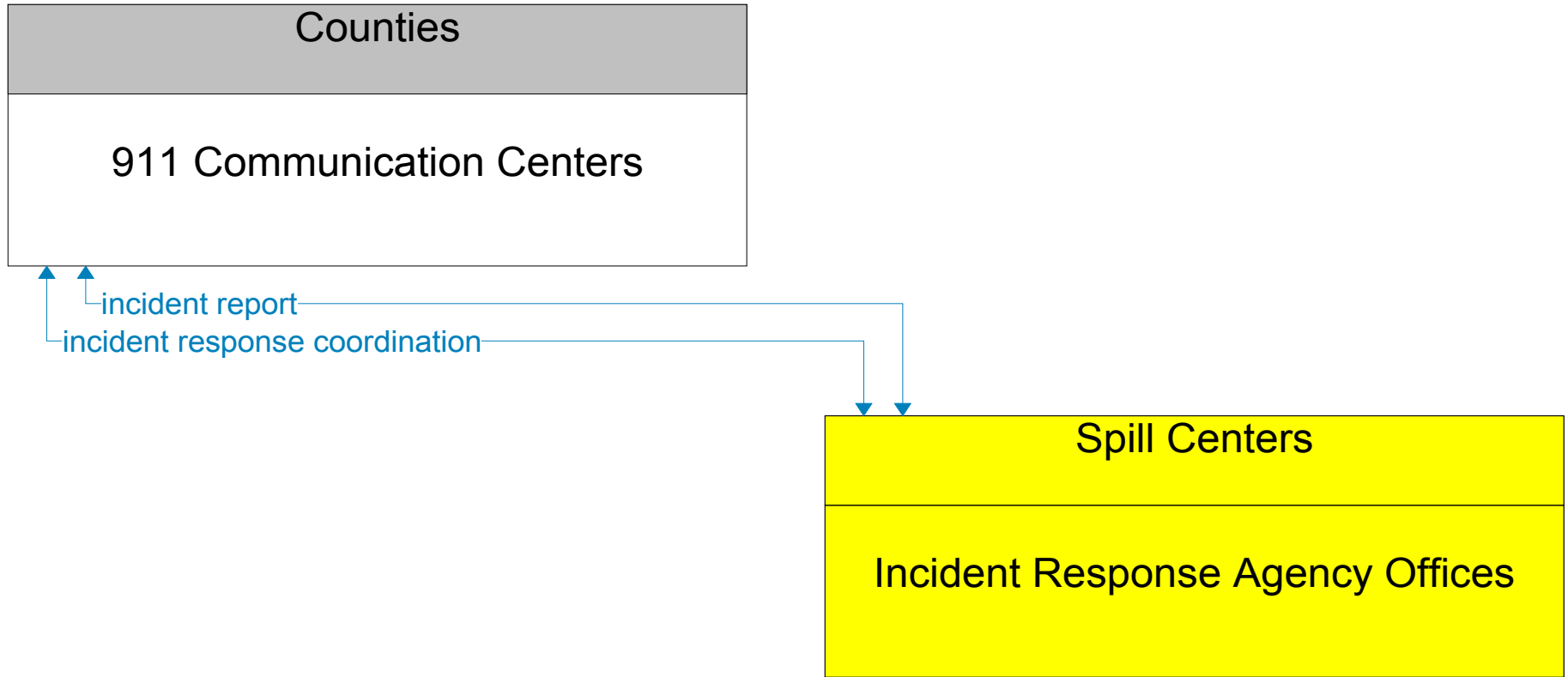
Incident Response Agency Offices Interconnect Diagram



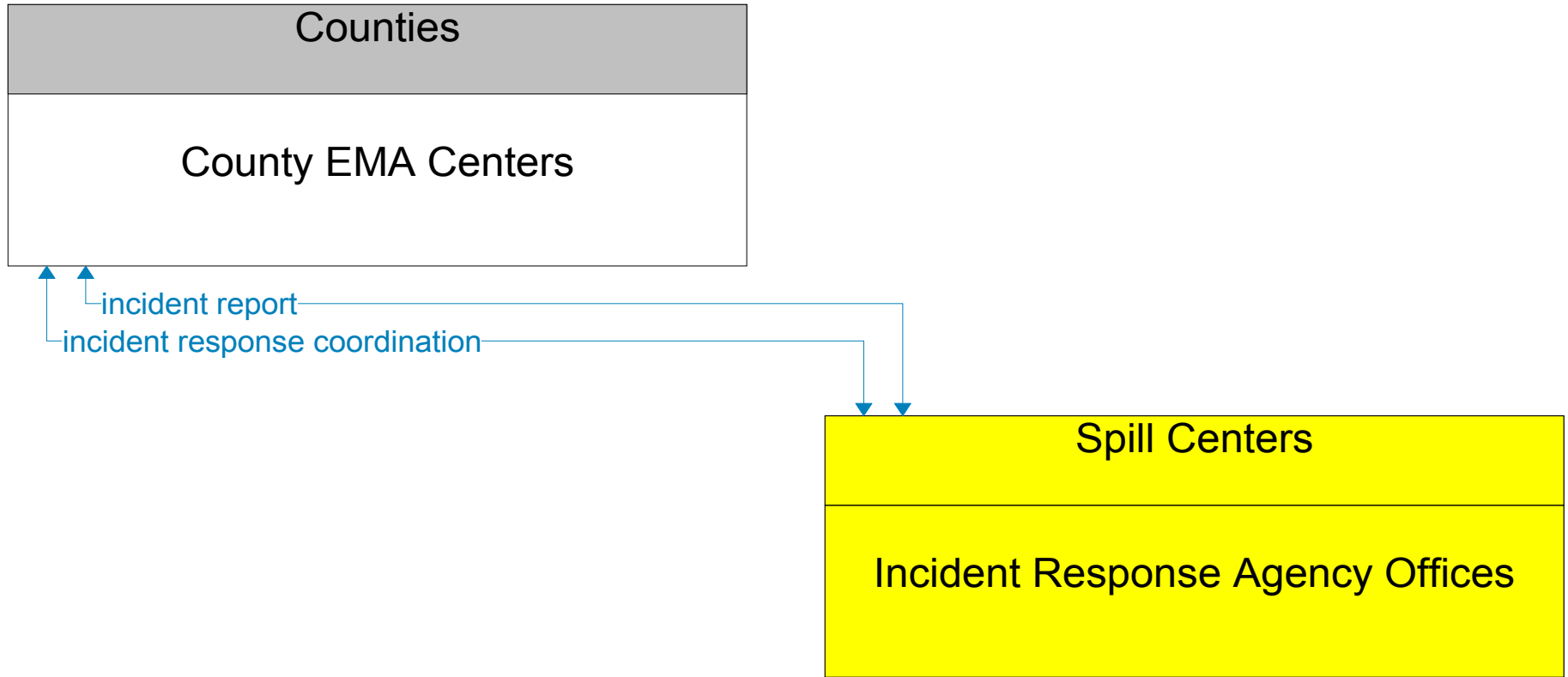


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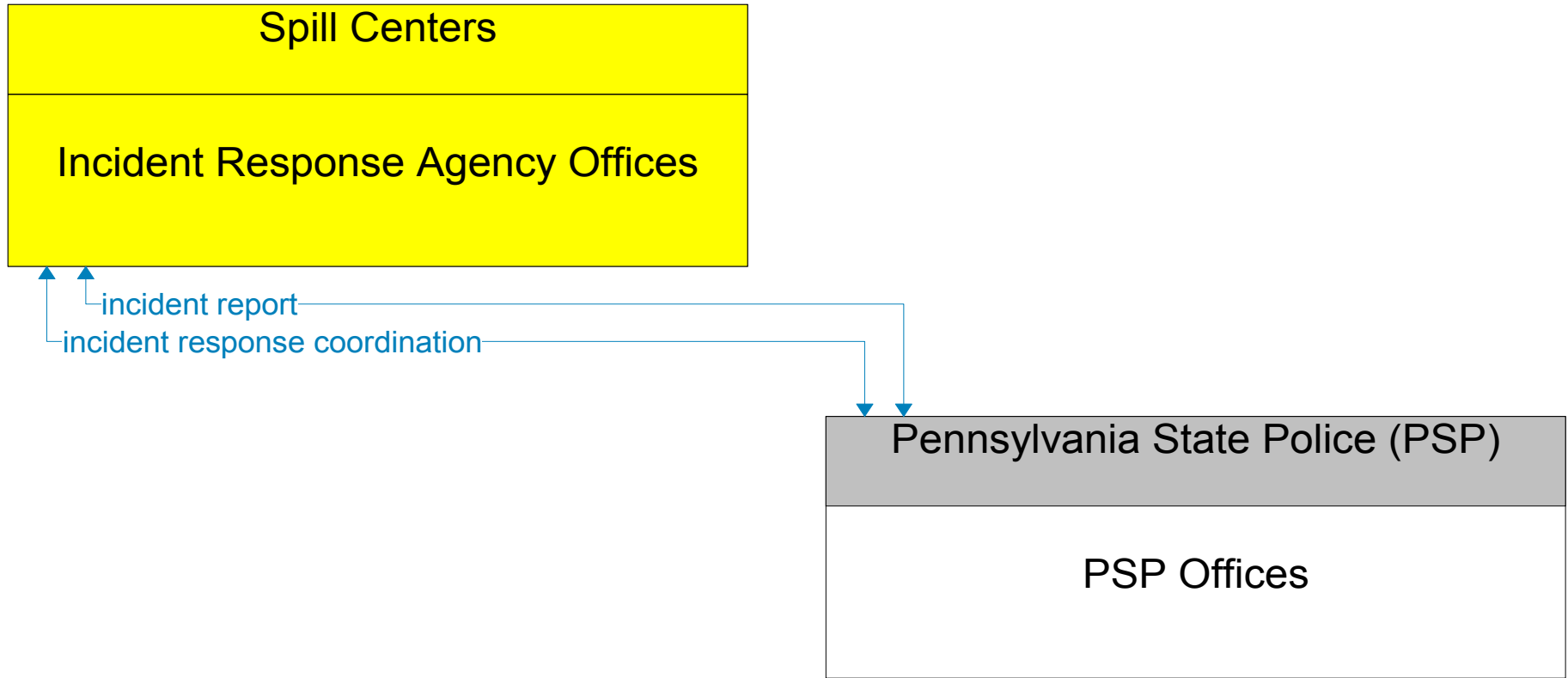




———— Existing
- - - - - Planned

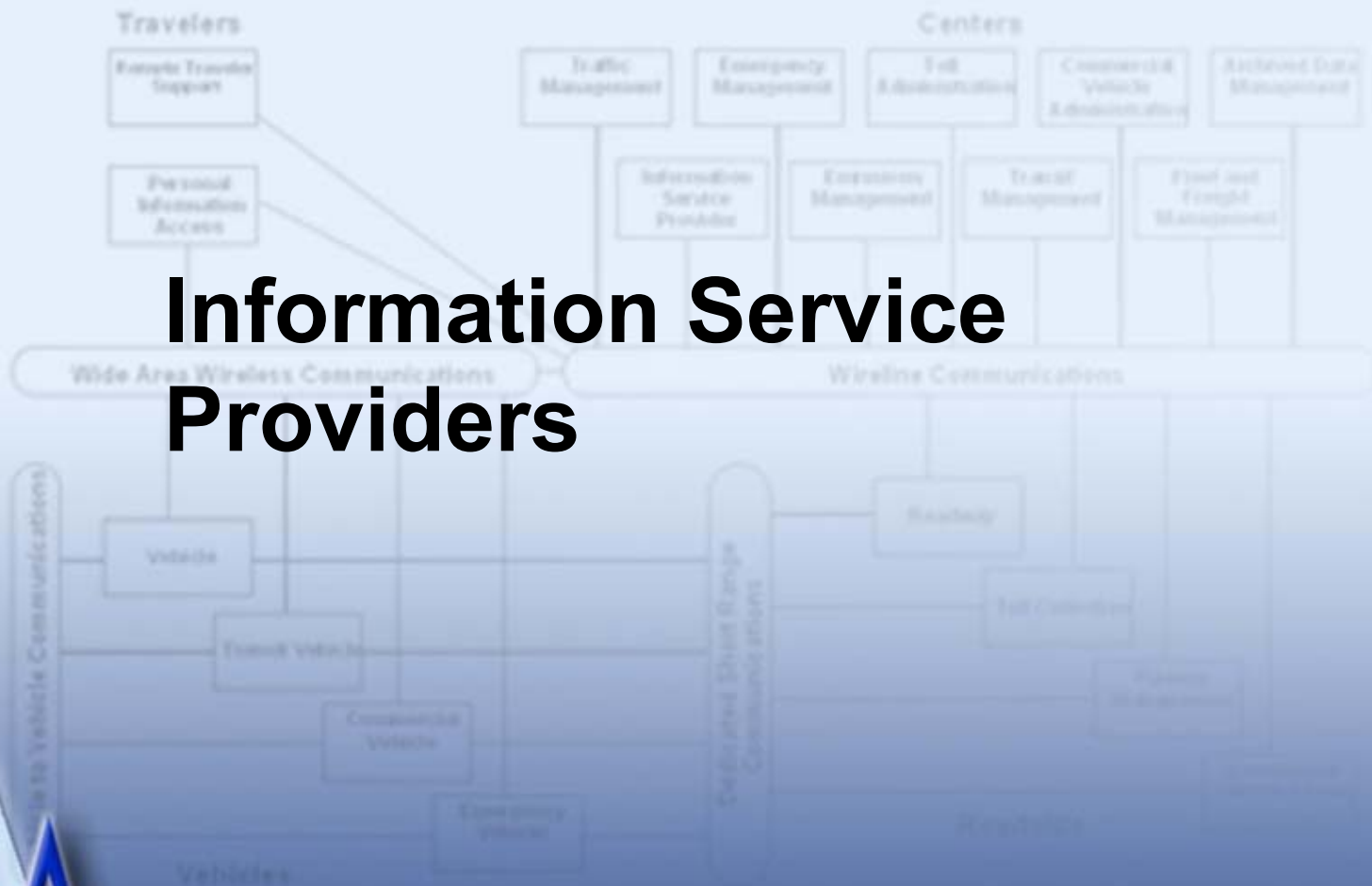


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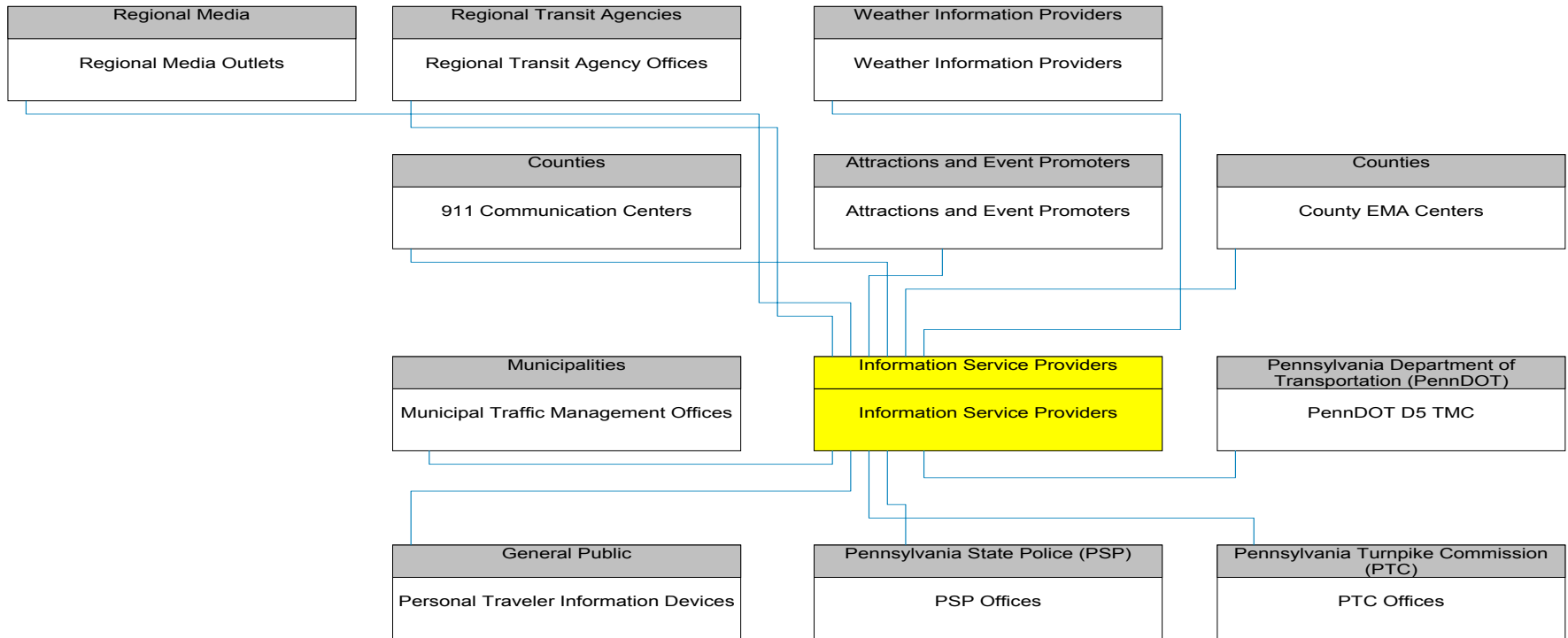
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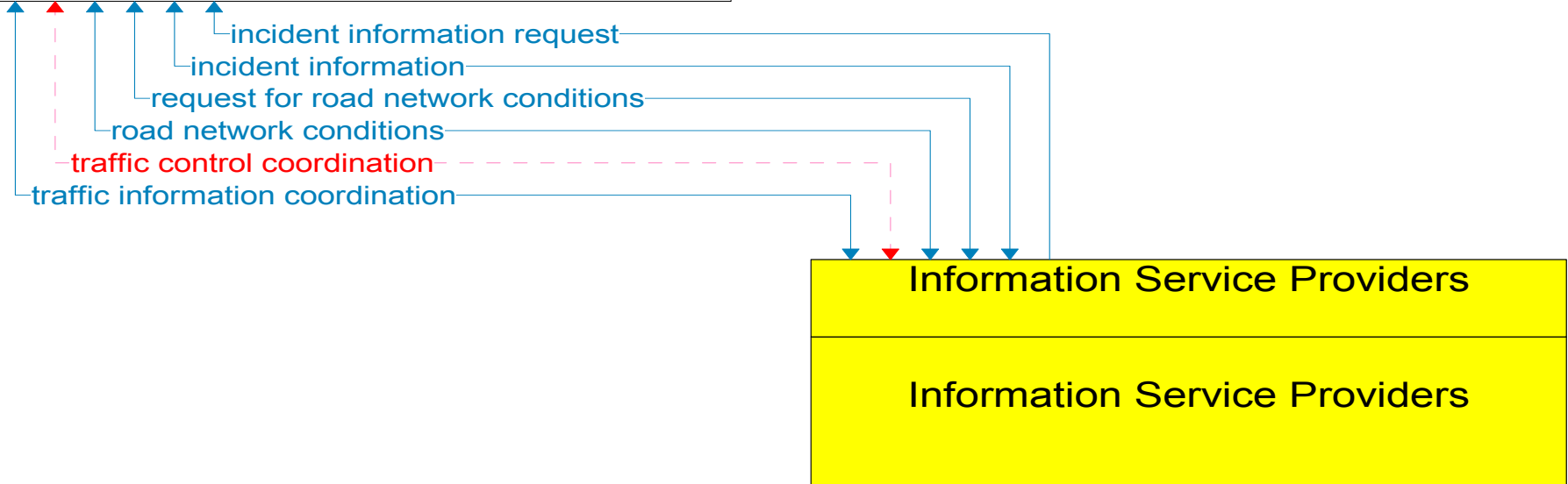
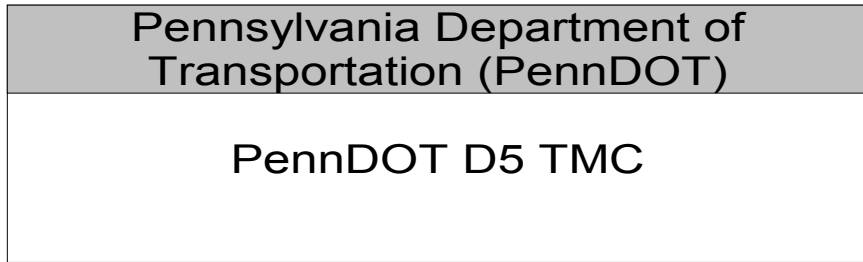
Information Service Providers



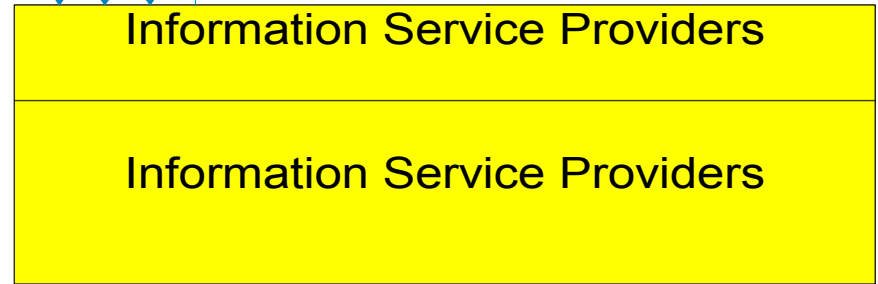
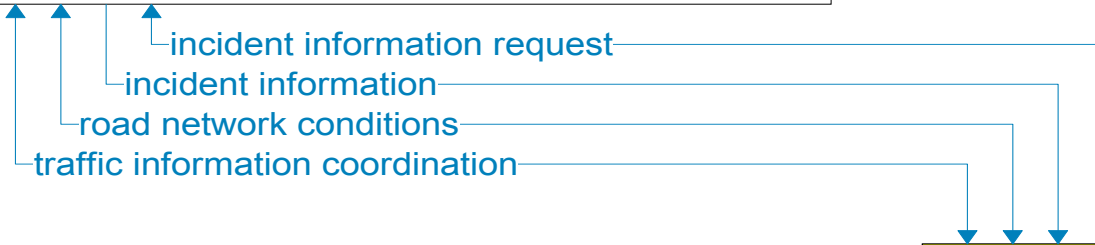
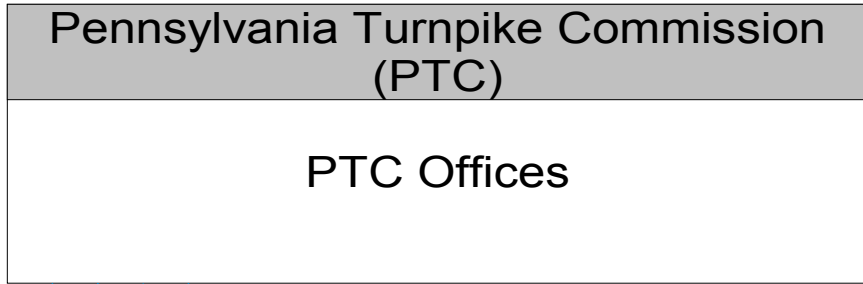
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Information Service Providers Interconnect Diagram

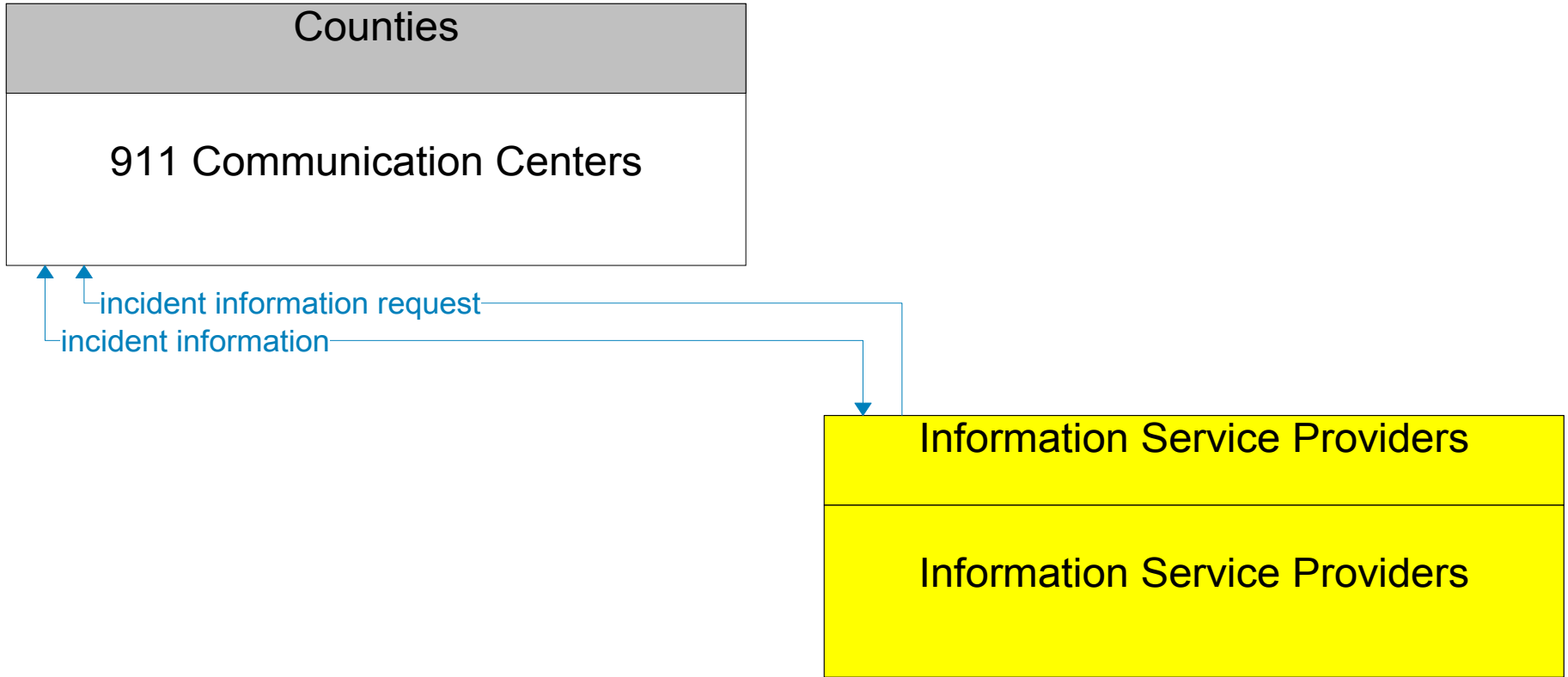




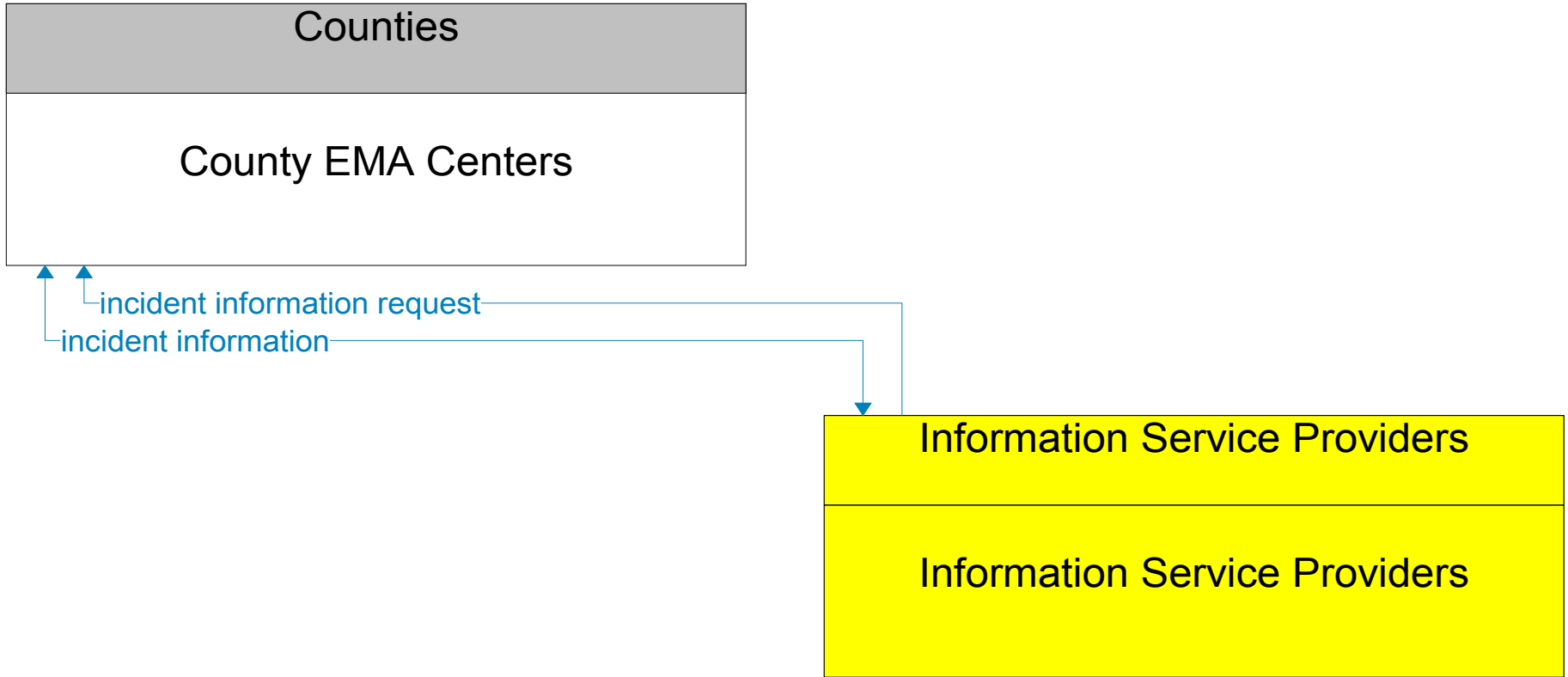
Existing
Planned



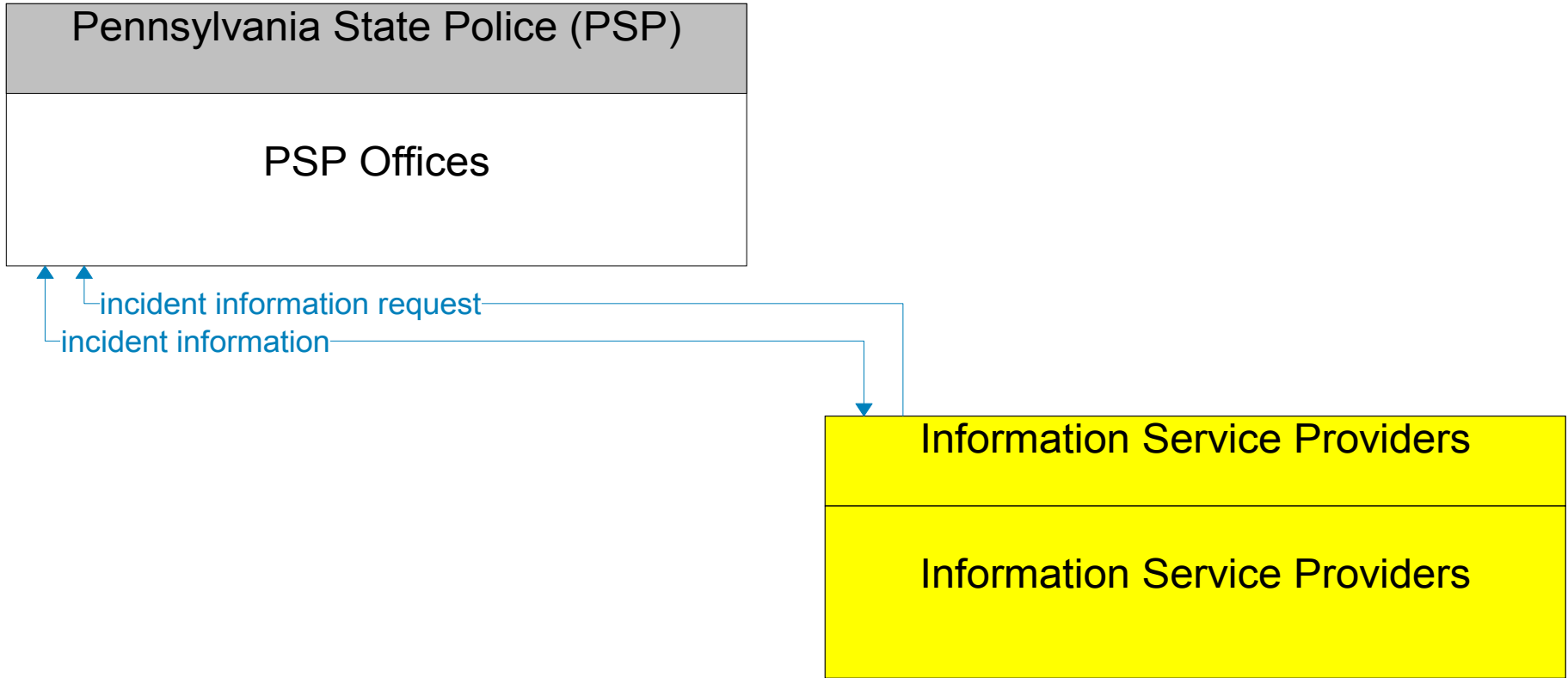
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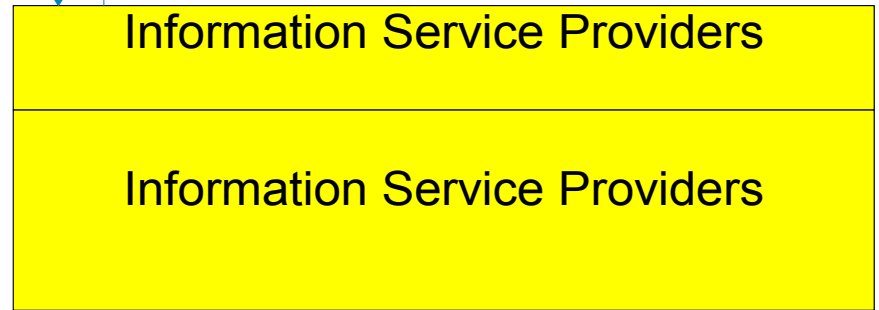
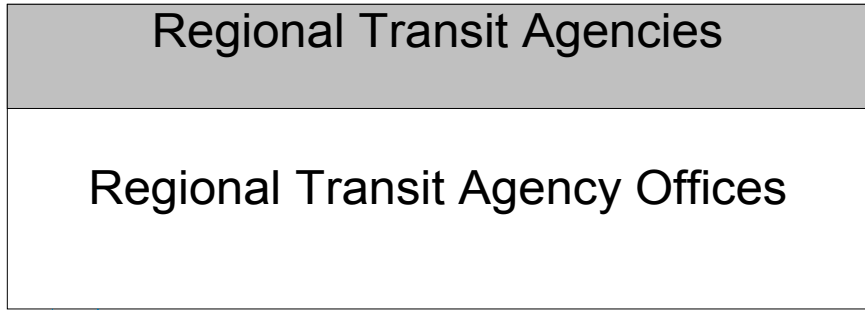
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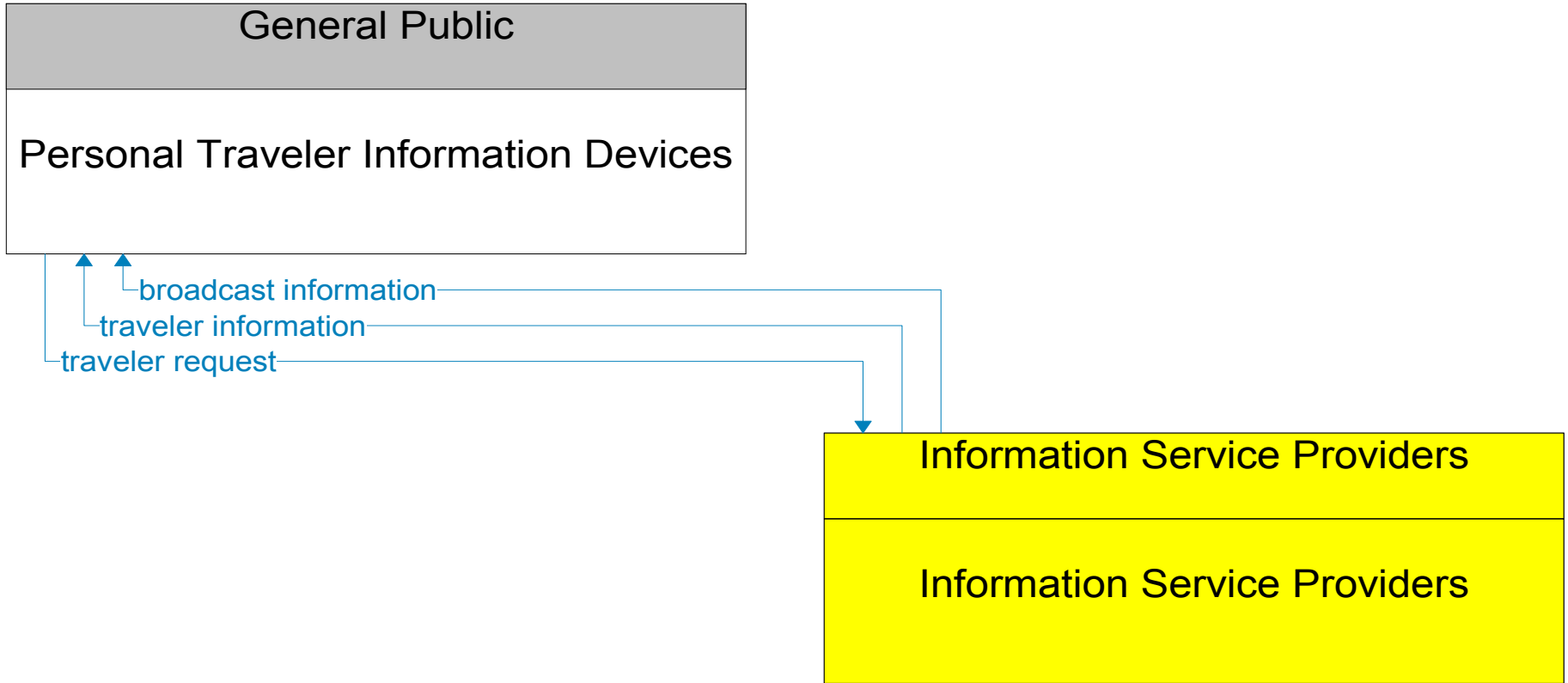


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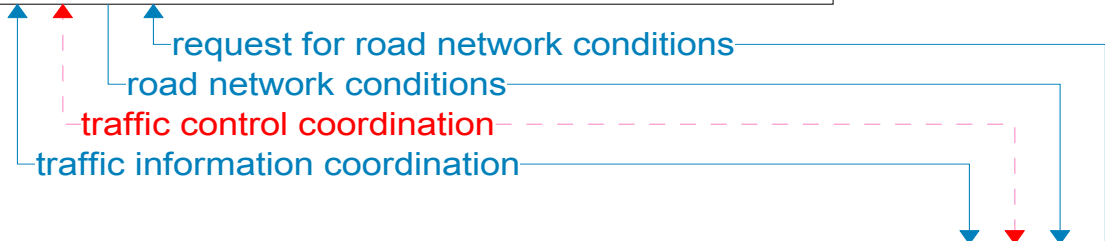
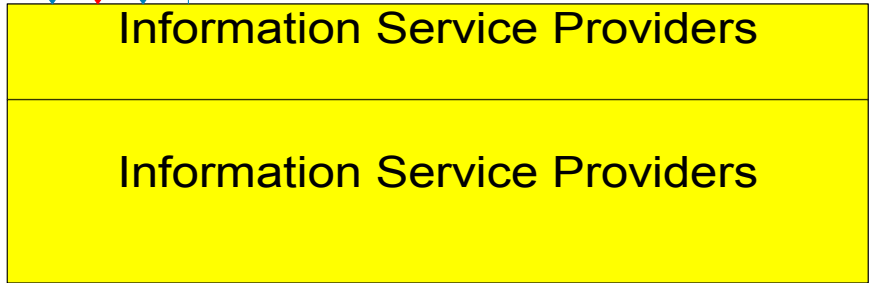


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- - - - - Planned

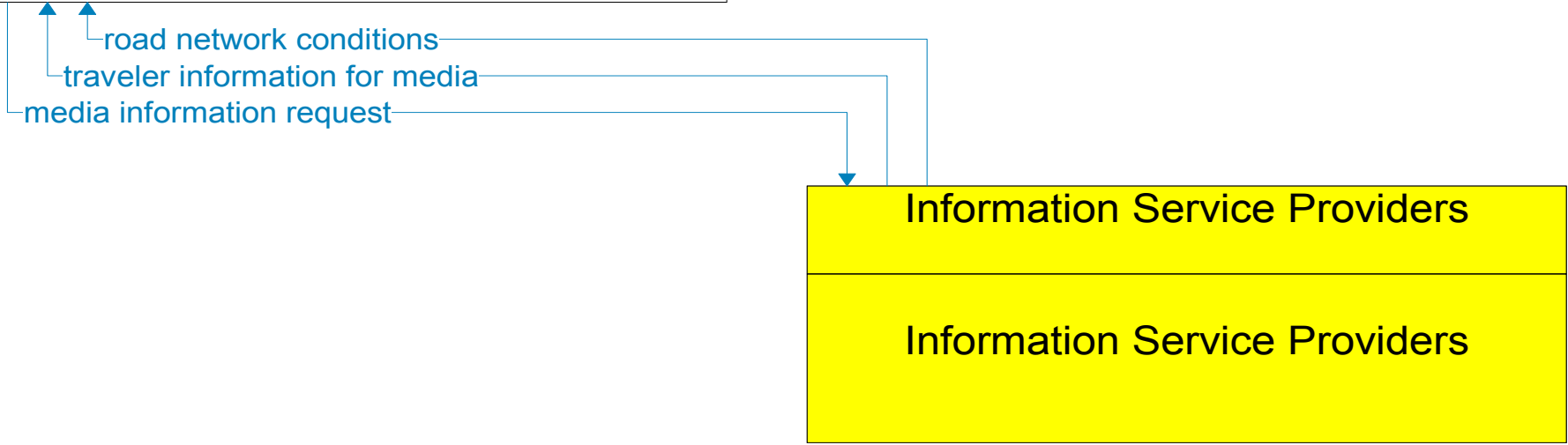
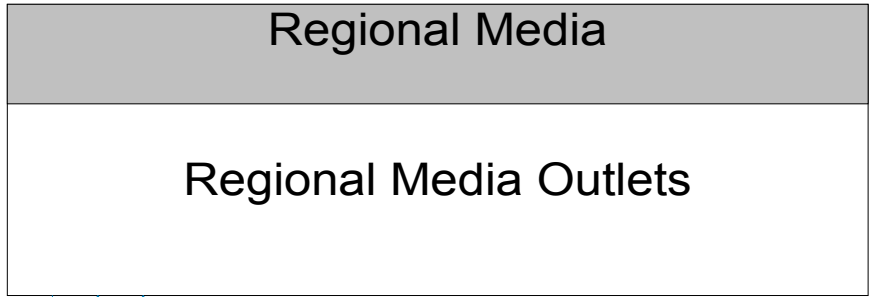




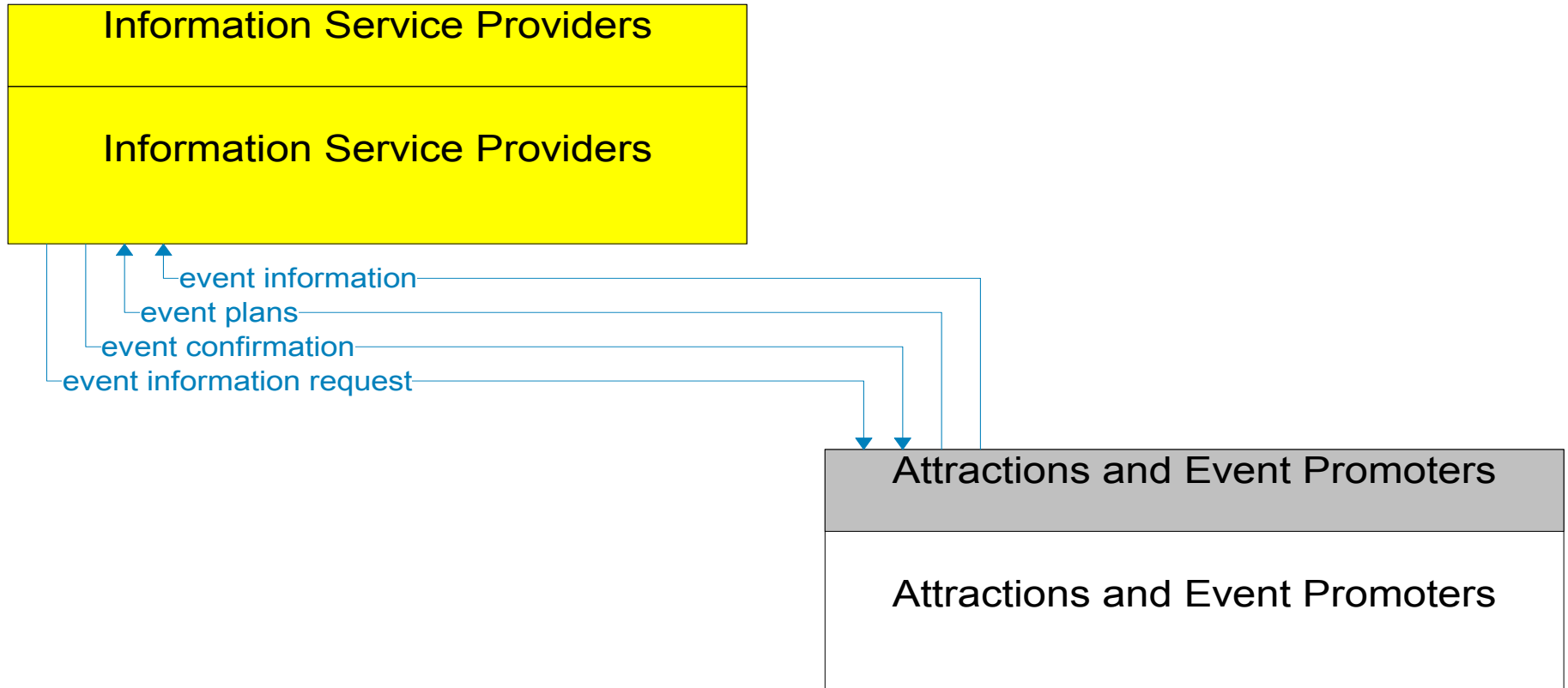
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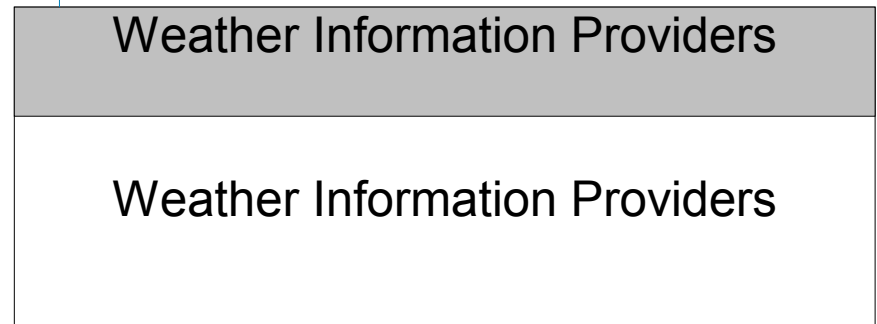
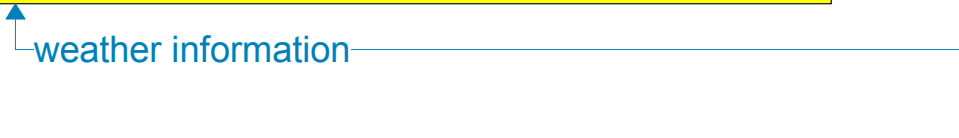
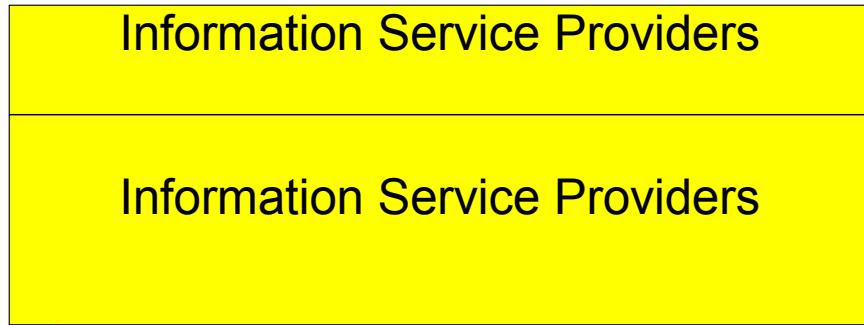
Existing
Planned



Existing
Planned

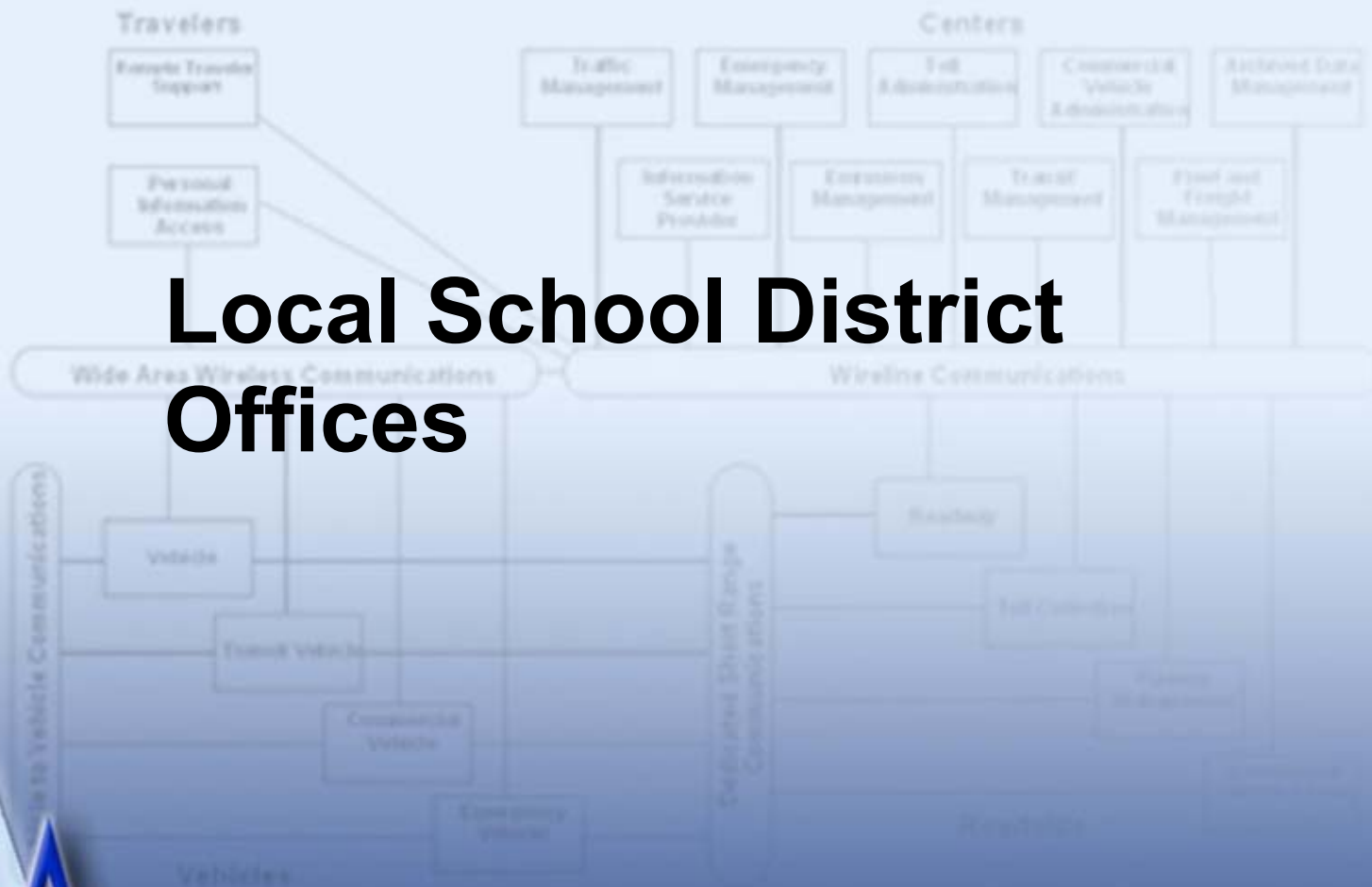


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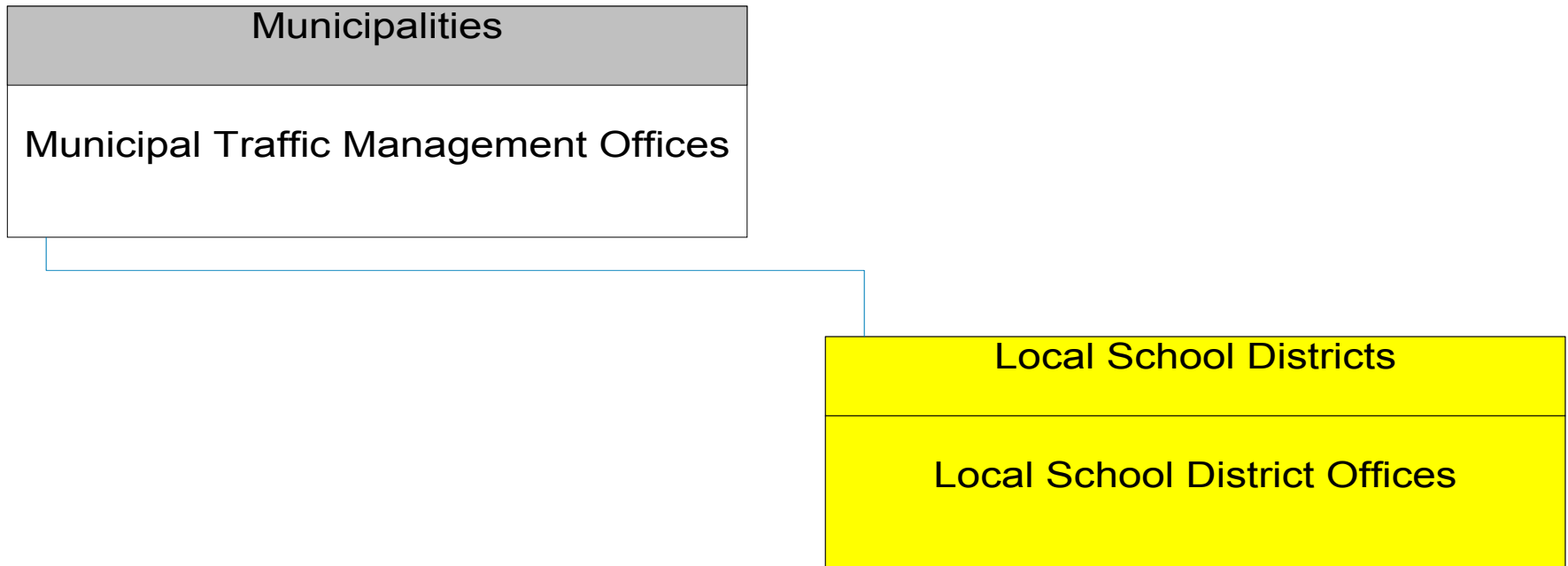


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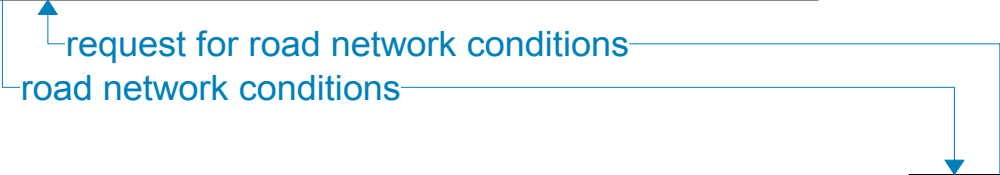
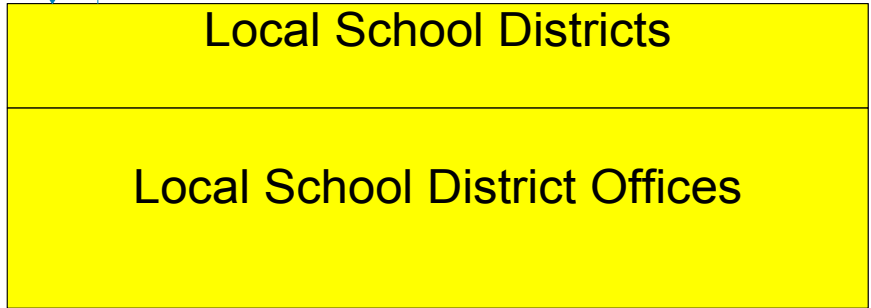
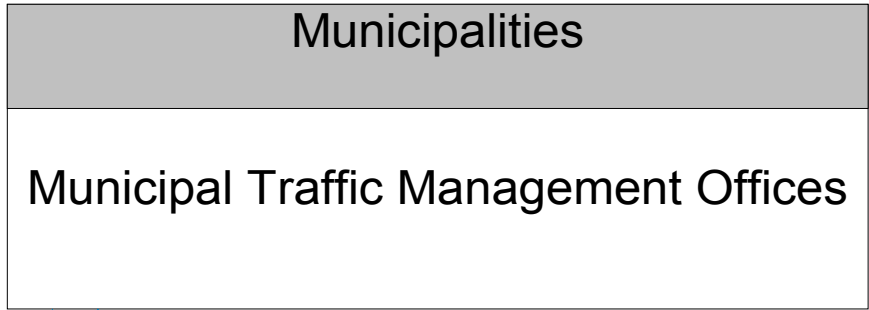
Local School District Offices



Local School District Offices Interconnect Diagram

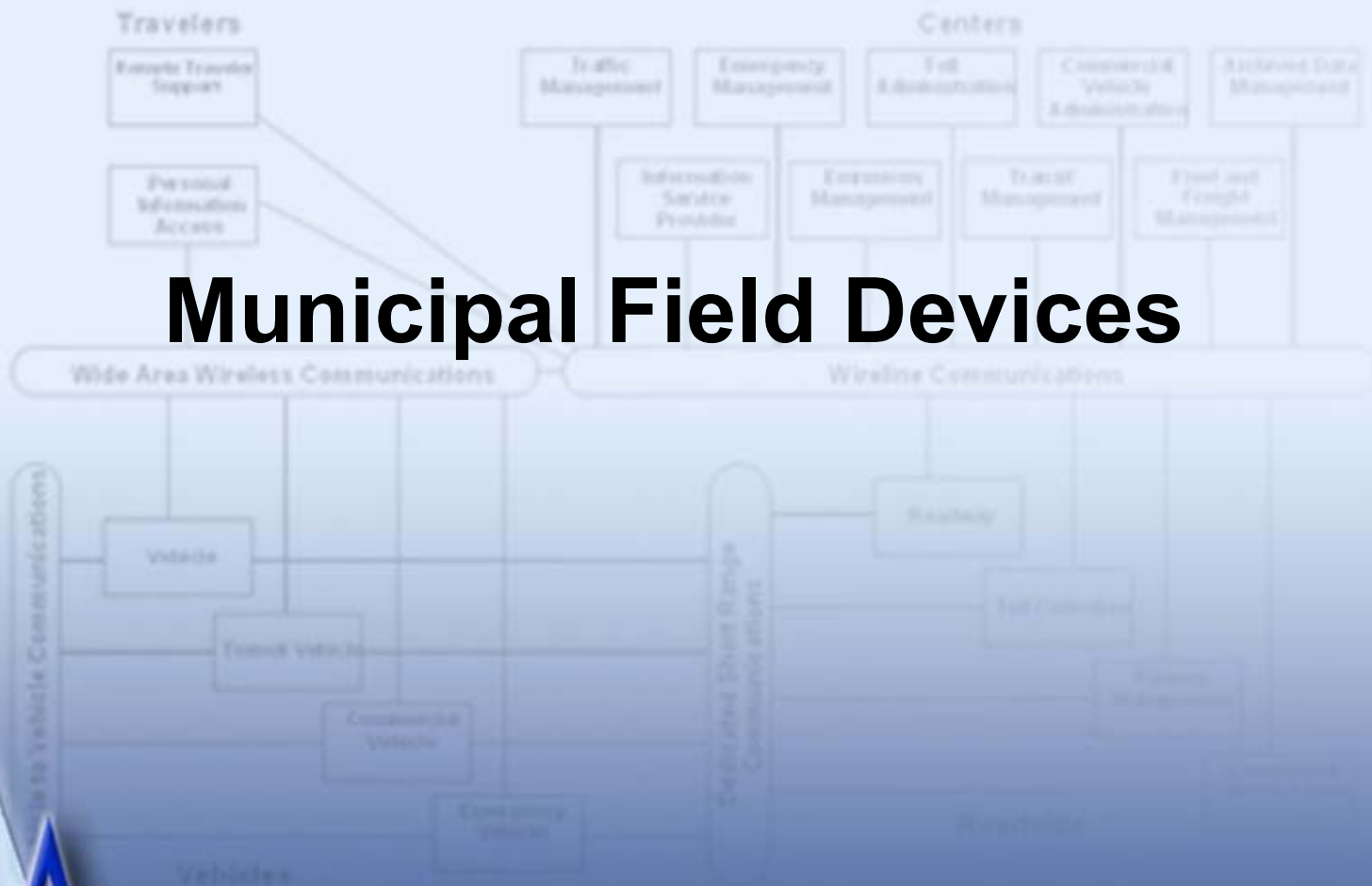


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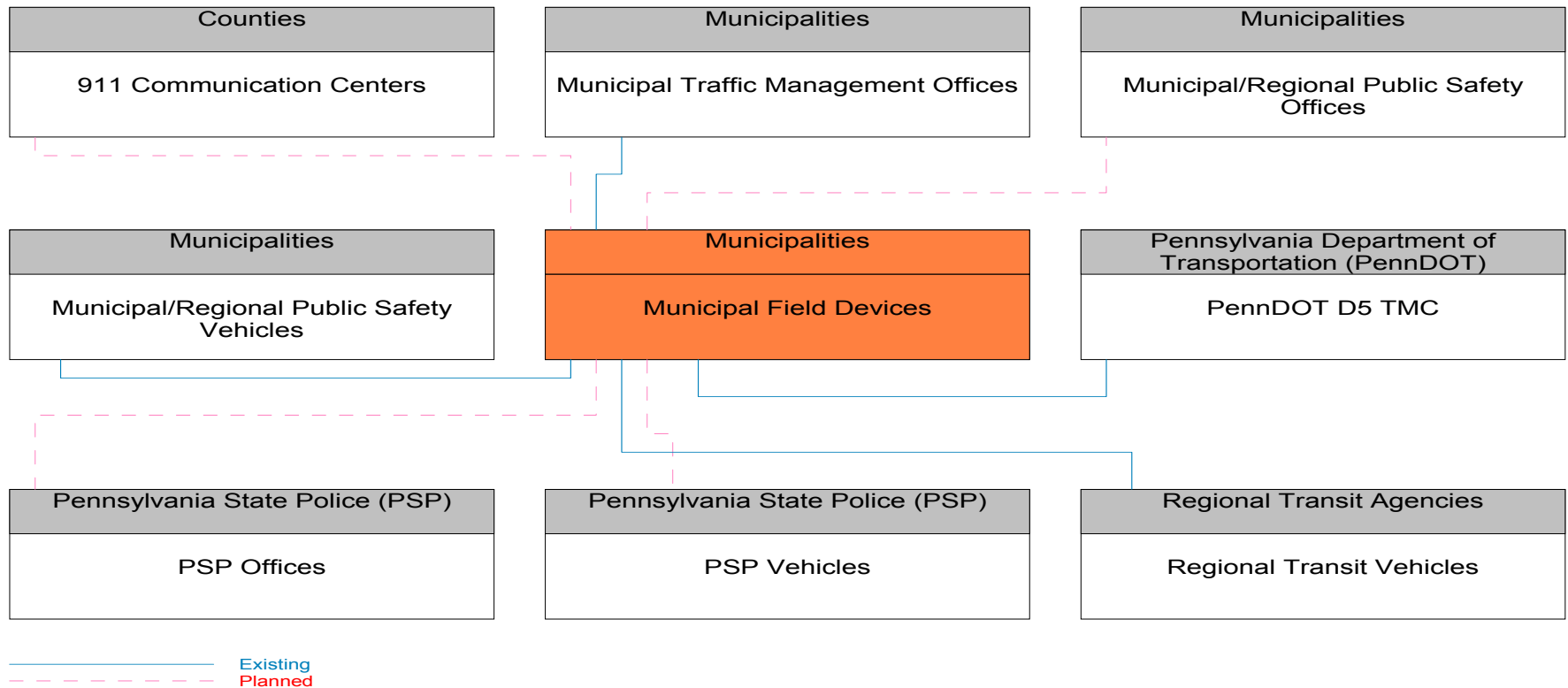
Existing
Planned

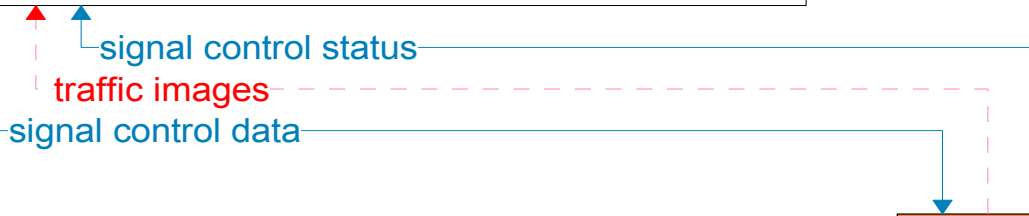
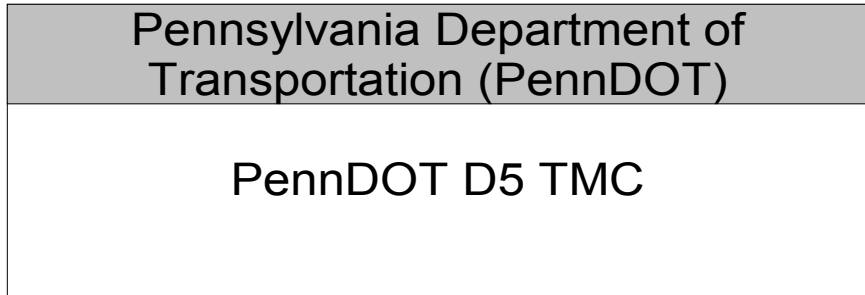
Municipal Field Devices

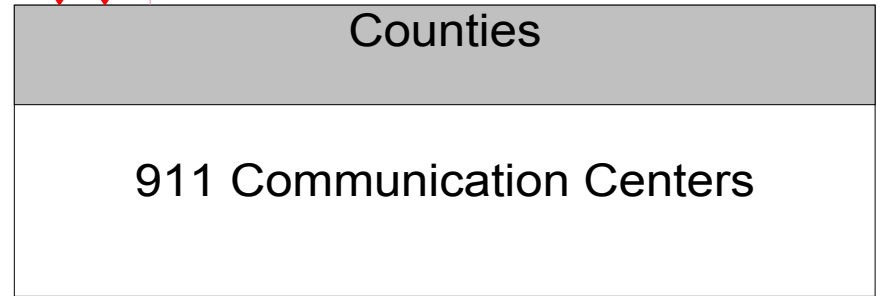
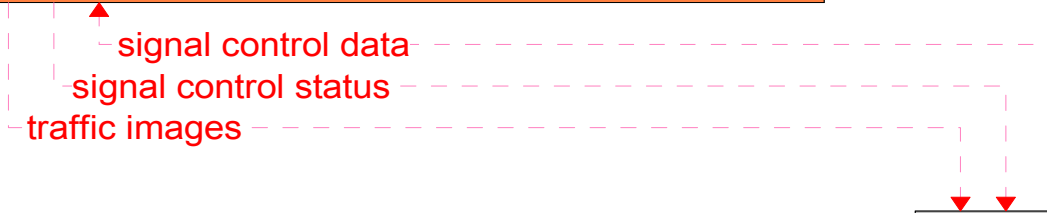


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Municipal Field Devices Interconnect Diagram

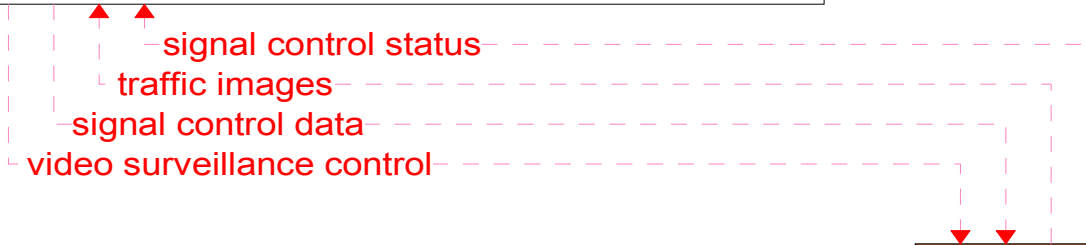
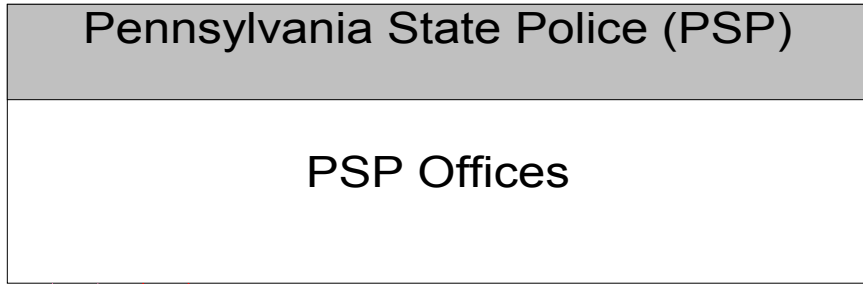


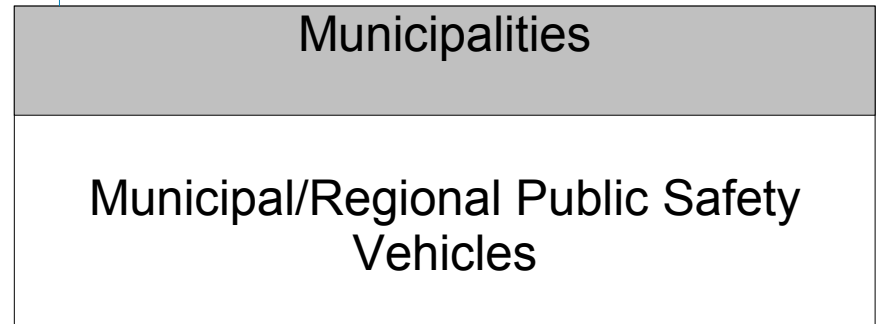
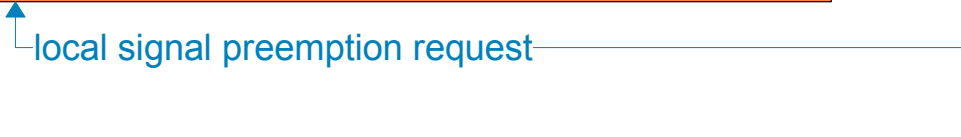
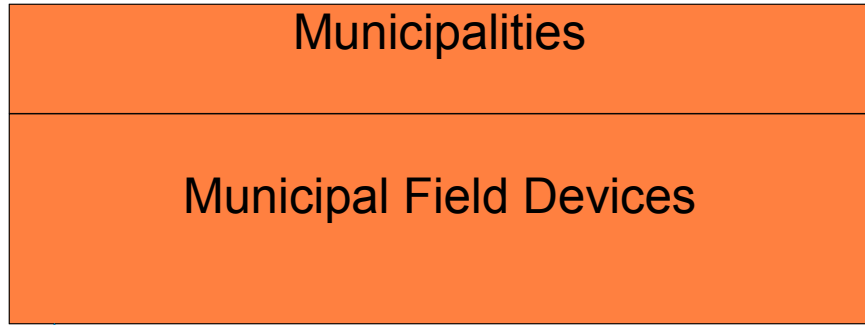


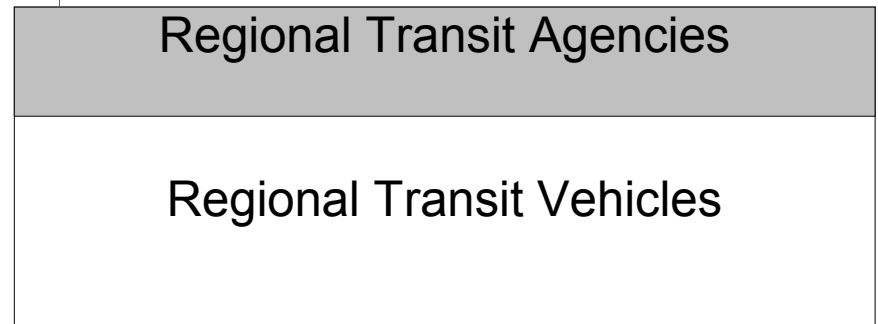


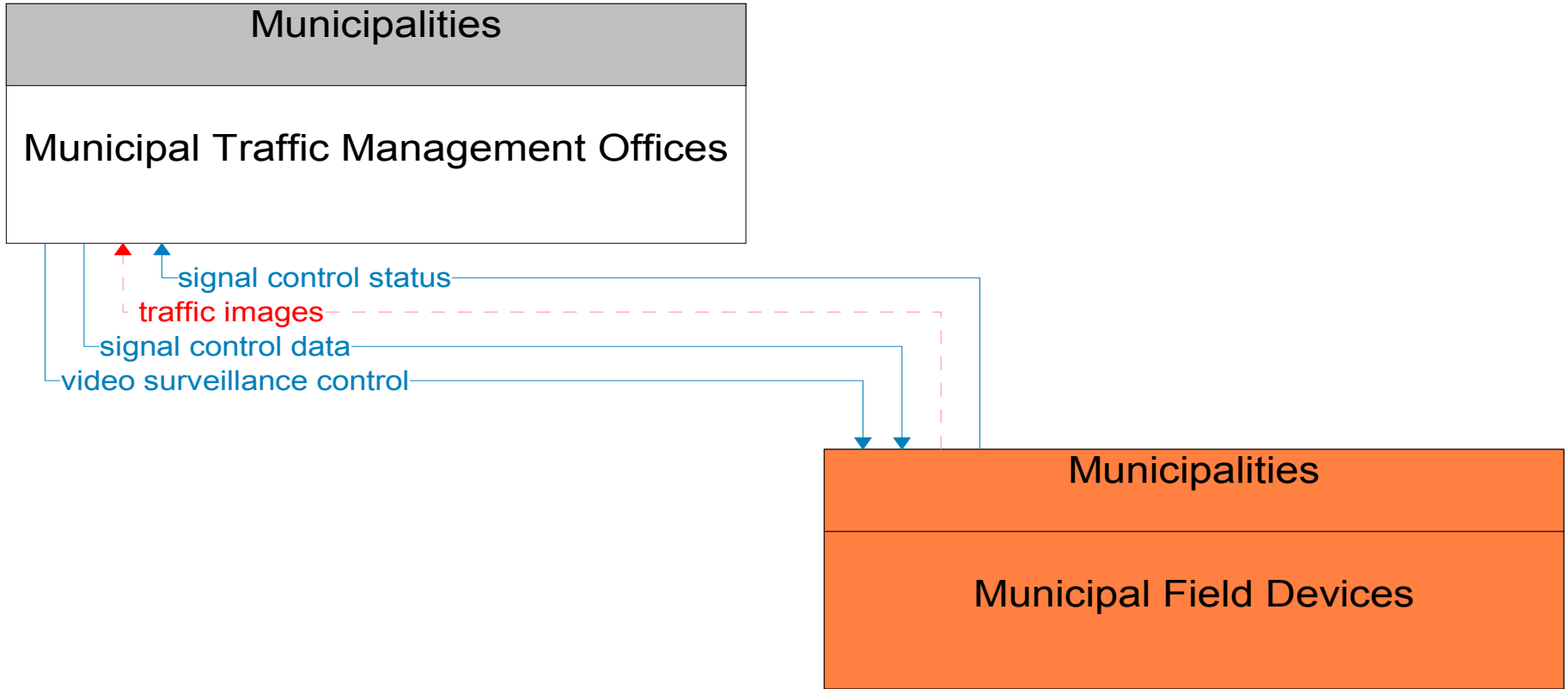
Existing

Planned

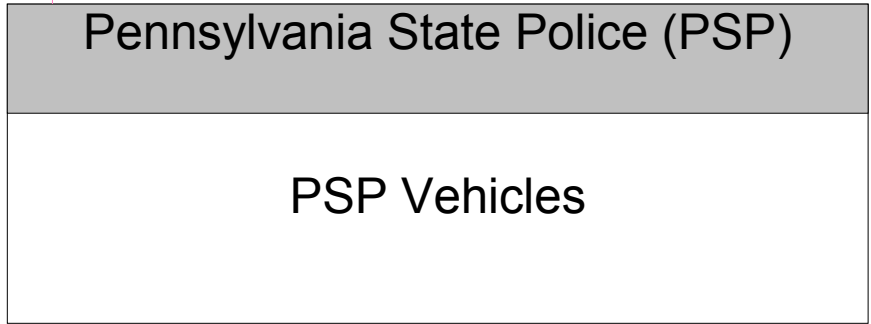






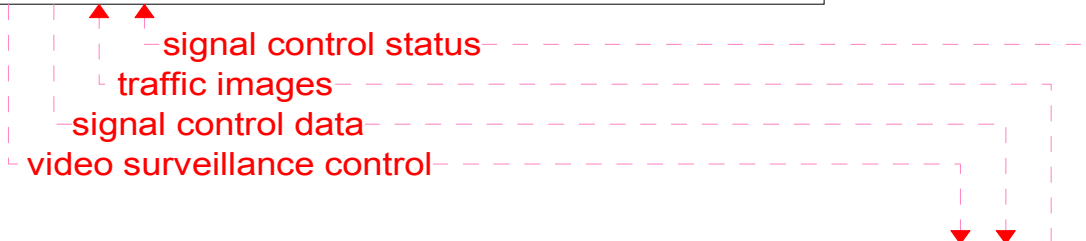


———— Existing
- - - - - Planned



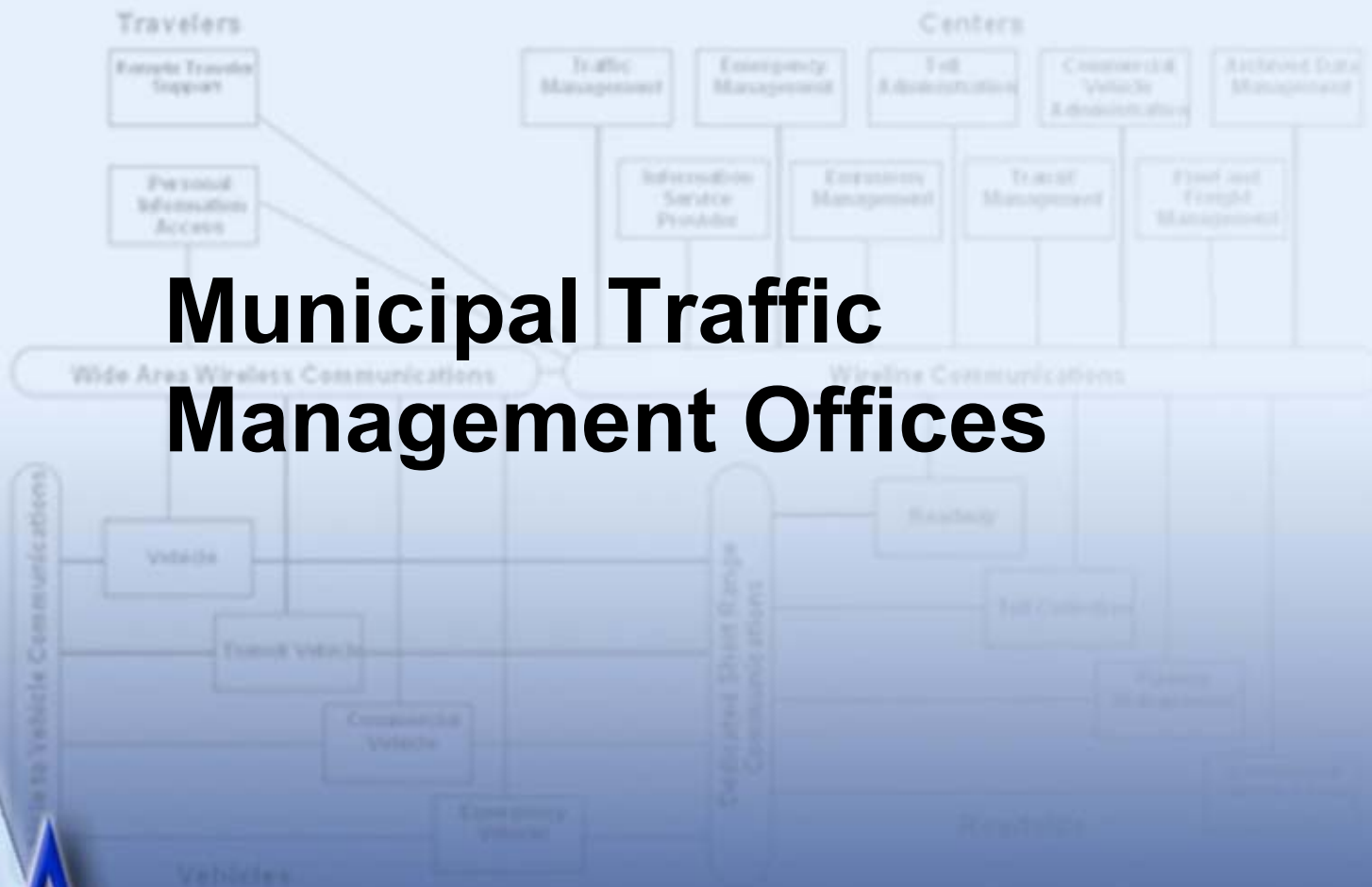
local signal preemption request

Existing
Planned

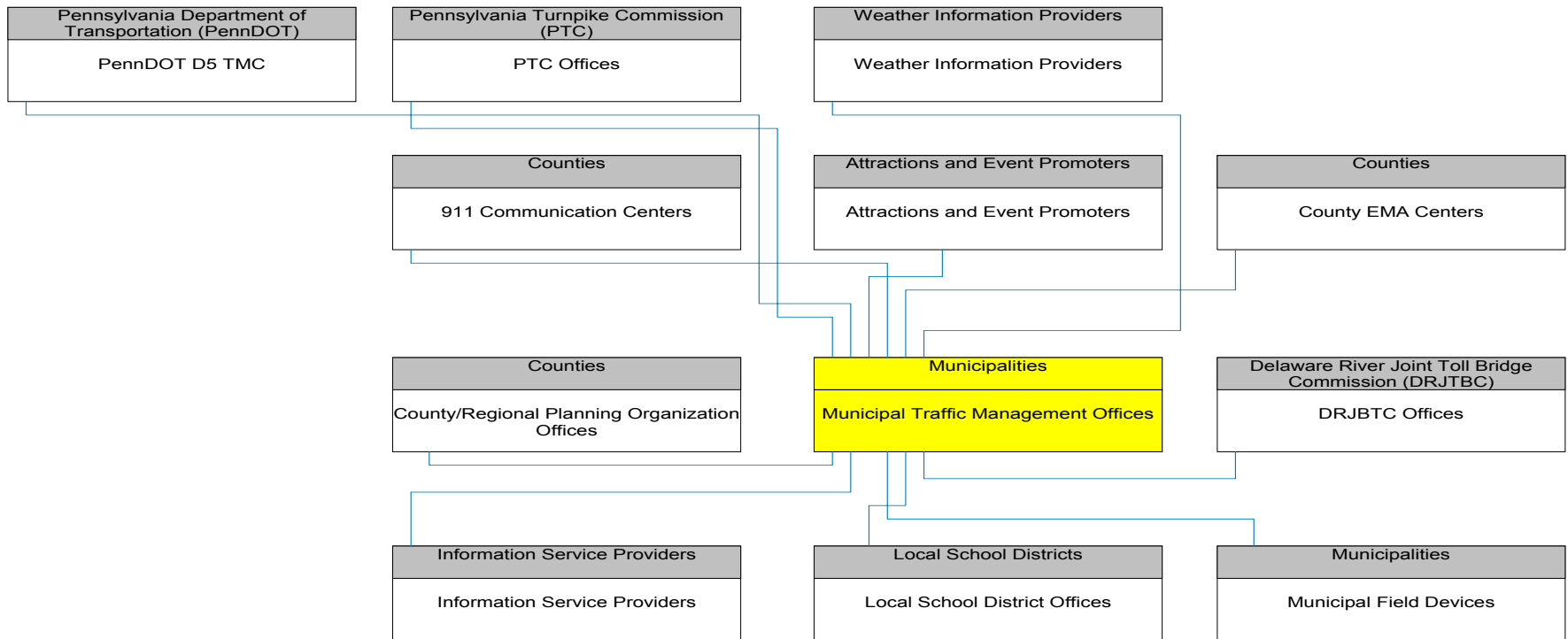


———— Existing
- - - - - Planned

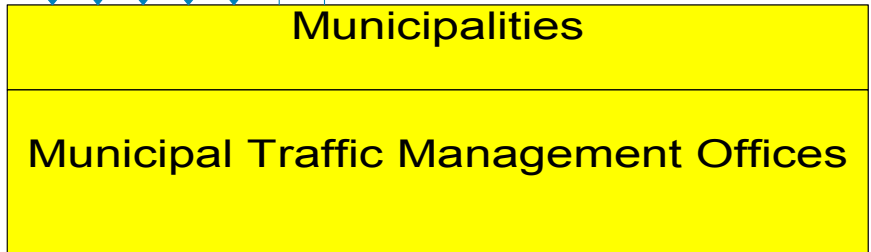
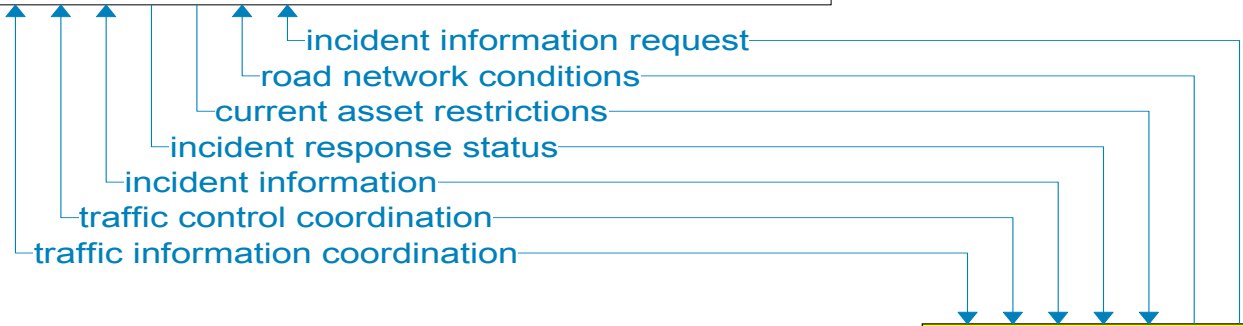
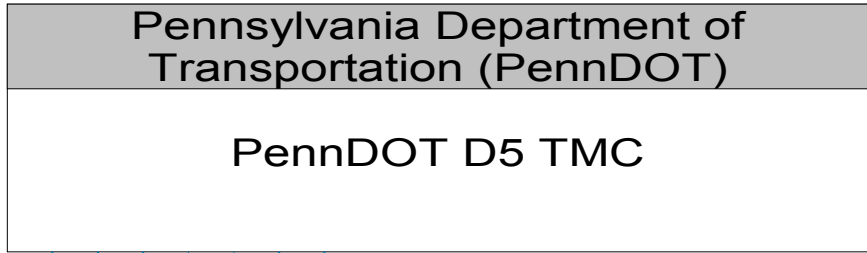
Municipal Traffic Management Offices



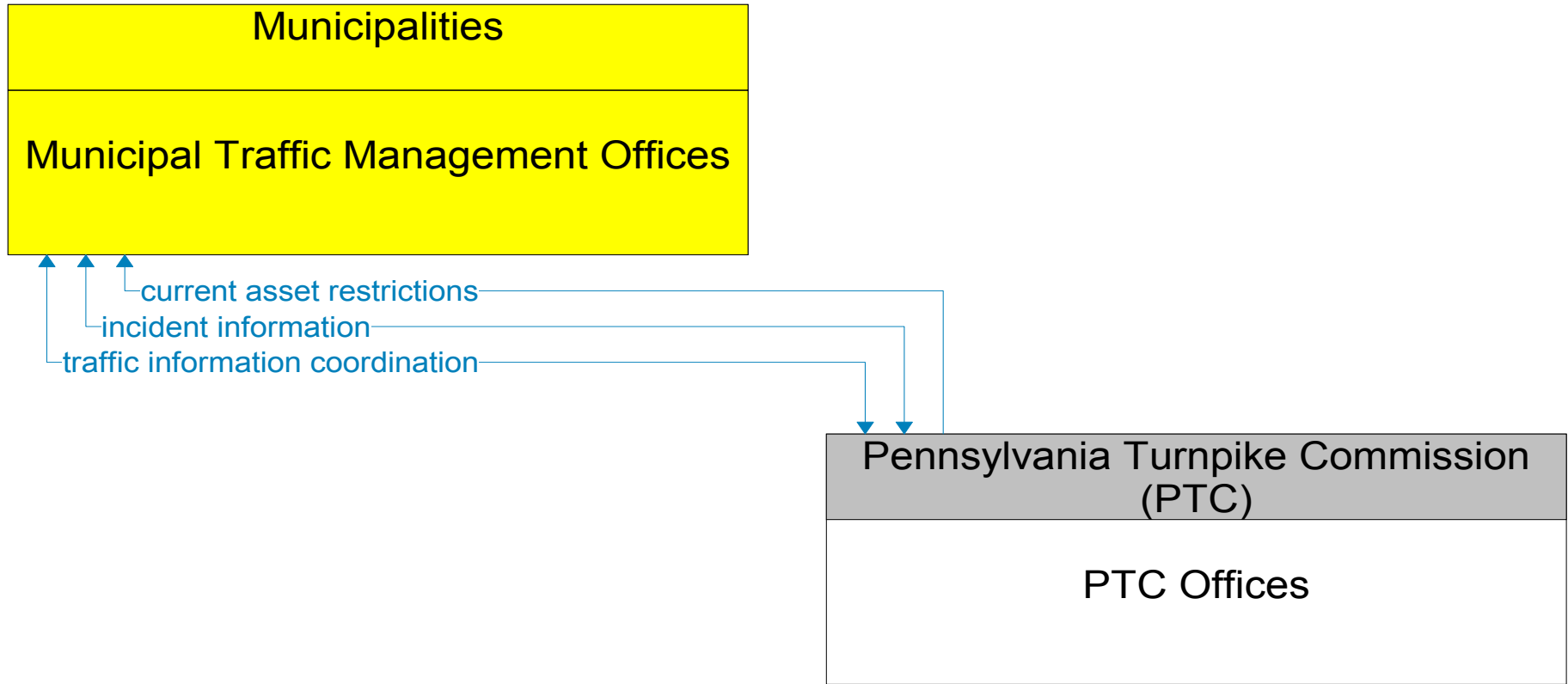
Municipal Traffic Management Offices Interconnect Diagram



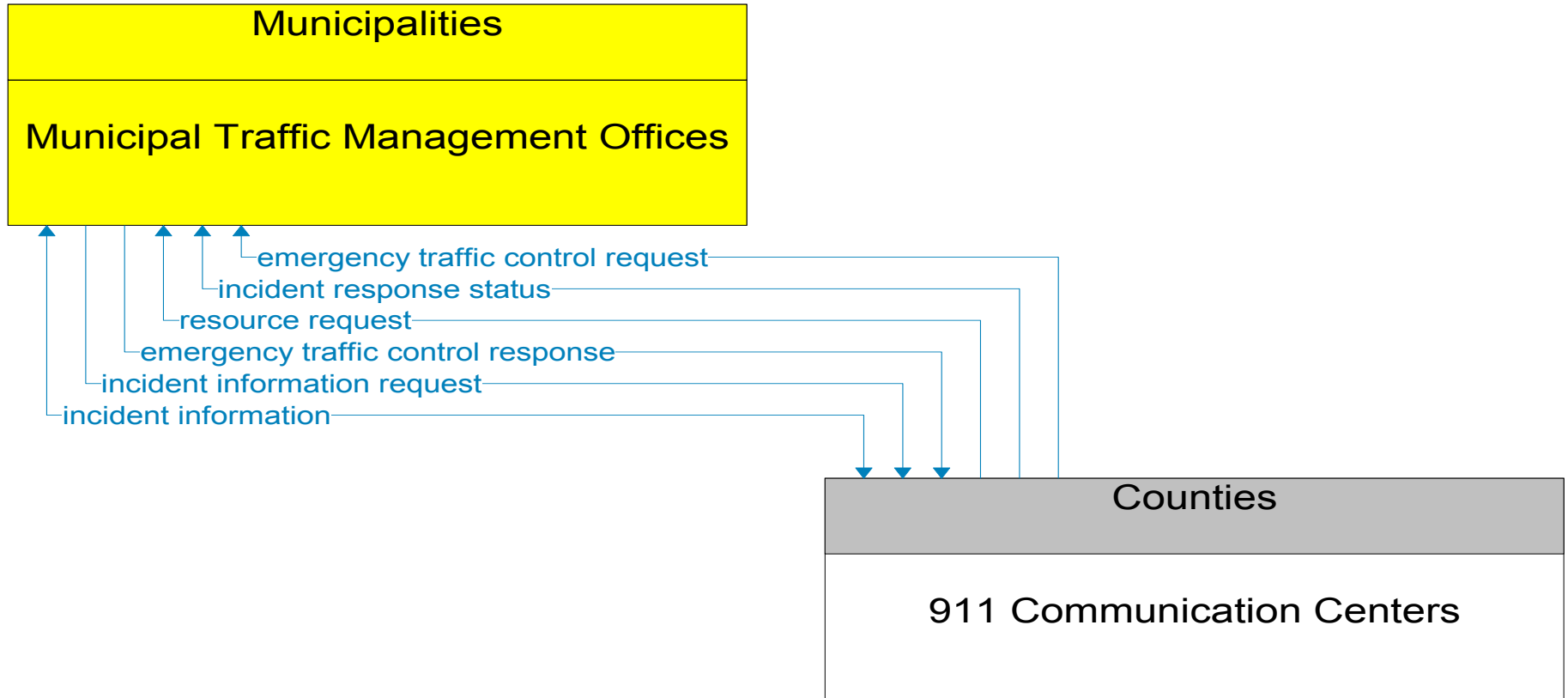
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- - - Planned



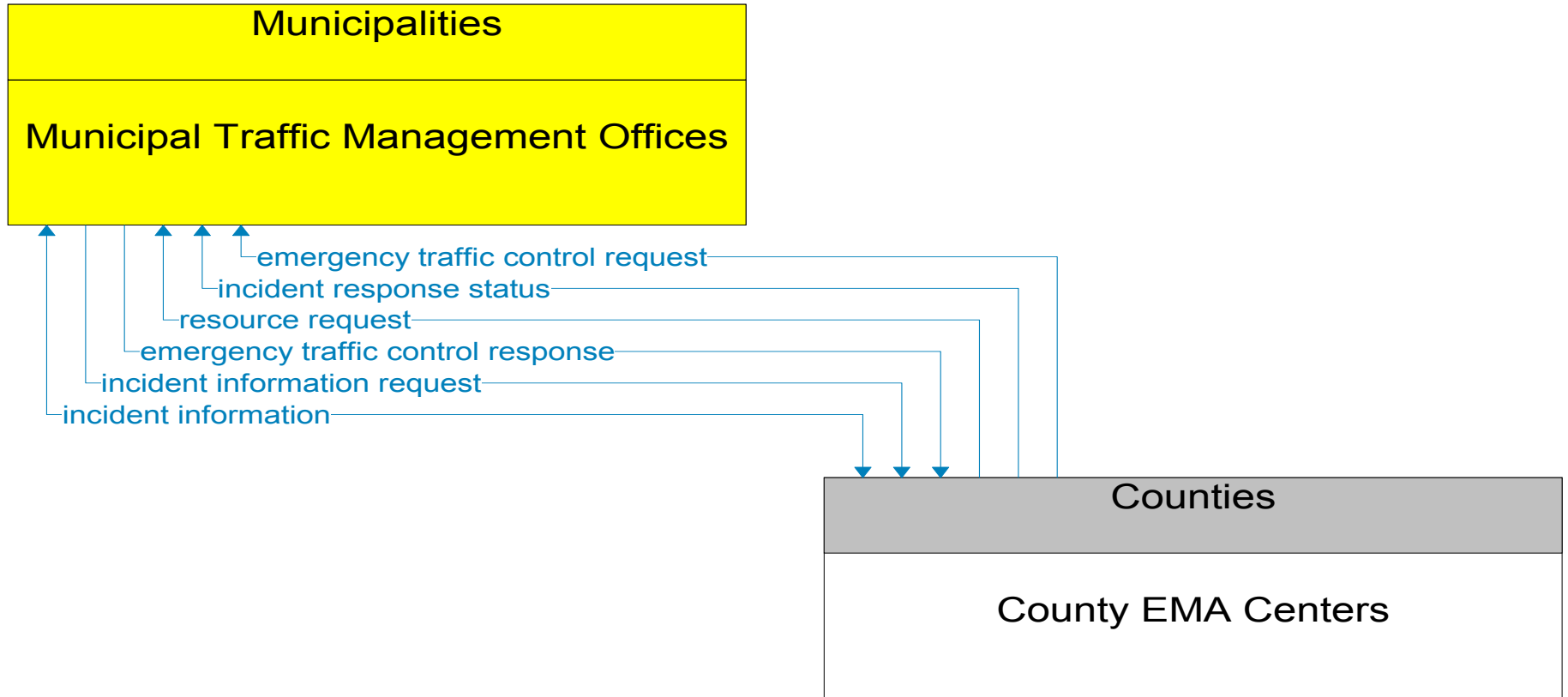
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- - - - - Planned



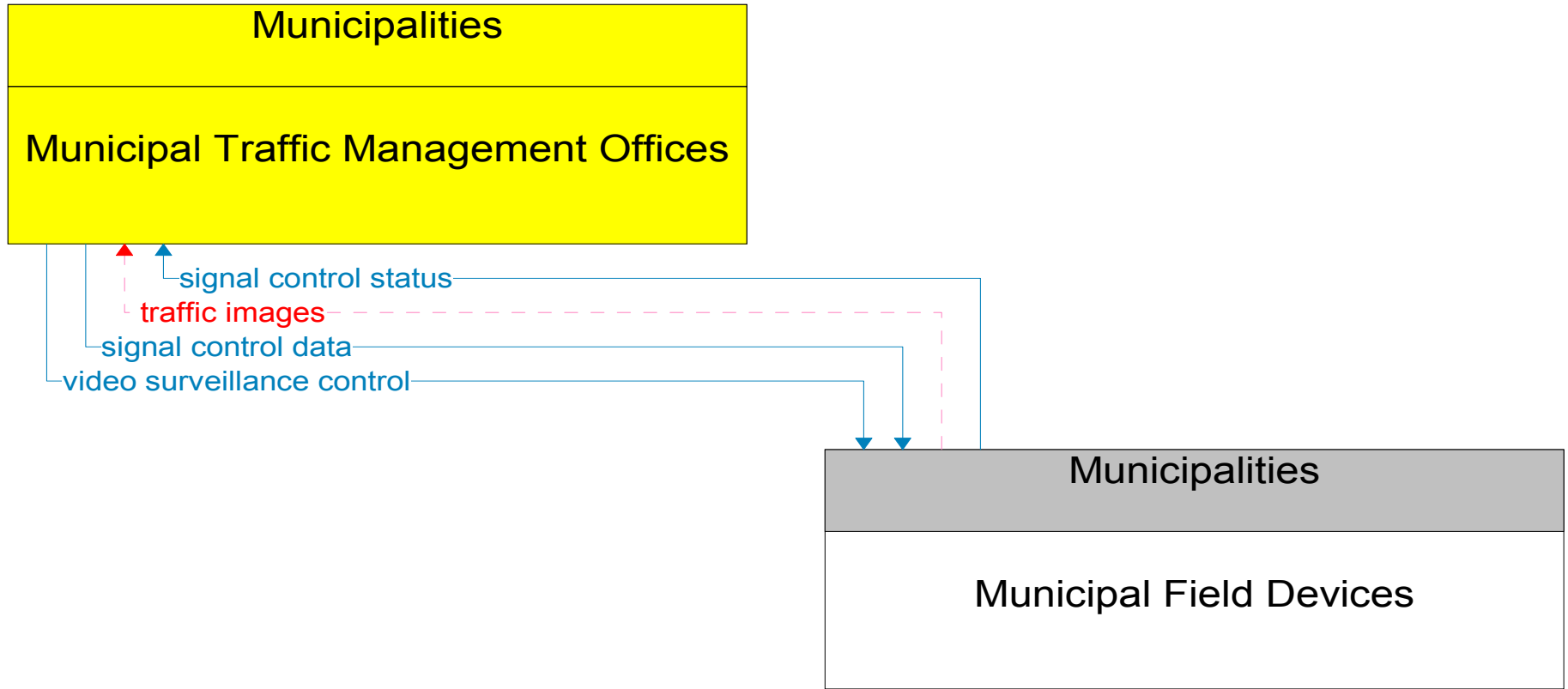
Existing
Planned



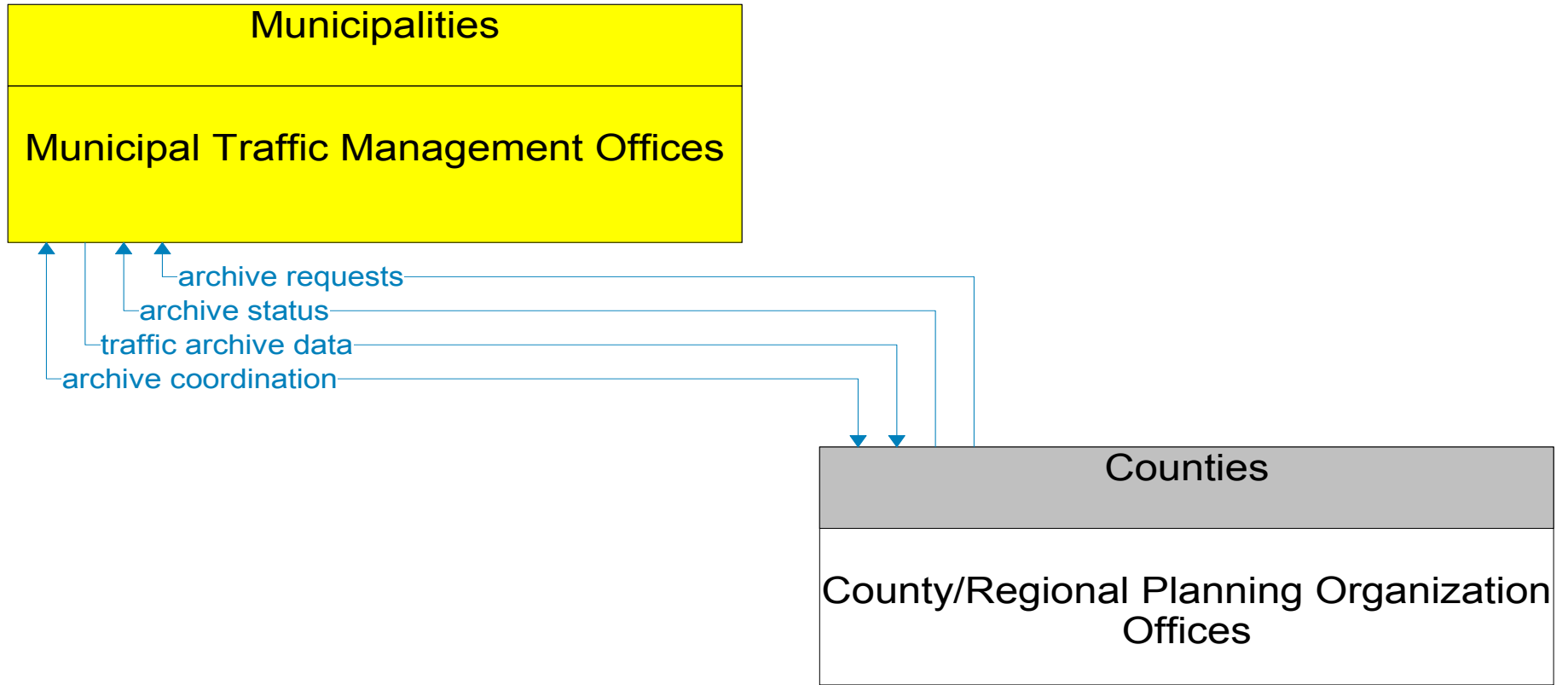
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- - - - - Planned



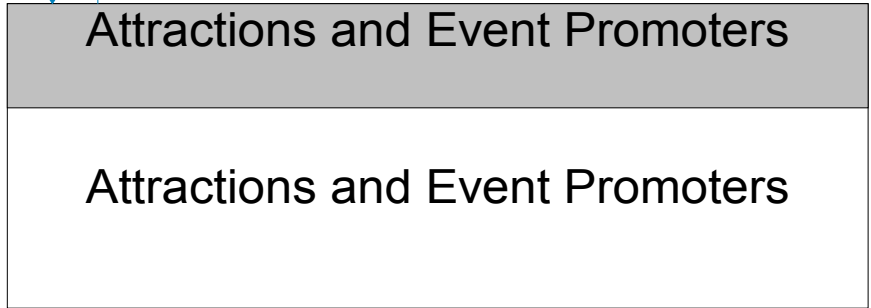
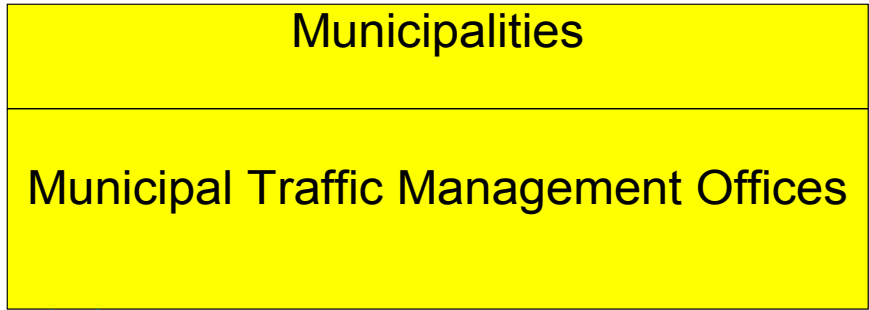
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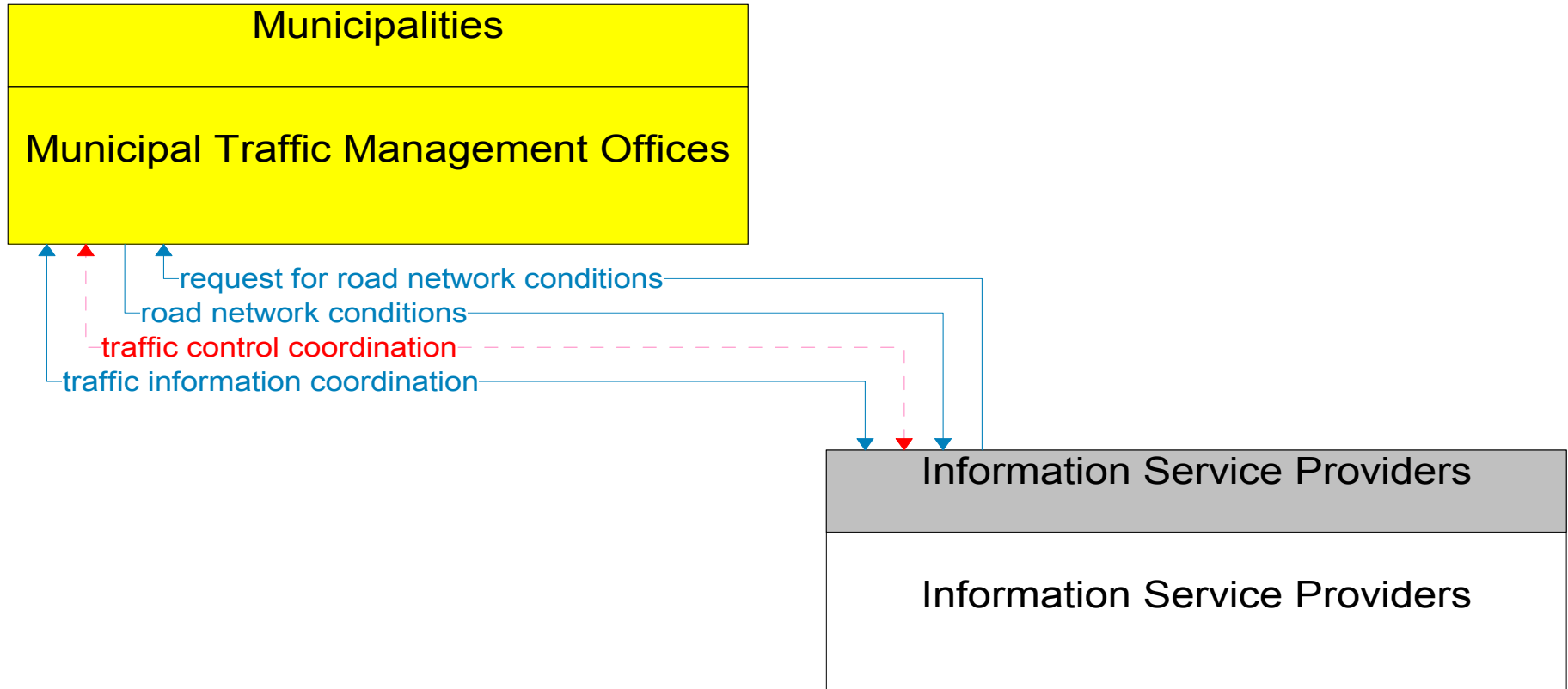
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- - - - - Planned



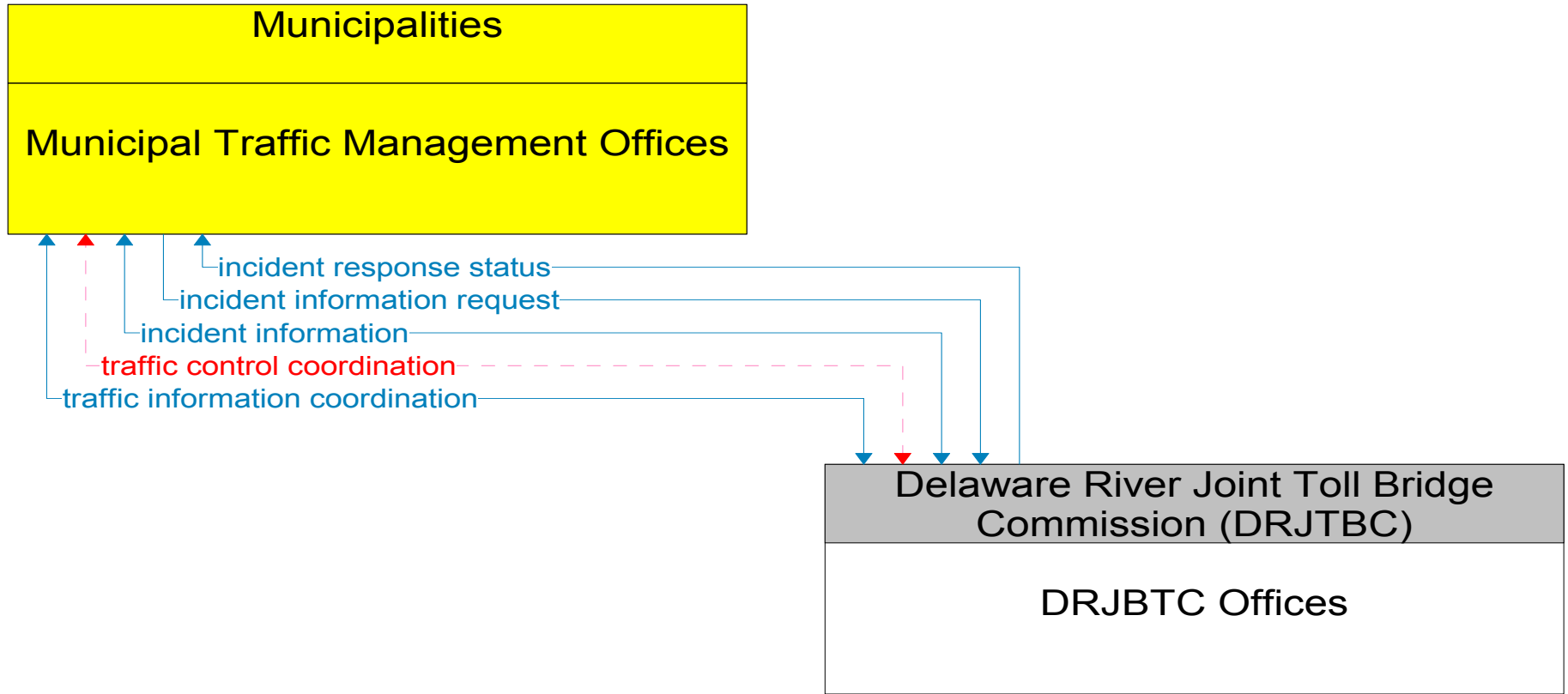
———— Existing
- - - - - Planned



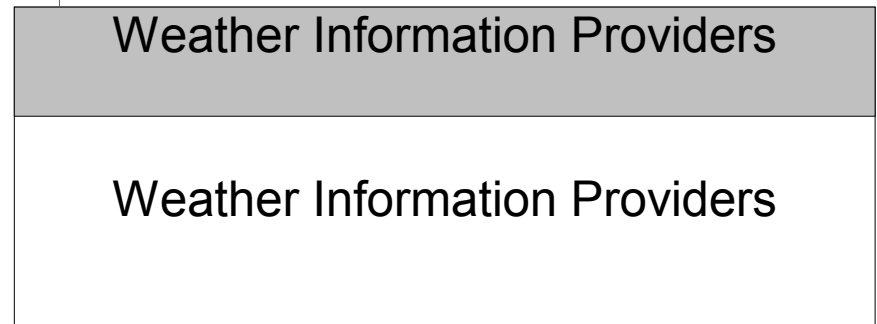
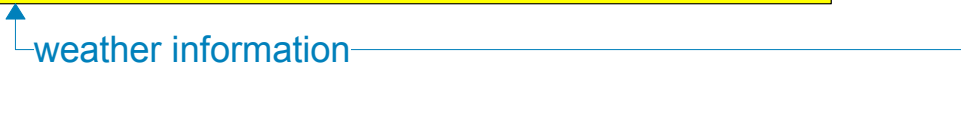
Existing
Planned

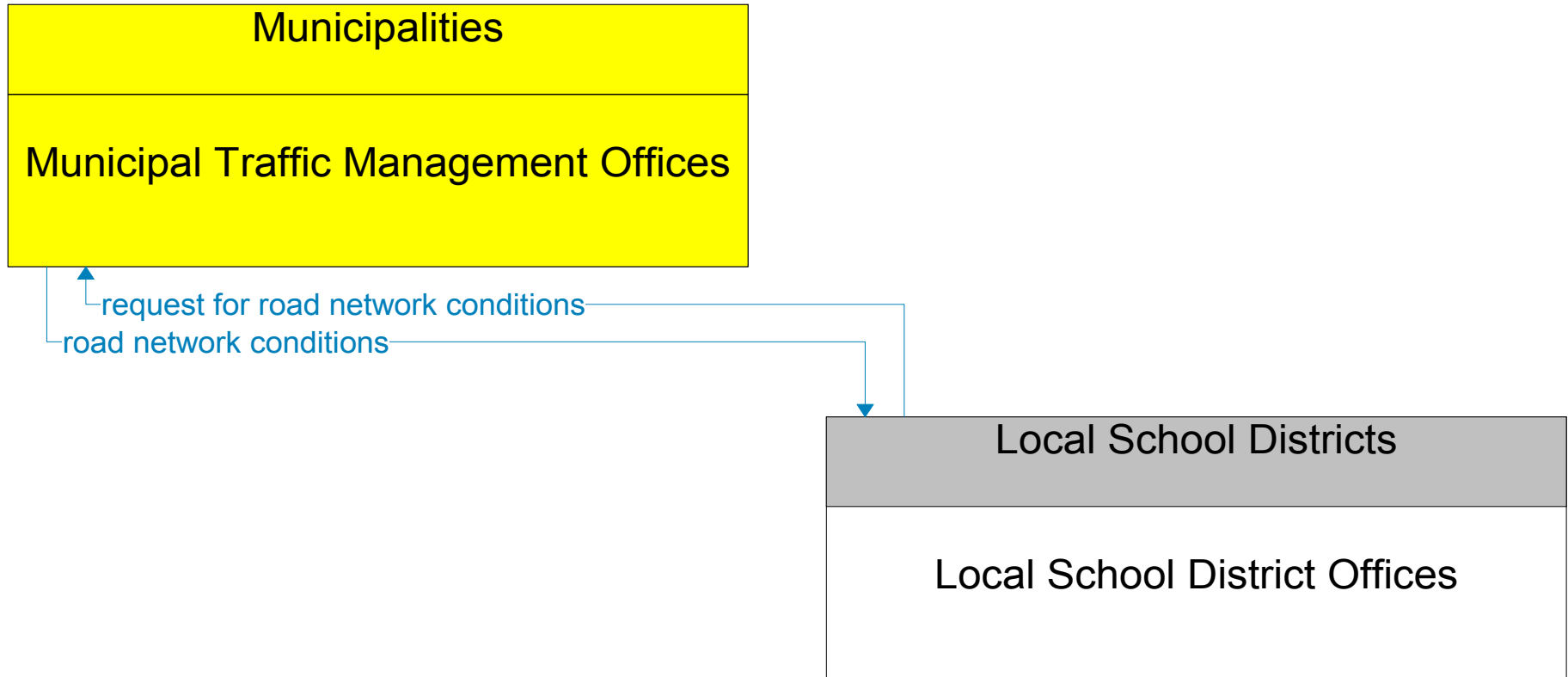


———— Existing
- - - - - Planned



———— Existing
- - - - - Planned

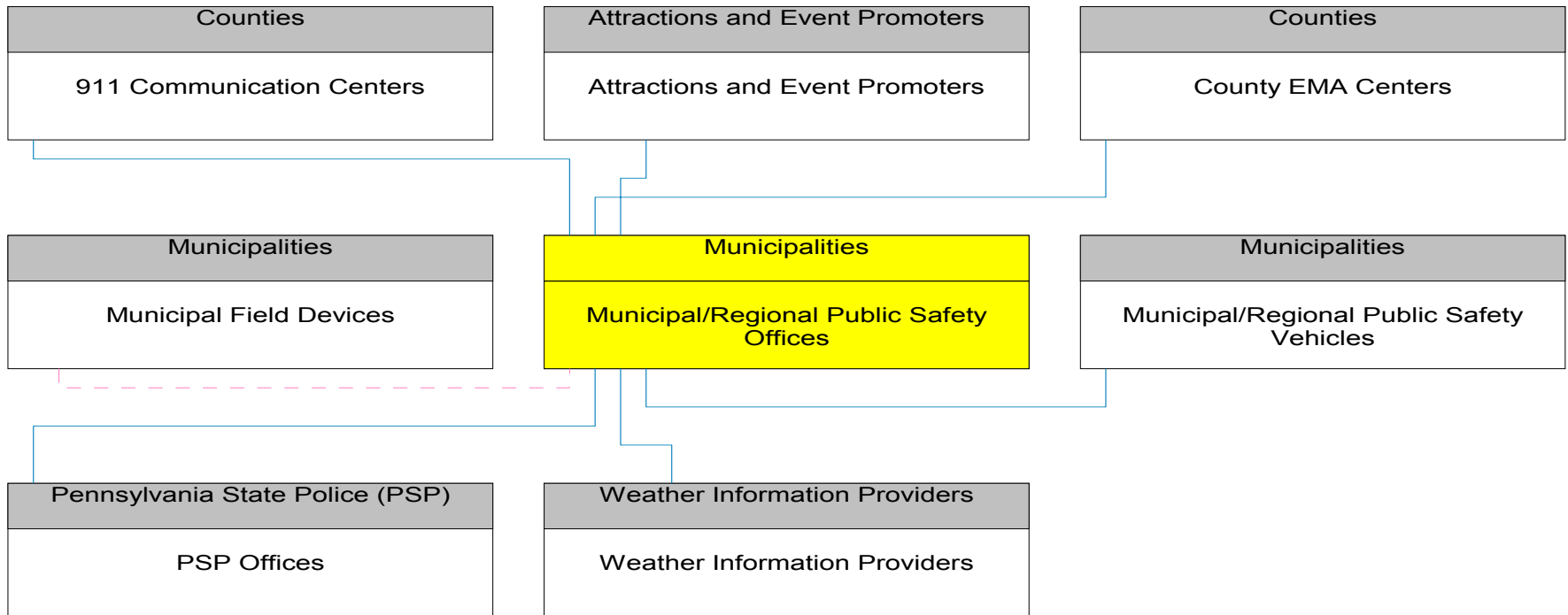




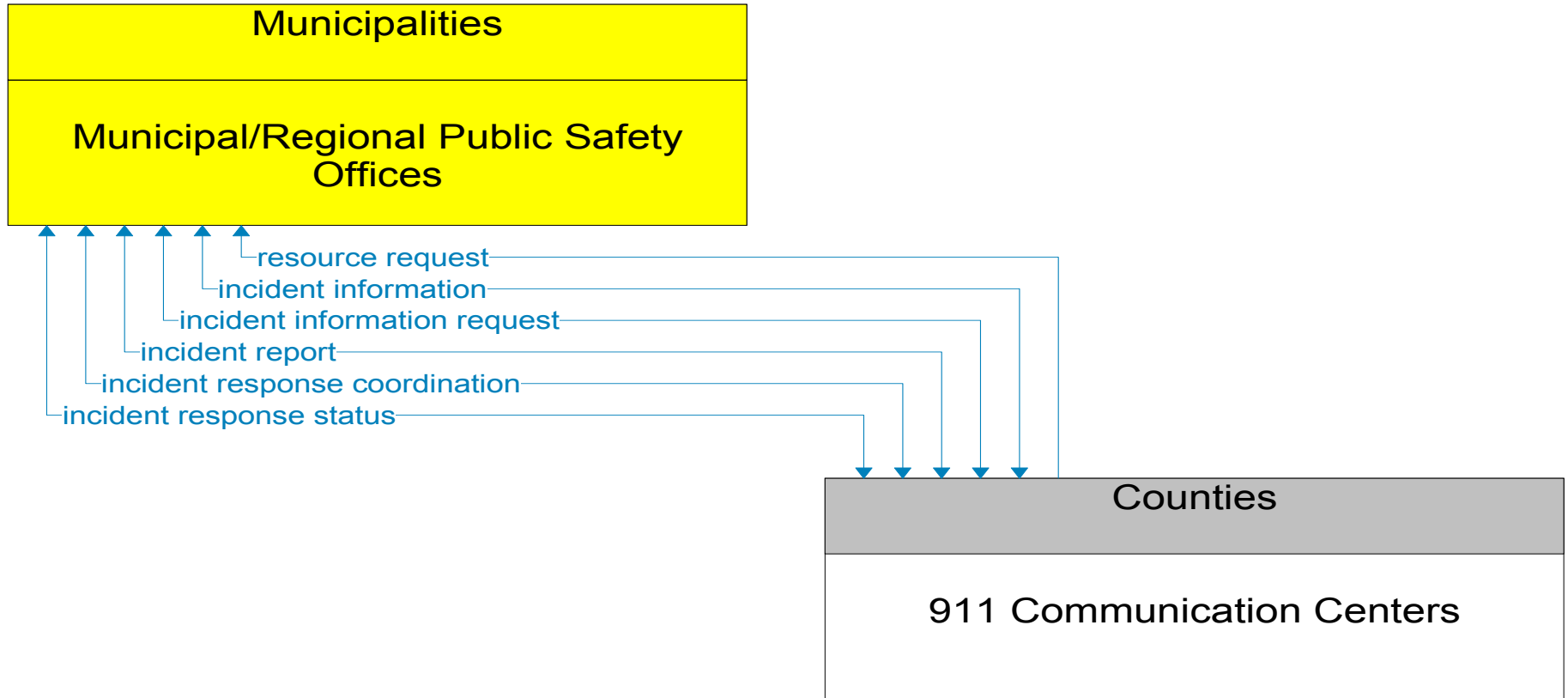
Municipal/Regional Public Safety Offices



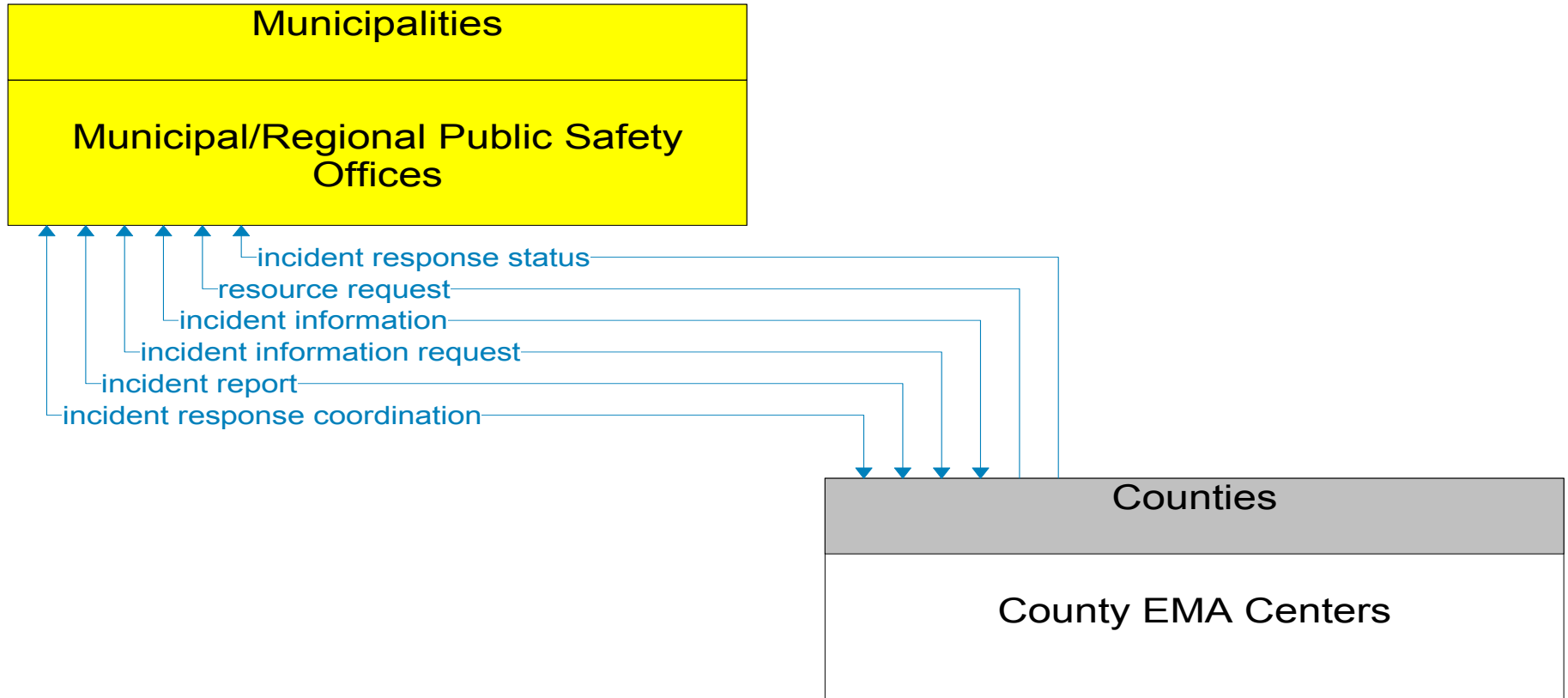
Municipal/Regional Public Safety Offices Interconnect Diagram



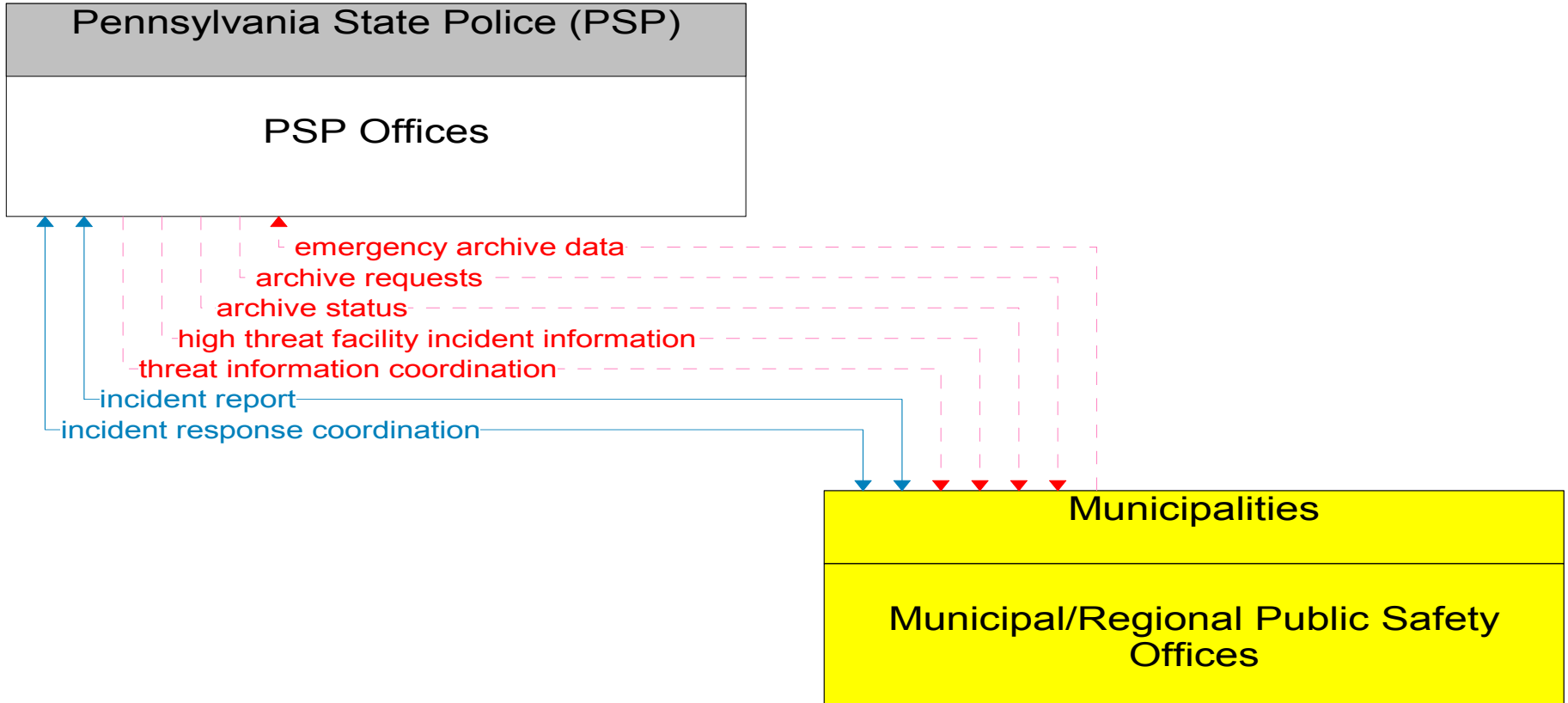
— Existing
- - - Planned



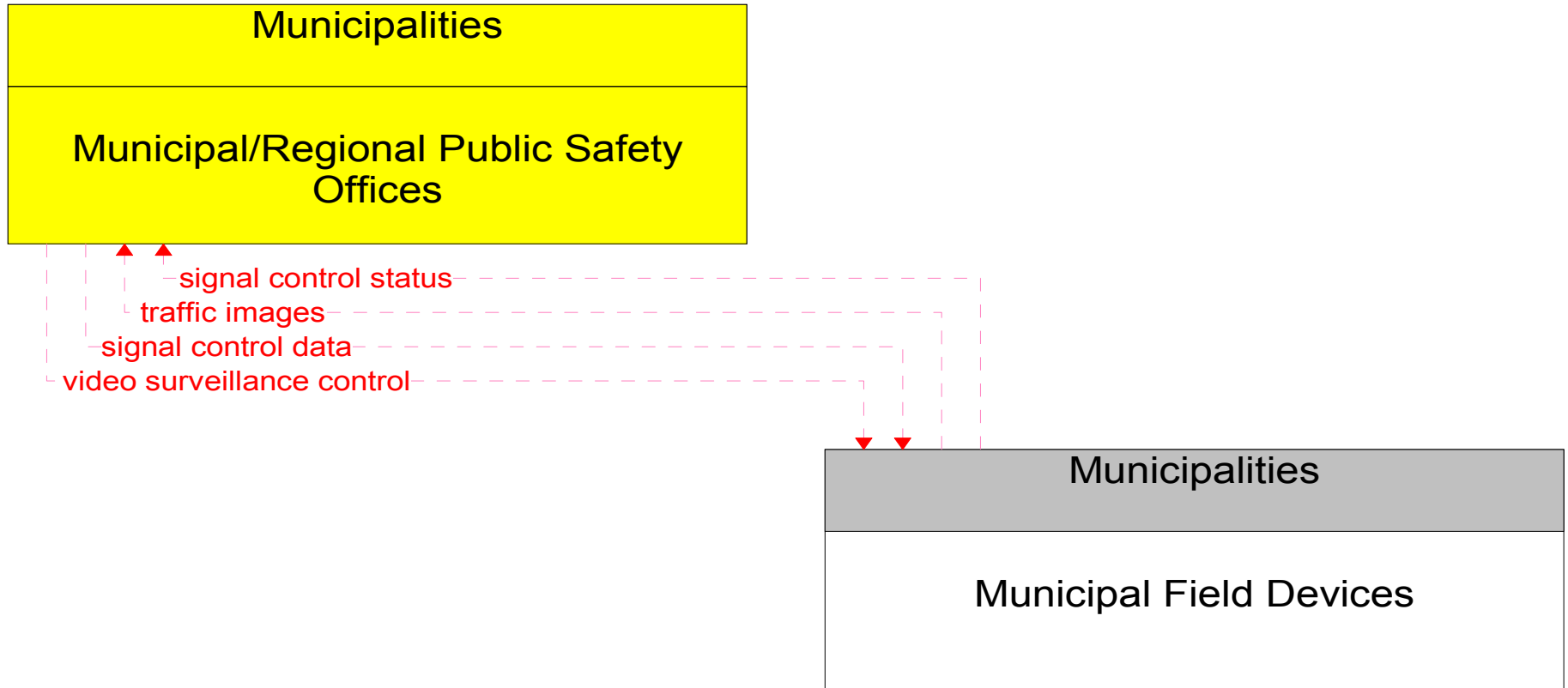
Existing
Planned



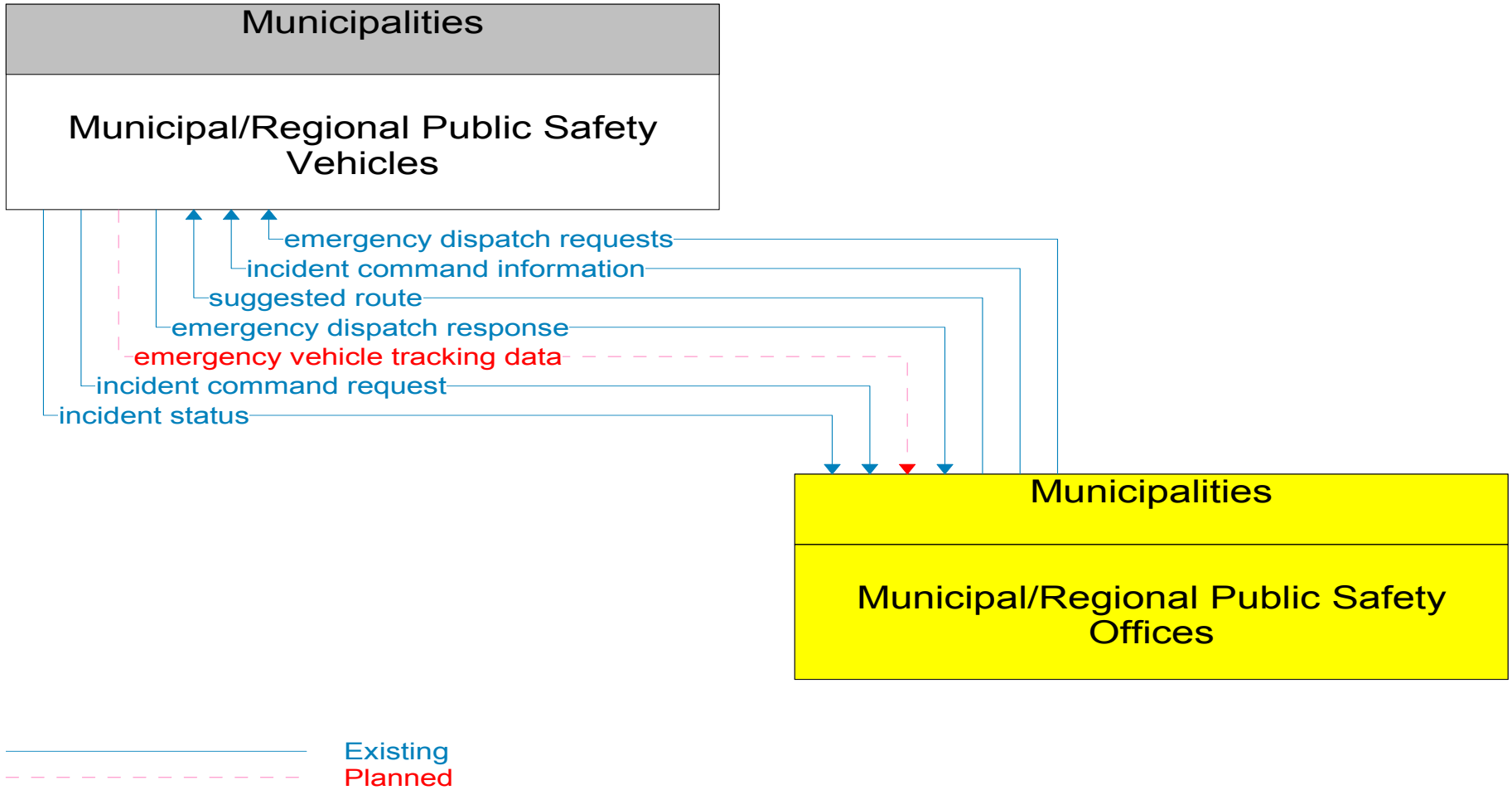
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- - - - - Planned

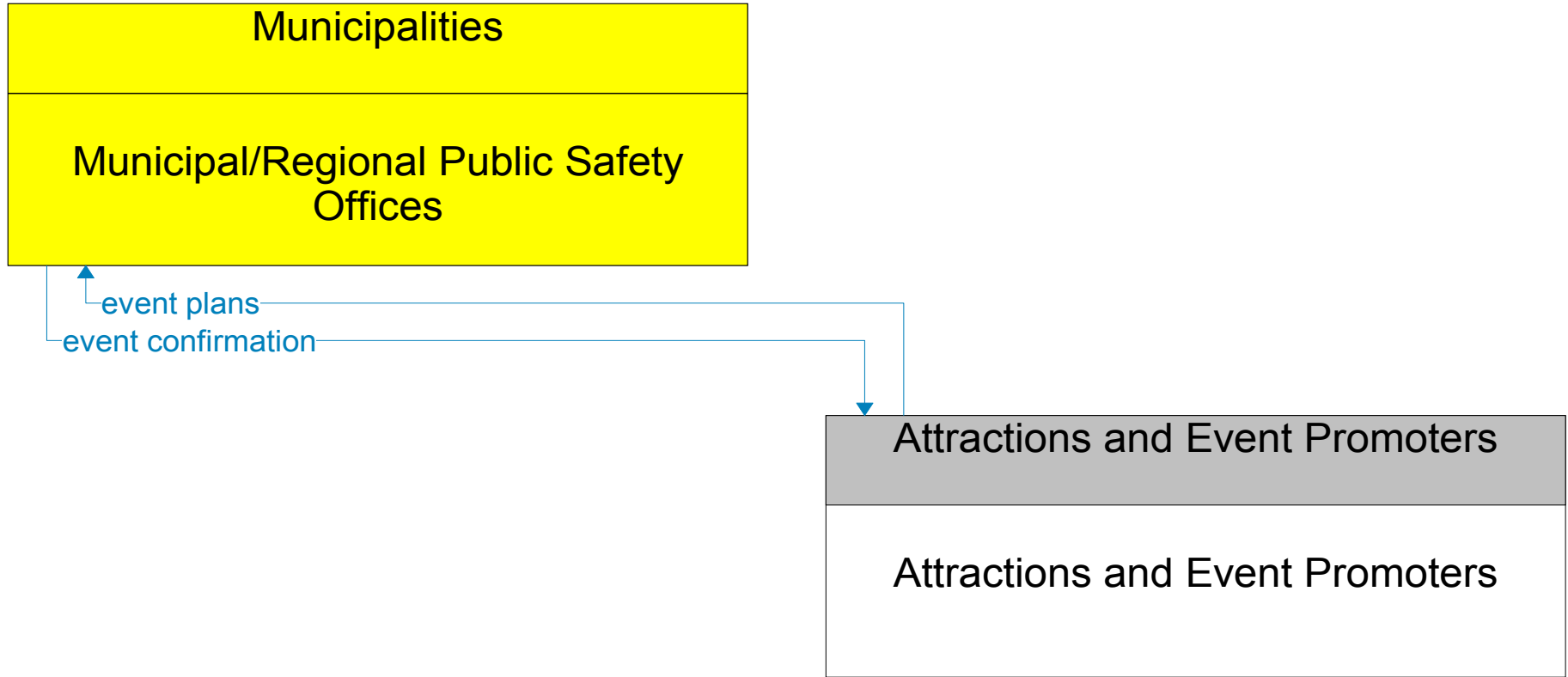


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- - - - - Planned

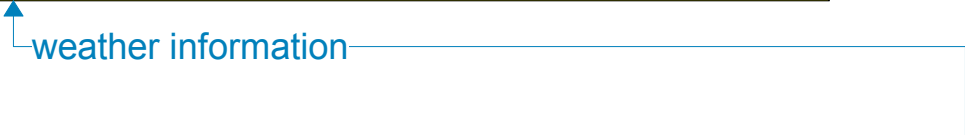
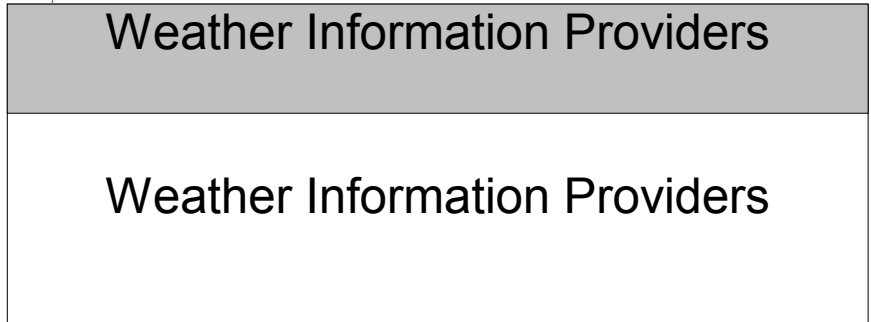


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- - - - - Planned



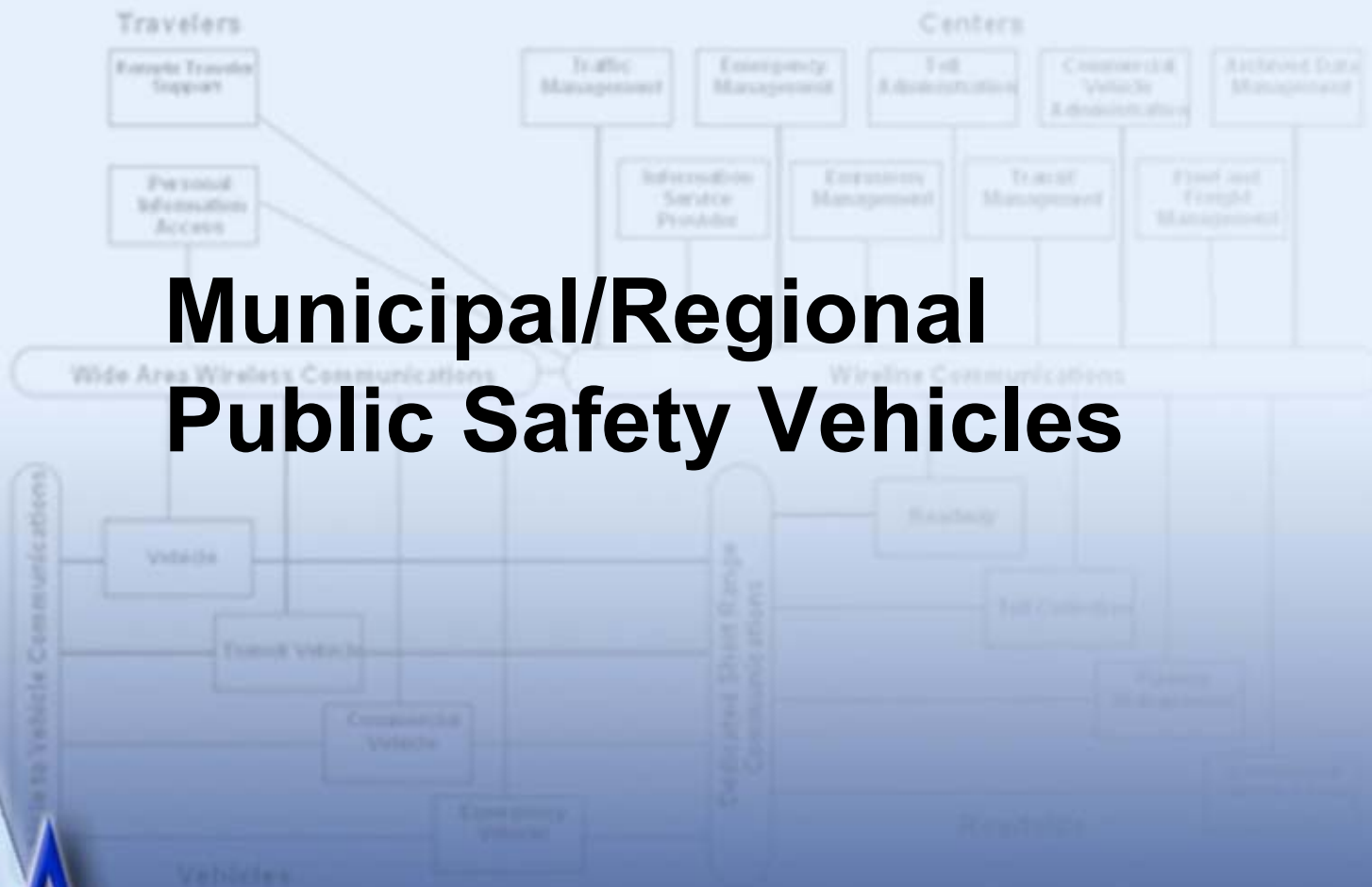


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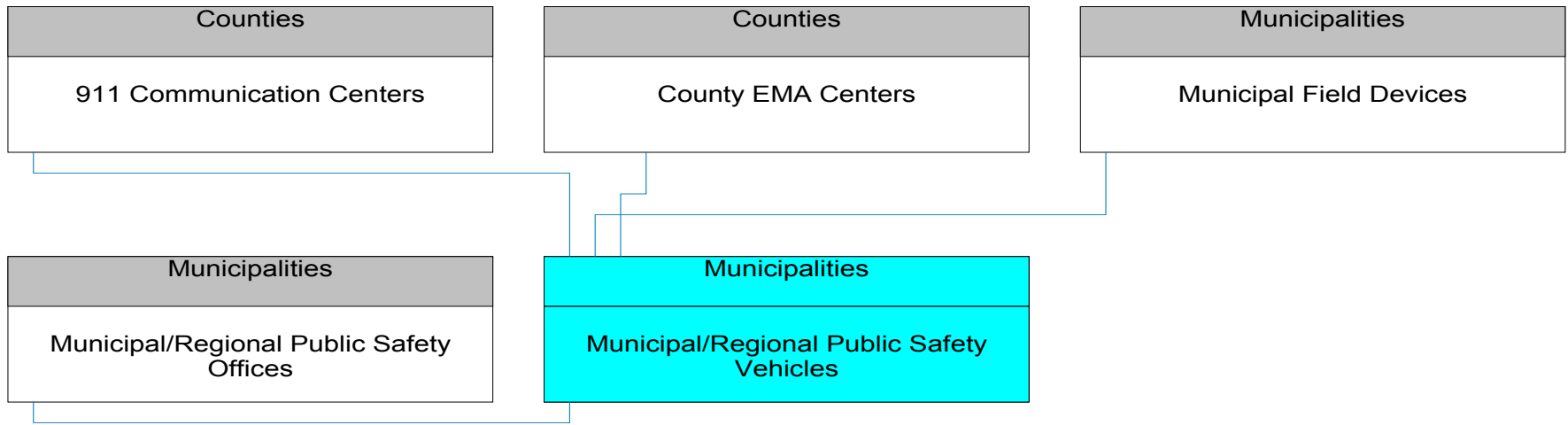


———— Existing
- - - - - Planned

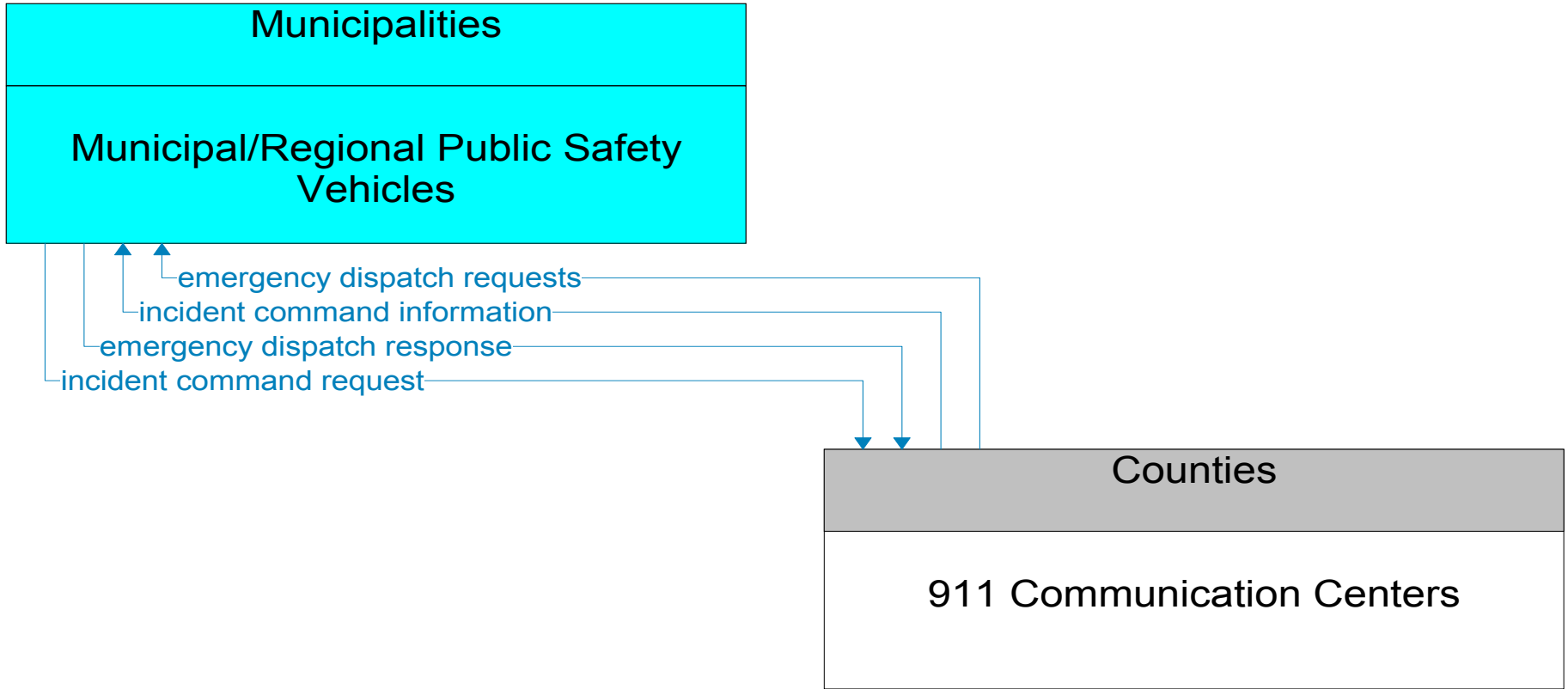
Municipal/Regional Public Safety Vehicles



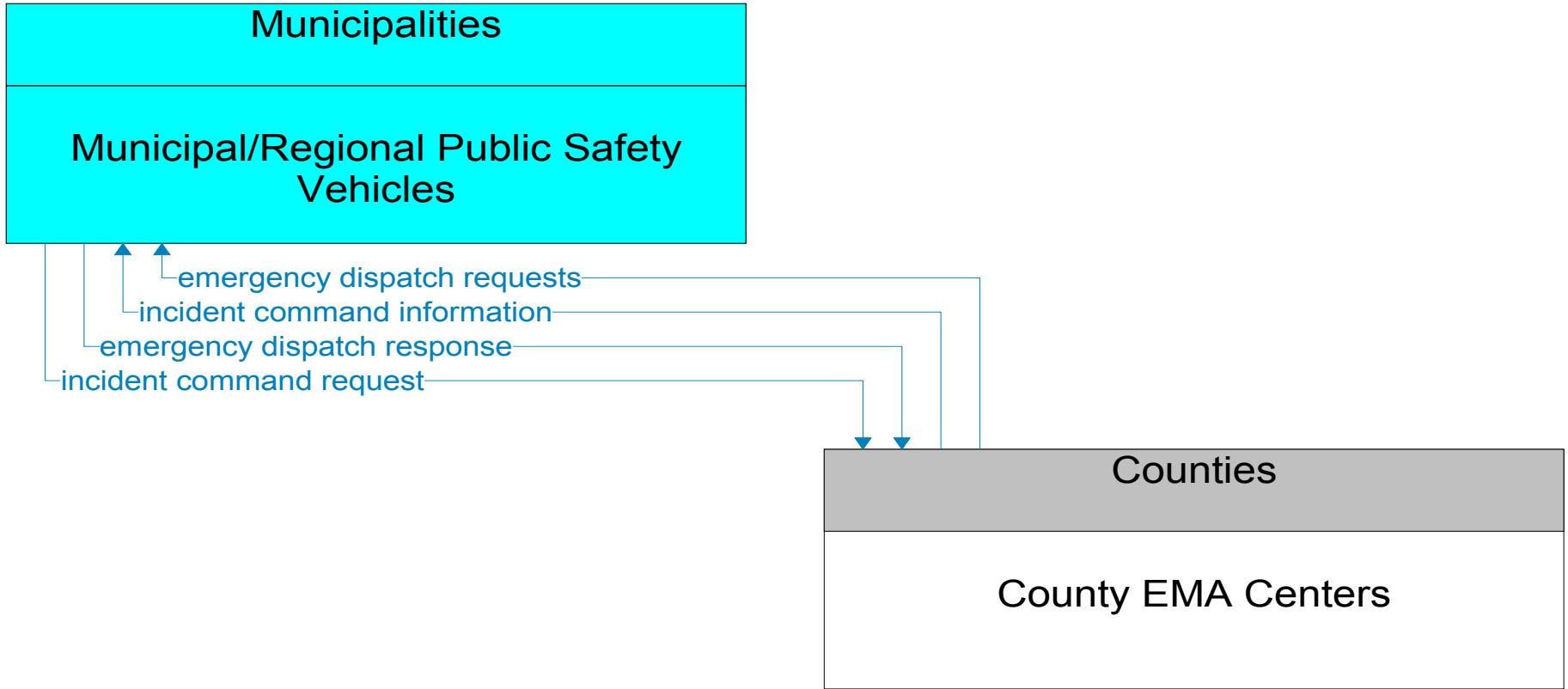
Municipal/Regional Public Safety Vehicles Interconnect Diagram



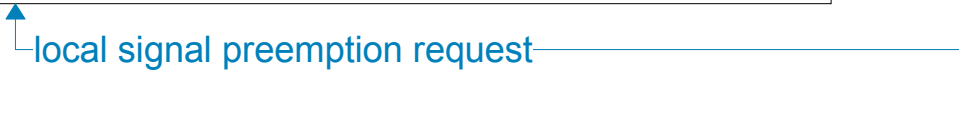
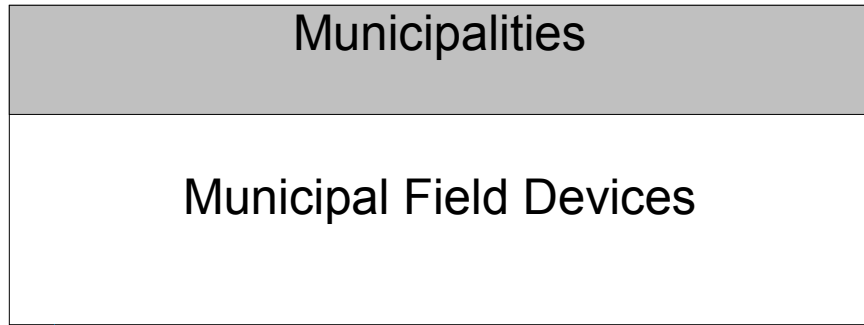
— Existing
- - - Planned



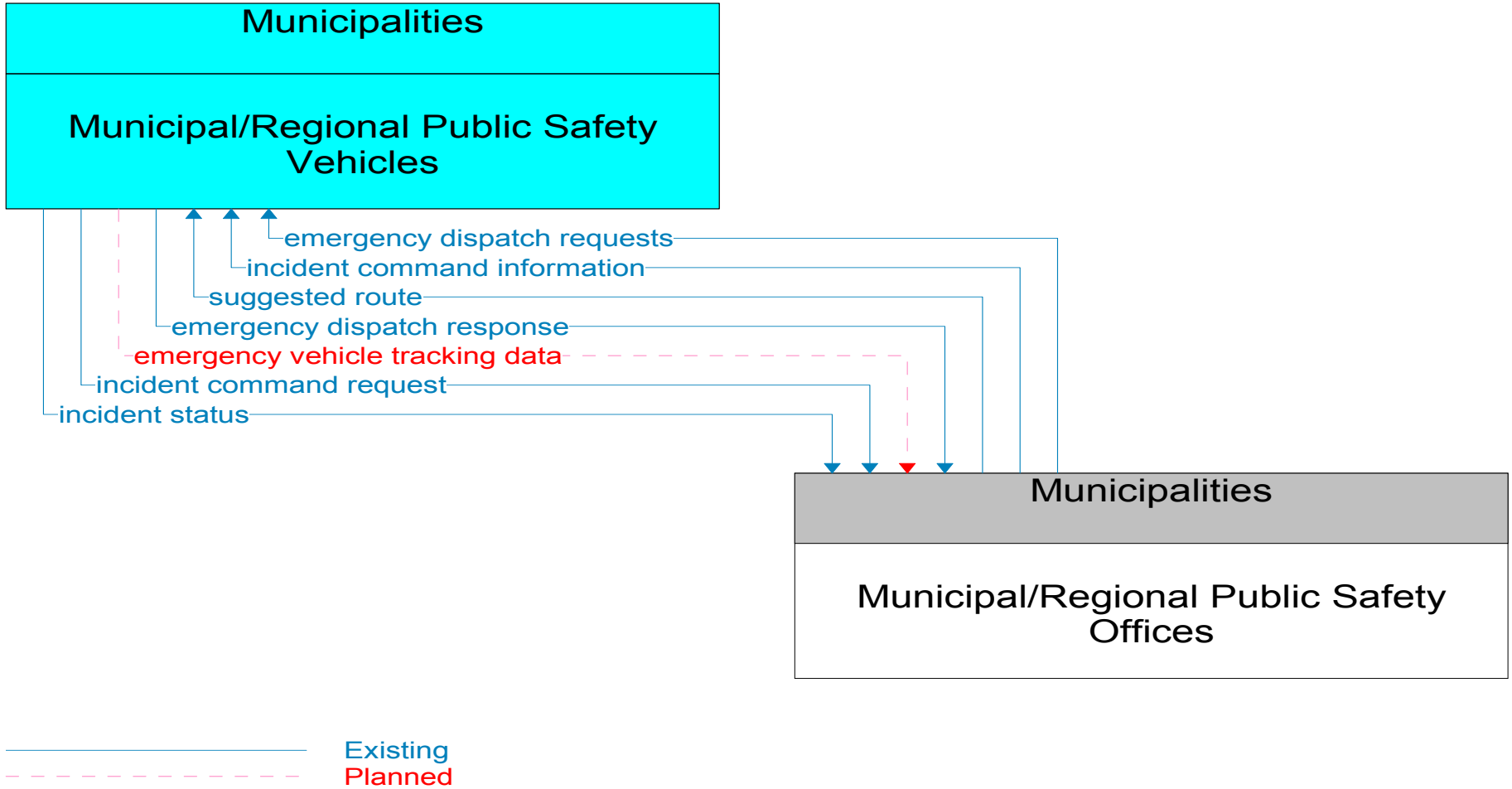
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----- Planned



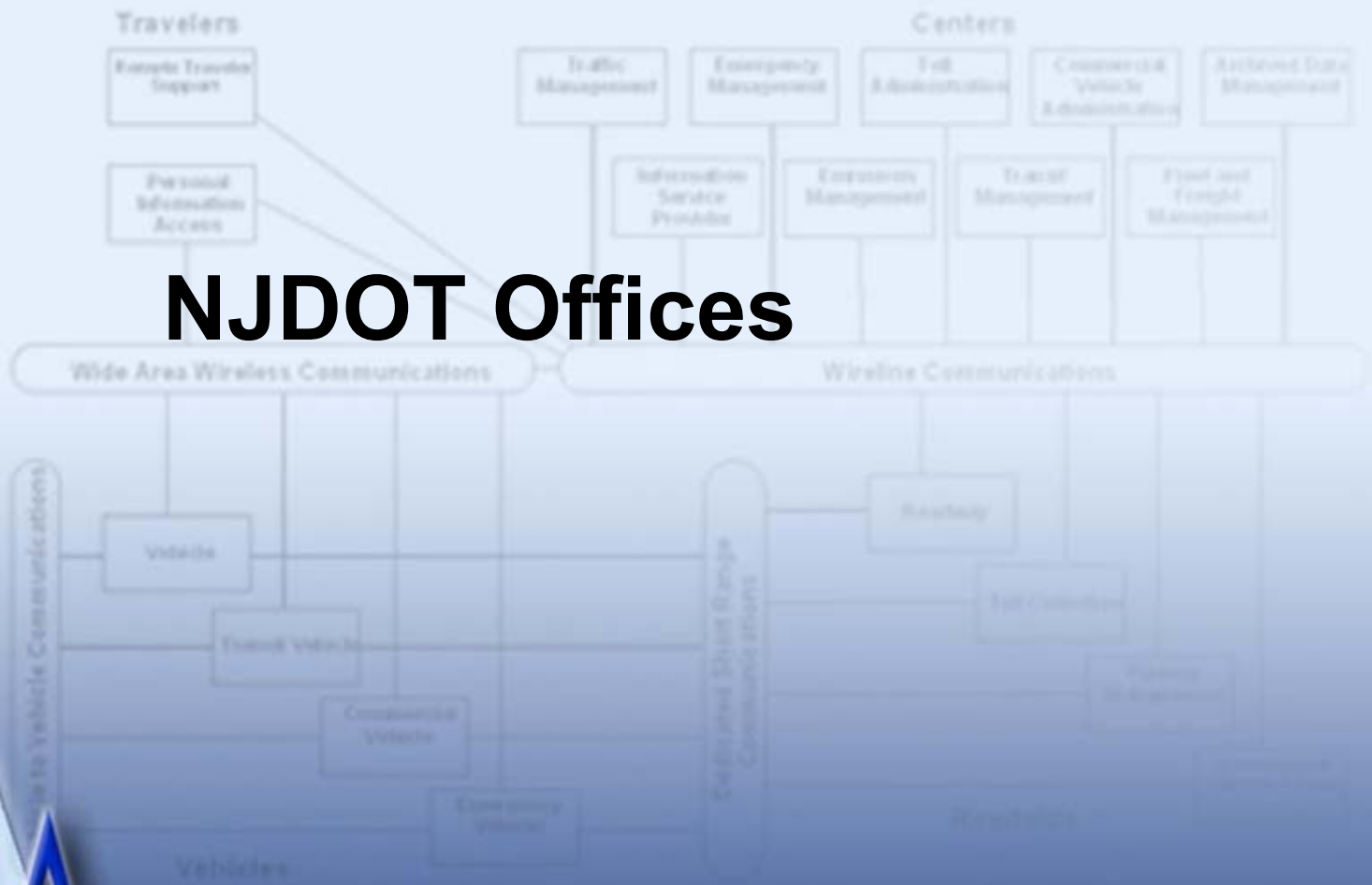
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----- Planned



———— Existing
- - - - - Planned

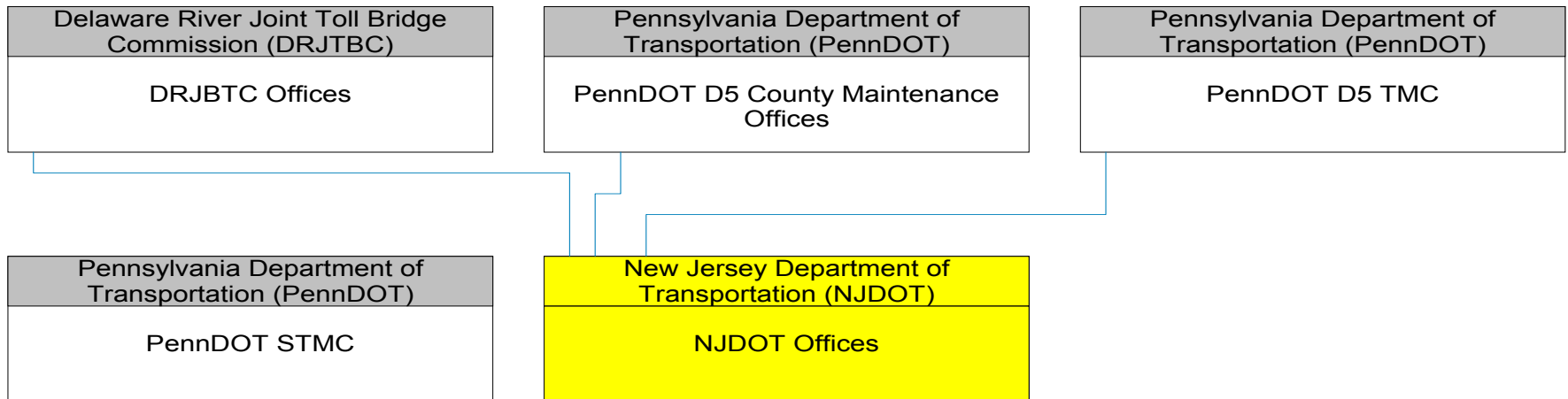


NJDOT Offices

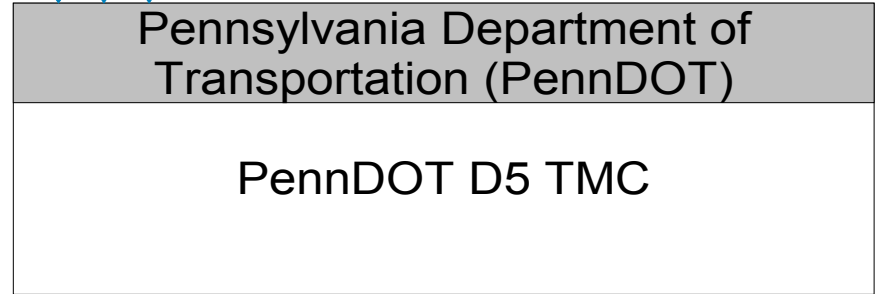
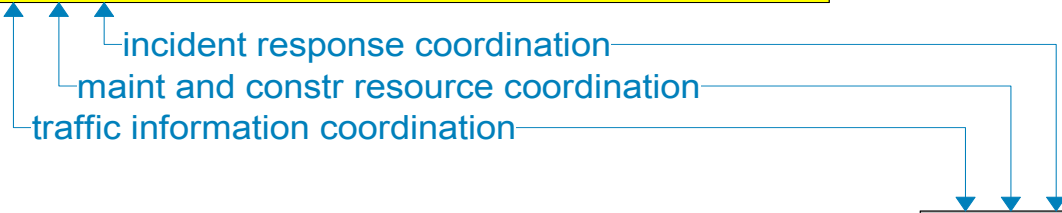
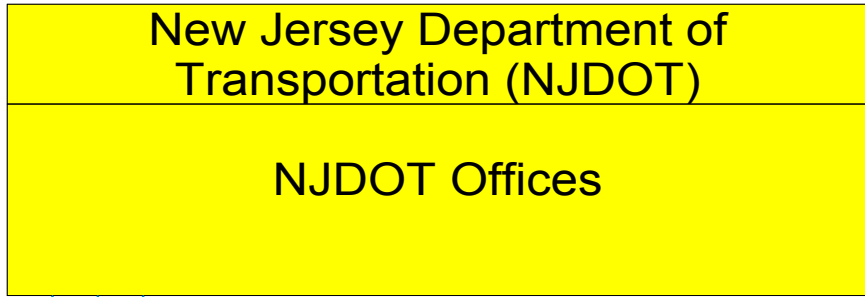


PA

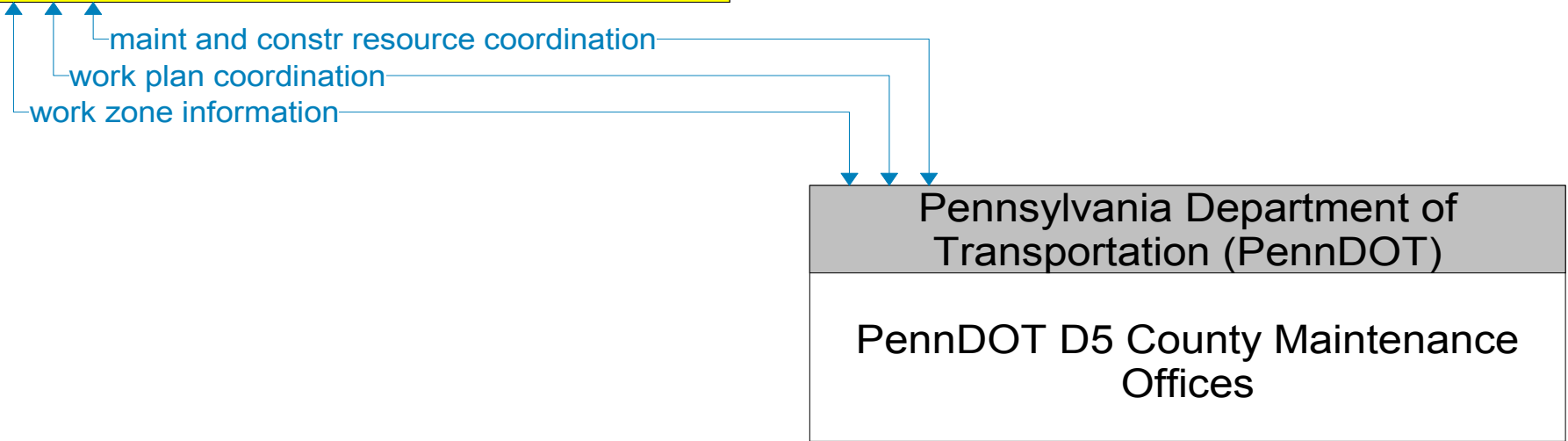
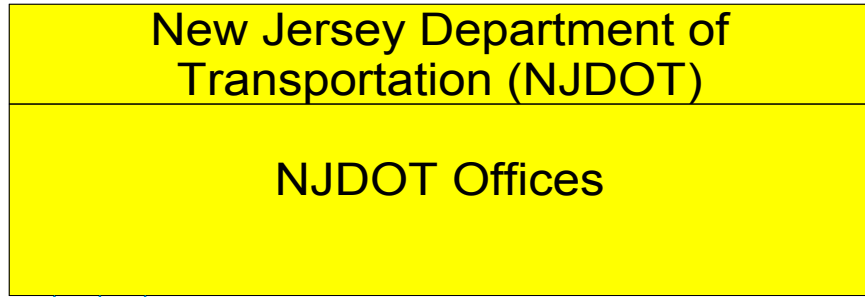
NJDOT Offices Interconnect Diagram



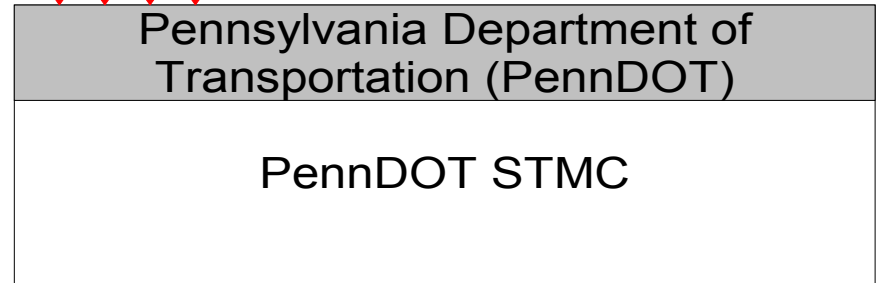
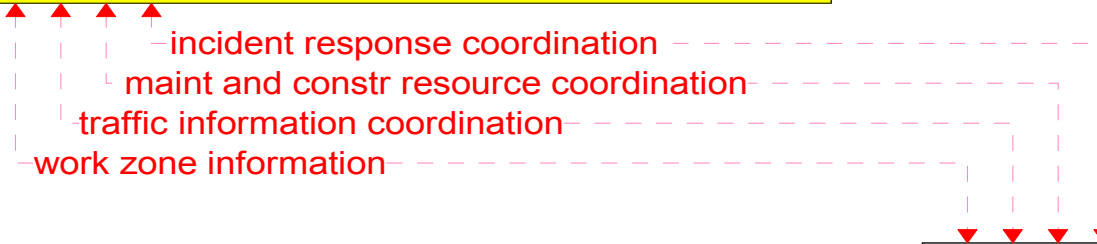
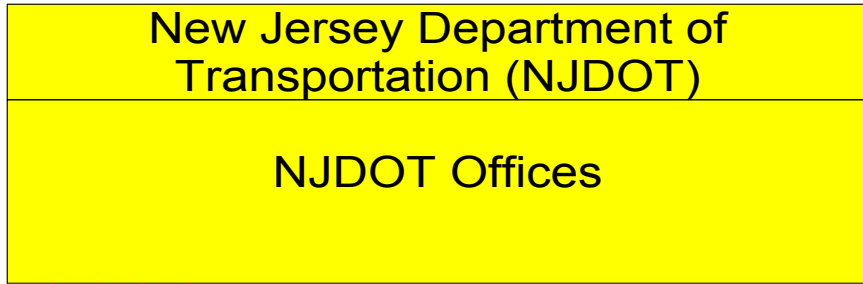
— Existing
- - - Planned



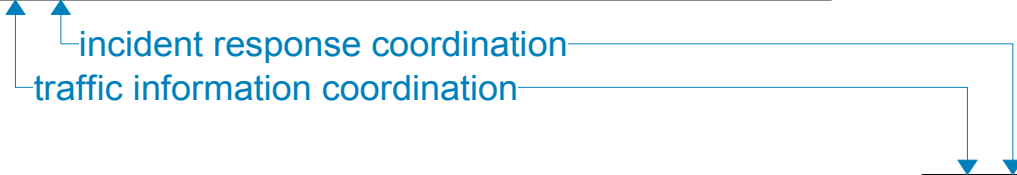
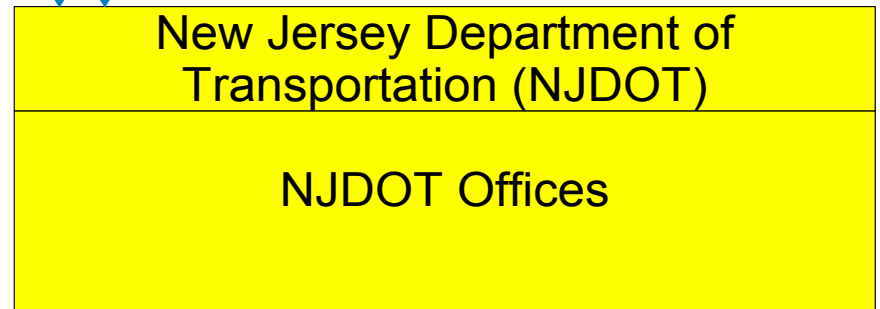
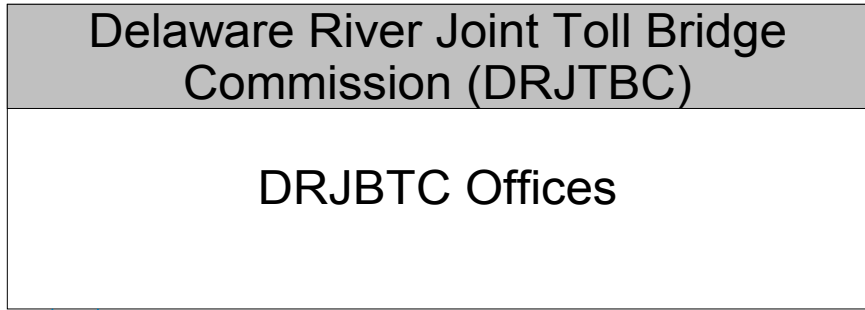
Existing
Planned



Existing
Planned

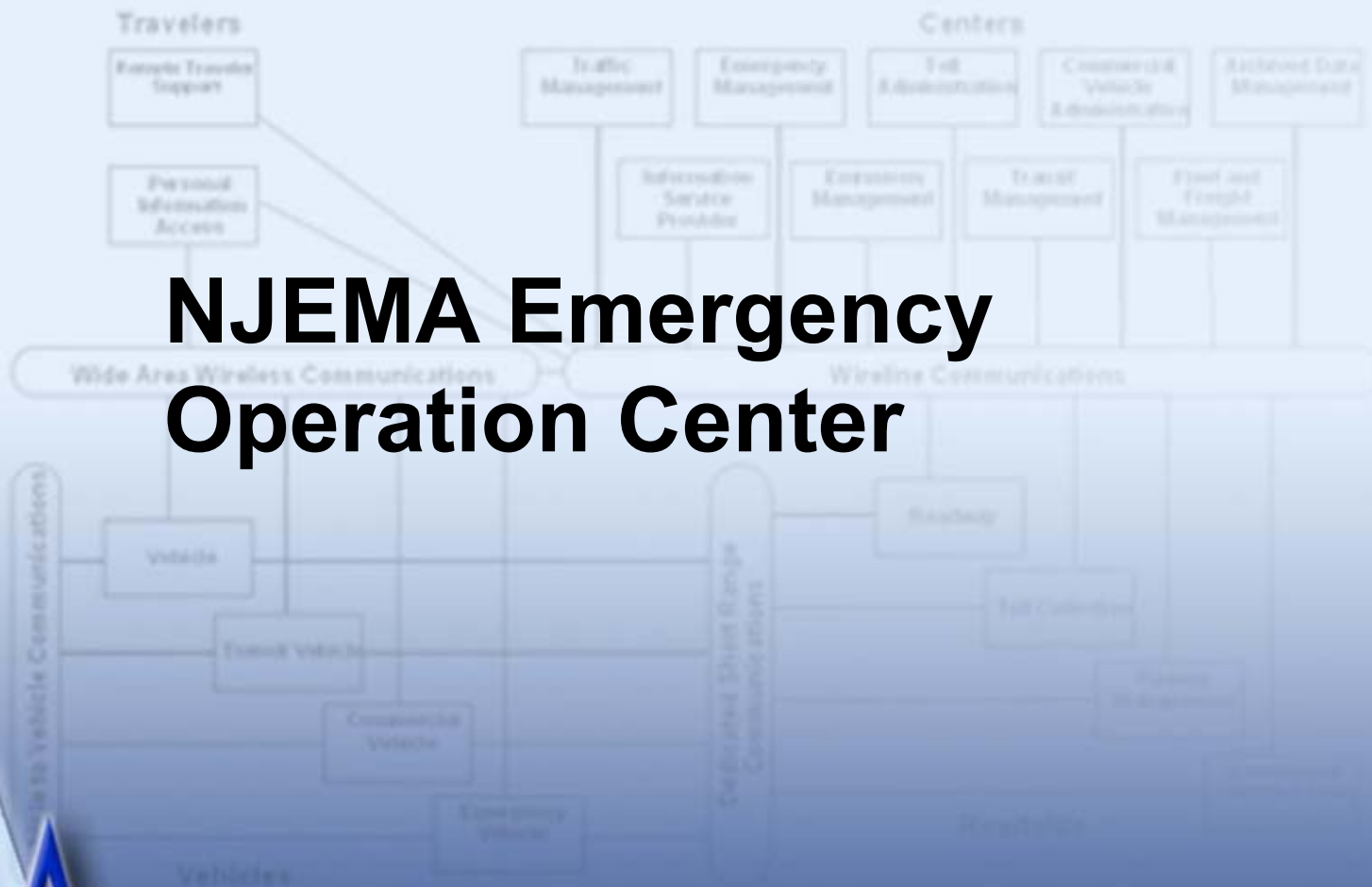


———— Existing
- - - - - Planned



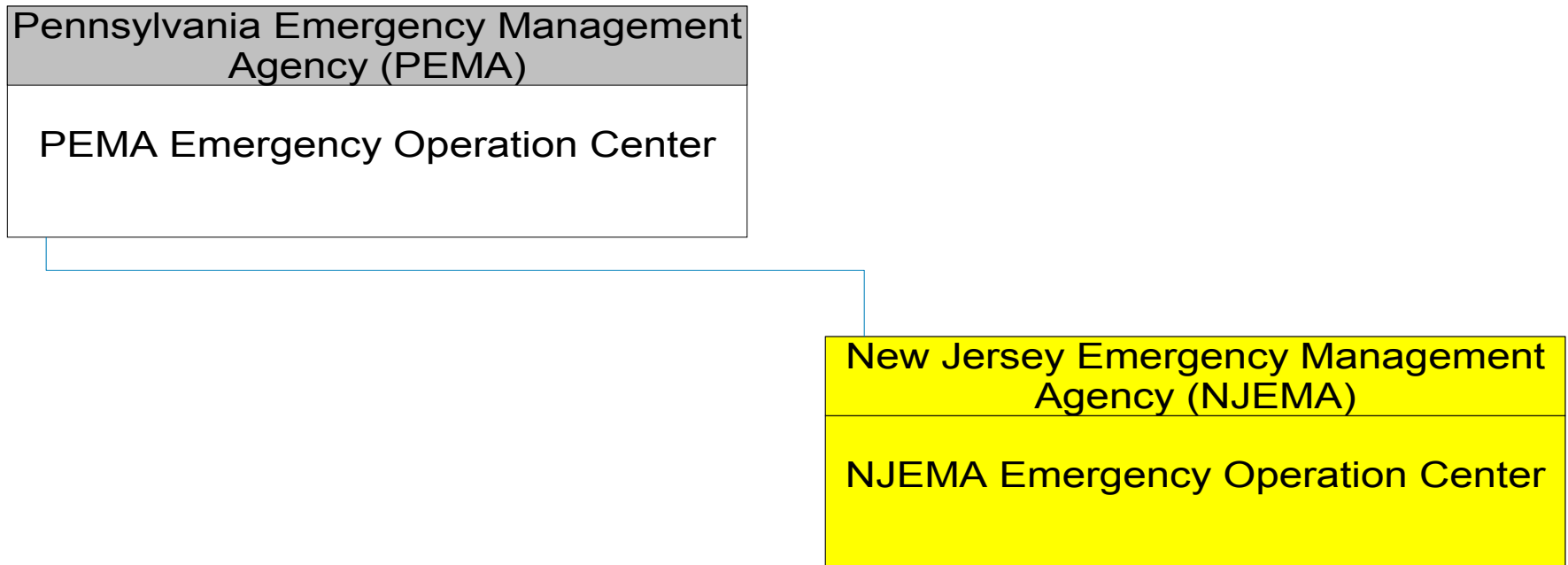
———— Existing
----- Planned

NJEMA Emergency Operation Center



PA

NJEMA Emergency Operation Center Interconnect Diagram



———— Existing
----- Planned

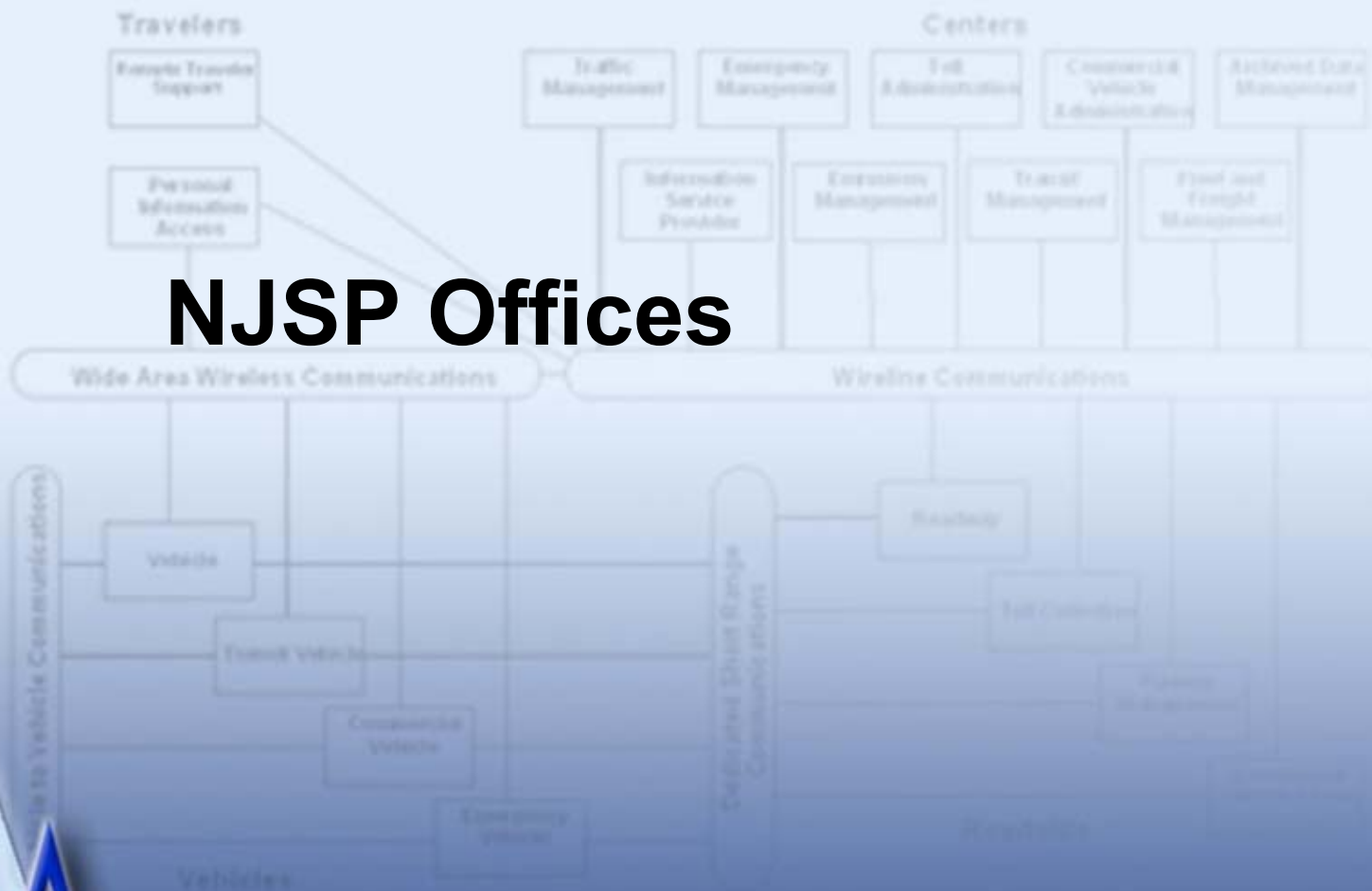
New Jersey Emergency Management Agency (NJEMA)
NJEMA Emergency Operation Center

incident response coordination
threat information coordination

Pennsylvania Emergency Management Agency (PEMA)
PEMA Emergency Operation Center

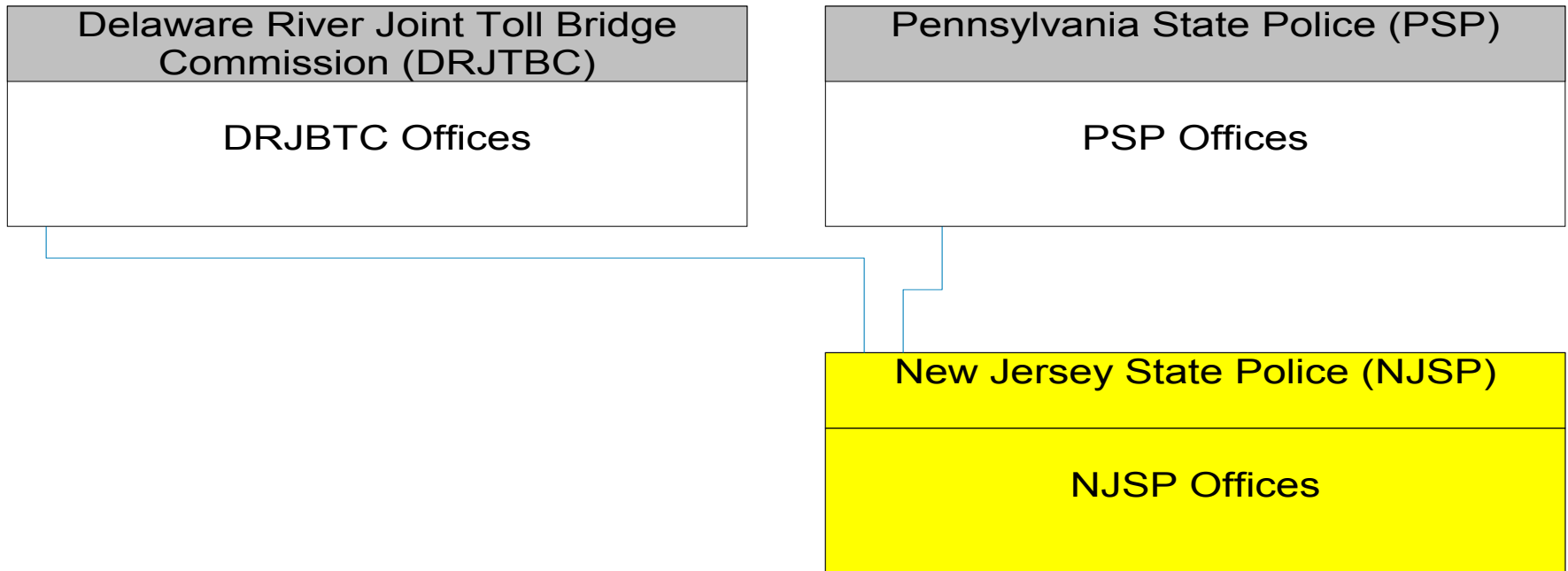
Existing
Planned

NJSP Offices

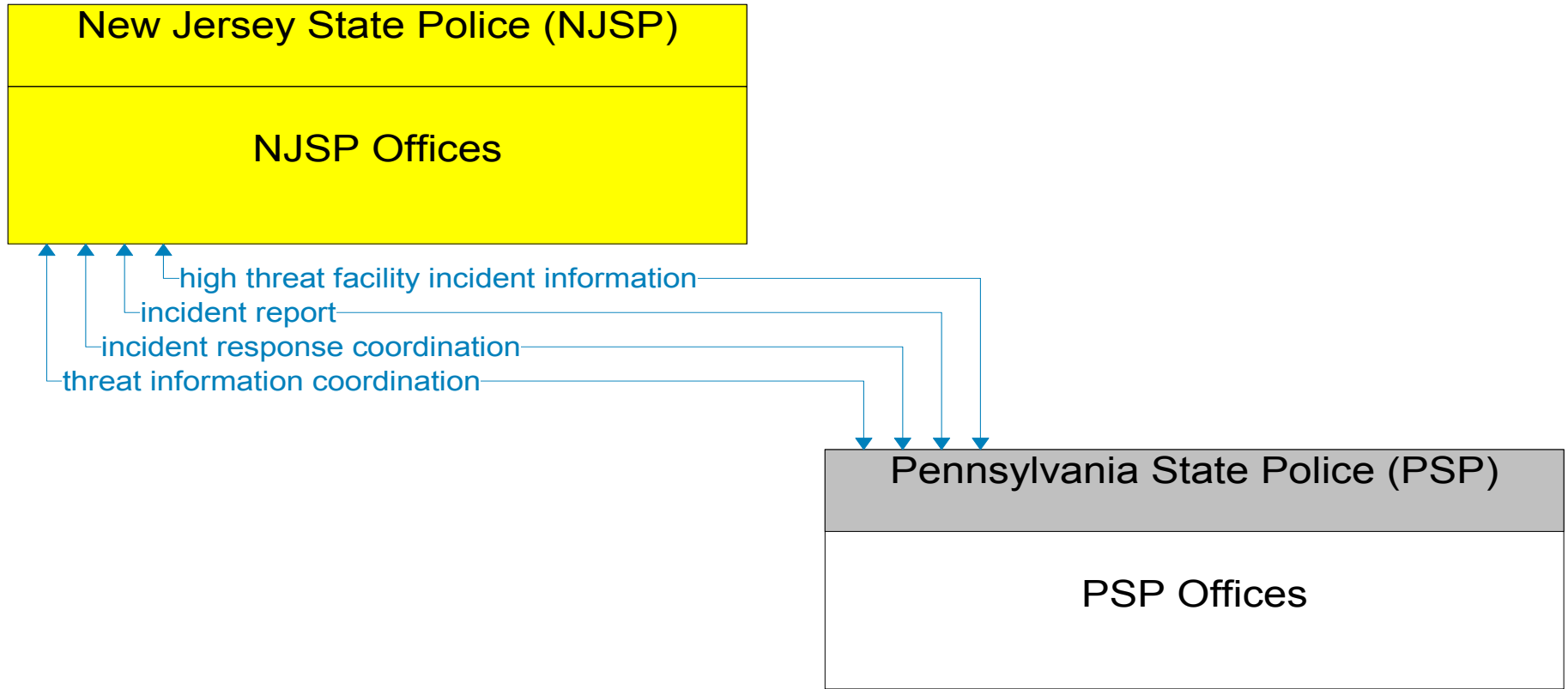


PA

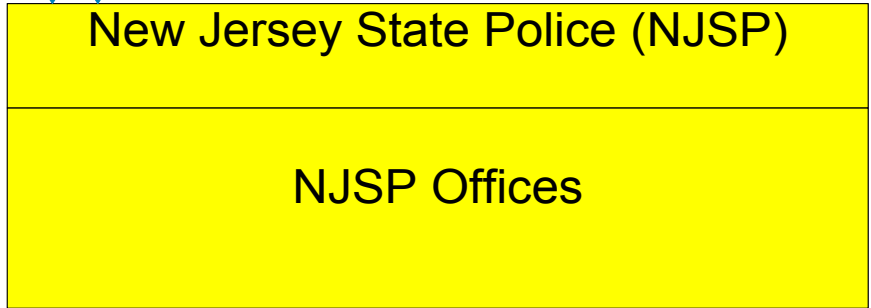
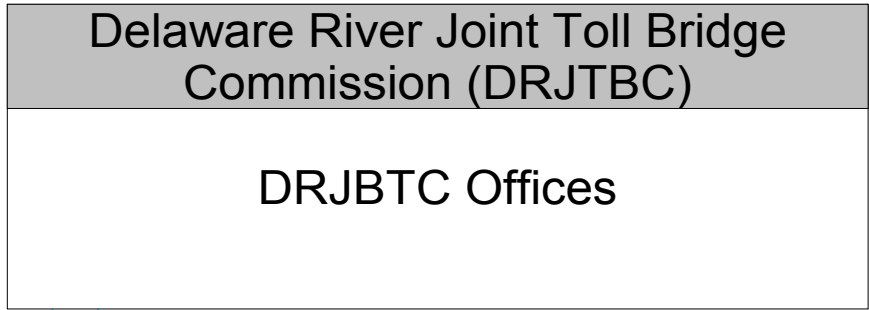
NJSP Offices Interconnect Diagram



———— Existing
- - - - - Planned

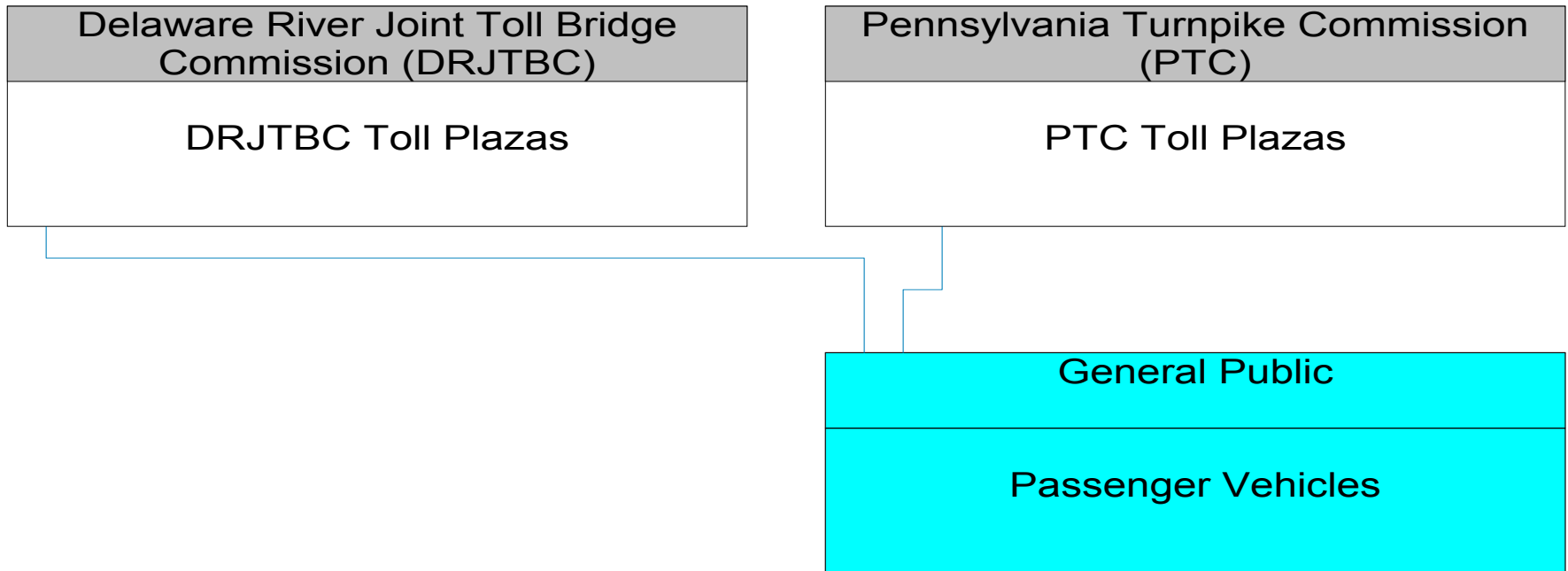


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- - - - - Planned

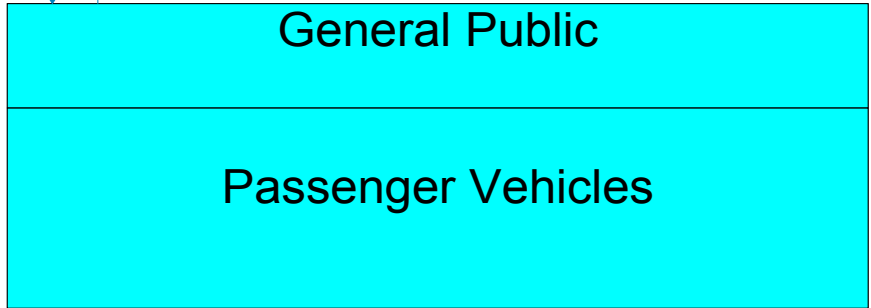
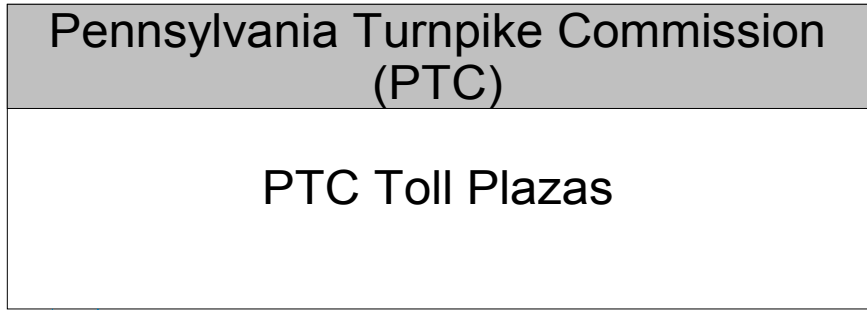


Existing
Planned

Passenger Vehicles Interconnect Diagram



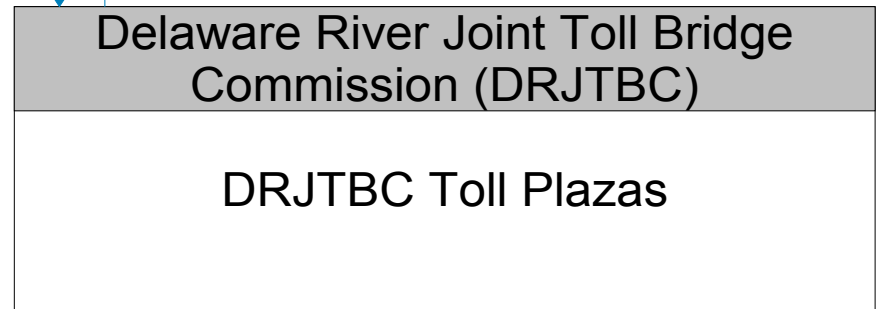
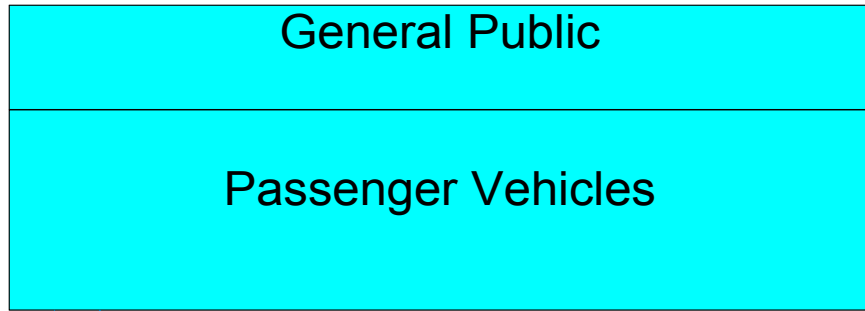
———— Existing
----- Planned



tag data

request tag data

Existing
Planned



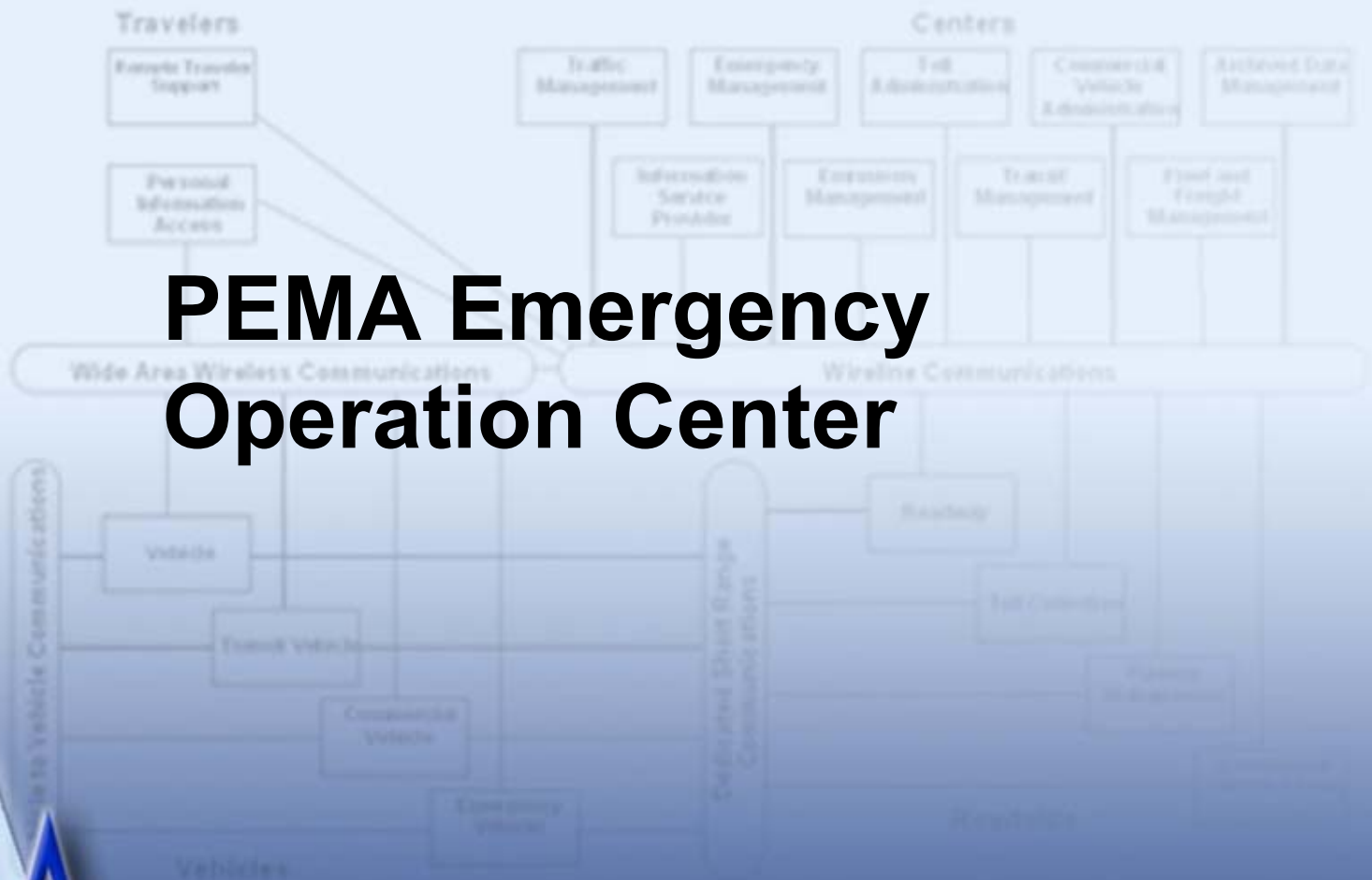
request tag data

tag data

Existing

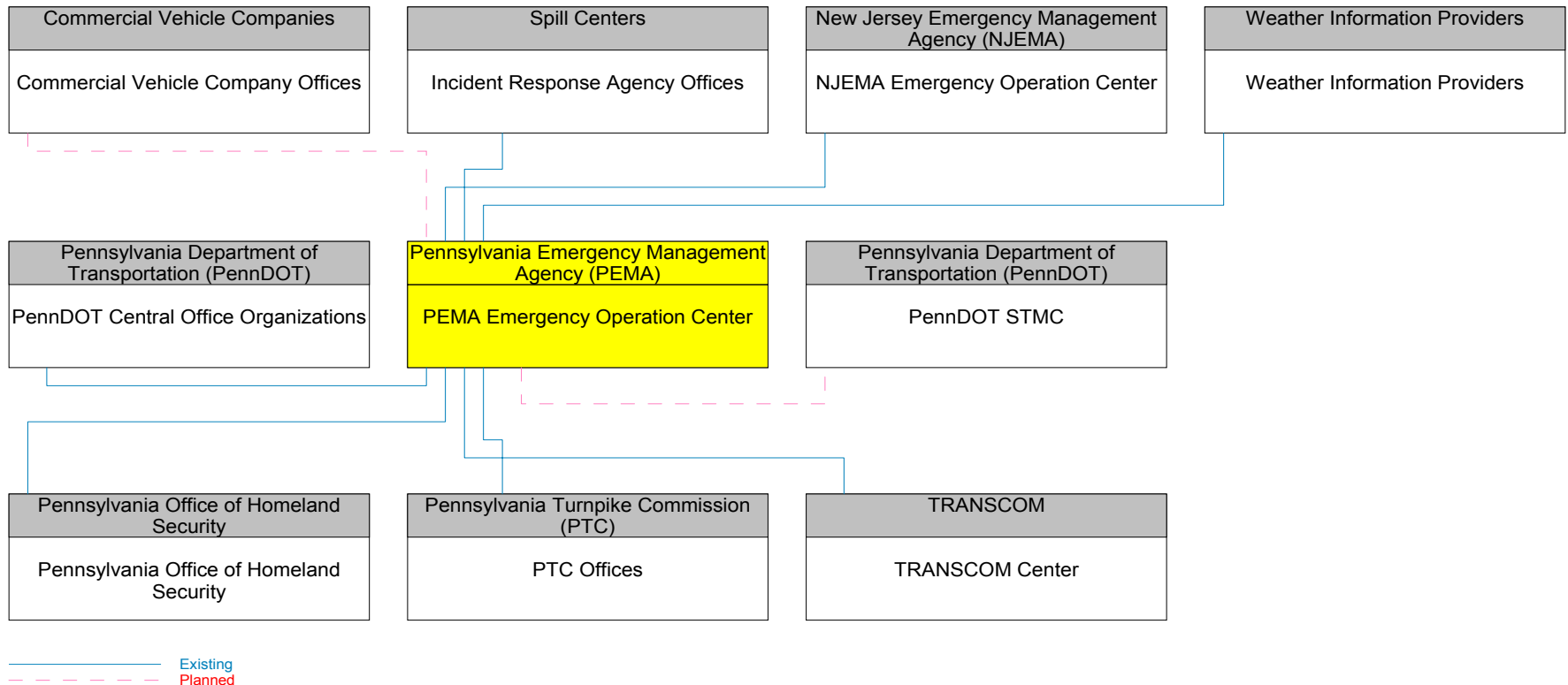
Planned

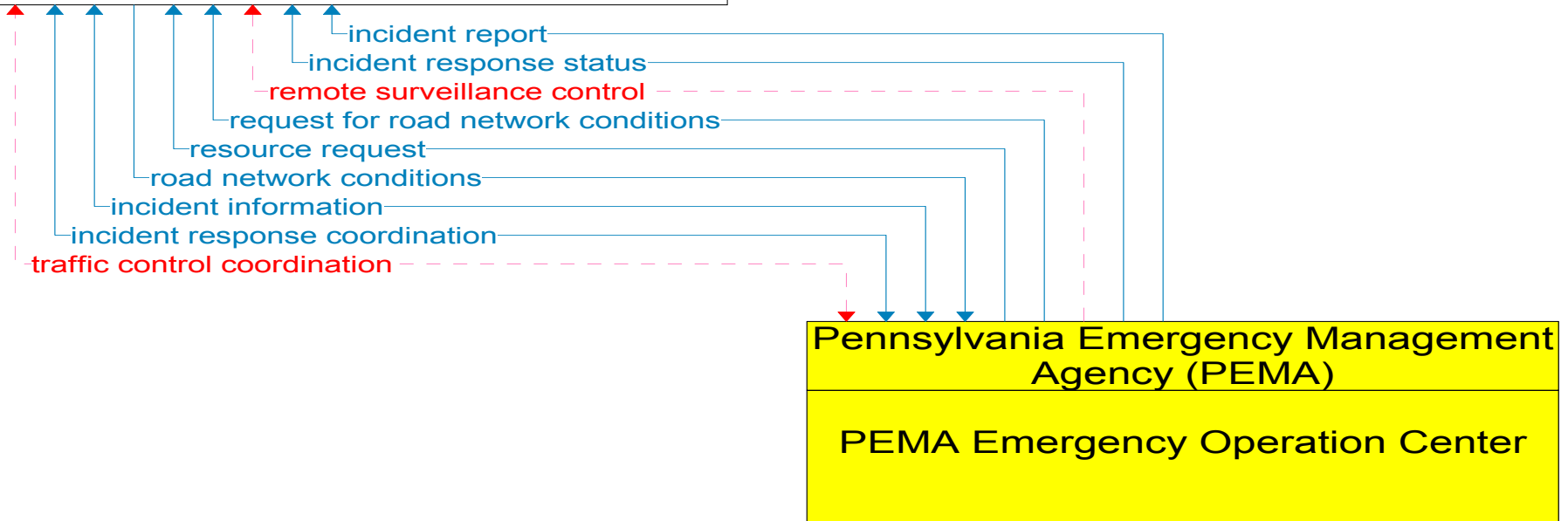
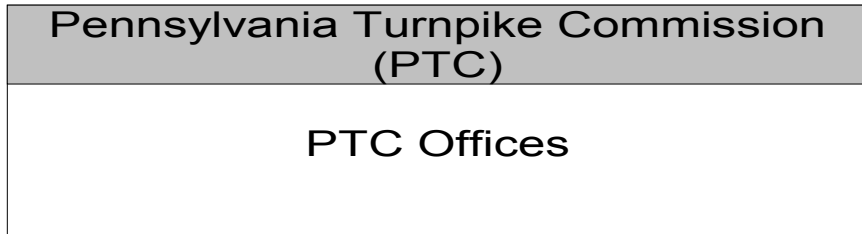
PEMA Emergency Operation Center



PA

PEMA Emergency Operation Center Interconnect Diagram





Existing
Planned

Pennsylvania Emergency Management Agency (PEMA)

PEMA Emergency Operation Center

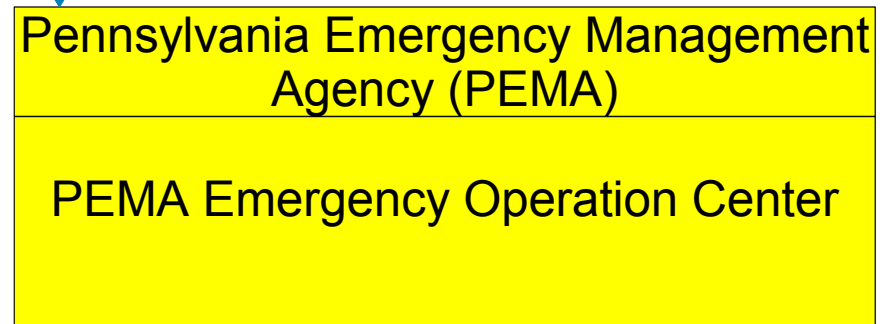
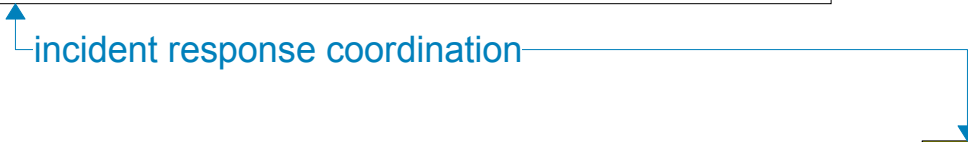
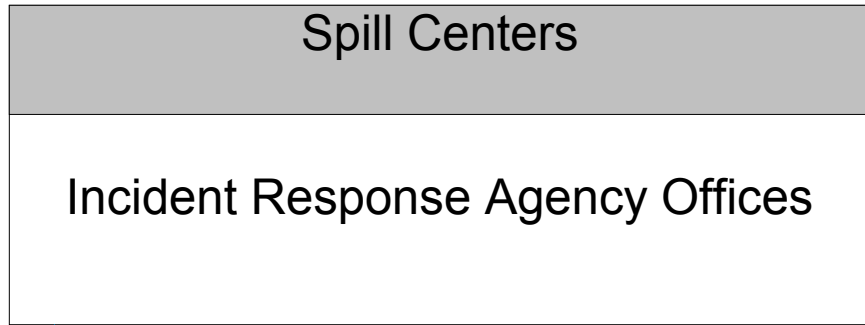


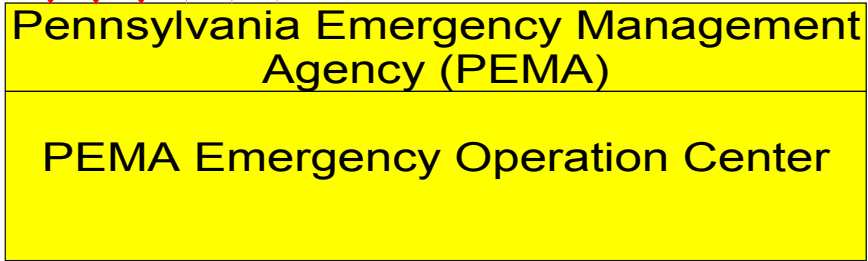
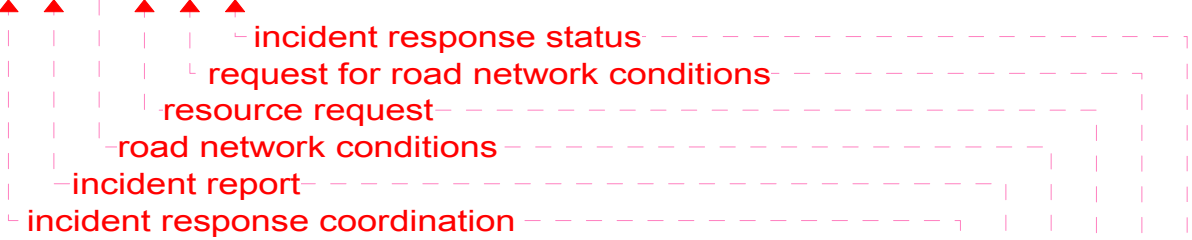
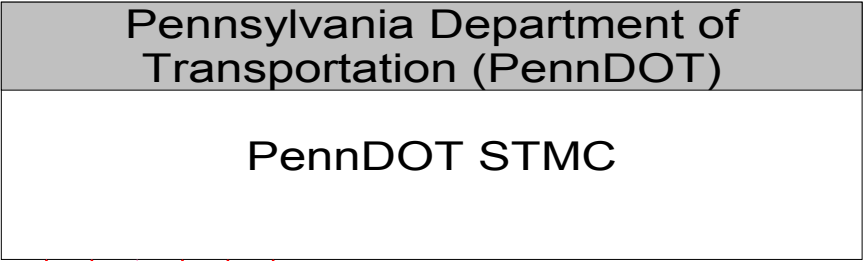
hazmat information

Commercial Vehicle Companies

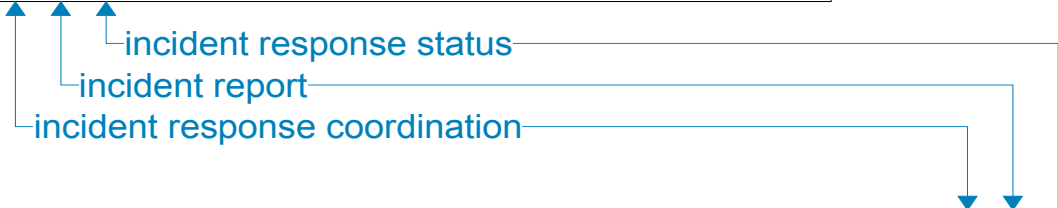
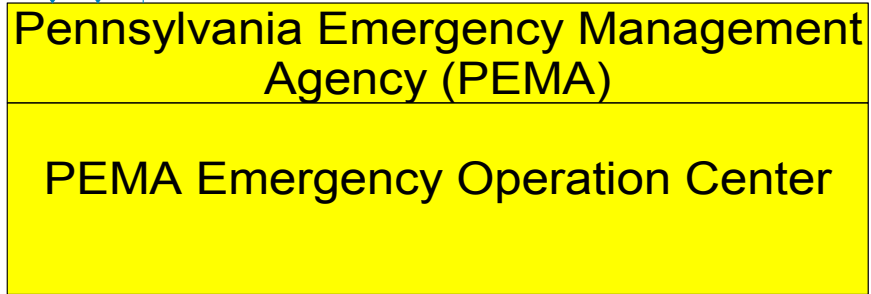
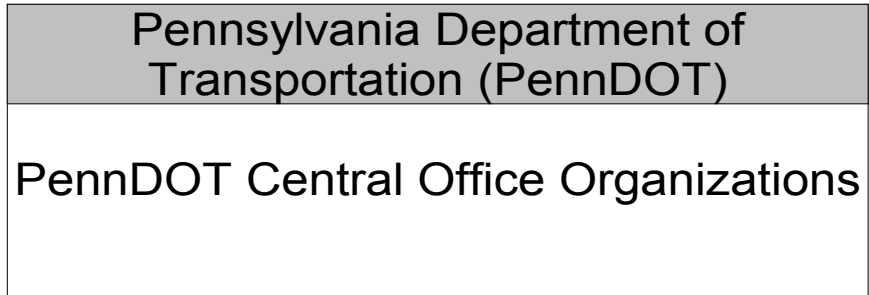
Commercial Vehicle Company Offices

Existing
Planned

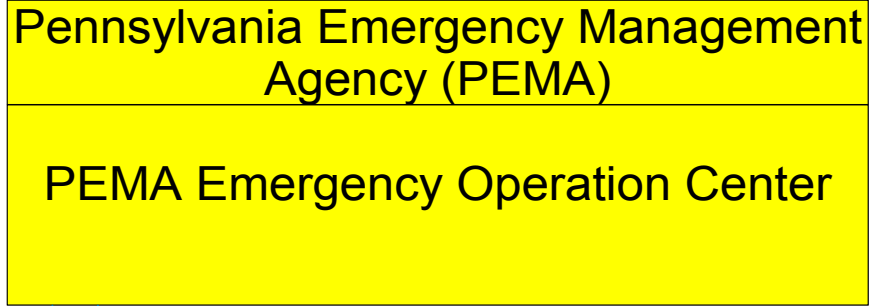




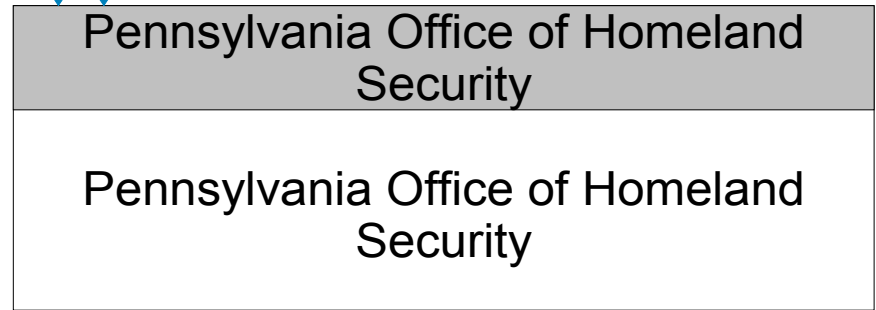
———— Existing
- - - - - Planned



———— Existing
- - - - - Planned



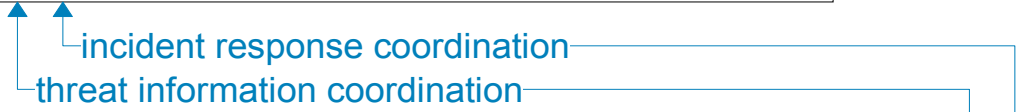
high threat facility incident information
threat information coordination



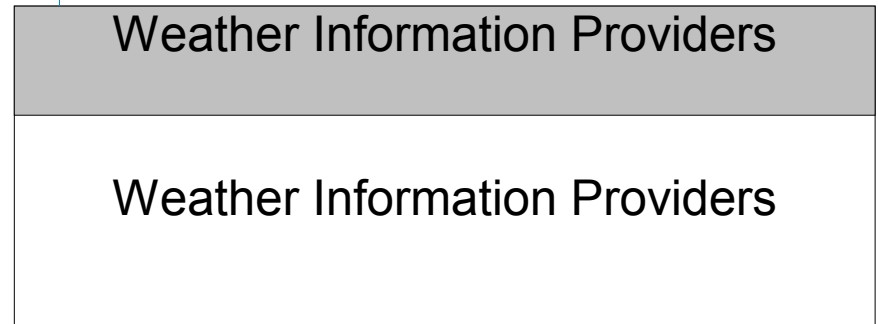
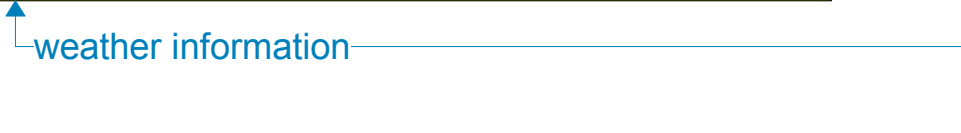
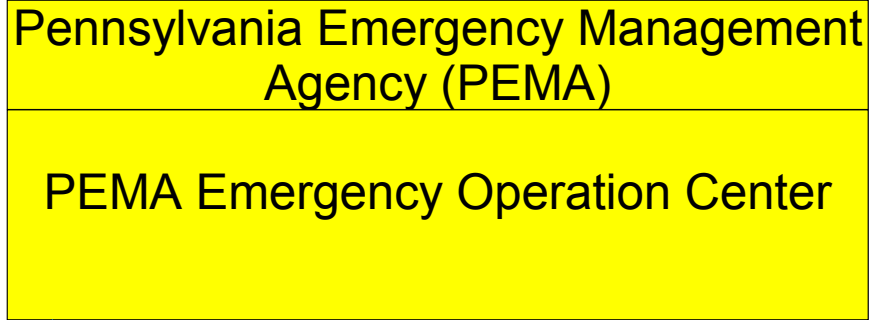
Existing
Planned

New Jersey Emergency Management Agency (NJEMA)
NJEMA Emergency Operation Center

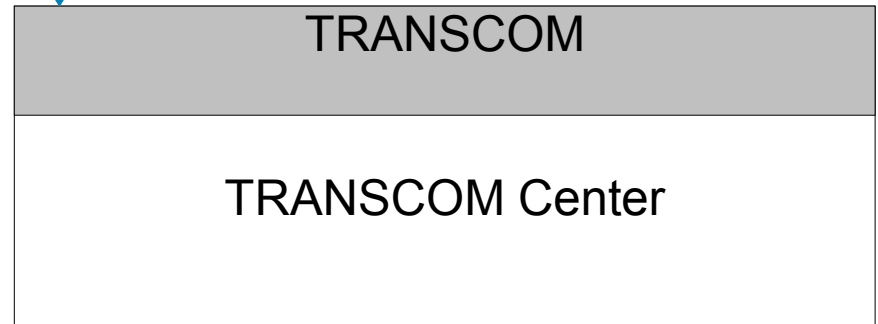
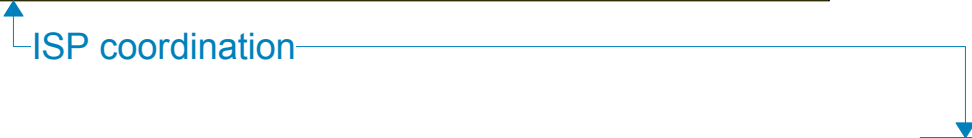
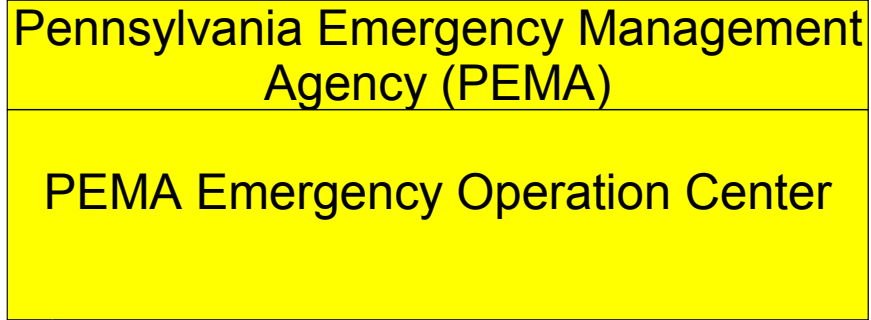
Pennsylvania Emergency Management Agency (PEMA)
PEMA Emergency Operation Center



———— Existing
----- Planned

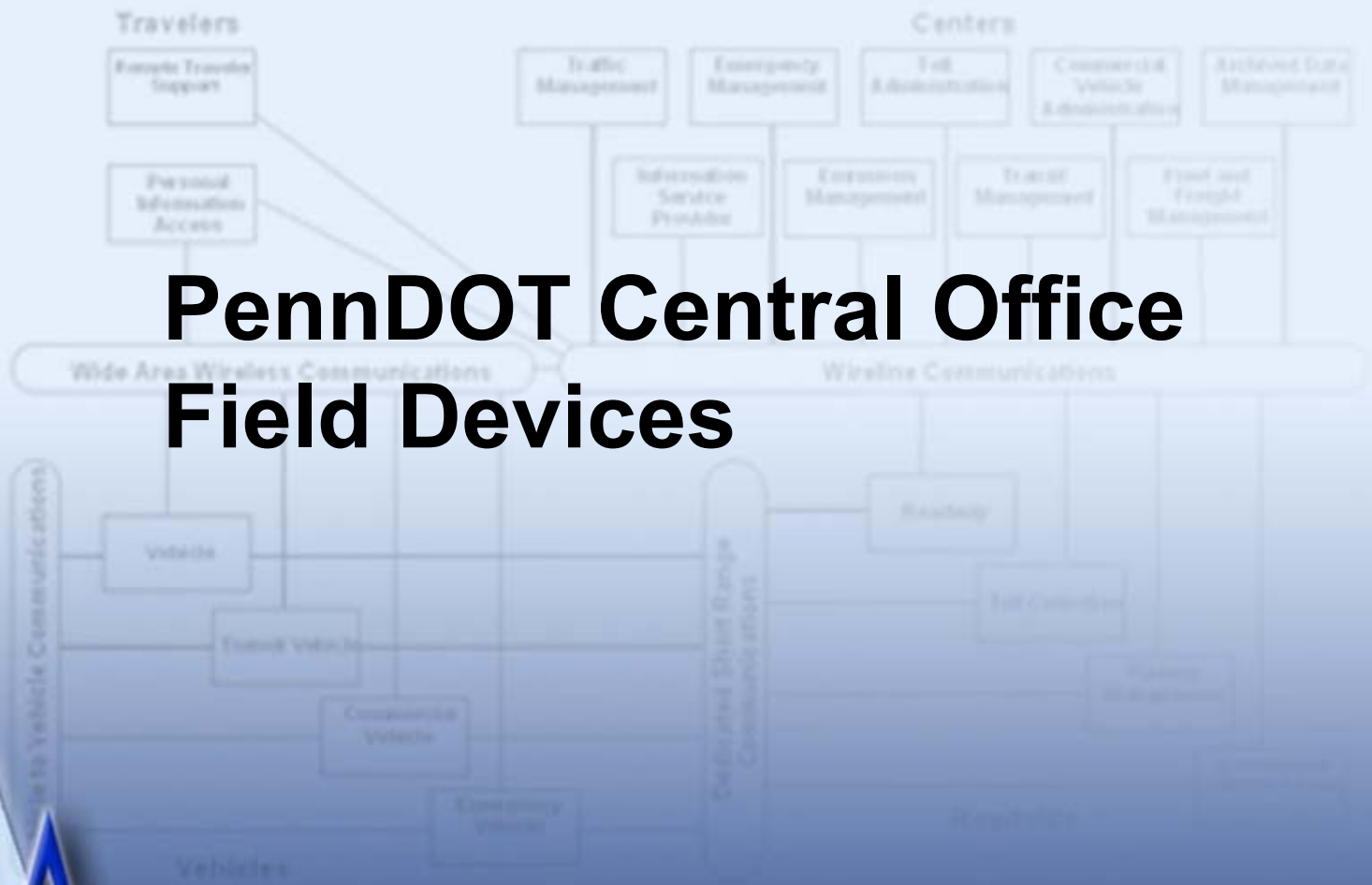


———— Existing
- - - - - Planned

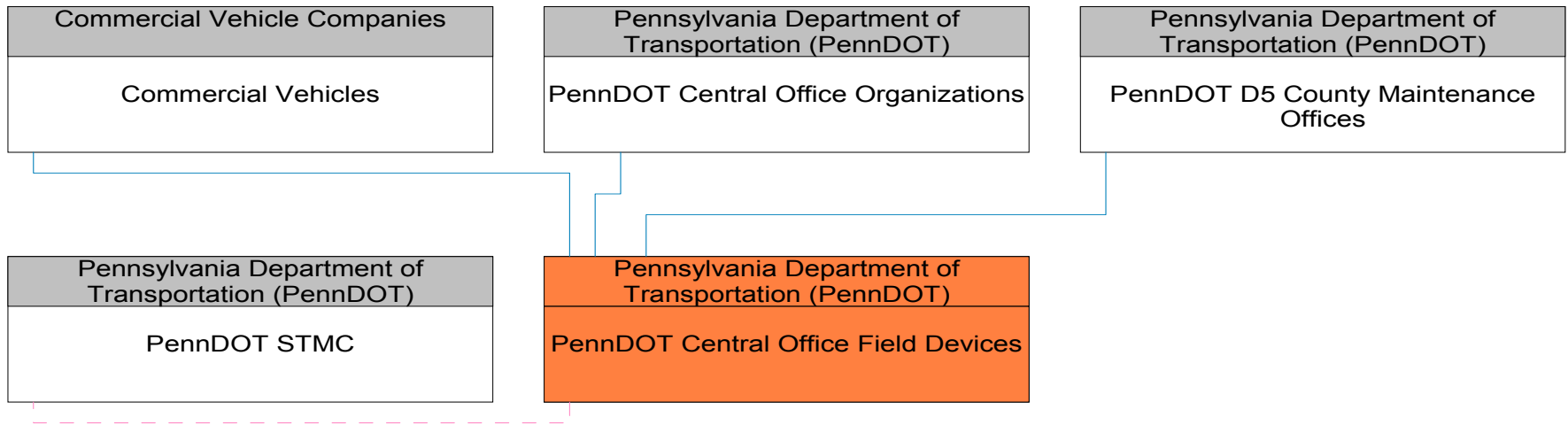


———— Existing
- - - - - Planned

PennDOT Central Office Field Devices



PennDOT Central Office Field Devices Interconnect Diagram



— Existing
- - - Planned

Pennsylvania Department of
Transportation (PennDOT)

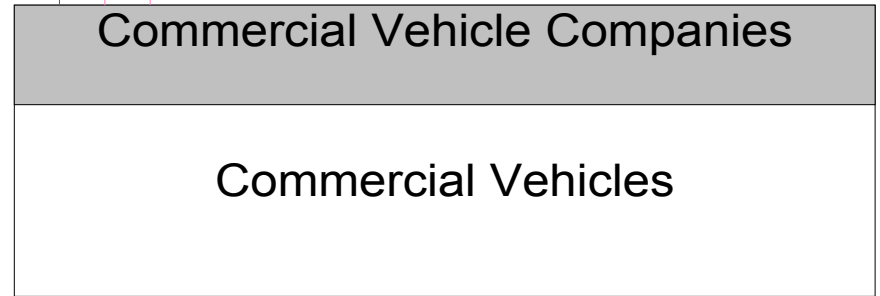
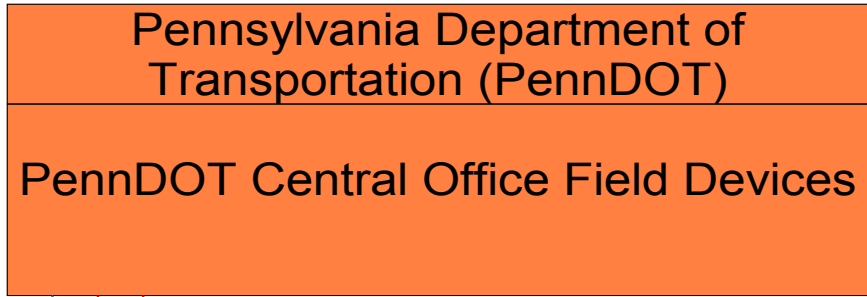
PennDOT D5 County Maintenance
Offices

environmental conditions data

Pennsylvania Department of
Transportation (PennDOT)

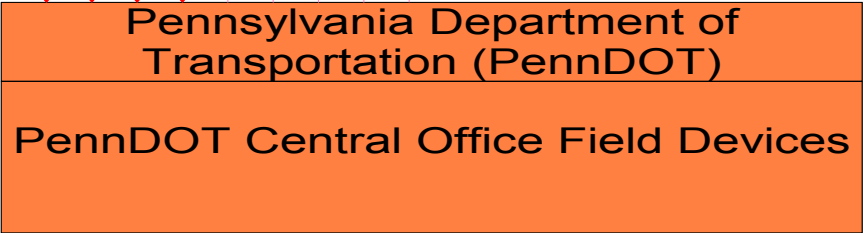
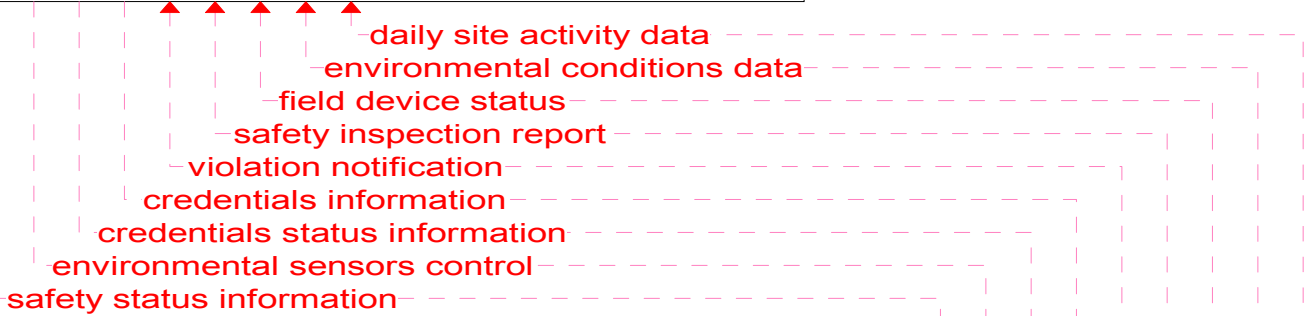
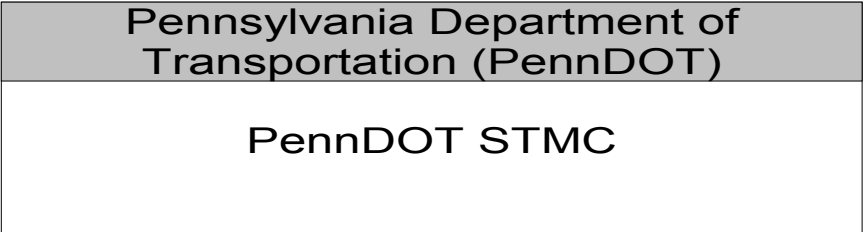
PennDOT Central Office Field Devices

Existing
Planned



↑ safety inspection record
↑ screening event record
↑ tag data

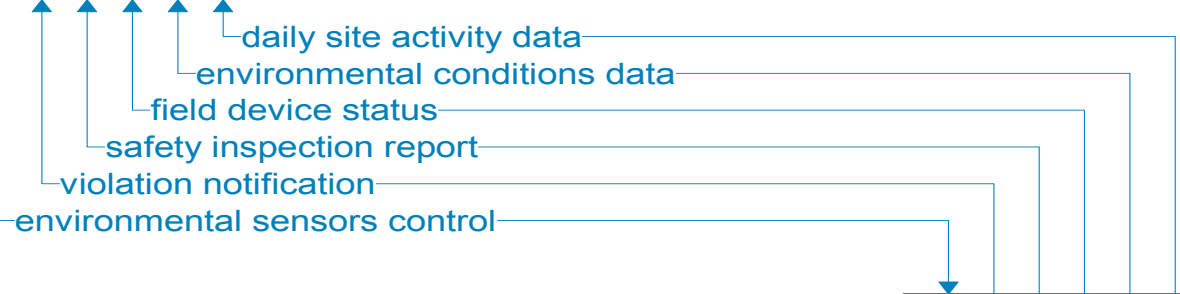
———— Existing
- - - - - Planned



———— Existing
- - - - - Planned

Pennsylvania Department of
Transportation (PennDOT)

PennDOT Central Office Organizations

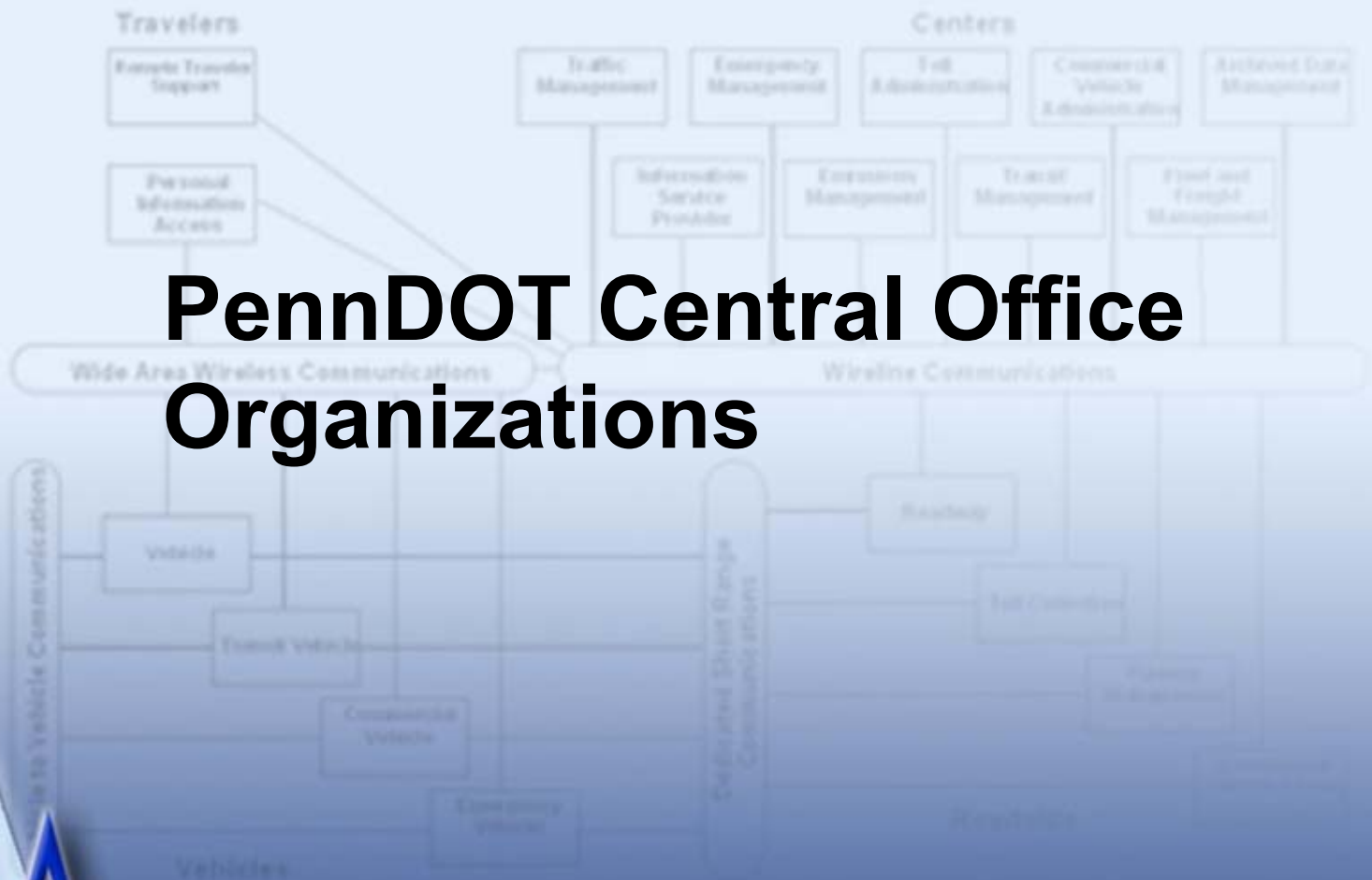


Pennsylvania Department of
Transportation (PennDOT)

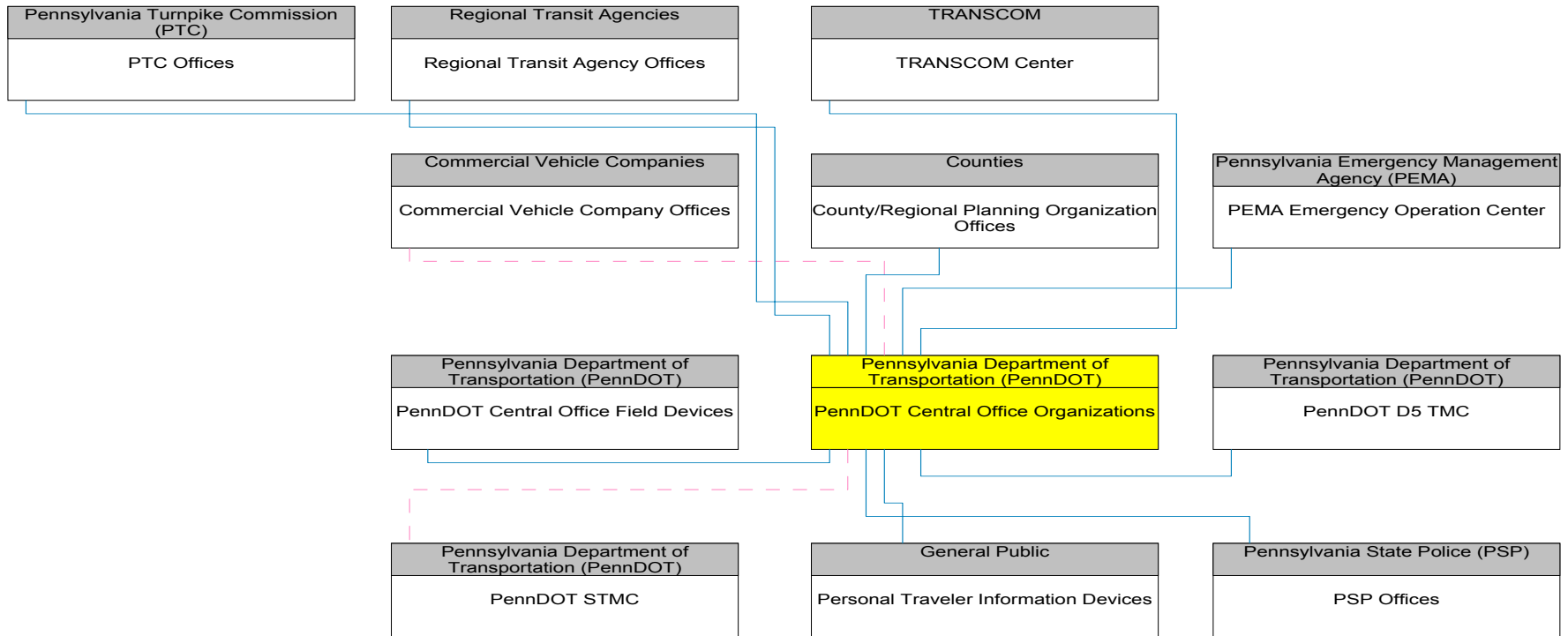
PennDOT Central Office Field Devices

Existing
Planned

PennDOT Central Office Organizations

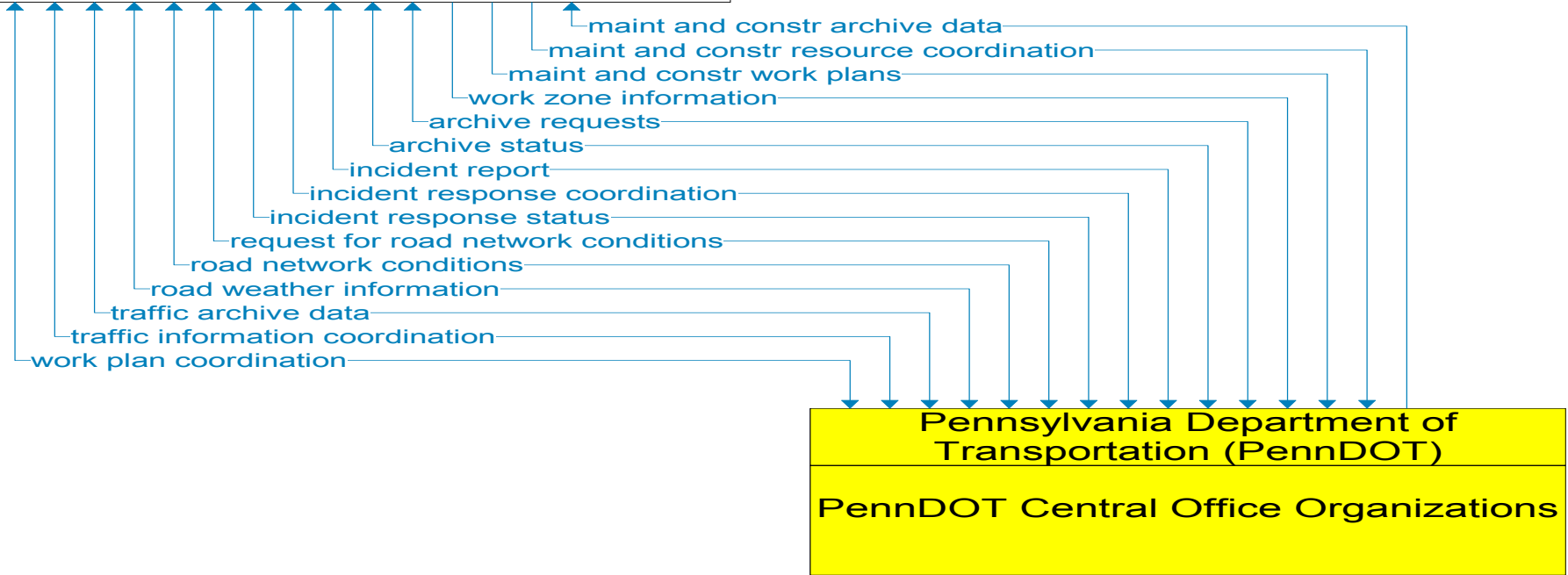


PennDOT Central Office Organizations Interconnect Diagram

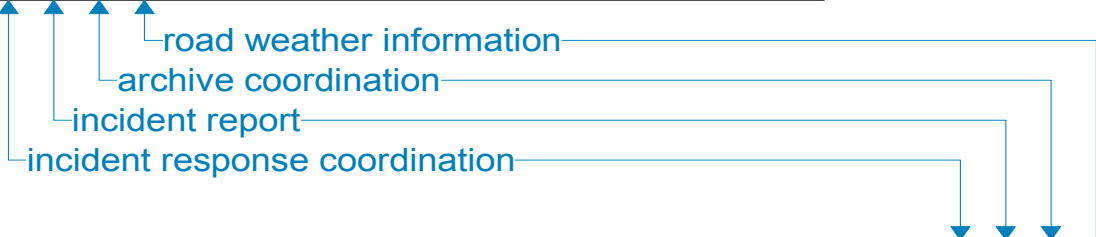
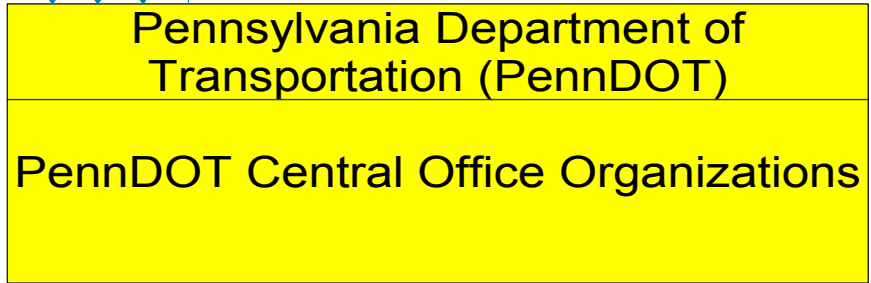
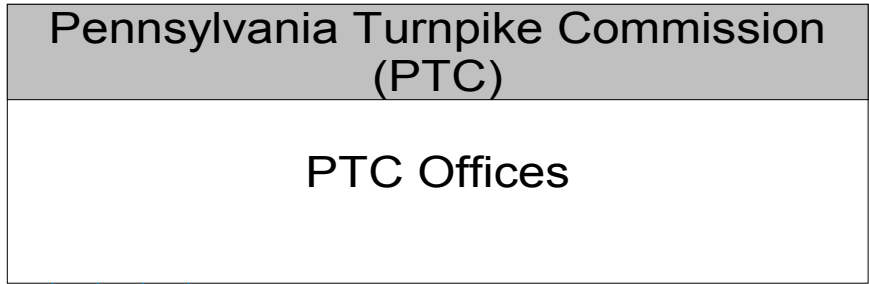


— Existing
- - - Planned

Pennsylvania Department of Transportation (PennDOT)
PennDOT D5 TMC



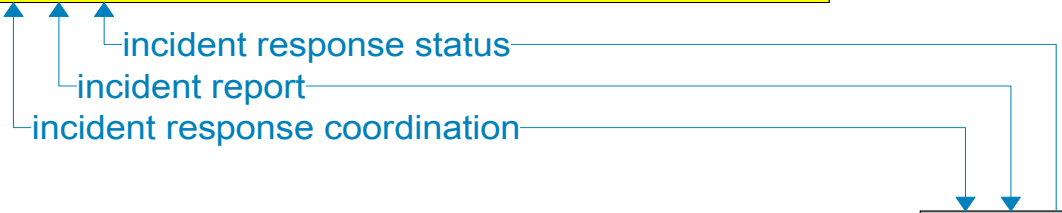
———— Existing
- - - - - Planned



———— Existing
----- Planned

Pennsylvania Department of
Transportation (PennDOT)

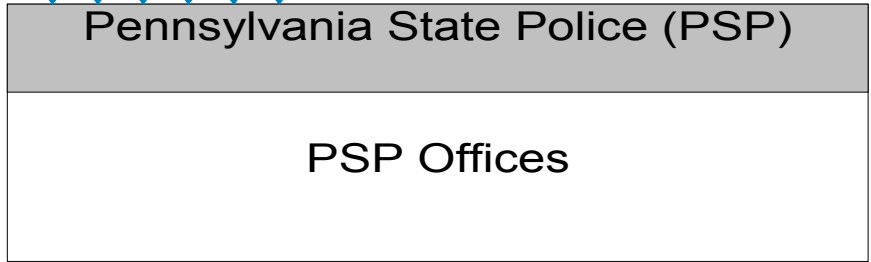
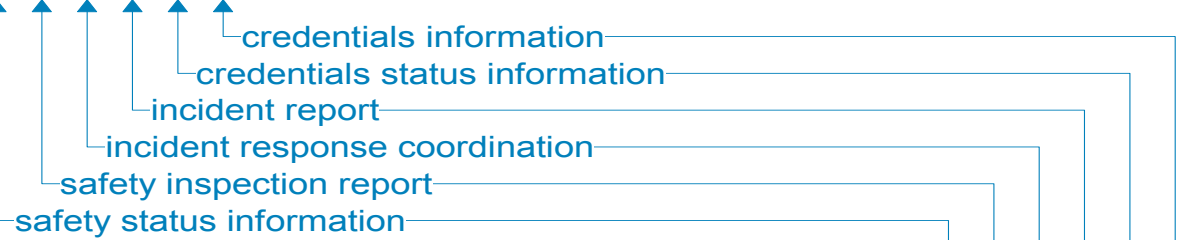
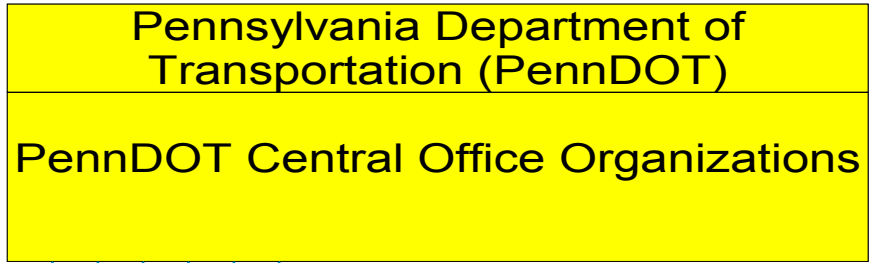
PennDOT Central Office Organizations

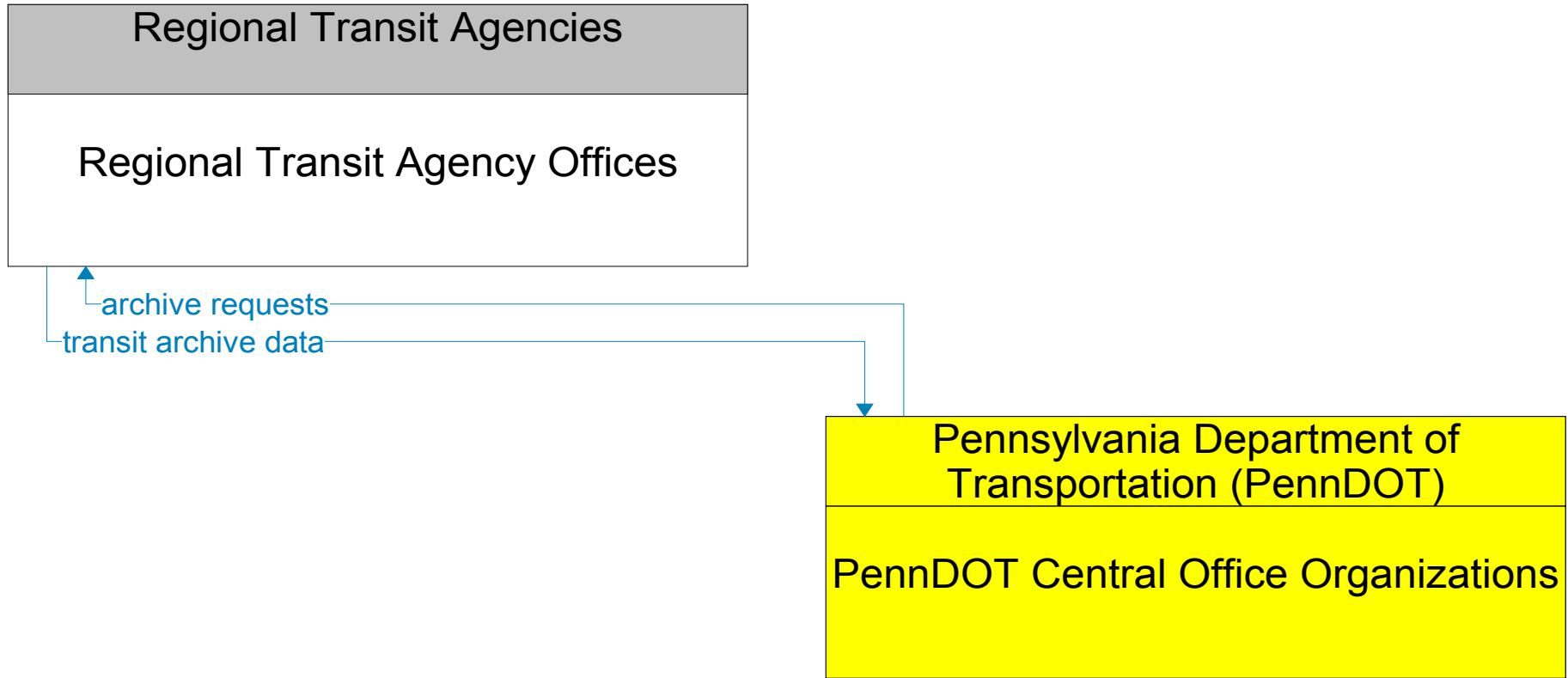


Pennsylvania Emergency Management
Agency (PEMA)

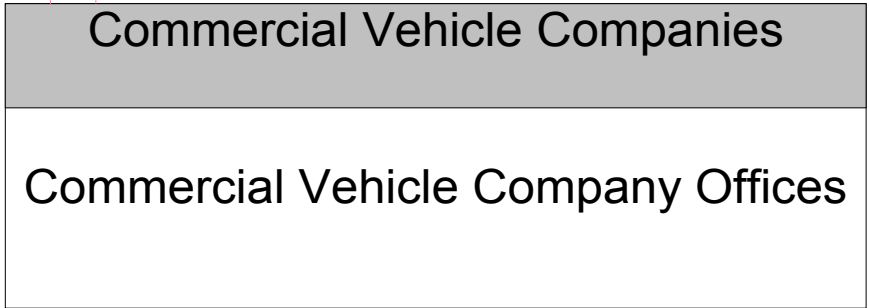
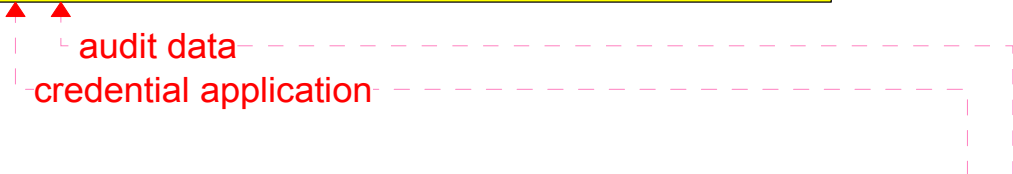
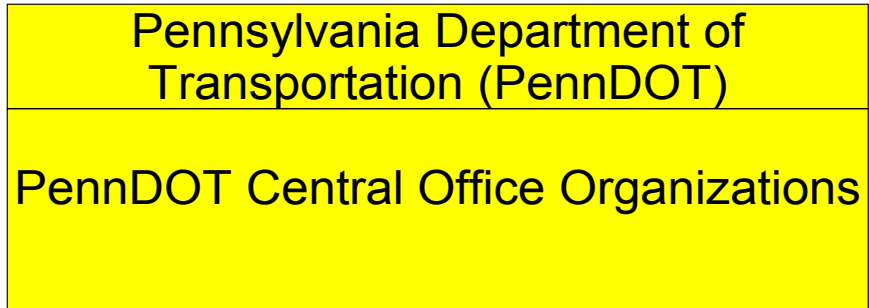
PEMA Emergency Operation Center

———— Existing
- - - - - Planned



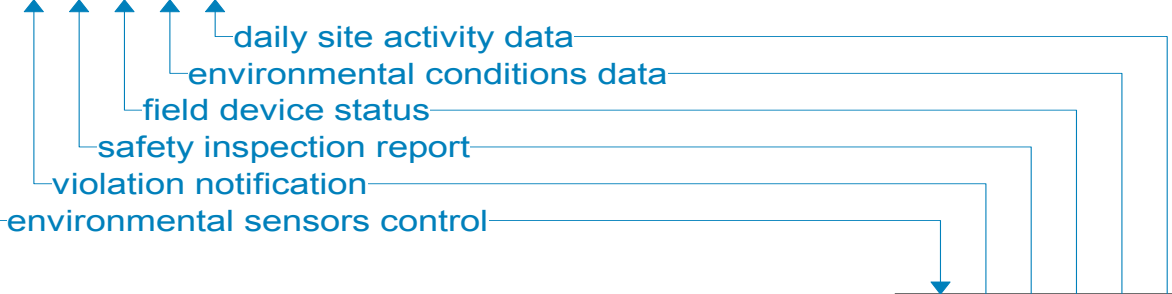


———— Existing
----- Planned



Pennsylvania Department of
Transportation (PennDOT)

PennDOT Central Office Organizations



Pennsylvania Department of
Transportation (PennDOT)

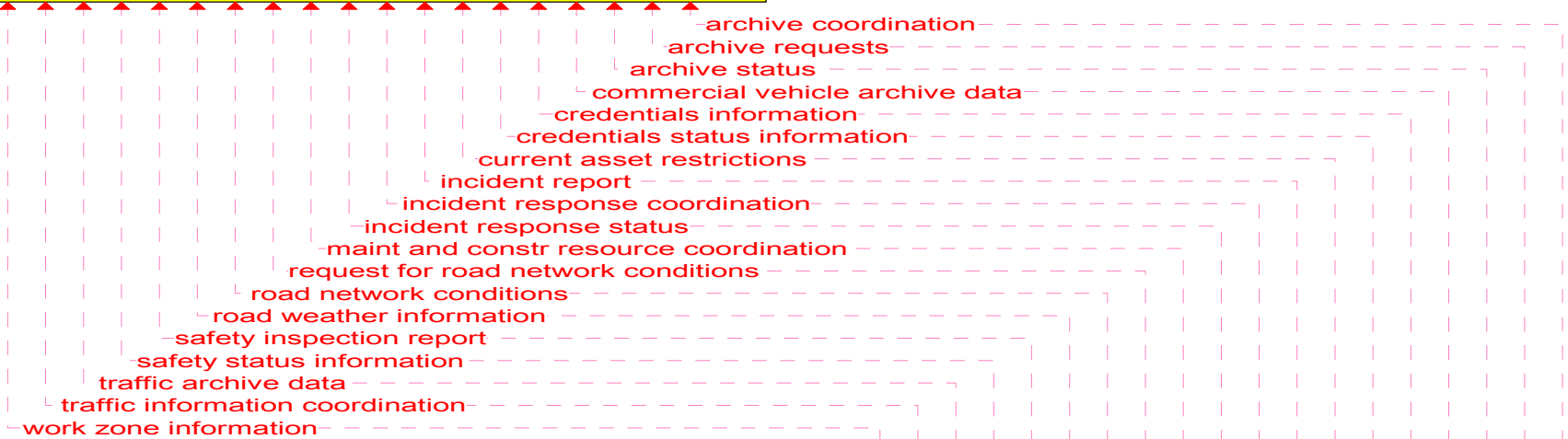
PennDOT Central Office Field Devices

———— Existing
- - - - - Planned



**Pennsylvania Department of Transportation
(PennDOT)**

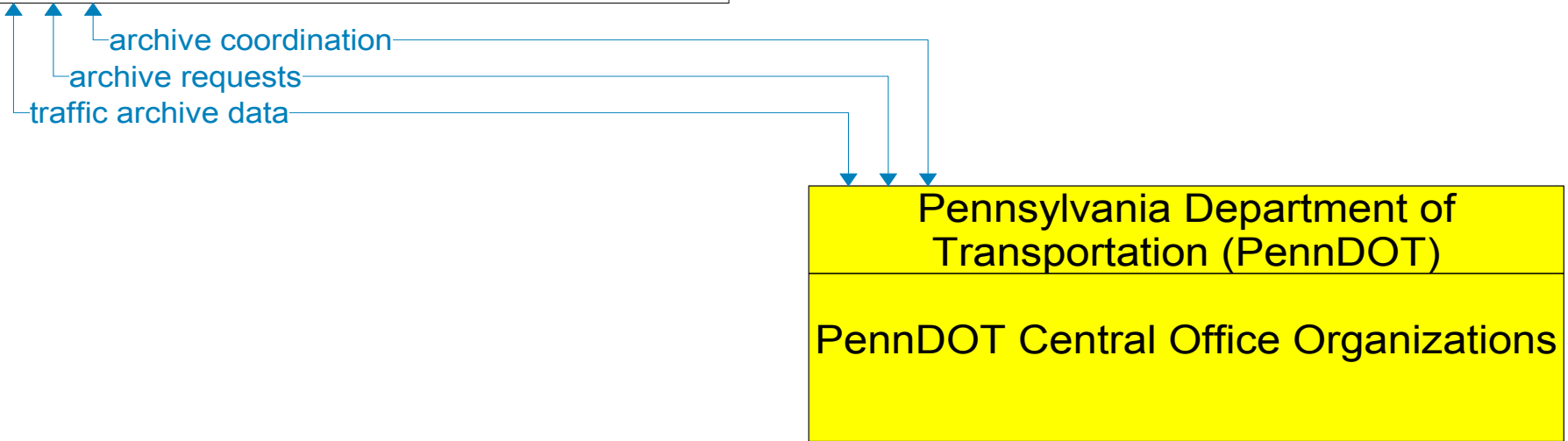
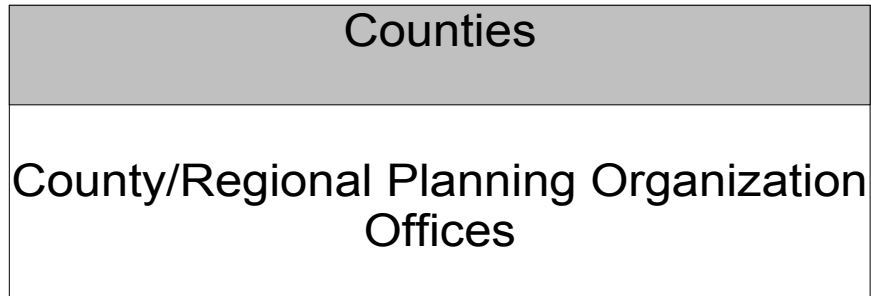
PennDOT Central Office Organizations



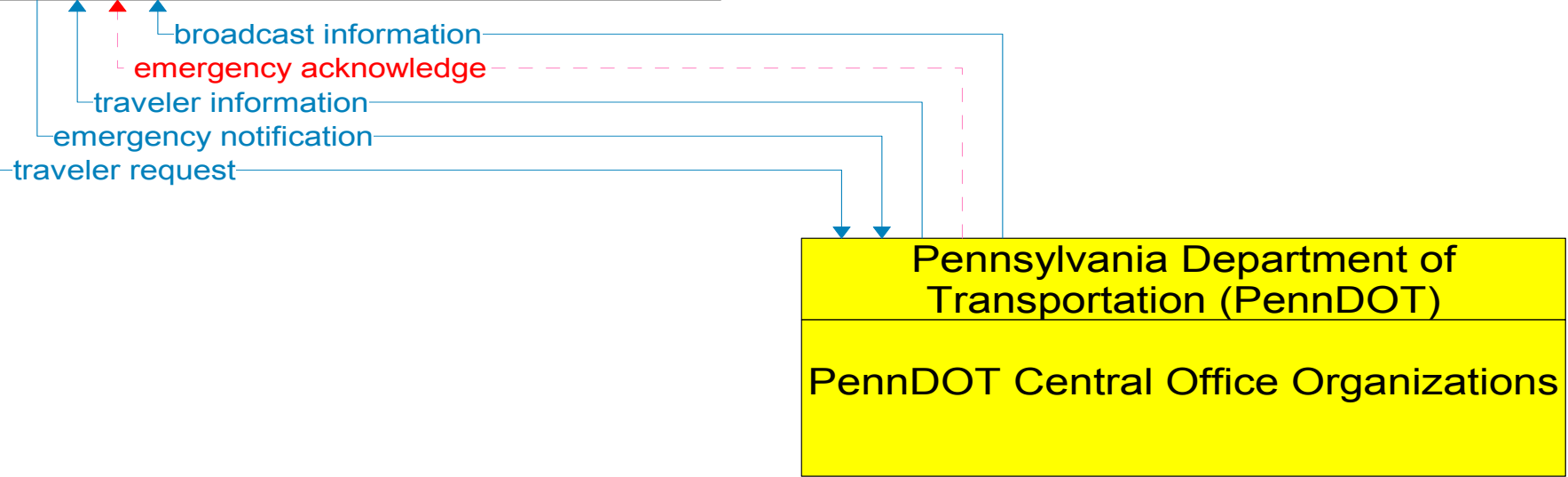
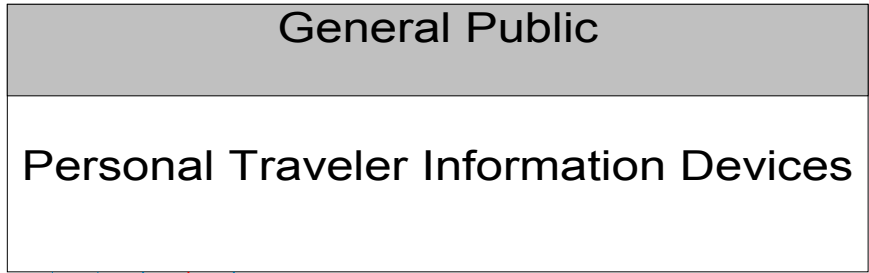
**Pennsylvania Department of Transportation
(PennDOT)**

PennDOT STMC

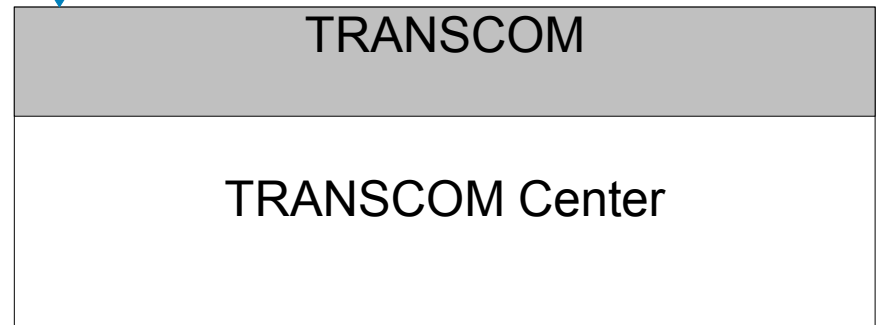
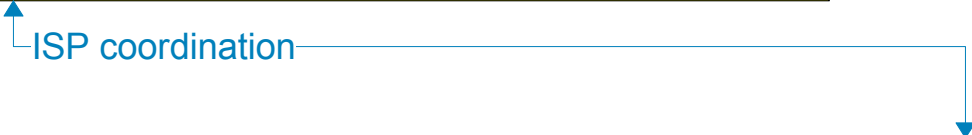
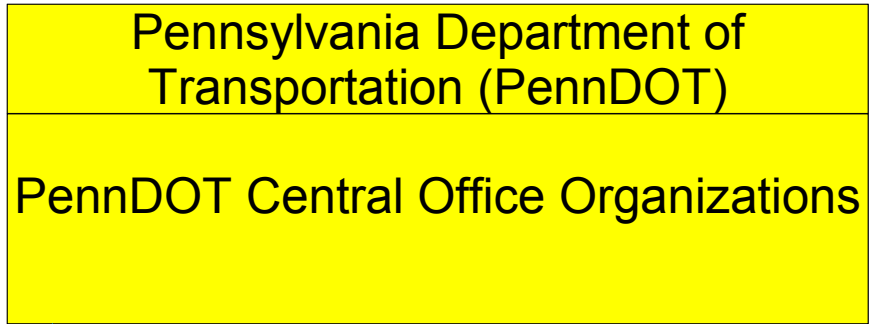
———— Existing
- - - - - Planned



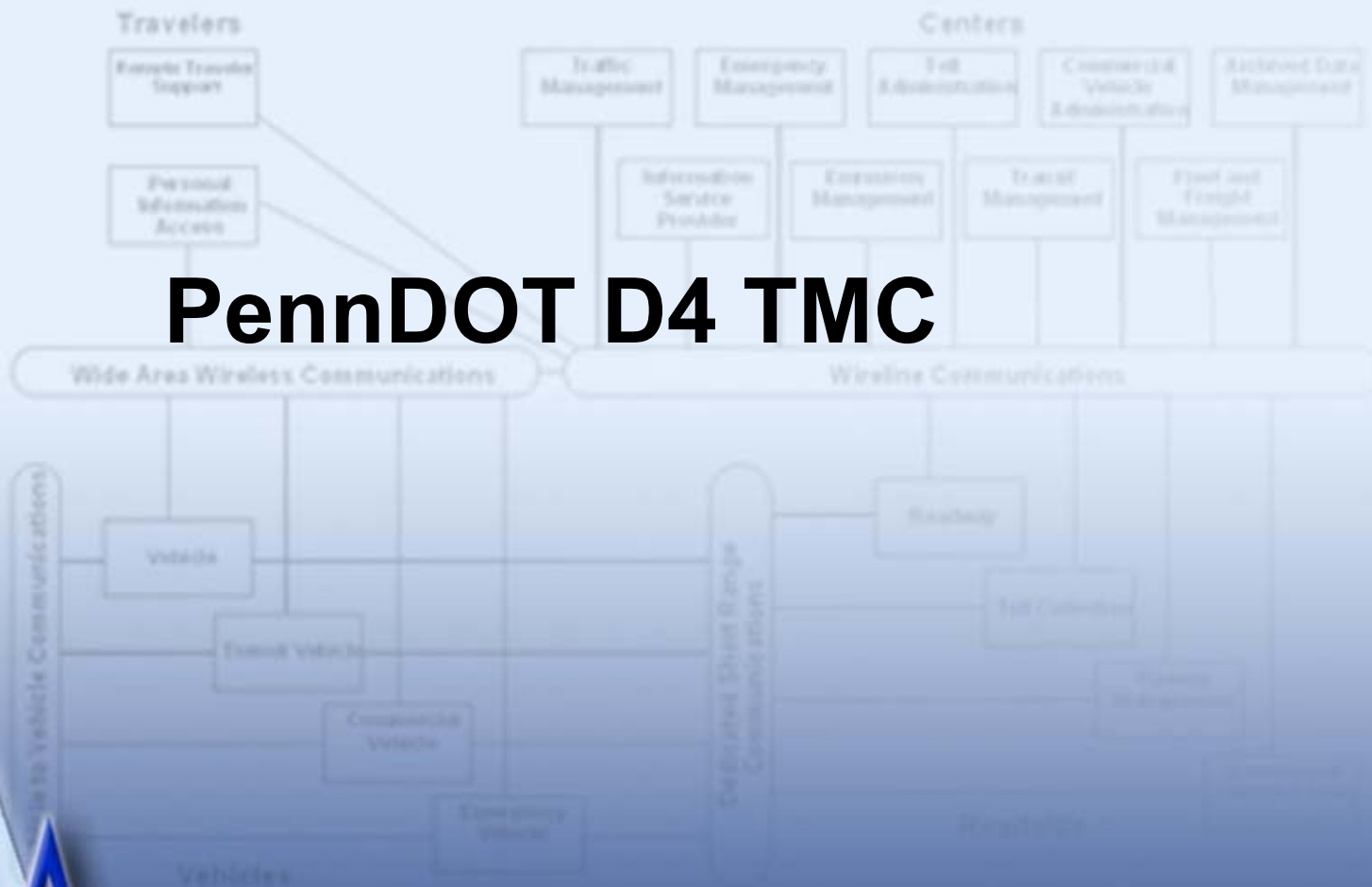
Existing
Planned



Existing
Planned

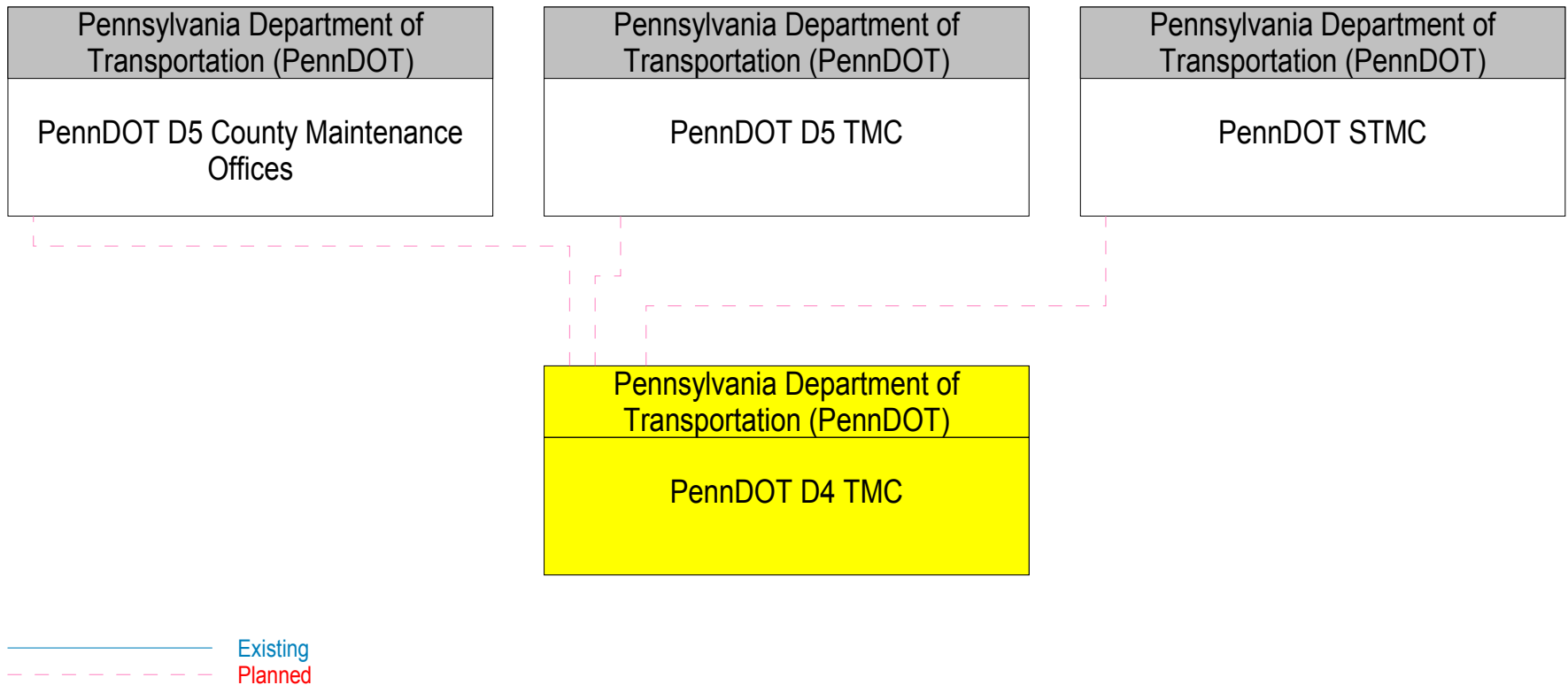


PennDOT D4 TMC



PA

PennDOT D4 TMC Interconnect Diagram



Pennsylvania Department of Transportation (PennDOT)
PennDOT D5 TMC

- traffic archive data -
- 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 D5 County Maintenance
Offices

- incident response status -
- maint and constr resource request -
- road network conditions -
- current asset restrictions -
- maint and constr resource response -
- maint and constr work plans -
- road weather information -
- work zone information -
- incident information -

Pennsylvania Department of
Transportation (PennDOT)

PennDOT D4 TMC

———— Existing
- - - - - Planned

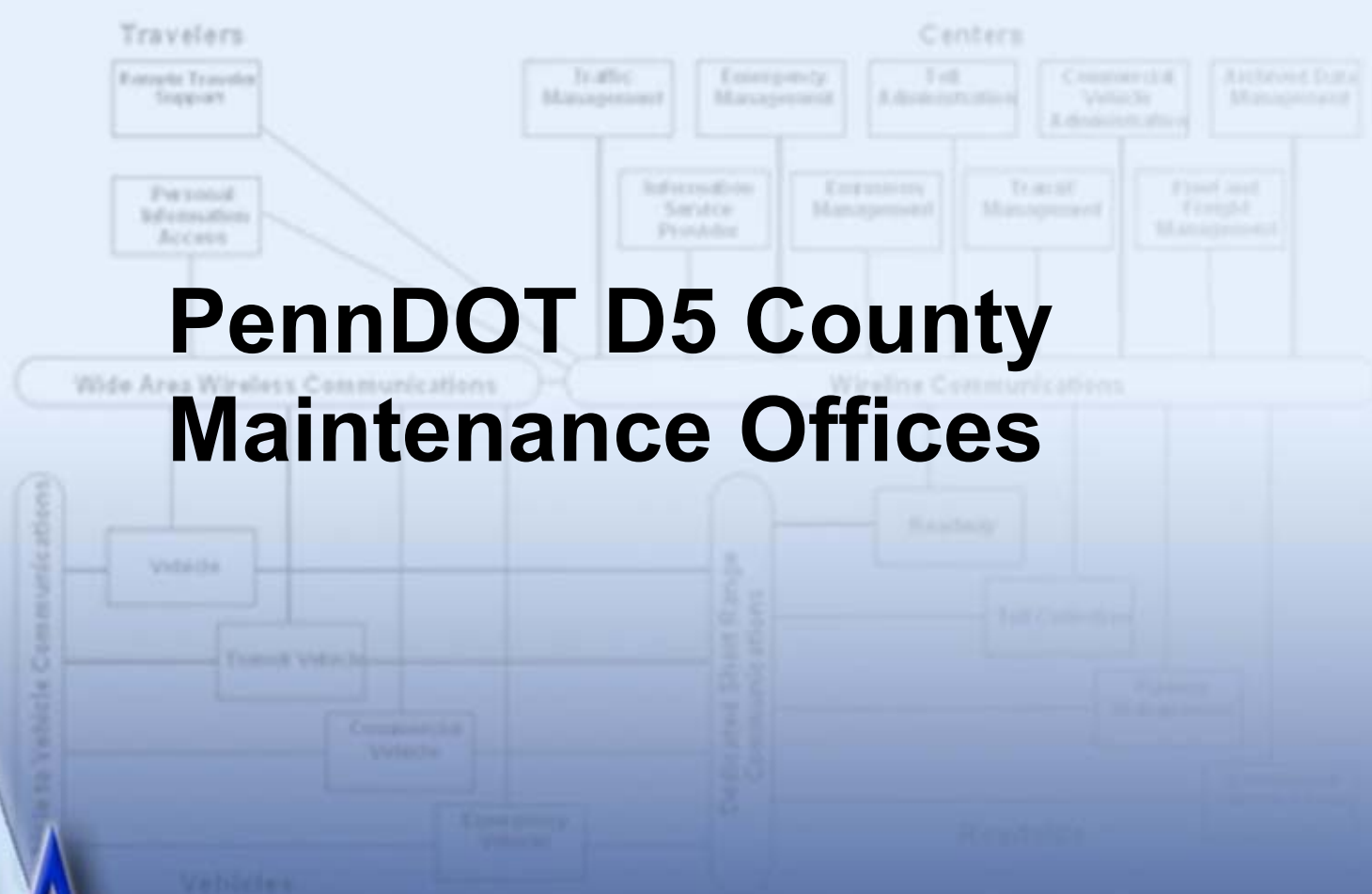
Pennsylvania Department of Transportation (PennDOT)
 PennDOT STMC

- roadway maintenance status
- archive requests
- archive status
- traffic archive data
- current asset restrictions
- incident information
- incident information request
- incident report
- incident response coordination
- incident response status
- maint and constr resource coordination
- resource deployment status
- resource request
- road network conditions
- road weather information
- traffic control coordination
- traffic information coordination
- work zone information

Pennsylvania Department of Transportation (PennDOT)
 PennDOT D4 TMC

Existing
 Planned

PennDOT D5 County Maintenance Offices

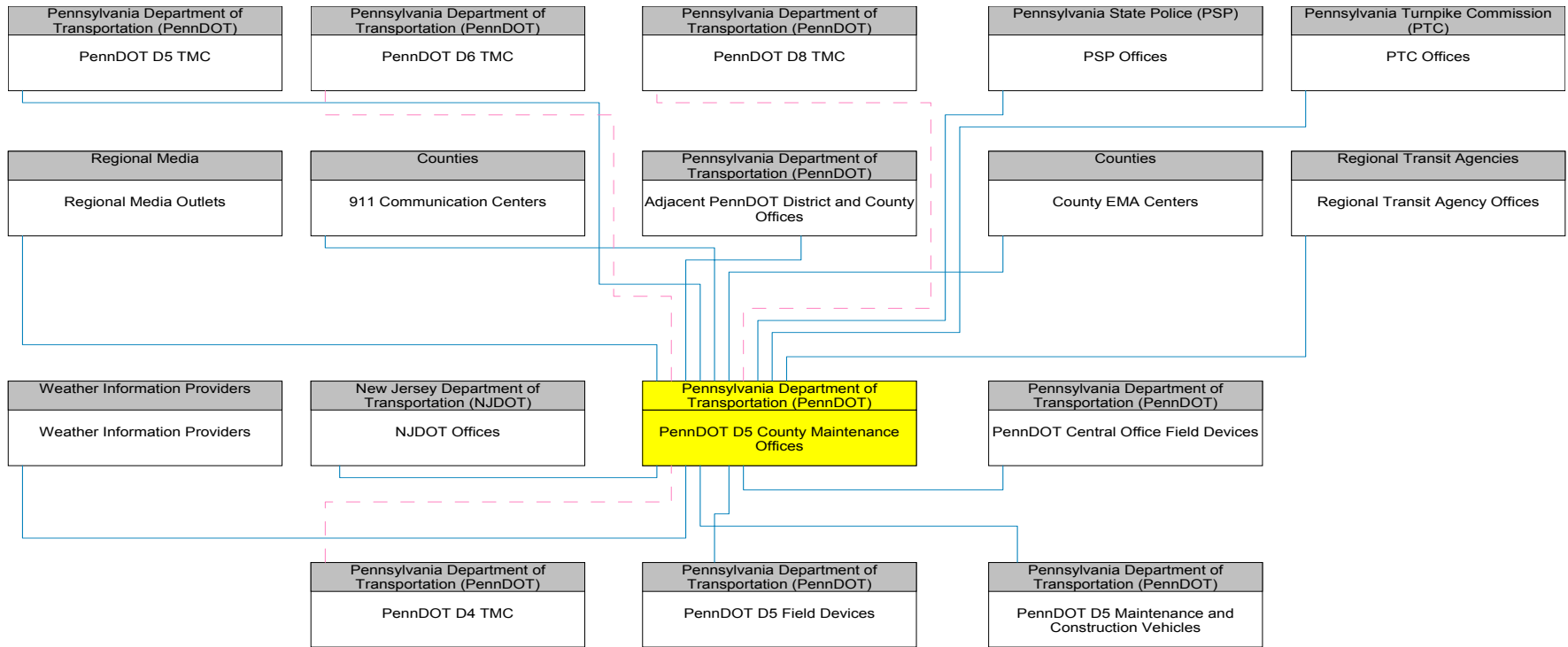


375

rchitecture

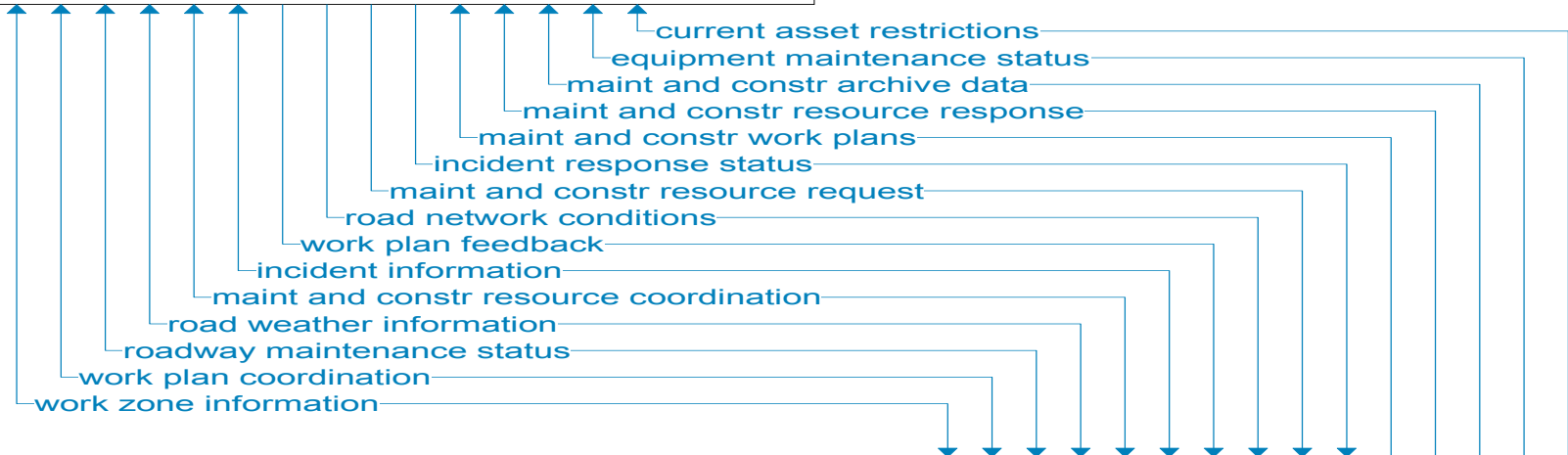


PennDOT D5 County Maintenance Offices Interconnect Diagram



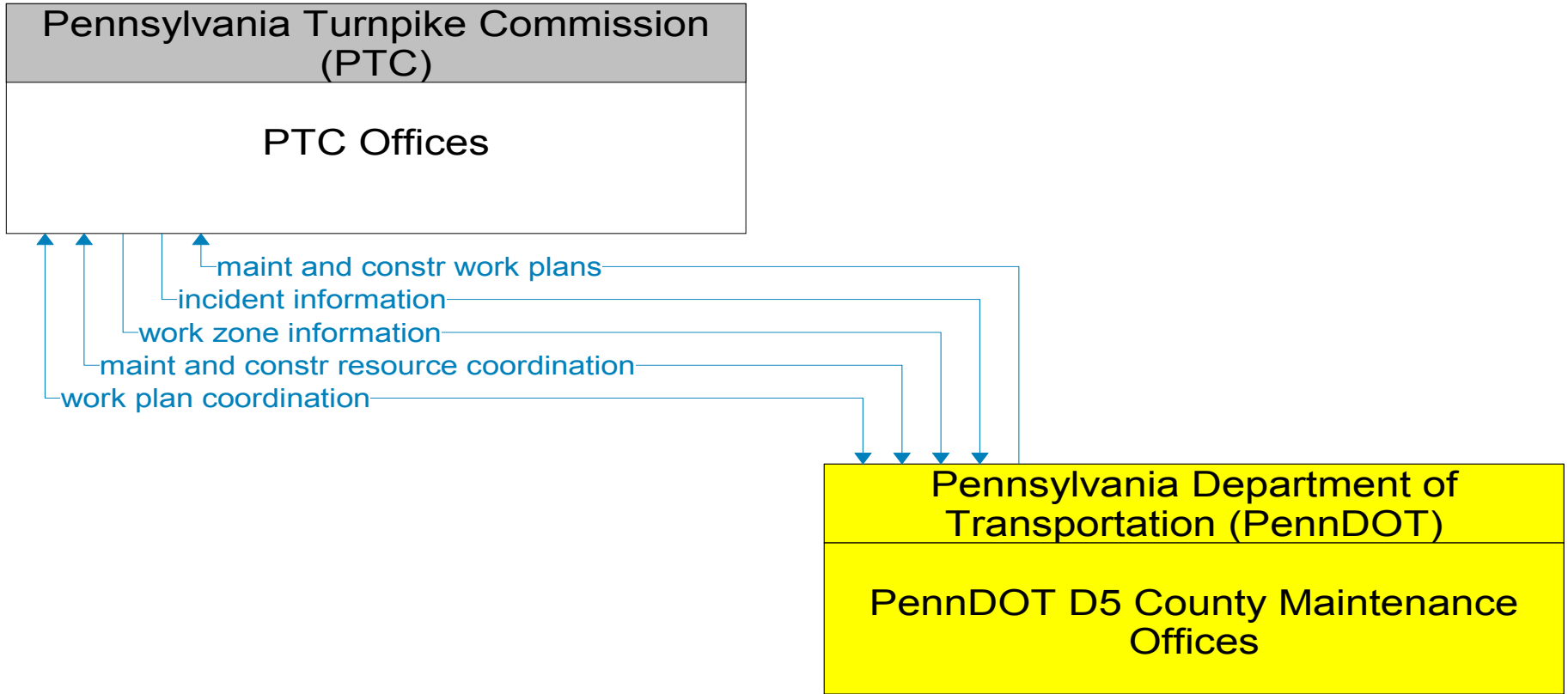
— Existing
- - - Planned

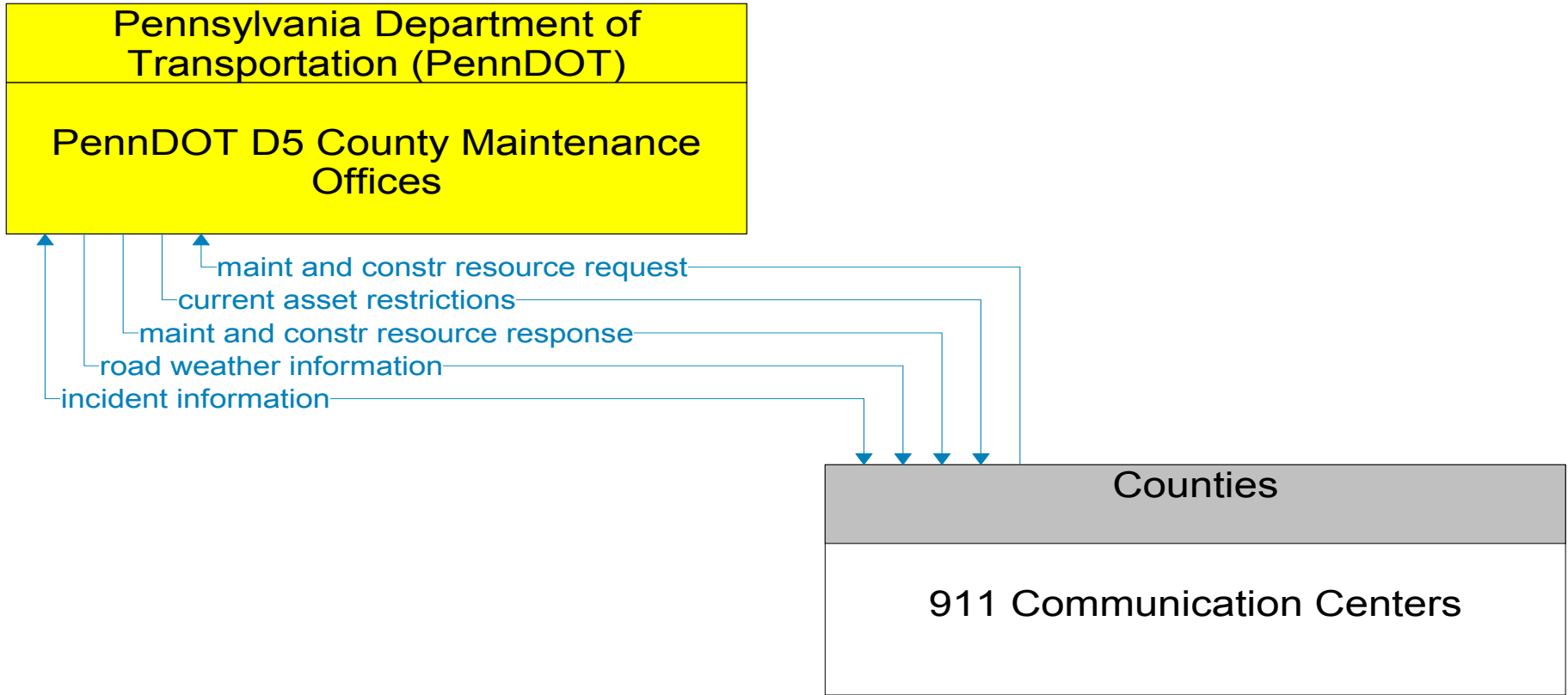
Pennsylvania Department of Transportation (PennDOT)
PennDOT D5 TMC



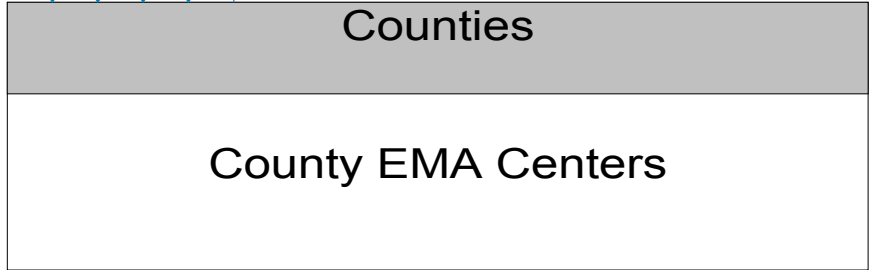
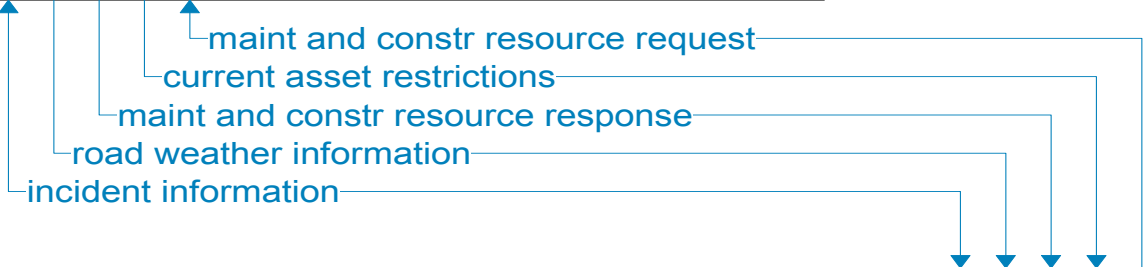
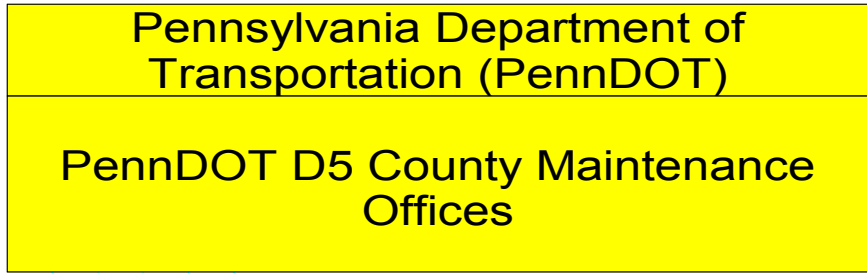
Pennsylvania Department of Transportation (PennDOT)
PennDOT D5 County Maintenance Offices

———— Existing
- - - - - Planned

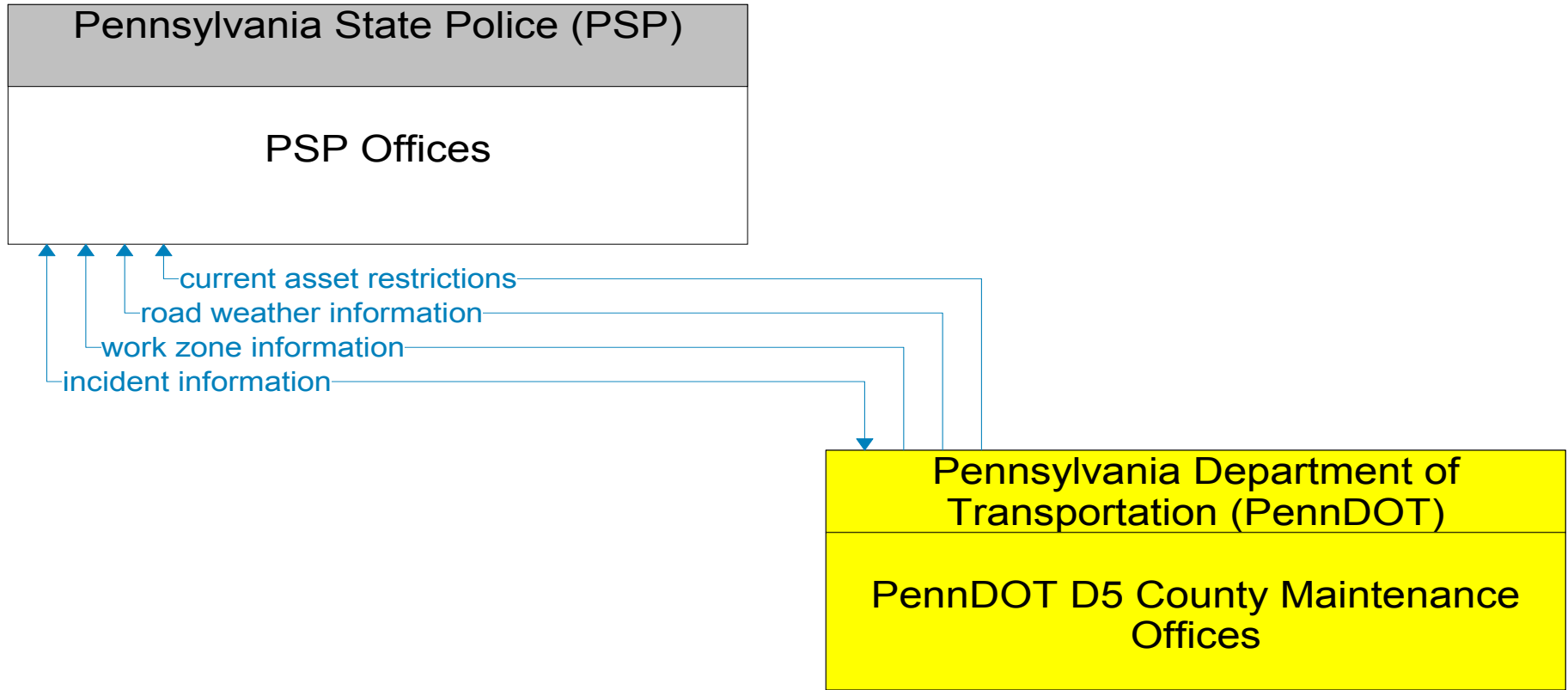




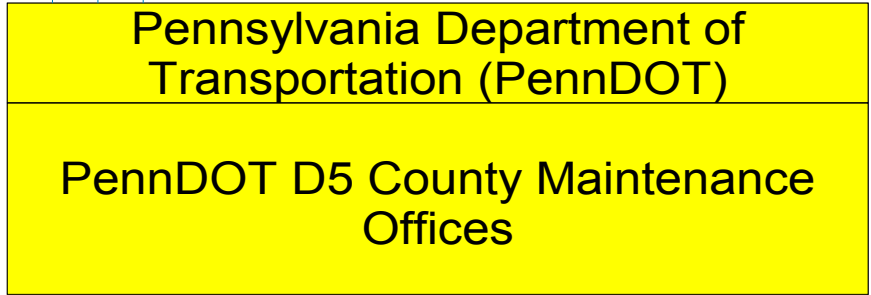
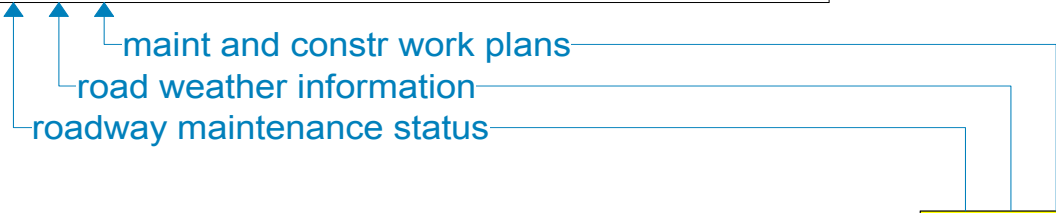
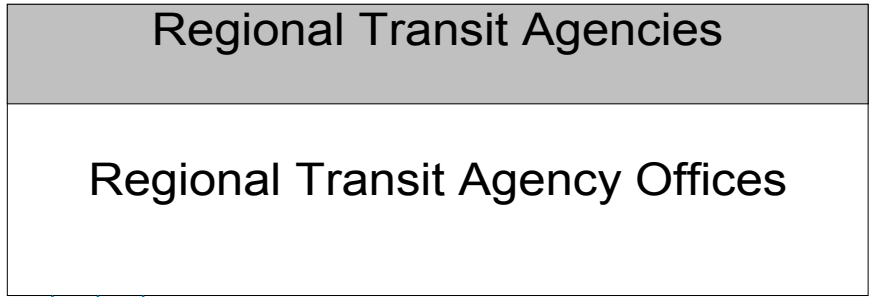
———— Existing
----- Planned



Existing
Planned

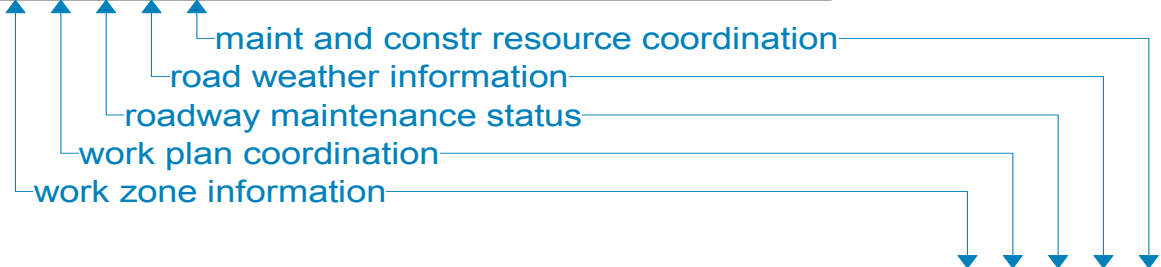


———— Existing
- - - - - Planned



Pennsylvania Department of
Transportation (PennDOT)

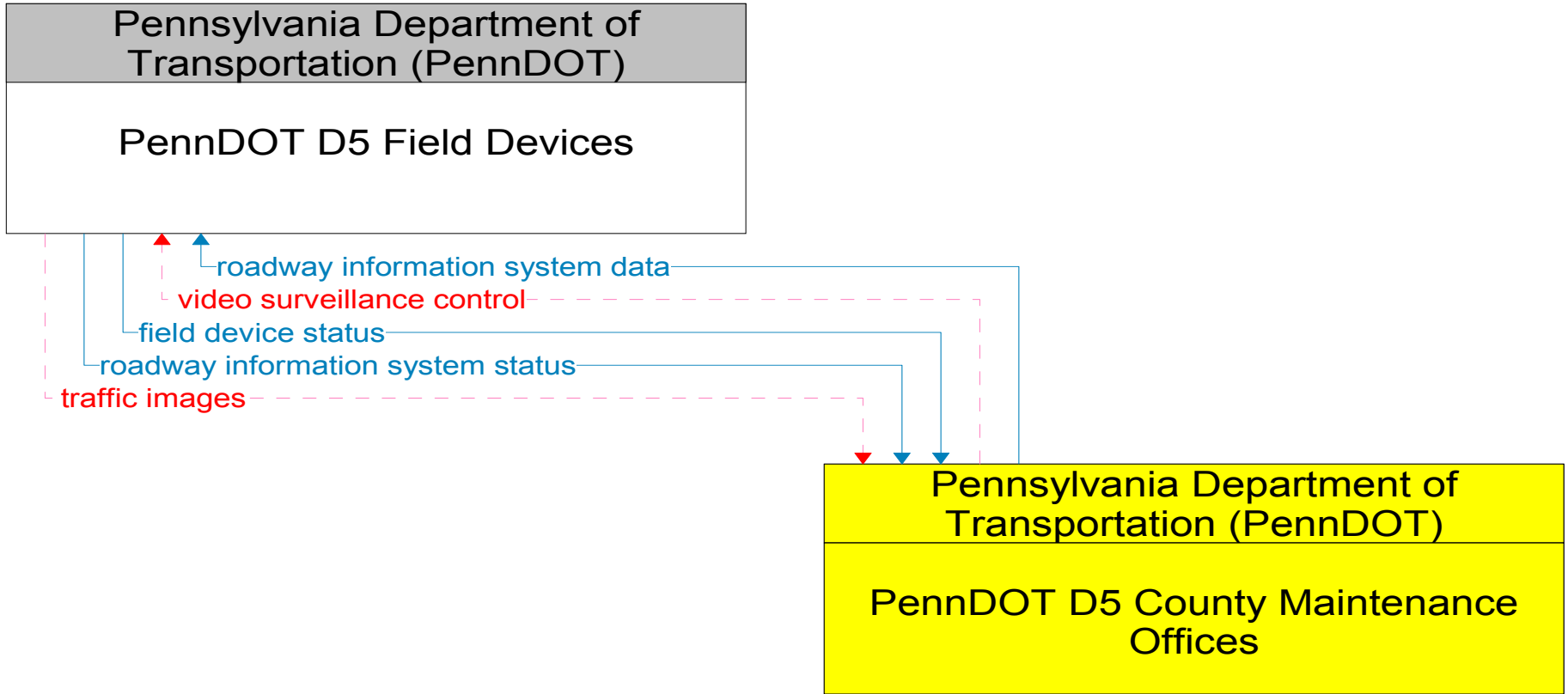
Adjacent PennDOT District and County
Offices



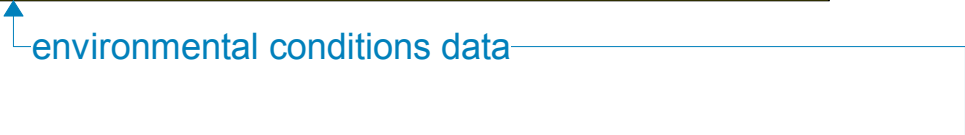
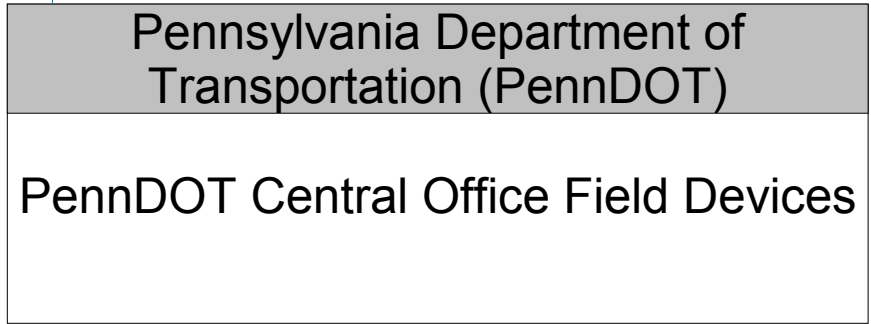
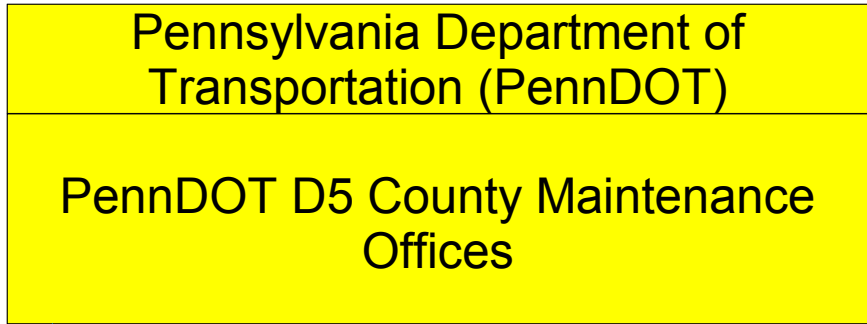
Pennsylvania Department of
Transportation (PennDOT)

PennDOT D5 County Maintenance
Offices

———— Existing
- - - - - Planned



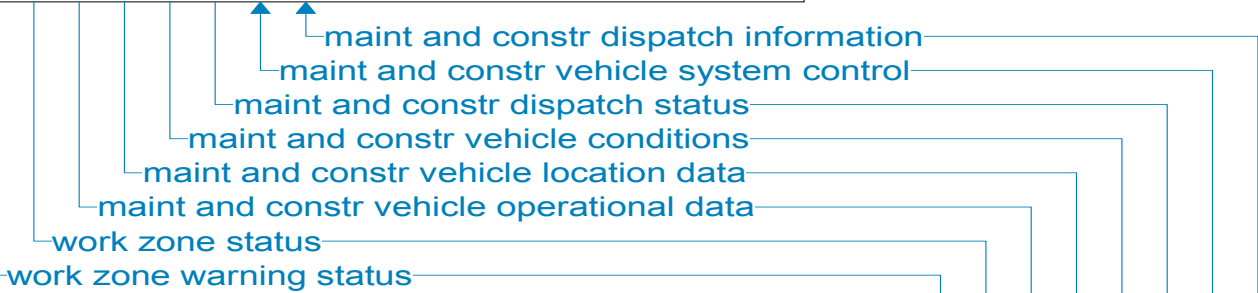
———— Existing
- - - - - Planned



———— Existing
- - - - - Planned

**Pennsylvania Department of
Transportation (PennDOT)**

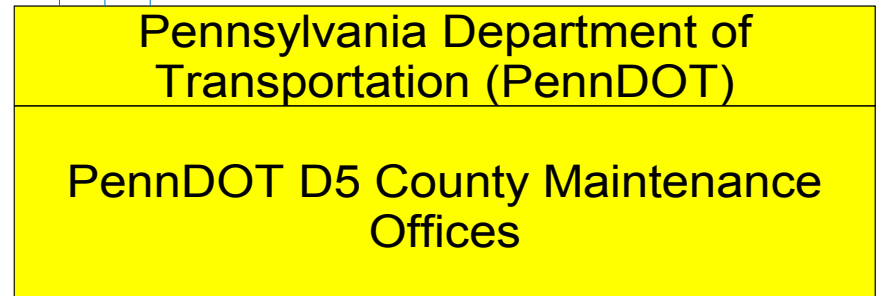
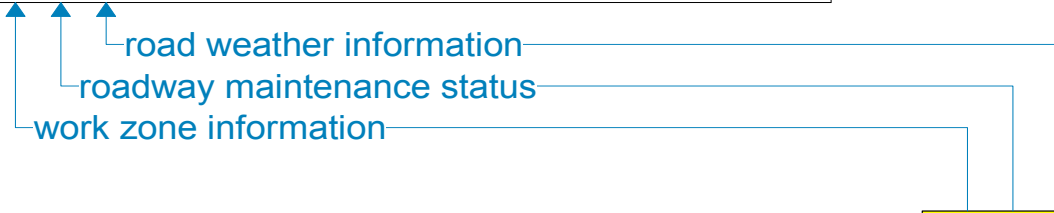
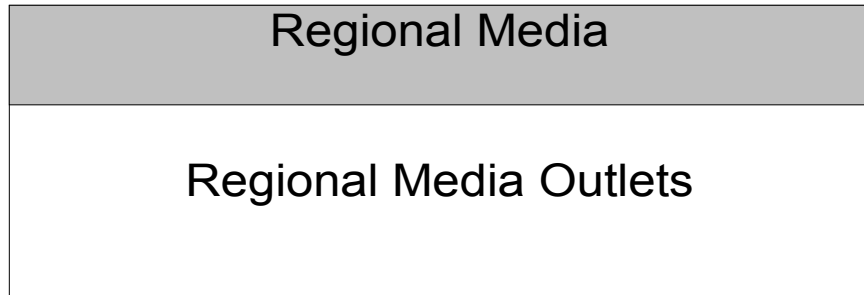
**PennDOT D5 Maintenance and
Construction Vehicles**

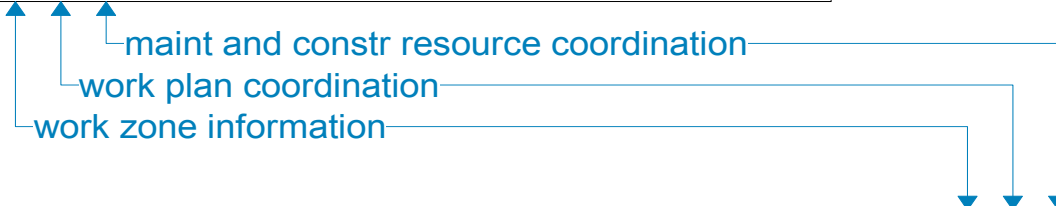
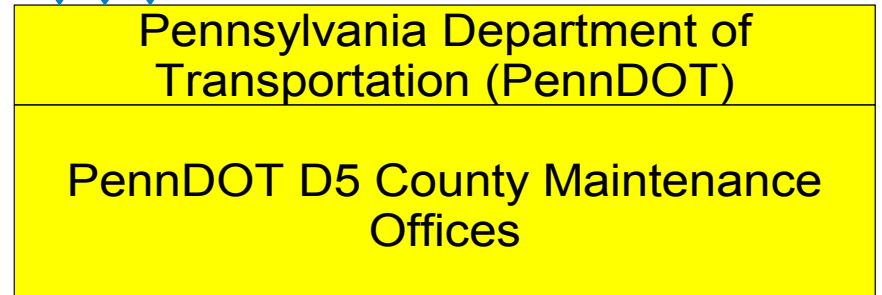
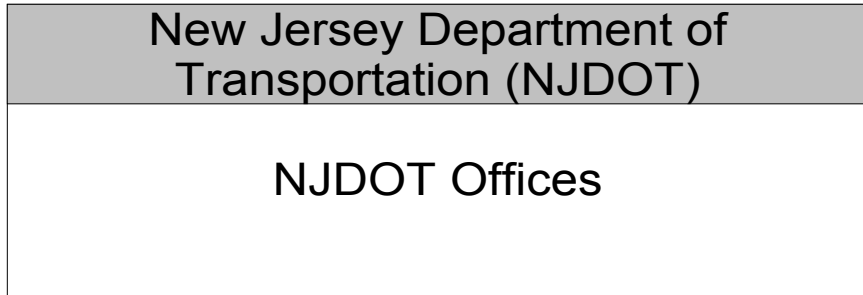


**Pennsylvania Department of
Transportation (PennDOT)**

**PennDOT D5 County Maintenance
Offices**

———— Existing
- - - - - Planned





Existing
Planned

Pennsylvania Department of
Transportation (PennDOT)

PennDOT D5 County Maintenance
Offices

- incident response status
- maint and constr resource request
- road network conditions
- current asset restrictions
- maint and constr resource response
- maint and constr work plans
- road weather information
- work zone information
- incident information

Pennsylvania Department of
Transportation (PennDOT)

PennDOT D4 TMC

———— Existing
- - - - - Planned

Pennsylvania Department of
Transportation (PennDOT)

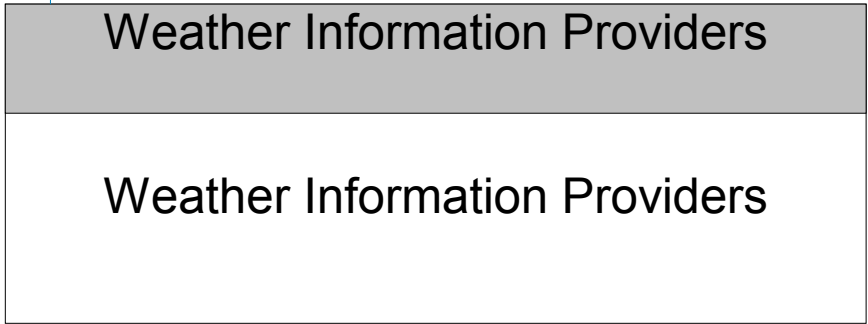
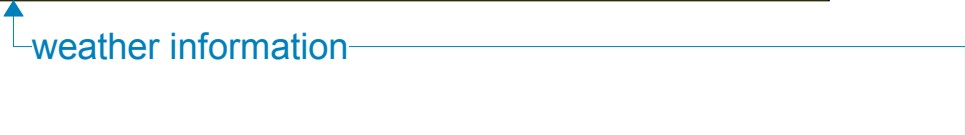
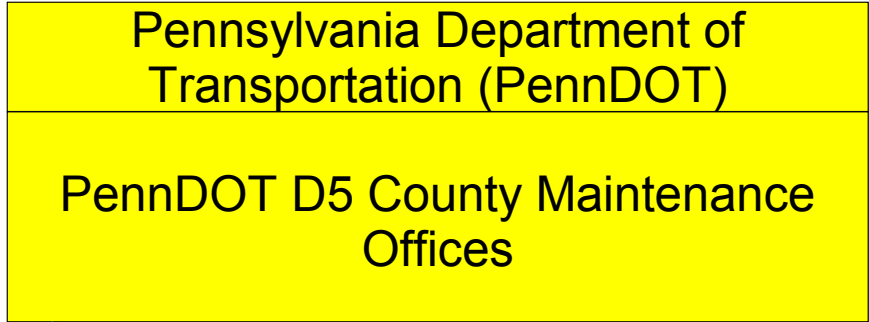
PennDOT D6 TMC

- current asset restrictions-
- maint and constr resource response-
- maint and constr work plans-
- road weather information-
- work zone information-
- incident response status-
- maint and constr resource request-
- road network conditions-
- incident information-

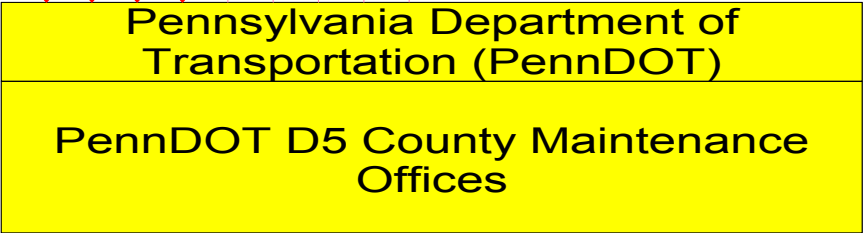
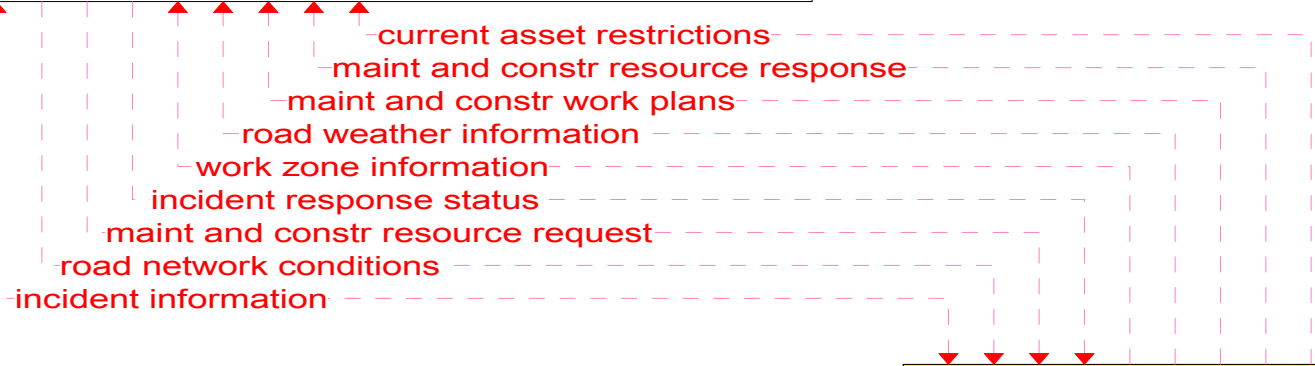
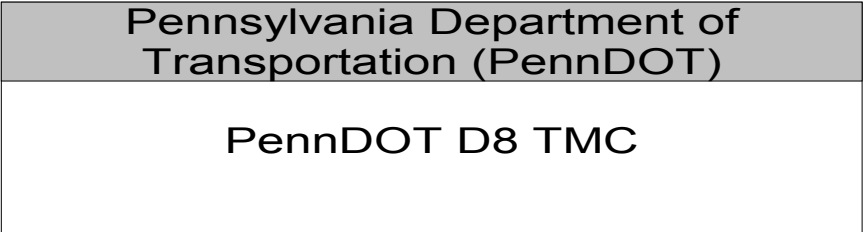
Pennsylvania Department of
Transportation (PennDOT)

PennDOT D5 County Maintenance
Offices

———— Existing
- - - - - Planned

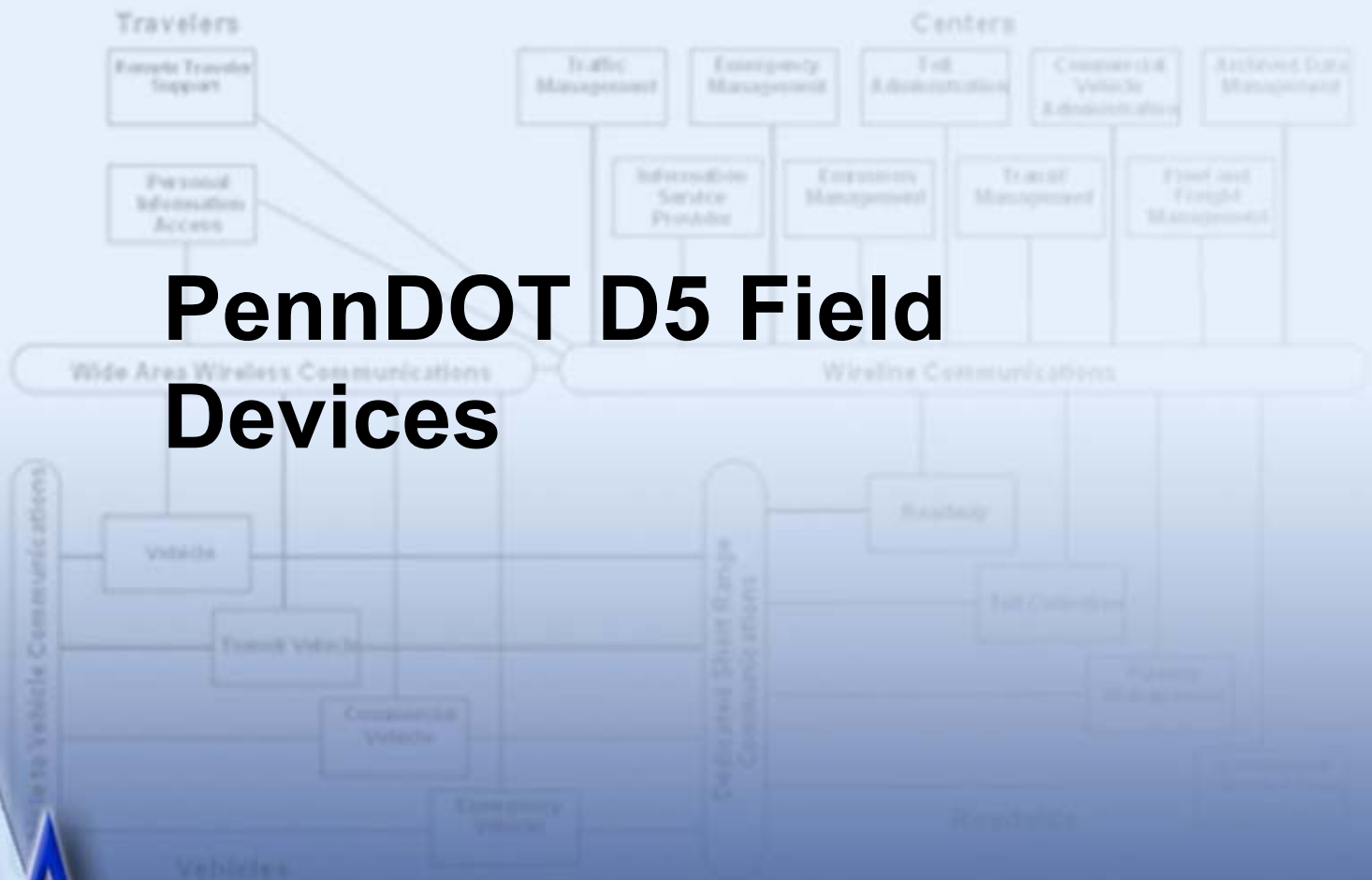


———— Existing
- - - - - Planned

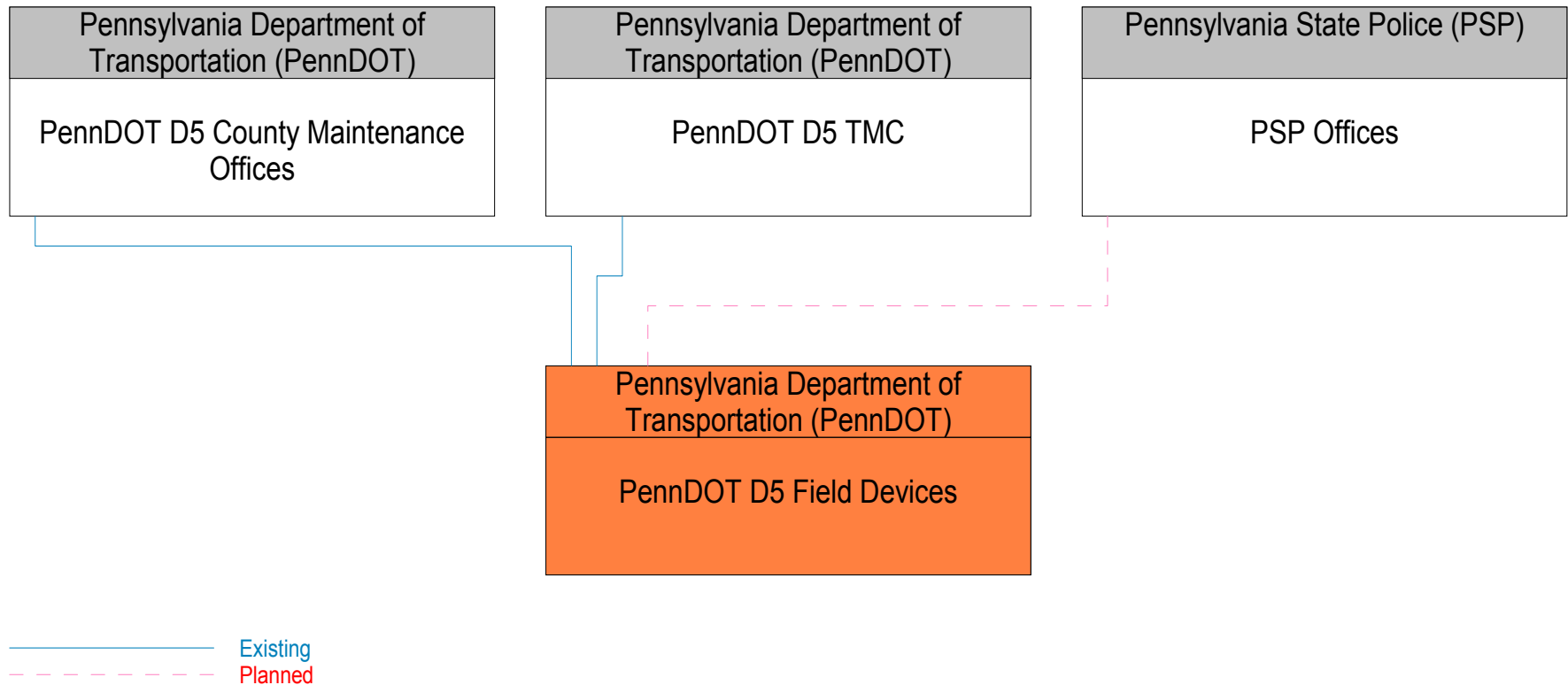


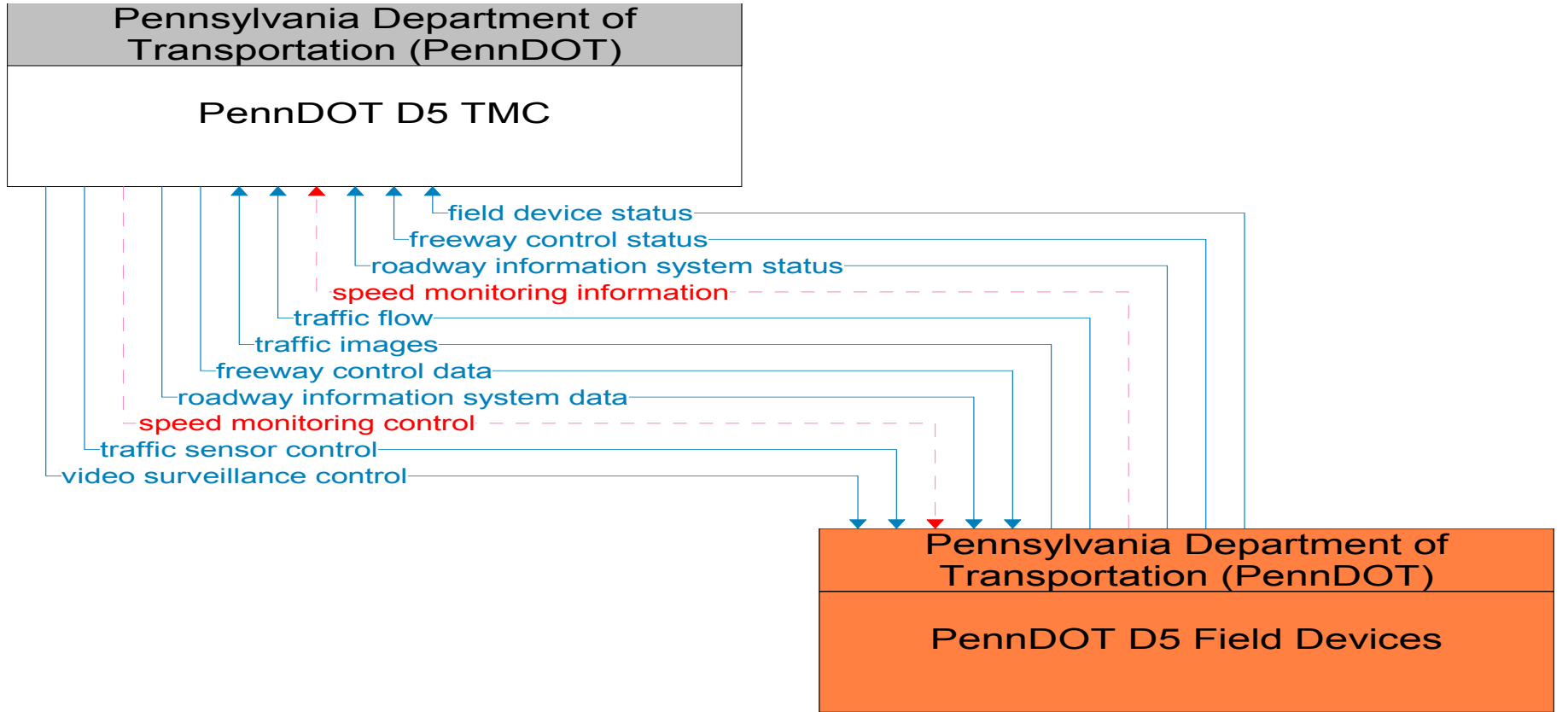
———— Existing
- - - - - Planned

PennDOT D5 Field Devices

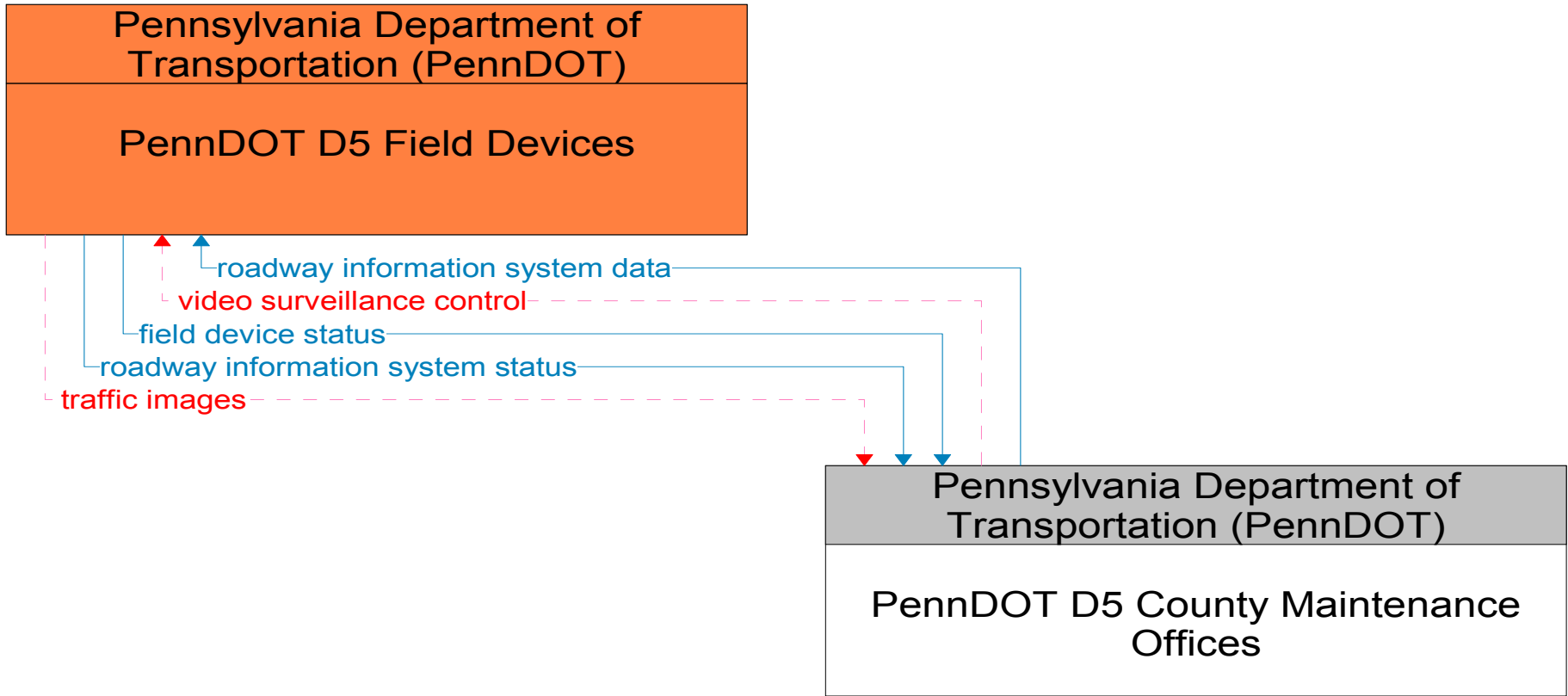


PennDOT D5 Field Devices Interconnect Diagram

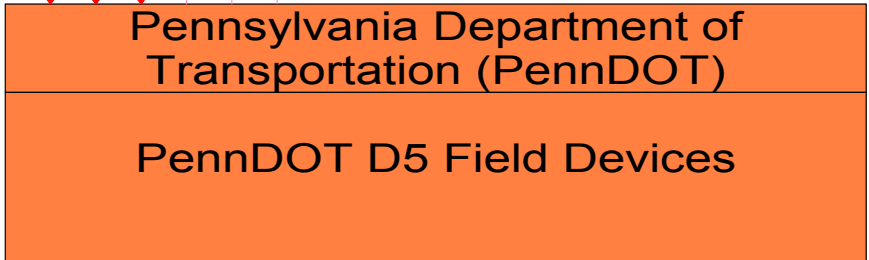
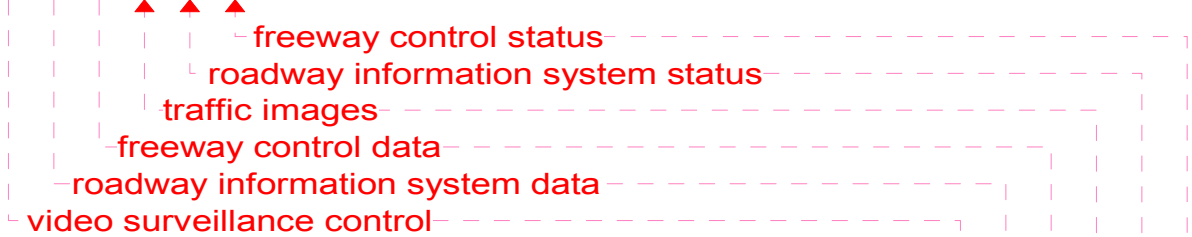
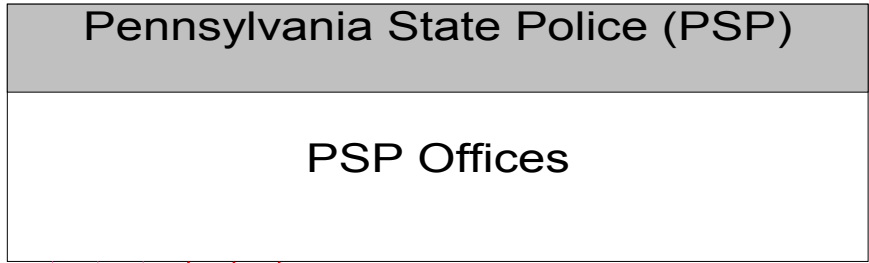




———— Existing
- - - - - Planned

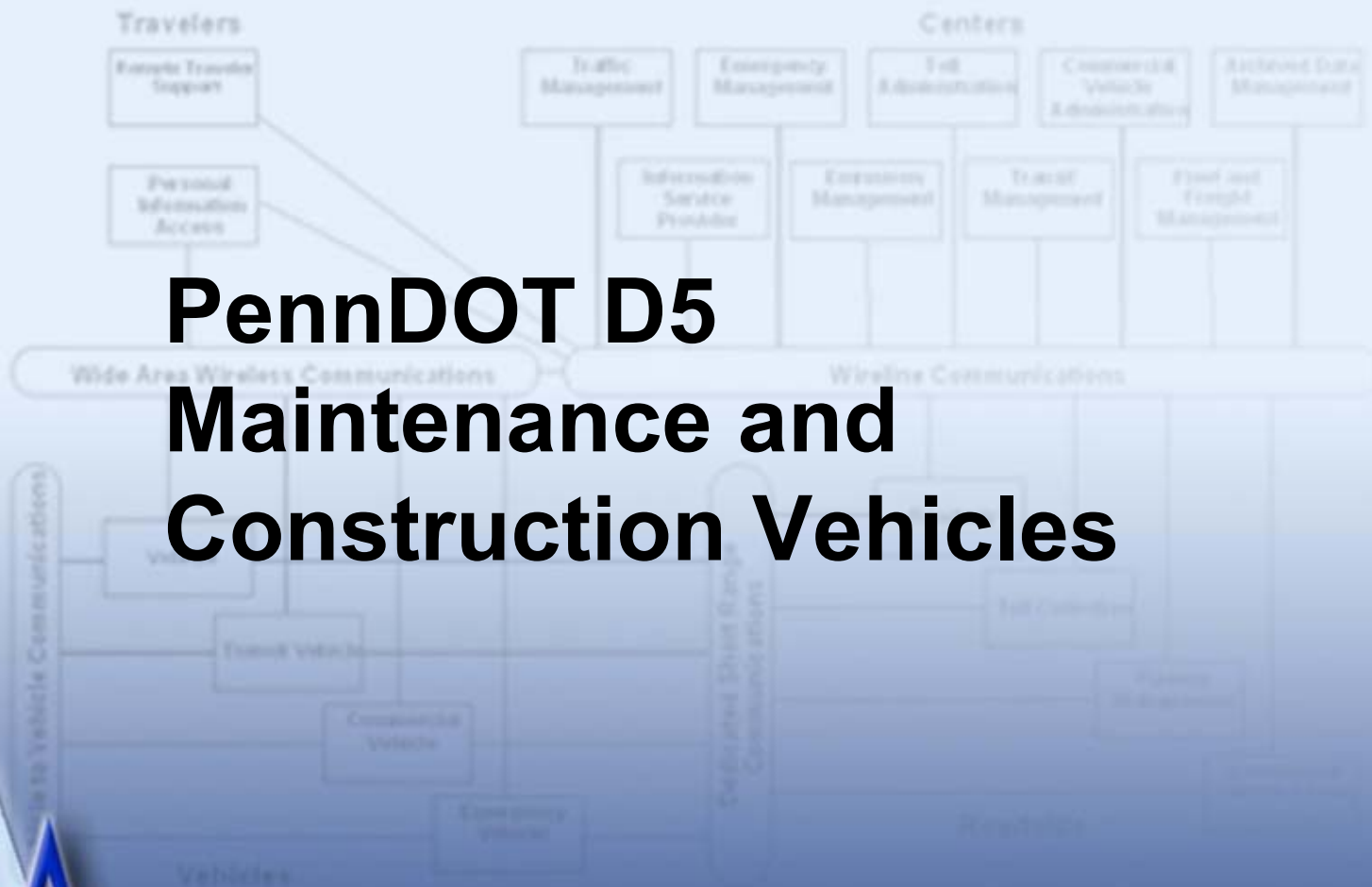


———— Existing
- - - - - Planned

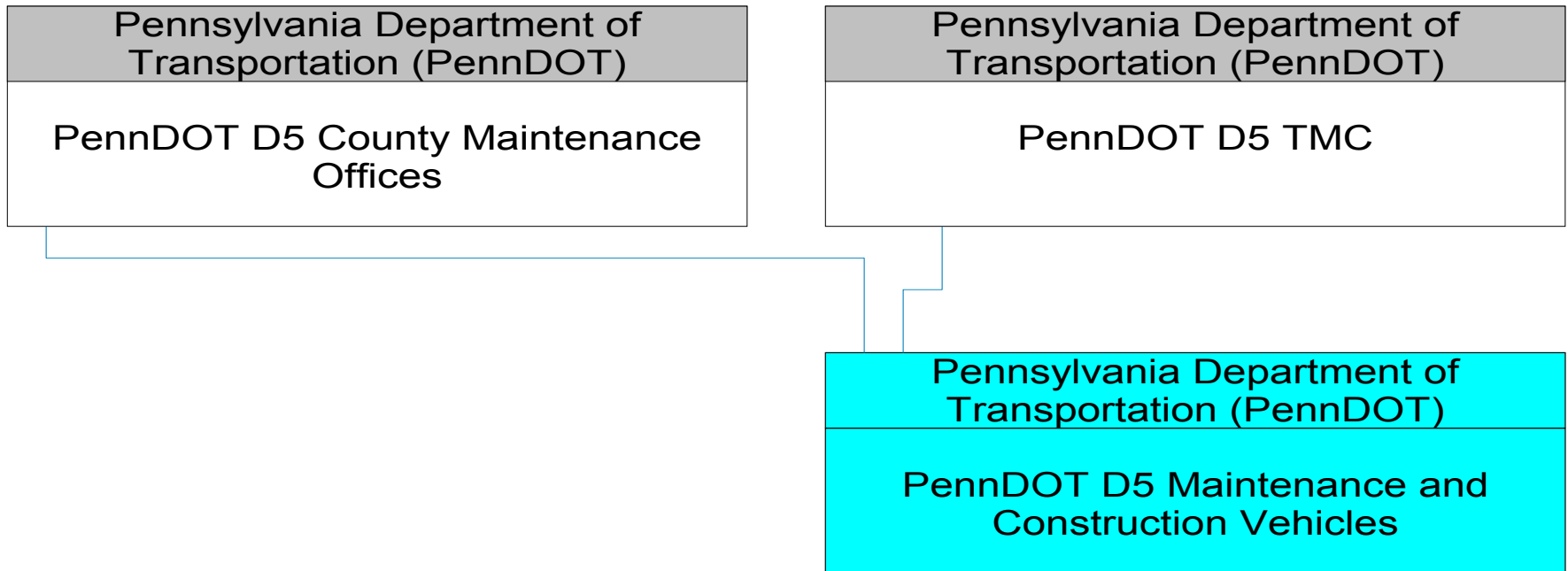


———— Existing
- - - - - Planned

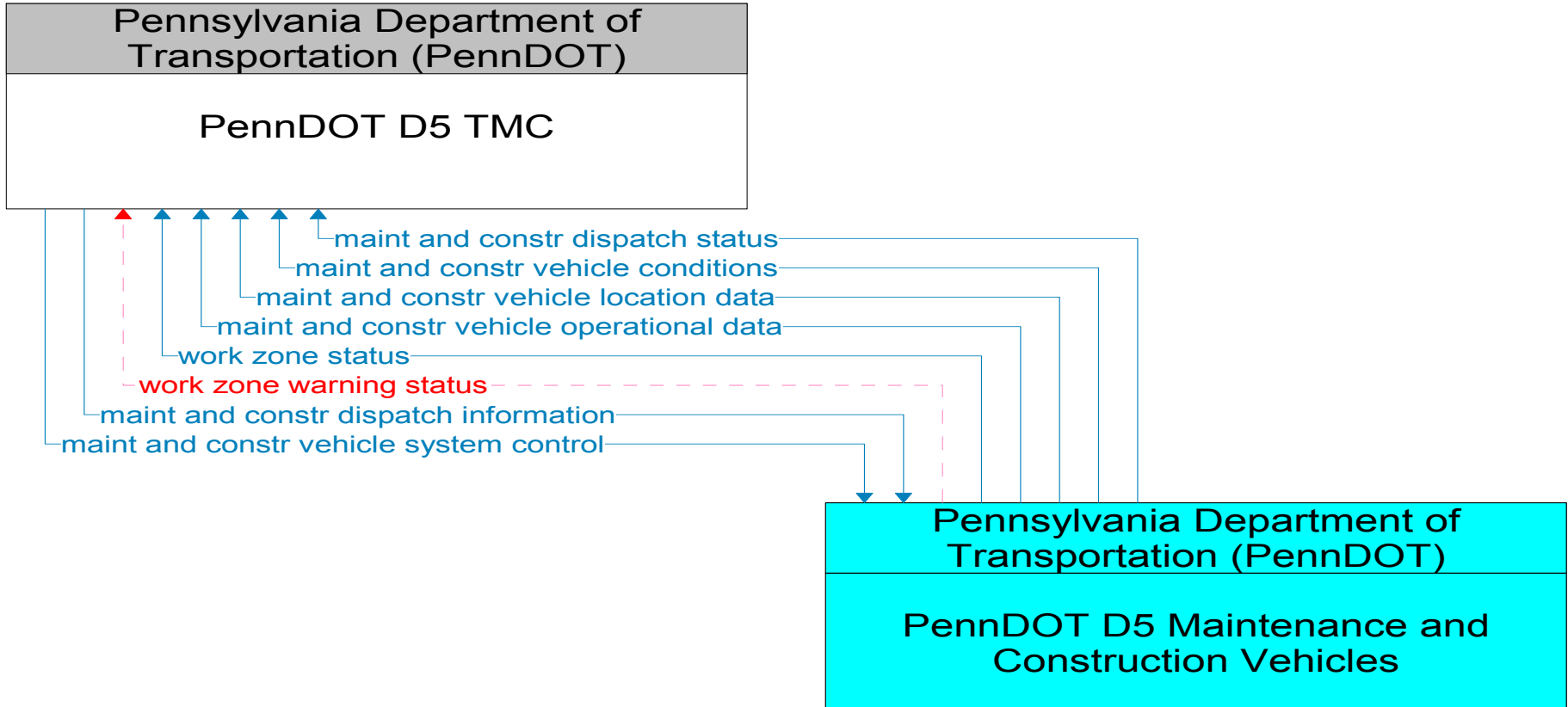
PennDOT D5 Maintenance and Construction Vehicles



PennDOT D5 Maintenance and Construction Vehicles Interconnect Diagram



———— Existing
----- Planned



———— Existing
- - - - - Planned

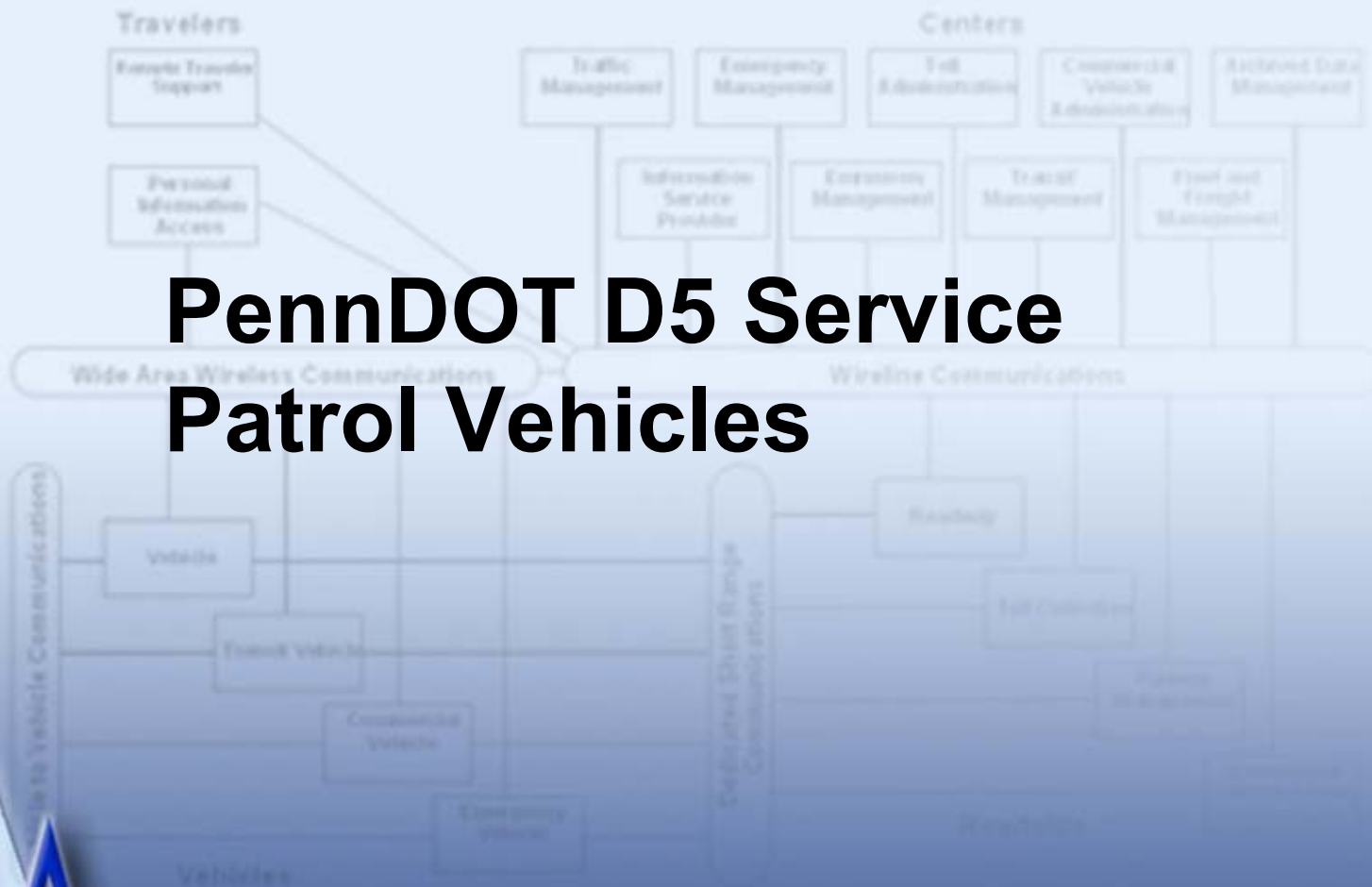
Pennsylvania Department of Transportation (PennDOT)
PennDOT D5 Maintenance and Construction Vehicles

- work zone warning status
- work zone status
- maint and constr vehicle operational data
- maint and constr vehicle location data
- maint and constr vehicle conditions
- maint and constr dispatch status
- maint and constr vehicle system control
- maint and constr dispatch information

Pennsylvania Department of Transportation (PennDOT)
PennDOT D5 County Maintenance Offices

———— Existing
- - - - - Planned

PennDOT D5 Service Patrol Vehicles

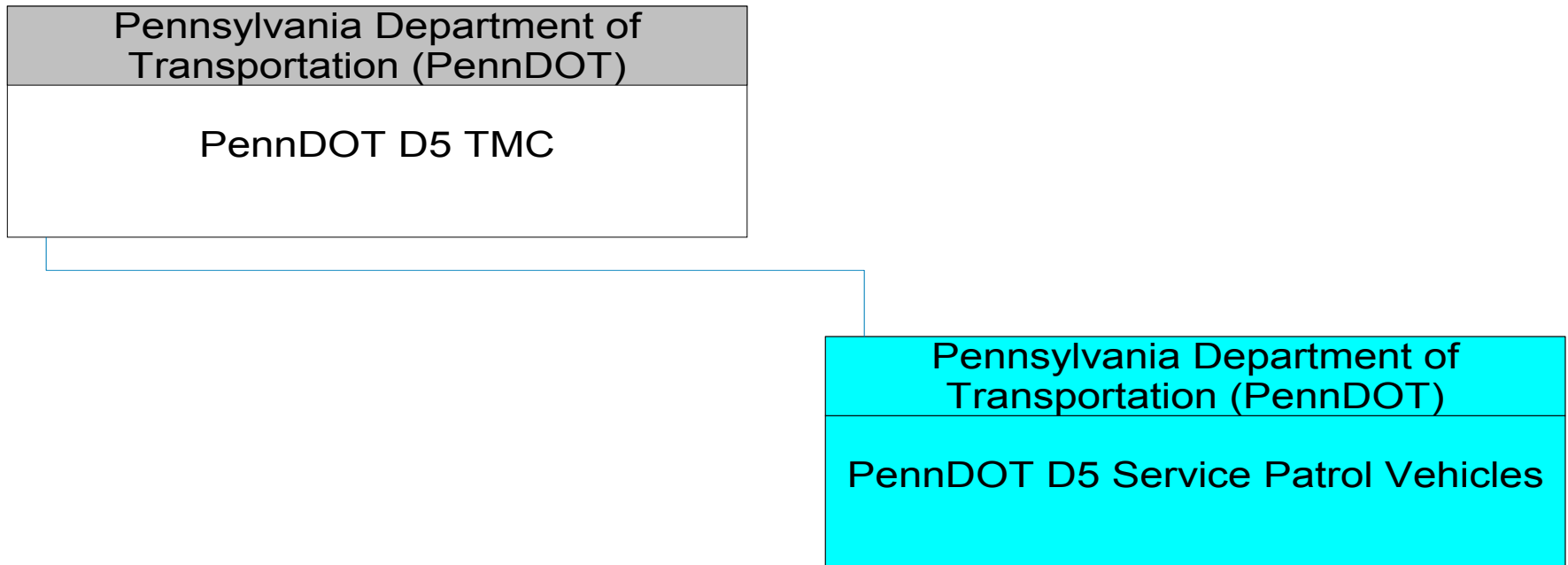


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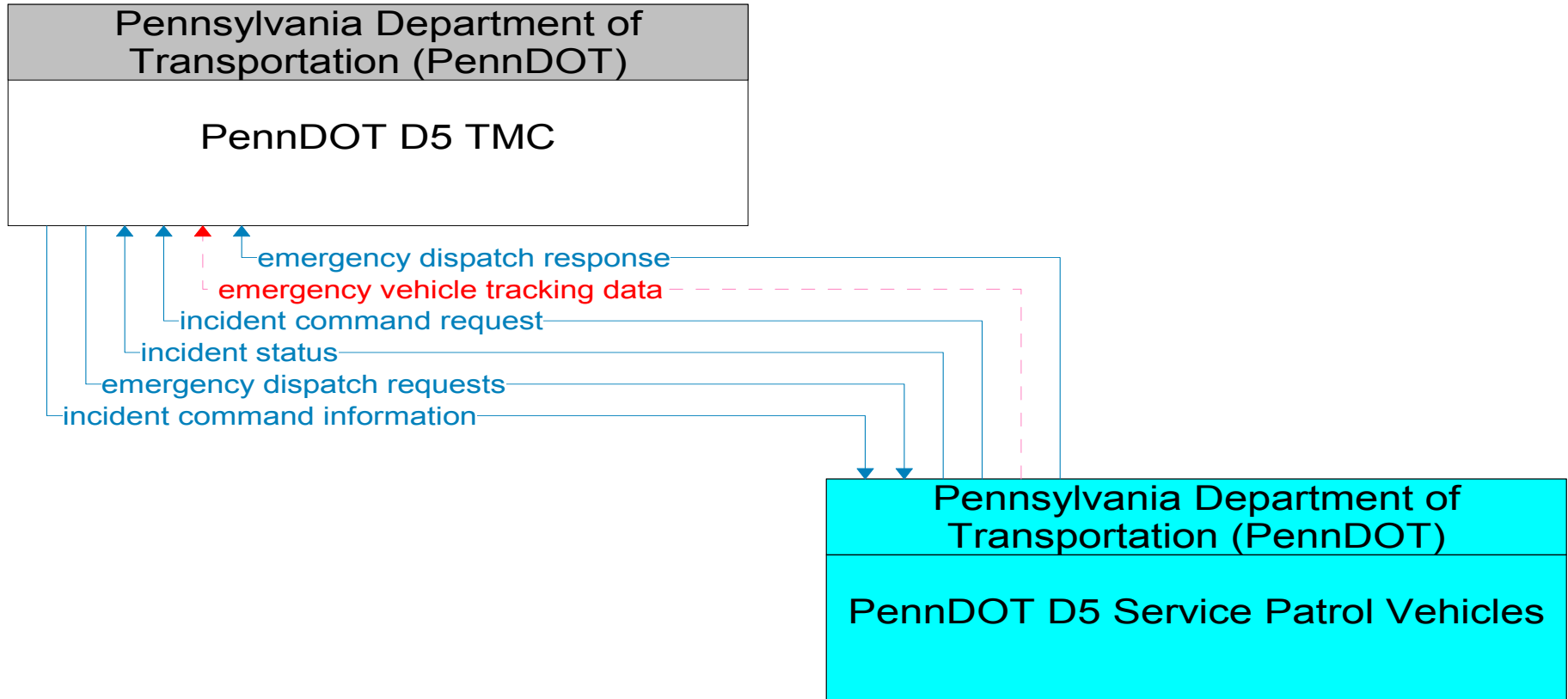
402

architecture

PennDOT D5 Service Patrol Vehicles Interconnect Diagram

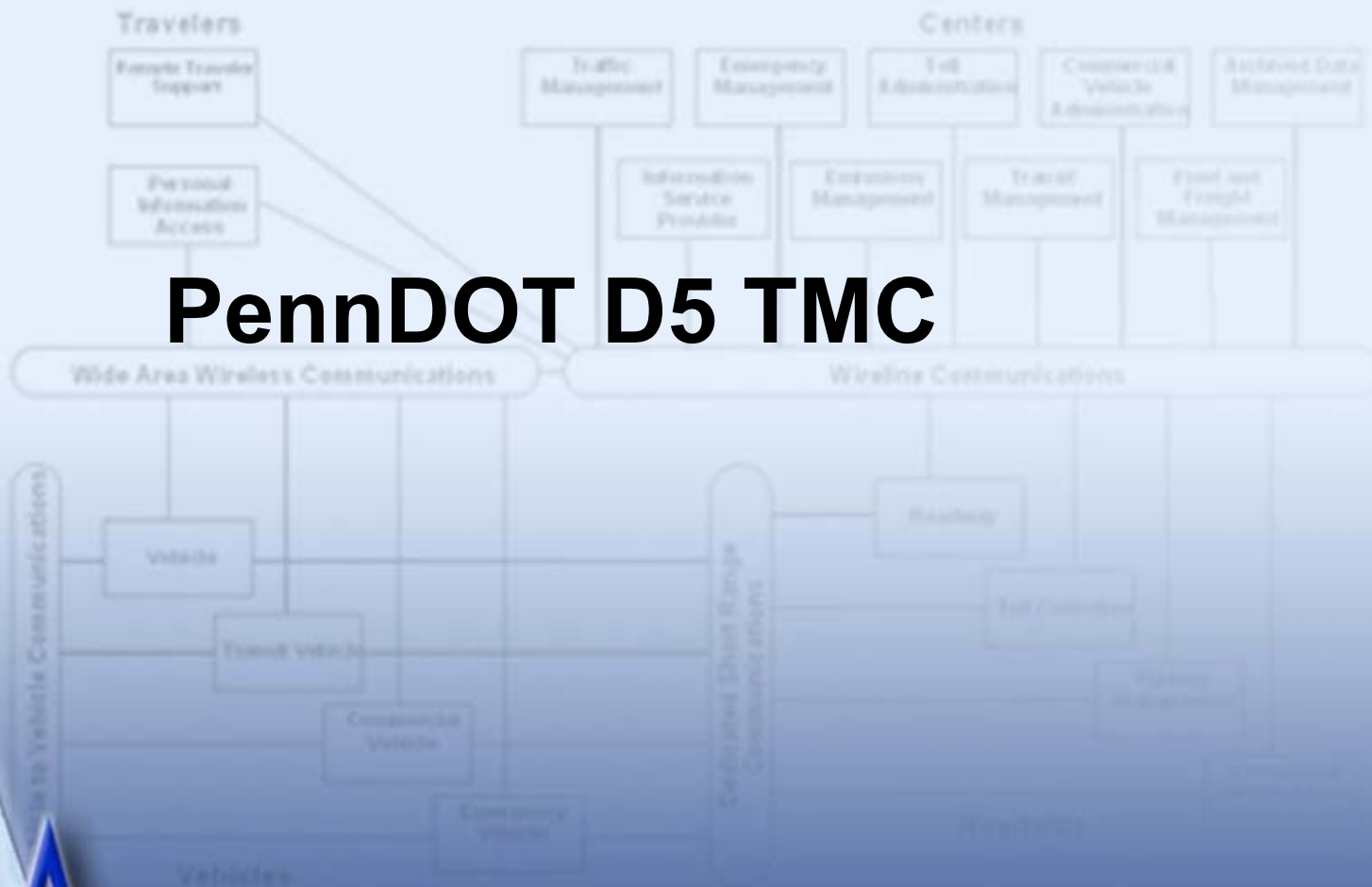


———— Existing
----- Planned



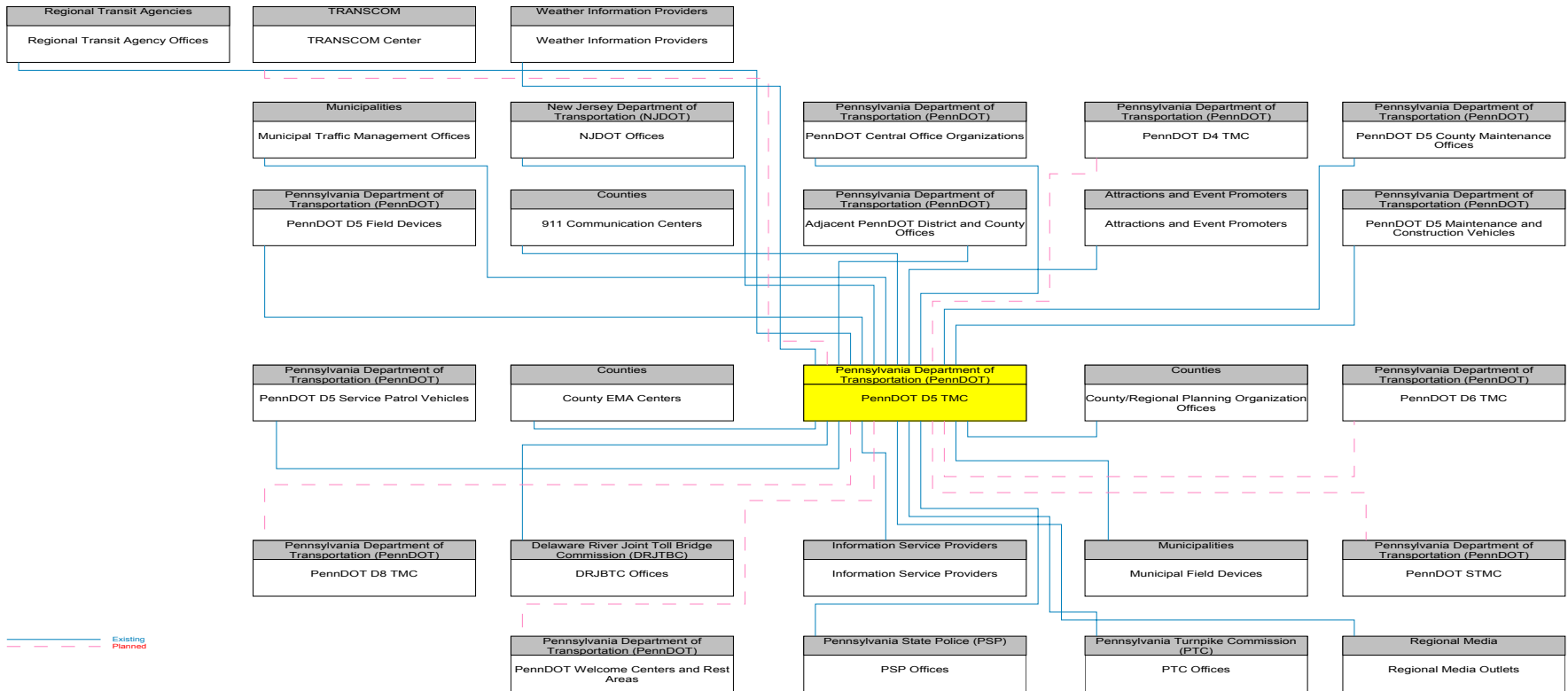
Existing
Planned

PennDOT D5 TMC



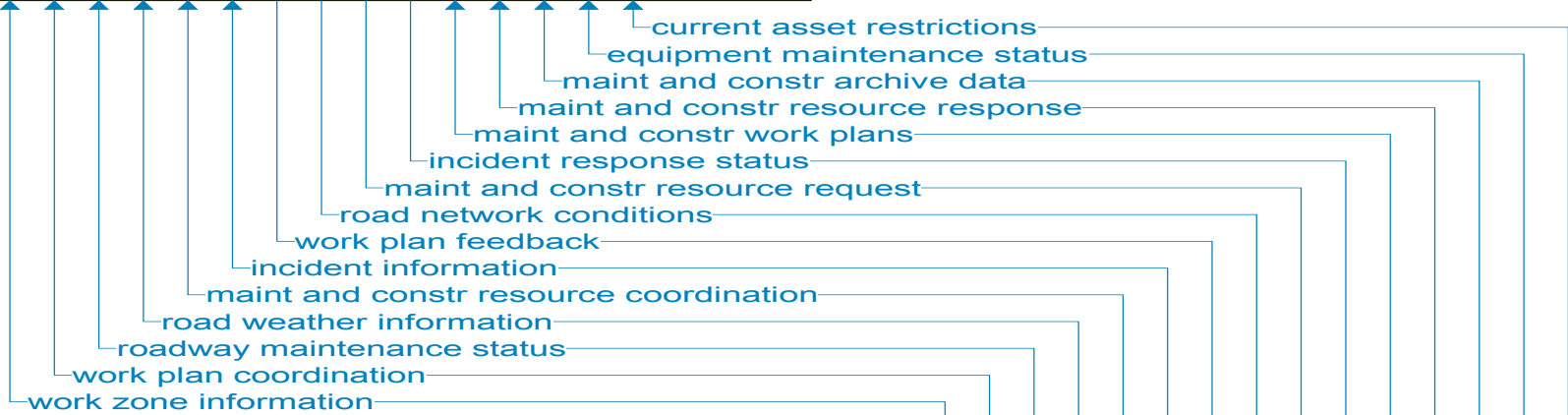
PA

PennDOT D5 TMC Interconnect Diagram



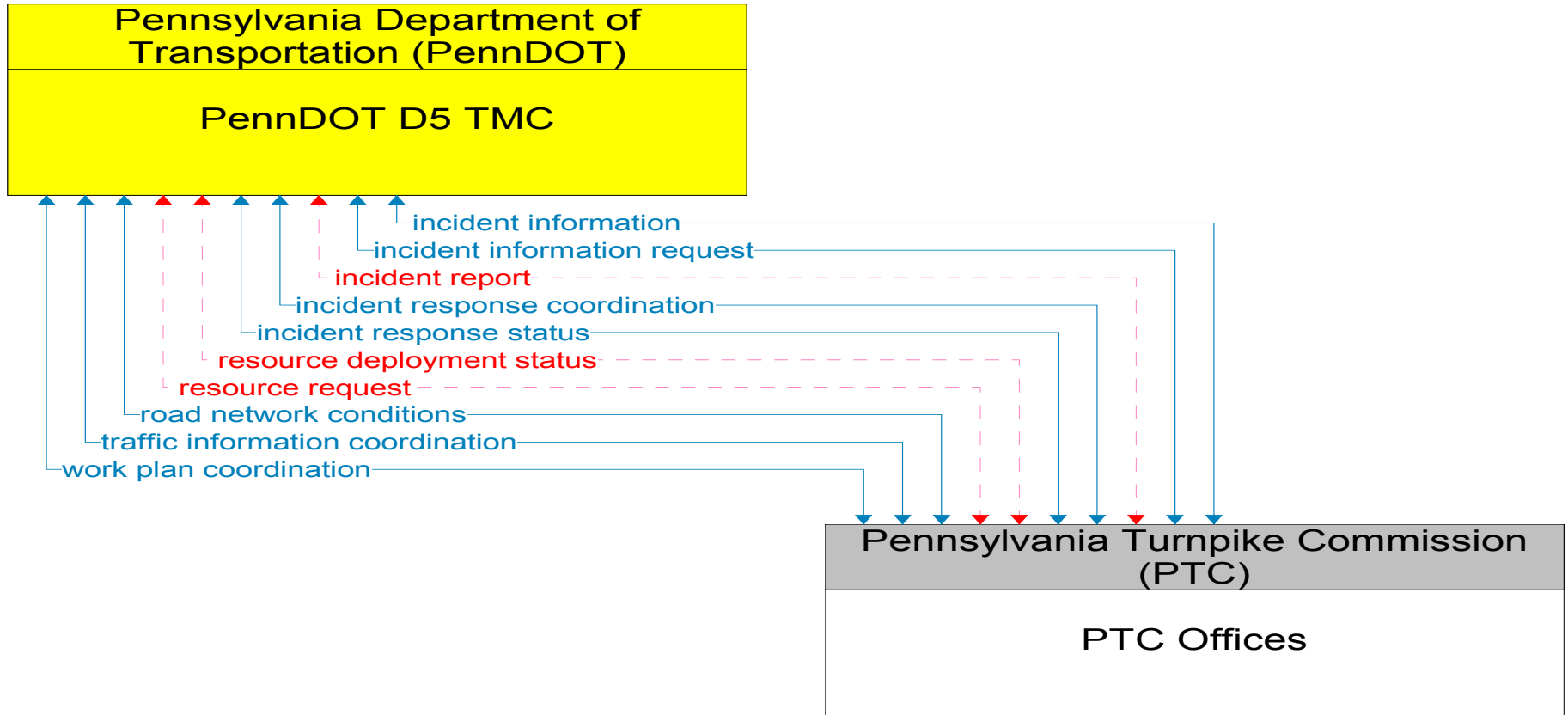


Pennsylvania Department of Transportation (PennDOT)
PennDOT D5 TMC

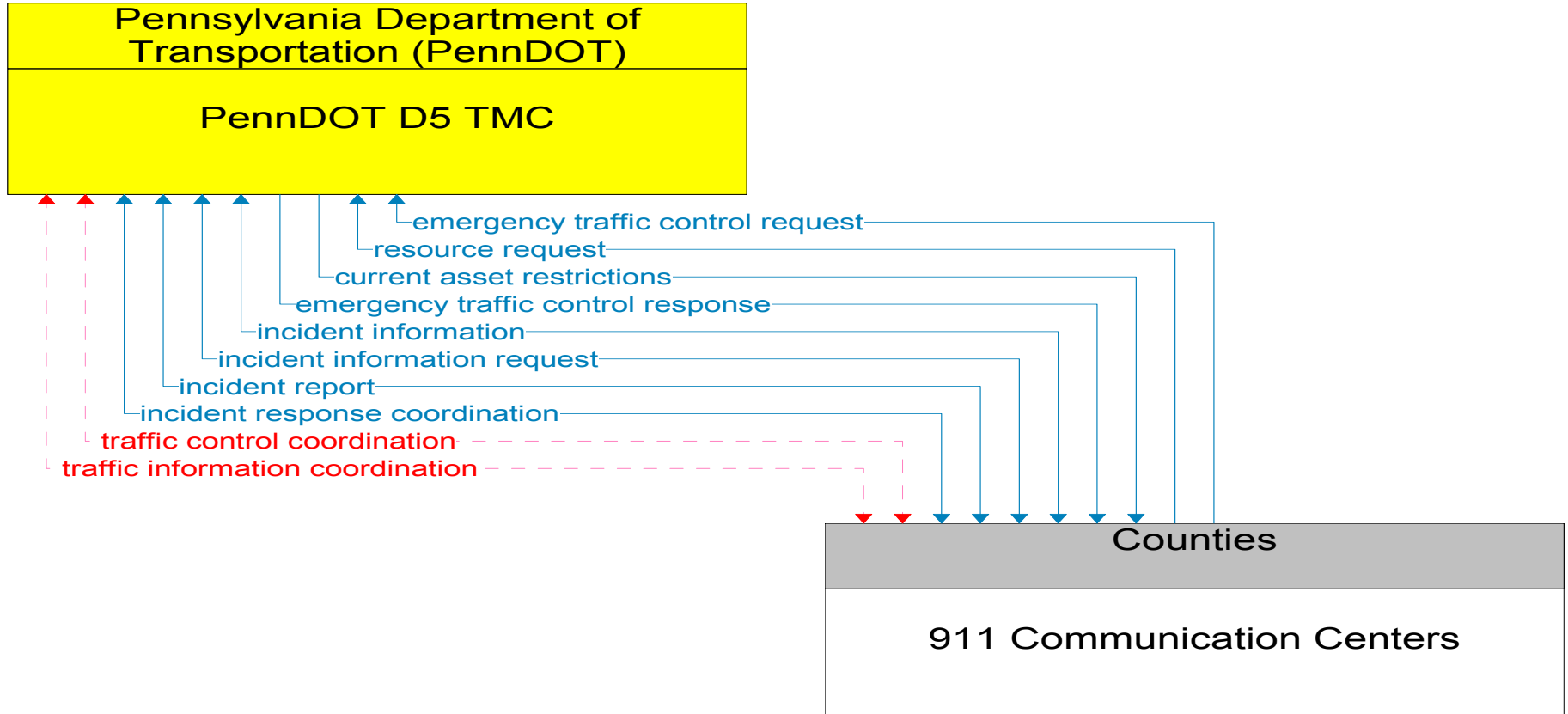


Pennsylvania Department of Transportation (PennDOT)
PennDOT D5 County Maintenance Offices

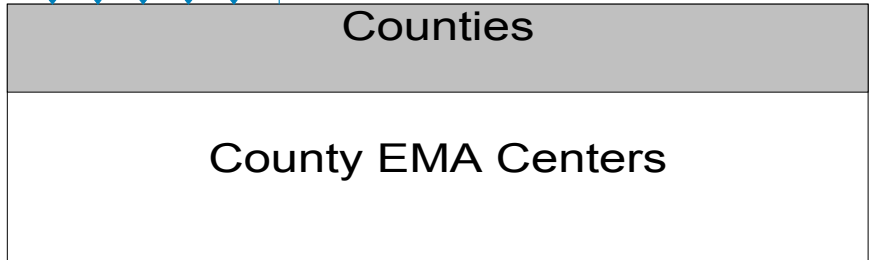
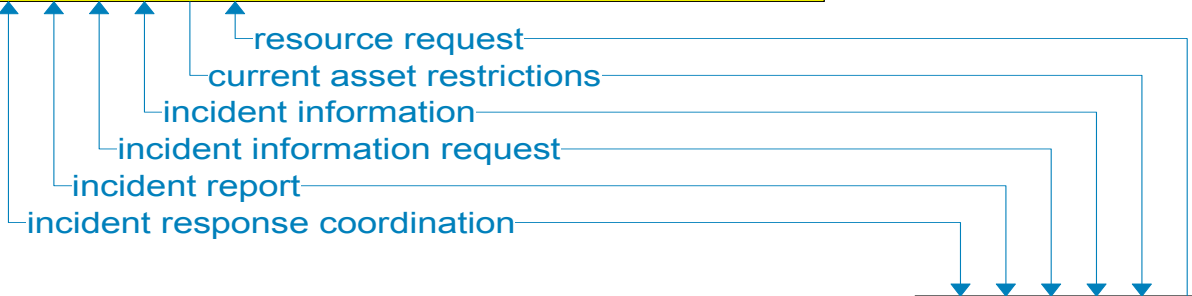
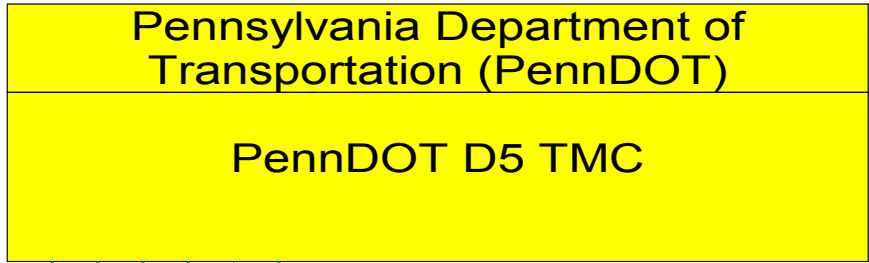
———— Existing
- - - - - Planned



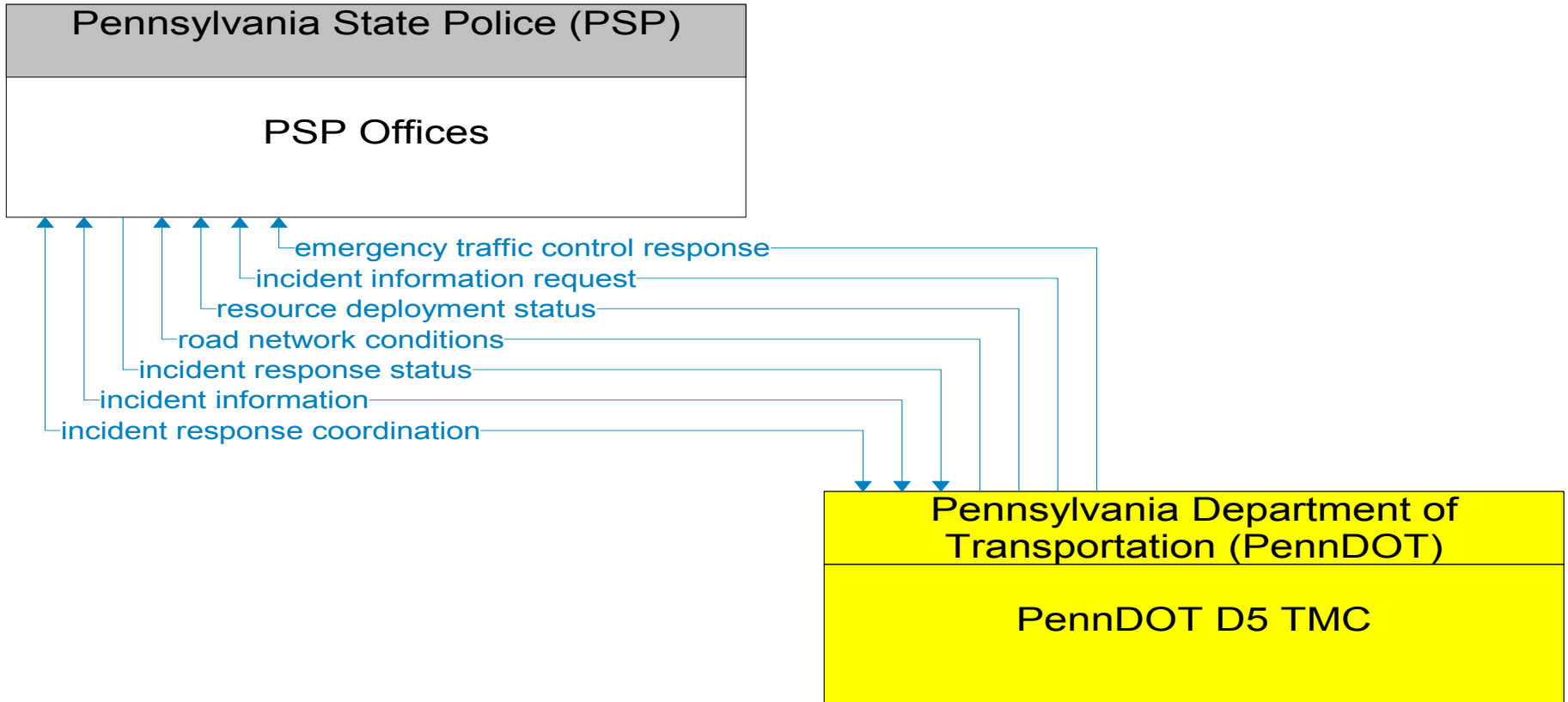
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Planned



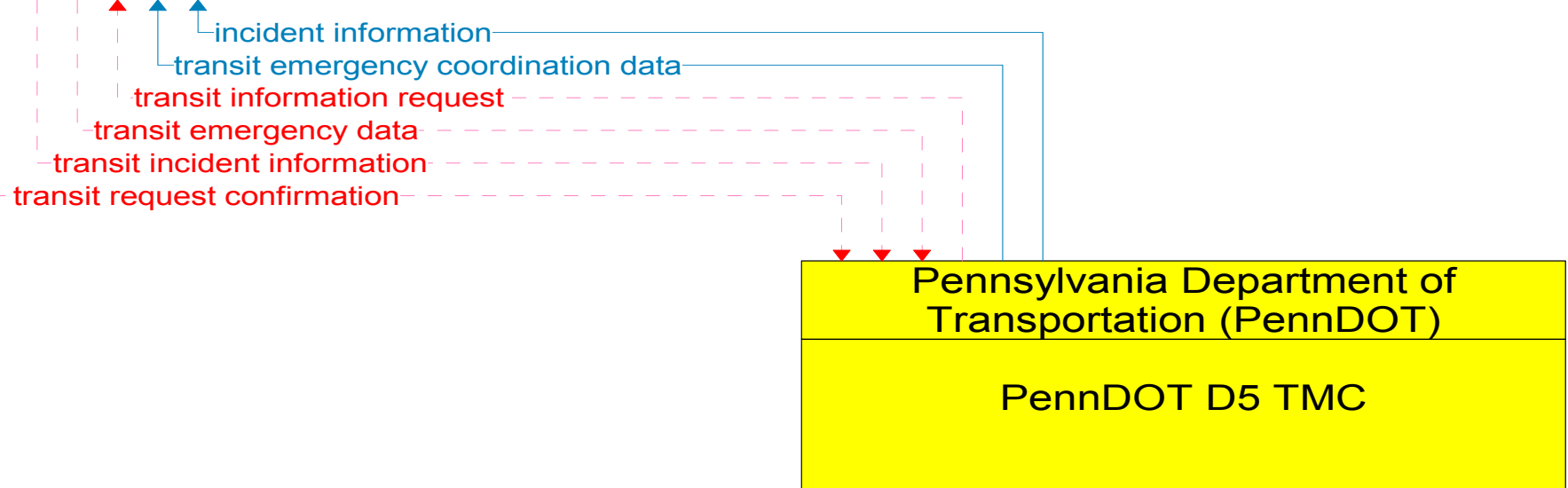
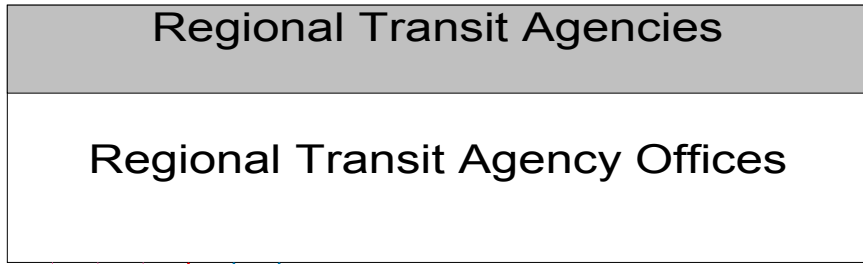
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- - - - - Planned



Existing
Planned



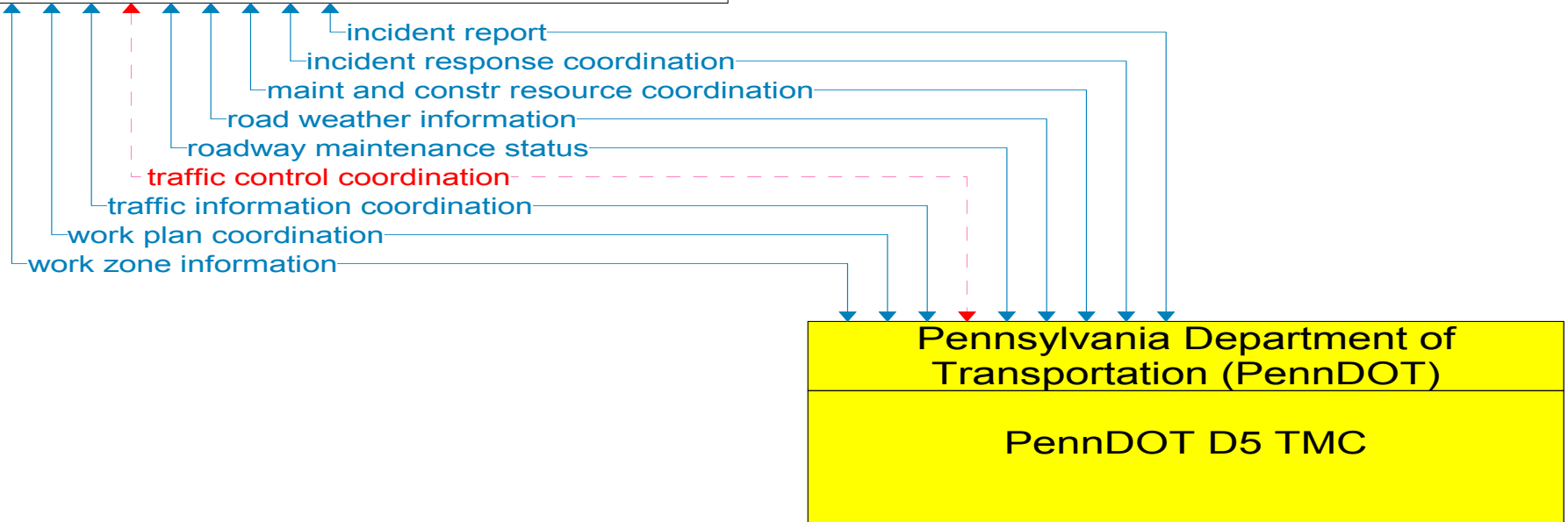
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- - - - - Planned



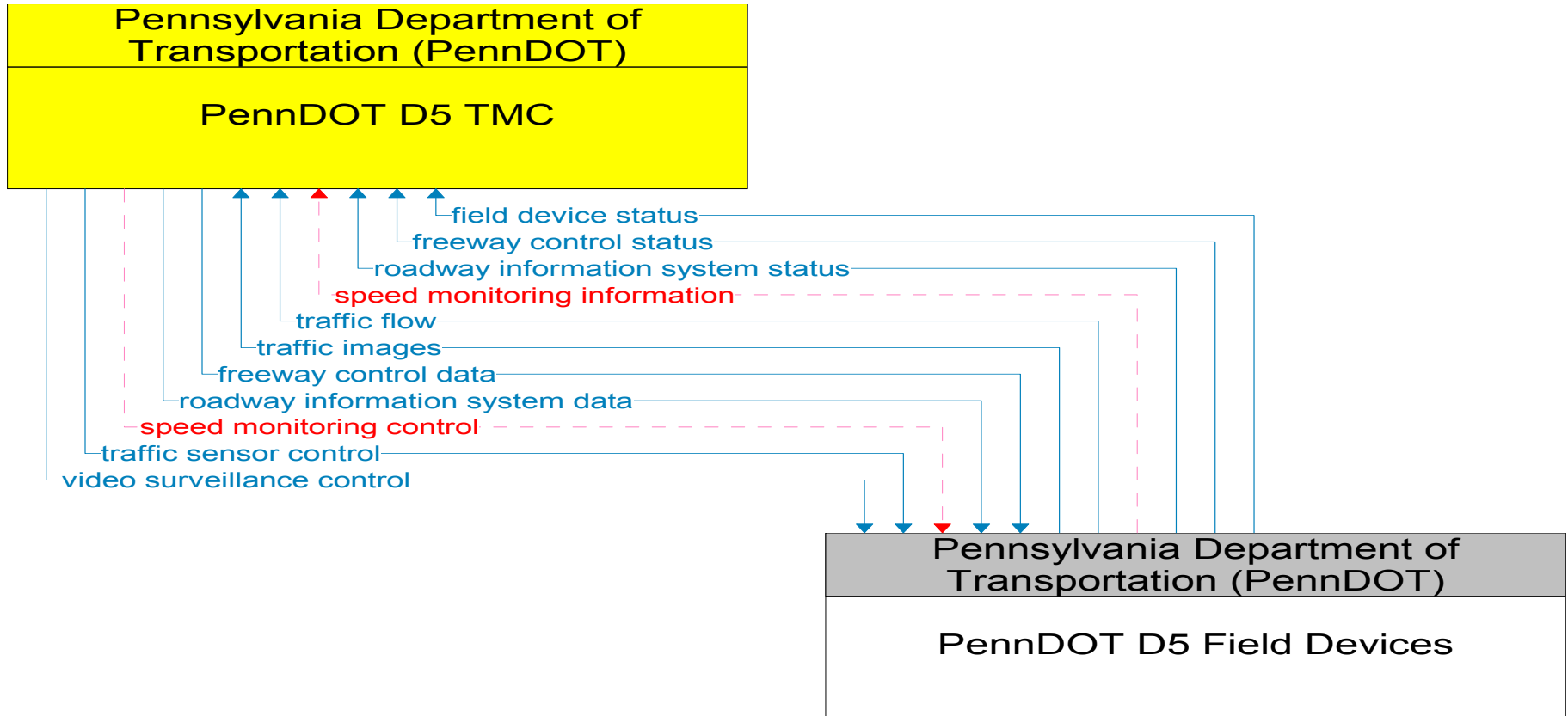
Existing
Planned

Pennsylvania Department of
Transportation (PennDOT)

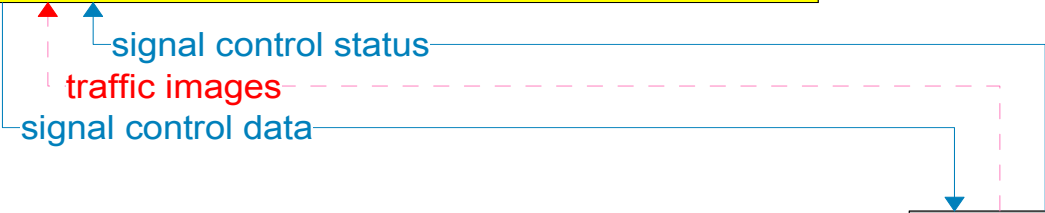
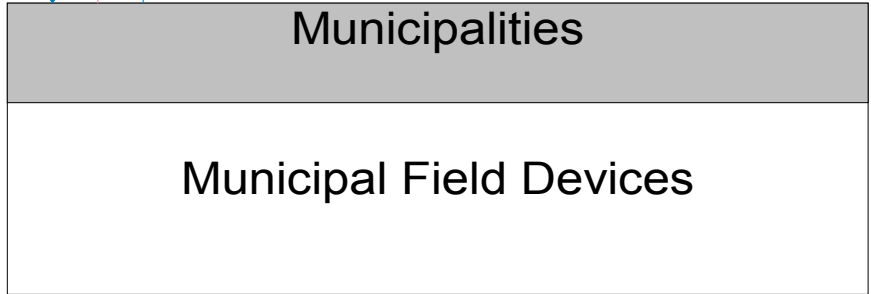
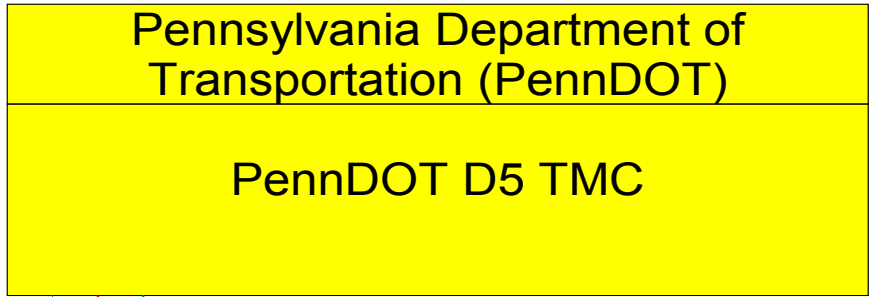
Adjacent PennDOT District and County
Offices



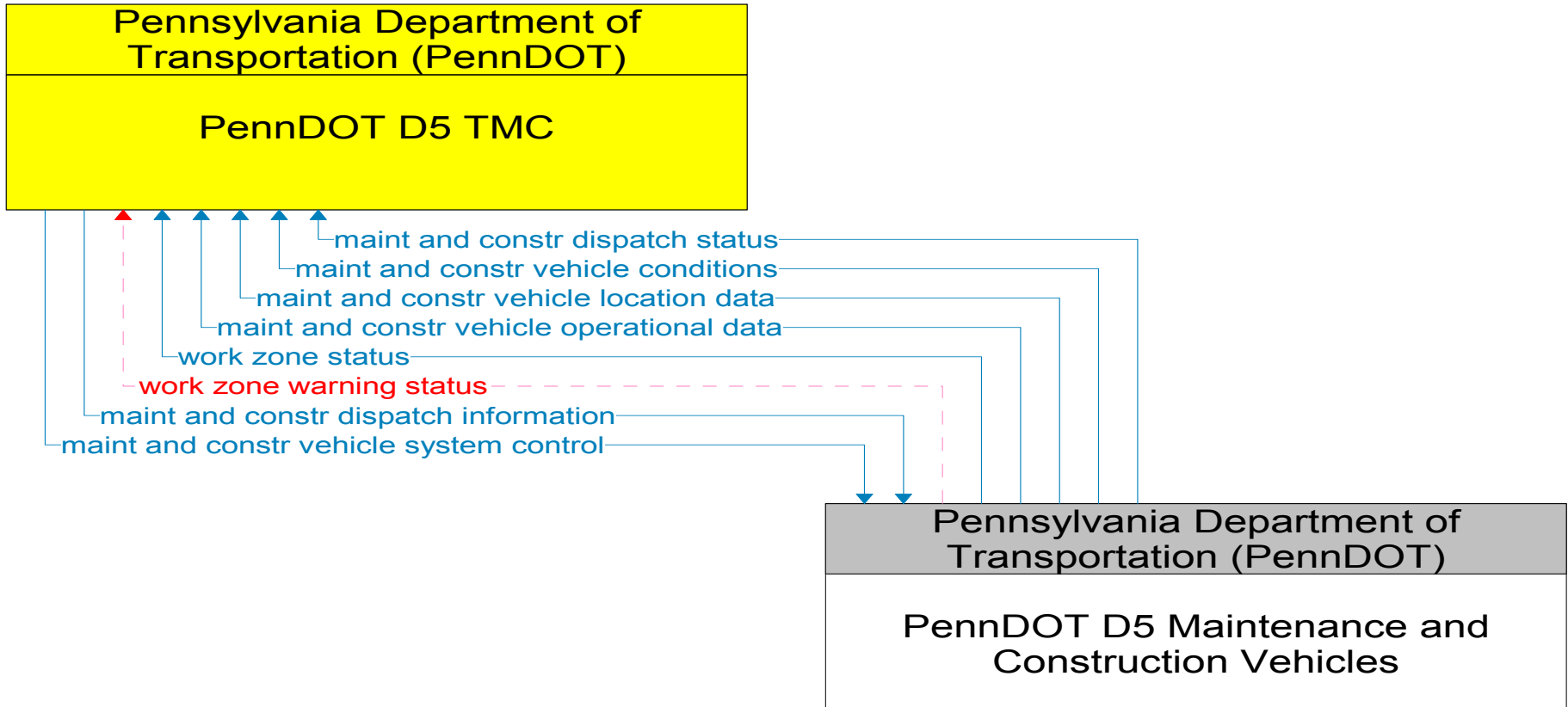
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Planned



———— Existing
- - - - - Planned



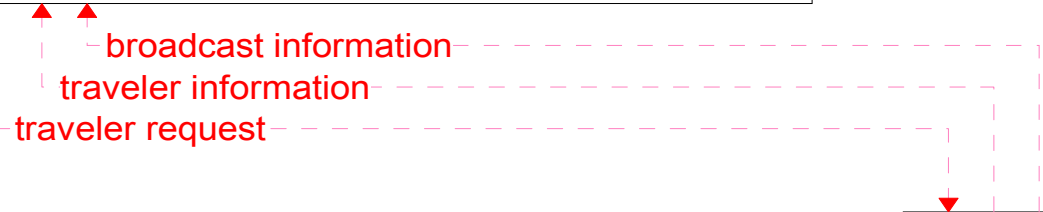
Existing
Planned



———— Existing
- - - - - Planned

Pennsylvania Department of
Transportation (PennDOT)

PennDOT Welcome Centers and Rest
Areas

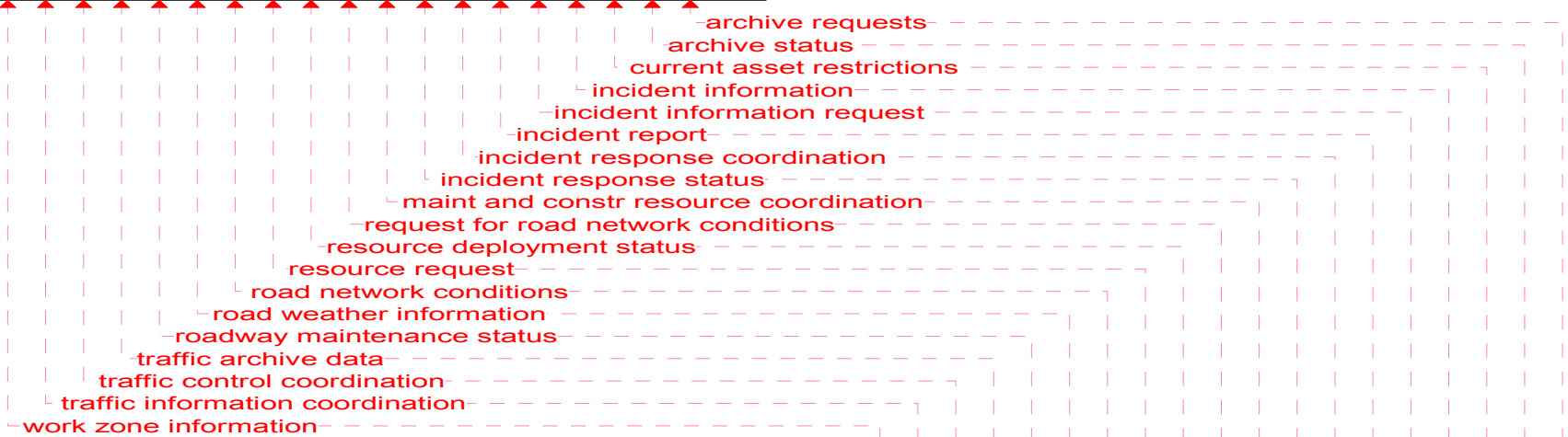


Pennsylvania Department of
Transportation (PennDOT)

PennDOT D5 TMC

**Pennsylvania Department of Transportation
(PennDOT)**

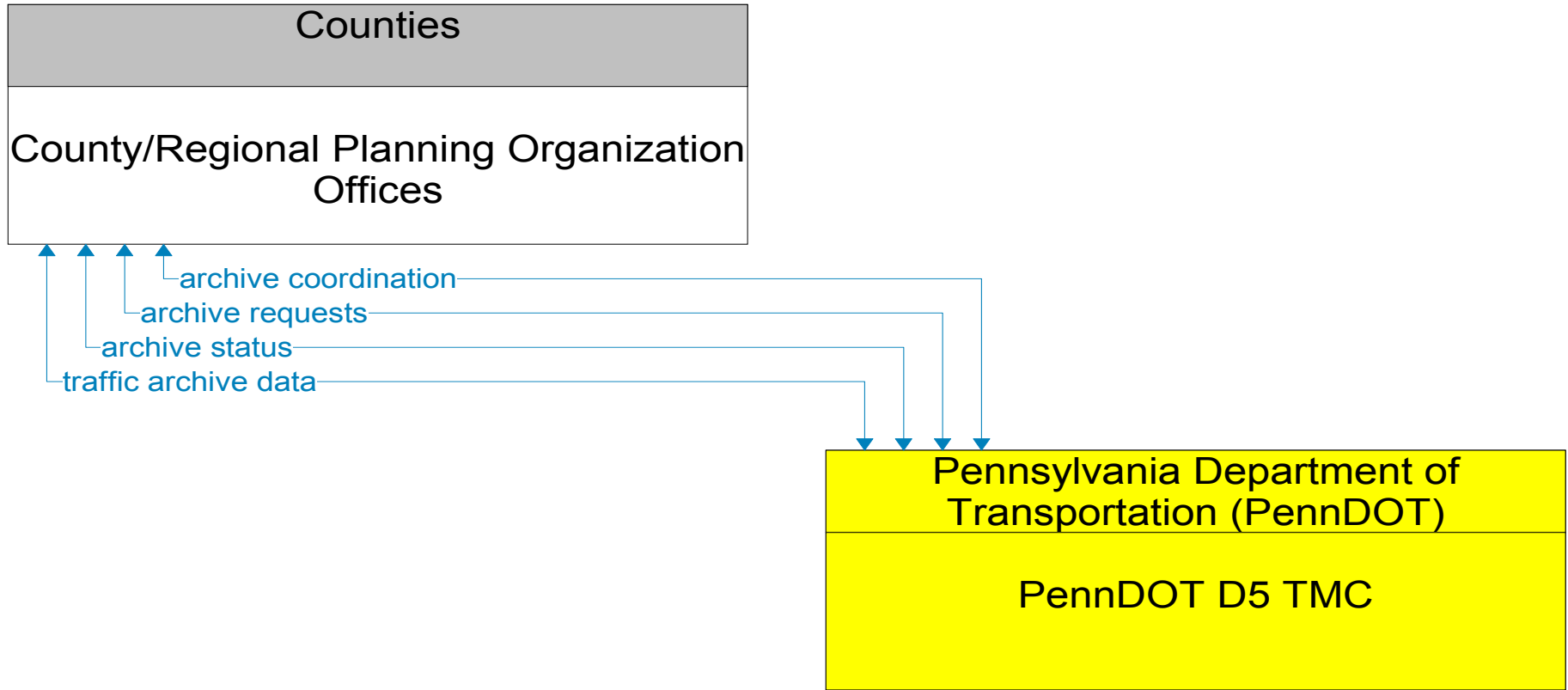
PennDOT D5 TMC



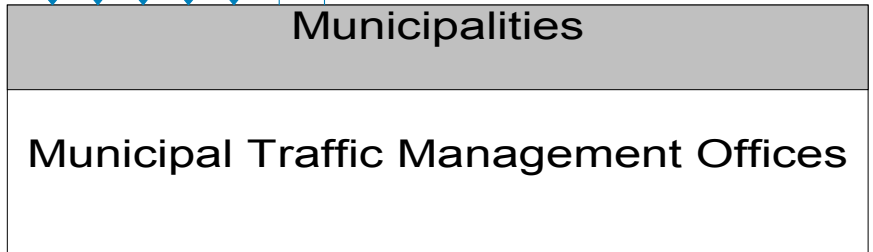
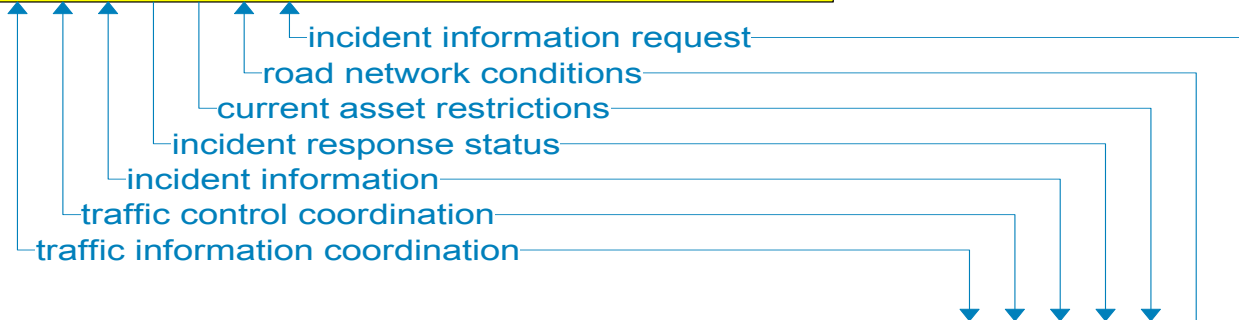
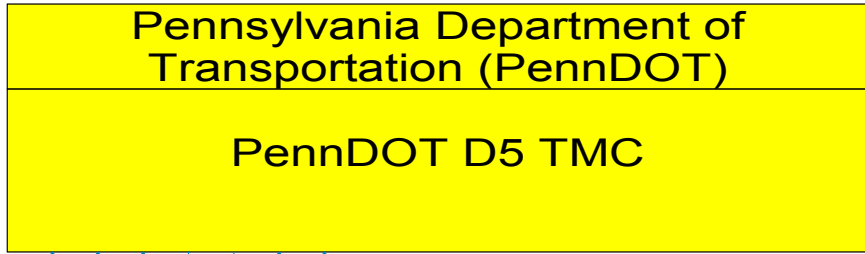
**Pennsylvania Department of Transportation
(PennDOT)**

PennDOT STMC

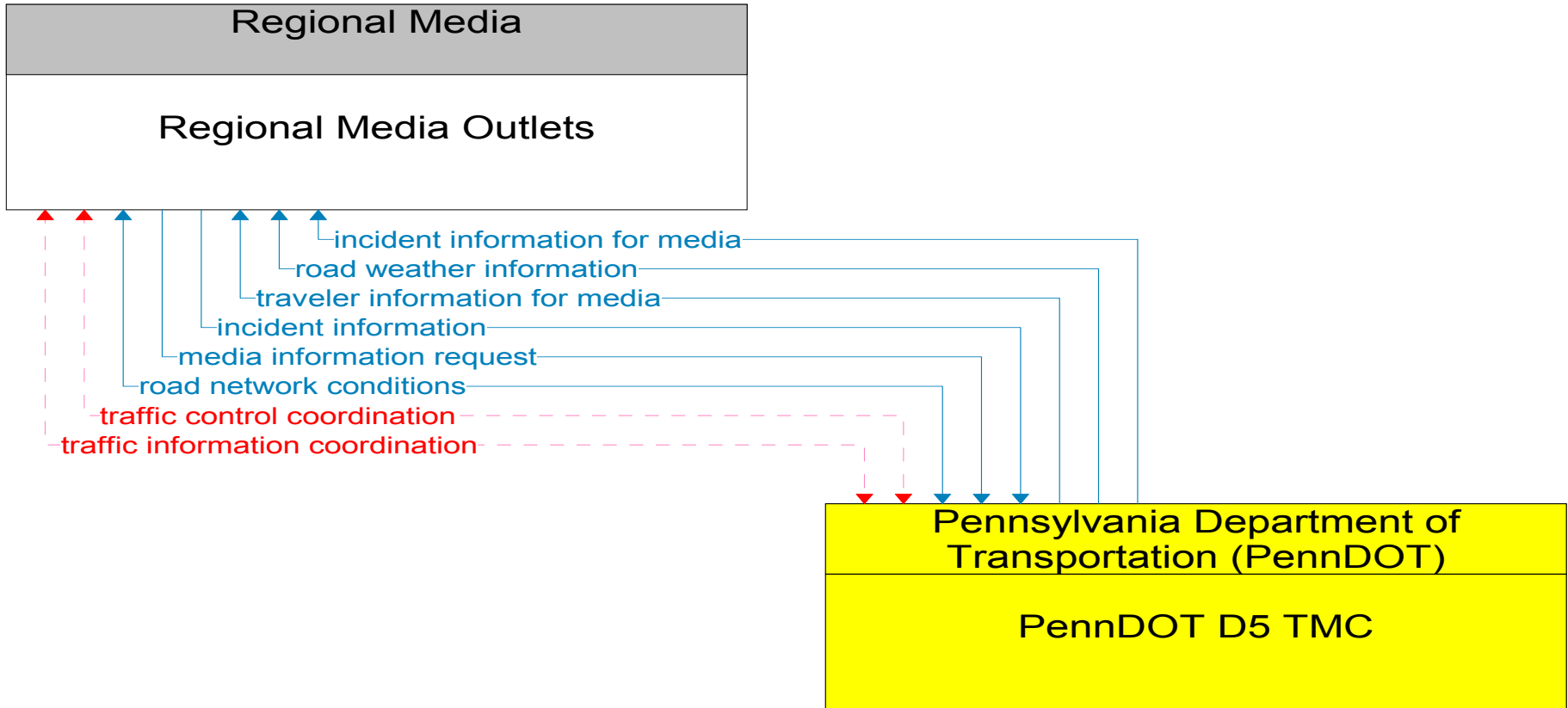
———— Existing
- - - - - Planned



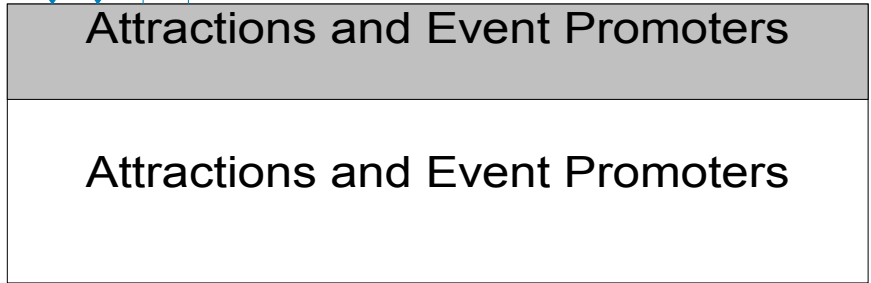
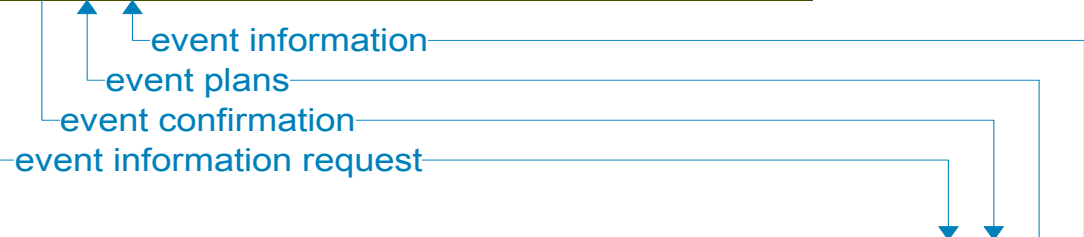
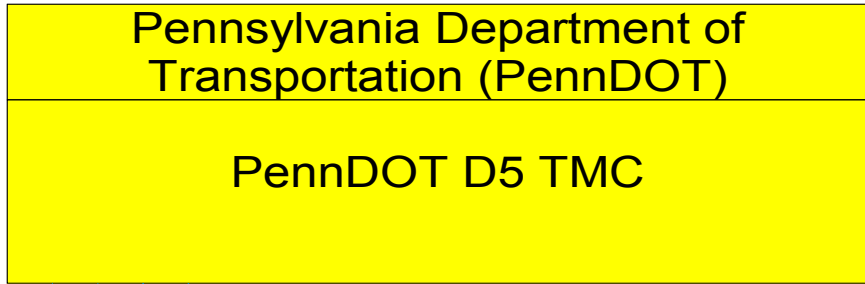
———— Existing
----- Planned



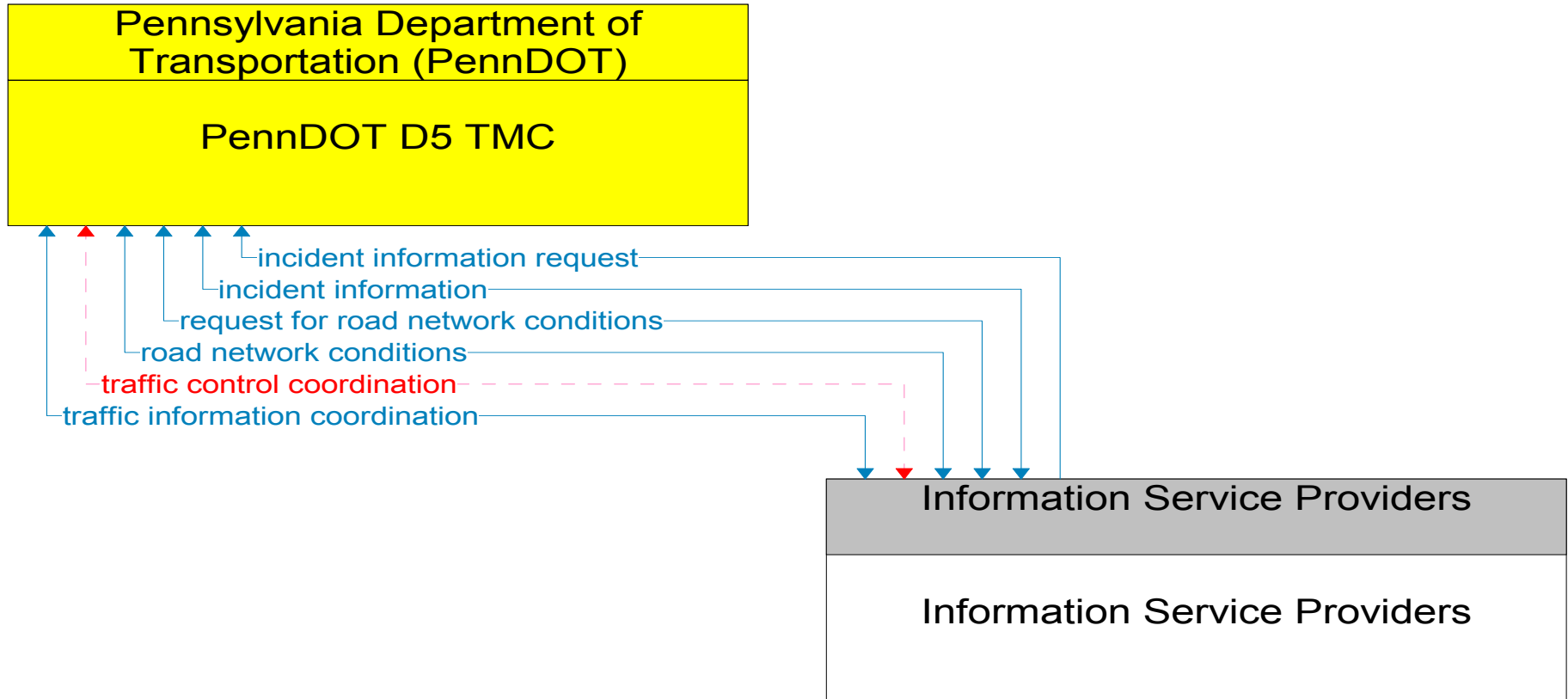
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Planned



Existing
Planned



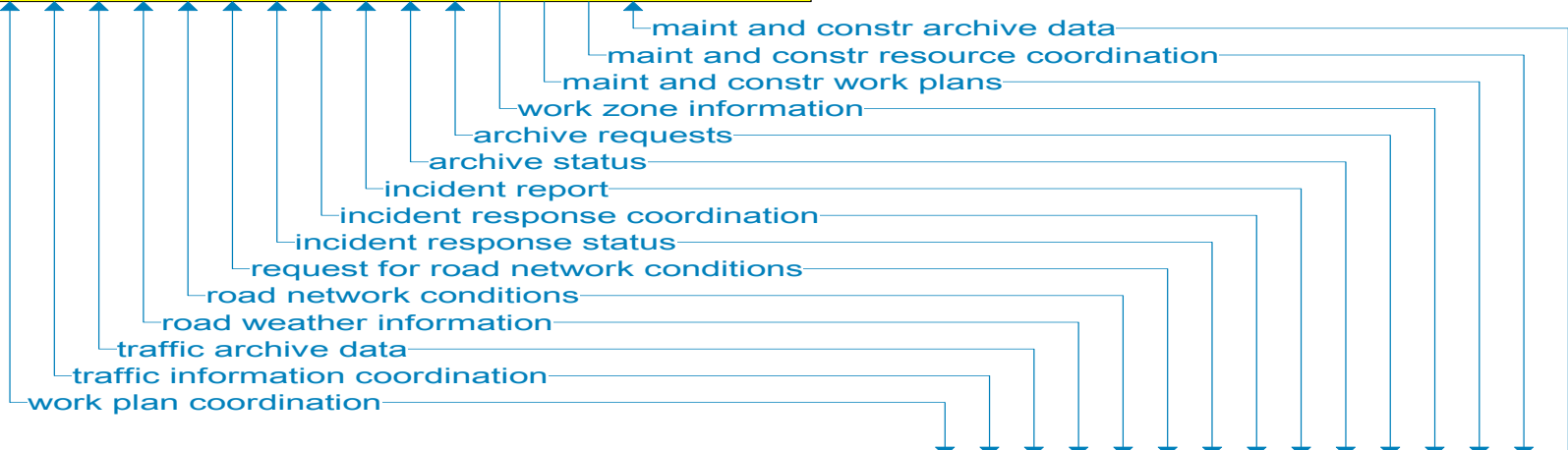
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Planned



———— Existing
- - - - - Planned

Pennsylvania Department of
Transportation (PennDOT)

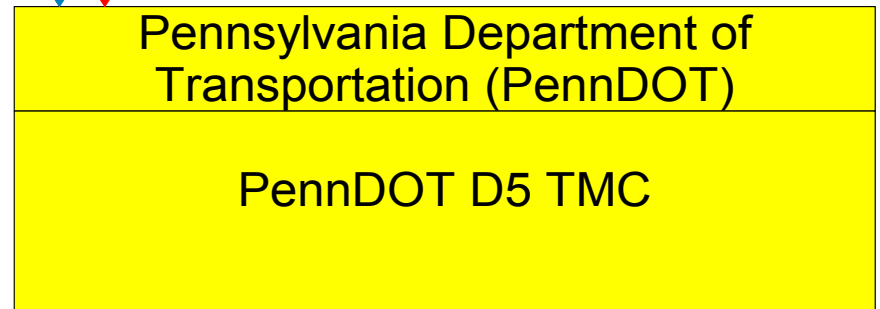
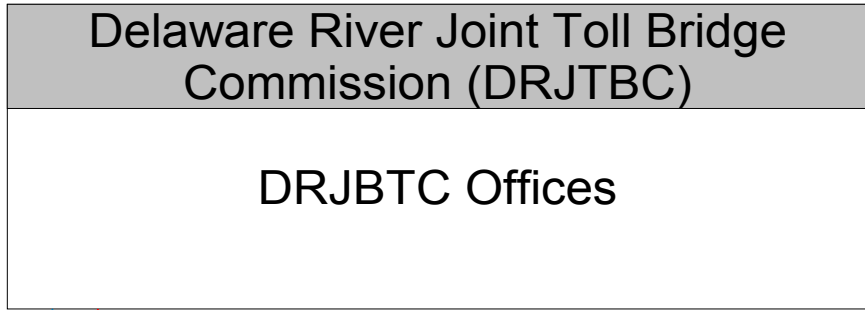
PennDOT D5 TMC



Pennsylvania Department of
Transportation (PennDOT)

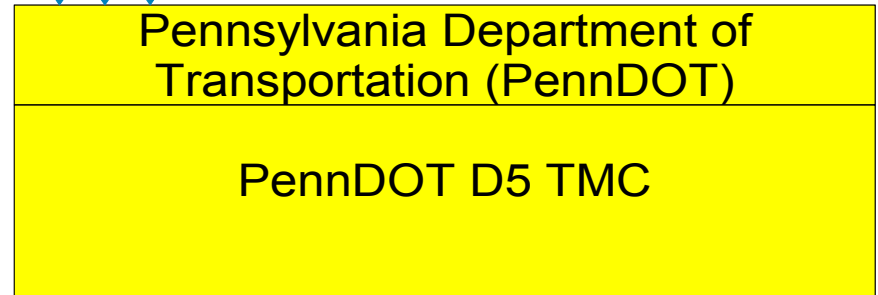
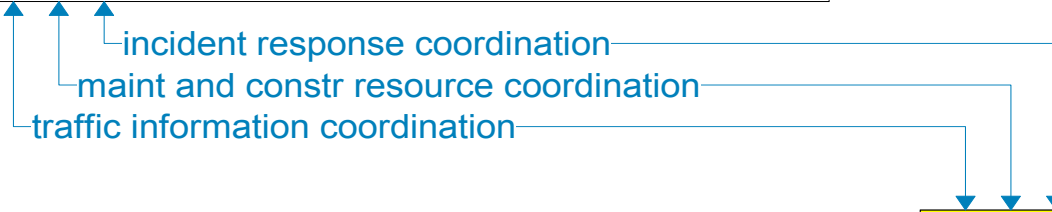
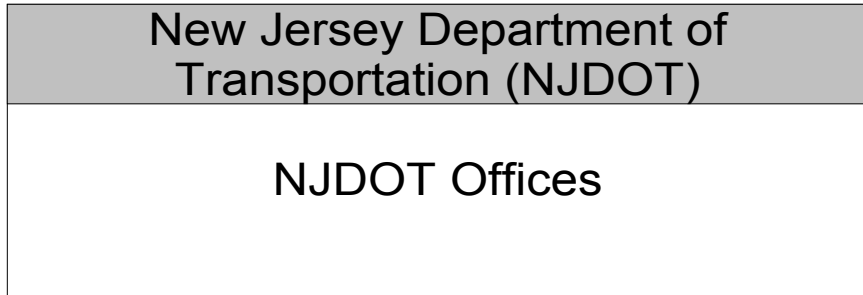
PennDOT Central Office Organizations

———— Existing
- - - - - Planned

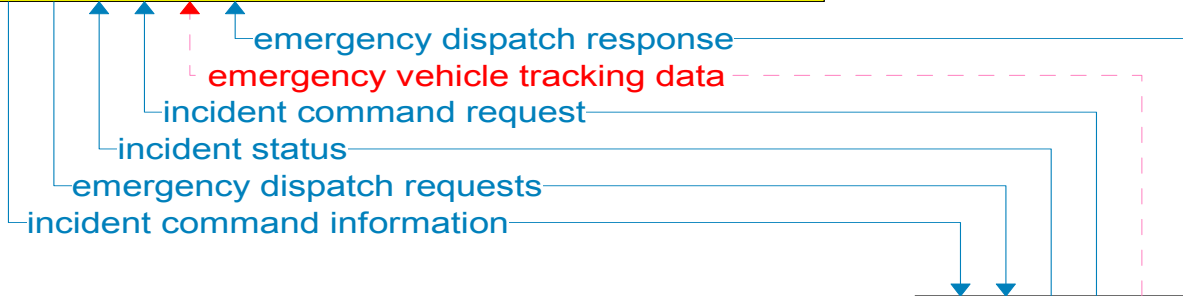
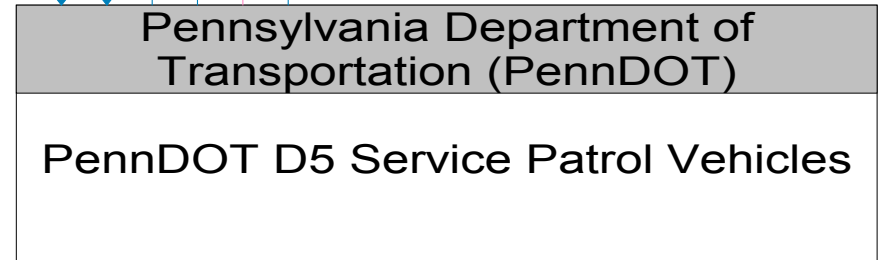
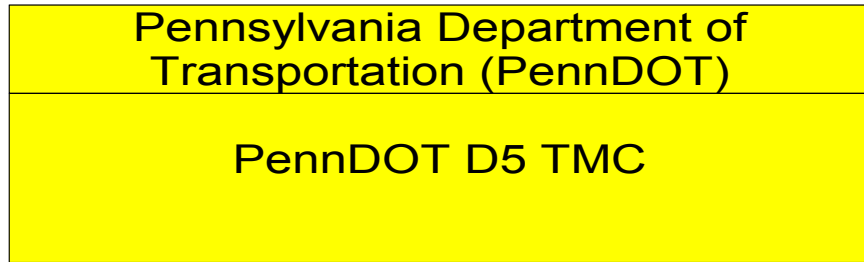


traffic control coordination
traffic information coordination

Existing
Planned

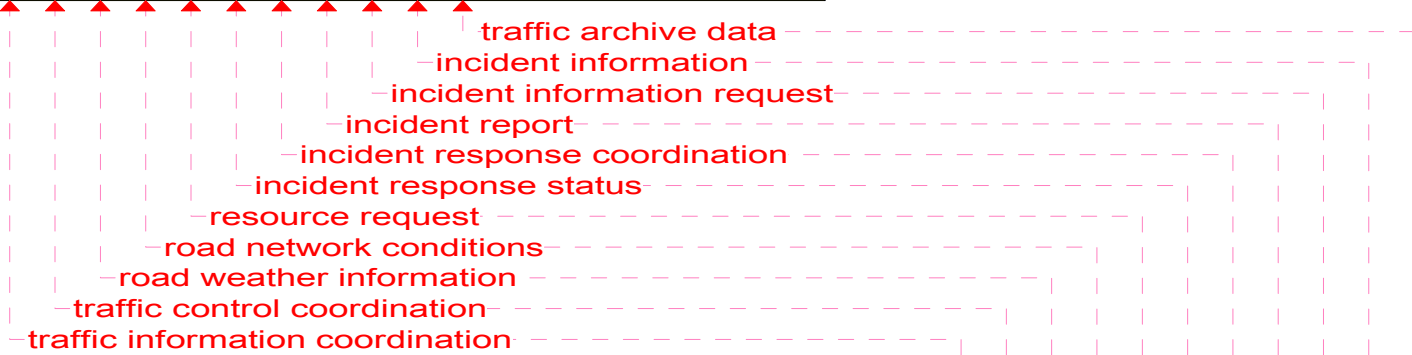


Existing
Planned



Pennsylvania Department of
Transportation (PennDOT)

PennDOT D5 TMC



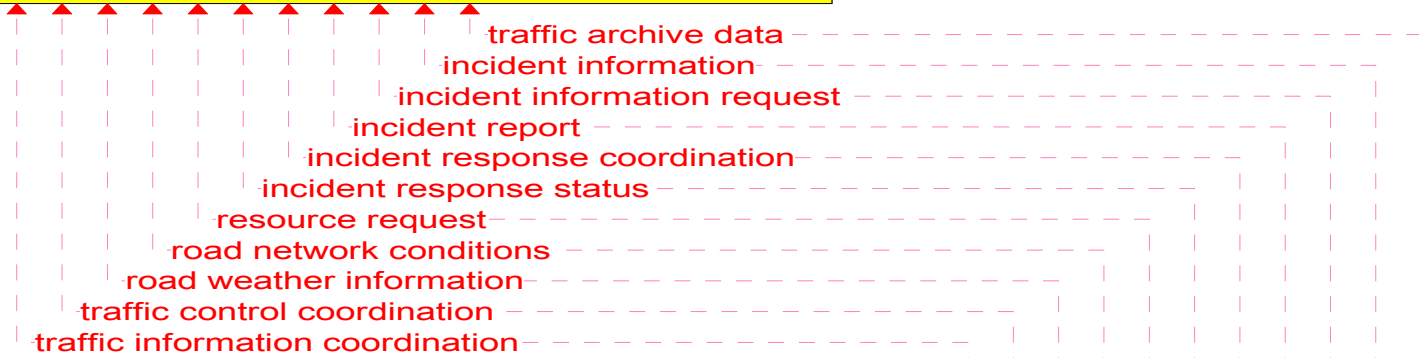
Pennsylvania Department of
Transportation (PennDOT)

PennDOT D4 TMC

———— Existing
- - - - - Planned

Pennsylvania Department of
Transportation (PennDOT)

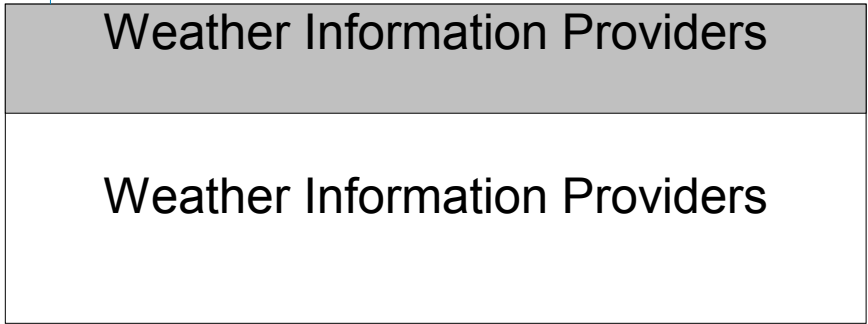
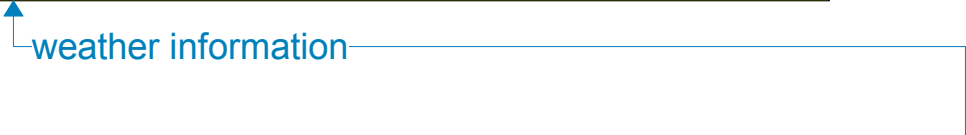
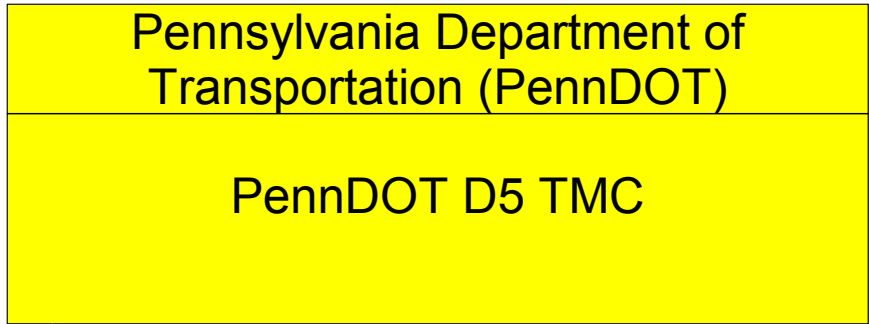
PennDOT D5 TMC



Pennsylvania Department of
Transportation (PennDOT)

PennDOT D6 TMC

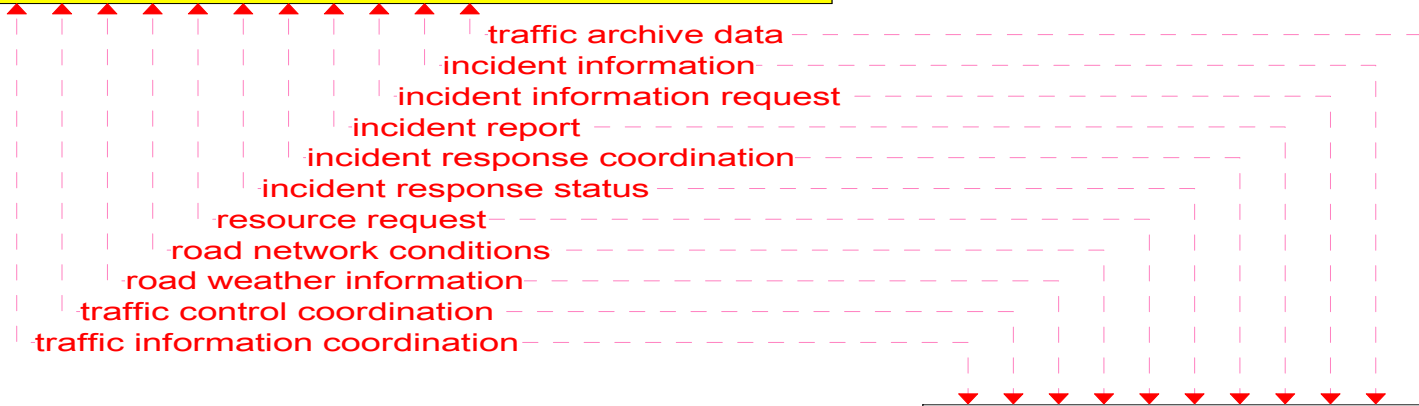
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- - - - - Planned



———— Existing
- - - - - Planned

Pennsylvania Department of
Transportation (PennDOT)

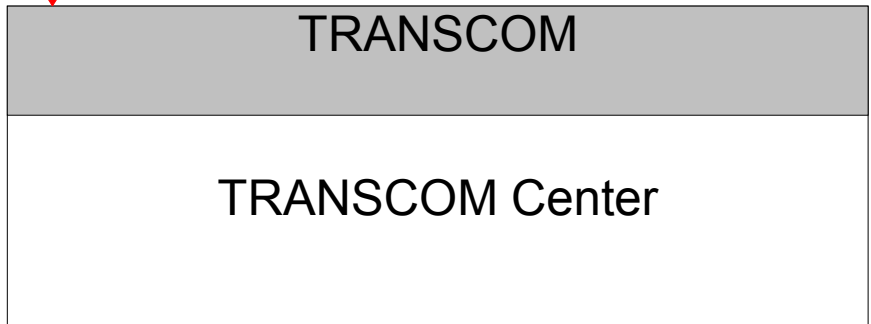
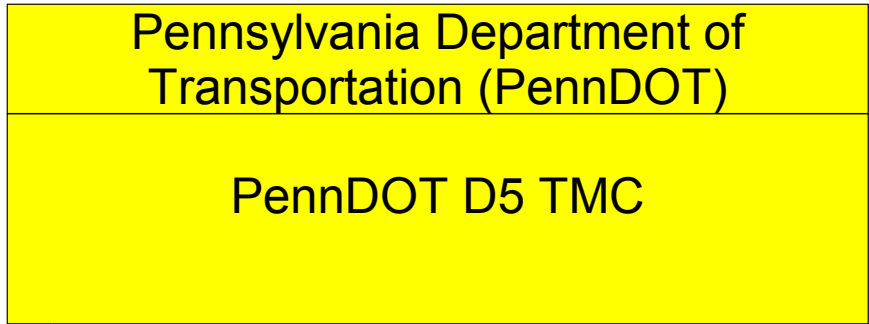
PennDOT D5 TMC



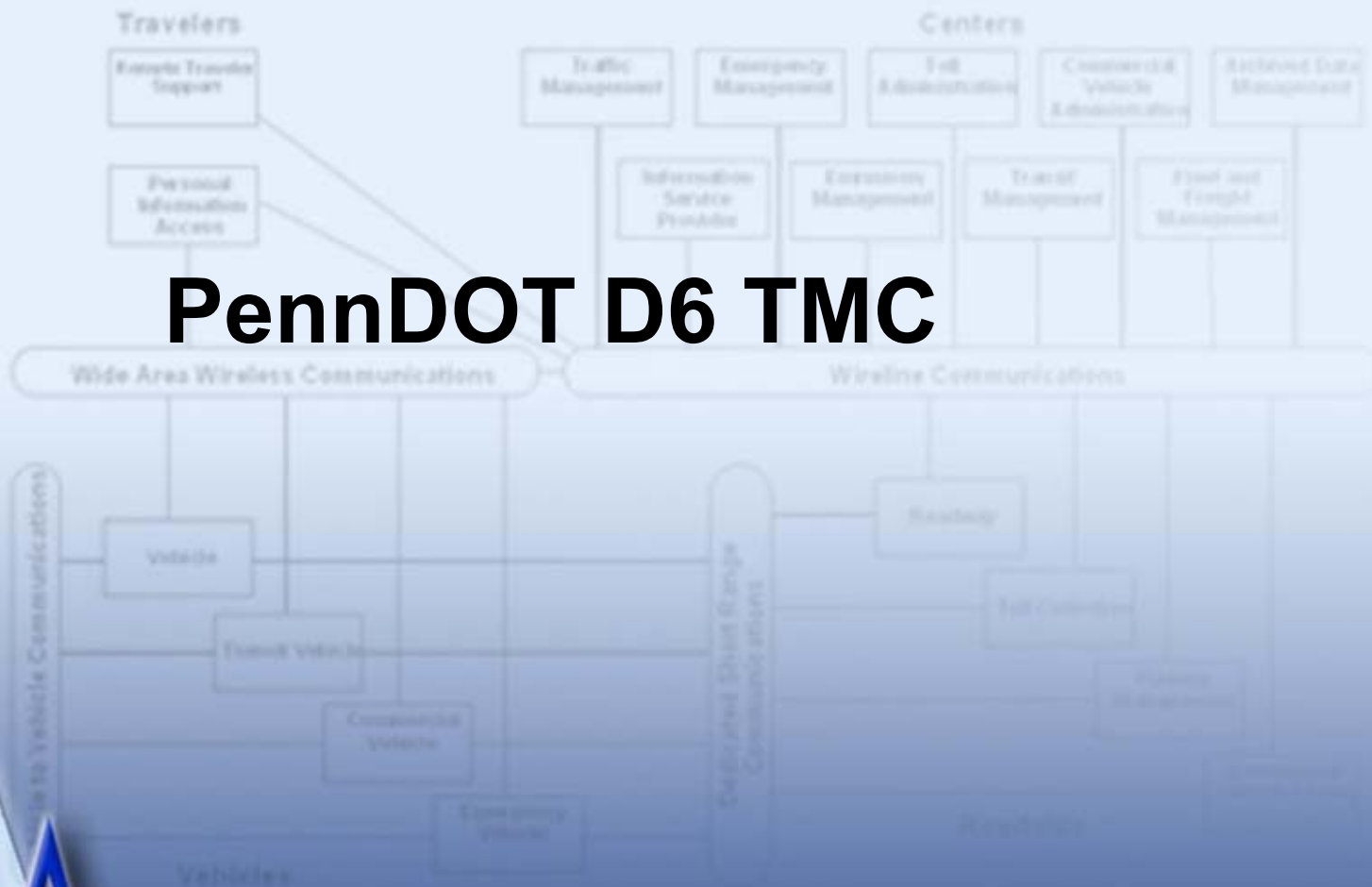
Pennsylvania Department of
Transportation (PennDOT)

PennDOT D8 TMC

———— Existing
- - - - - Planned

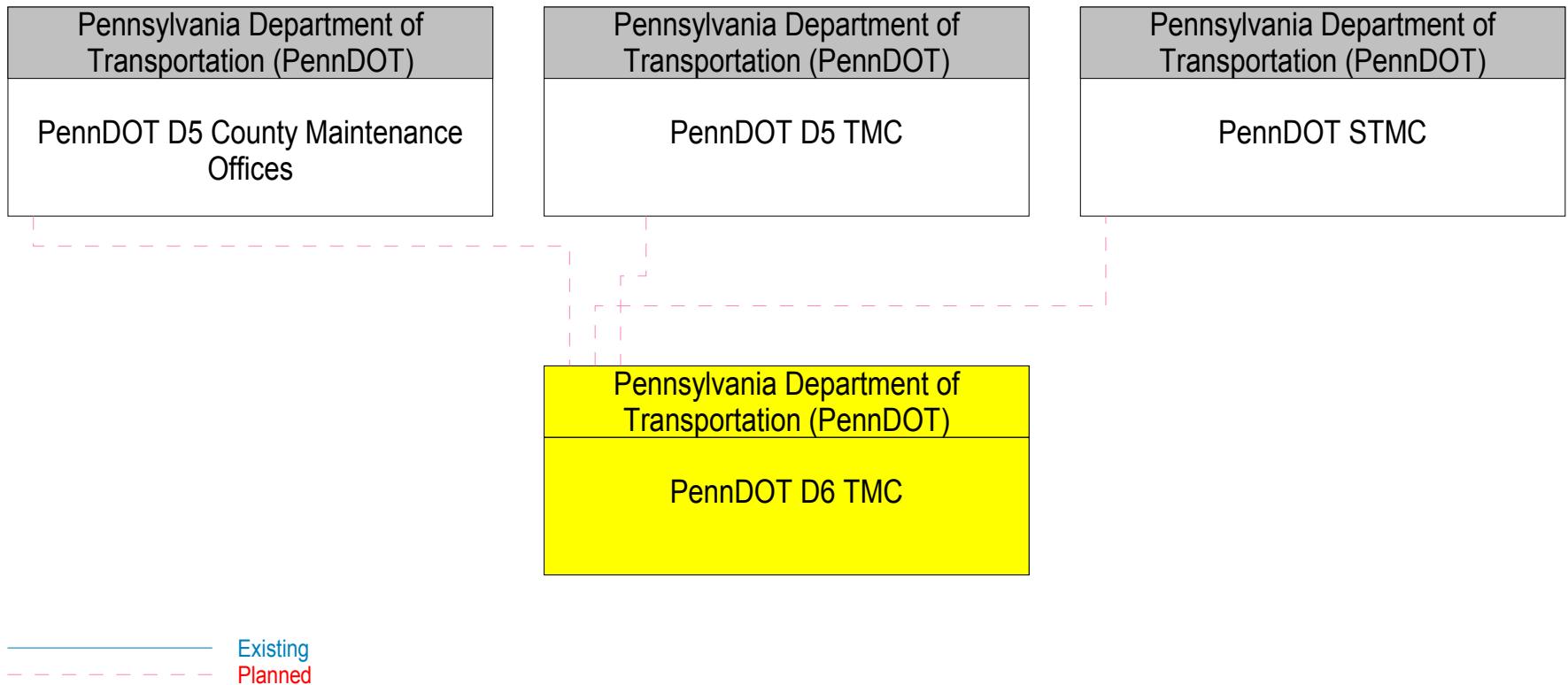


PennDOT D6 TMC

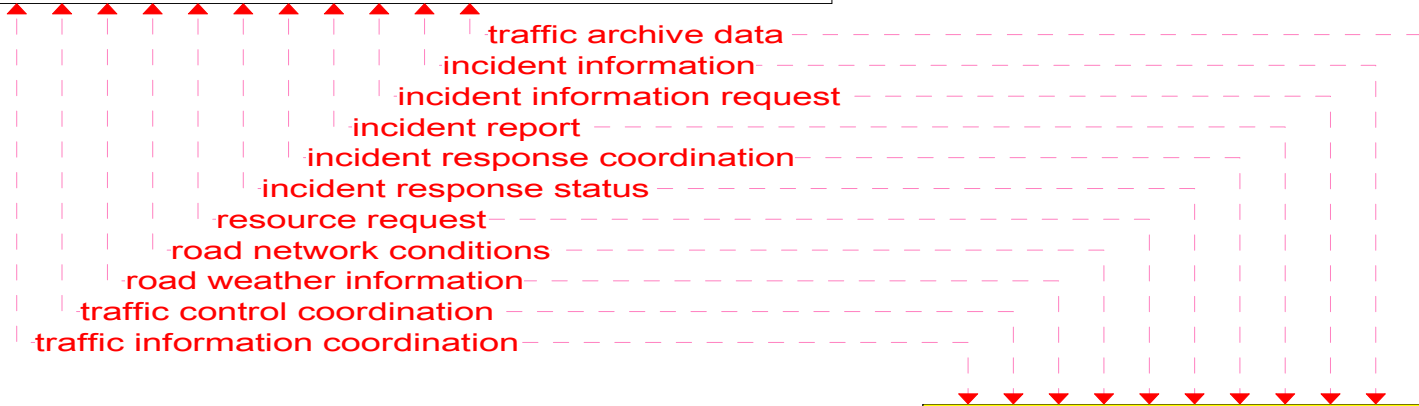


PA

PennDOT D6 TMC Interconnect Diagram

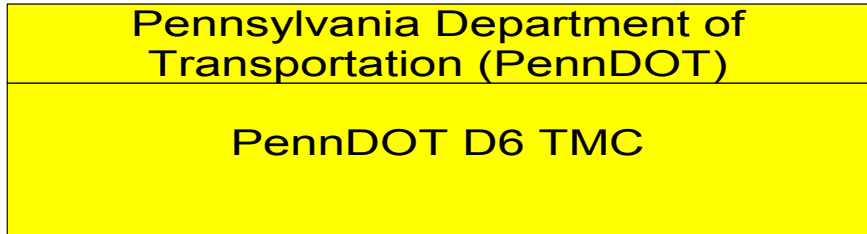


Pennsylvania Department of Transportation (PennDOT)
PennDOT D5 TMC

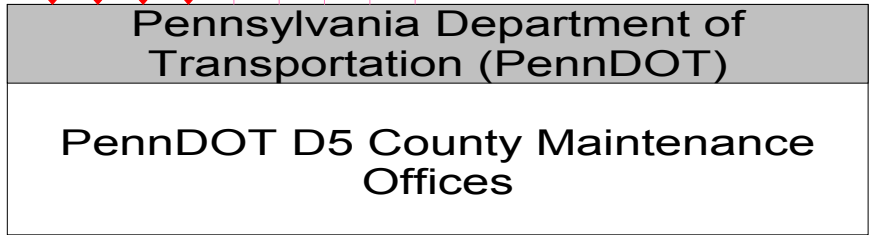


Pennsylvania Department of Transportation (PennDOT)
PennDOT D6 TMC

———— Existing
- - - - - Planned



- current asset restrictions -
- maint and constr resource response -
- maint and constr work plans -
- road weather information -
- work zone information -
- incident response status -
- maint and constr resource request -
- road network conditions -
- incident information -



———— Existing
- - - - - Planned

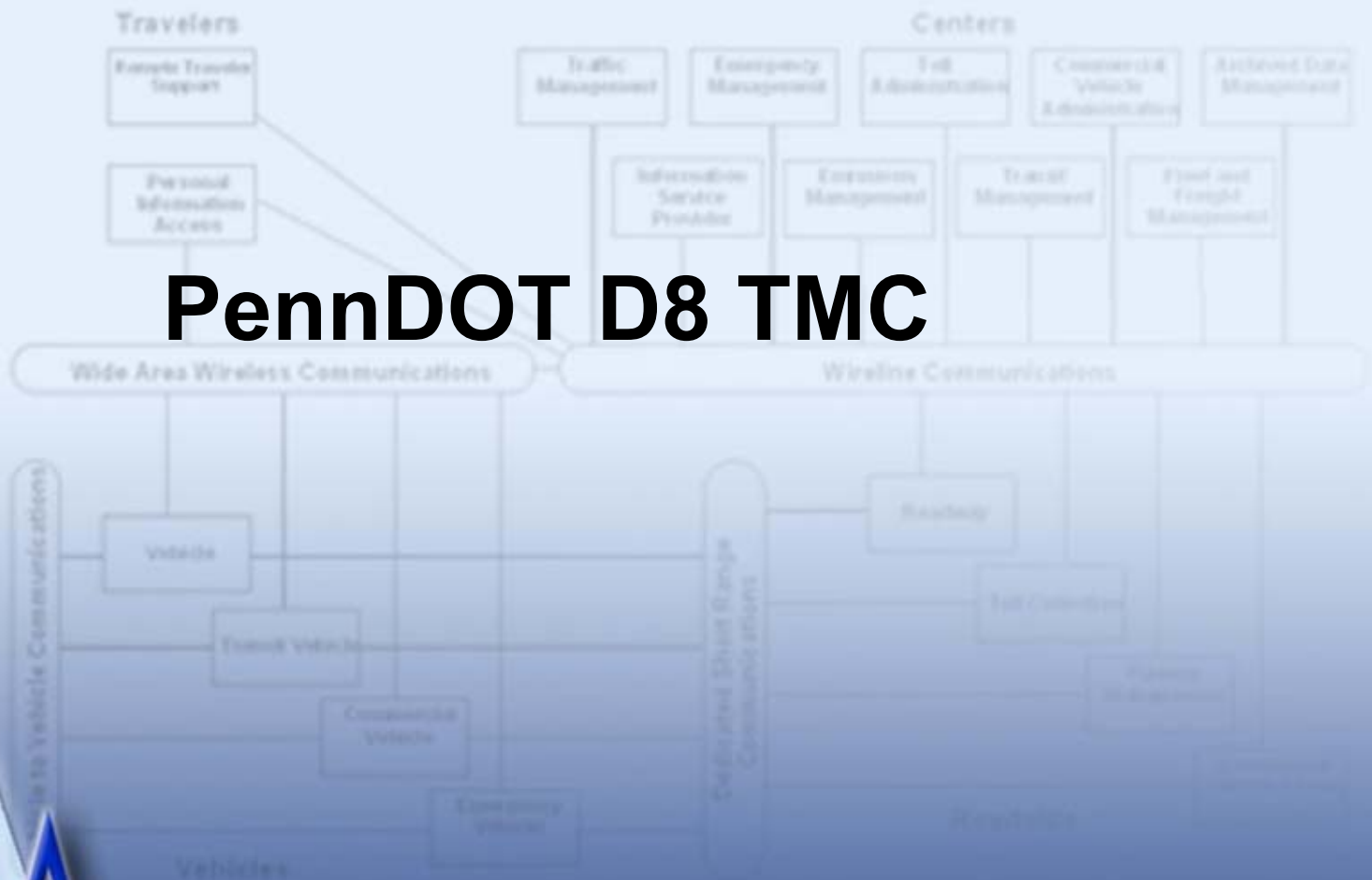
Pennsylvania Department of Transportation (PennDOT)
PennDOT STMC

- roadway maintenance status
- archive requests
- archive status
- traffic archive data
- current asset restrictions
- incident information
- incident information request
- incident report
- incident response coordination
- incident response status
- maint and constr resource coordination
- resource deployment status
- resource request
- road network conditions
- road weather information
- traffic control coordination
- traffic information coordination
- work zone information

Pennsylvania Department of Transportation (PennDOT)
PennDOT D6 TMC

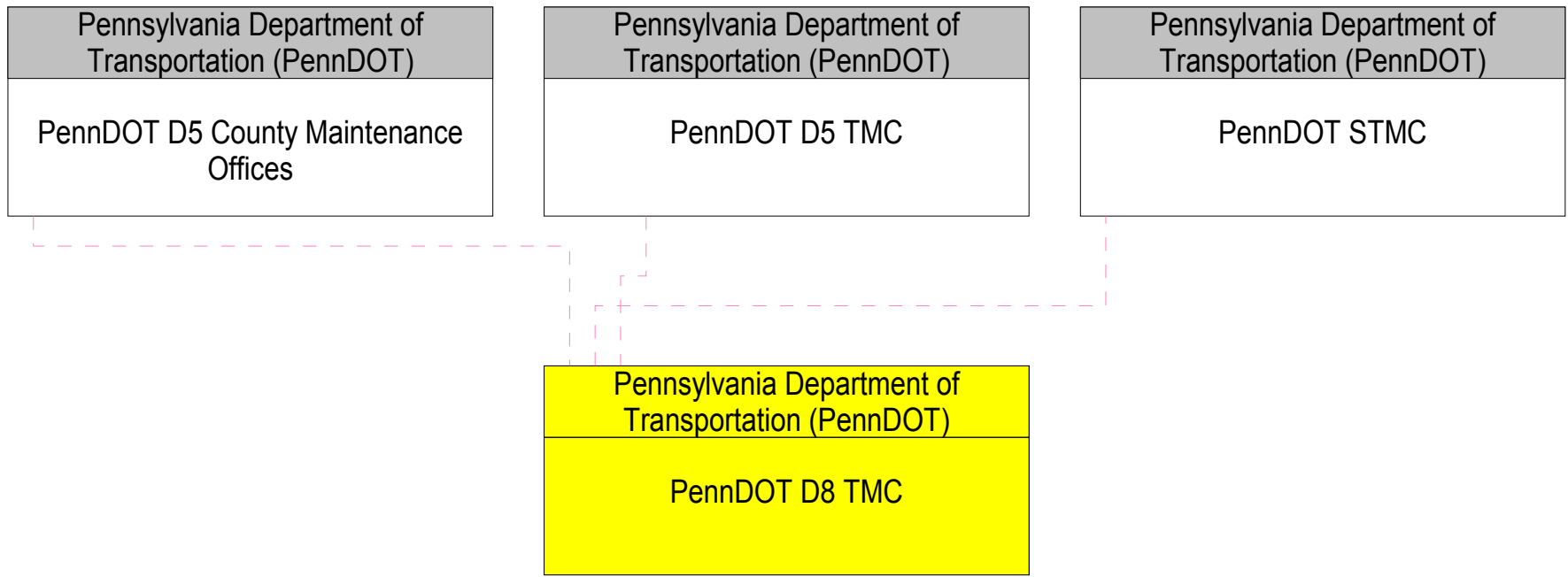
Existing
Planned

PennDOT D8 TMC



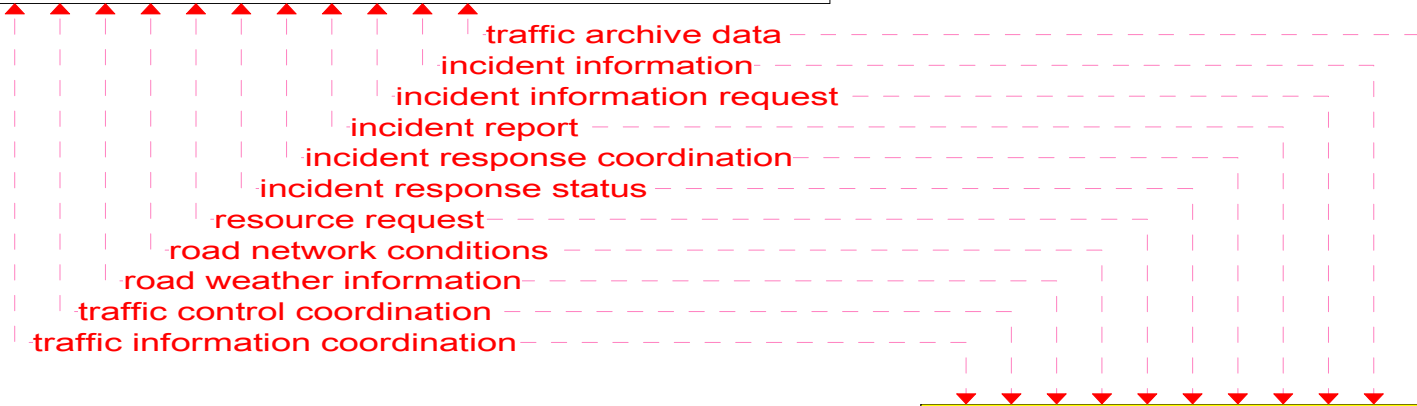
PA

PennDOT D8 TMC Interconnect Diagram



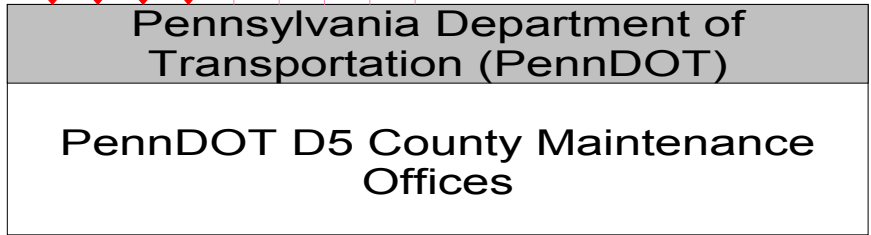
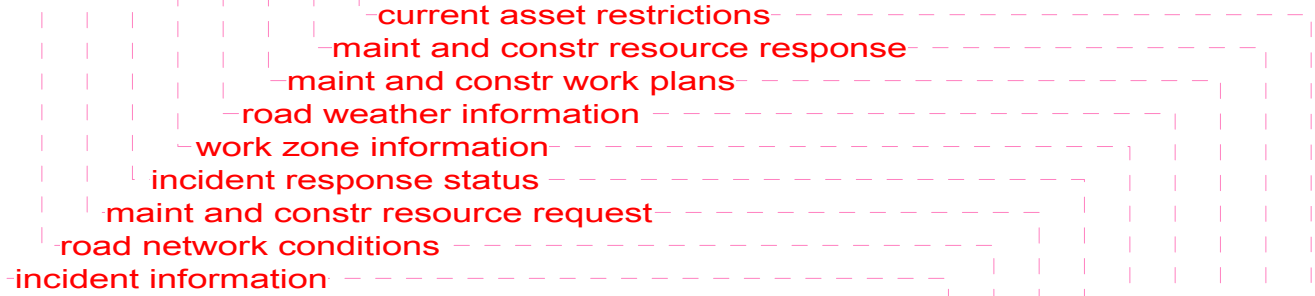
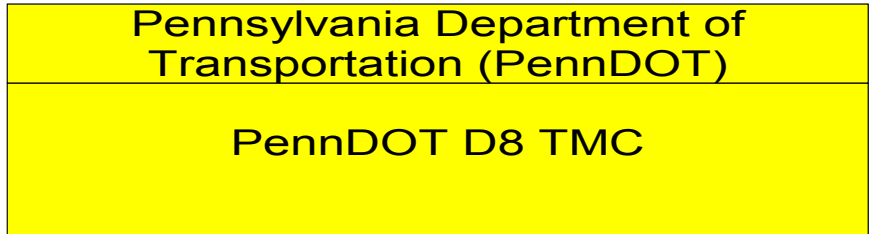
— Existing
- - - Planned

Pennsylvania Department of Transportation (PennDOT)
PennDOT D5 TMC



Pennsylvania Department of Transportation (PennDOT)
PennDOT D8 TMC

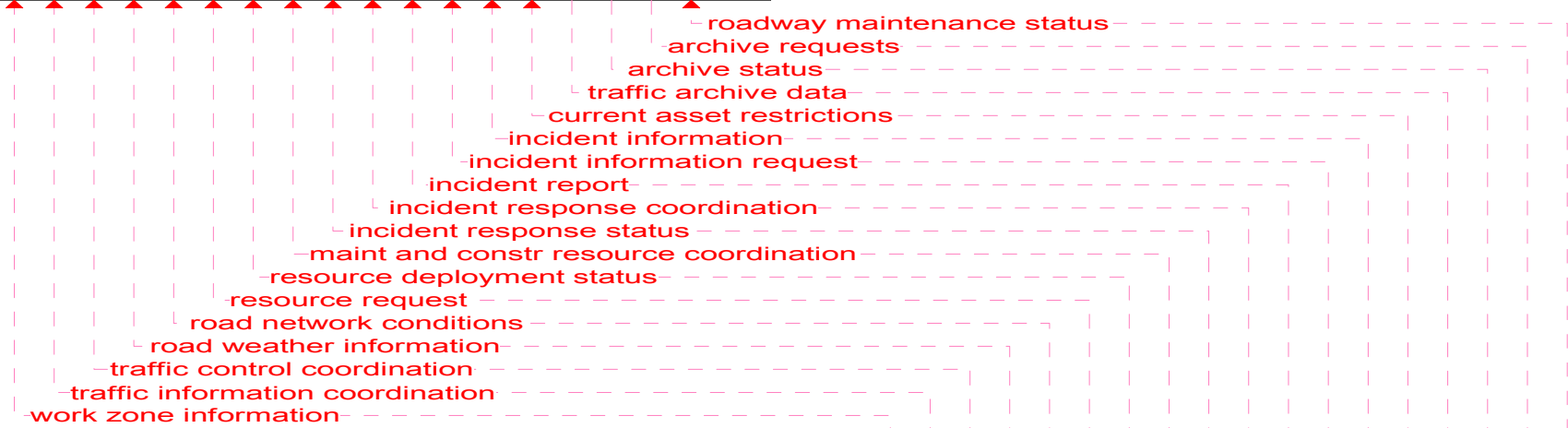
Existing
Planned



———— Existing
- - - - - Planned

Pennsylvania Department of
Transportation (PennDOT)

PennDOT STMC

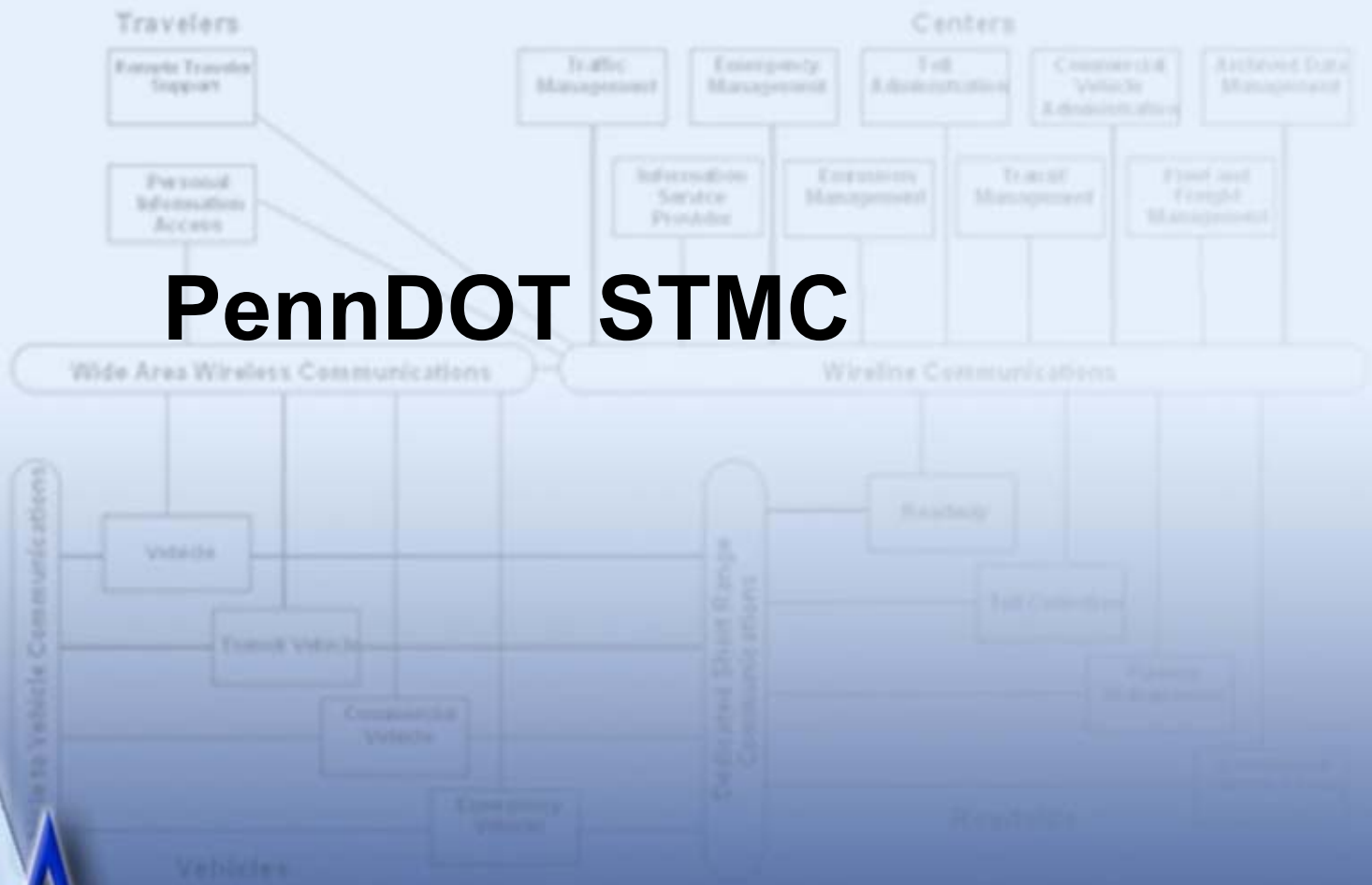


Pennsylvania Department of
Transportation (PennDOT)

PennDOT D8 TMC

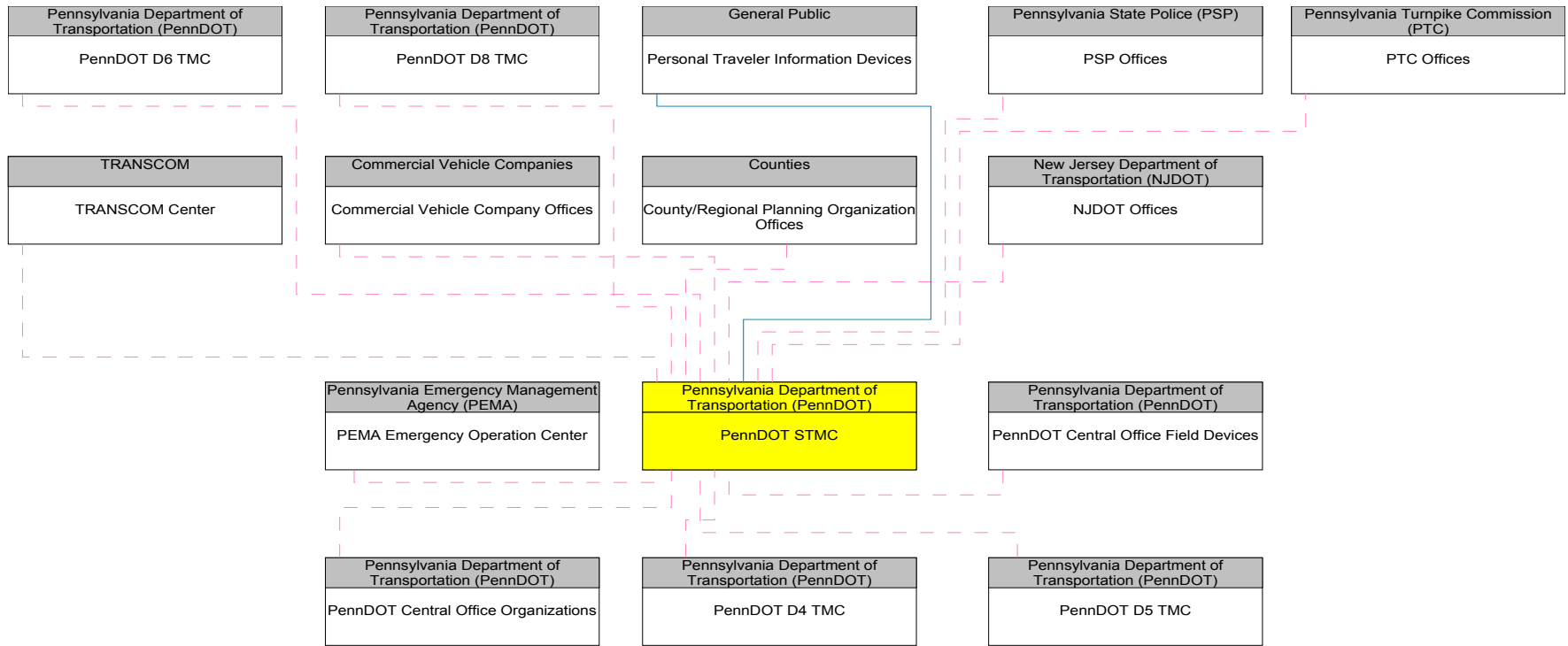
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Planned

PennDOT STMC



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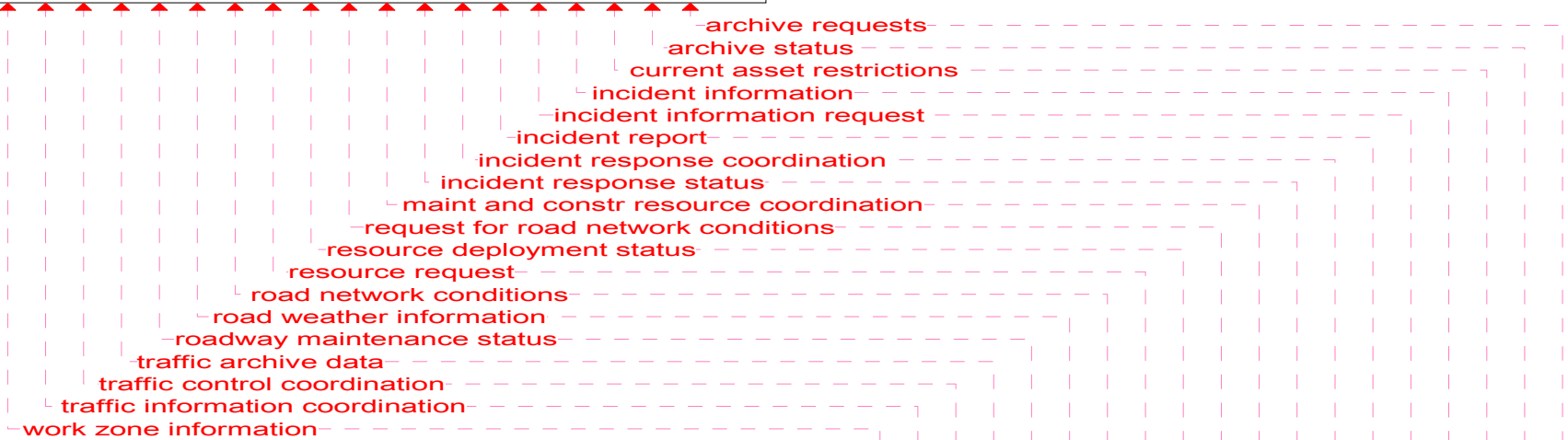
PennDOT STMC Interconnect Diagram



— Existing
 - - - Planned

**Pennsylvania Department of Transportation
(PennDOT)**

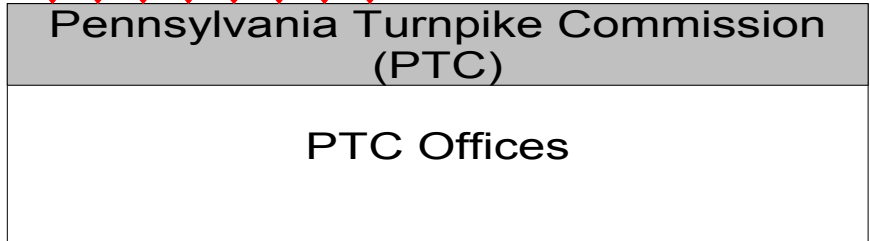
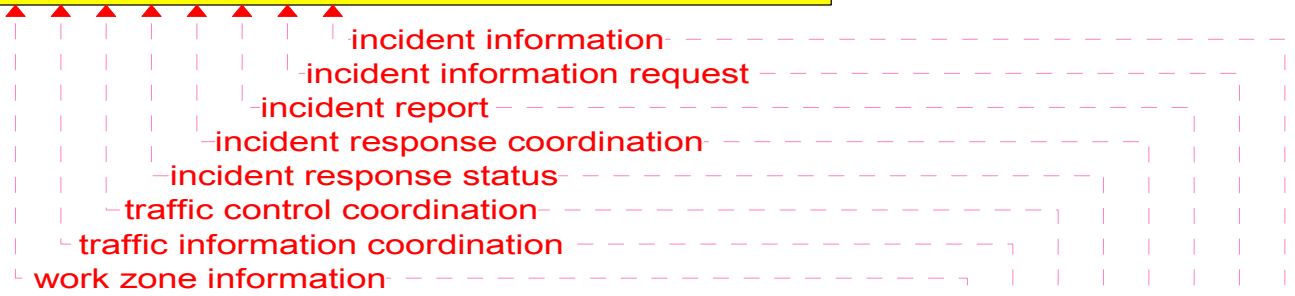
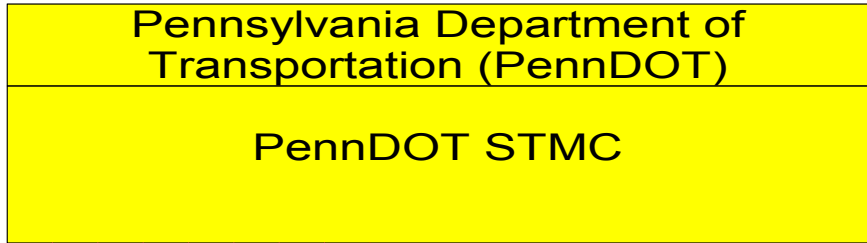
PennDOT D5 TMC



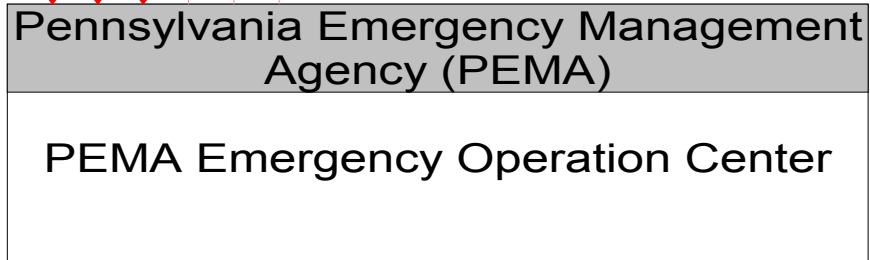
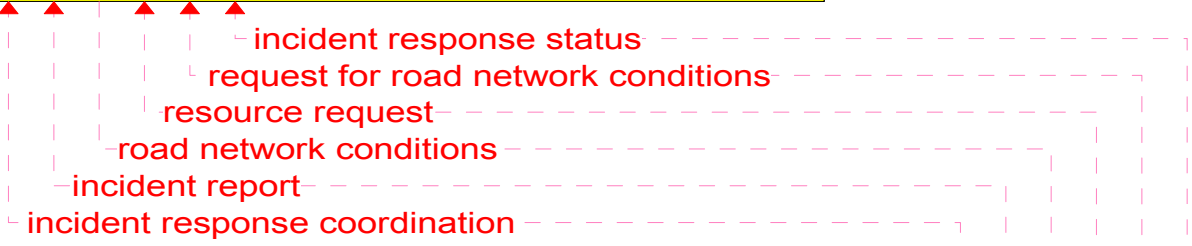
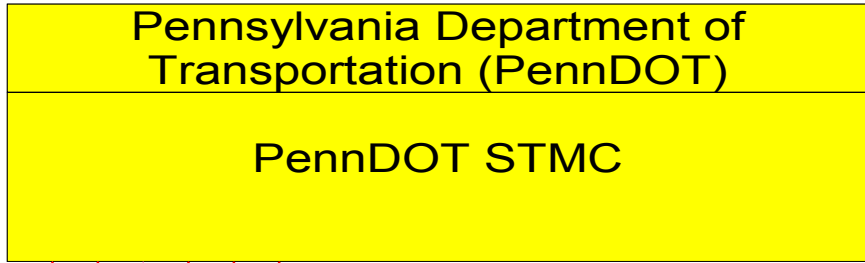
**Pennsylvania Department of Transportation
(PennDOT)**

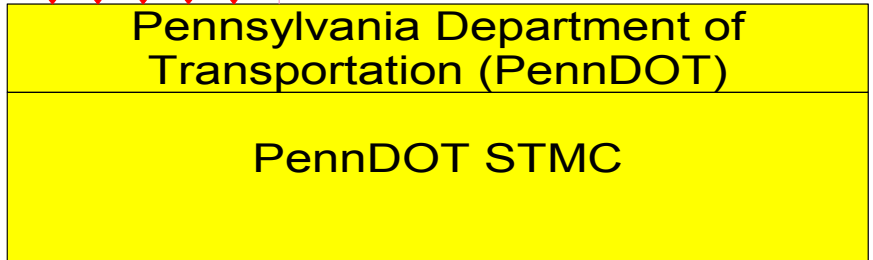
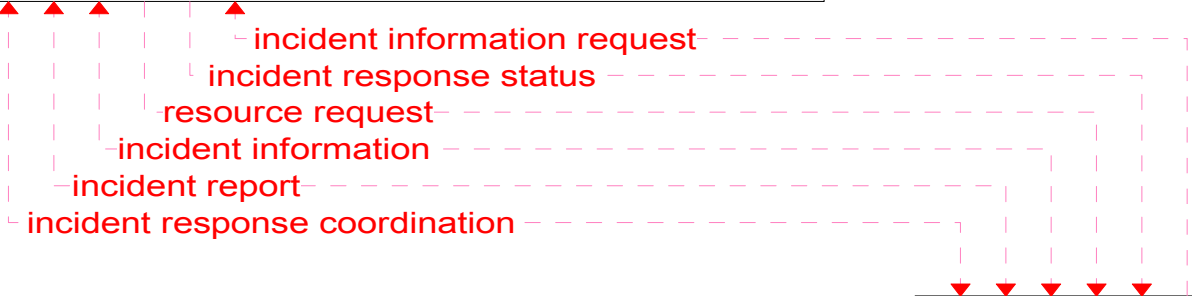
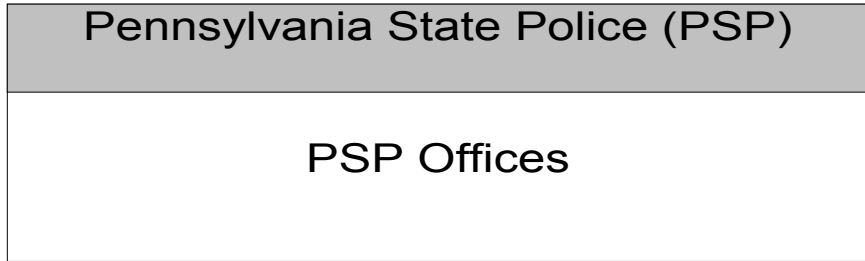
PennDOT STMC

———— Existing
- - - - - Planned

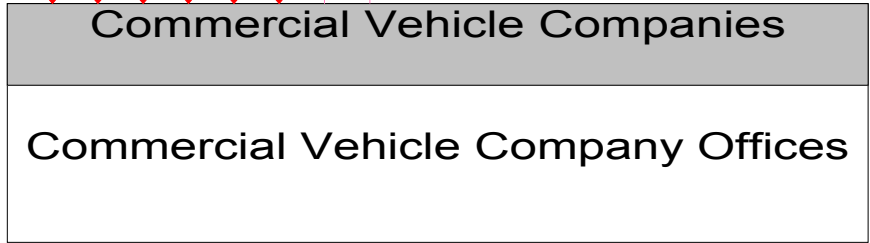
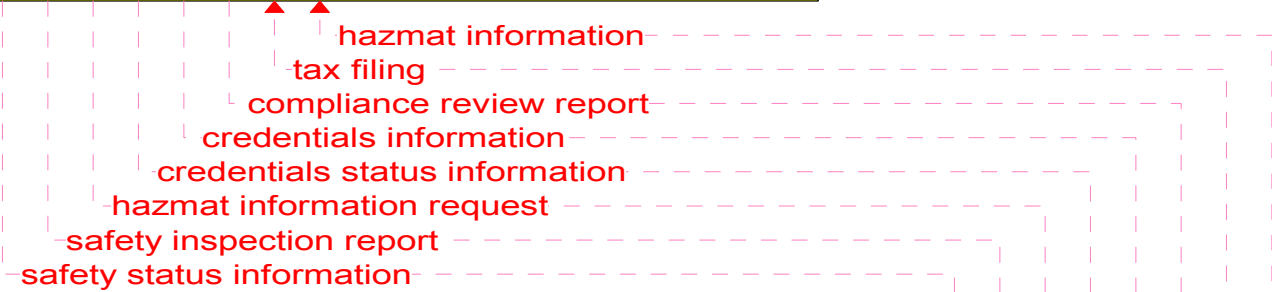
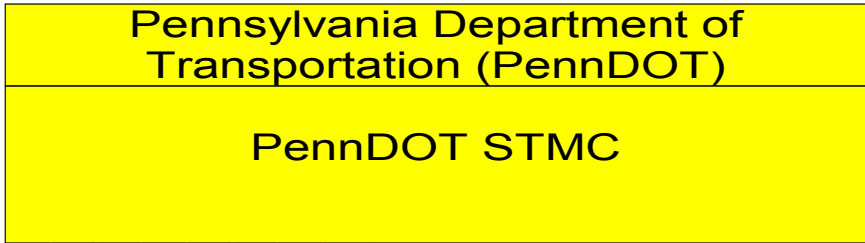


———— Existing
- - - - - Planned

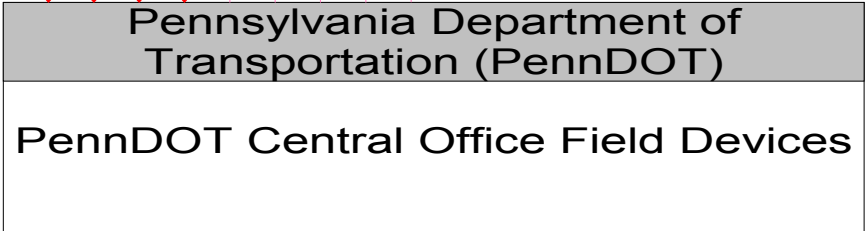
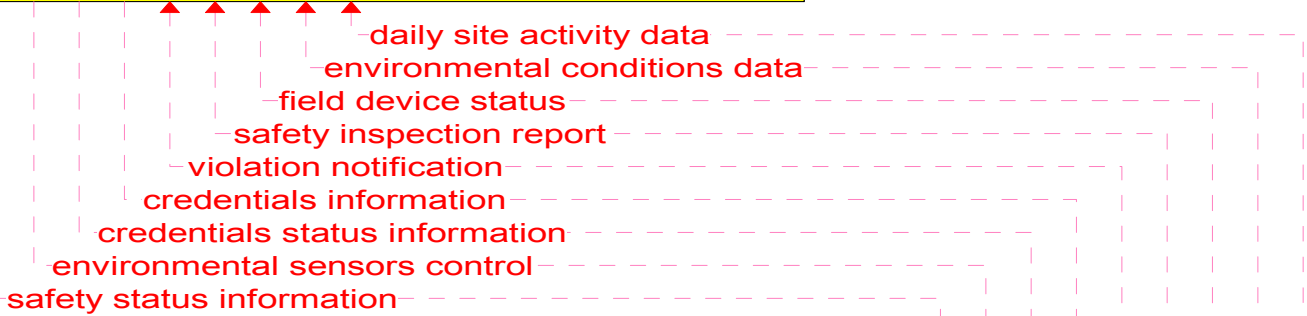
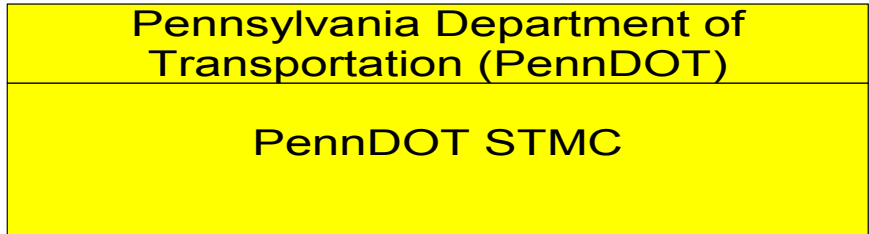




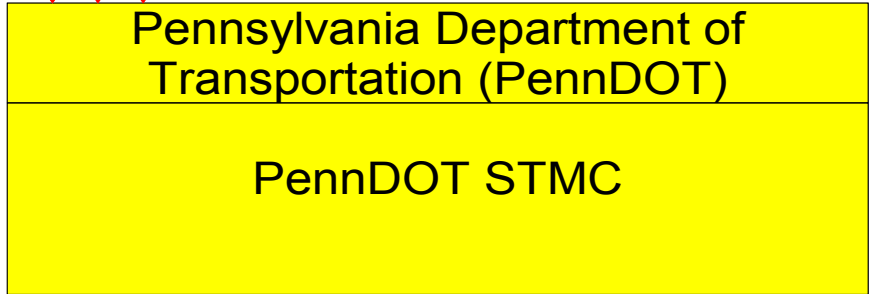
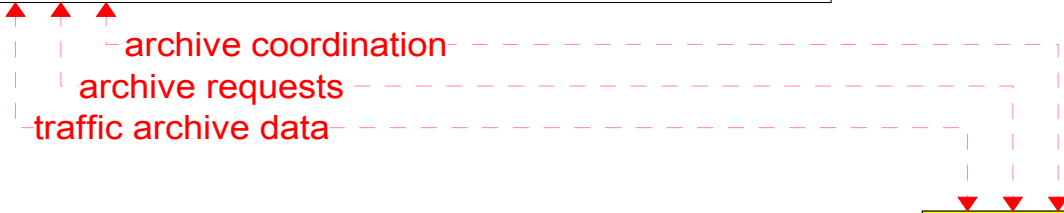
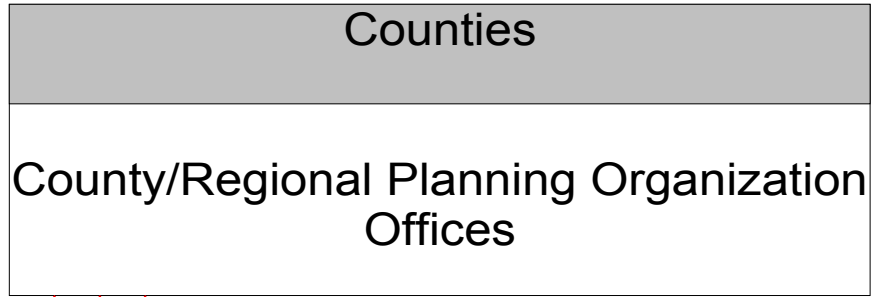
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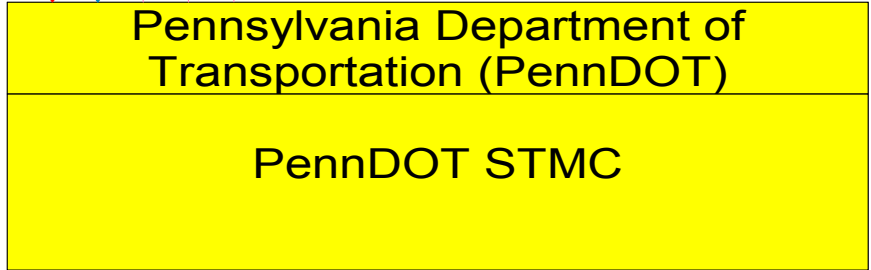
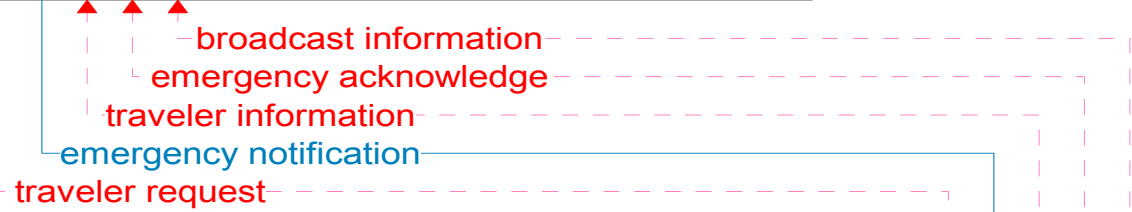
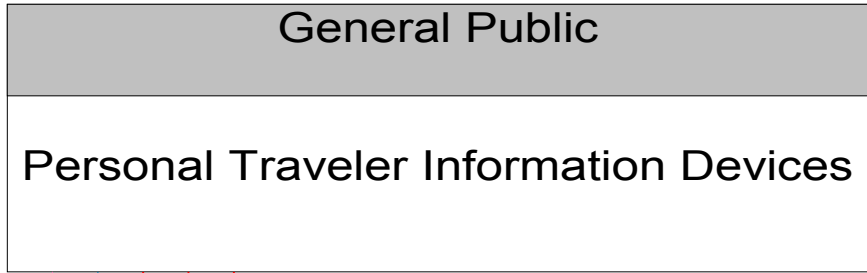
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———— Existing
- - - - - Planned



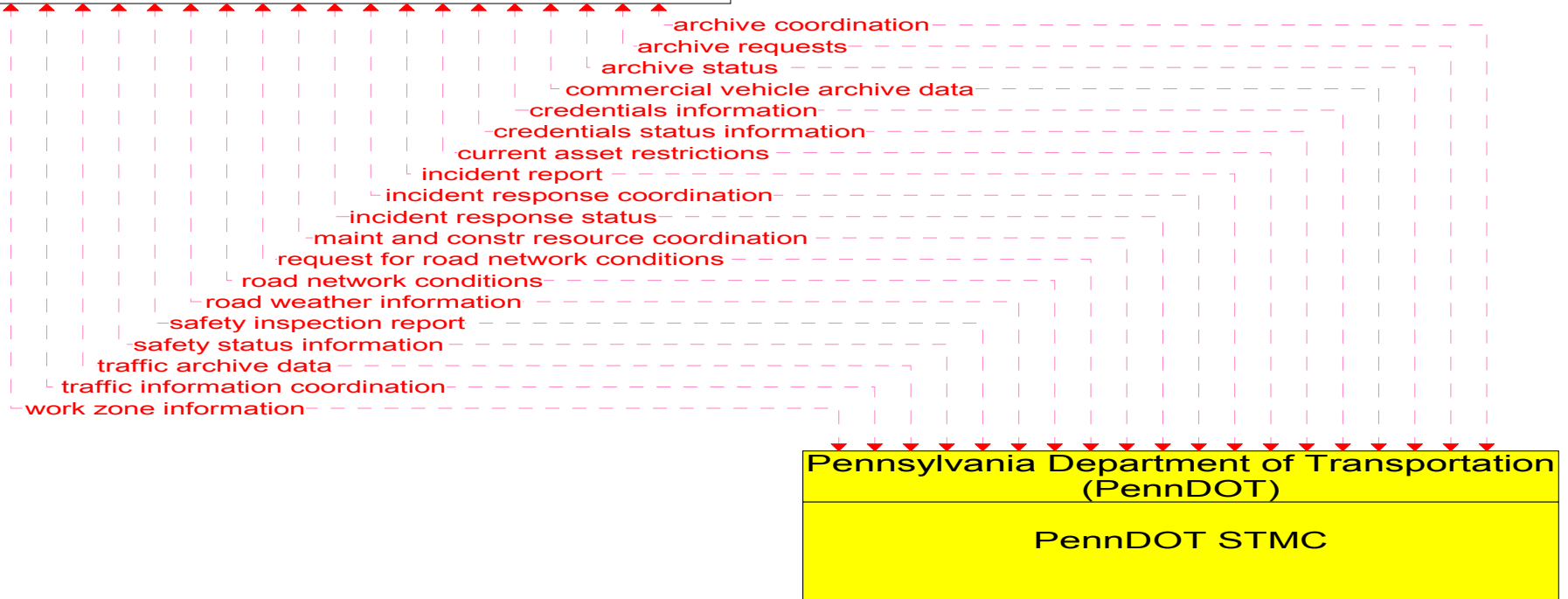
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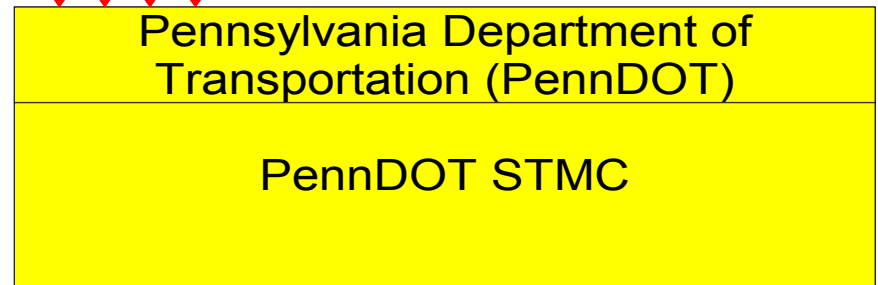
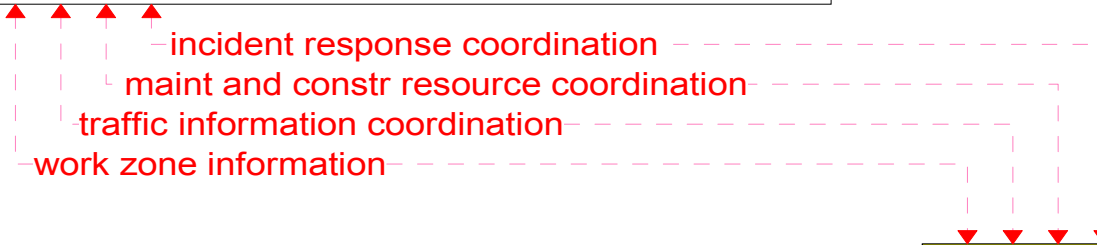
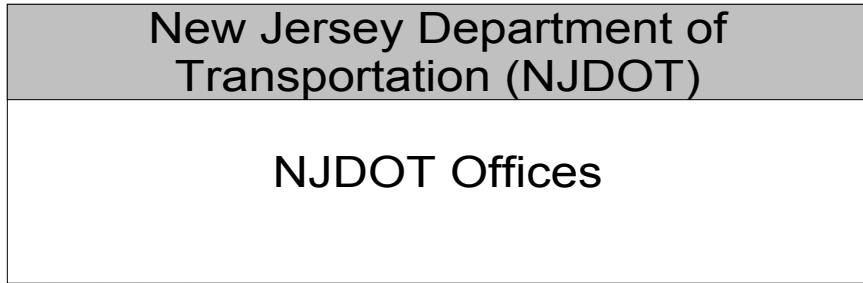


Existing
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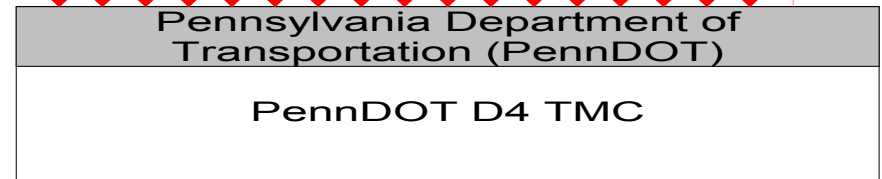
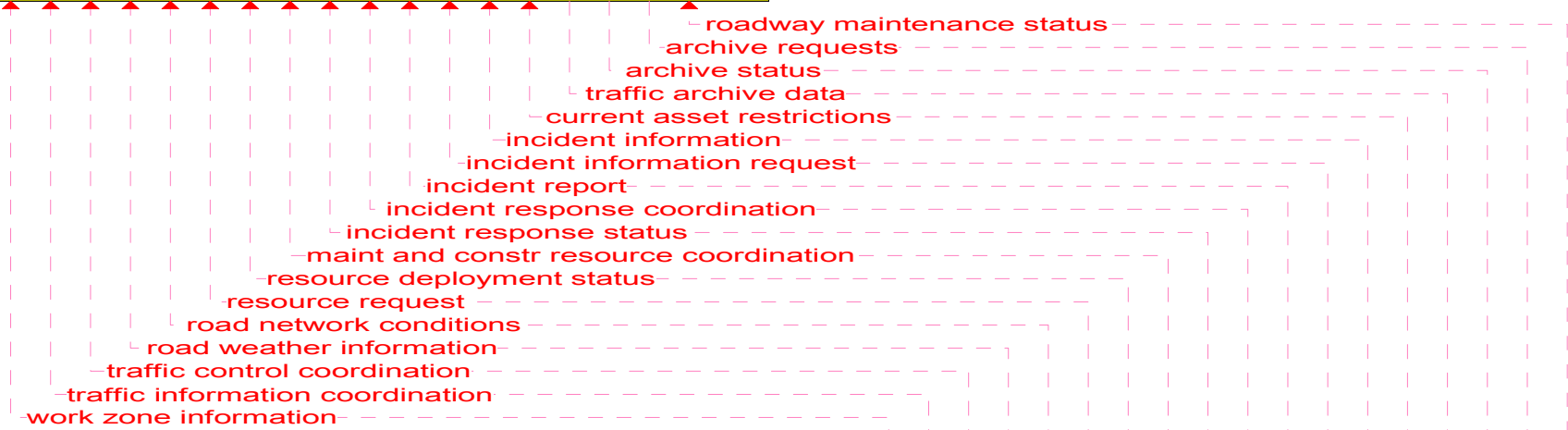
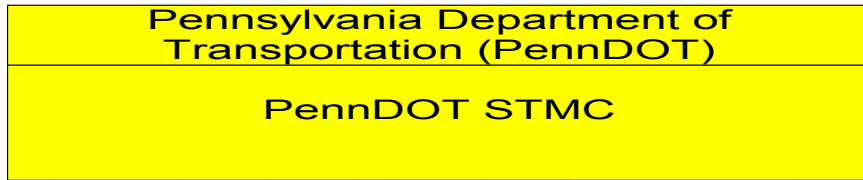
**Pennsylvania Department of Transportation
(PennDOT)**

PennDOT Central Office Organizations

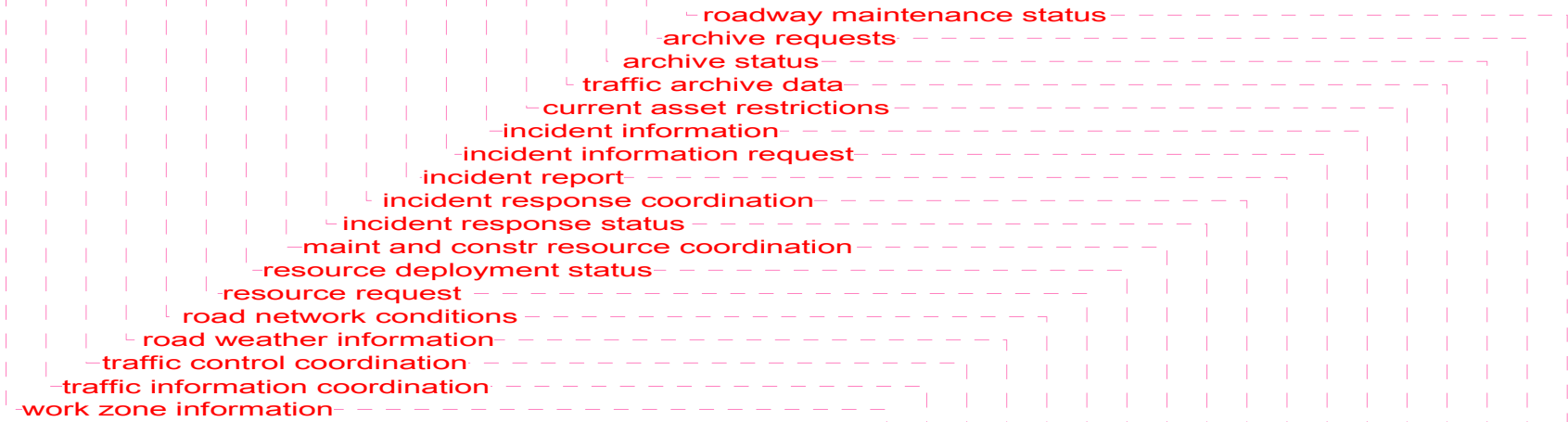
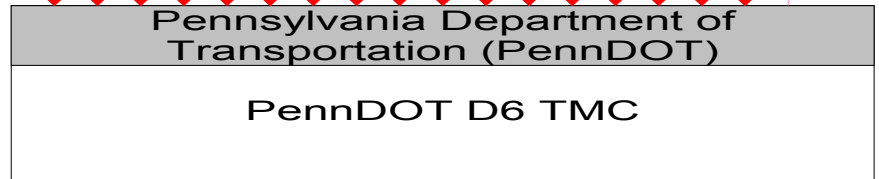
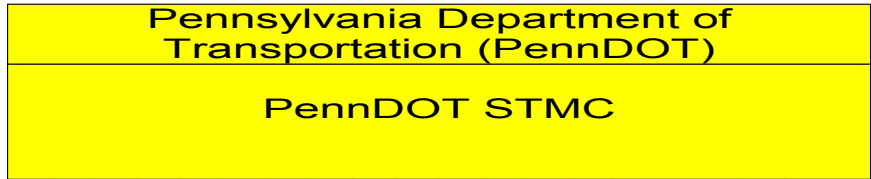




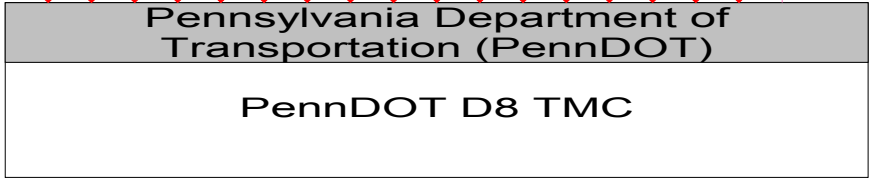
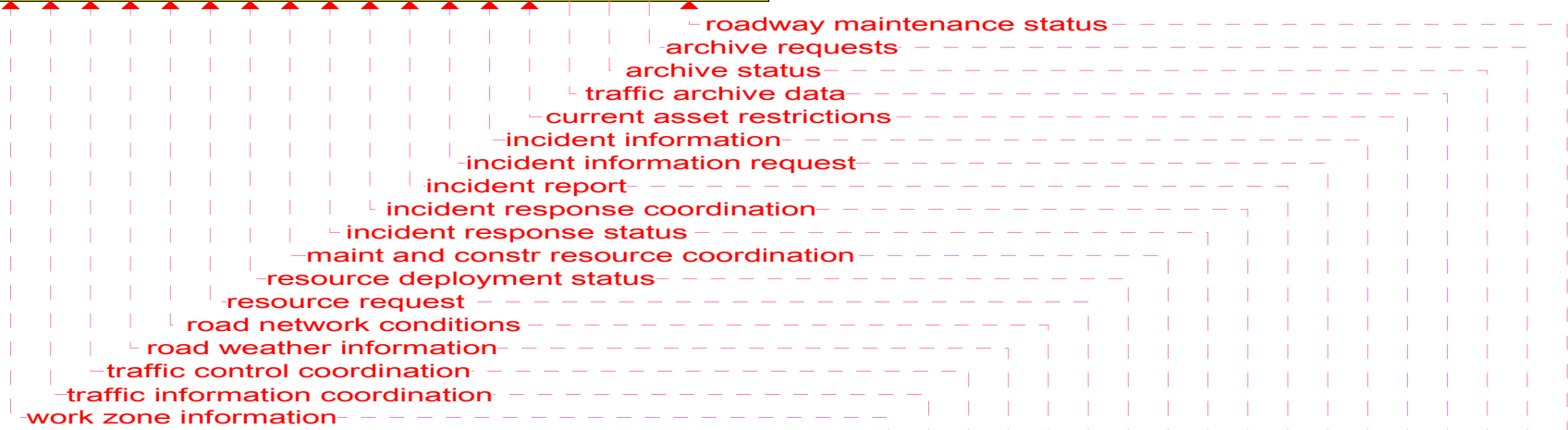
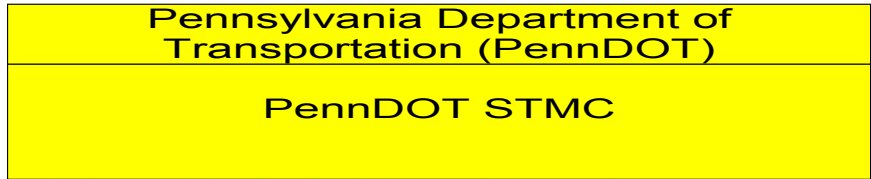
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- - - - - Planned



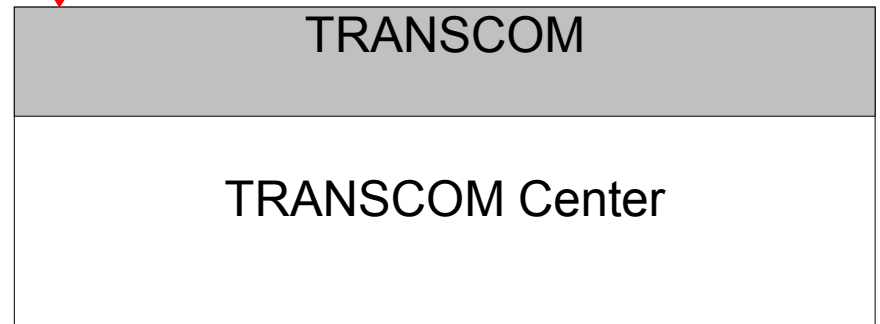
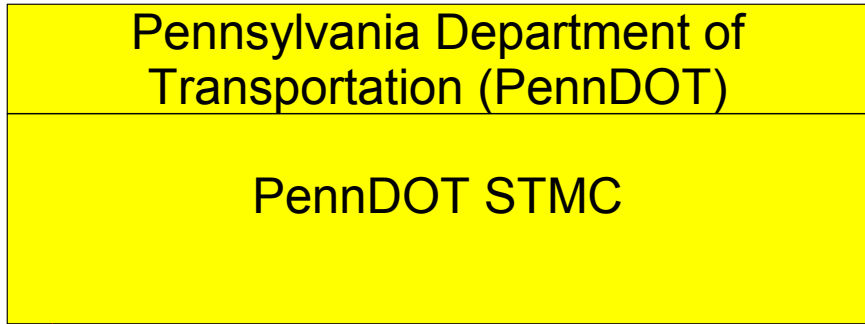
Existing
Planned



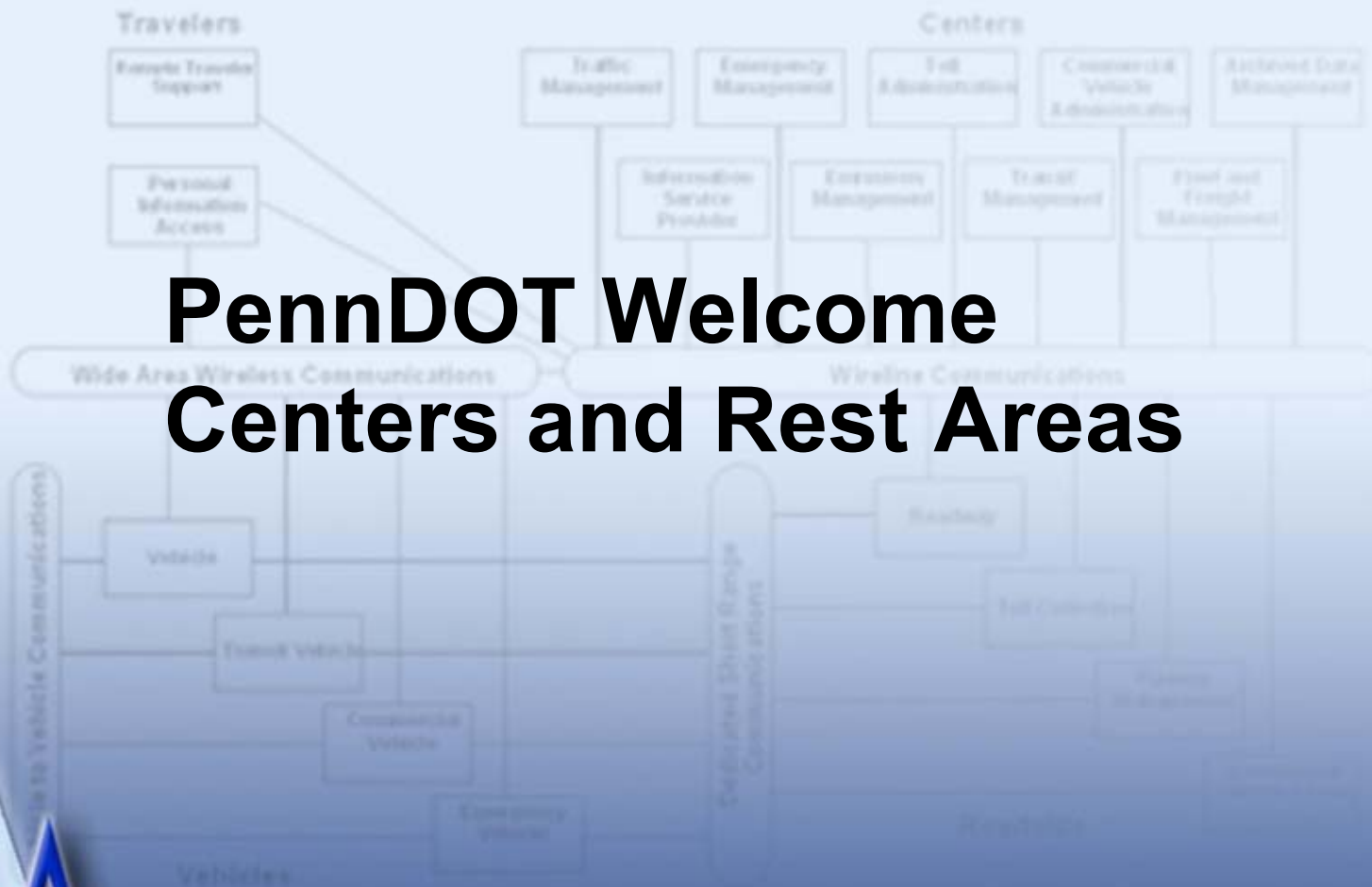
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Existing
Planned

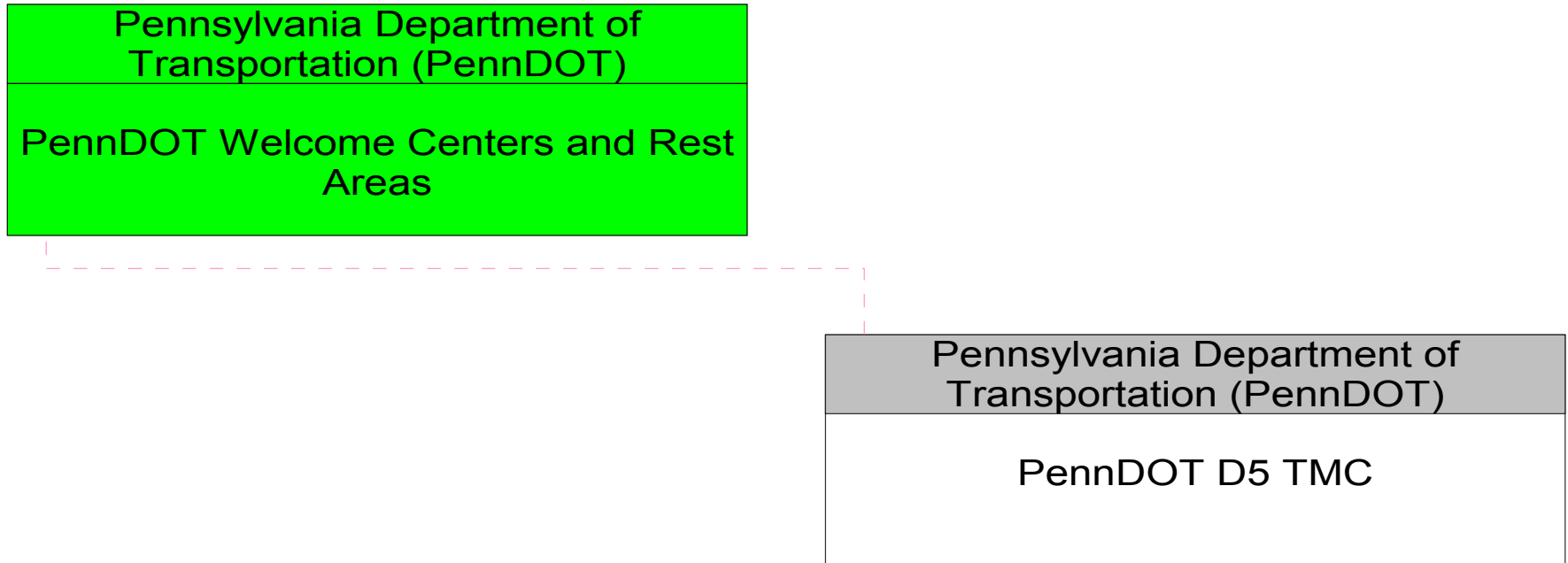


PennDOT Welcome Centers and Rest Areas



PA

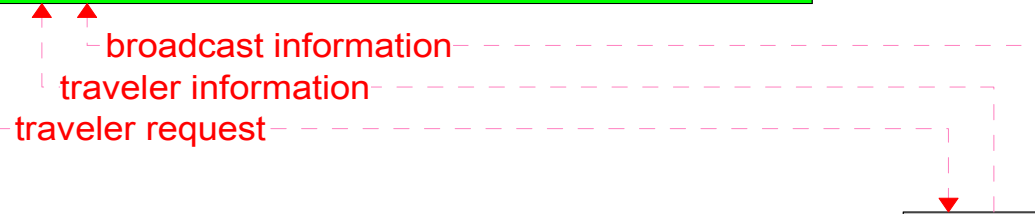
PennDOT Welcome Centers and Rest Areas Interconnect Diagram



———— Existing
- - - - - Planned

Pennsylvania Department of
Transportation (PennDOT)

PennDOT Welcome Centers and Rest
Areas



Pennsylvania Department of
Transportation (PennDOT)

PennDOT D5 TMC

— Existing
- - - Planned

Pennsylvania Office of Homeland Security

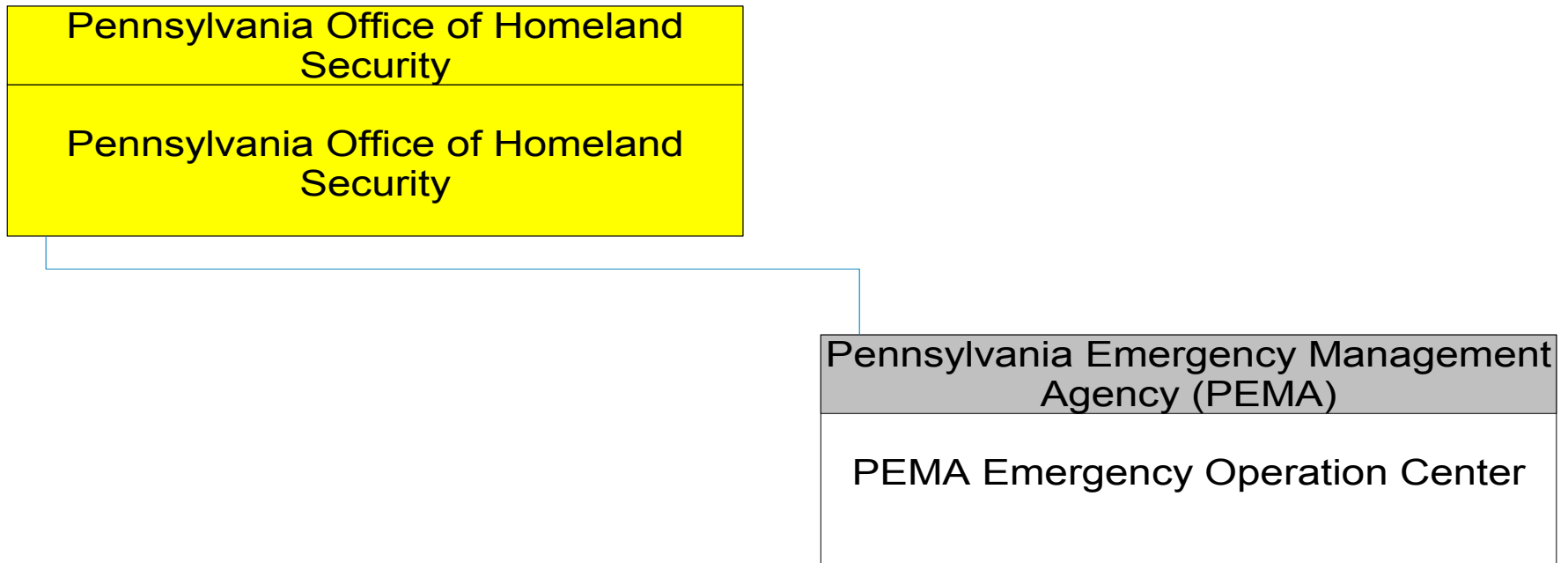


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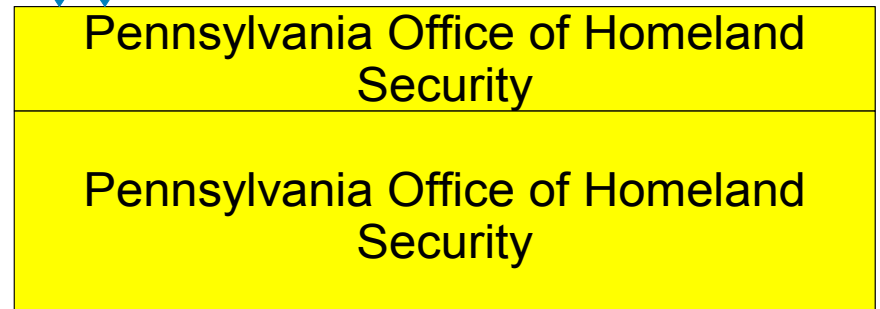
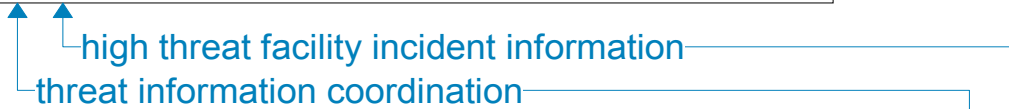
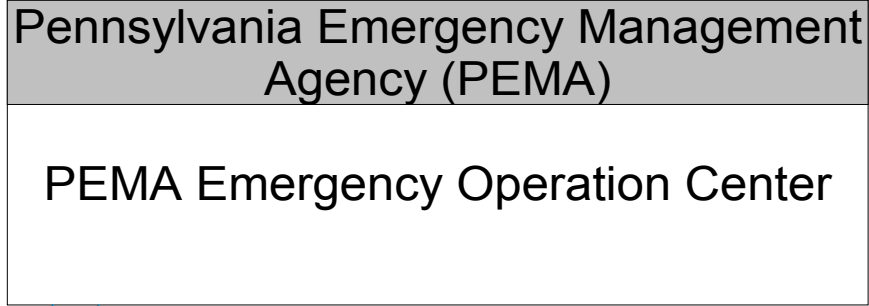
architecture



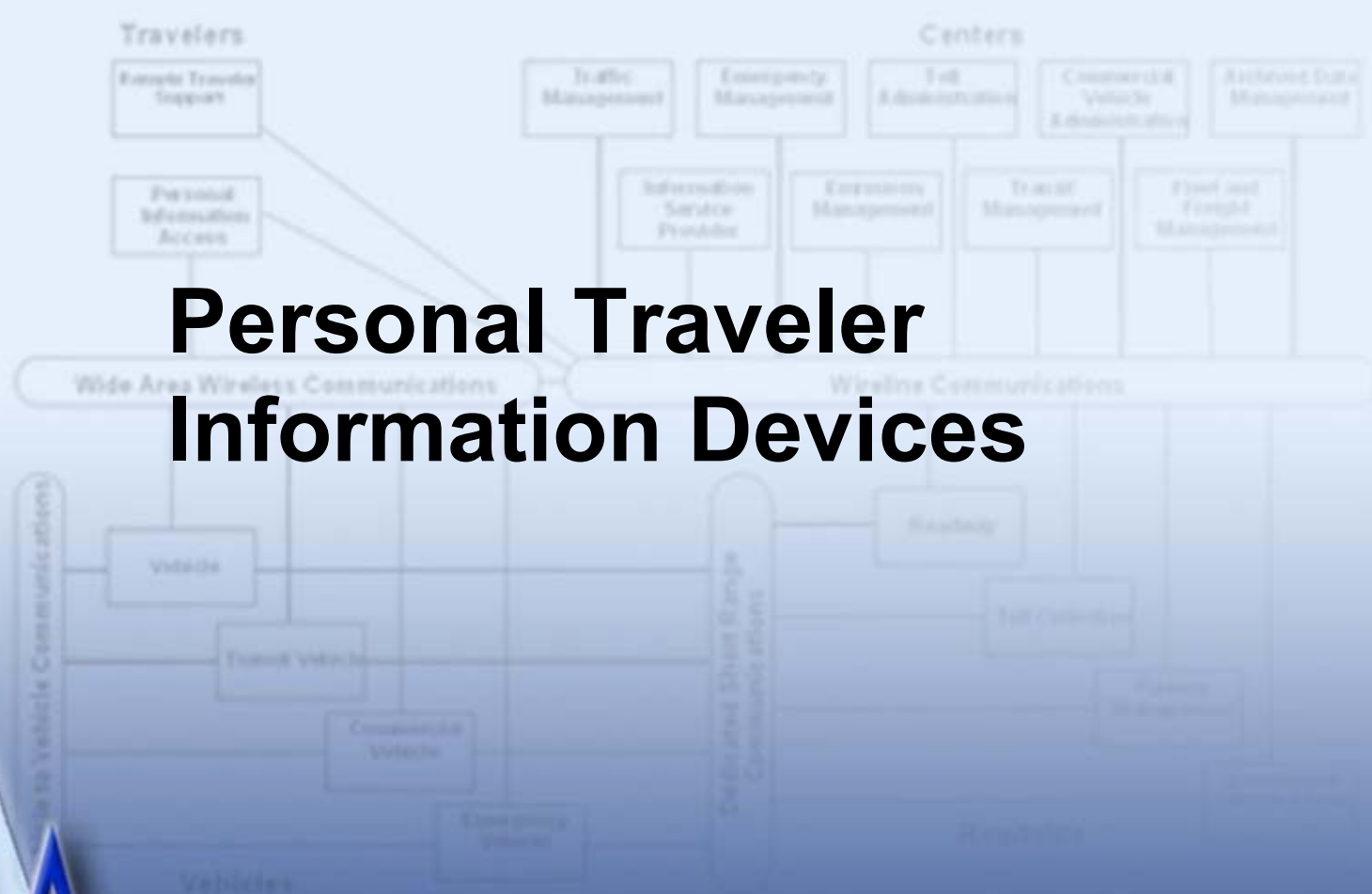
Pennsylvania Office of Homeland Security Interconnect Diagram



Existing
Planned

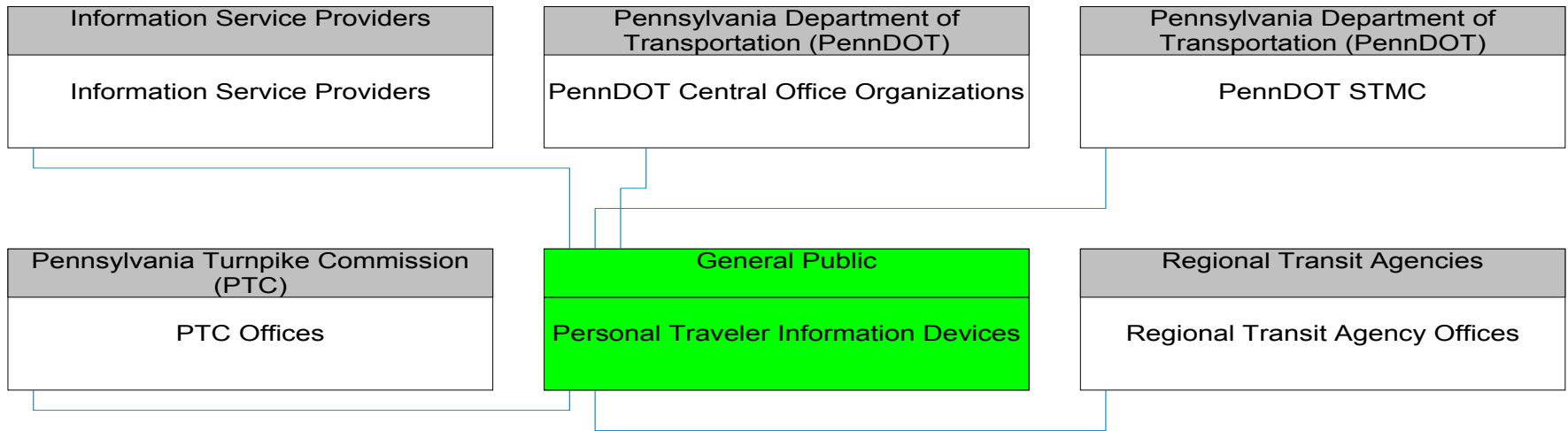


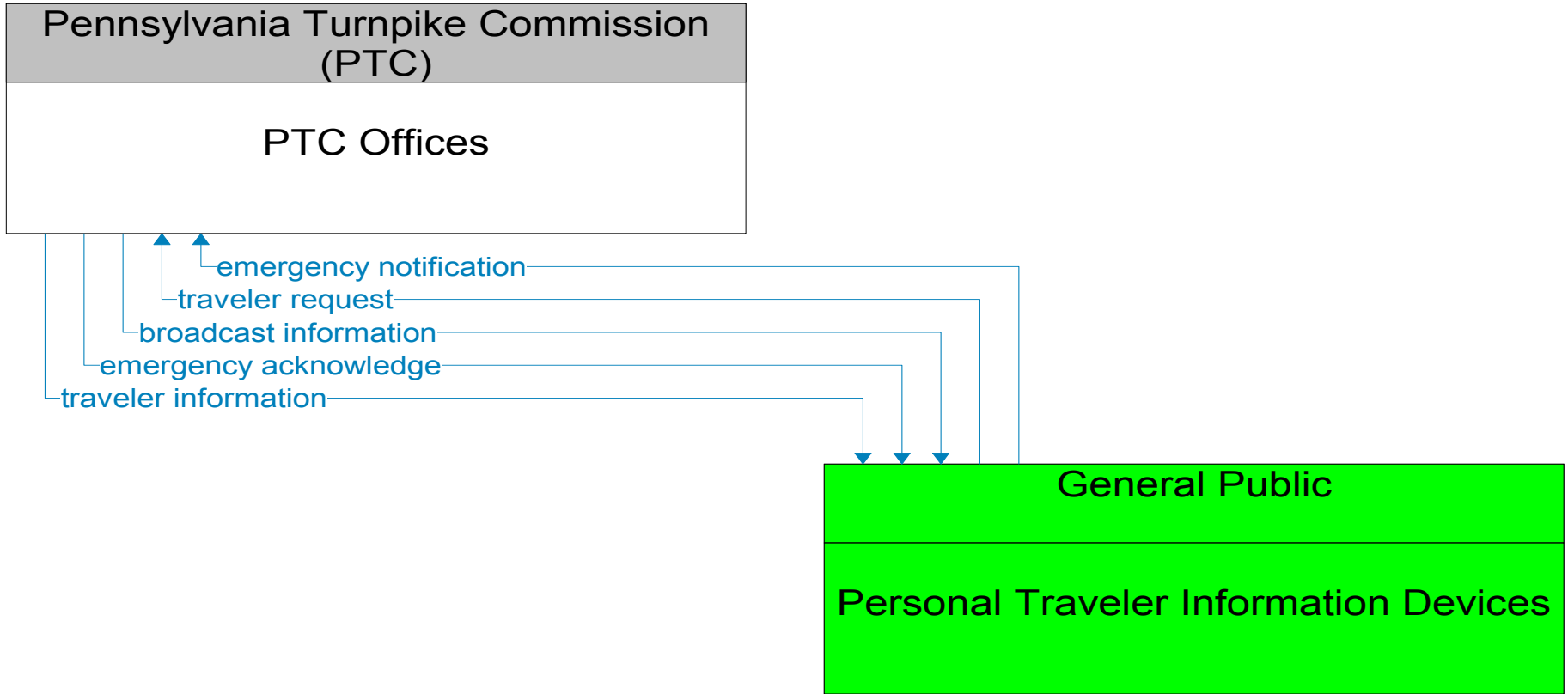
Personal Traveler Information Devices



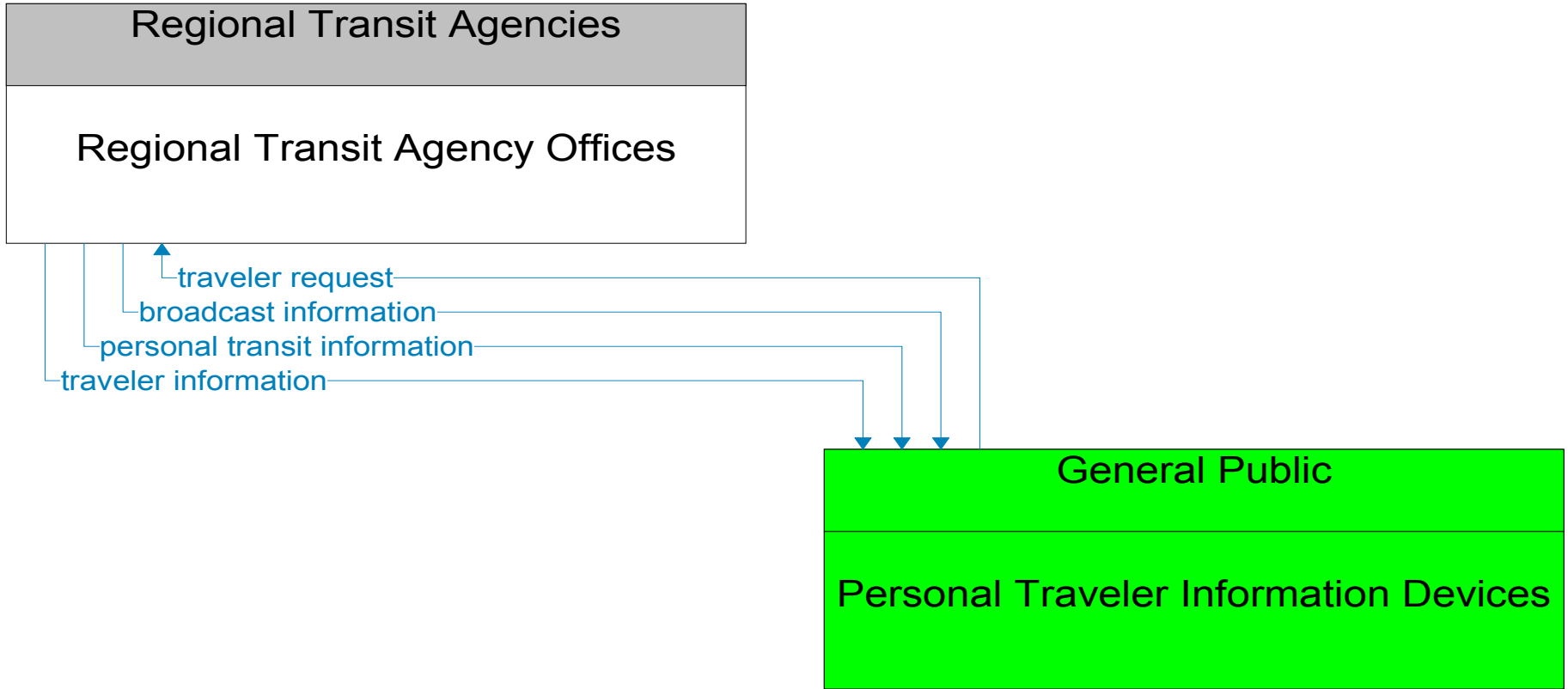
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Personal Traveler Information Devices Interconnect Diagram

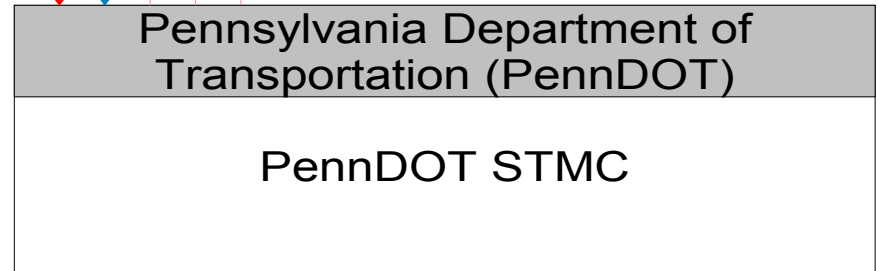
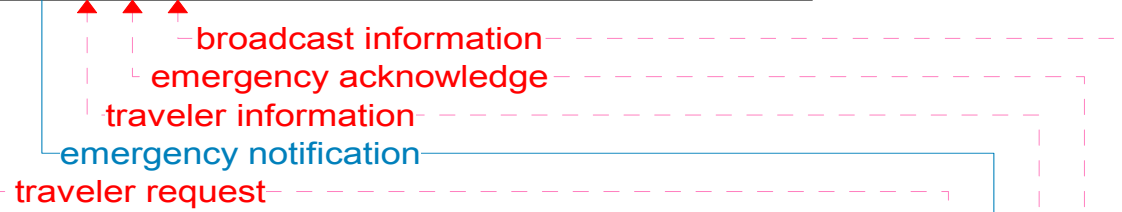
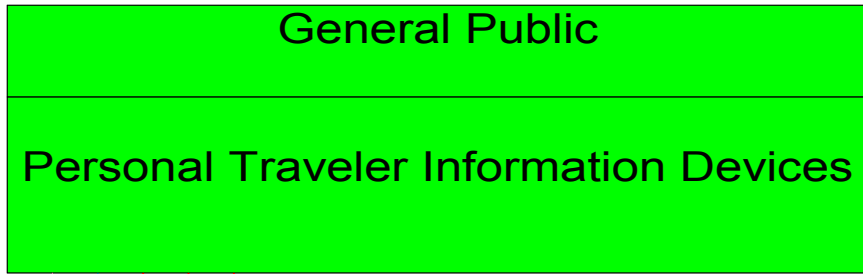




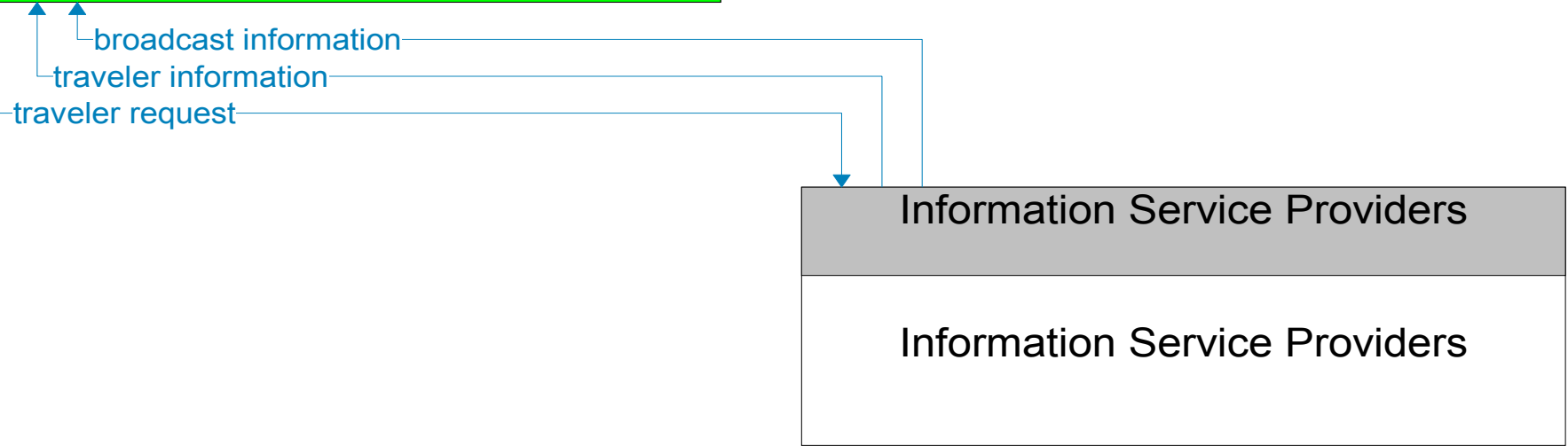
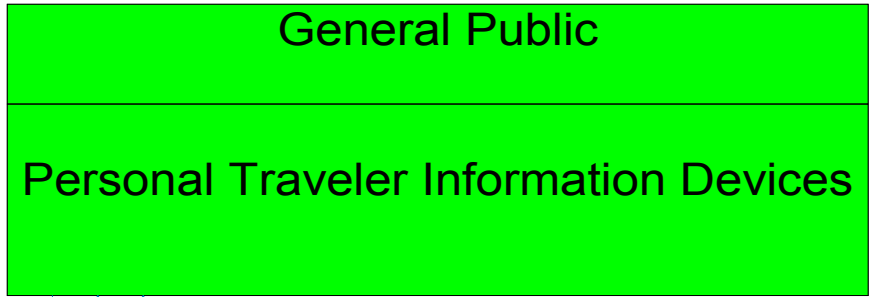
———— Existing
- - - - - Planned



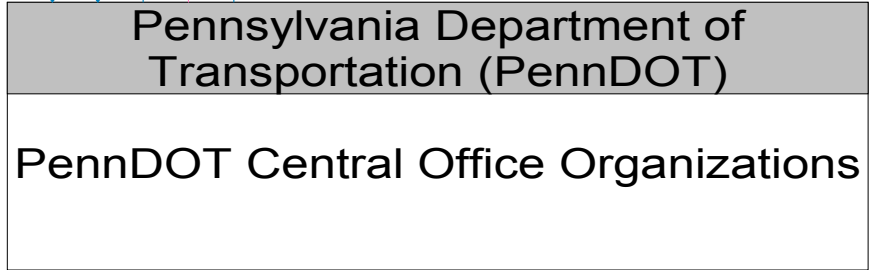
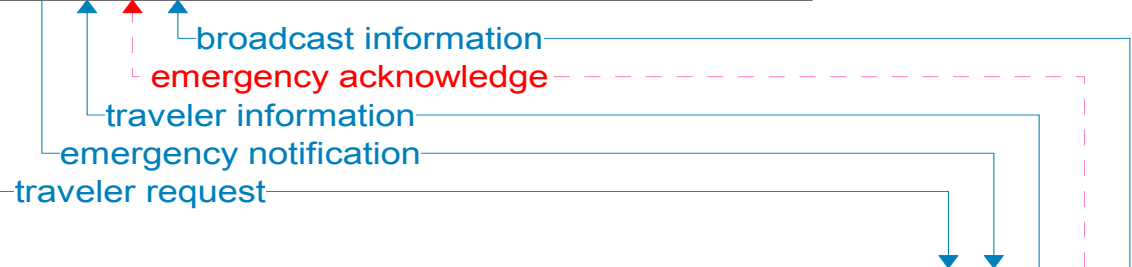
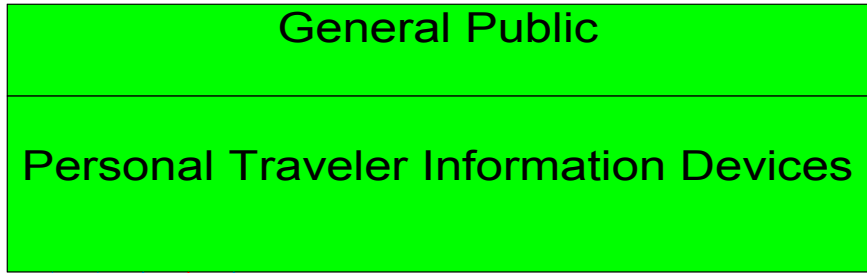
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----- Planned



— Existing
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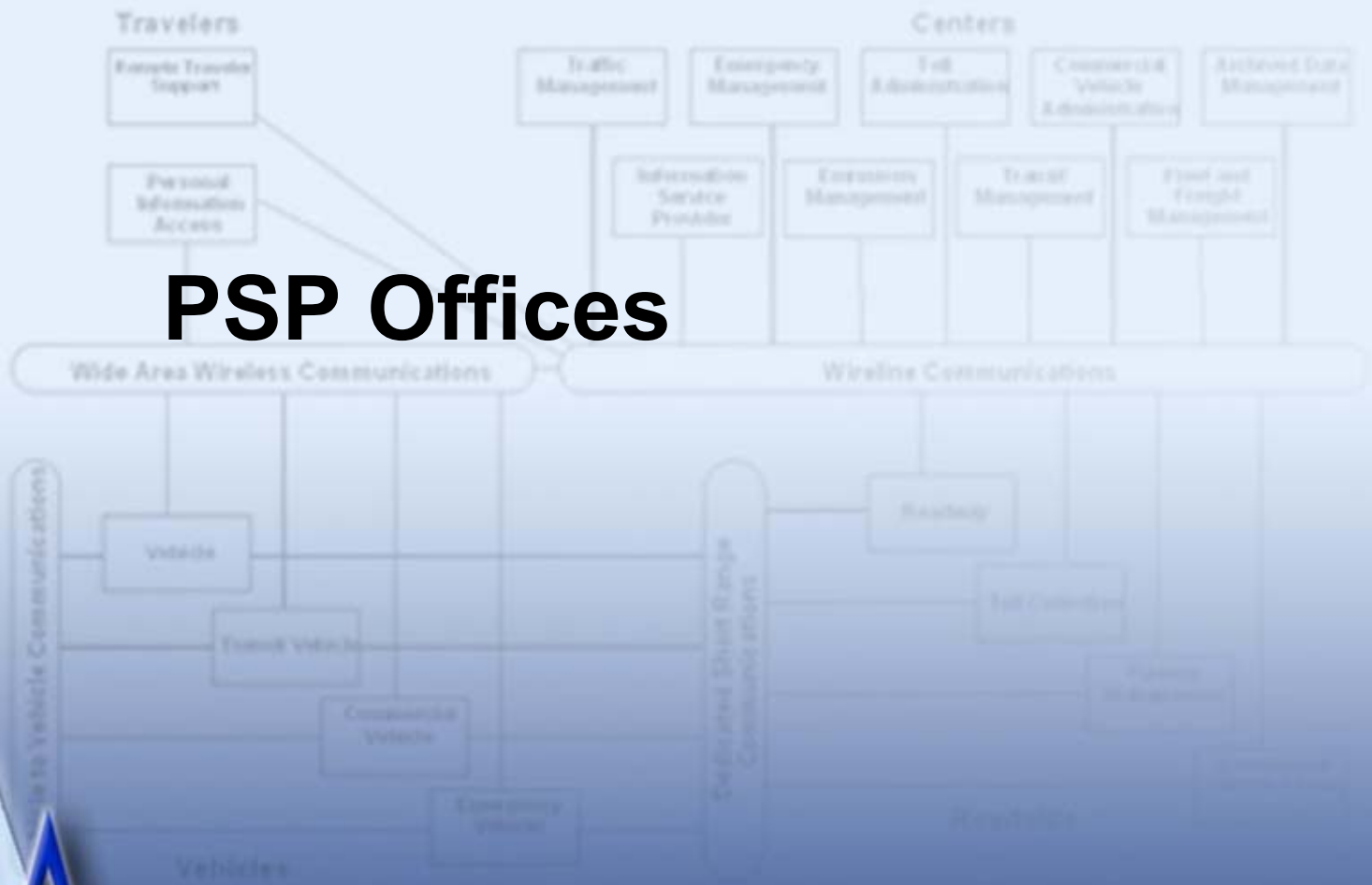


Existing
Planned



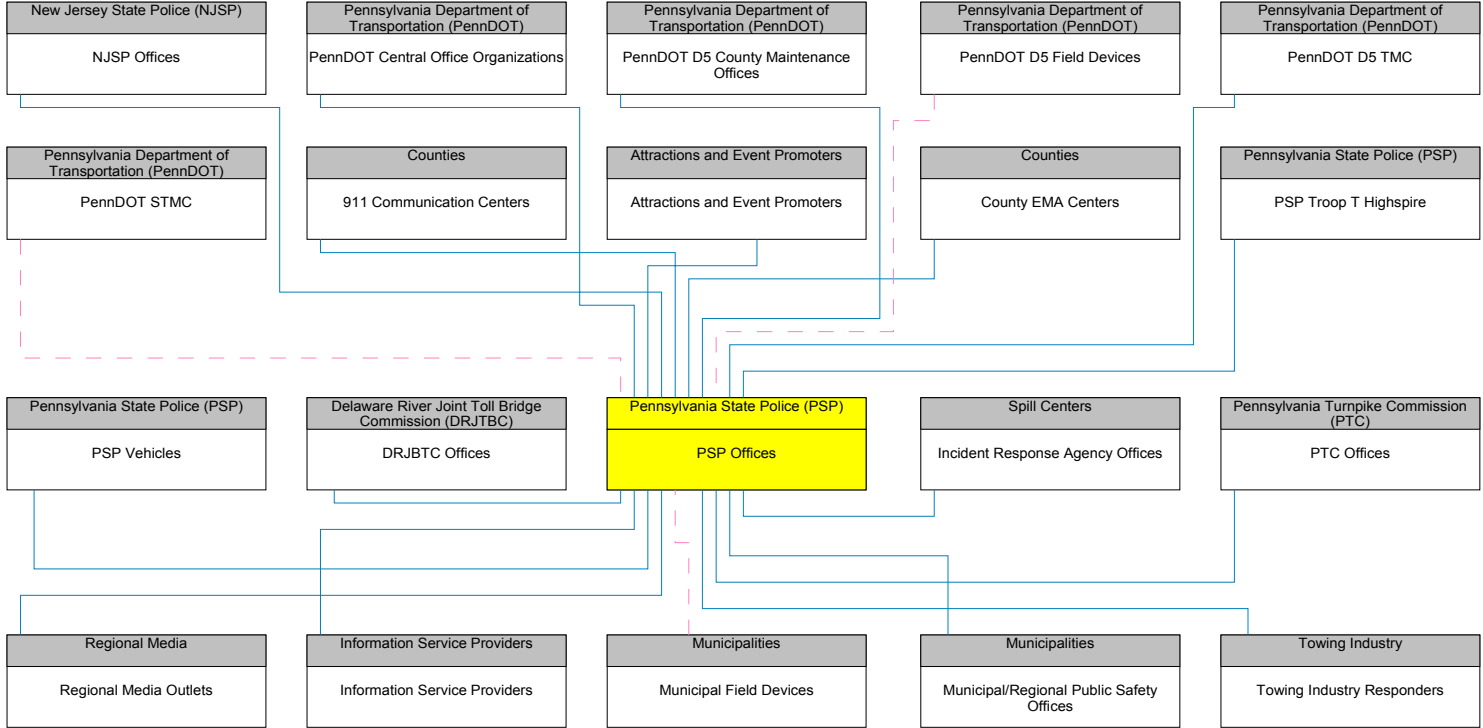
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PSP Offices

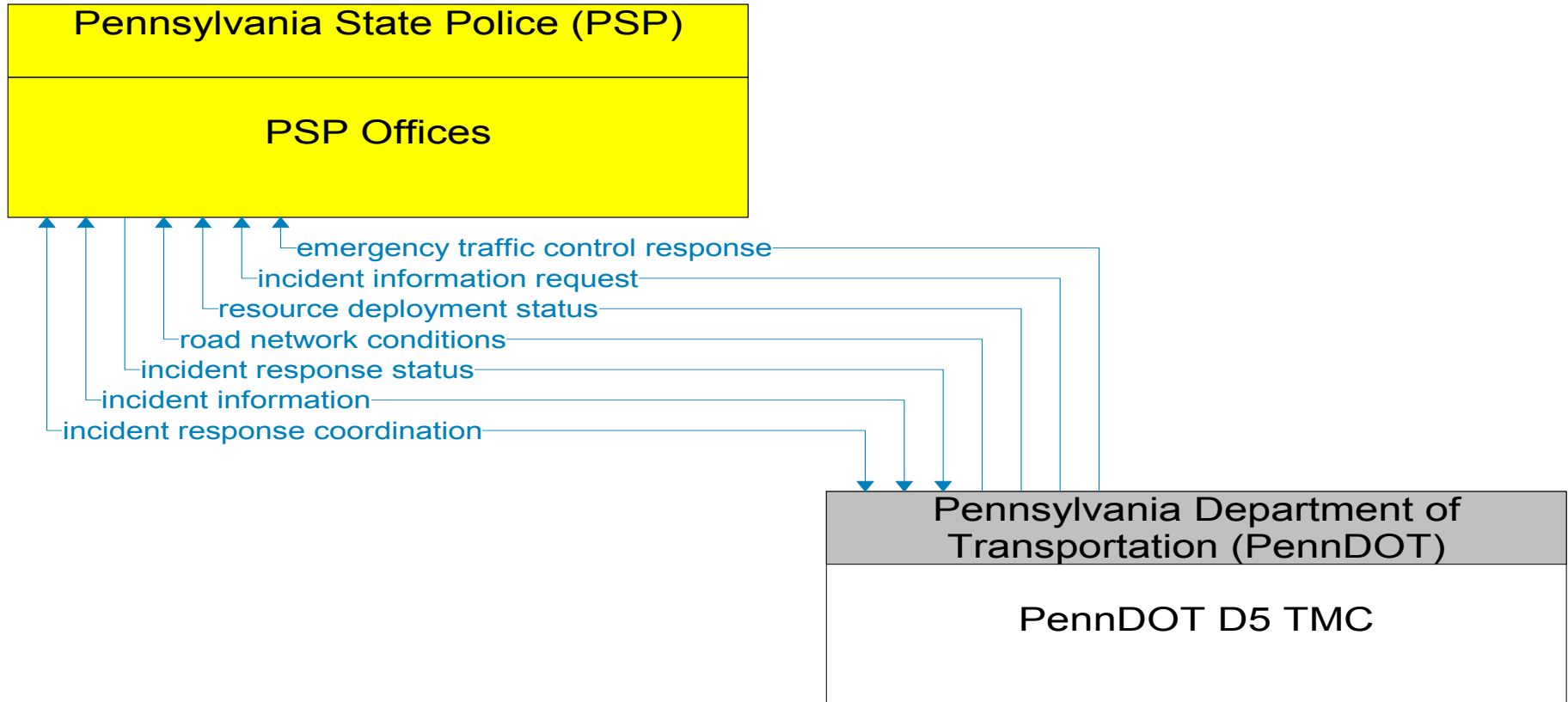


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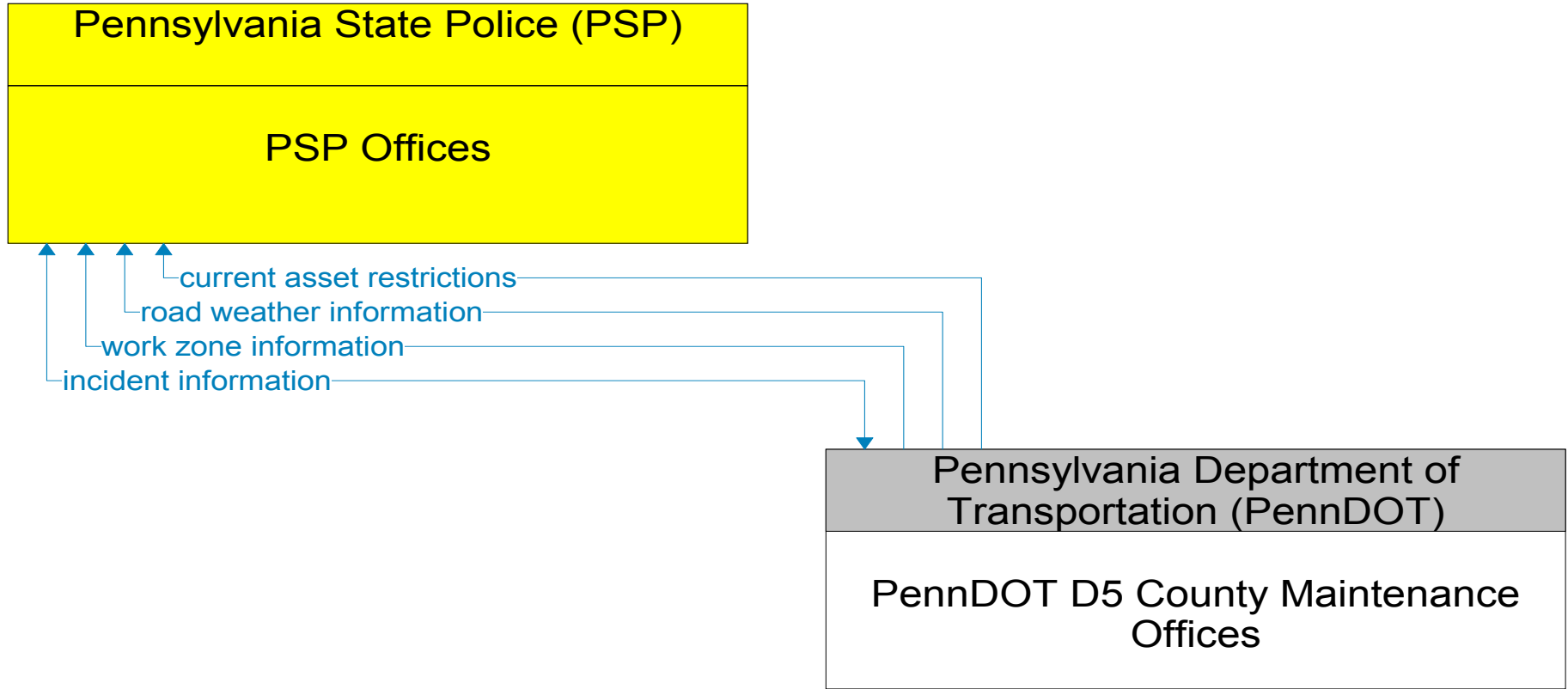
PSP Offices Interconnect Diagram



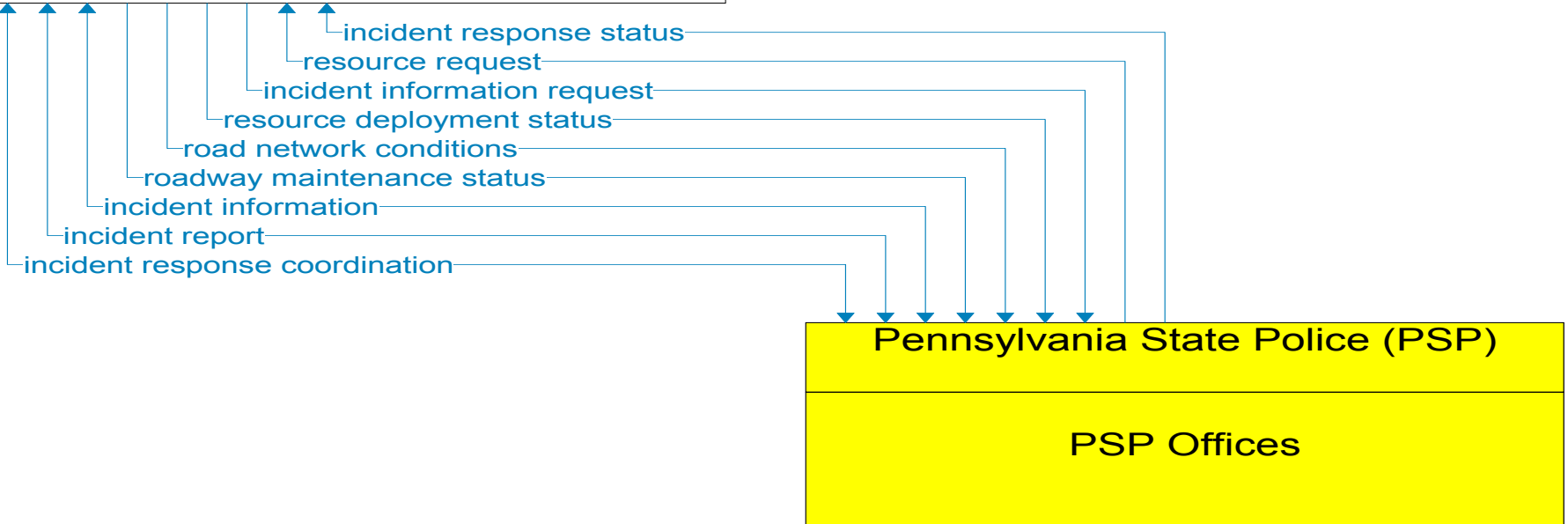
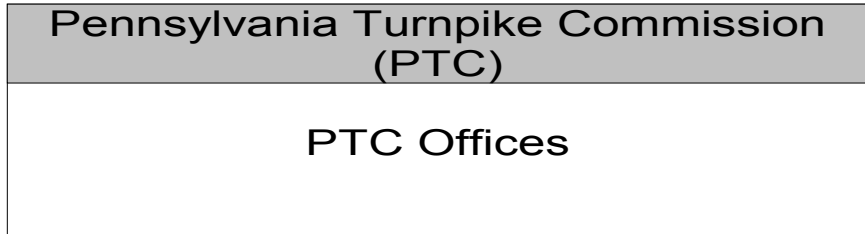
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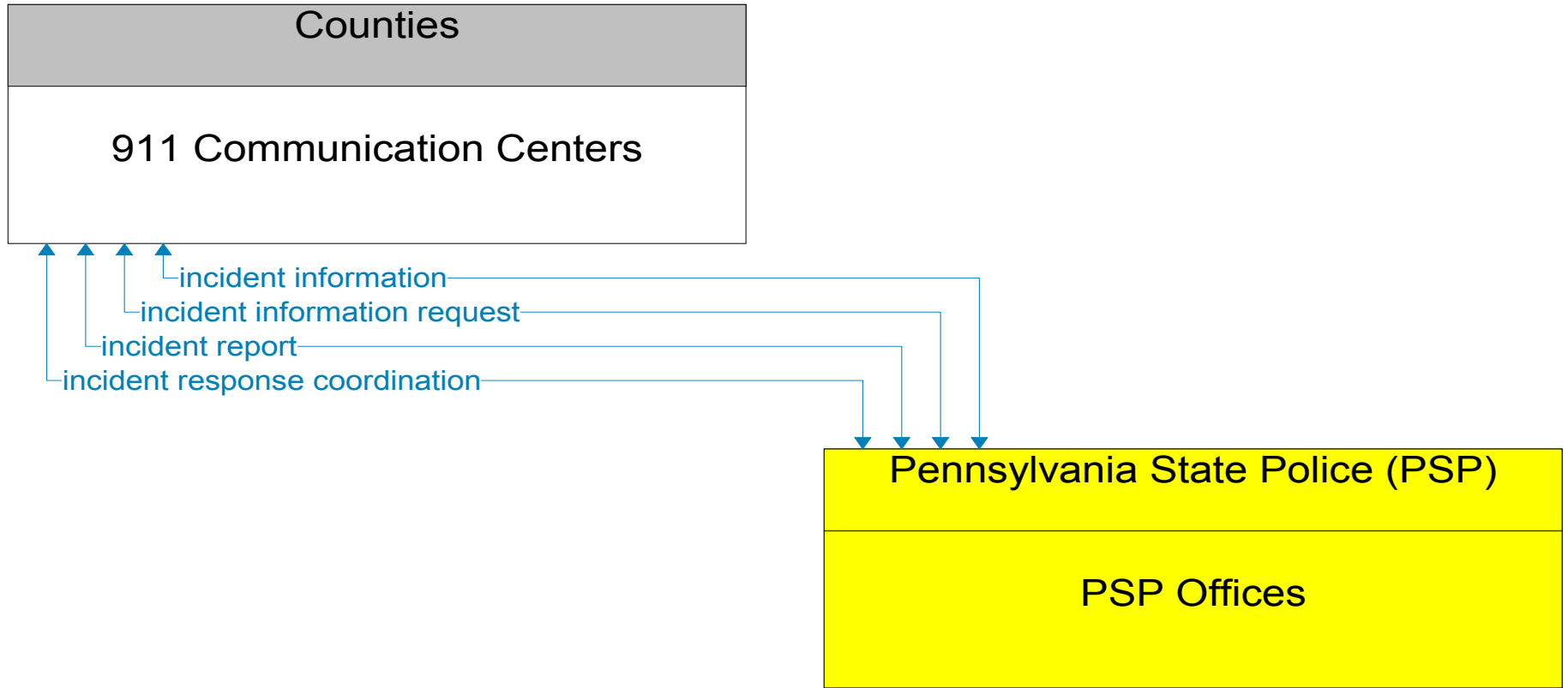
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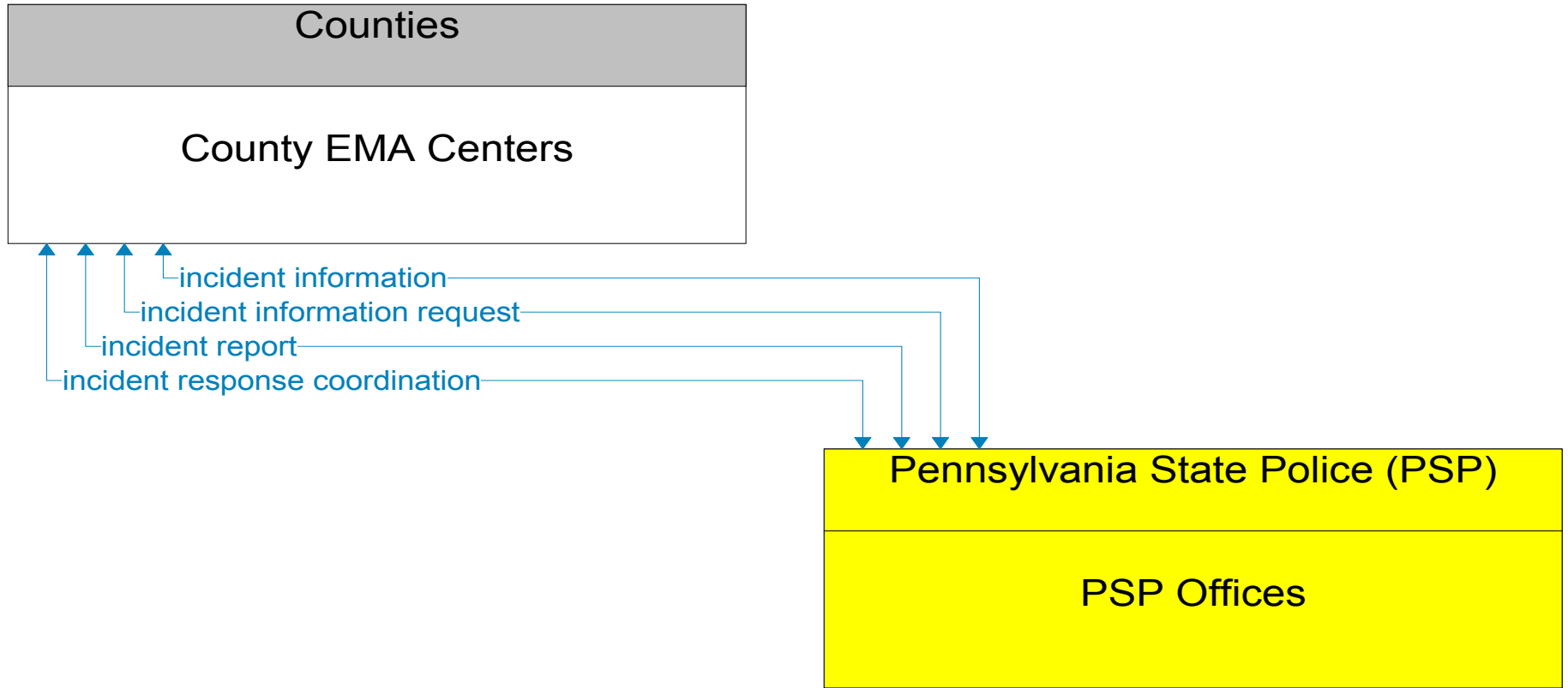
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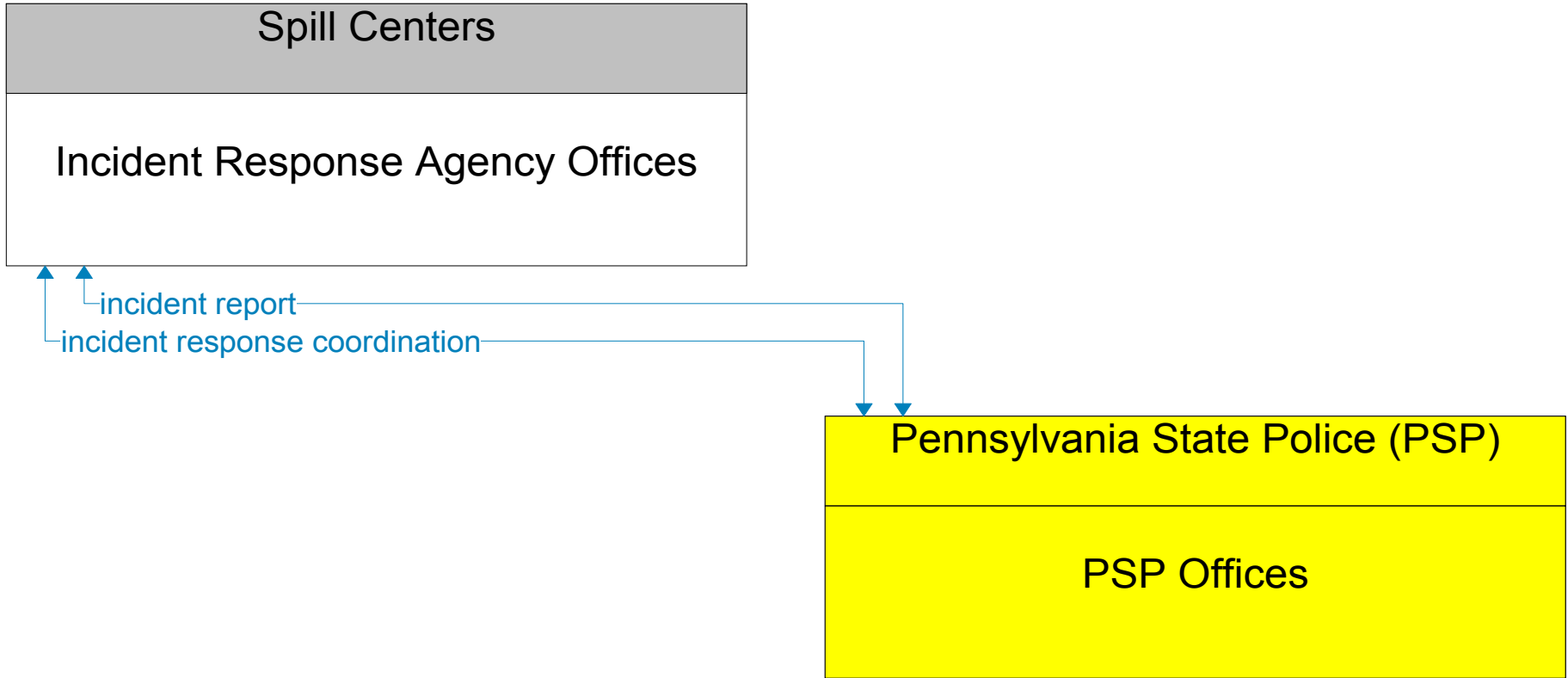
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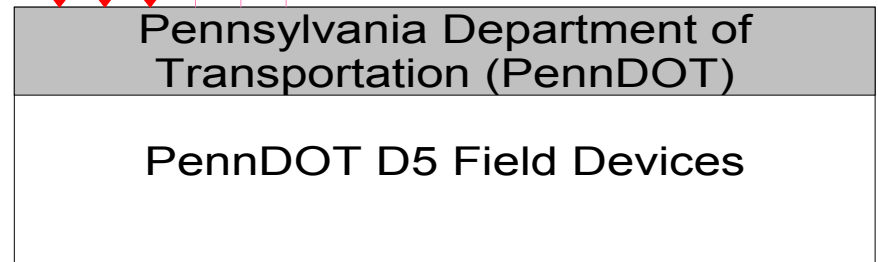
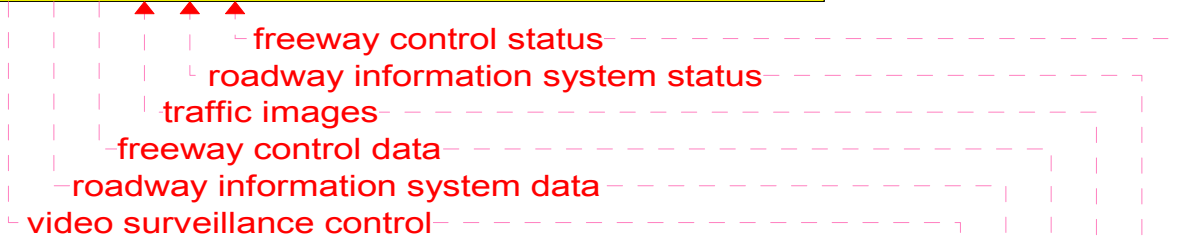
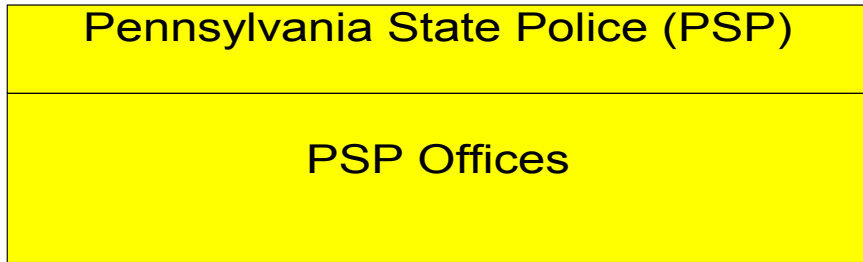
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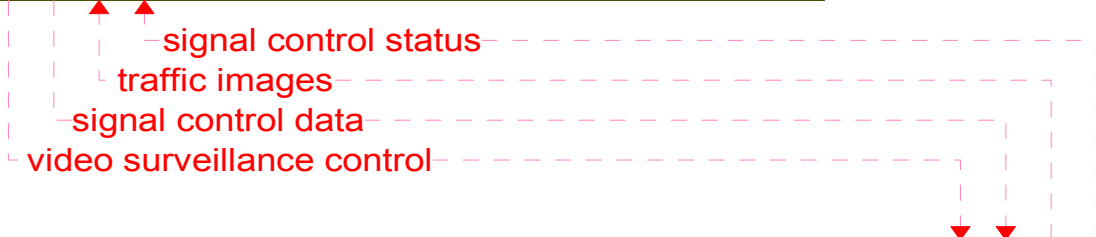
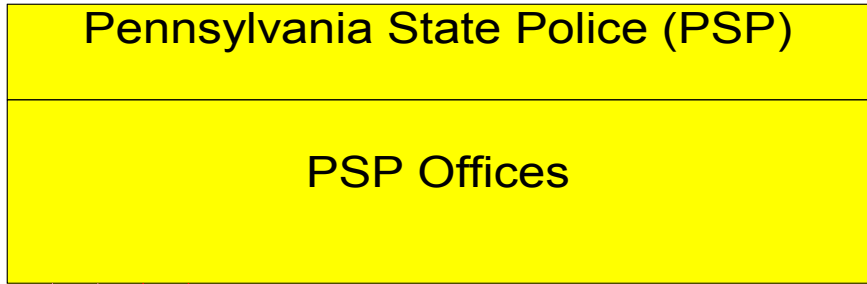
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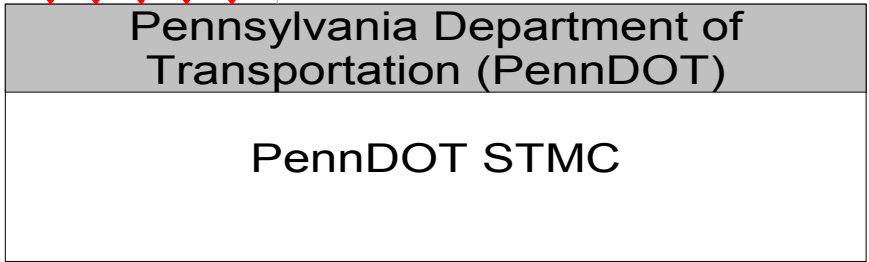
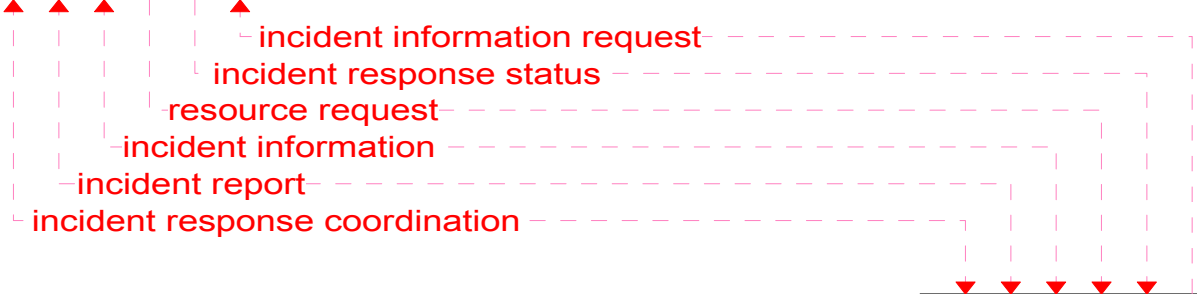
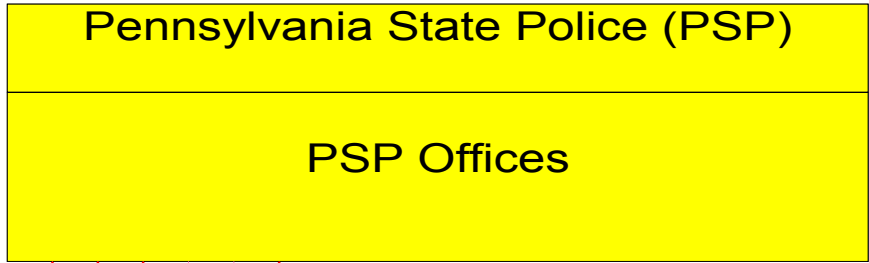
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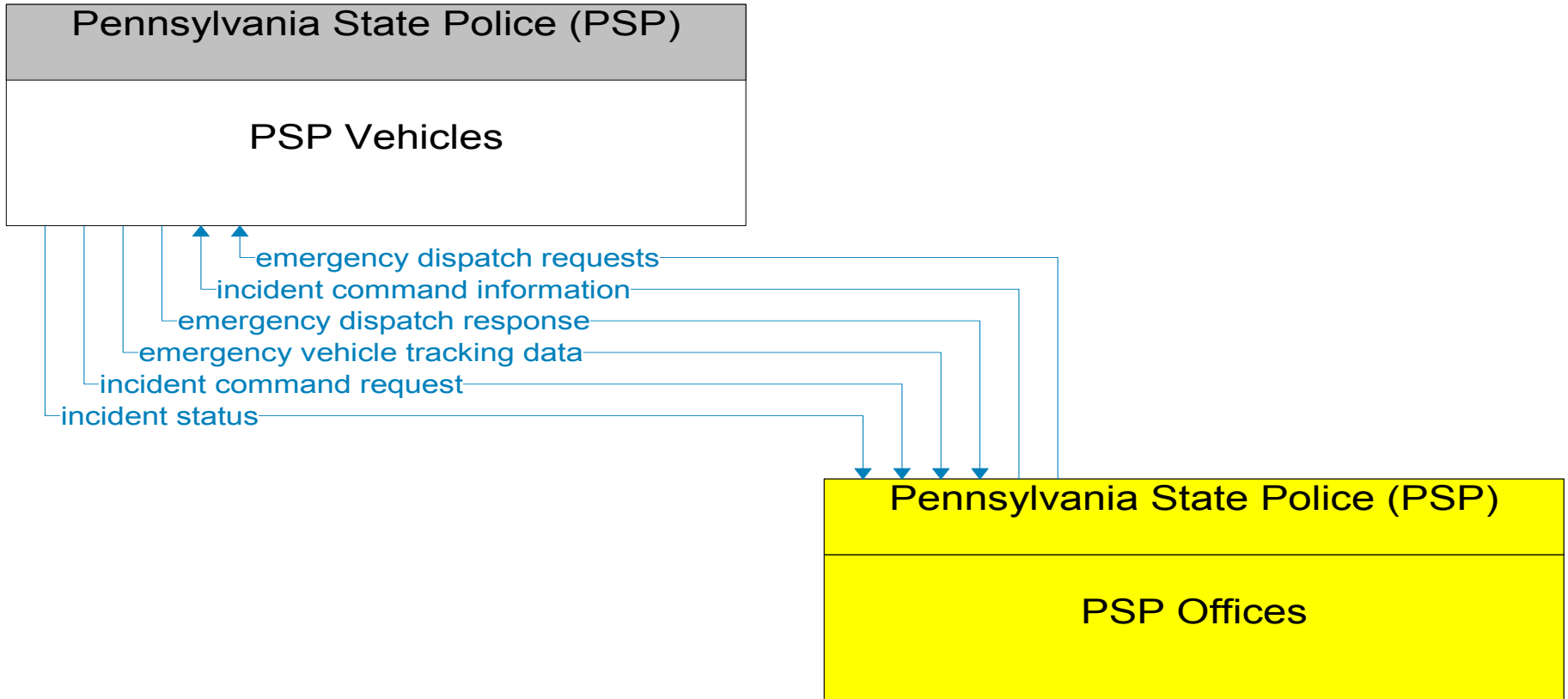
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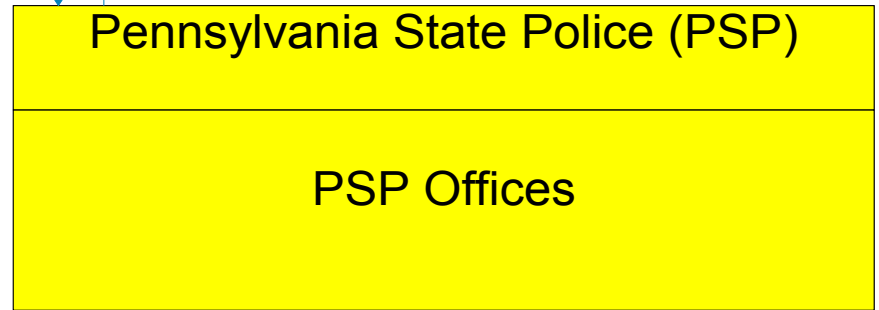
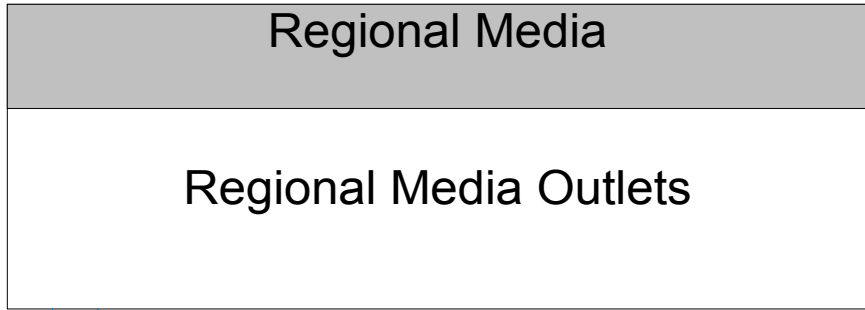
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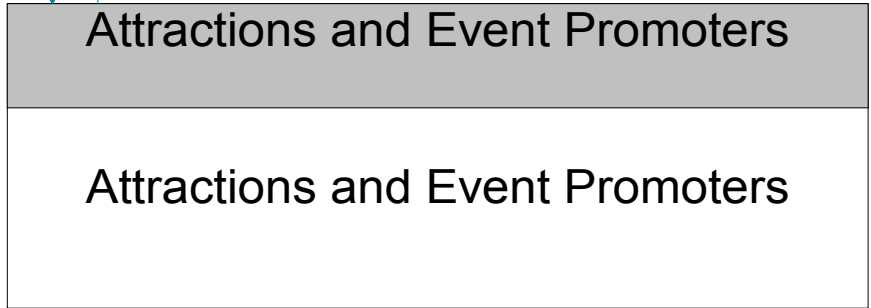
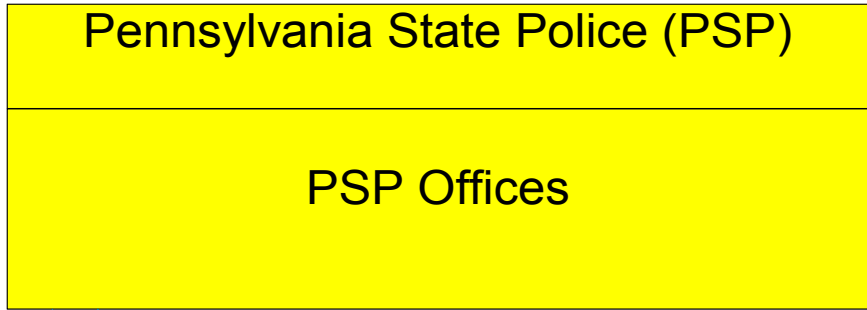


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- - - - - Planned



incident information for media
media information request

Existing
Planned

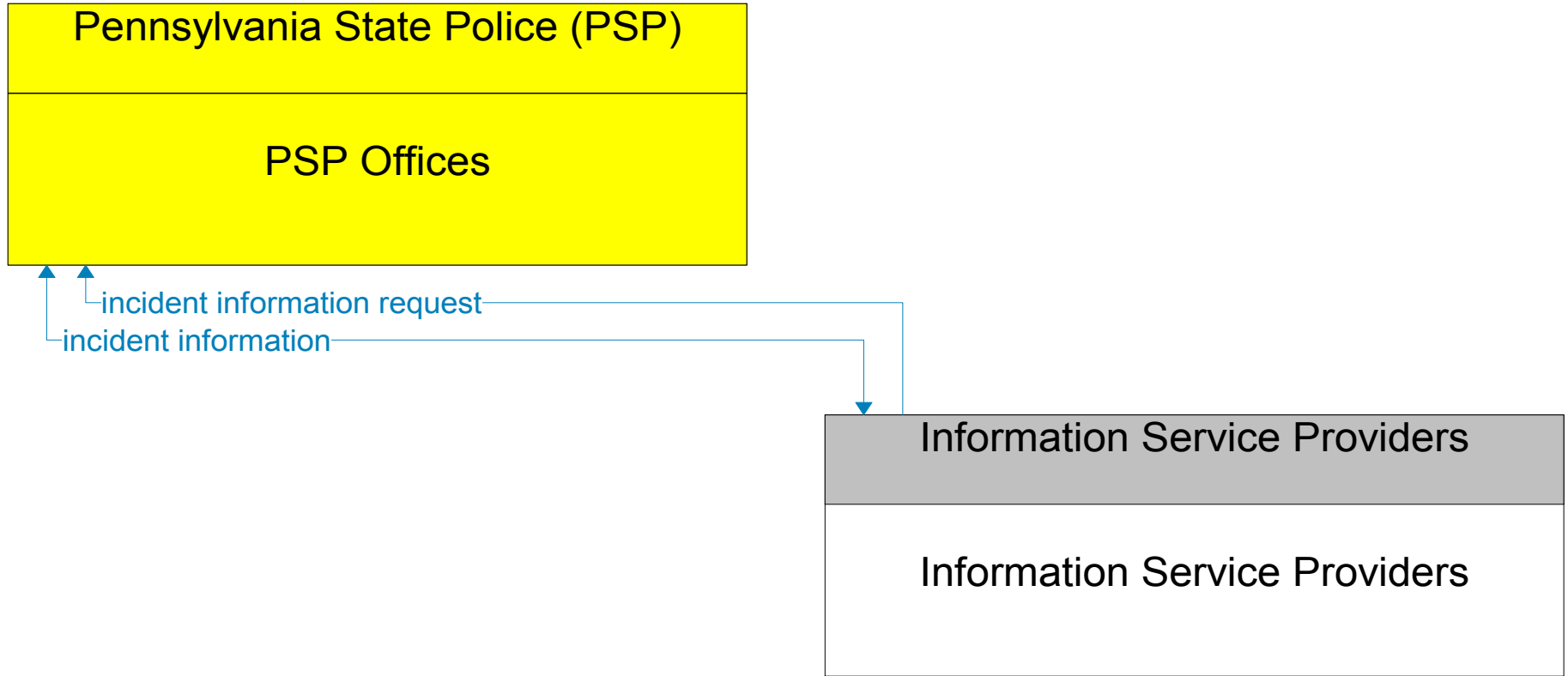


event plans

event confirmation

Existing

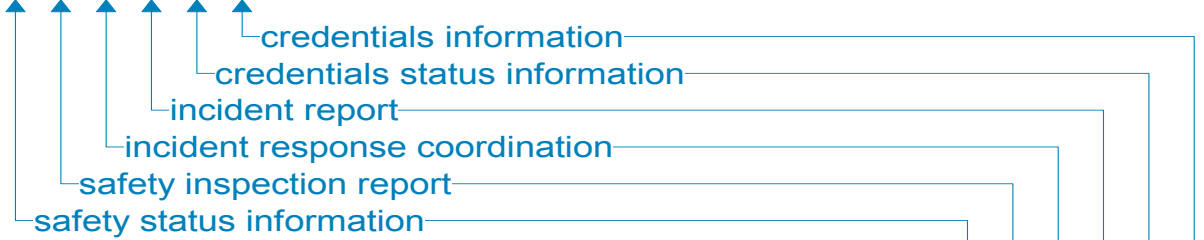
Planned



———— Existing
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Pennsylvania Department of
Transportation (PennDOT)

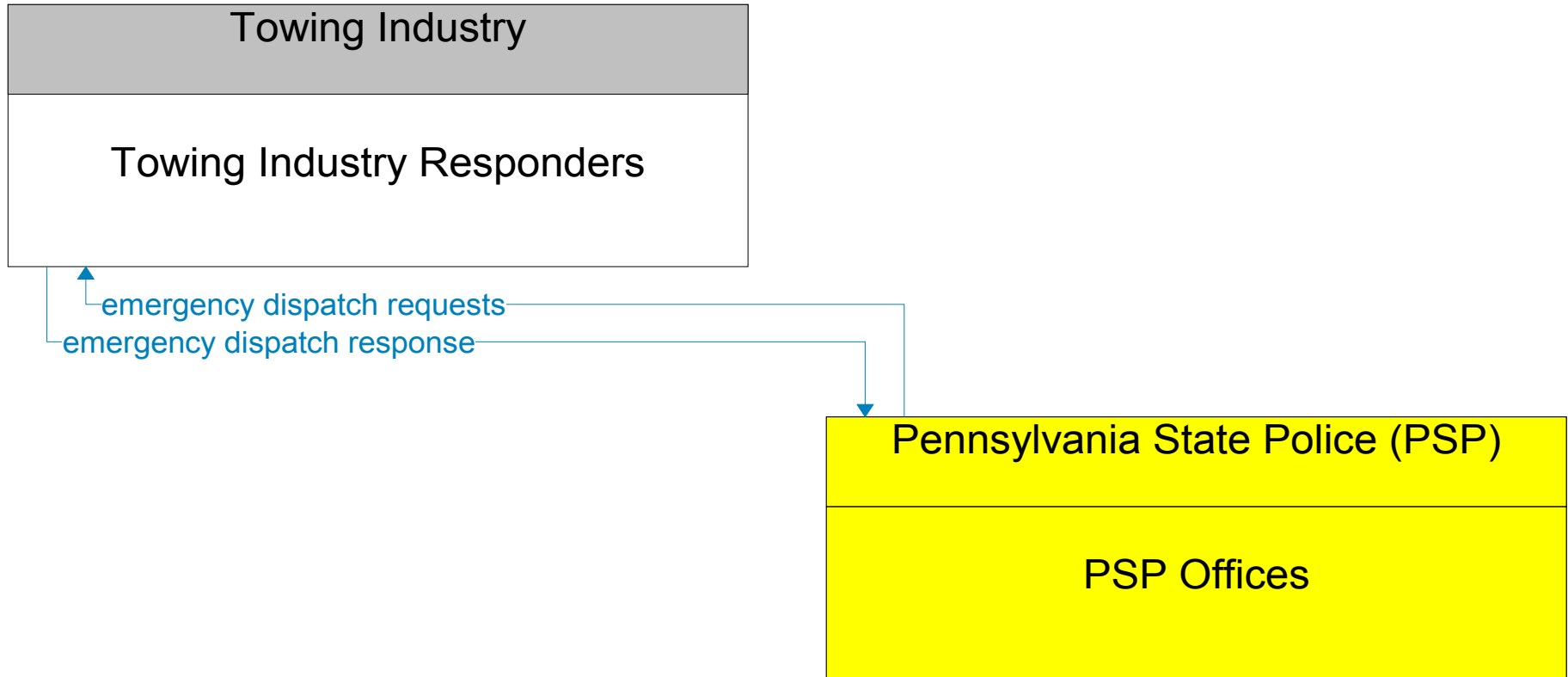
PennDOT Central Office Organizations



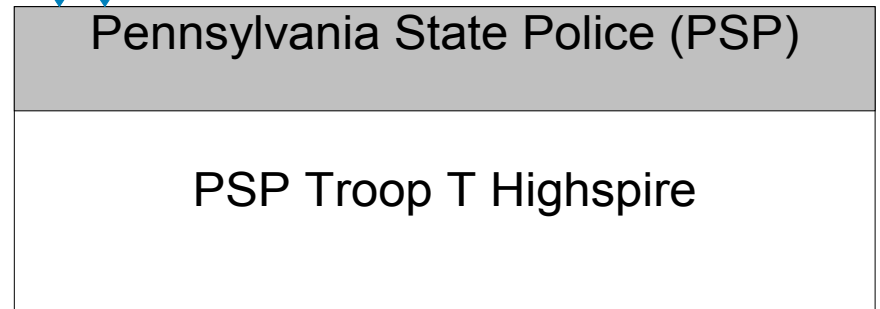
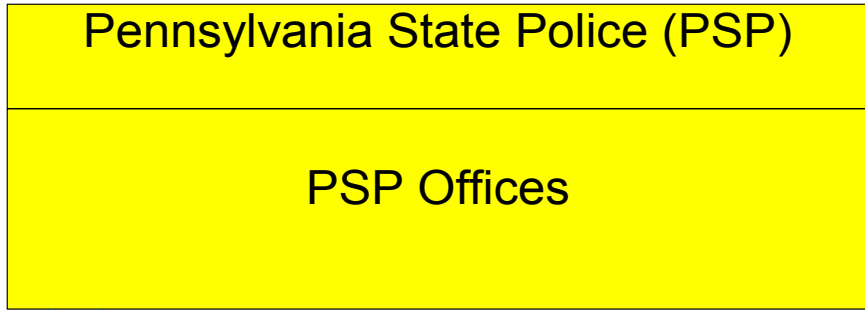
Pennsylvania State Police (PSP)

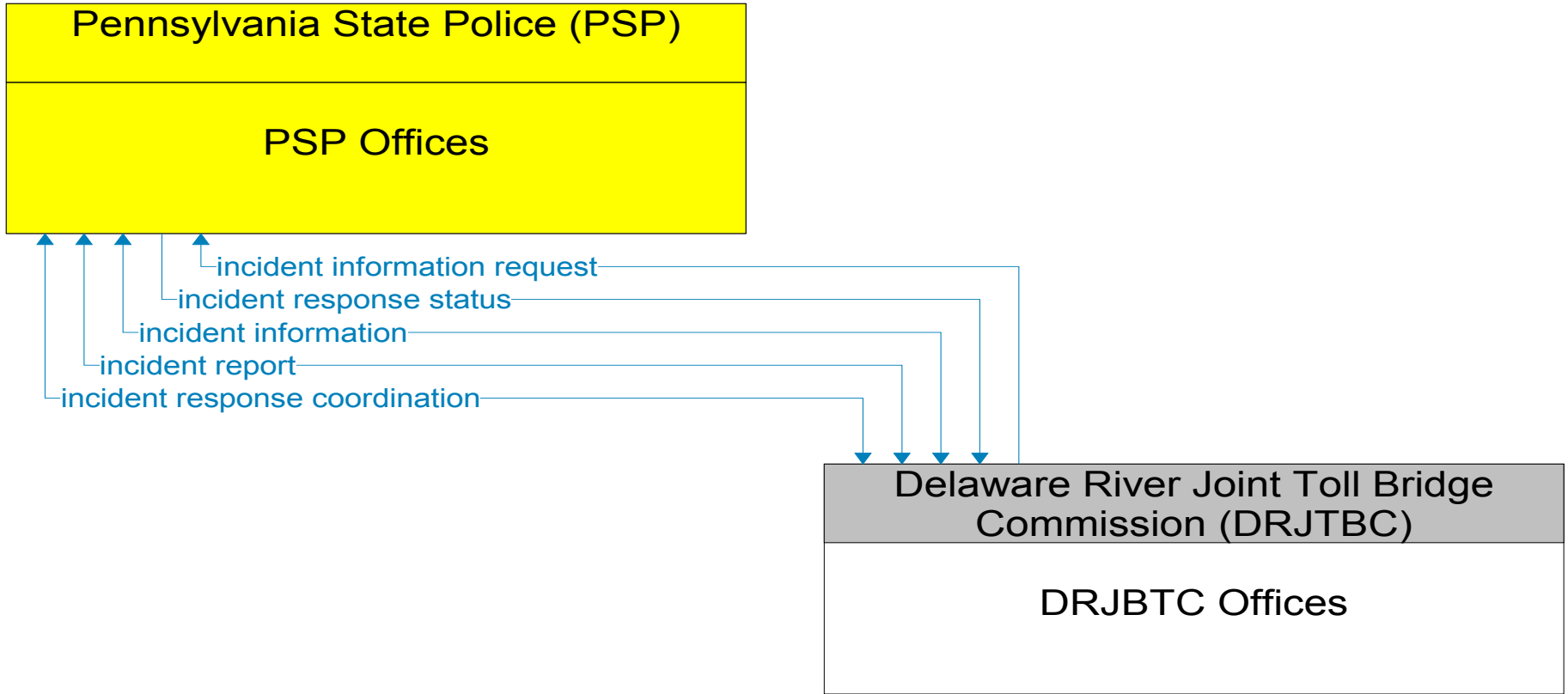
PSP Offices

Existing
Planned

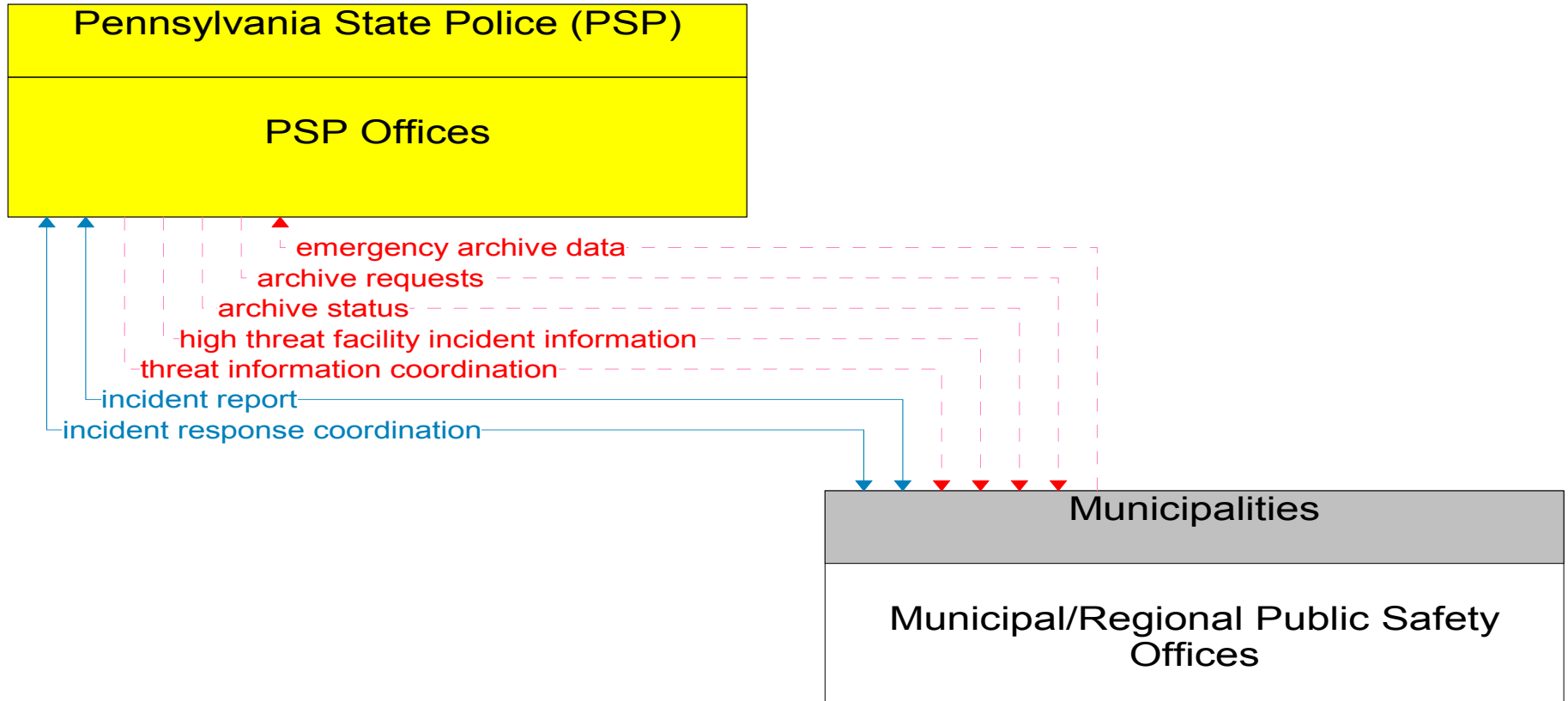


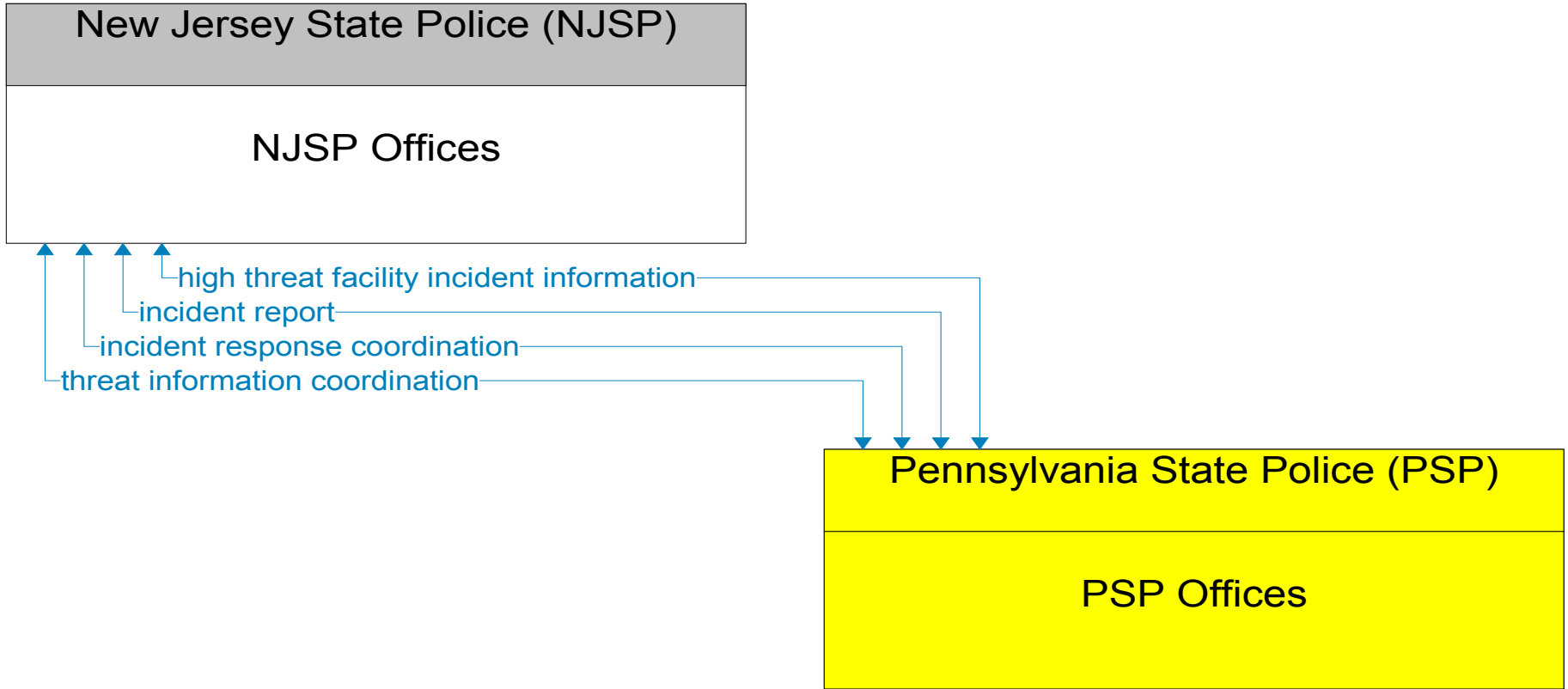
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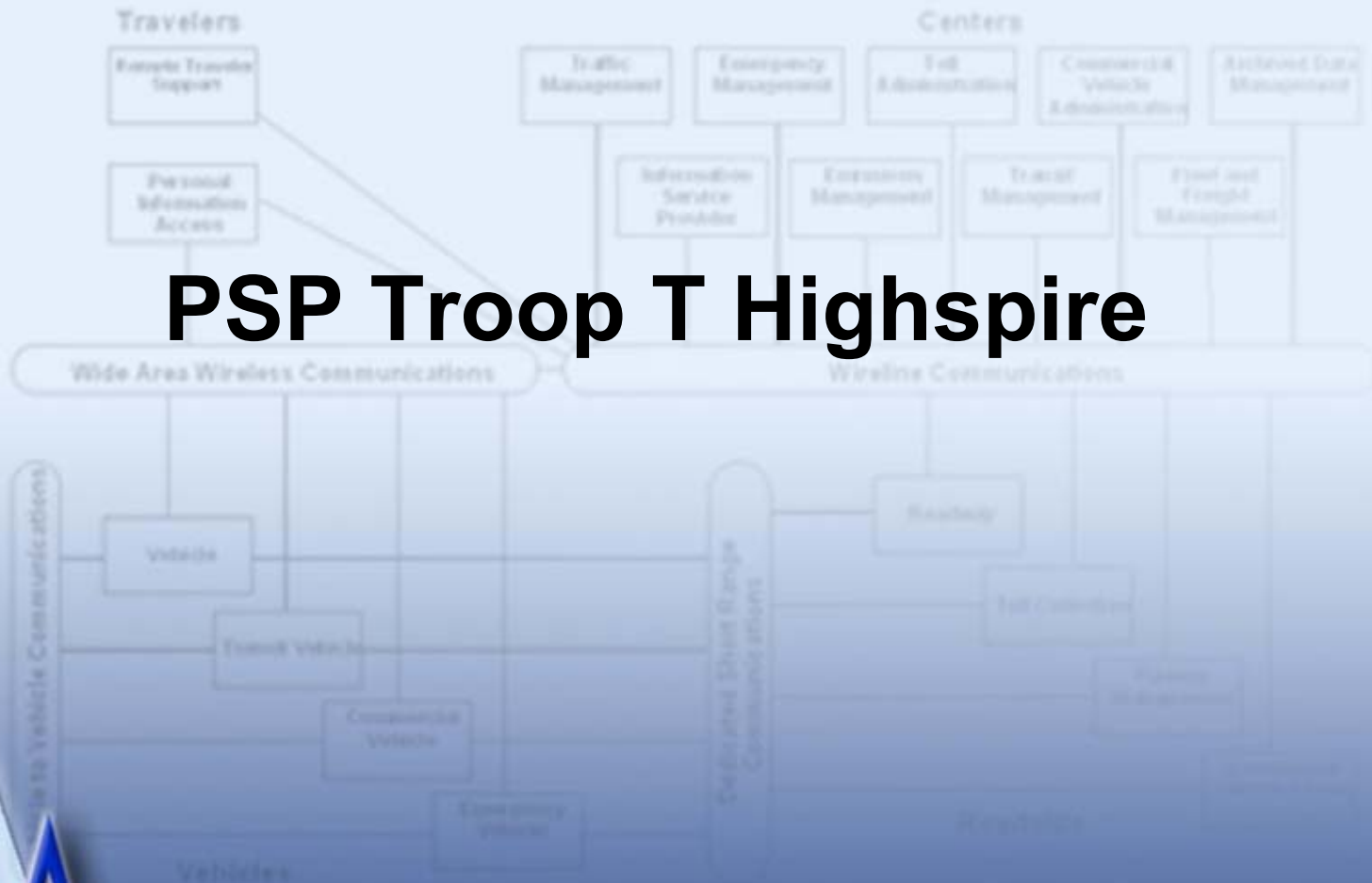
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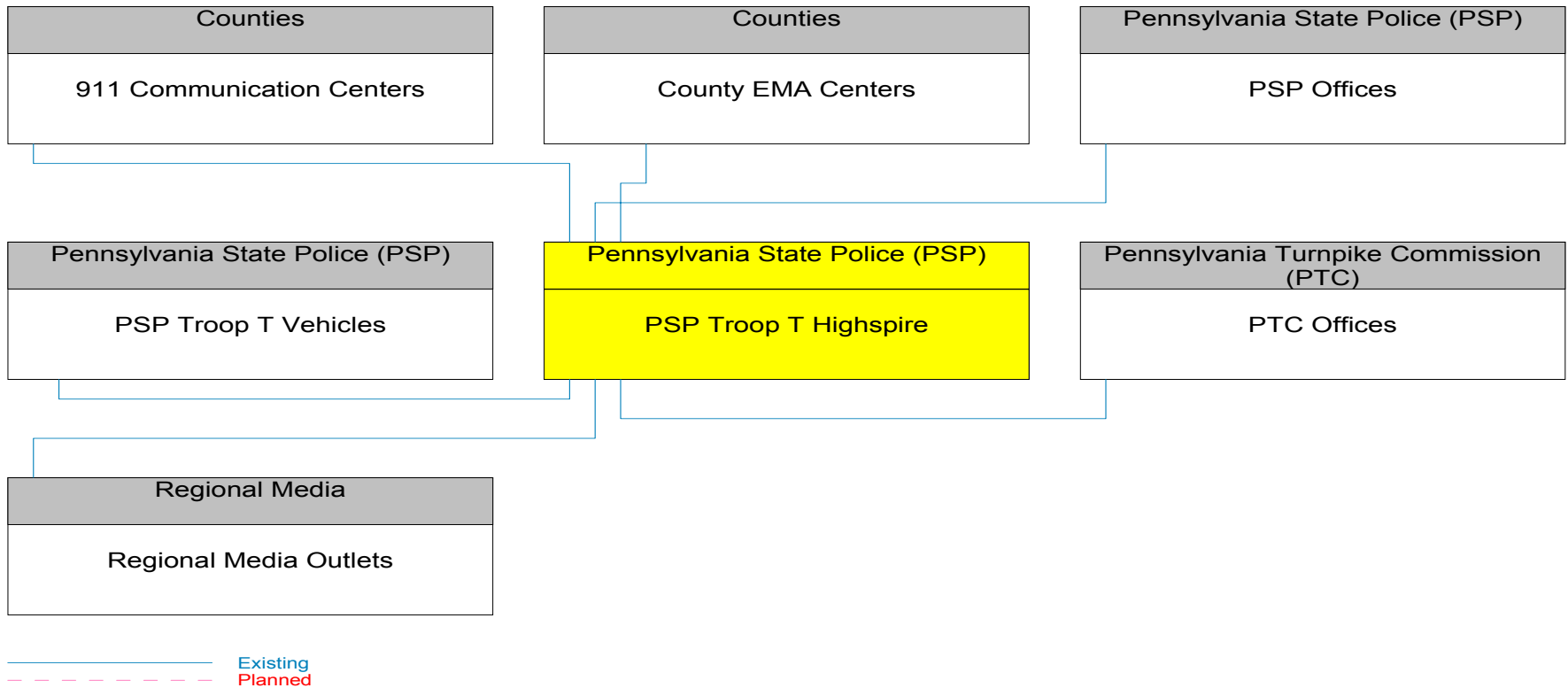
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PSP Troop T Highspire



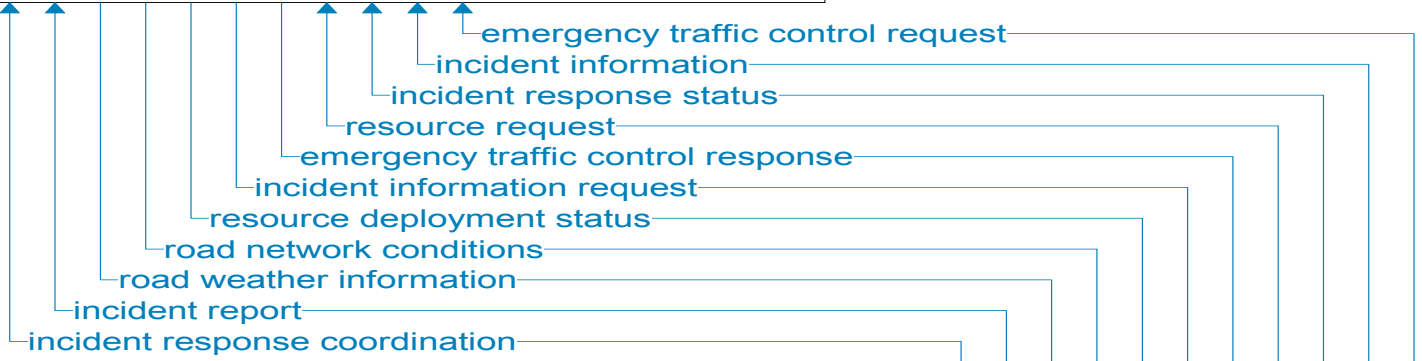
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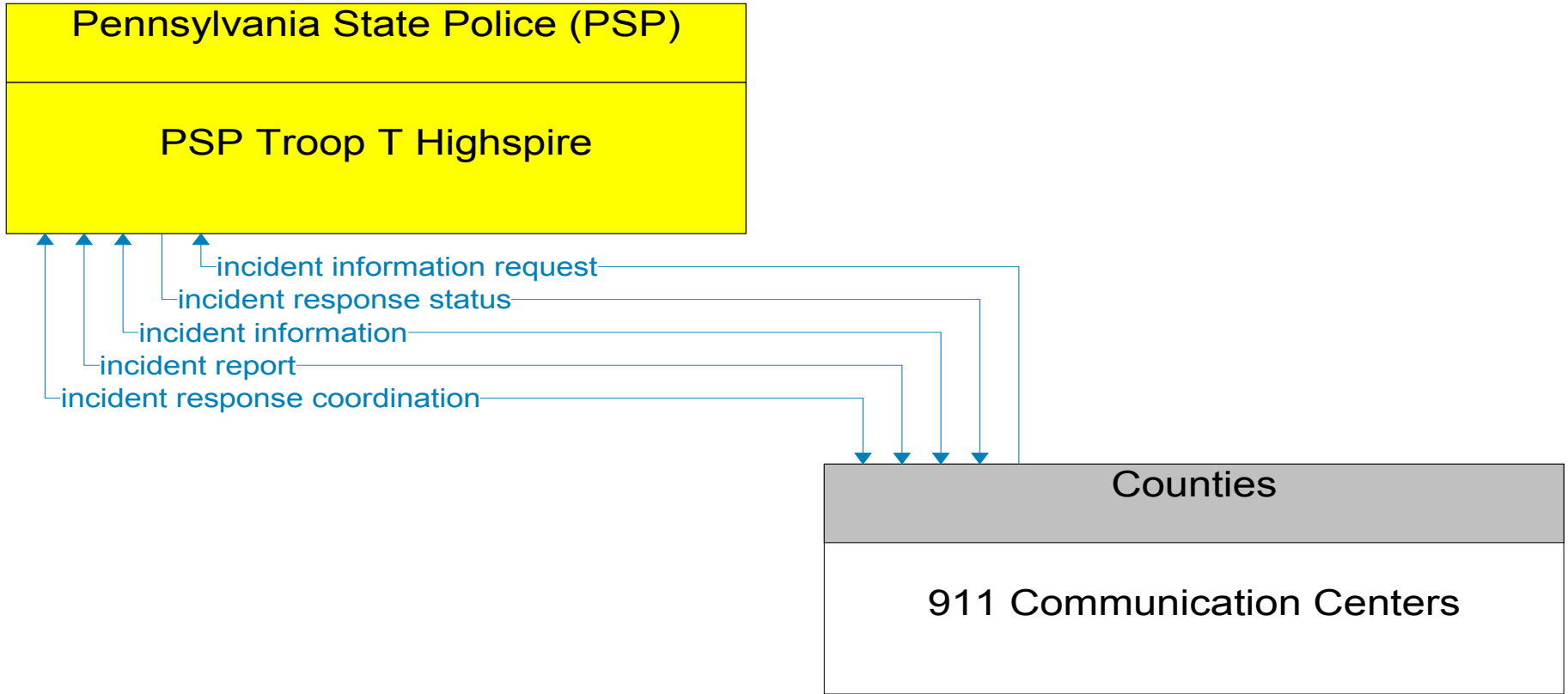
PSP Troop T Highspire Interconnect Diagram



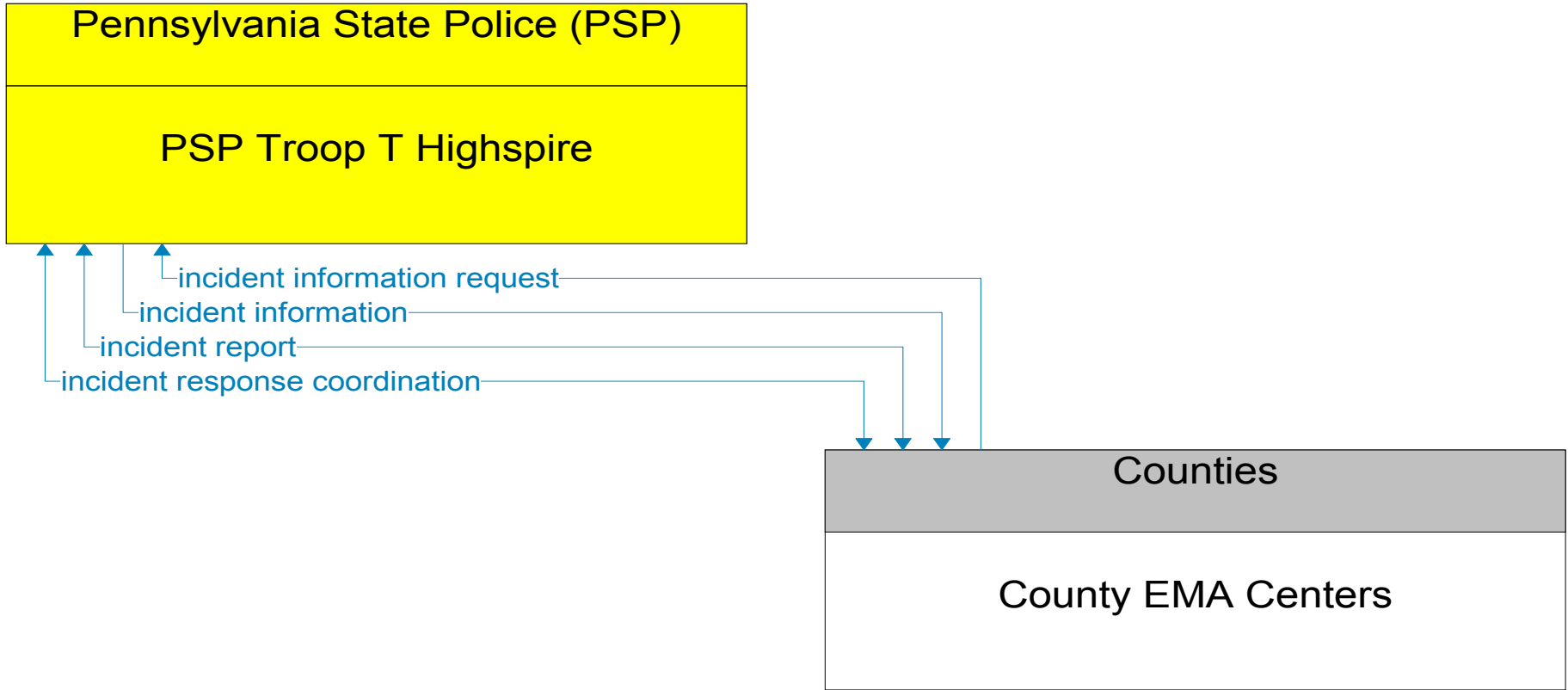
Pennsylvania Turnpike Commission (PTC)
PTC Offices

Pennsylvania State Police (PSP)
PSP Troop T Highspire

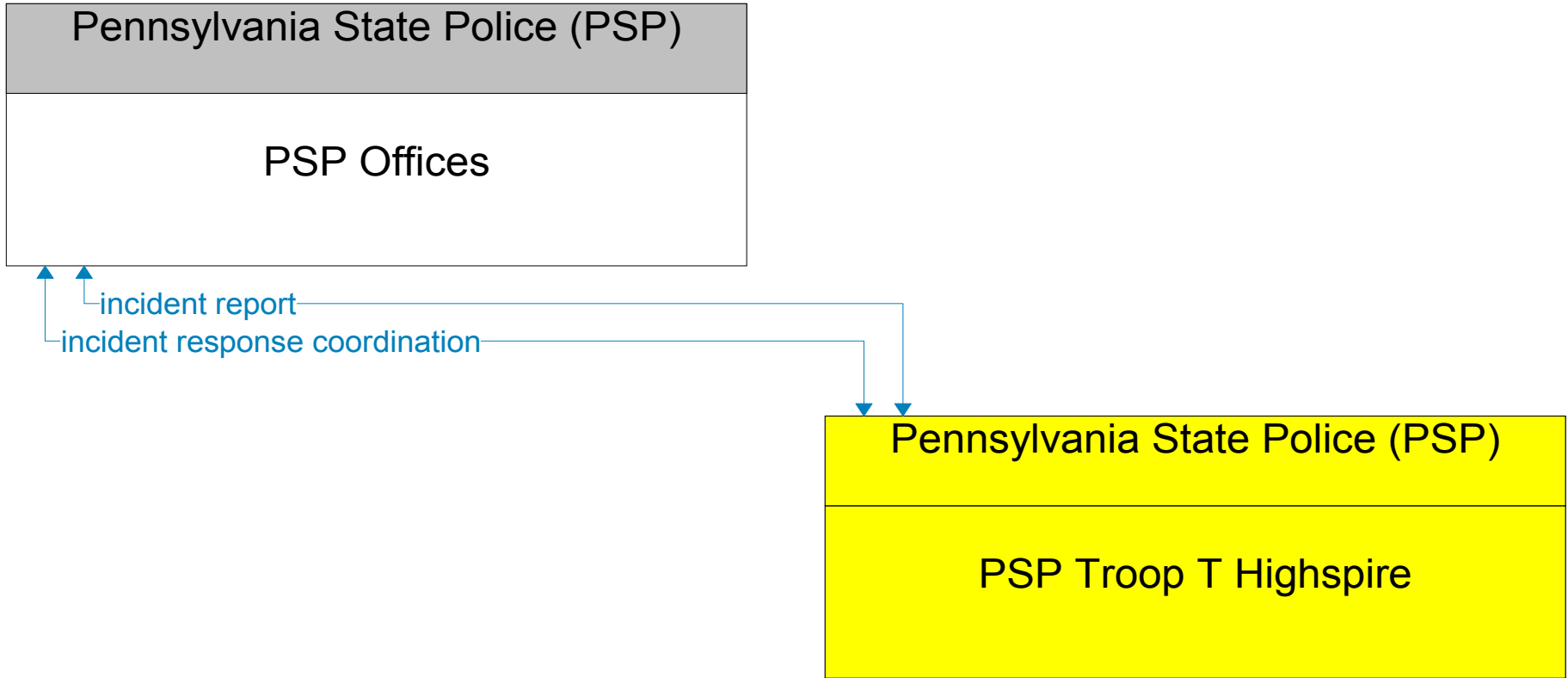




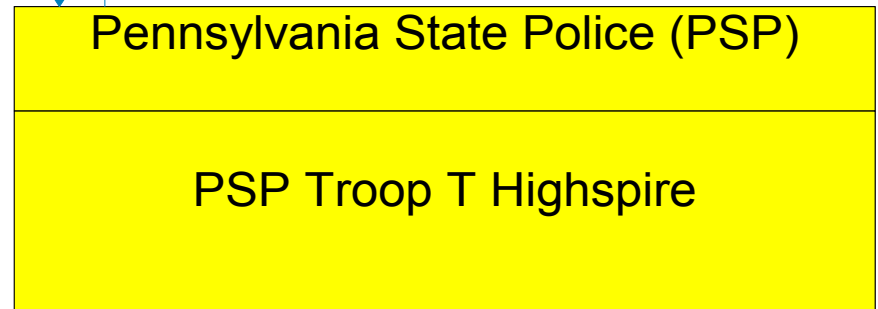
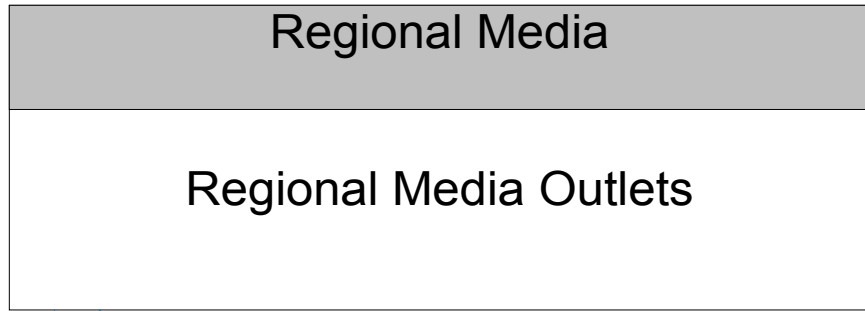
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- - - - - Planned



Existing
Planned



———— Existing
- - - - - Planned

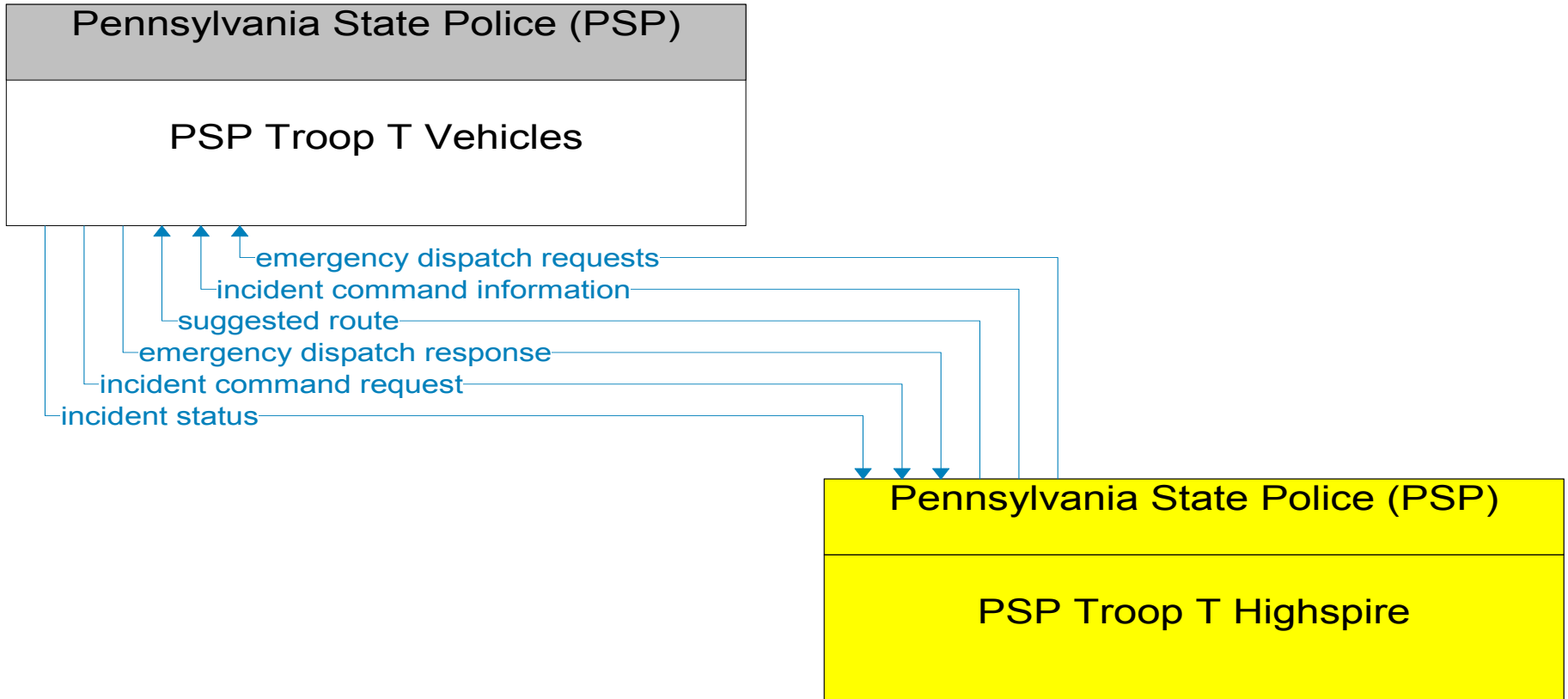


incident information for media

media information request

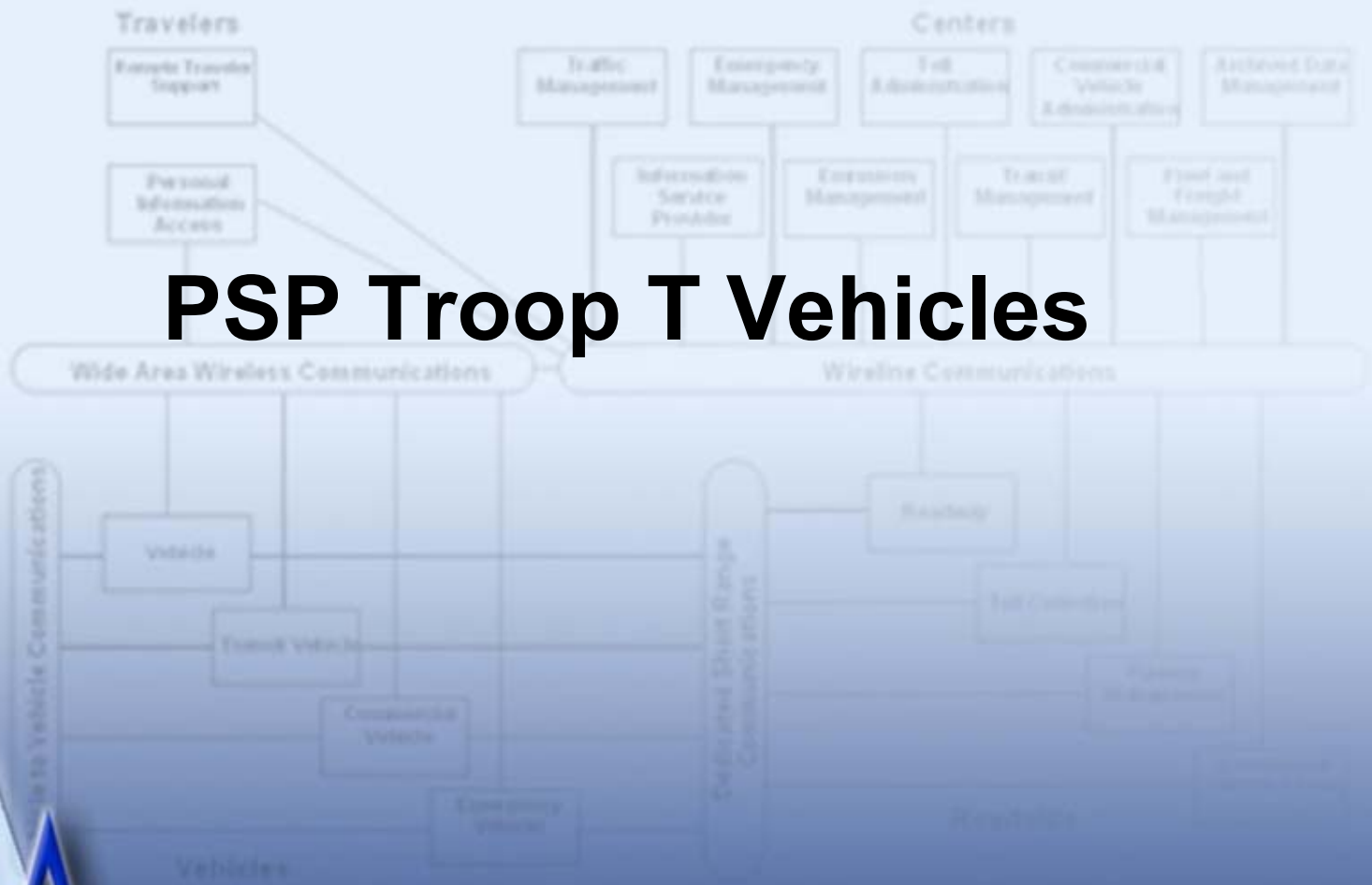
Existing

Planned

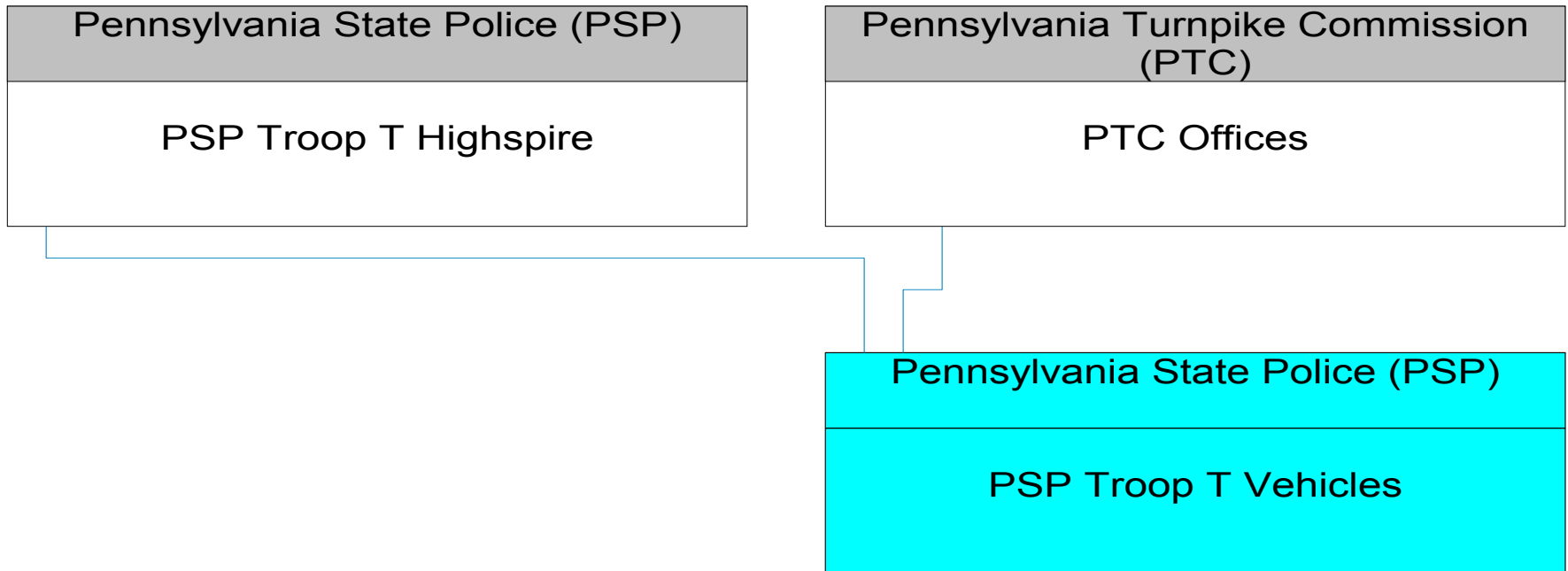


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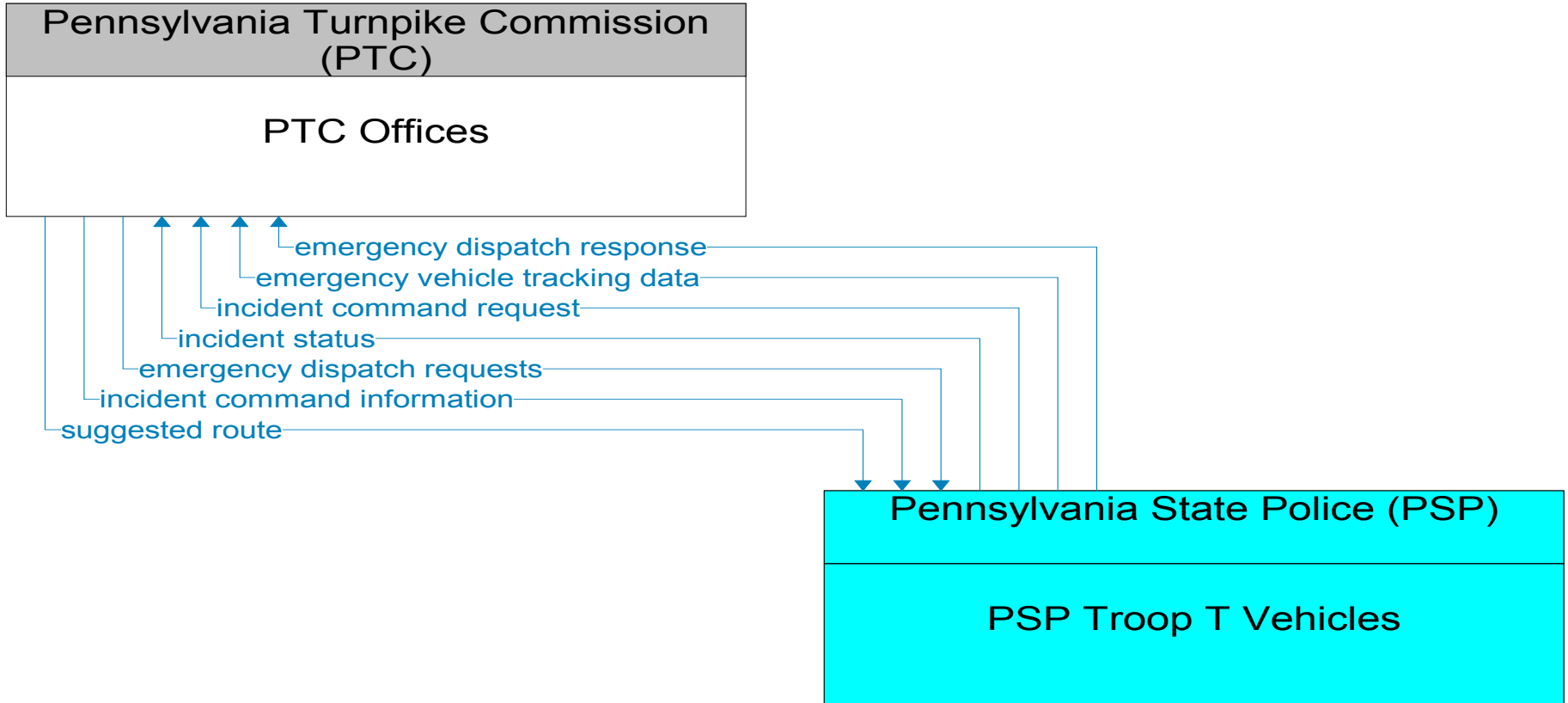
PSP Troop T Vehicles



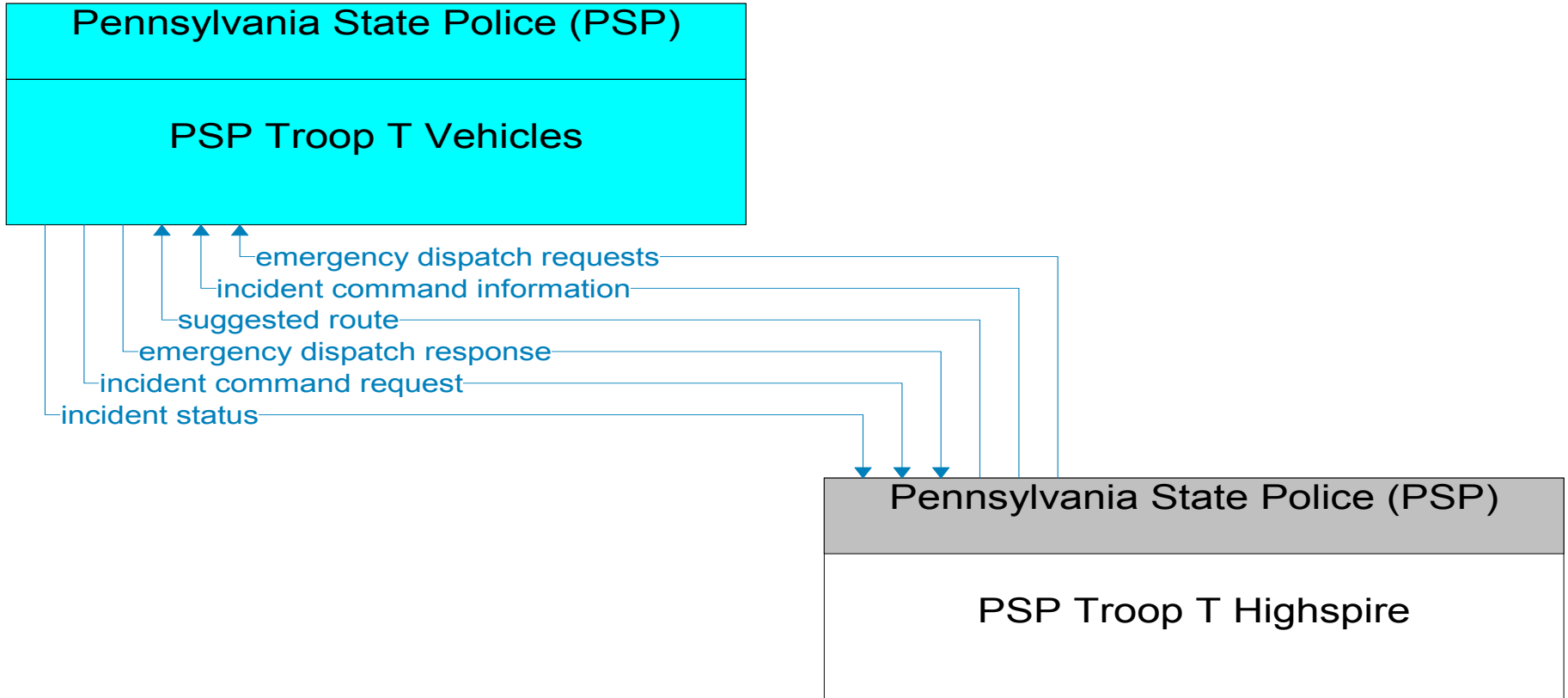
PSP Troop T Vehicles Interconnect Diagram



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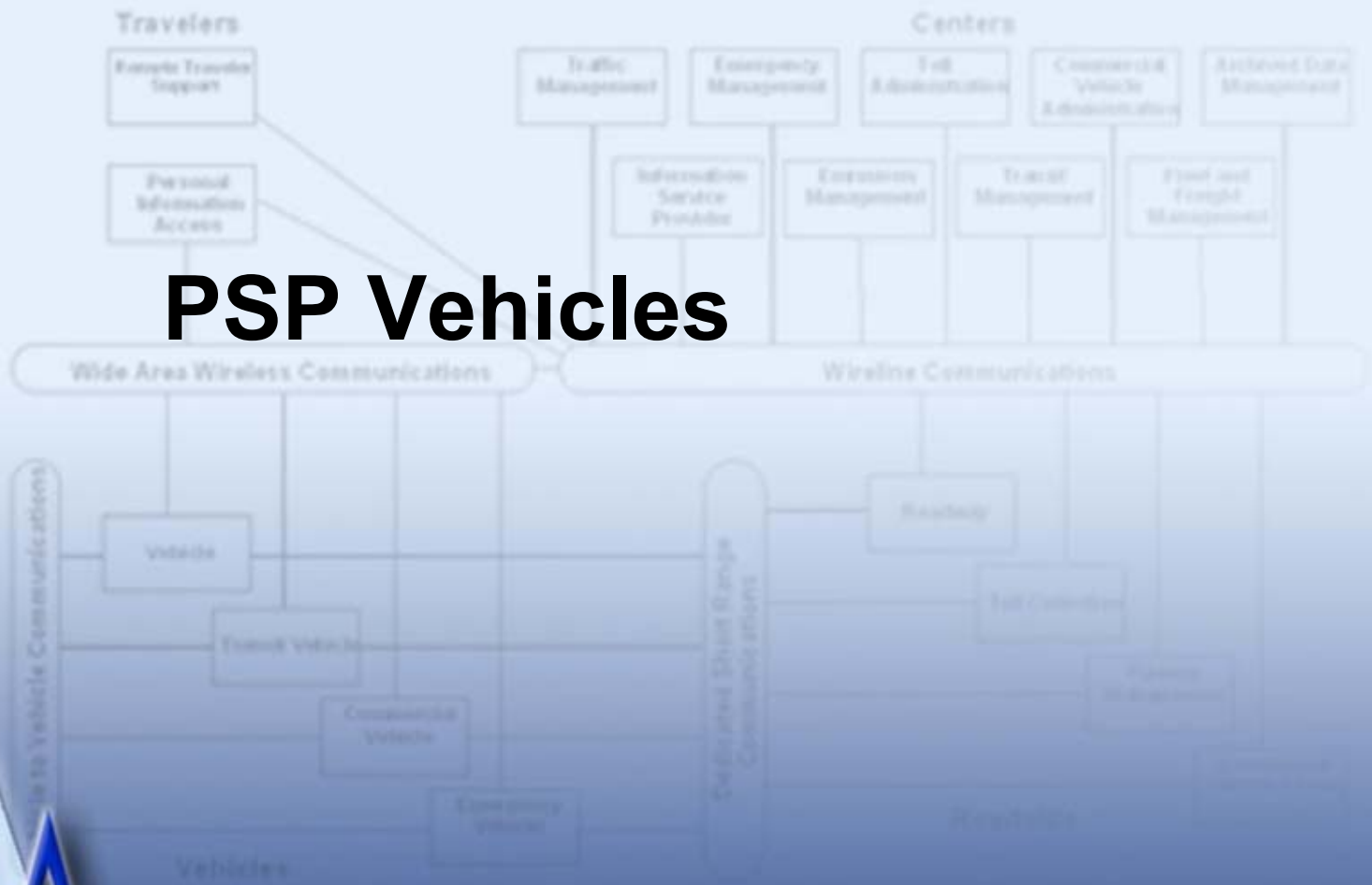


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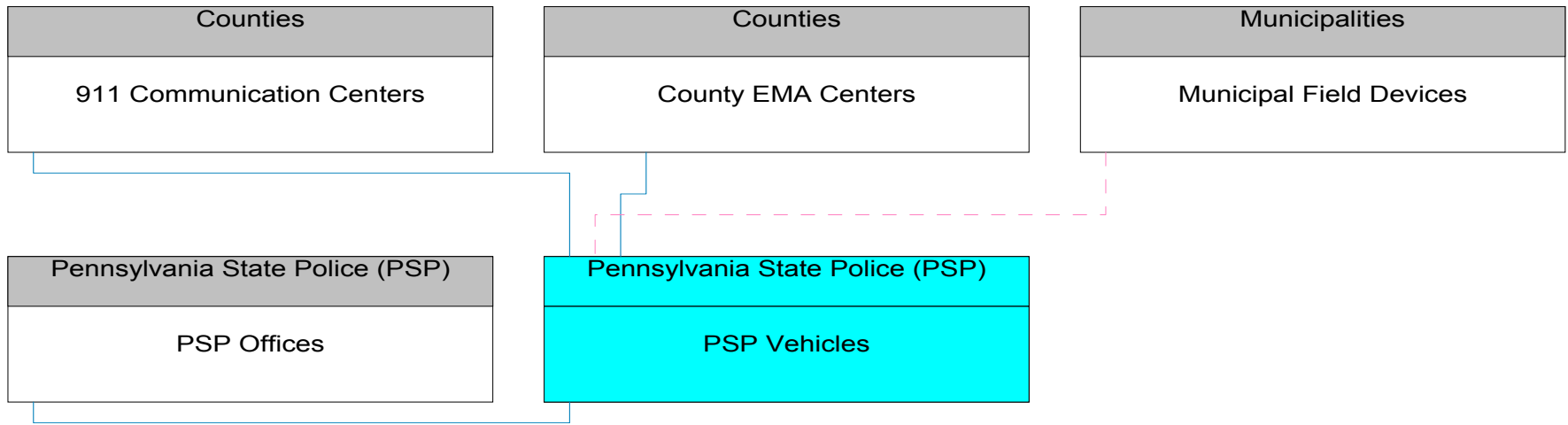
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PSP Vehicles

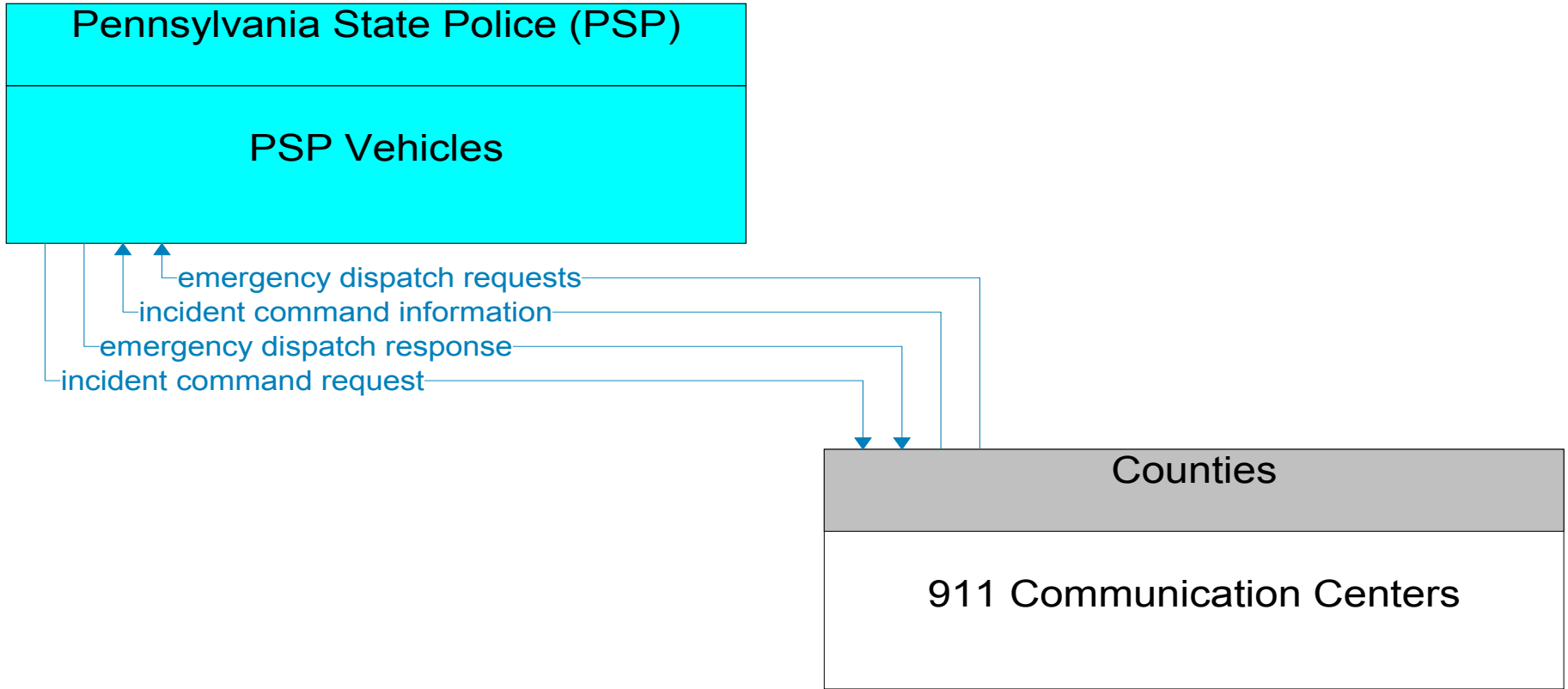


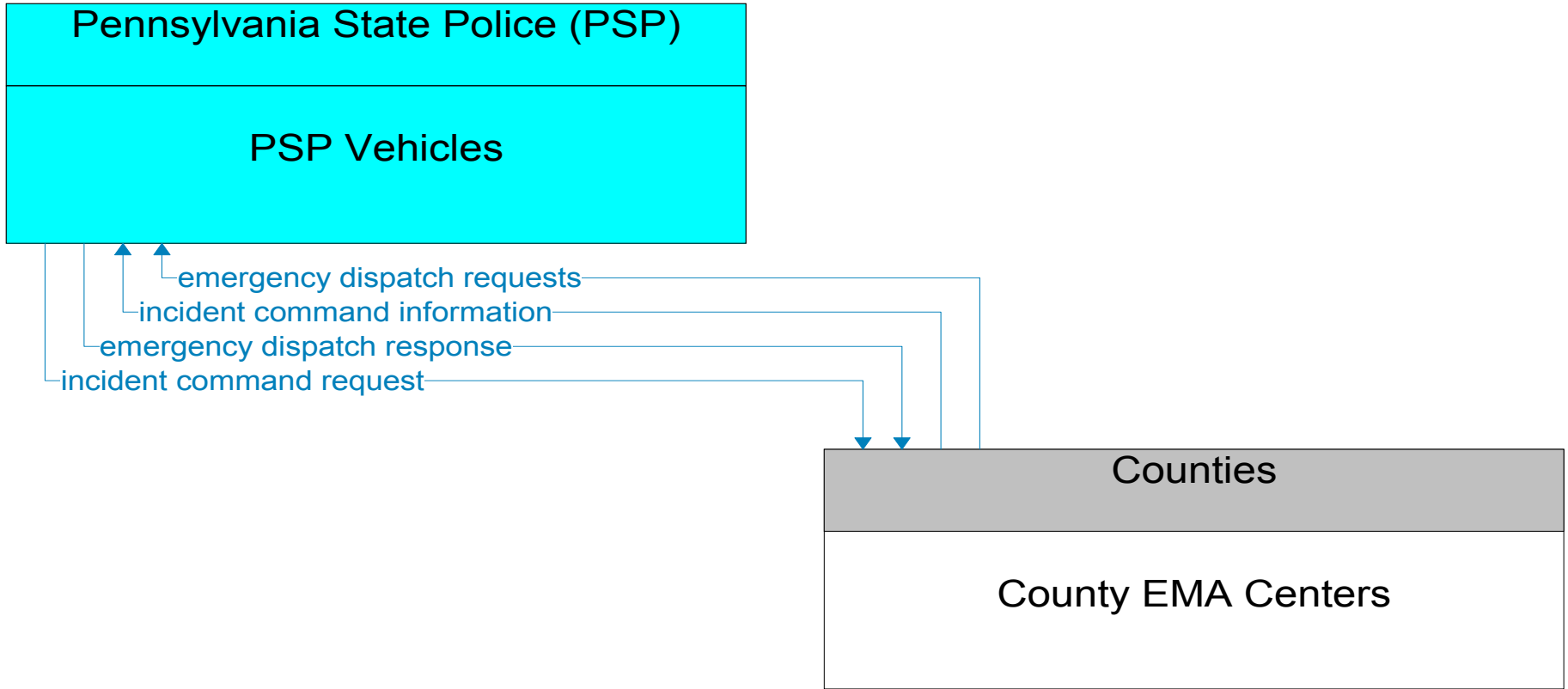
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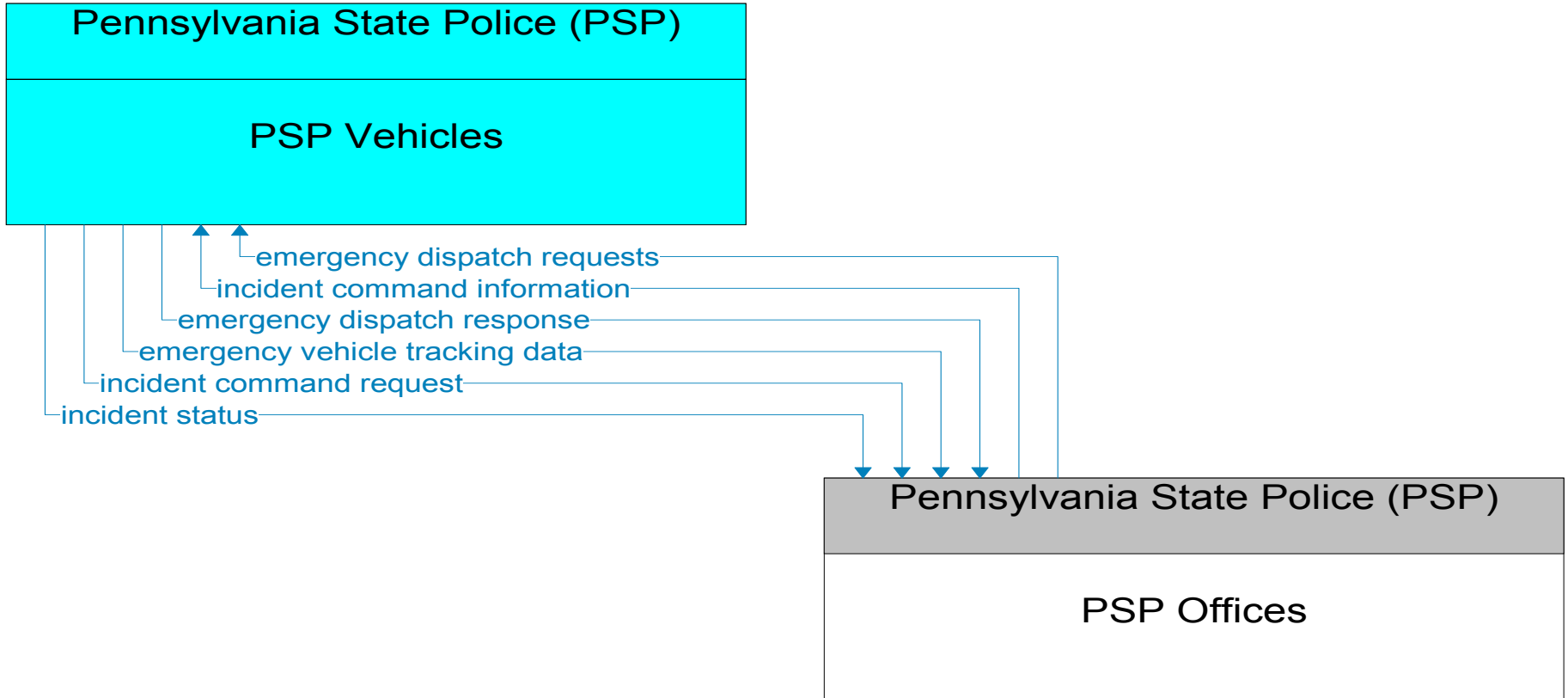
PSP Vehicles Interconnect Diagram



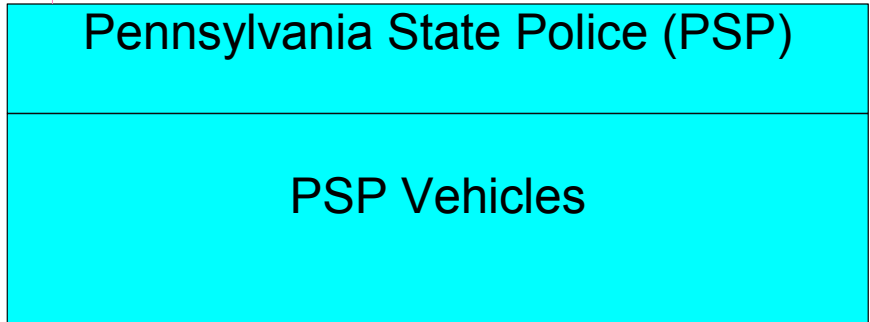
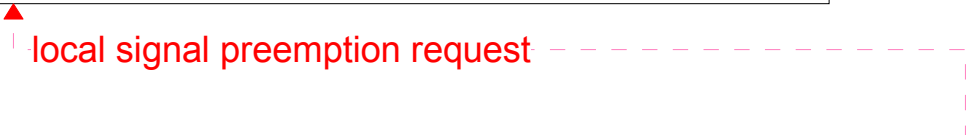
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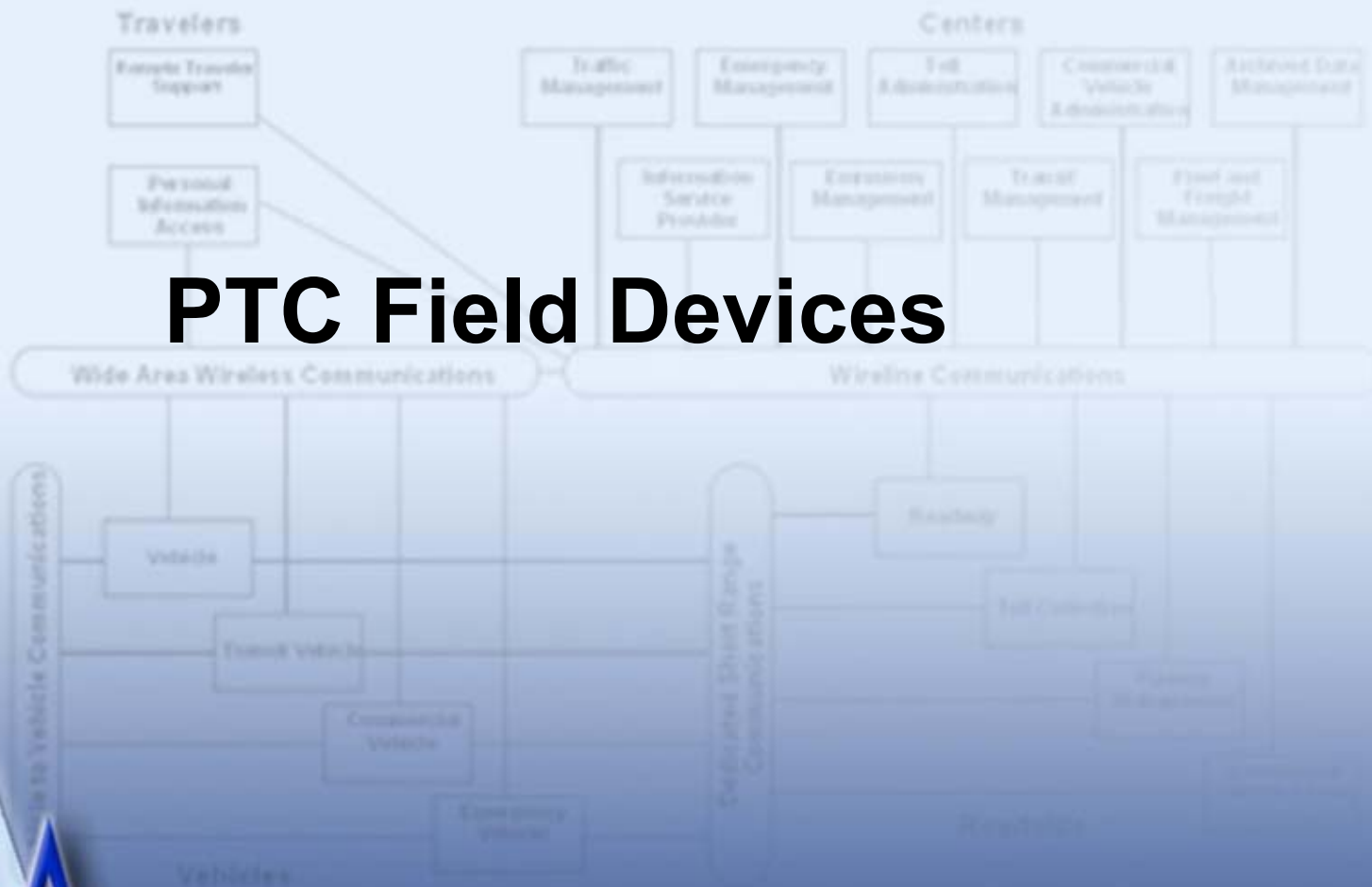




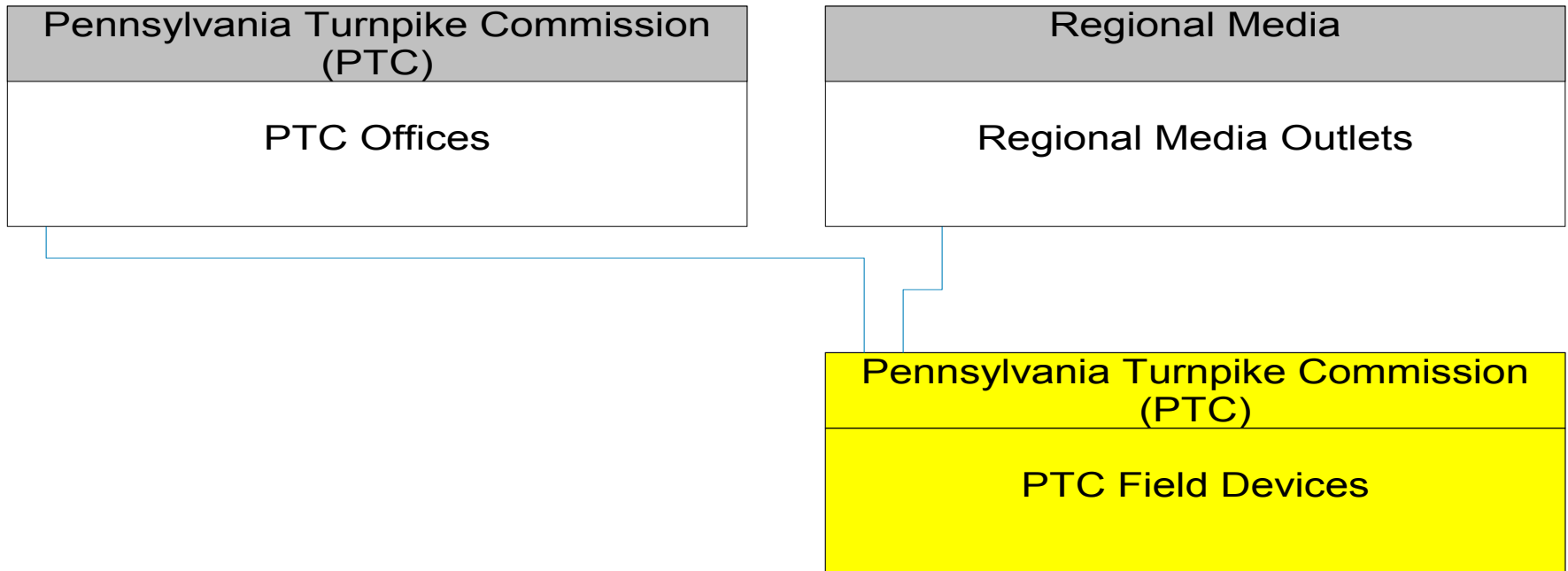
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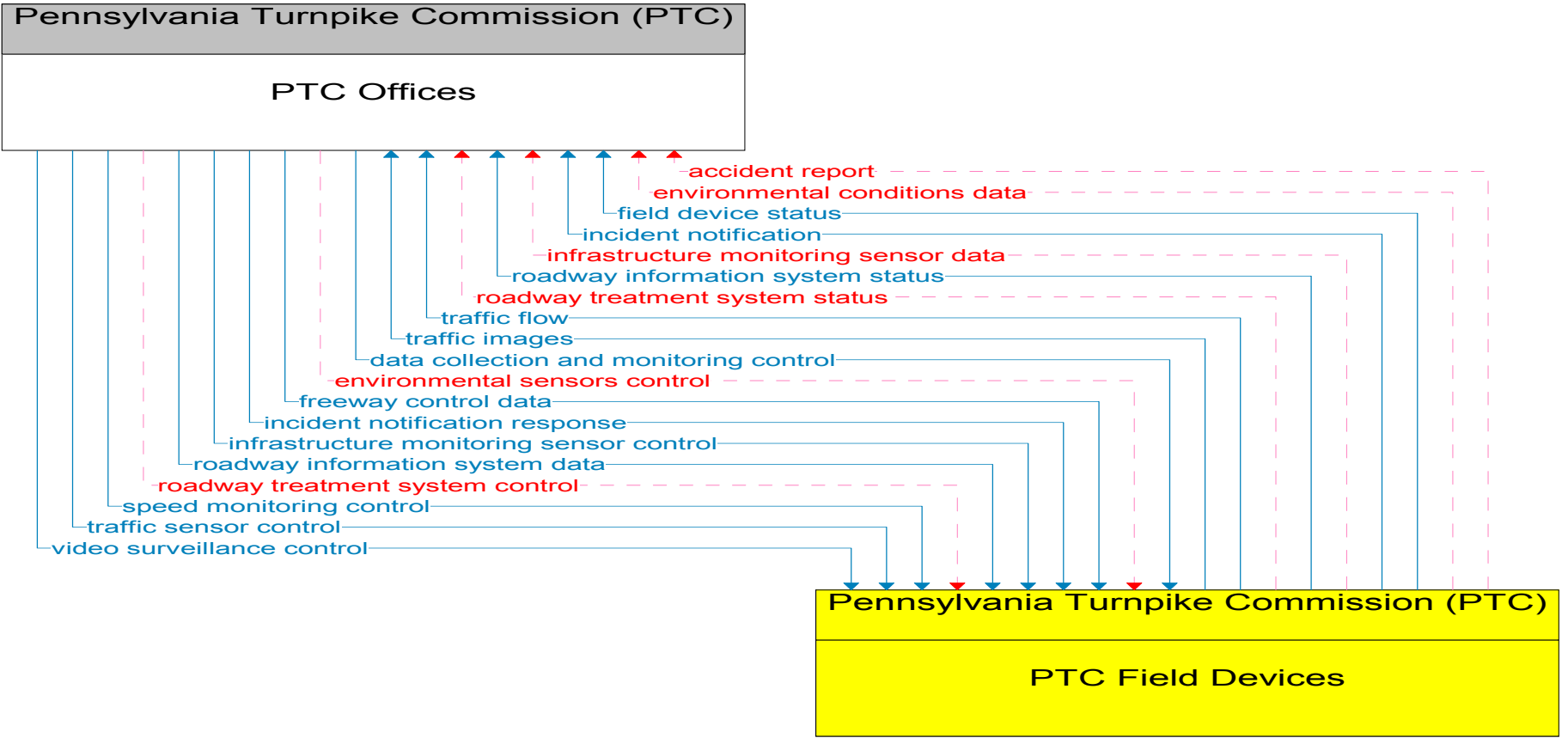
PTC Field Devices



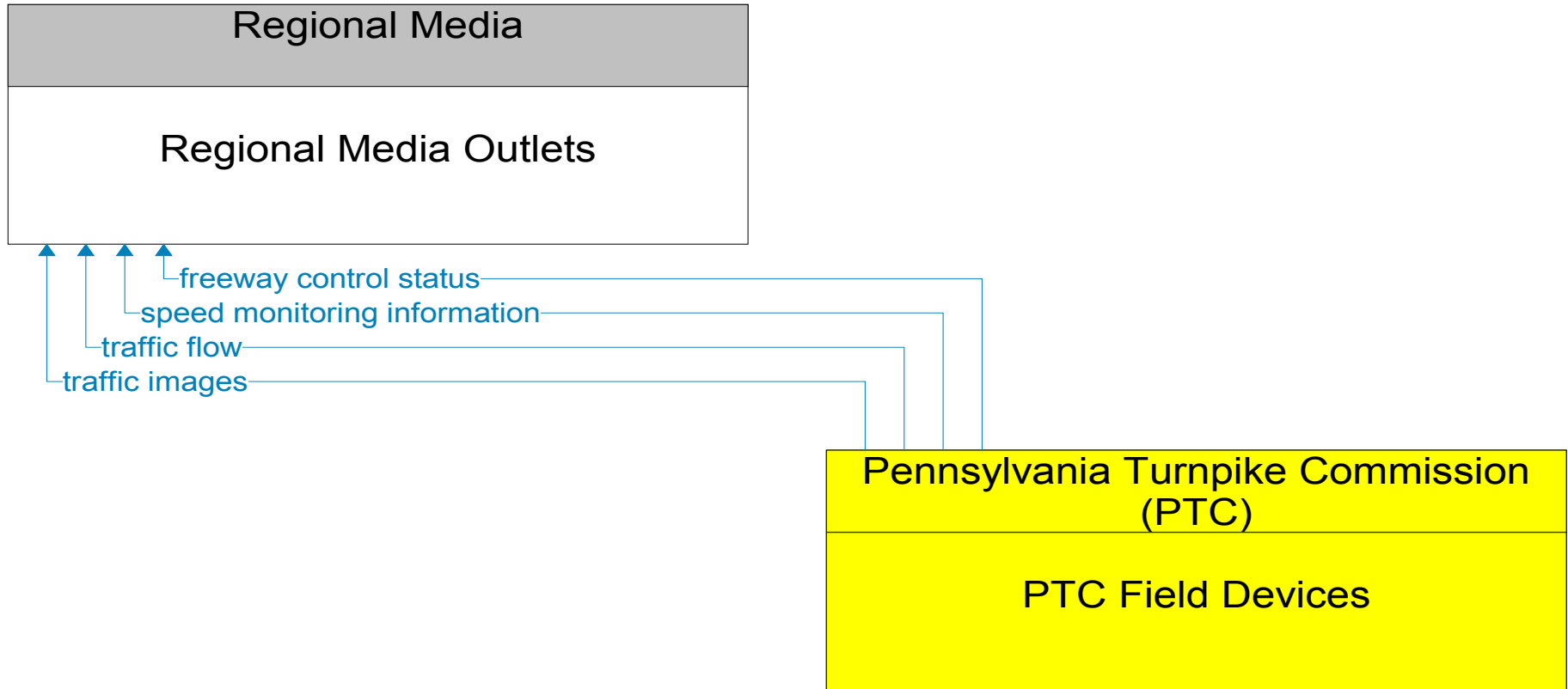
PTC Field Devices Interconnect Diagram



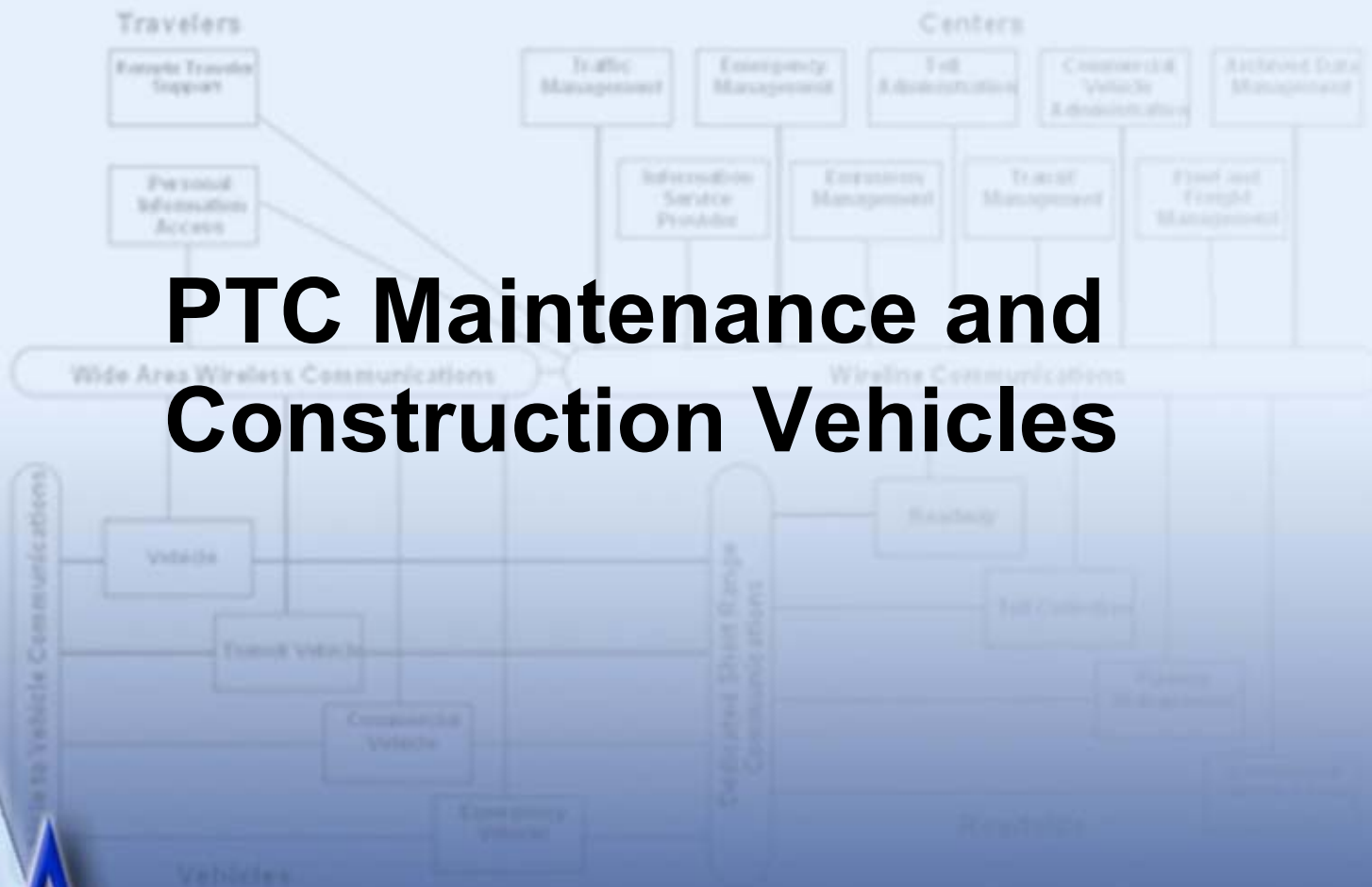
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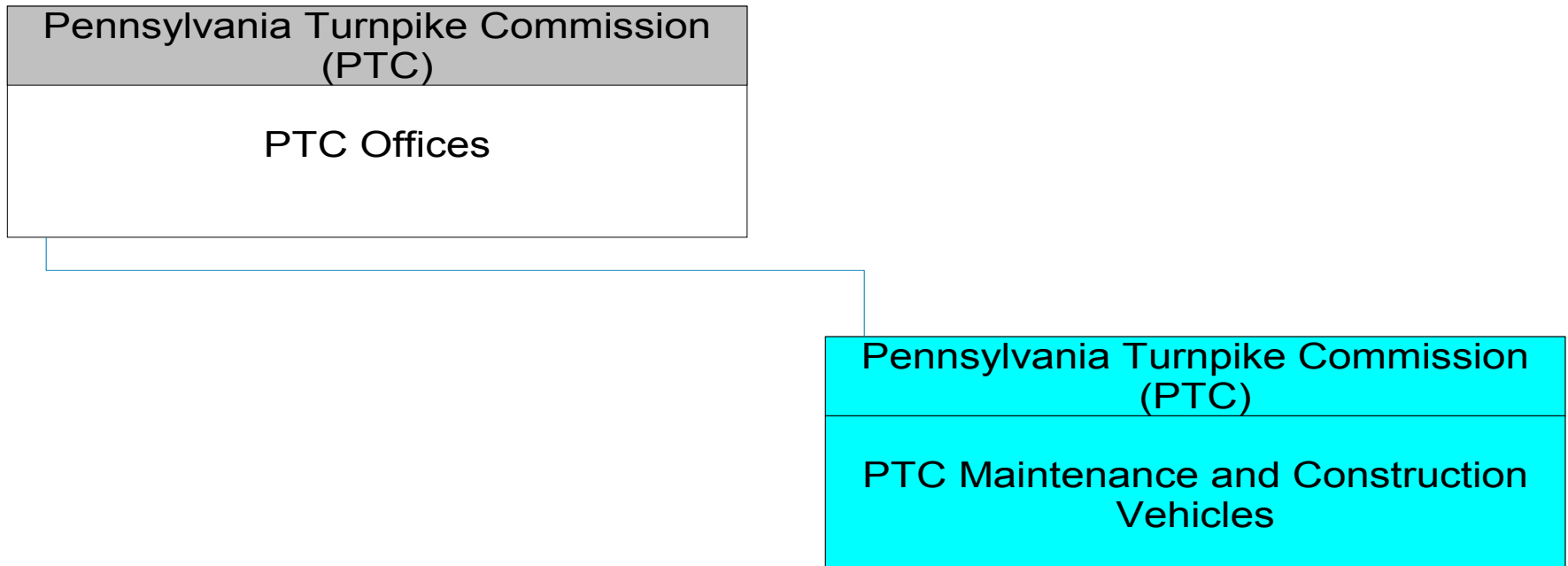
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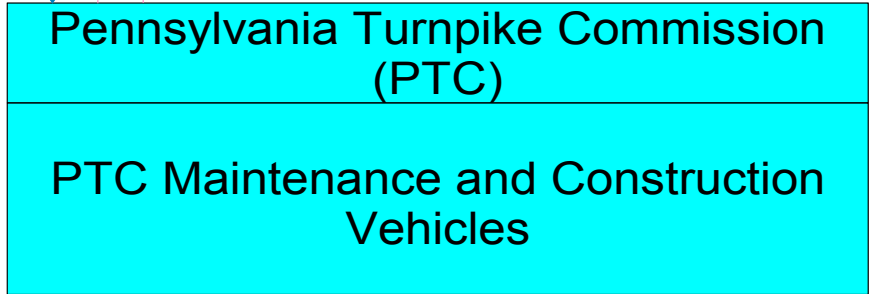
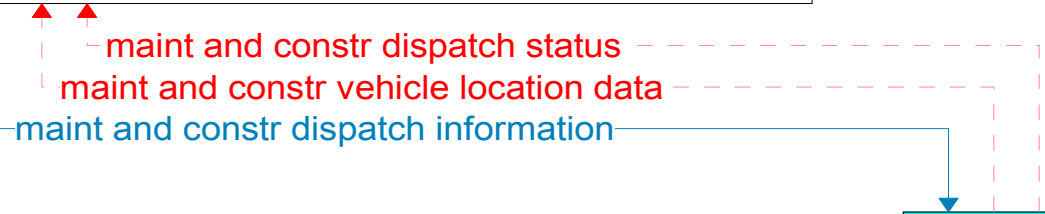
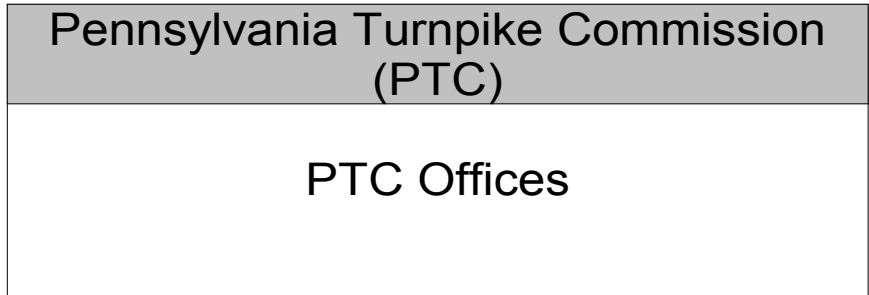
PTC Maintenance and Construction Vehicles



PTC Maintenance and Construction Vehicles Interconnect Diagram

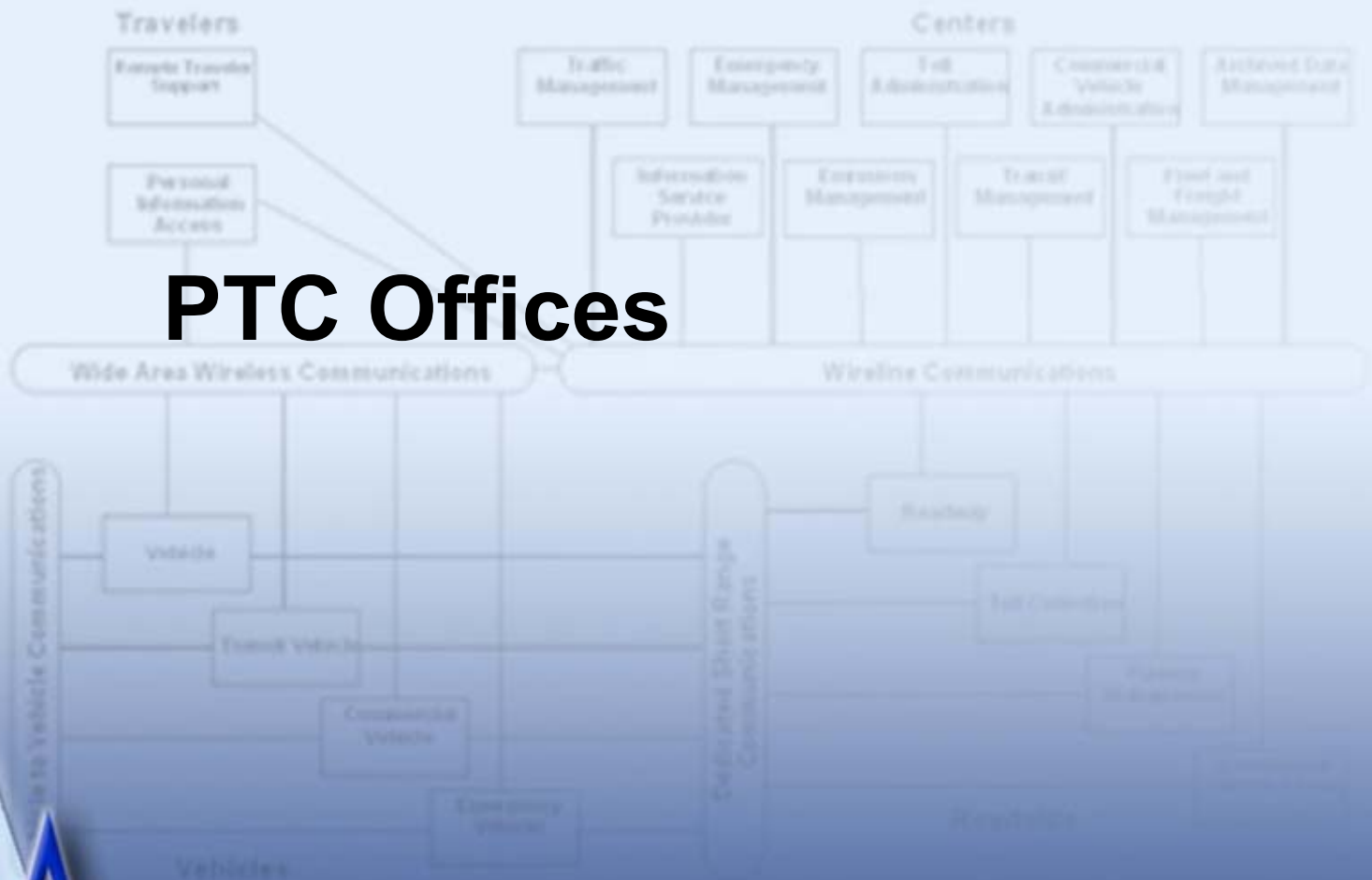


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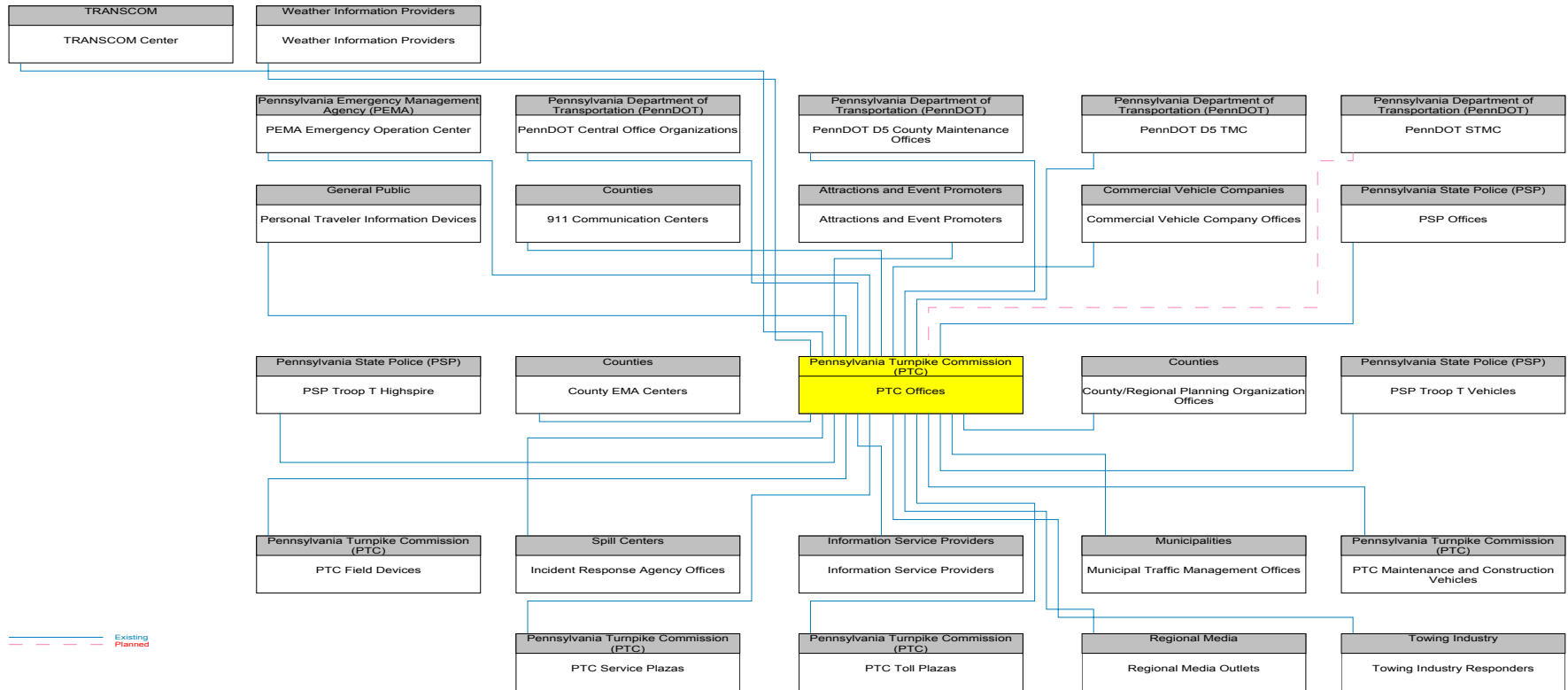
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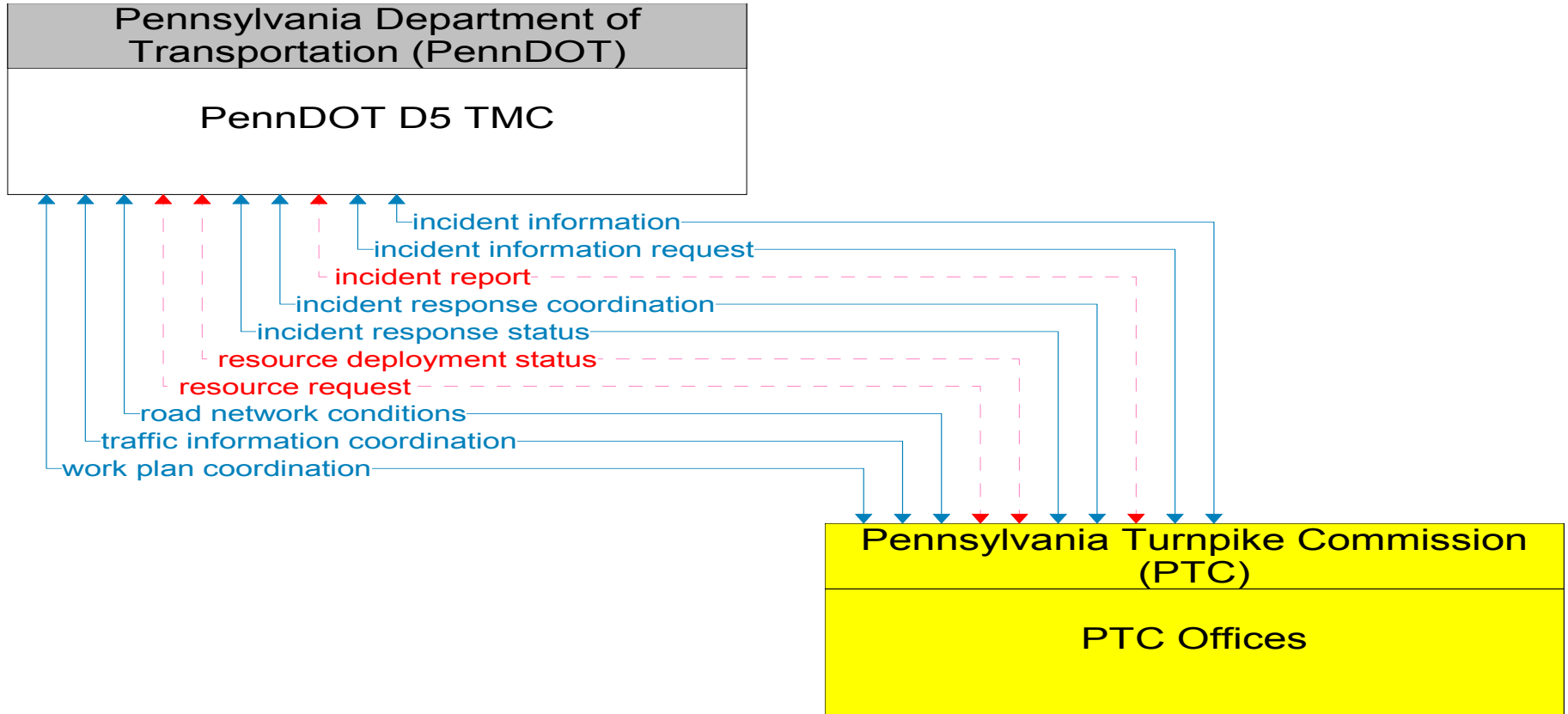
PTC Offices

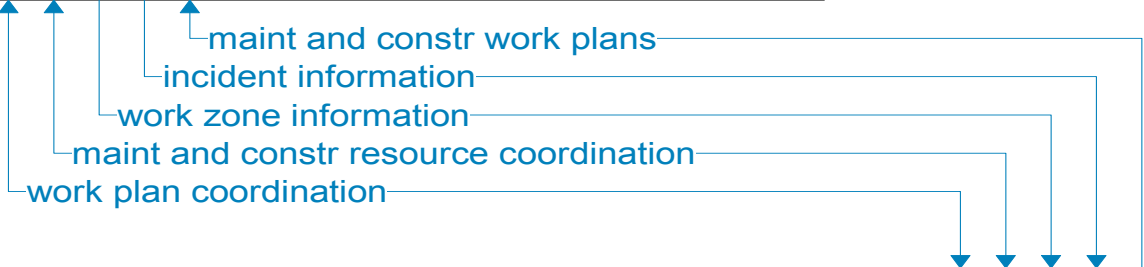
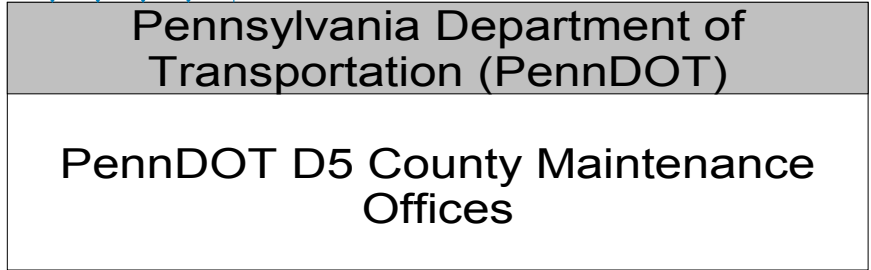
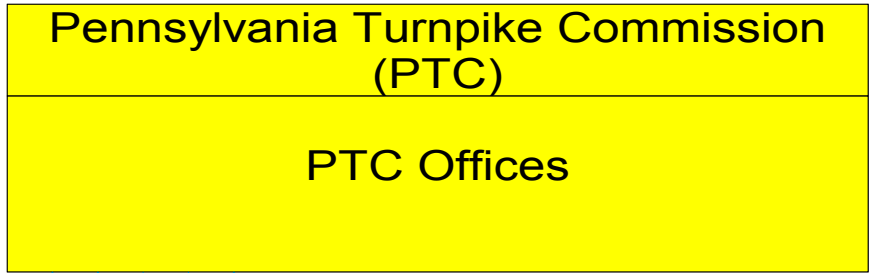


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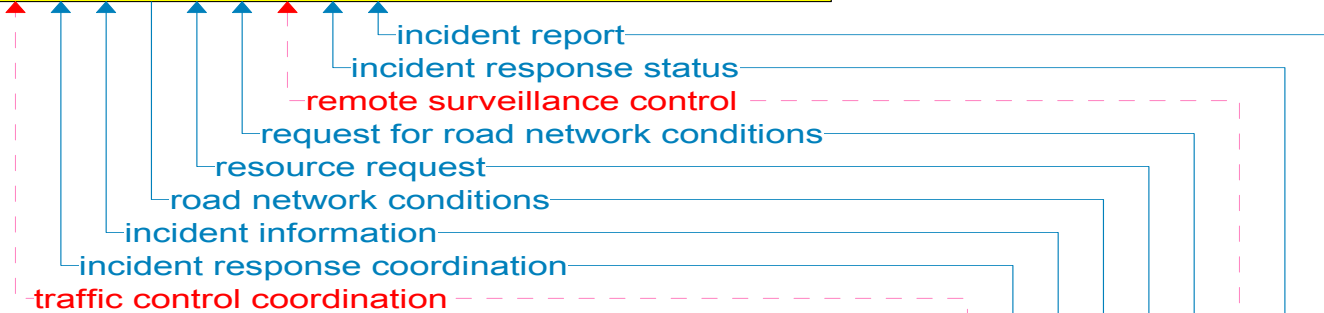
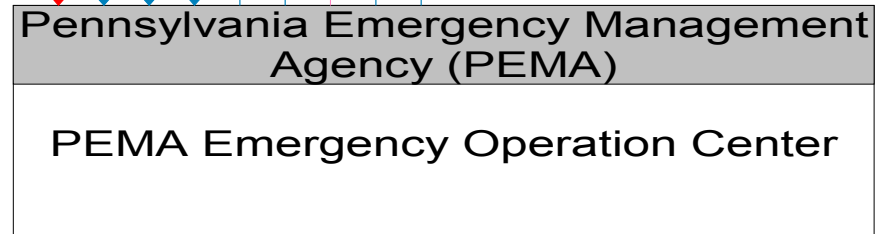
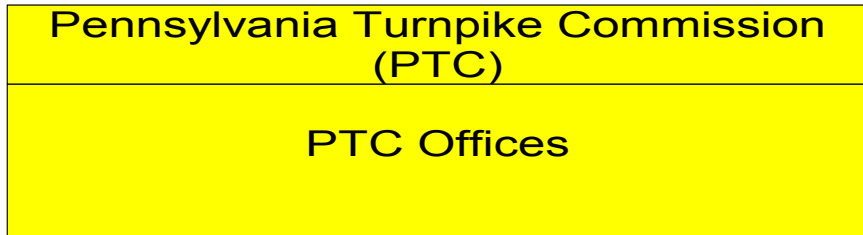
PTC Offices Interconnect Diagram



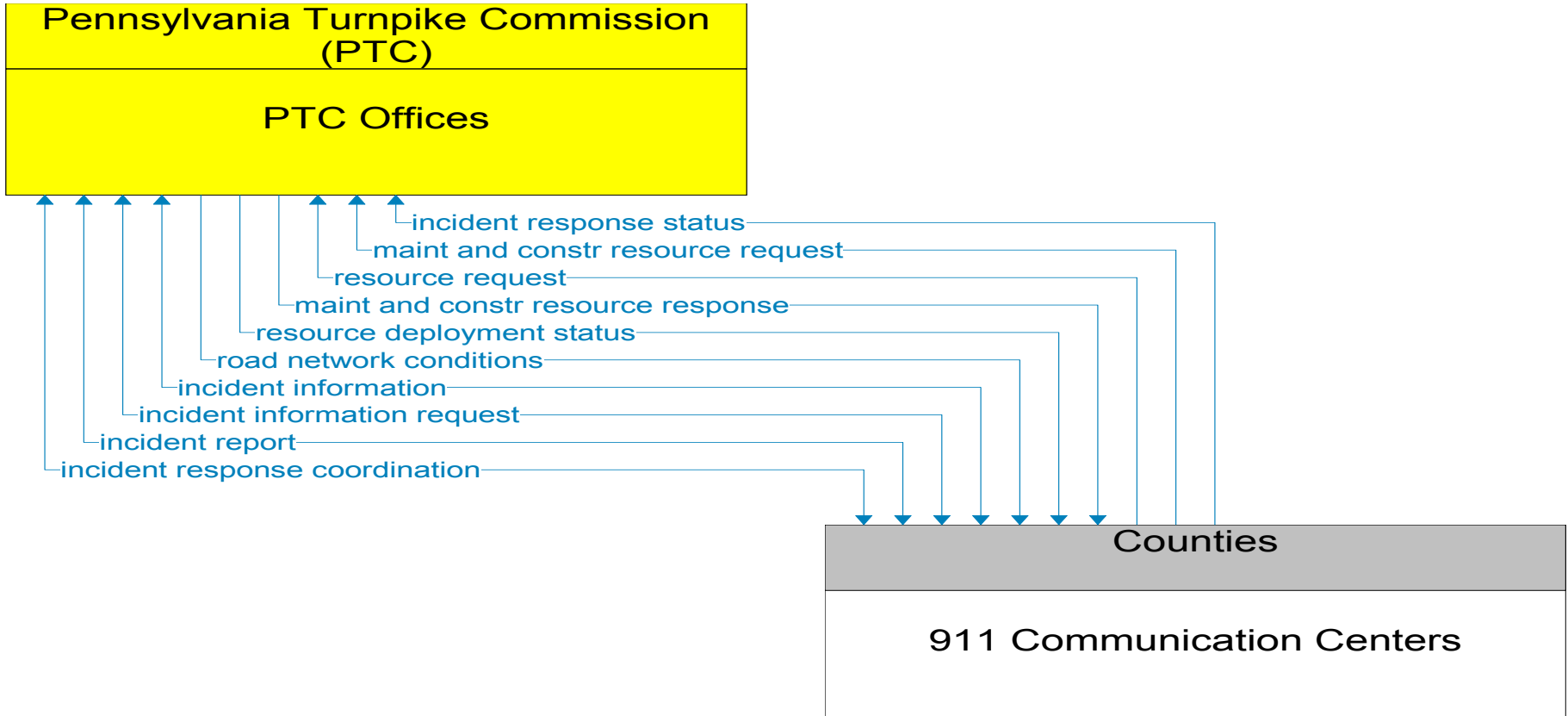




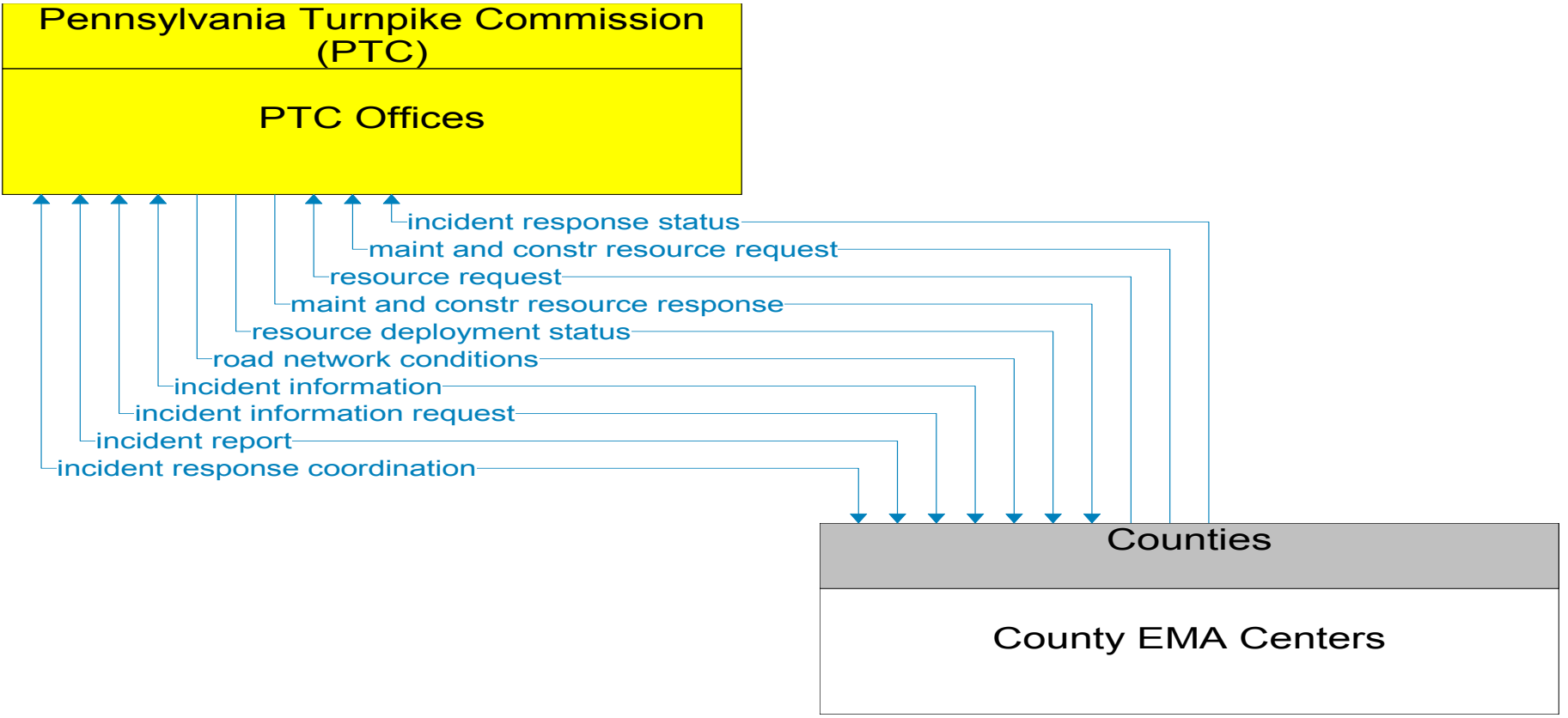
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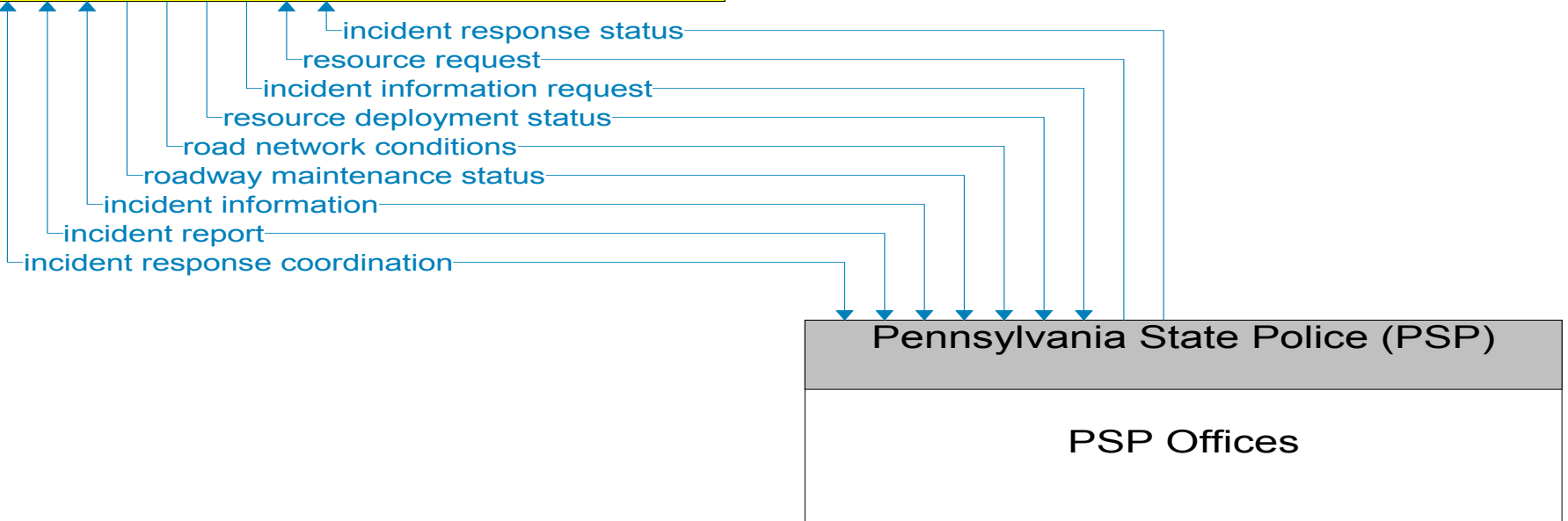
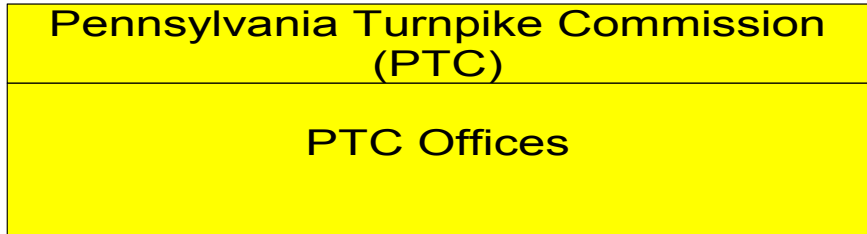
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Planned



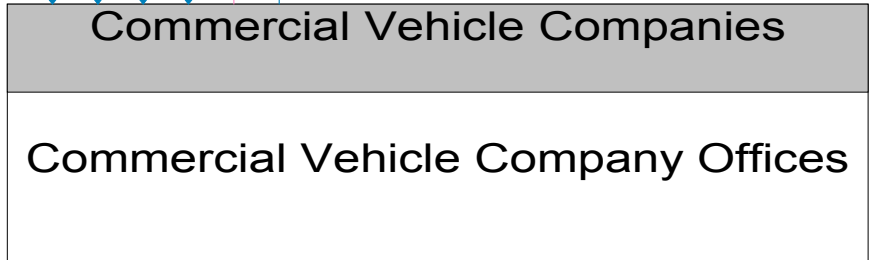
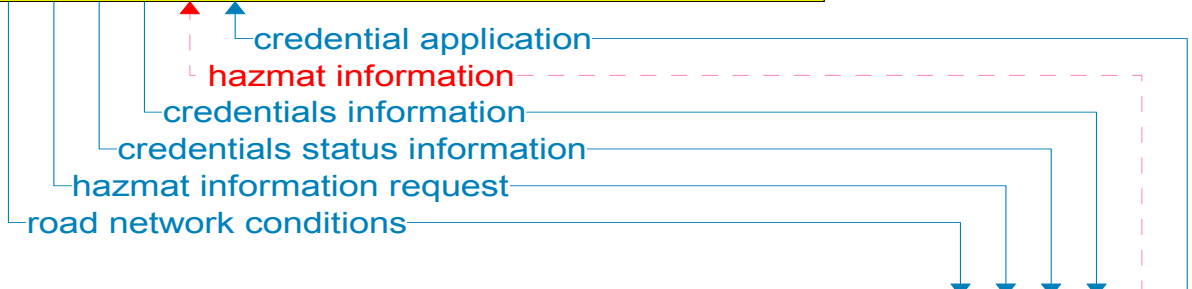
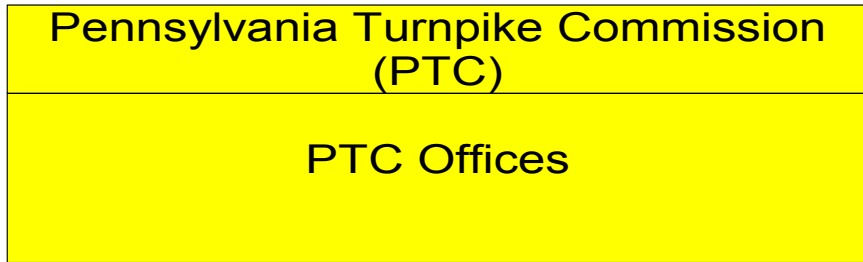
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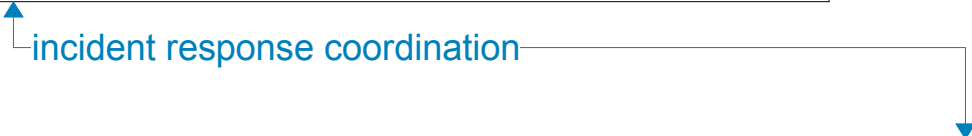
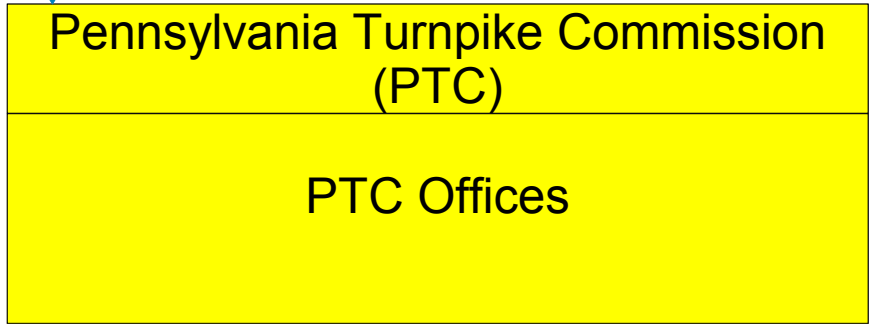
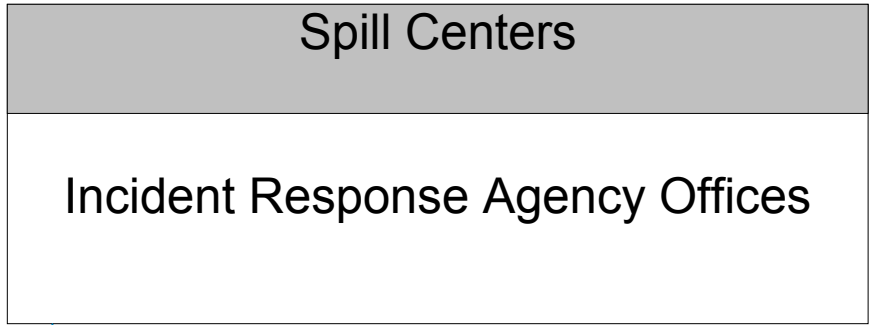
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Existing
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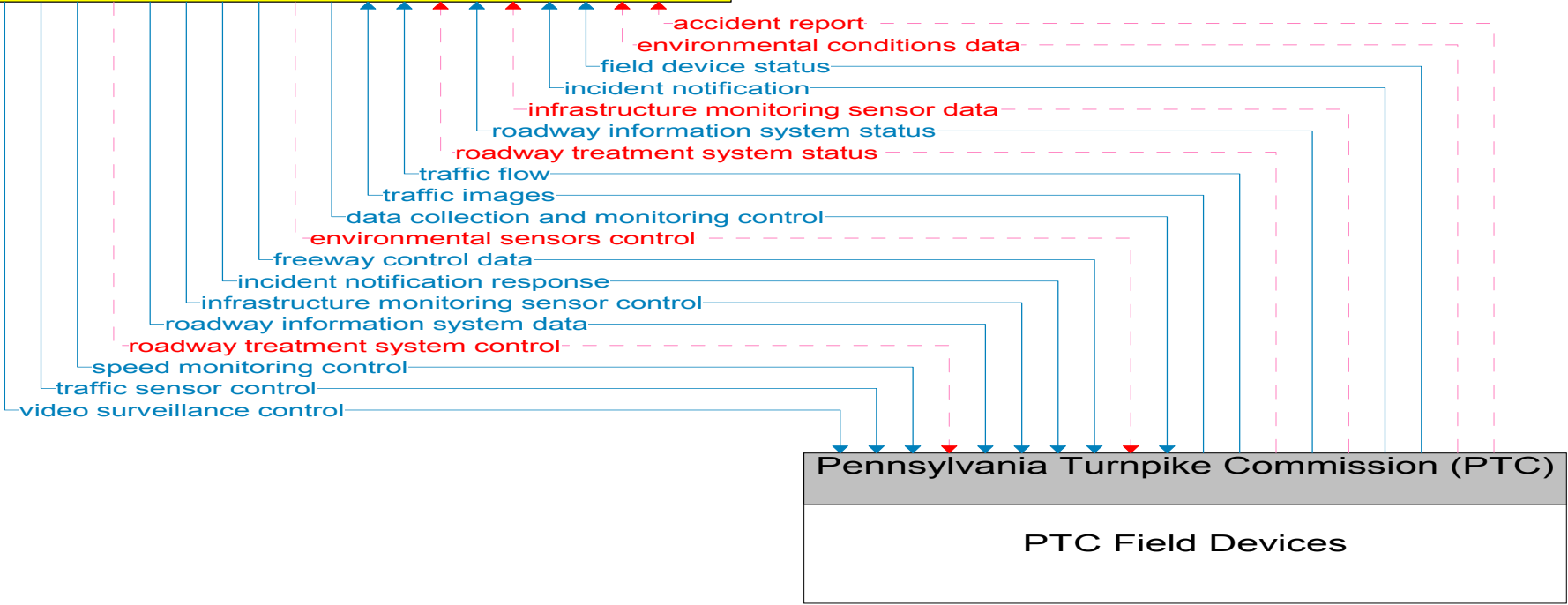


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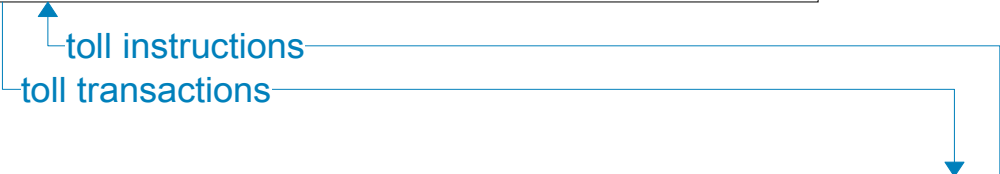
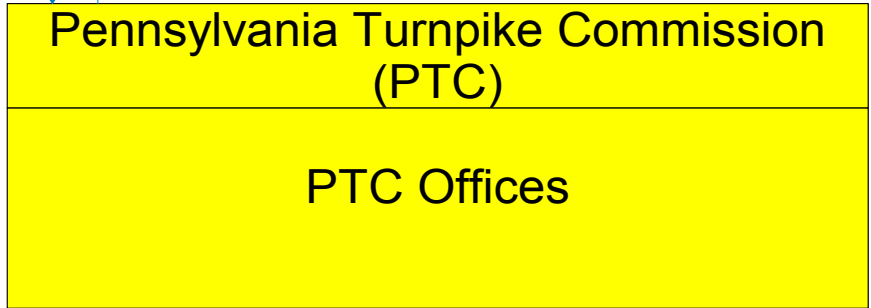
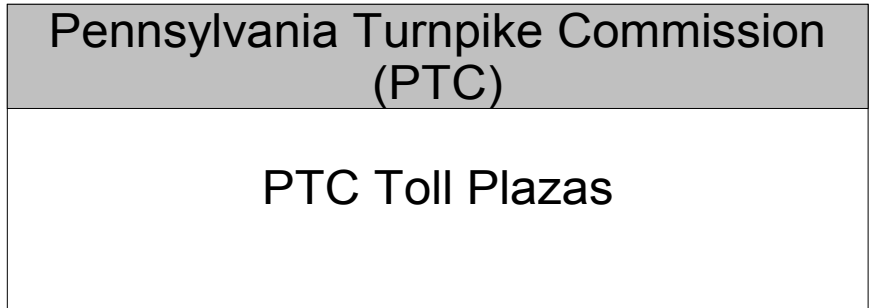


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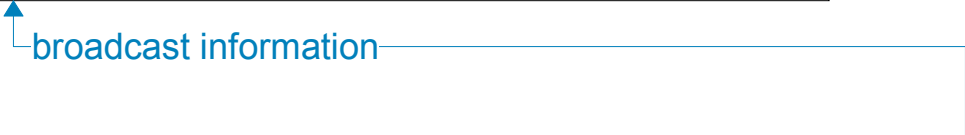
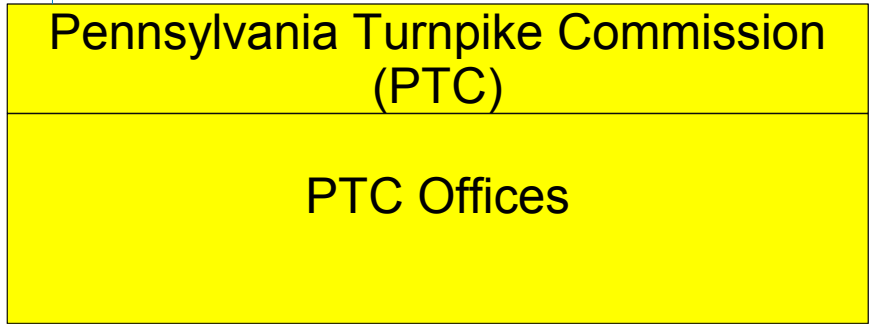
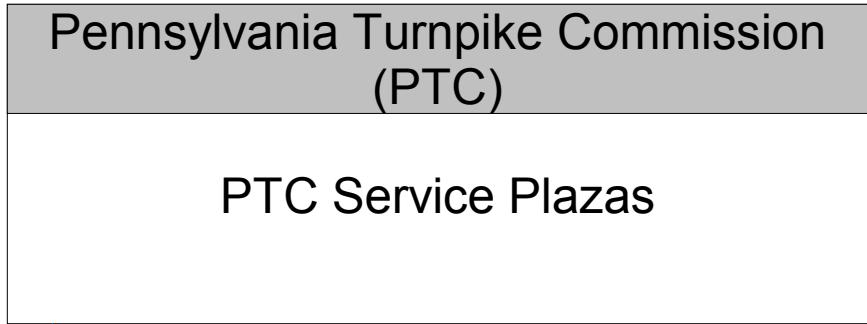
Pennsylvania Turnpike Commission (PTC)
PTC Offices



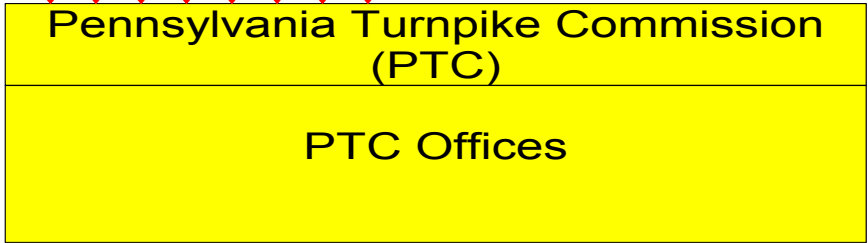
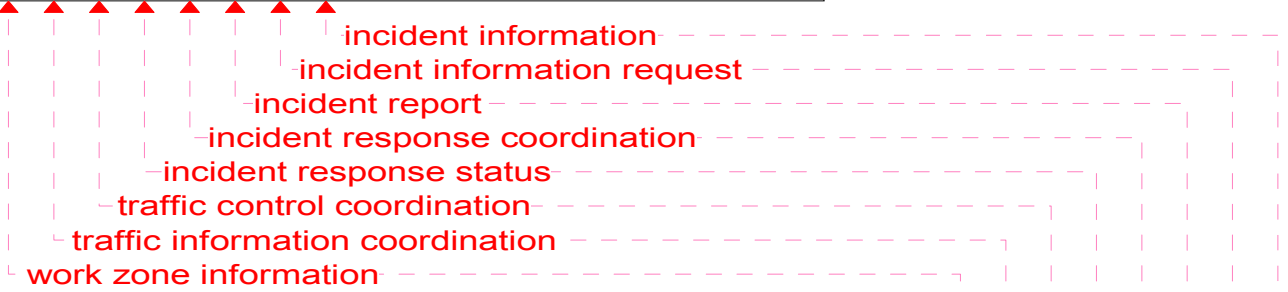
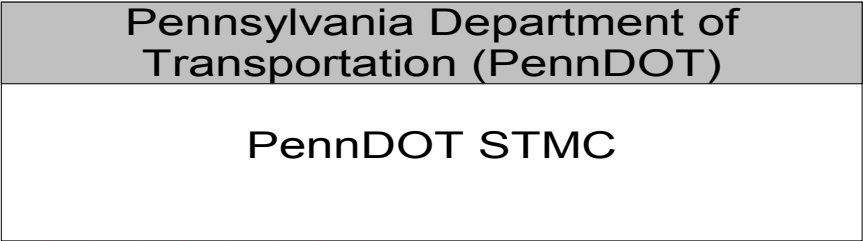
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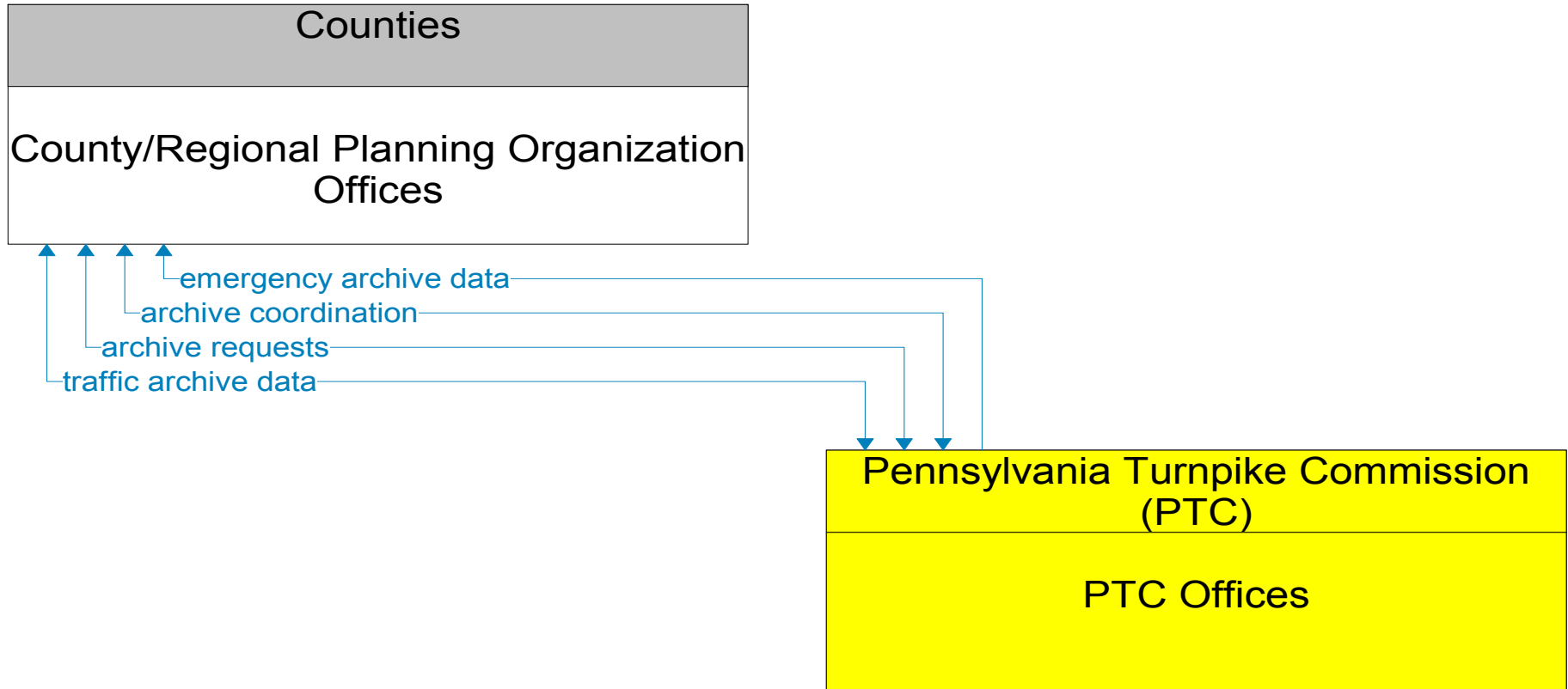
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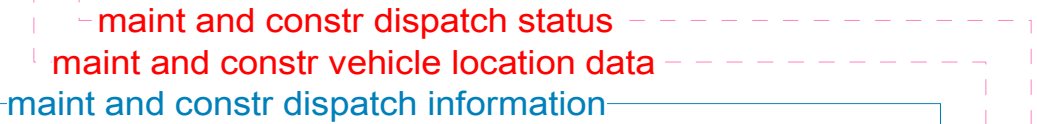
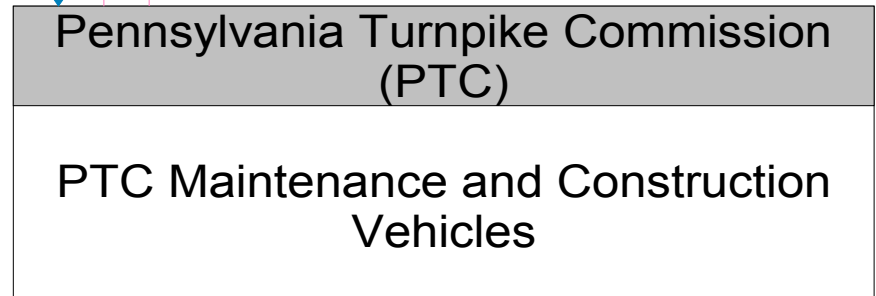
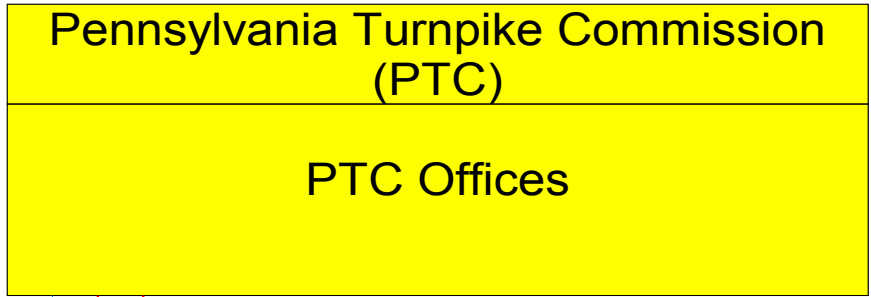
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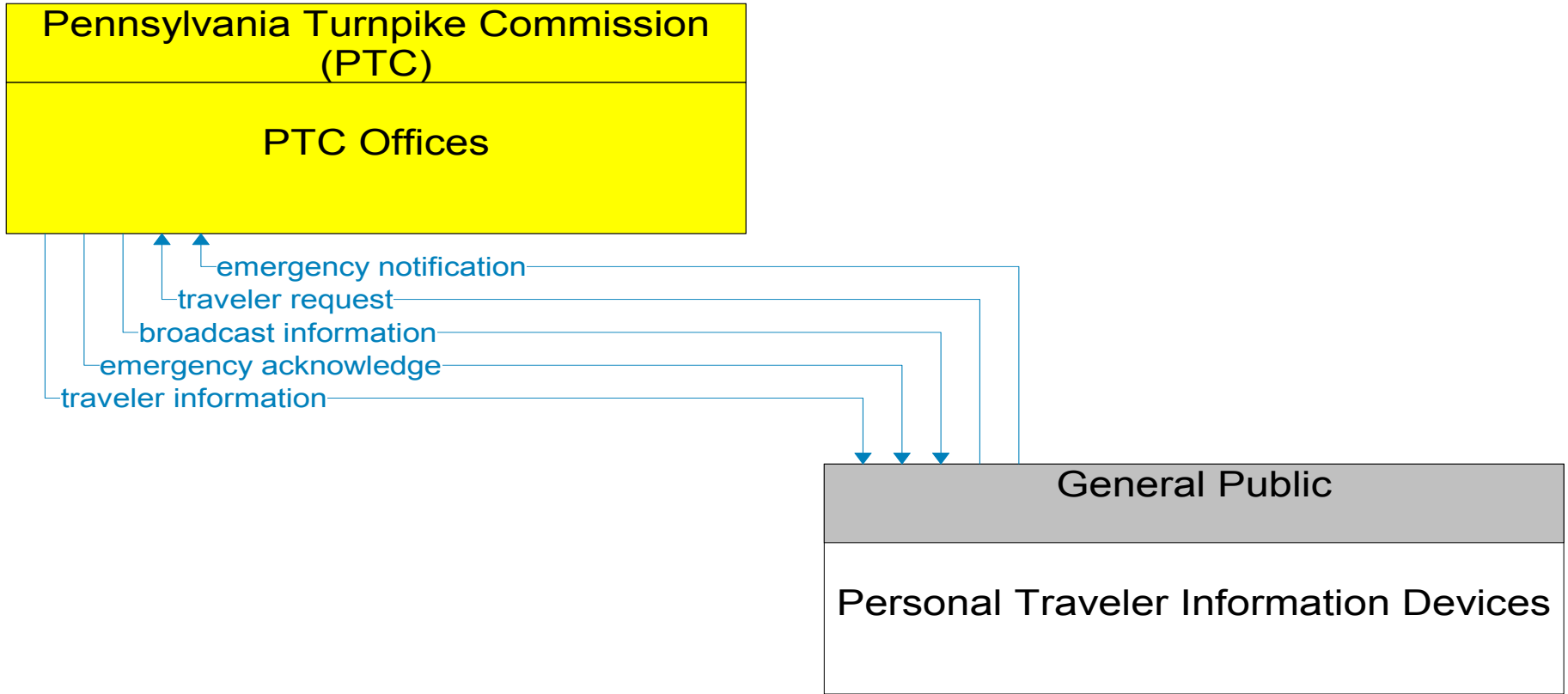
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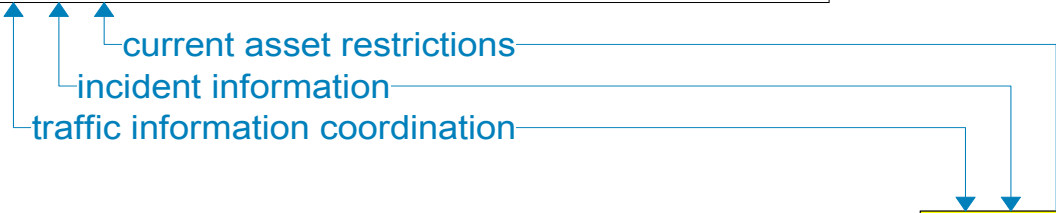
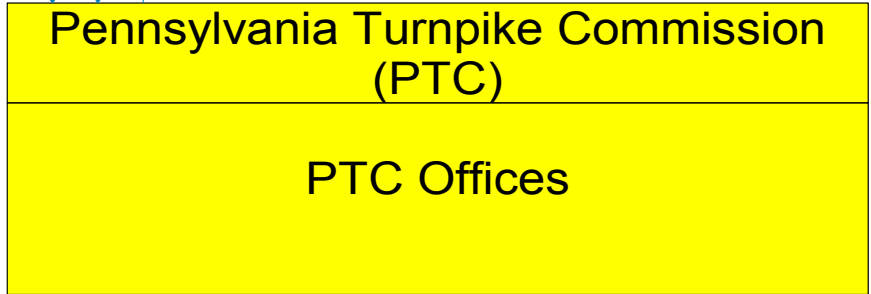
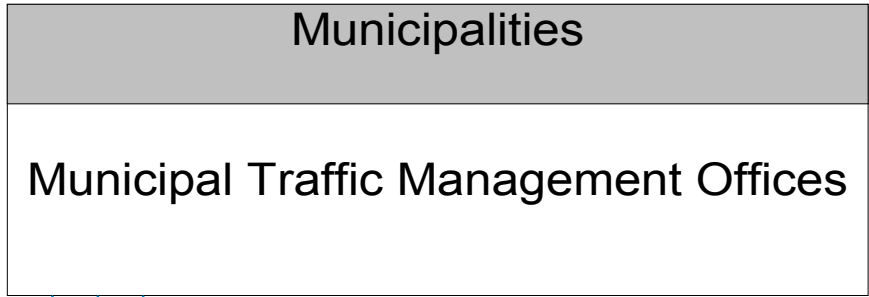
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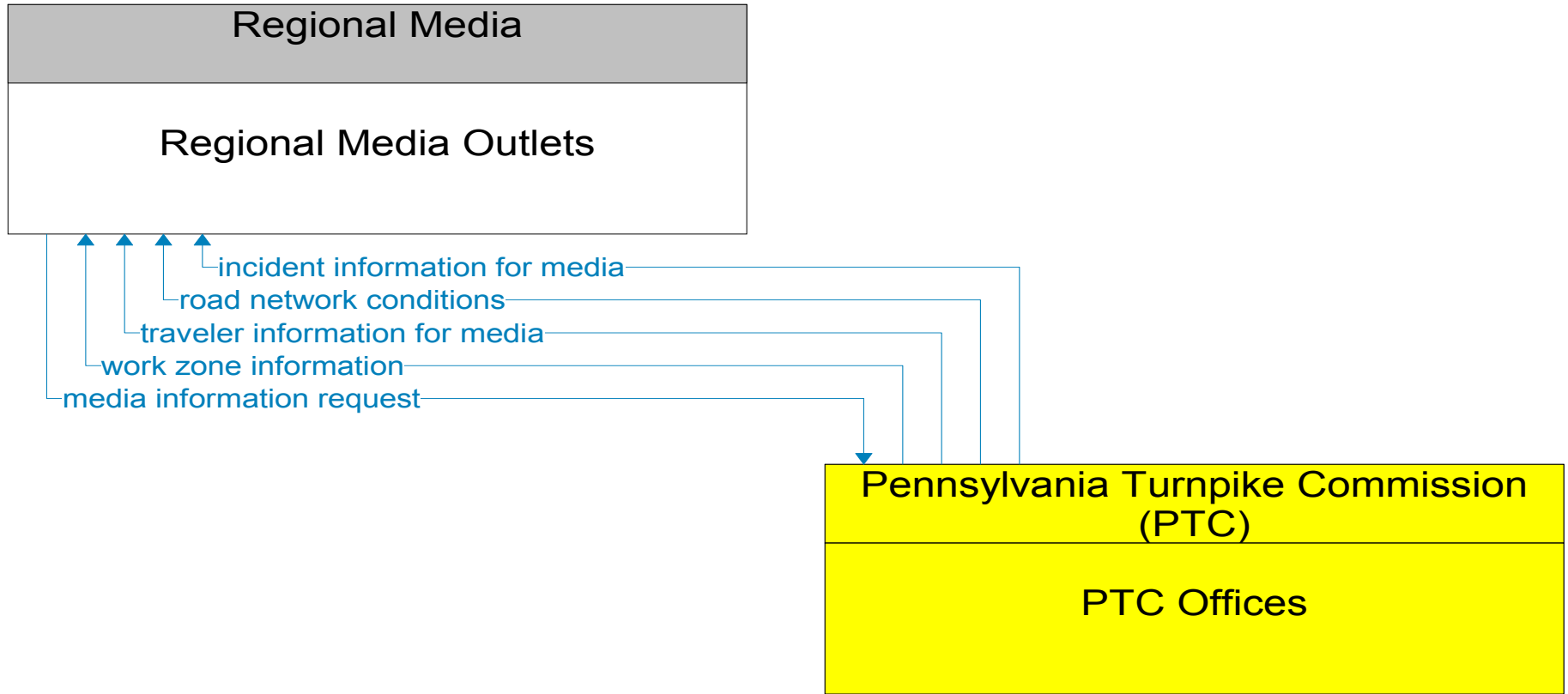
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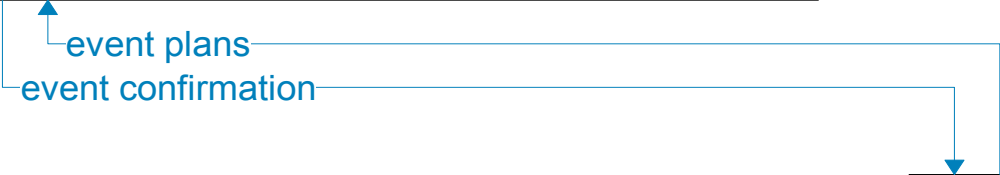
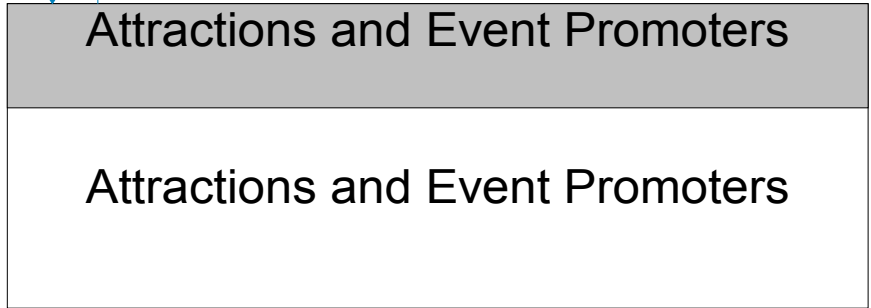
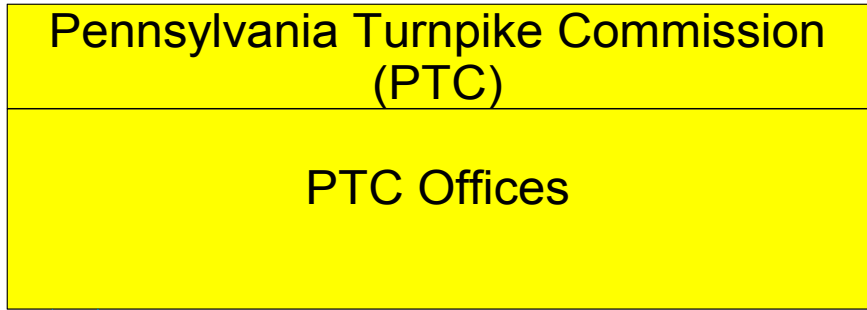
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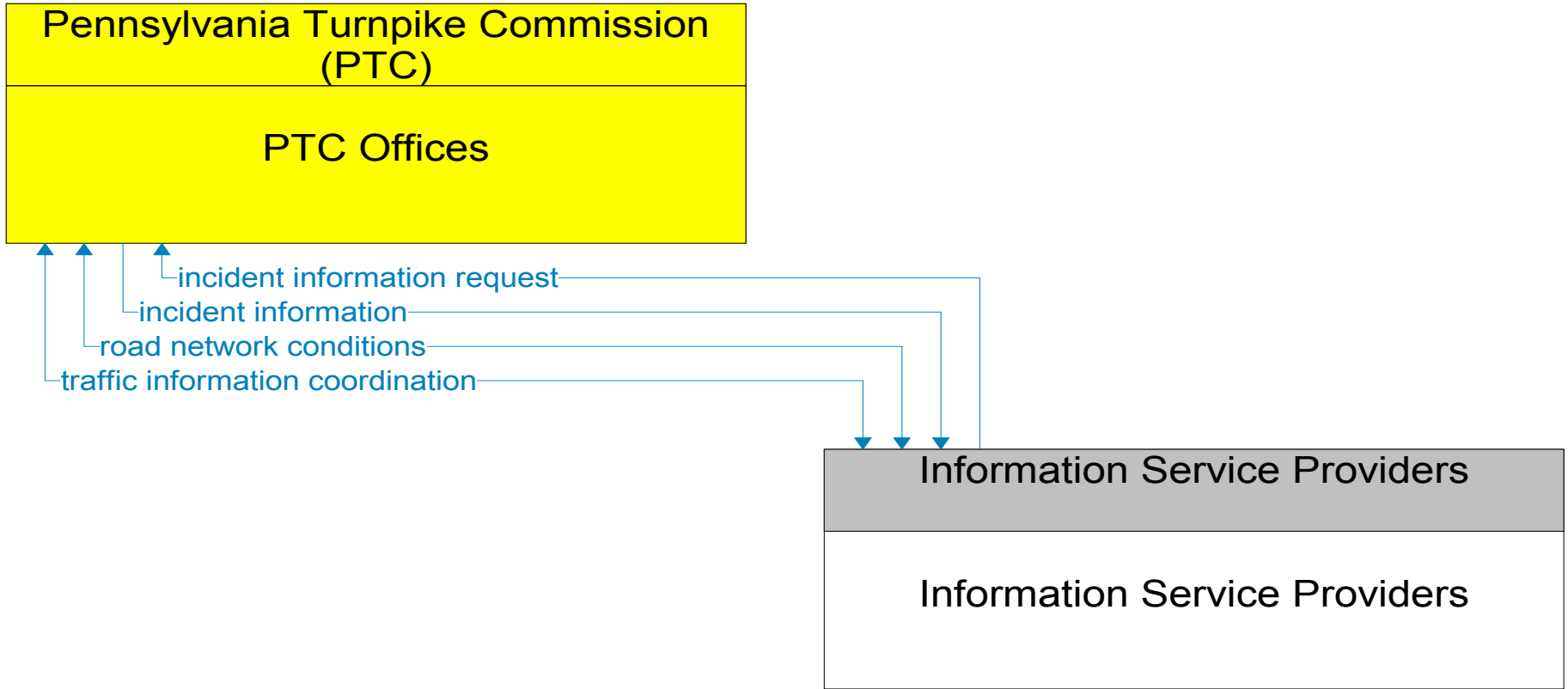
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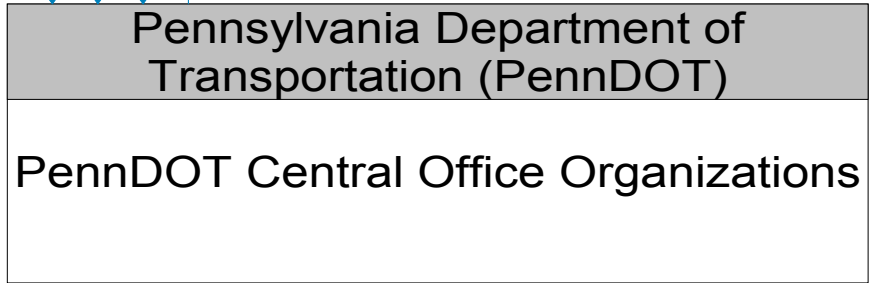
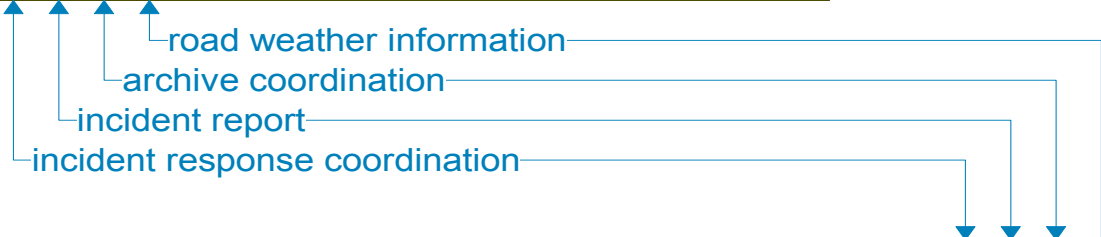
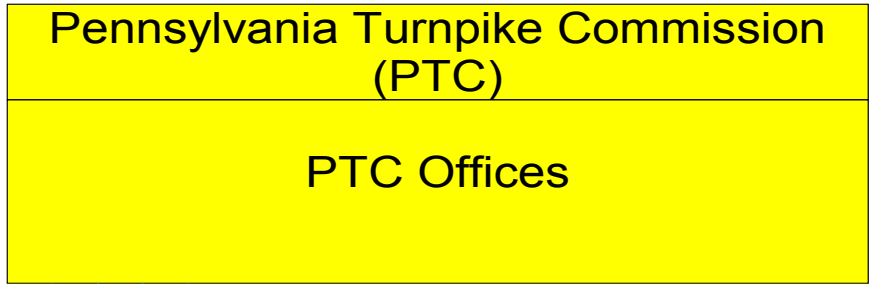


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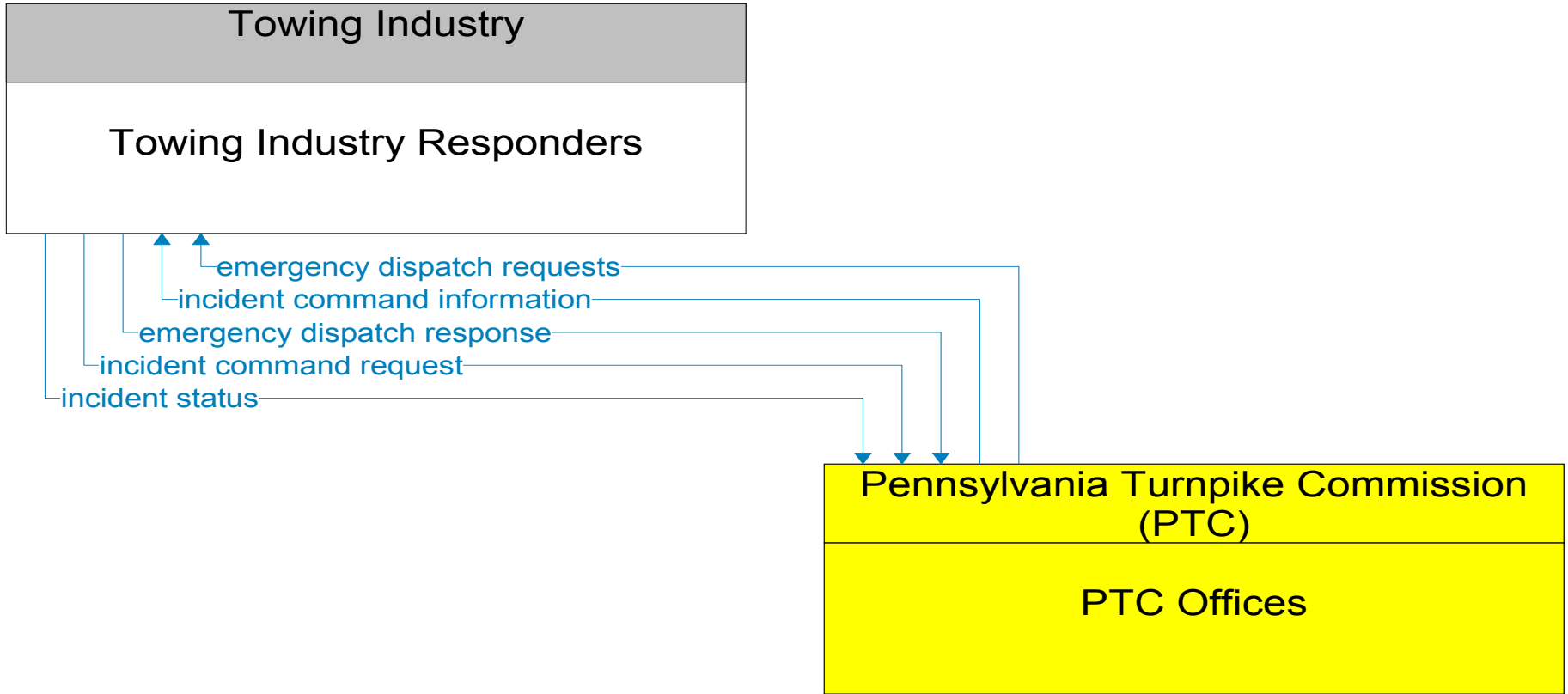


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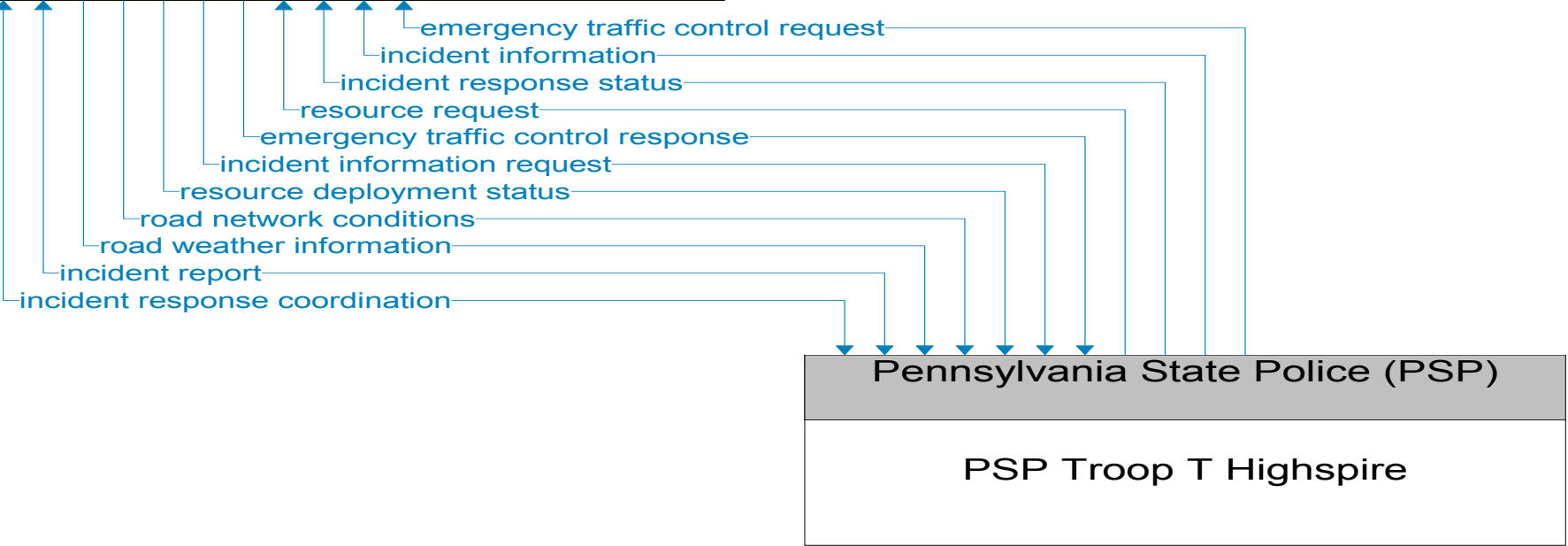
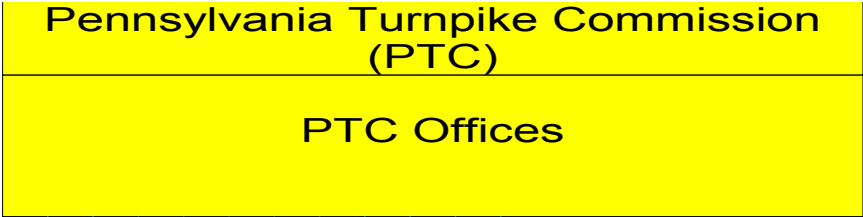




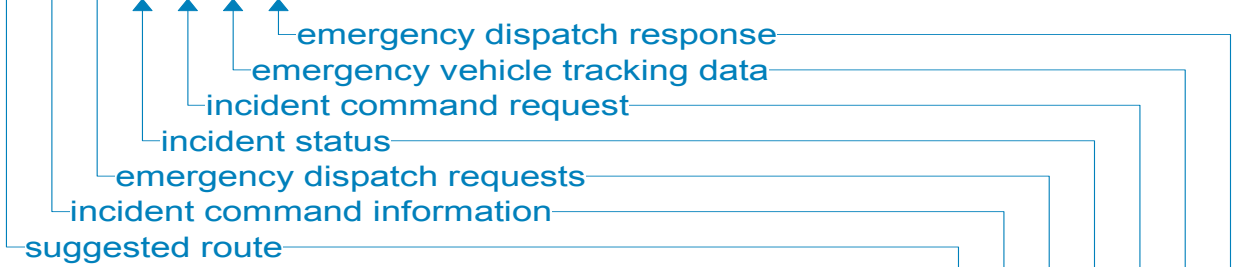
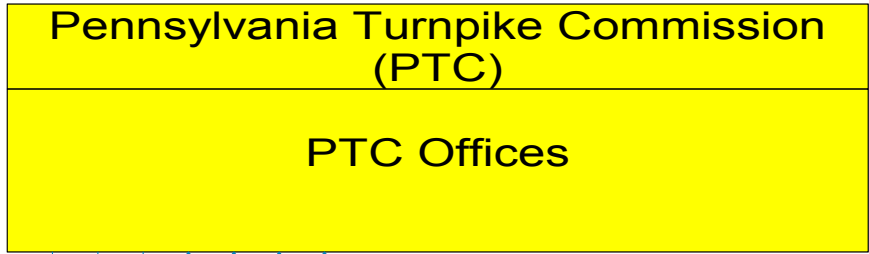
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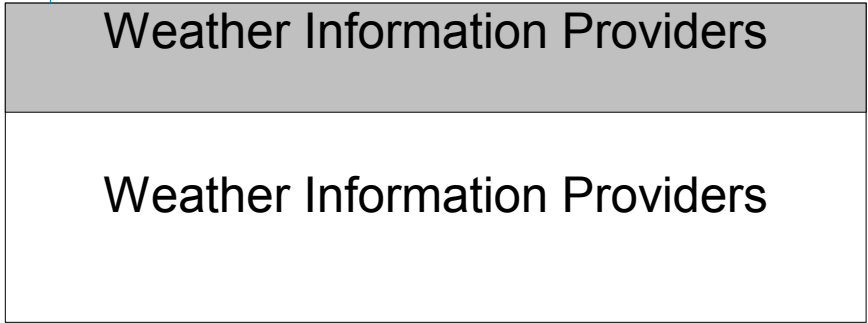
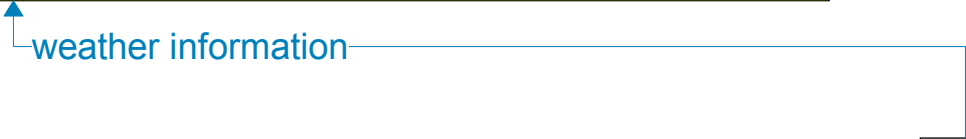
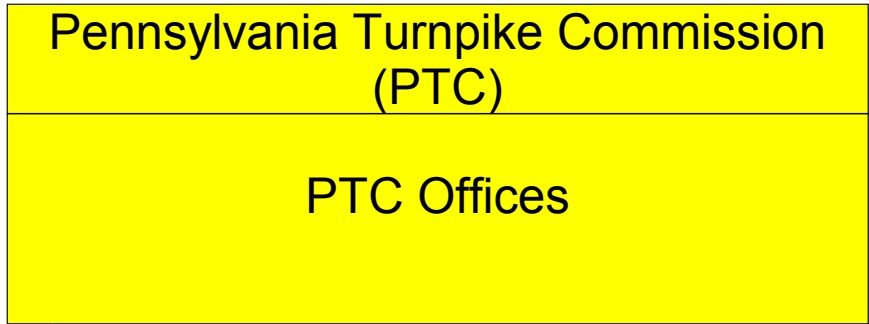
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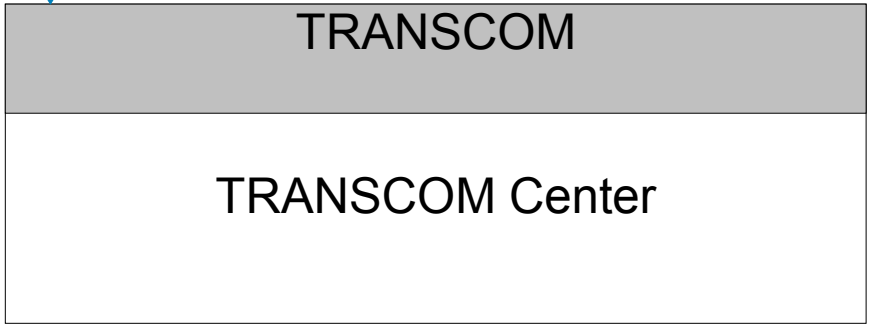
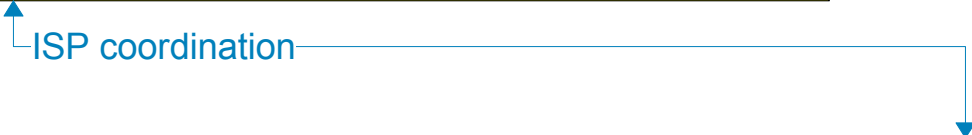
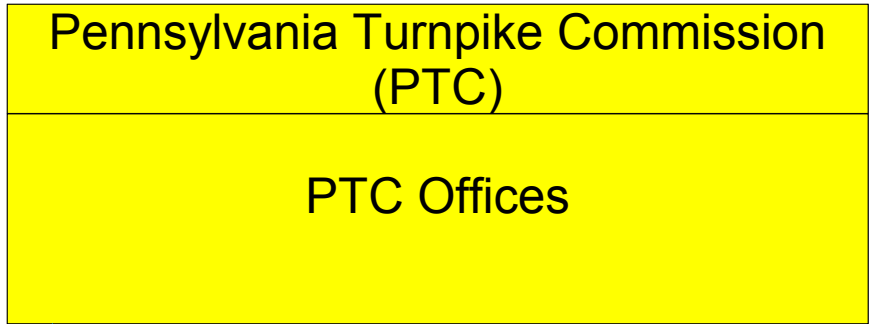
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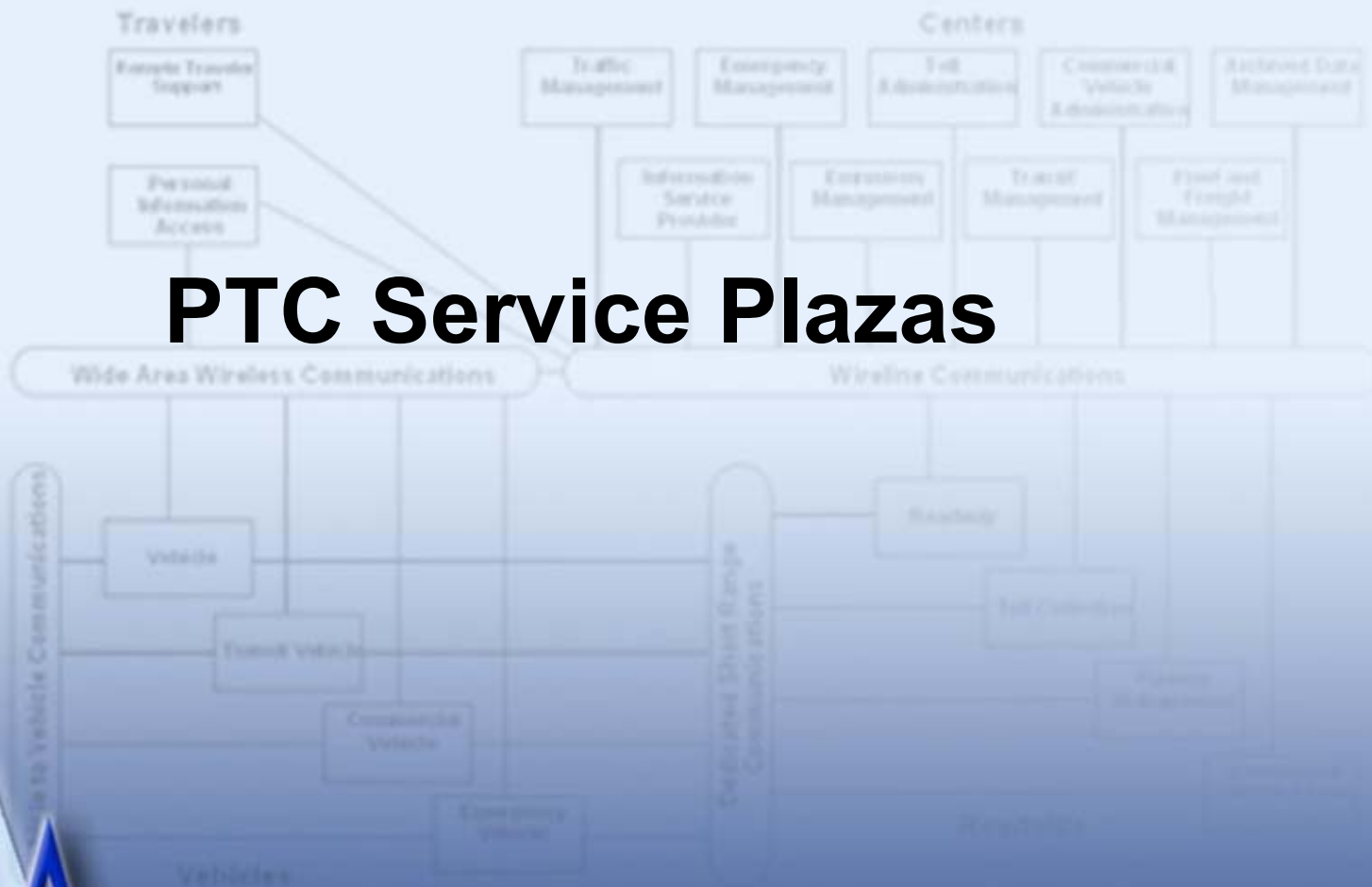


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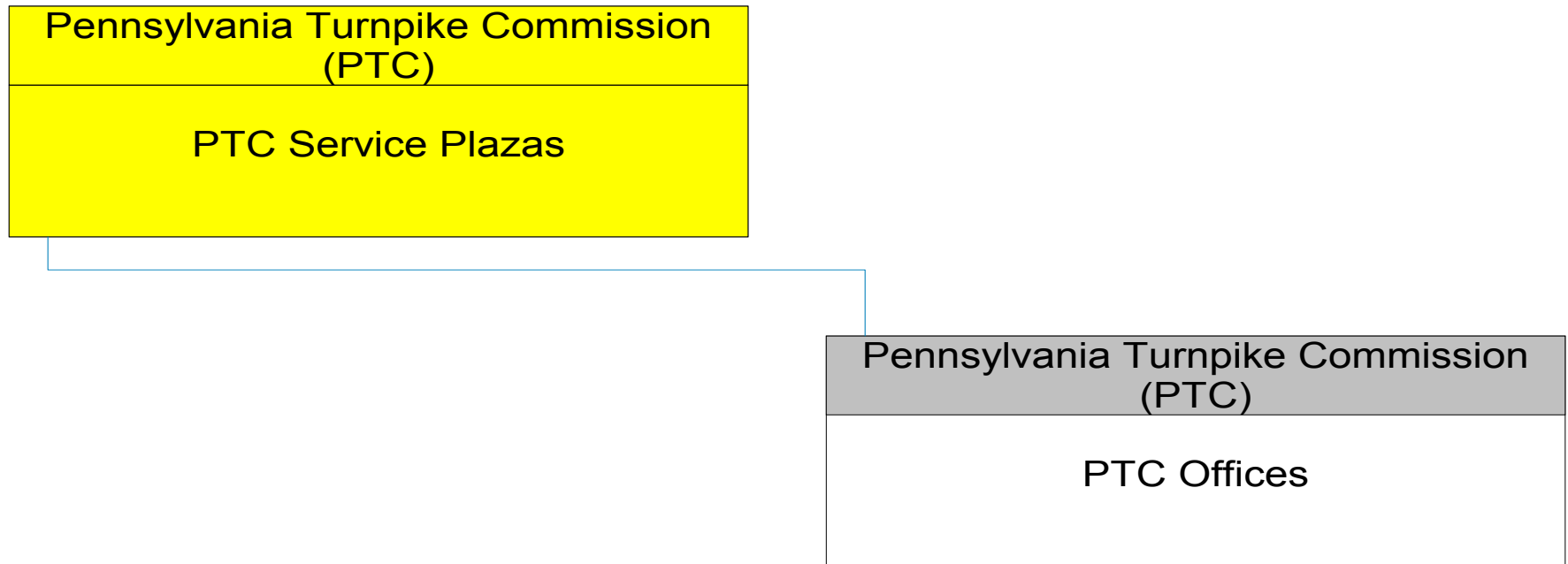
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PTC Service Plazas

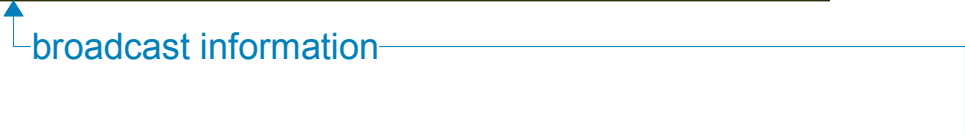
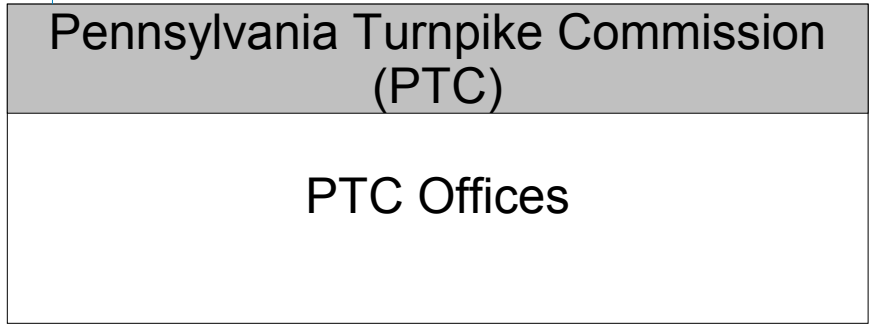
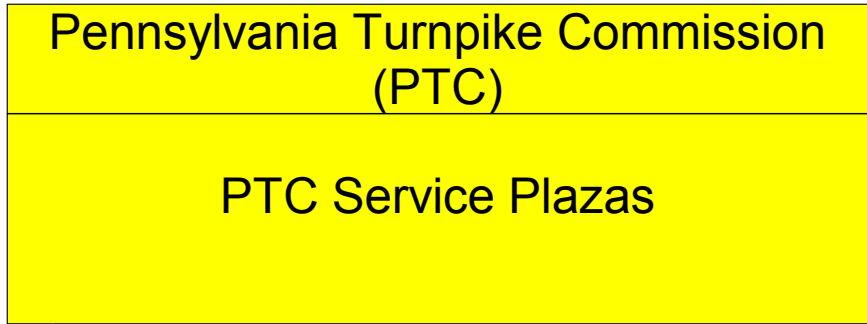


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PTC Service Plazas Interconnect Diagram

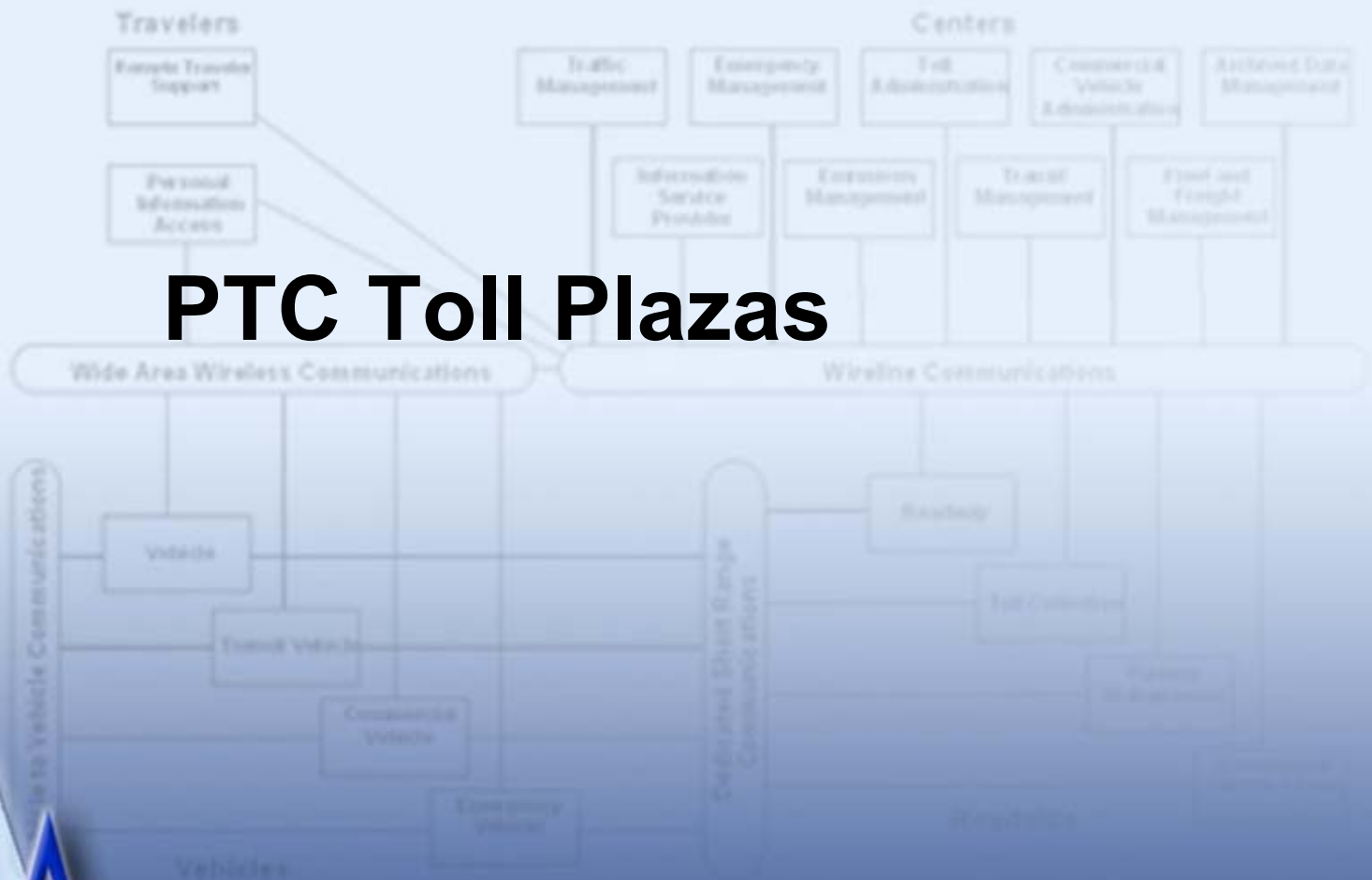


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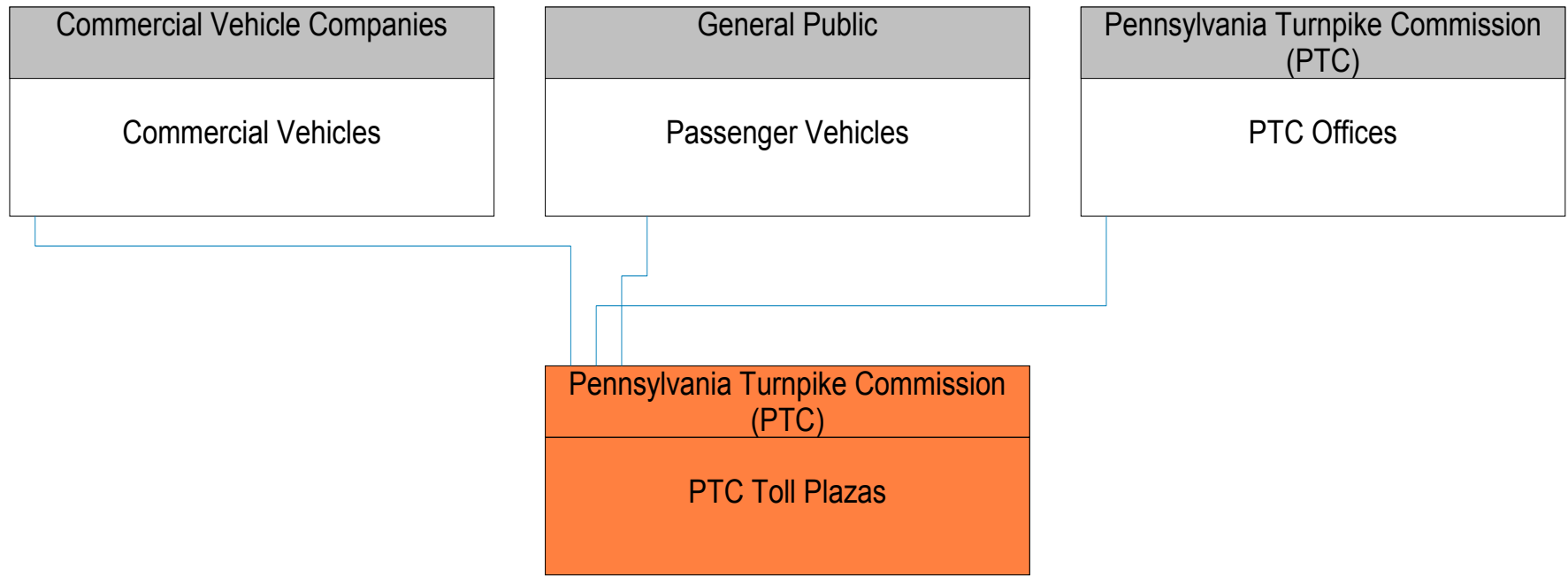


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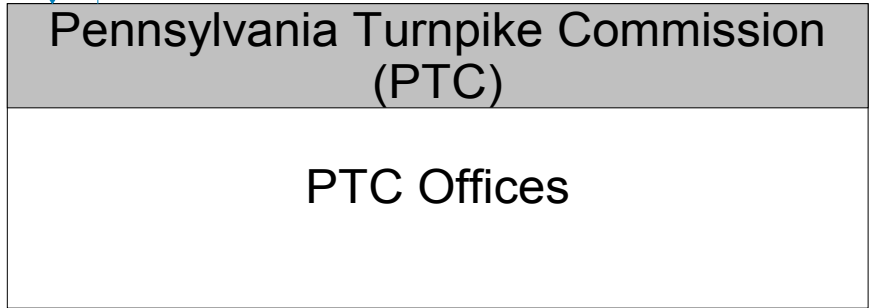
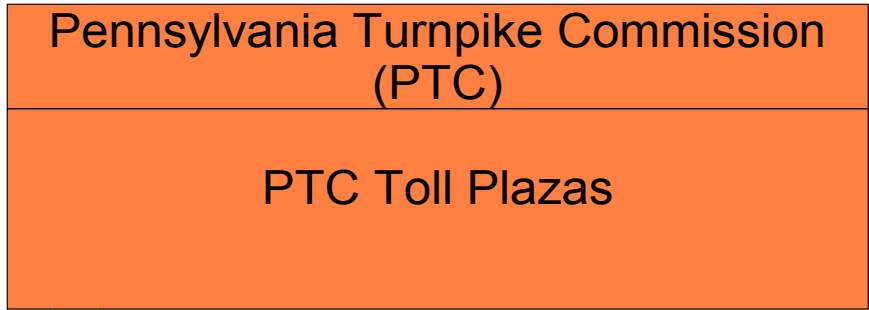
PTC Toll Plazas



PTC Toll Plazas Interconnect Diagram

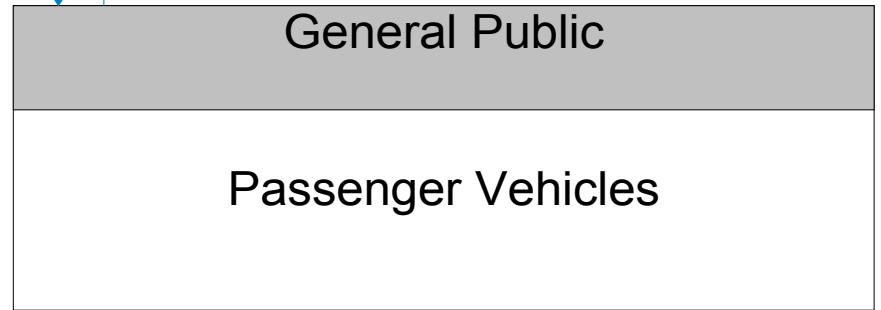
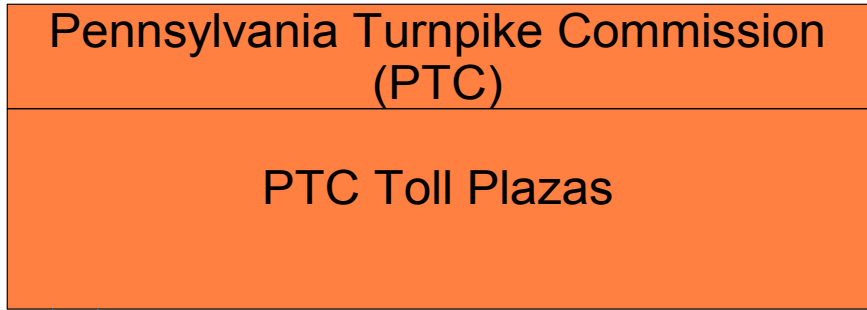


— Existing
- - - Planned



toll instructions
toll transactions

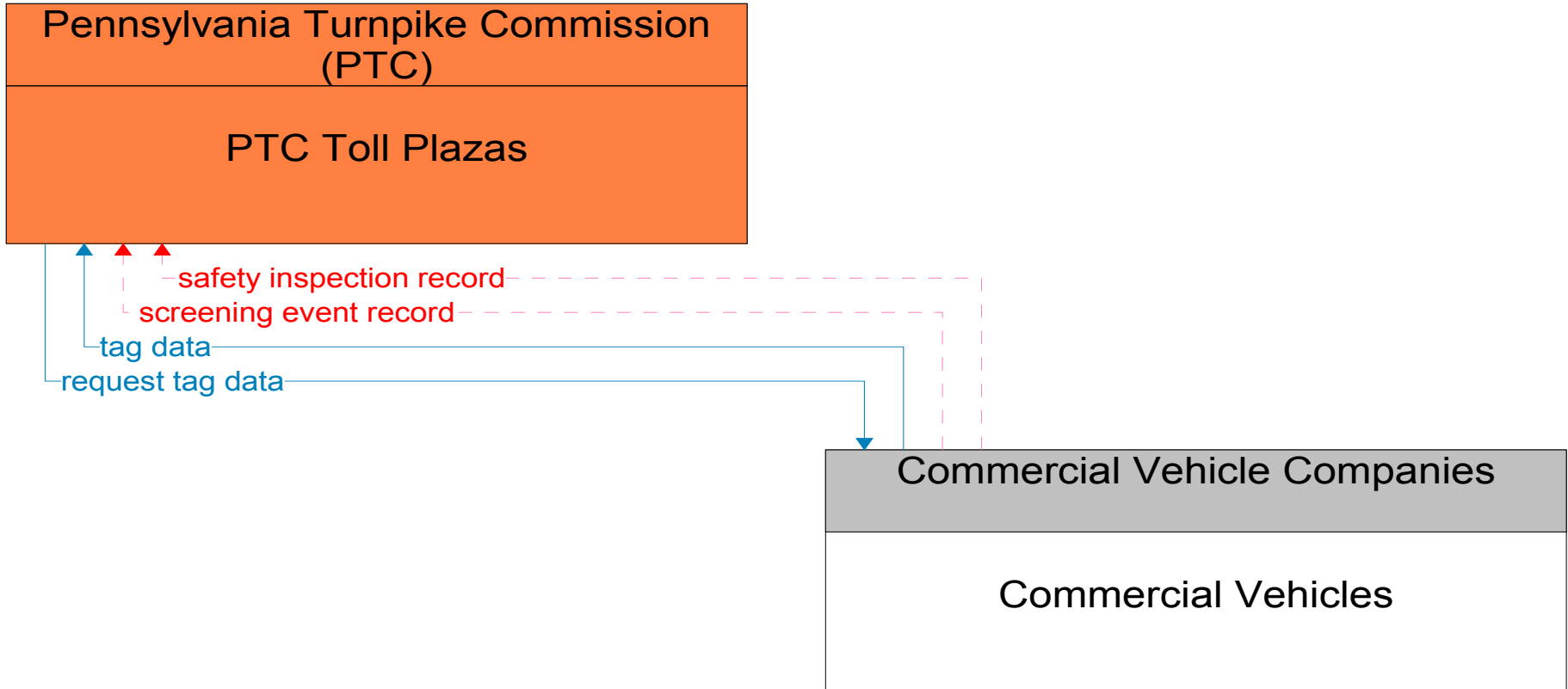
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Planned



tag data

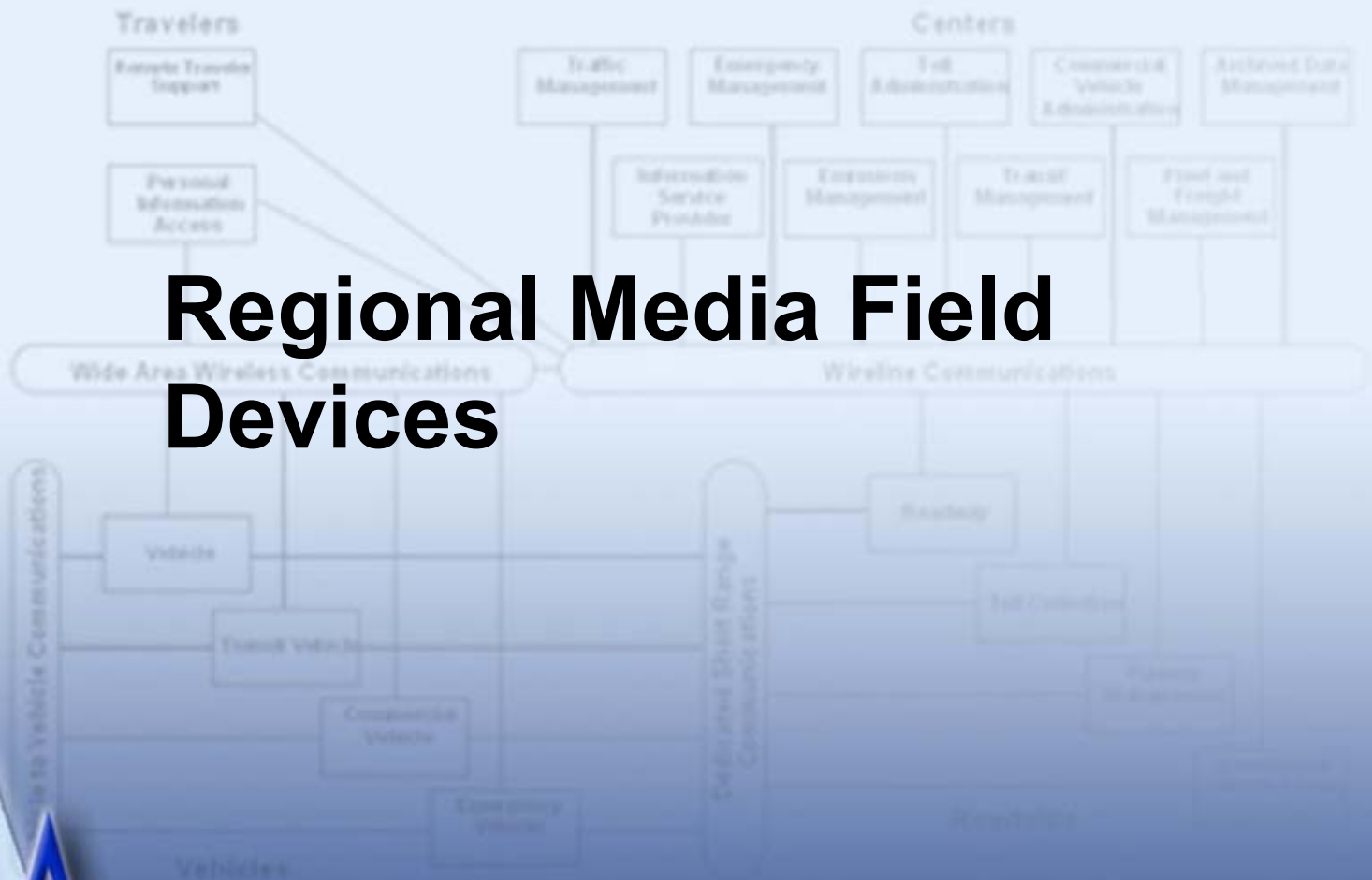
request tag data

Existing
Planned

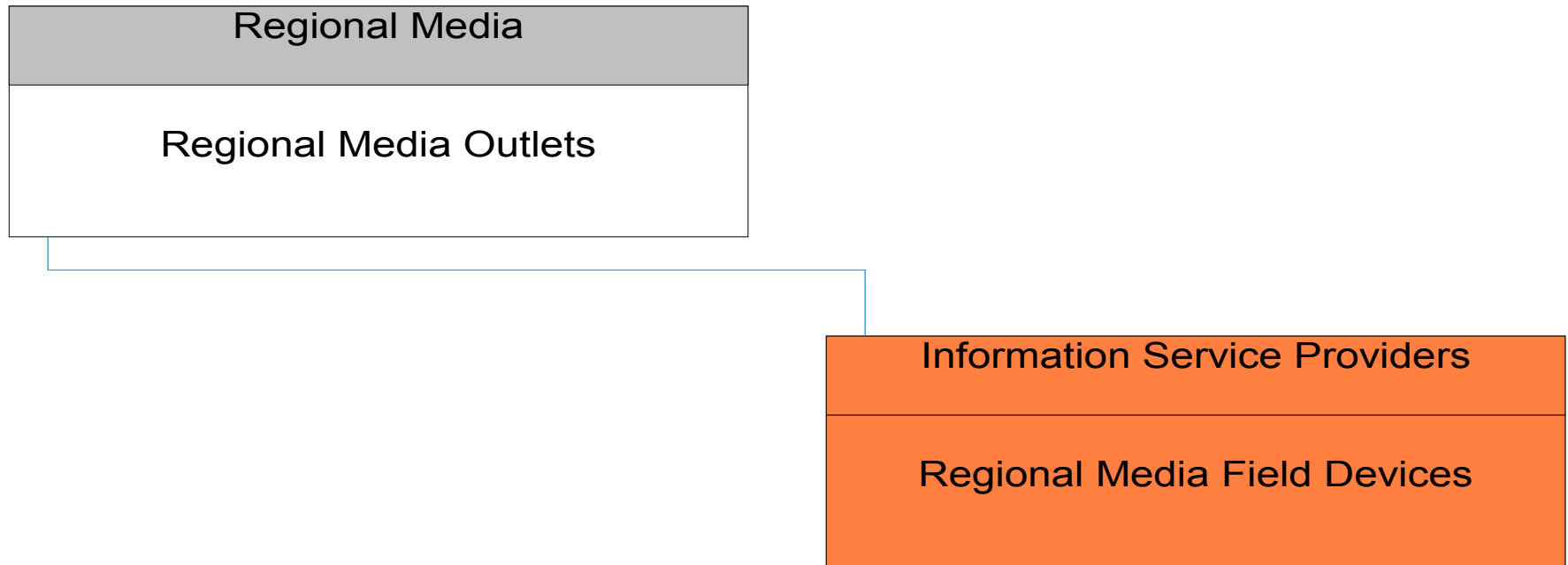


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- - - - - Planned

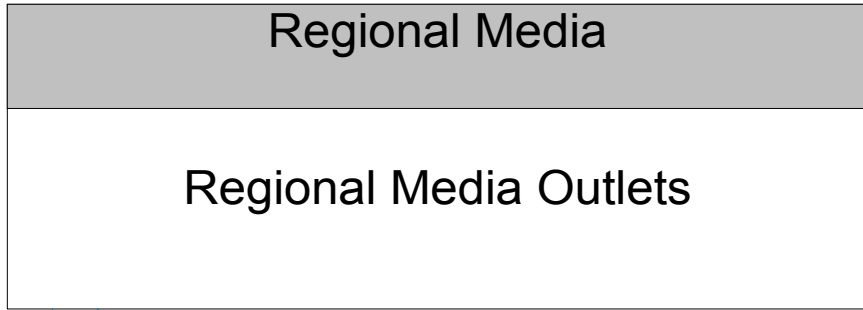
Regional Media Field Devices



Regional Media Field Devices Interconnect Diagram



———— Existing
----- Planned



traffic images

video surveillance control

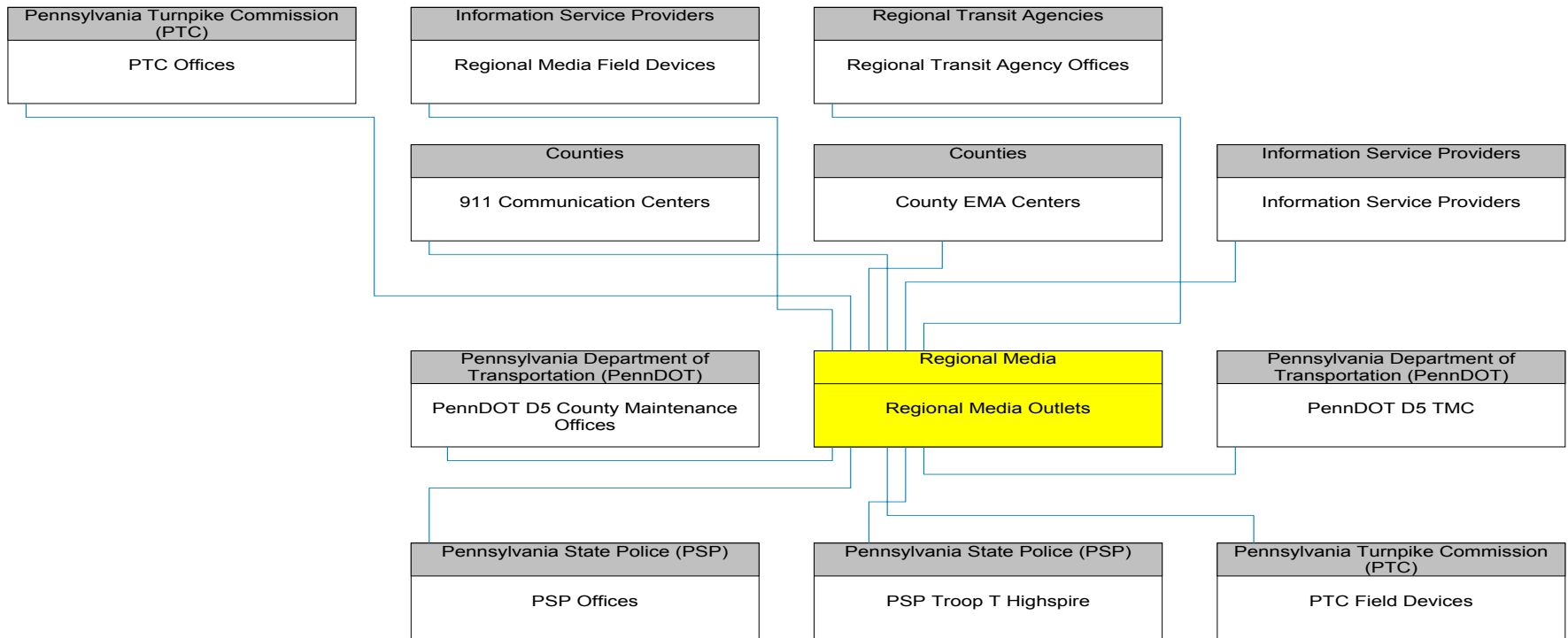
Existing

Planned

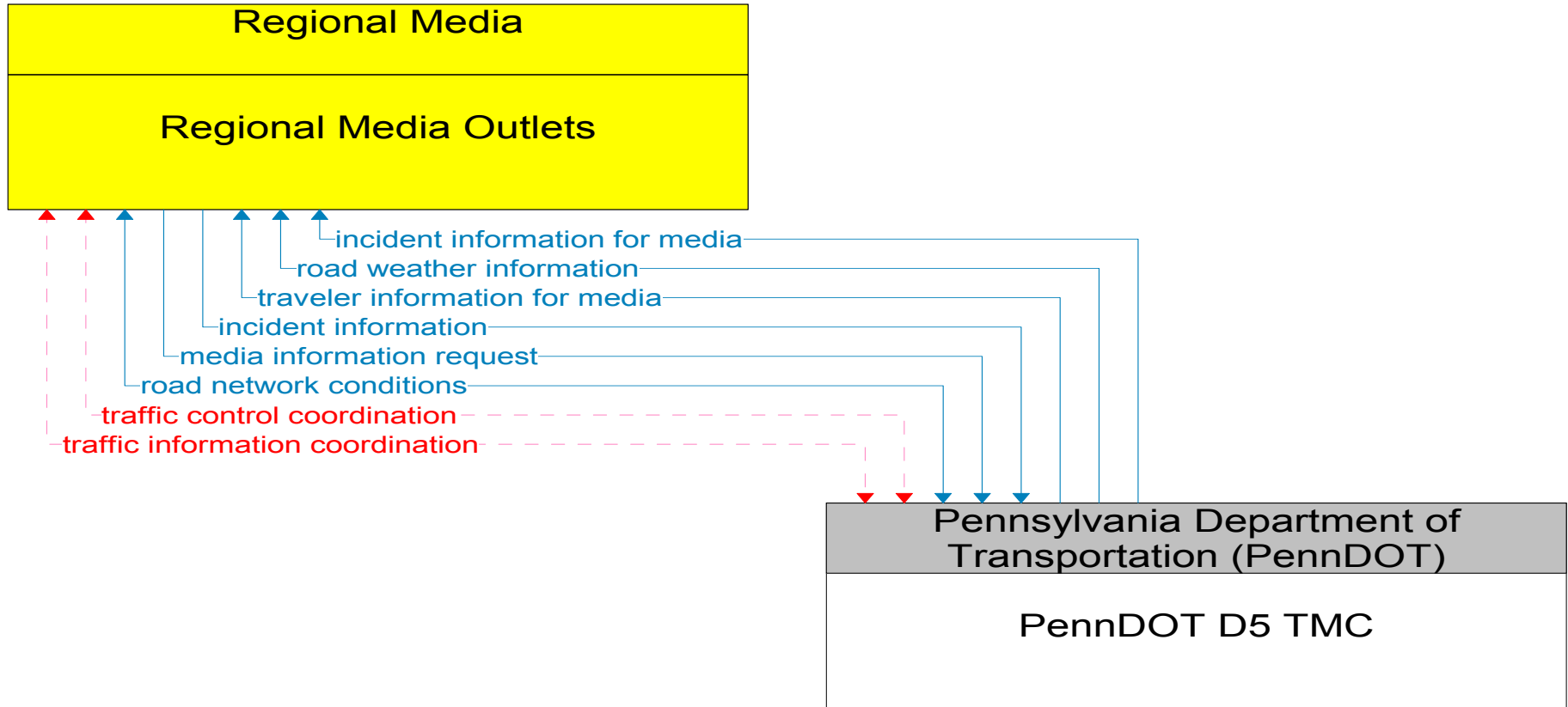
Regional Media Outlets



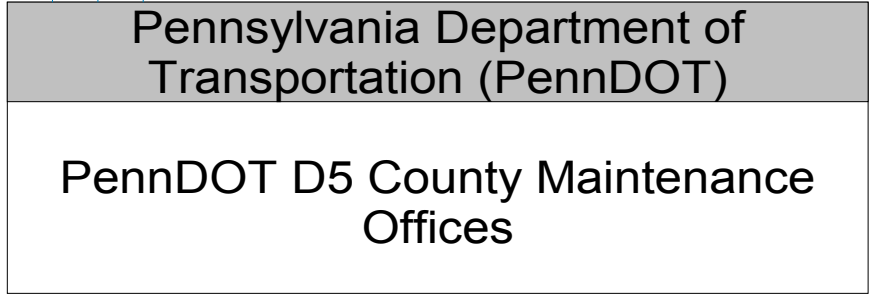
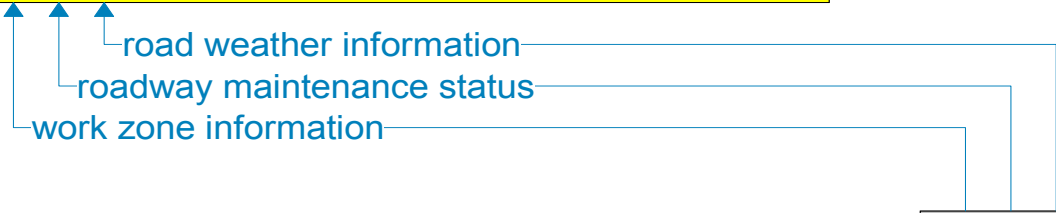
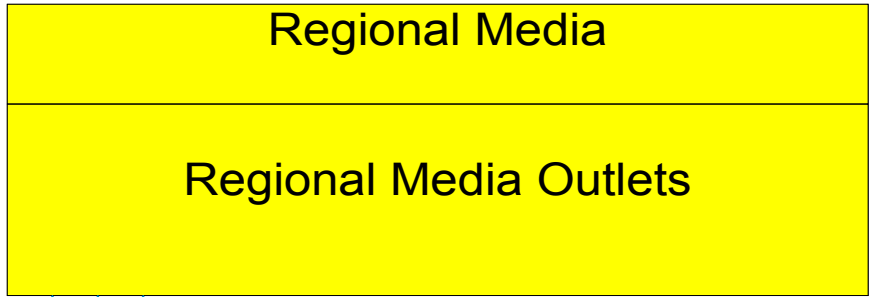
Regional Media Outlets Interconnect Diagram

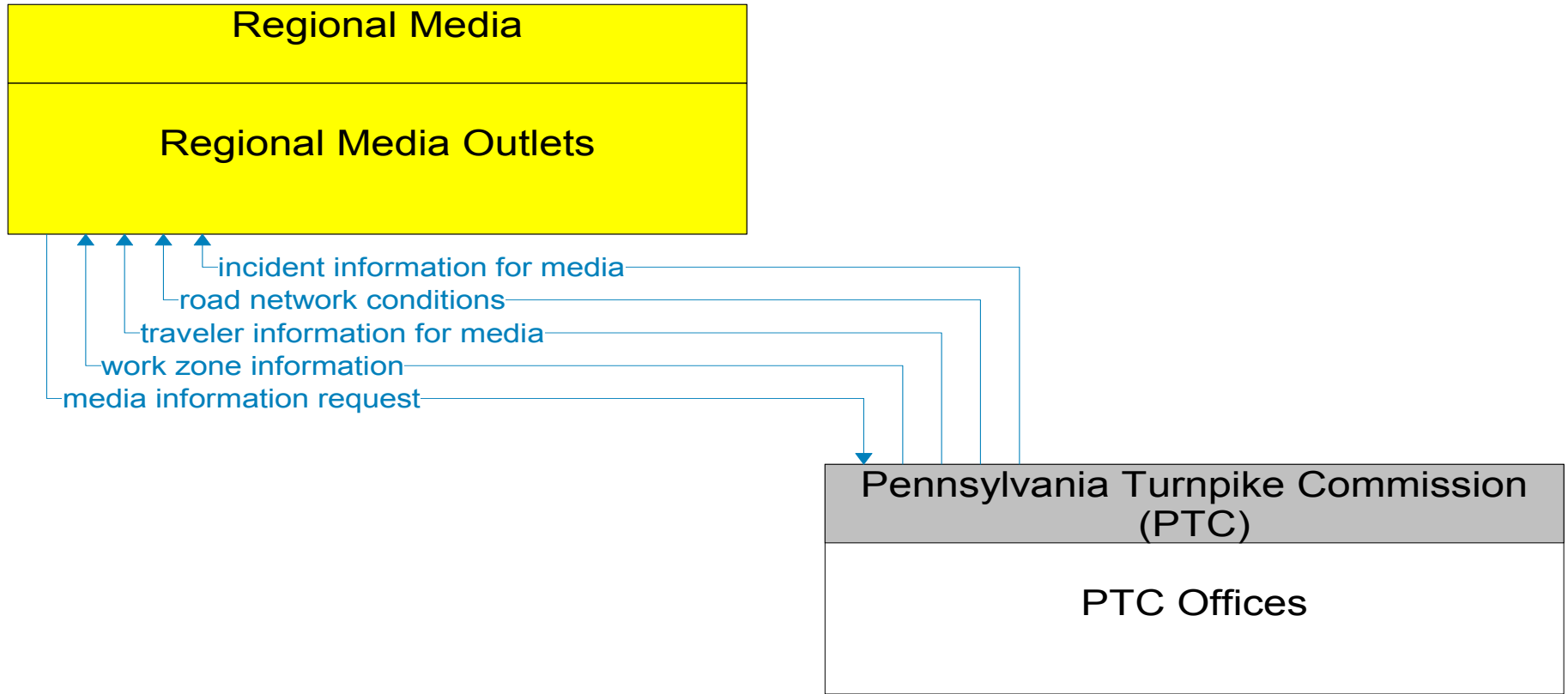


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- - - Planned

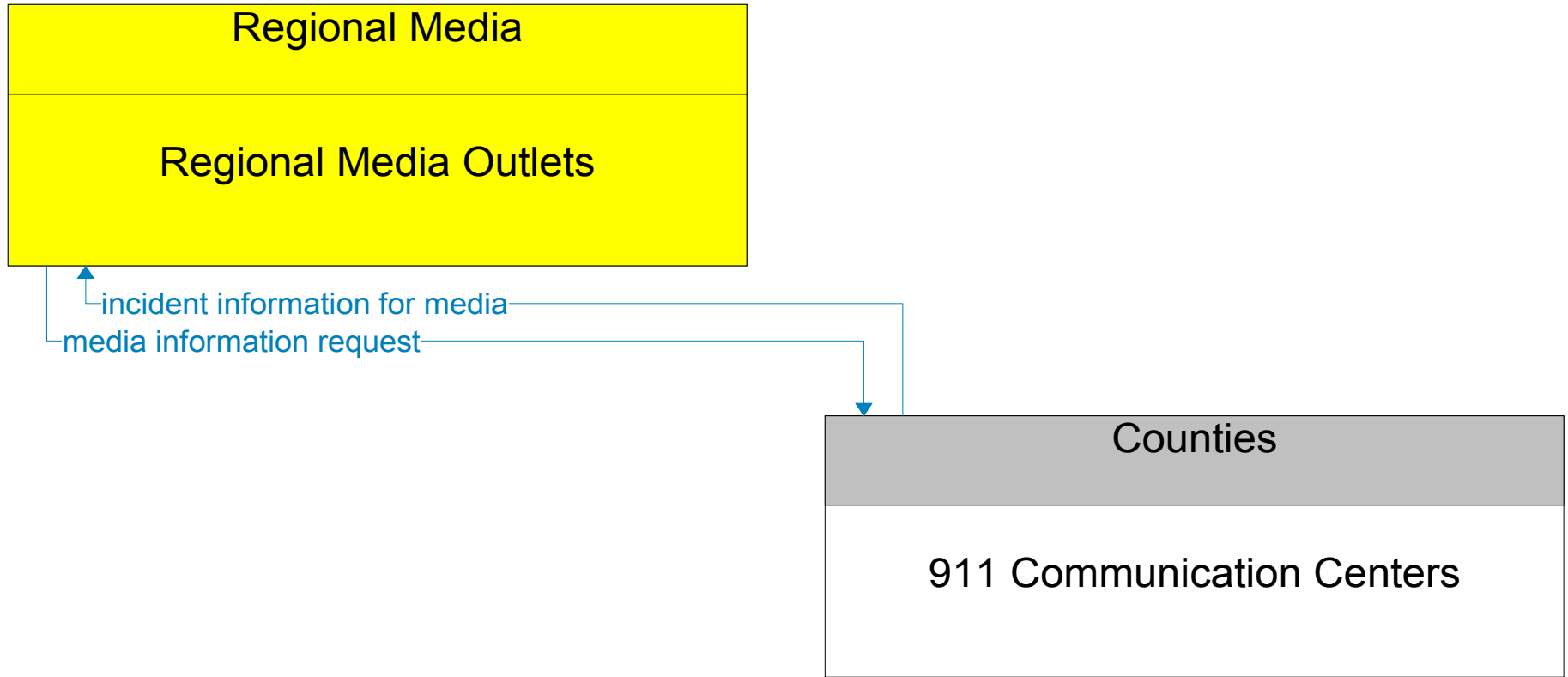


Existing
Planned

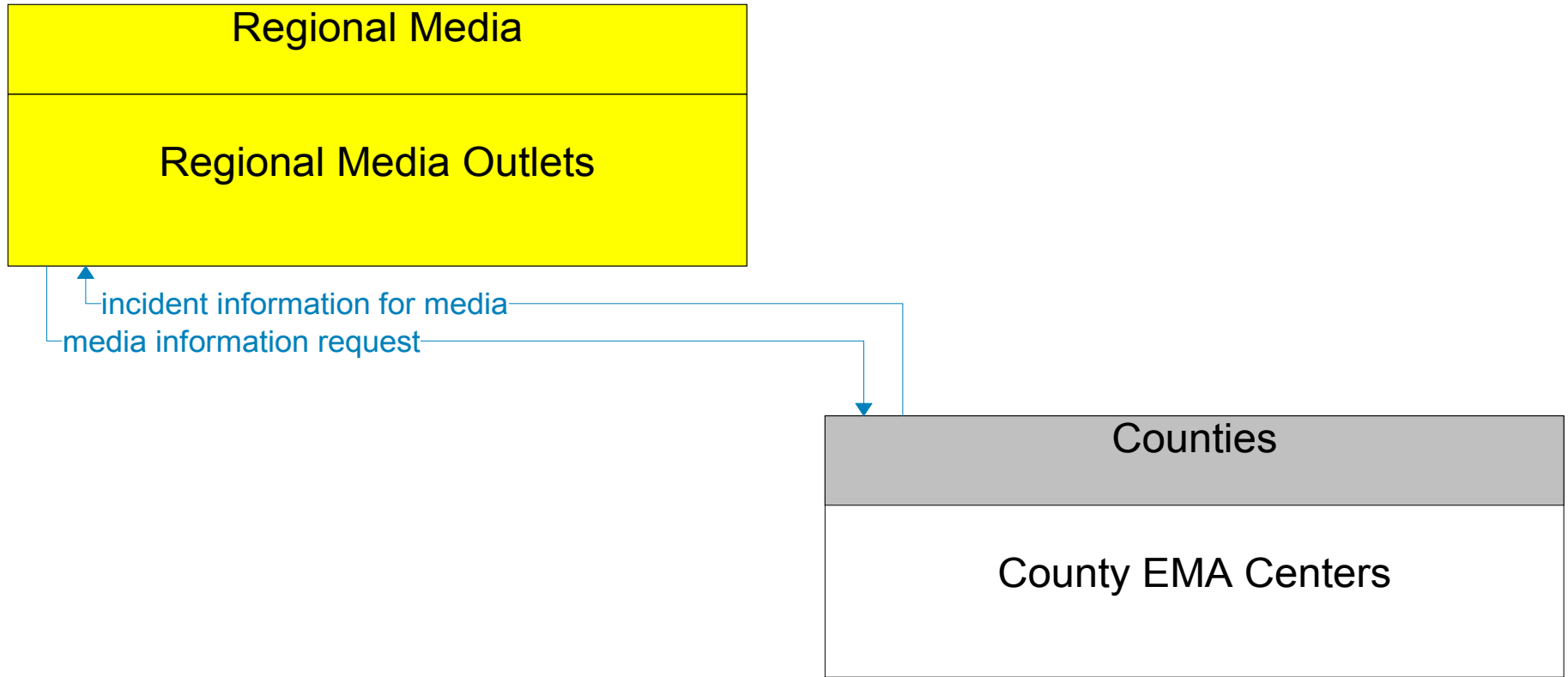


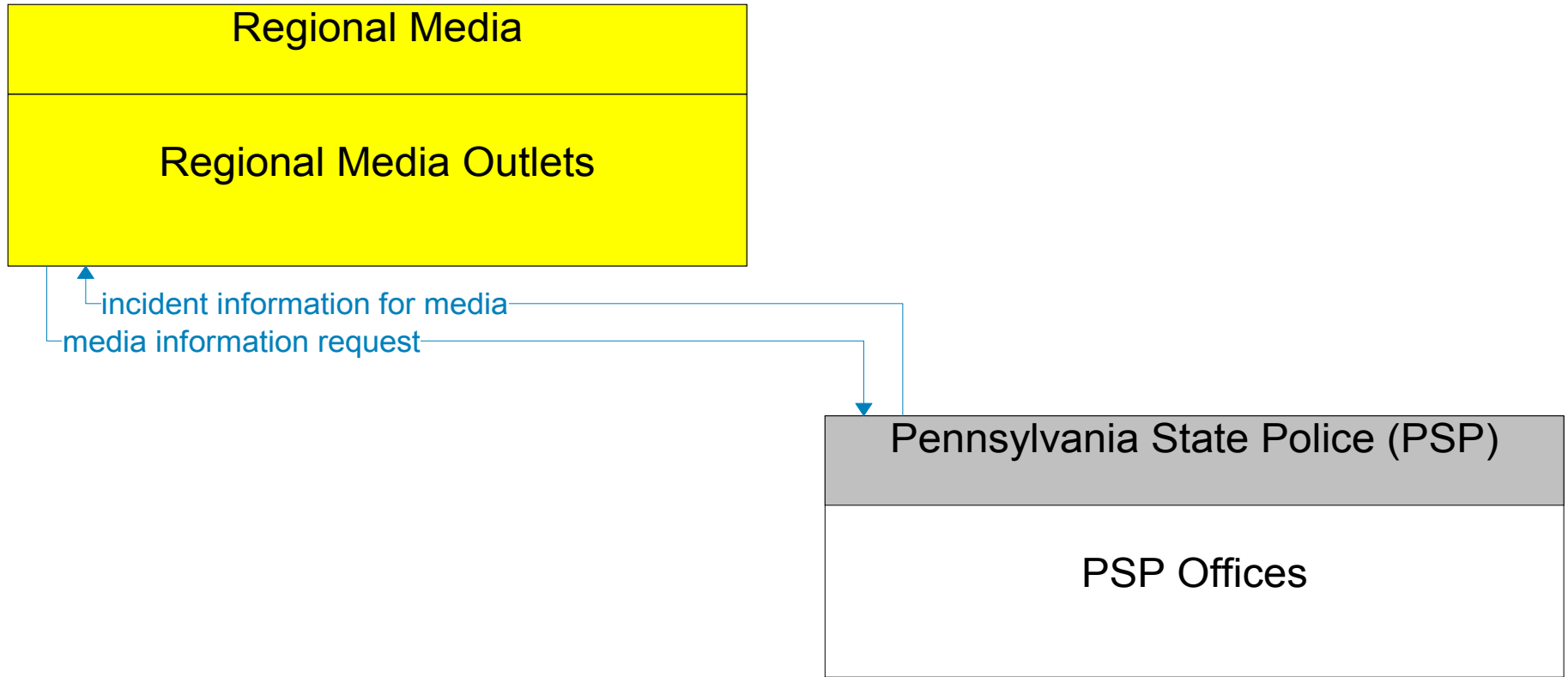


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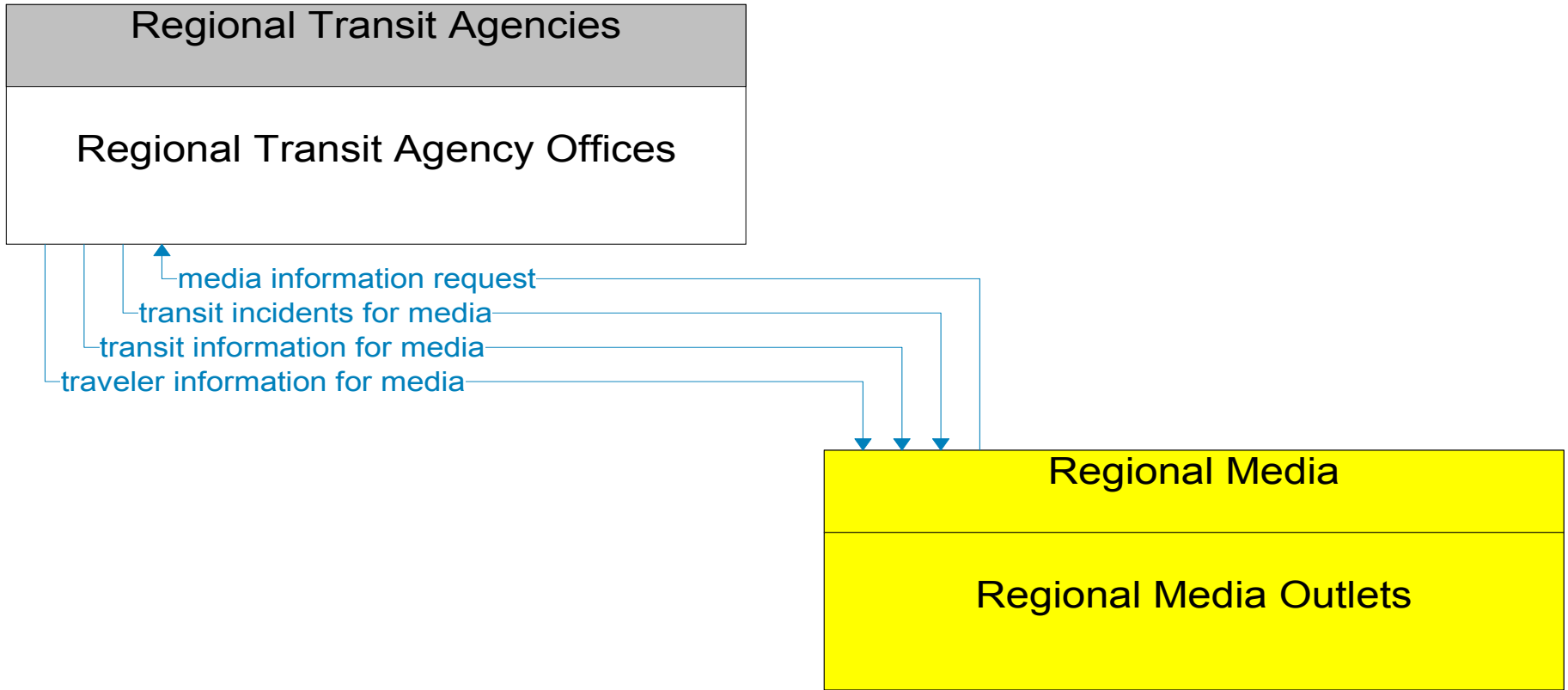
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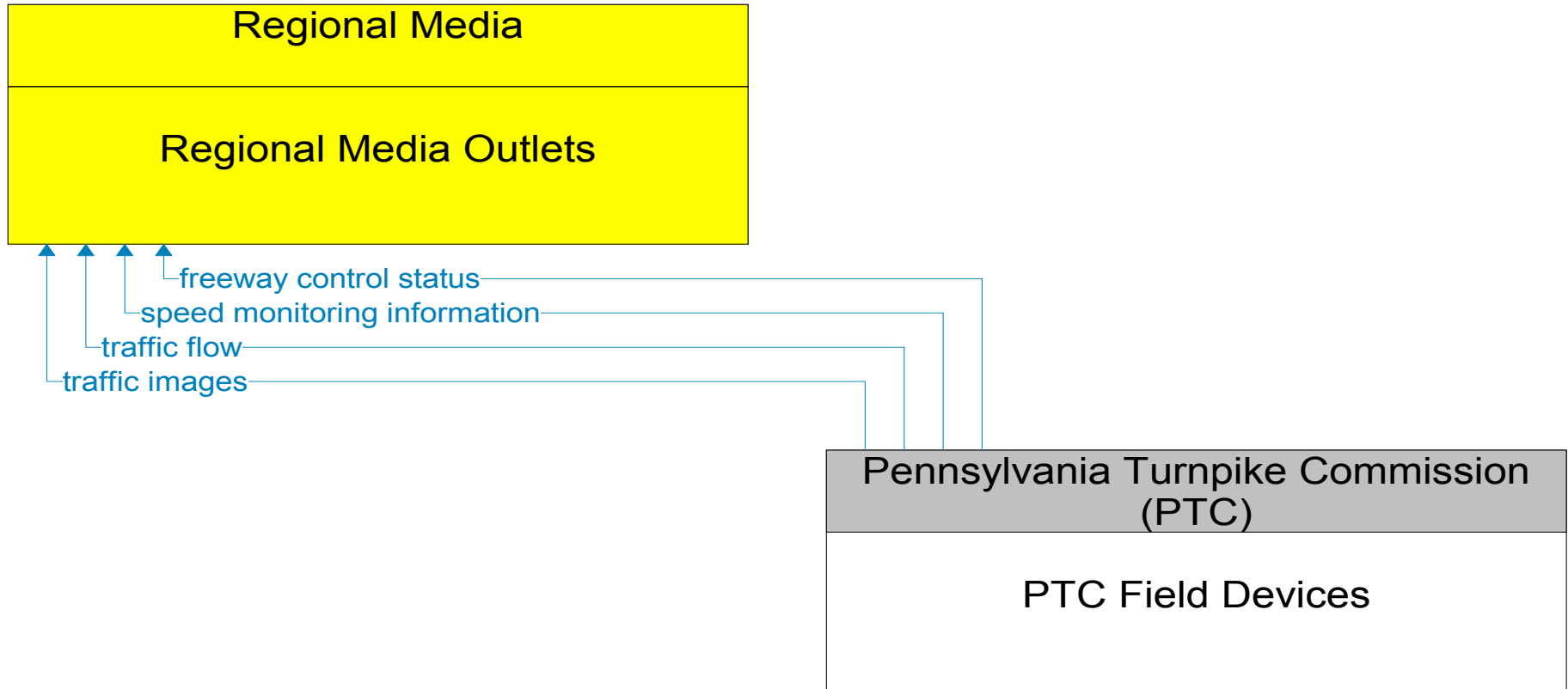


incident information for media
media information request

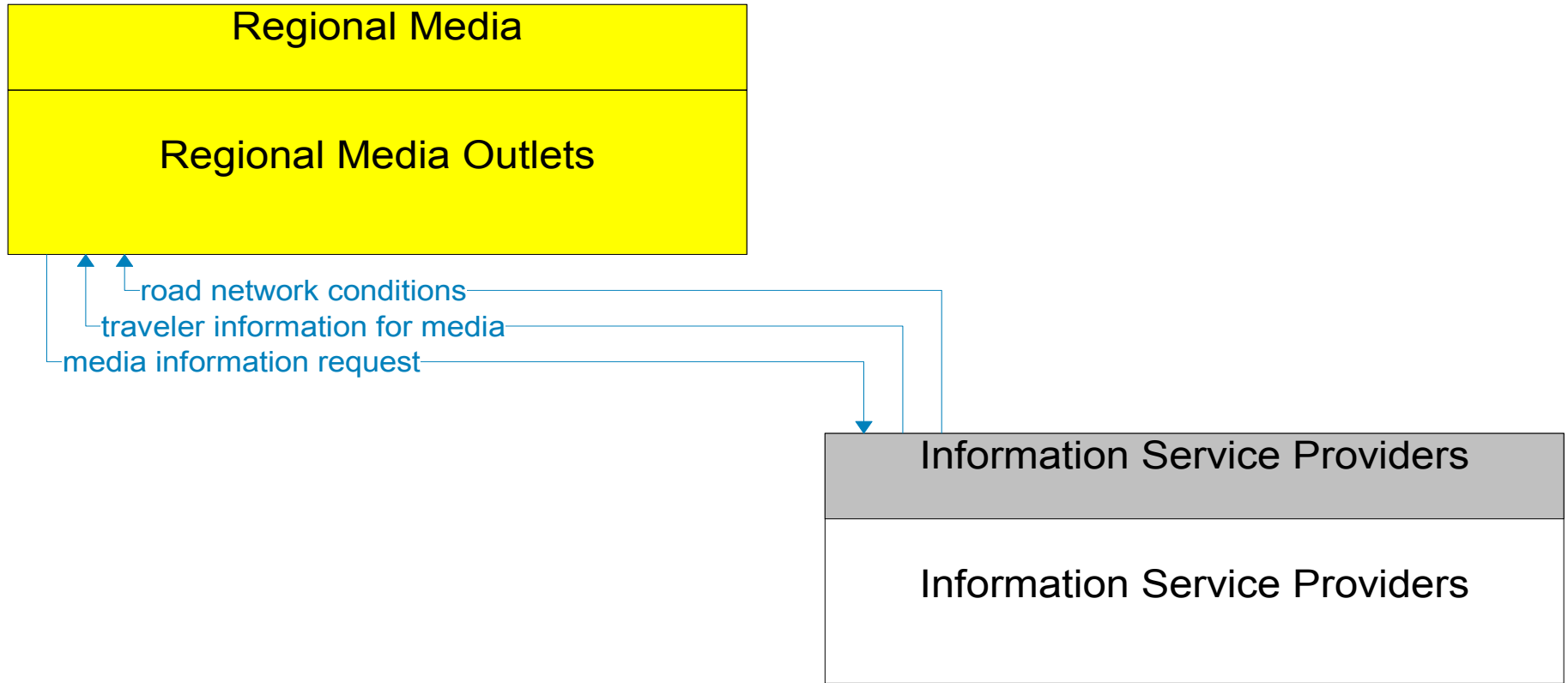
Existing
Planned



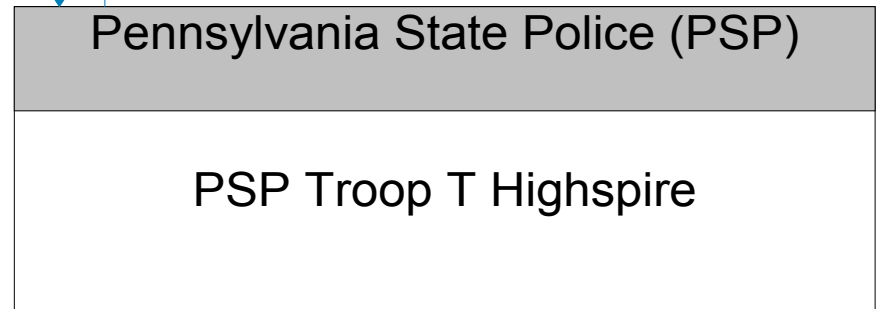
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———— Existing
----- Planned



———— Existing
----- Planned

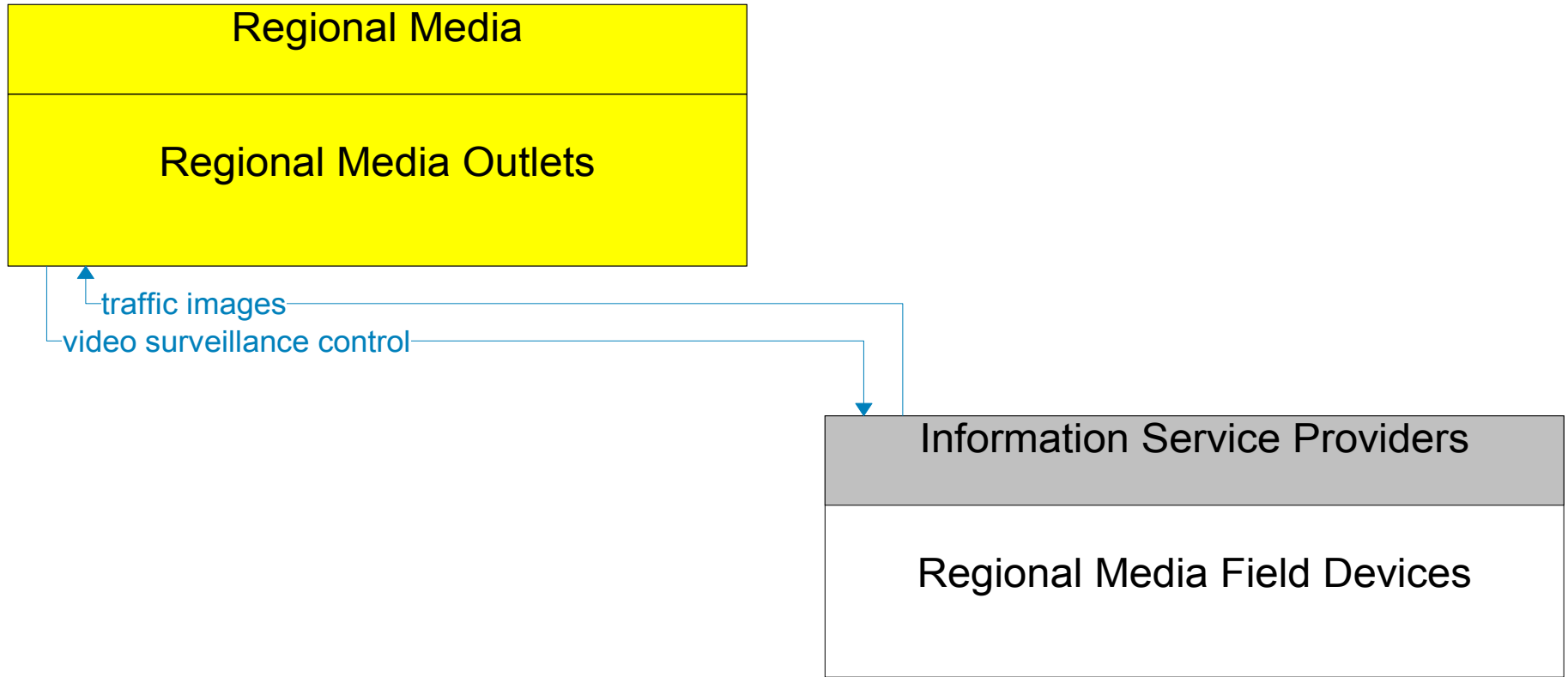


incident information for media

media information request

Existing

Planned

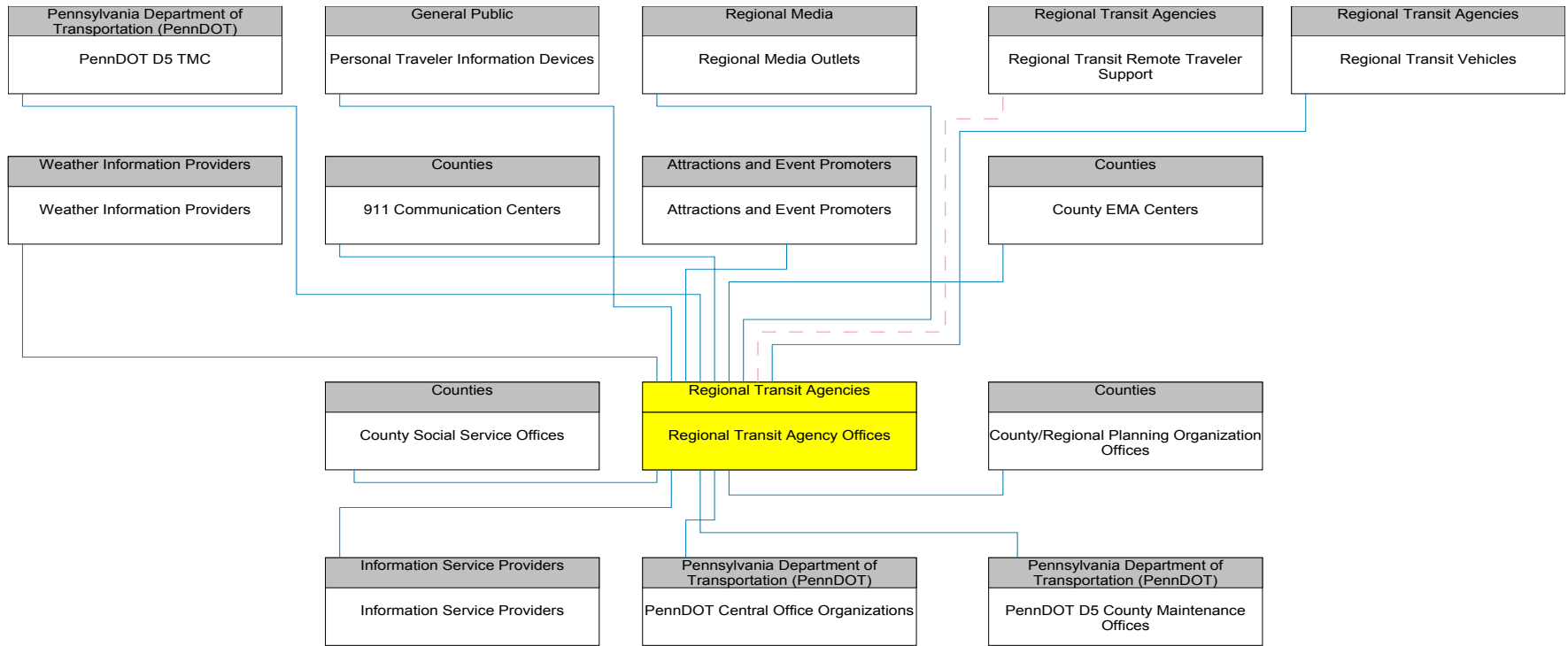


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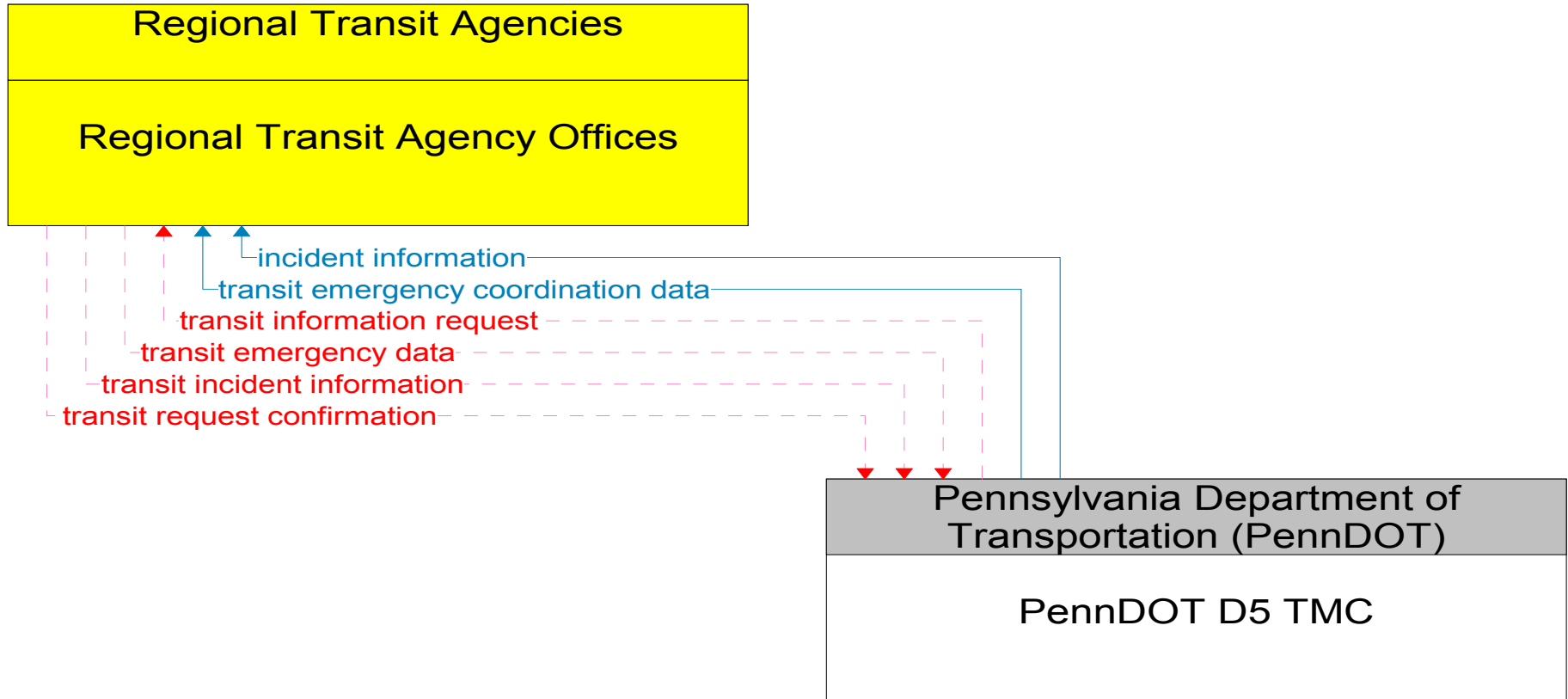
Regional Transit Agency Offices



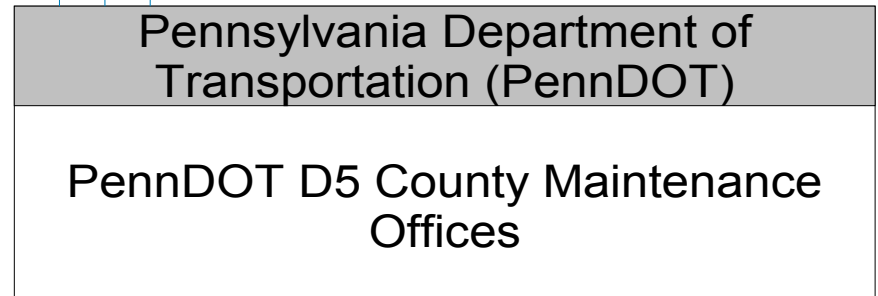
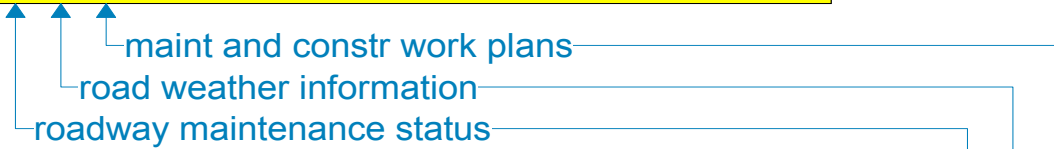
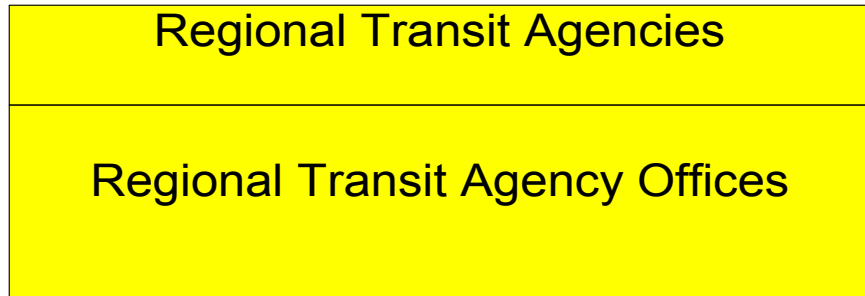
Regional Transit Agency Offices Interconnect Diagram

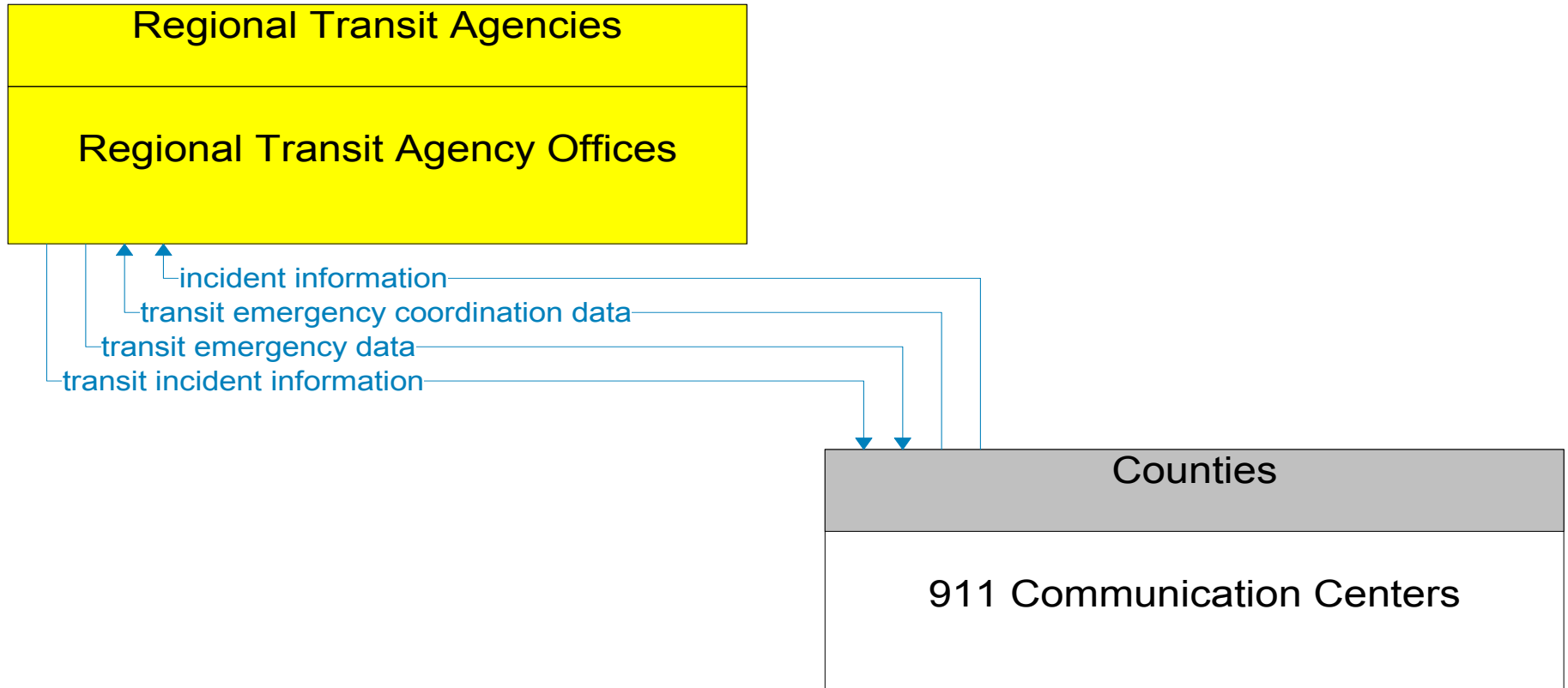


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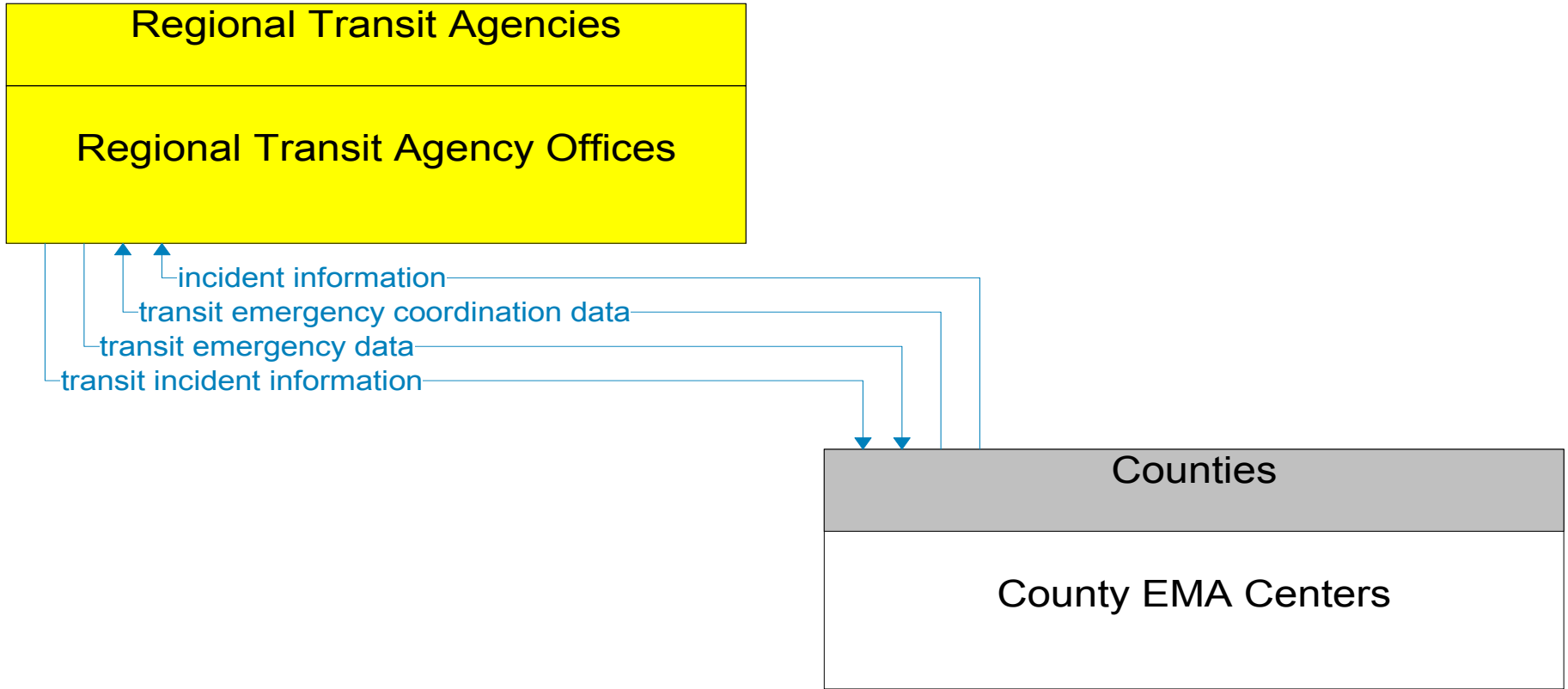


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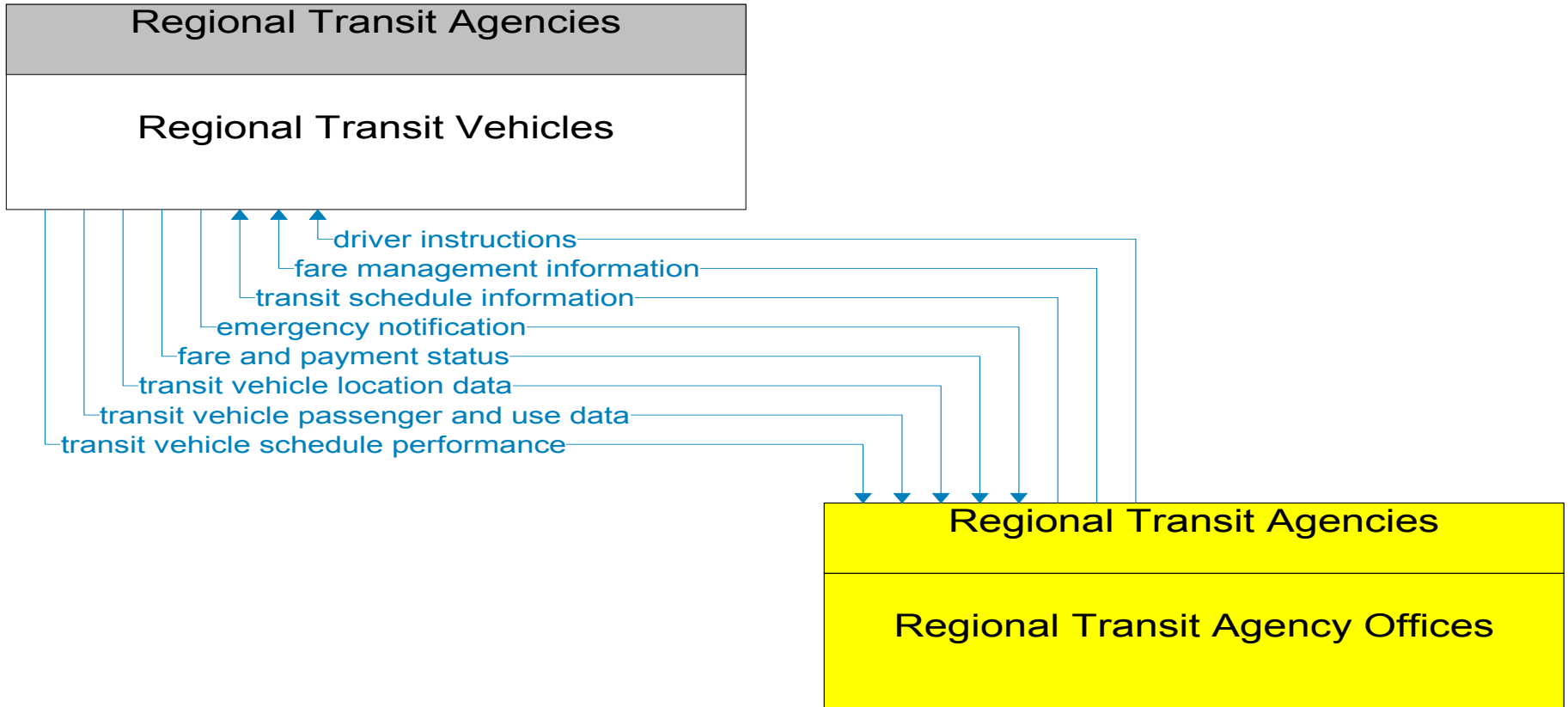




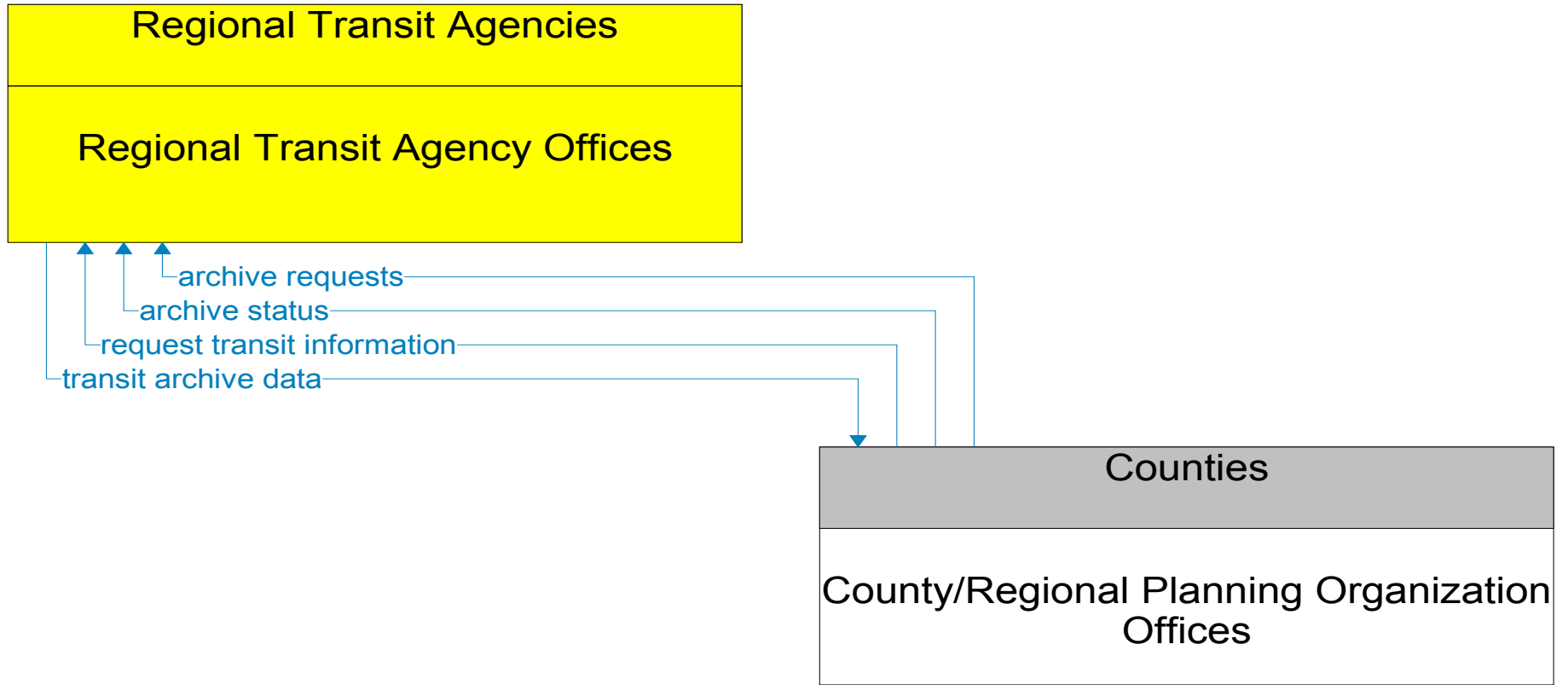
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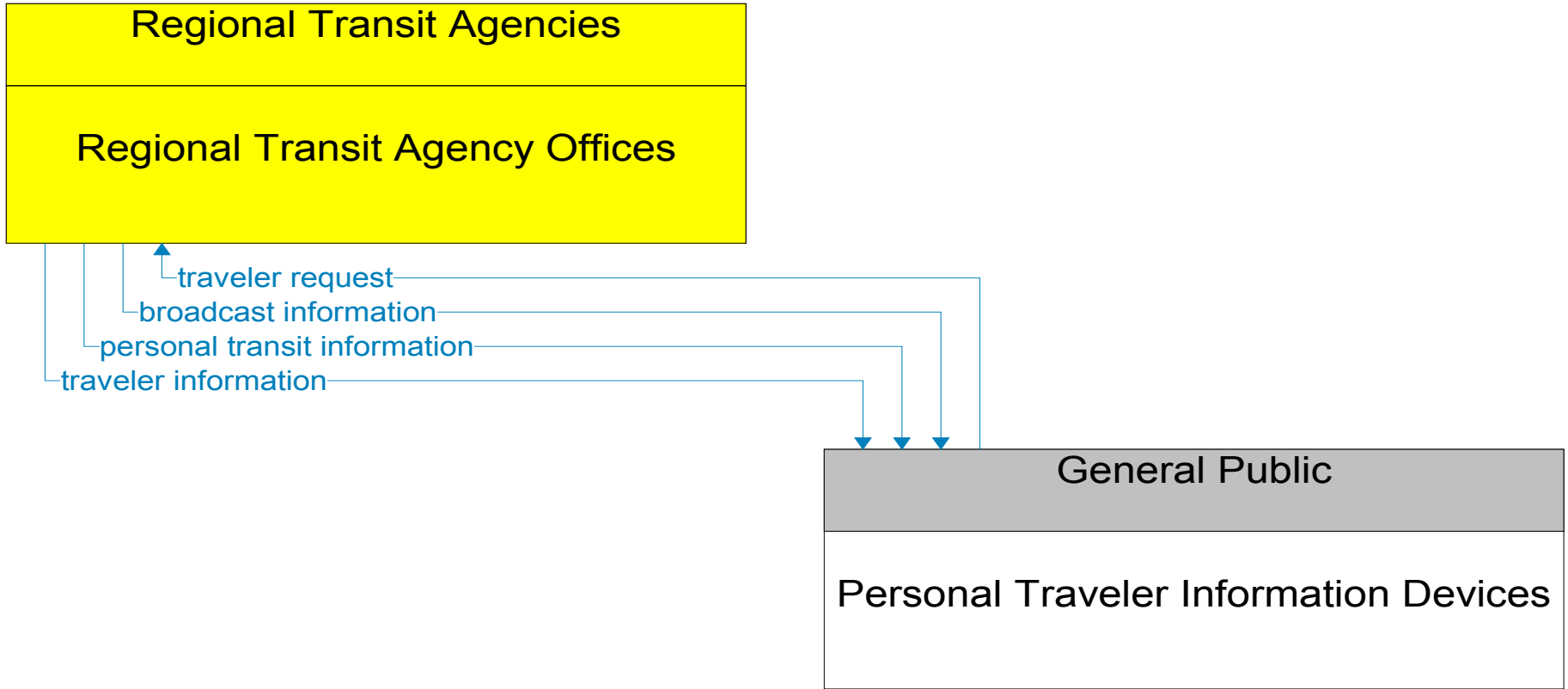
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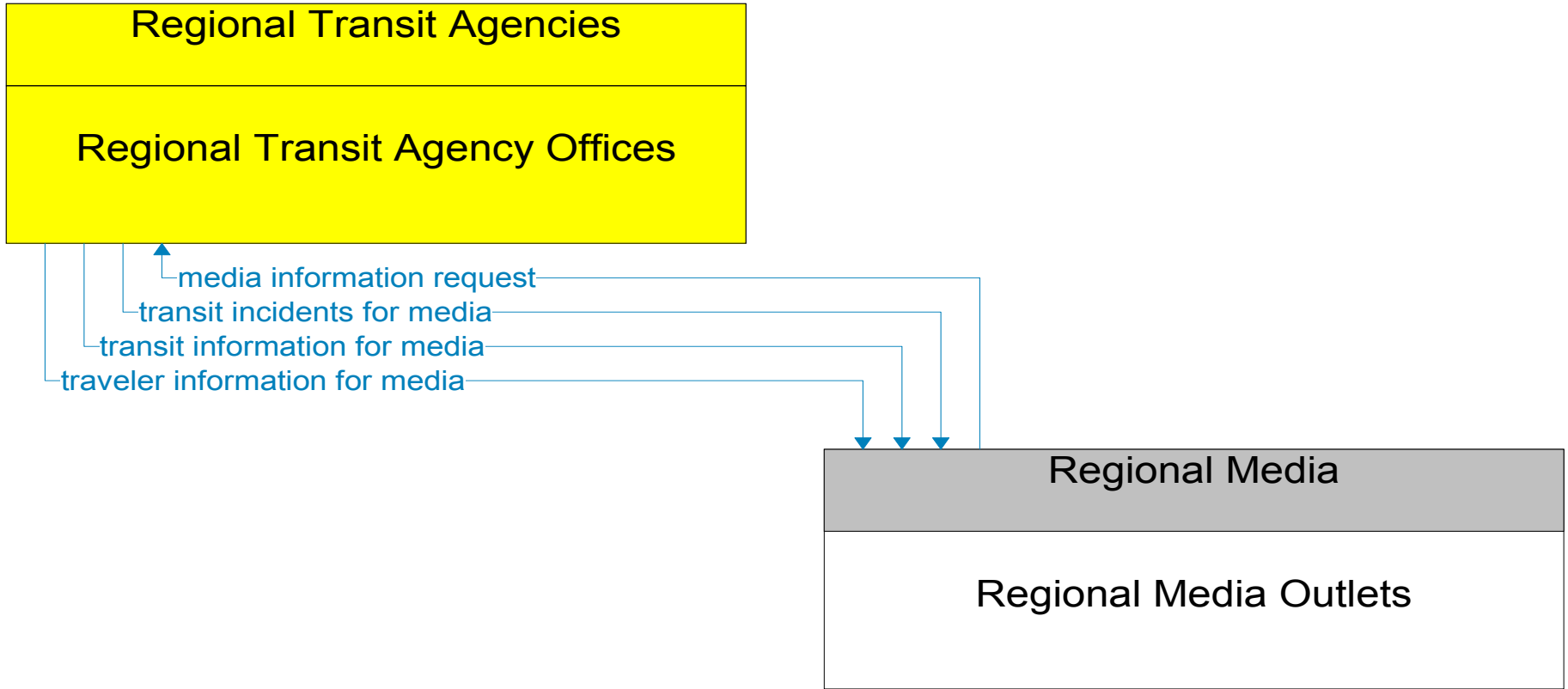
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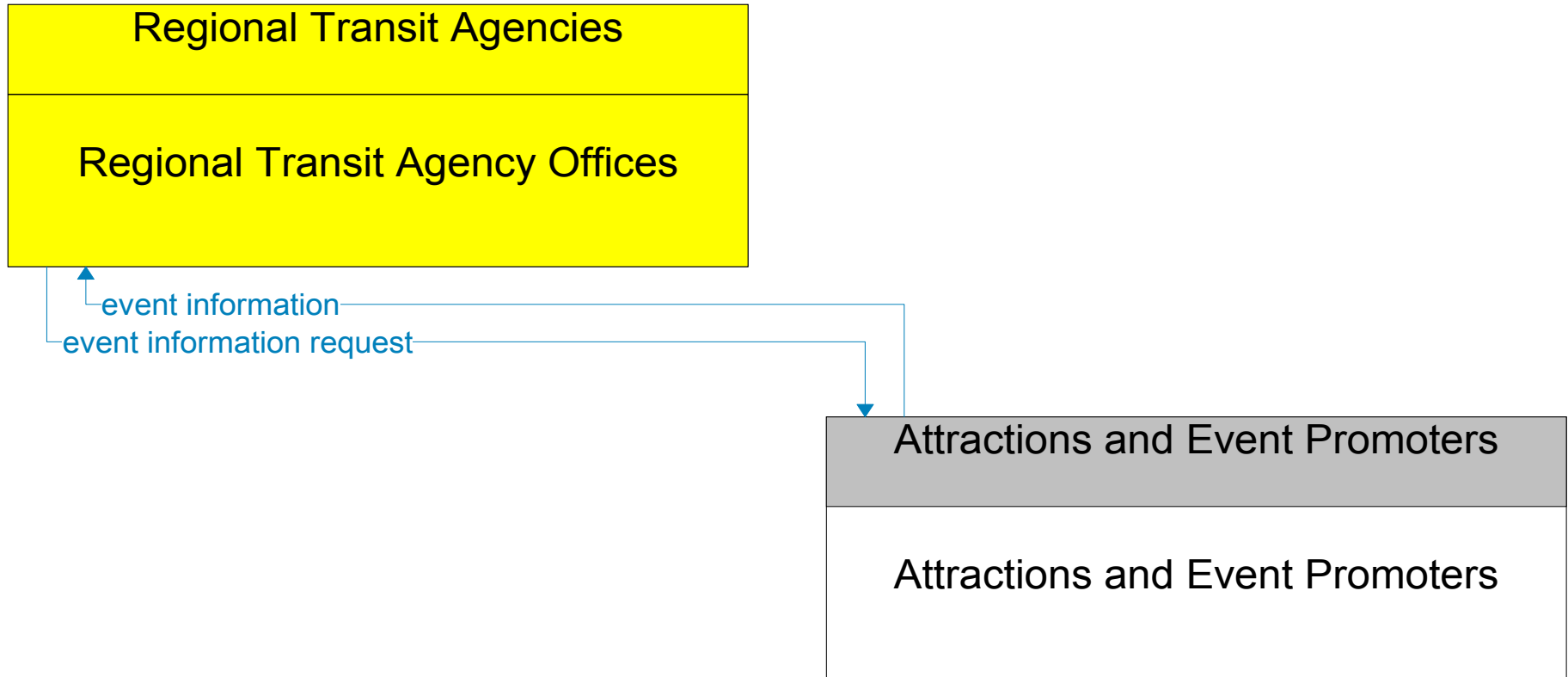


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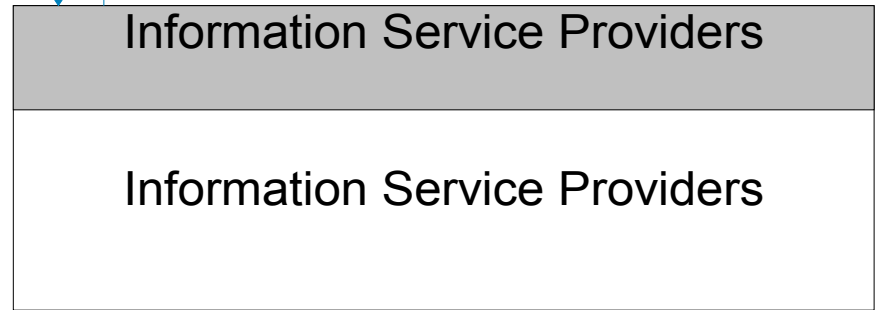
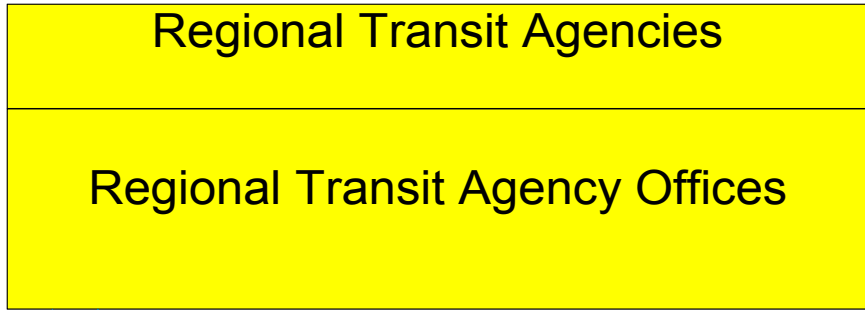


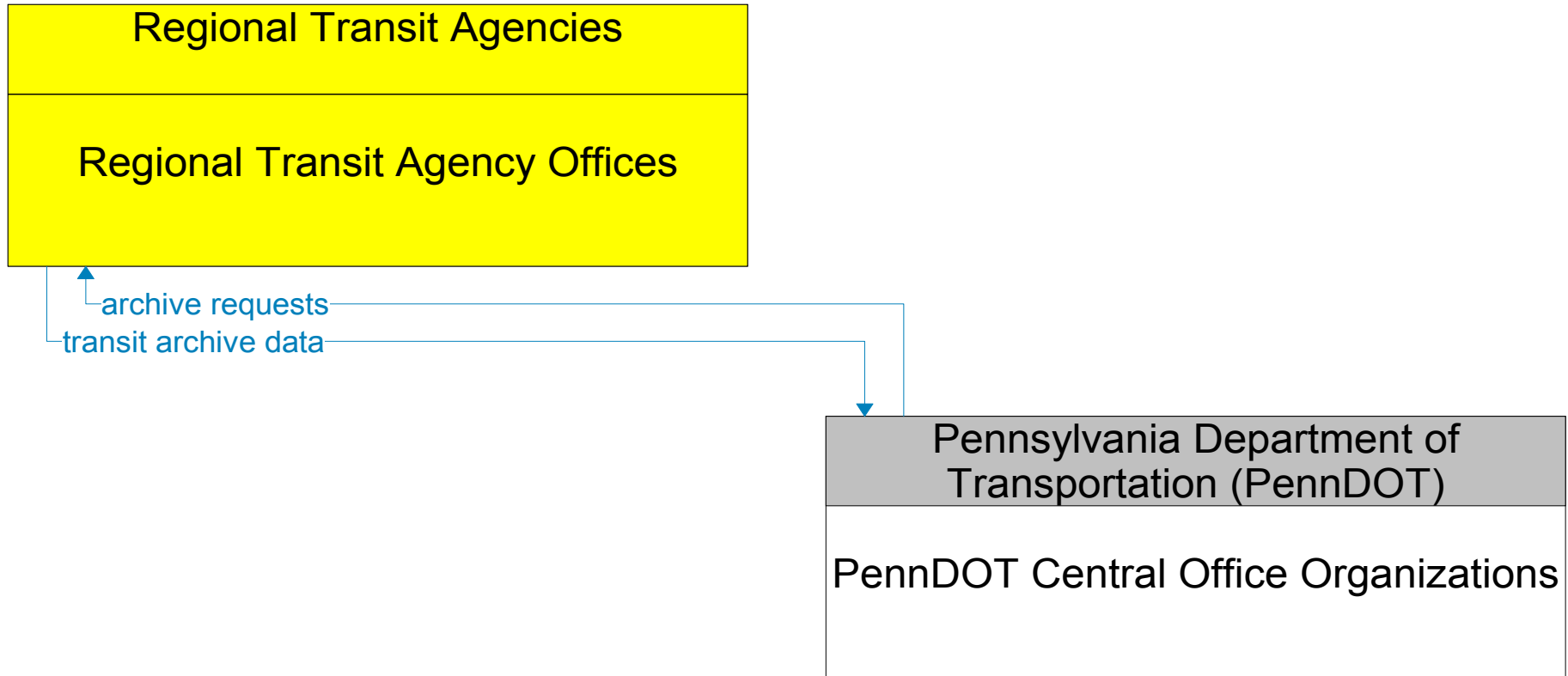
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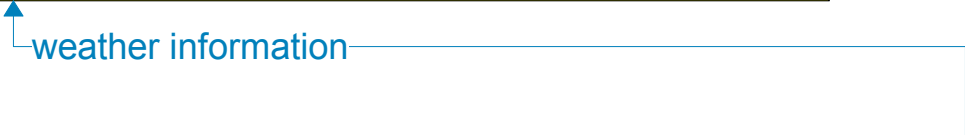
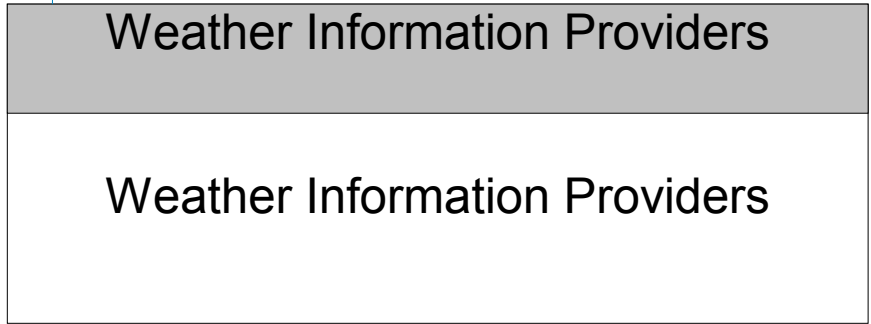
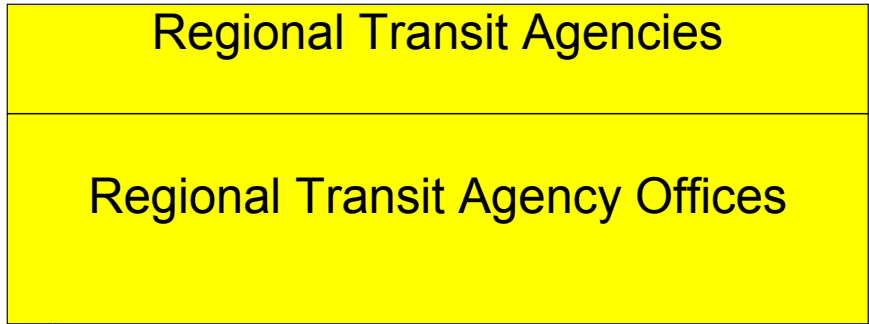


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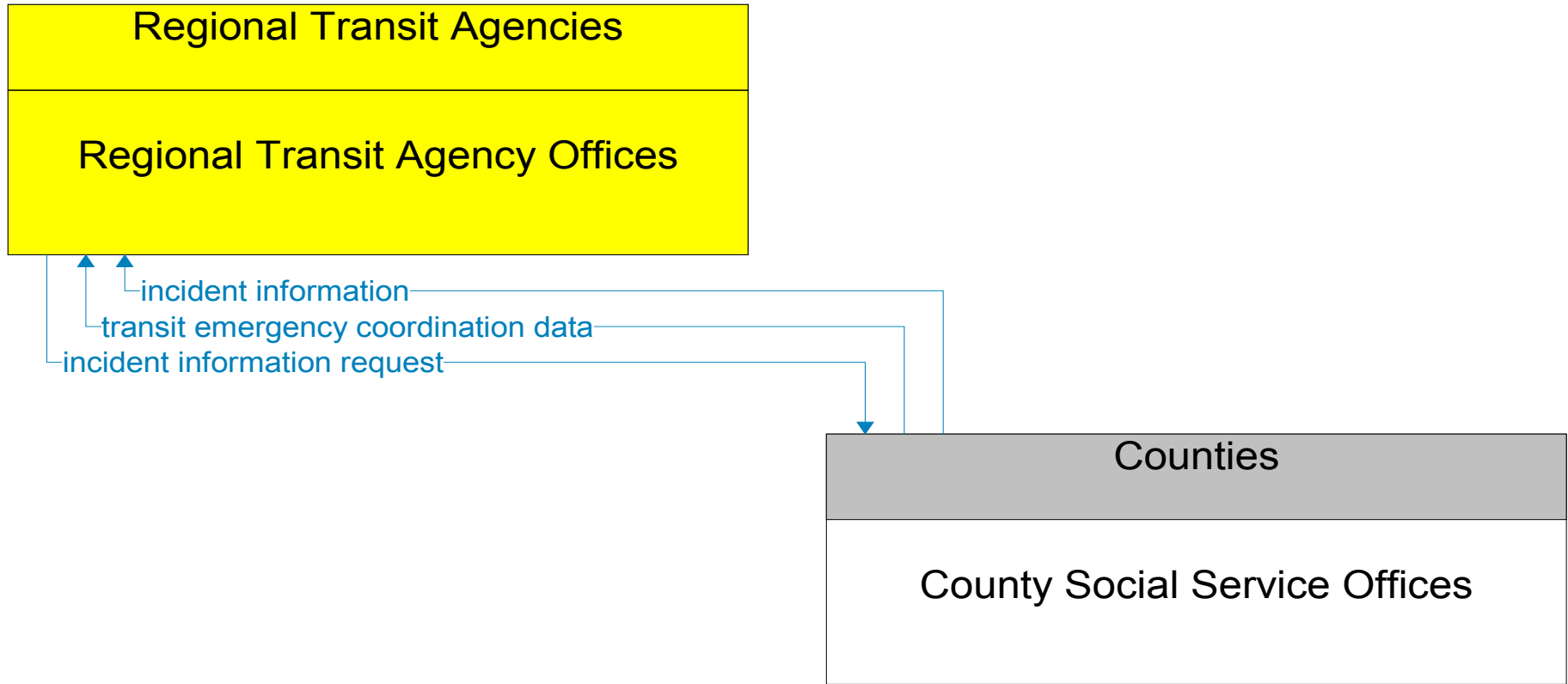




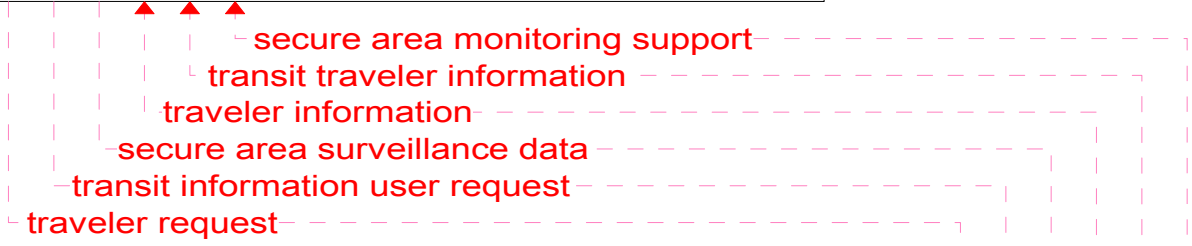
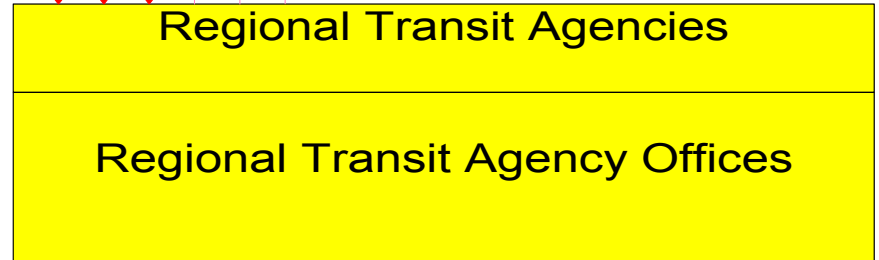
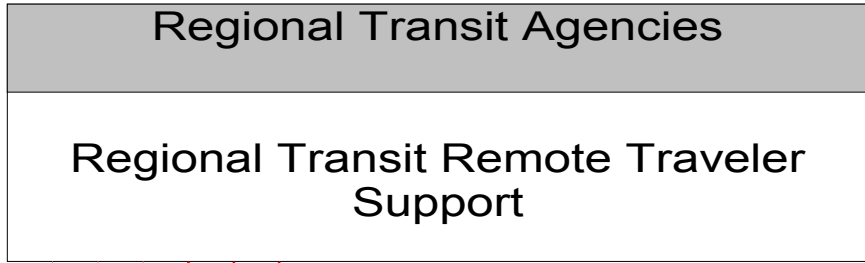
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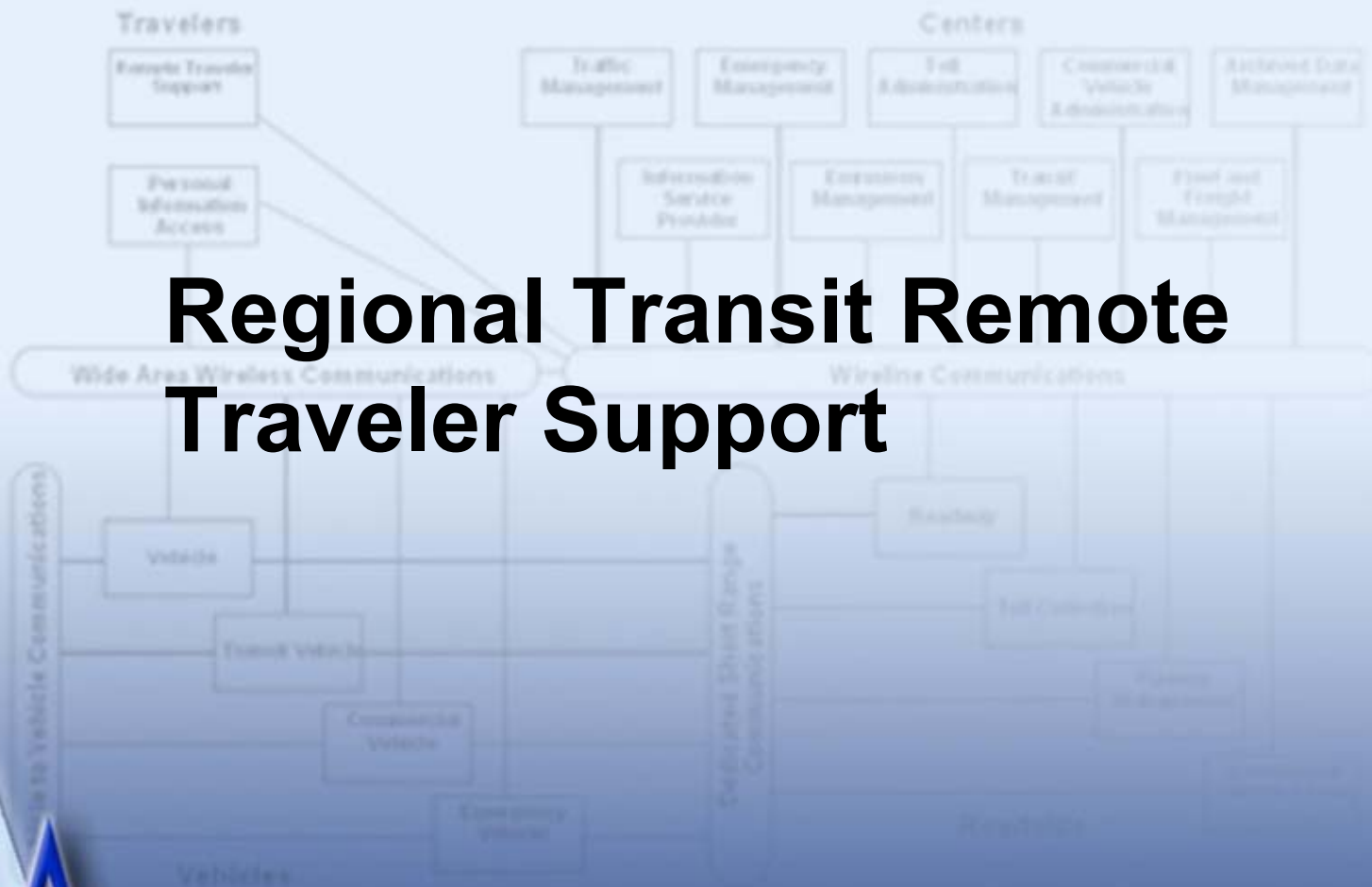


———— Existing
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———— Existing
- - - - - Planned

Regional Transit Remote Traveler Support

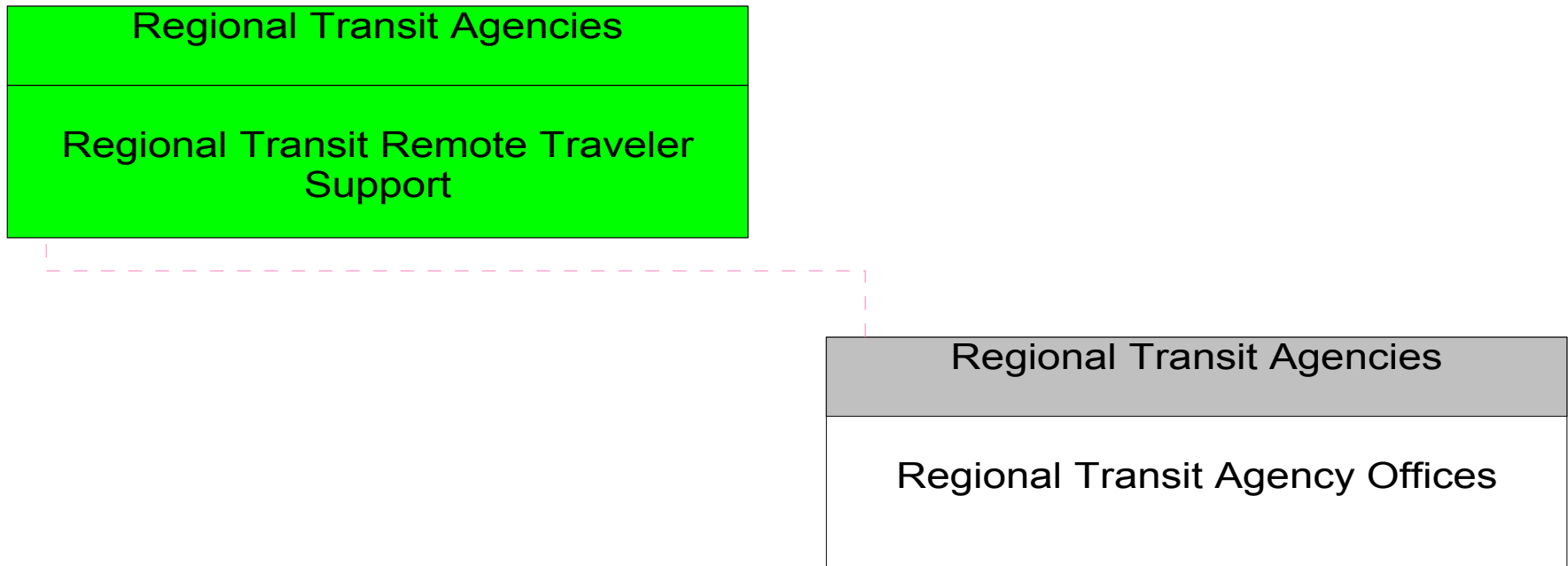


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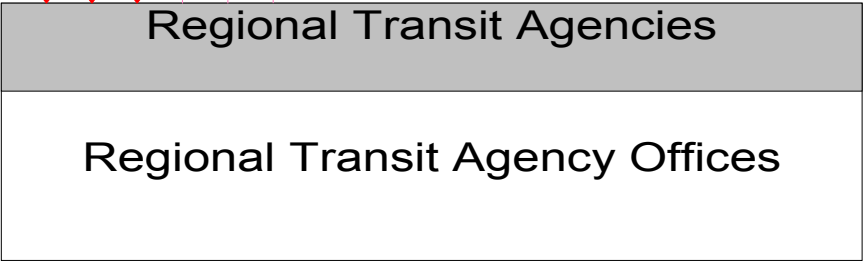
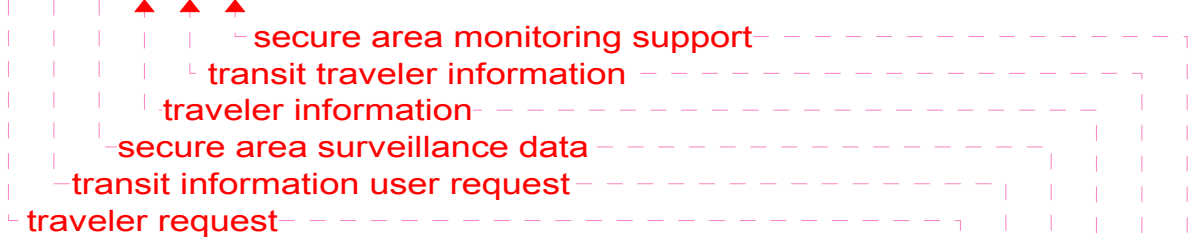
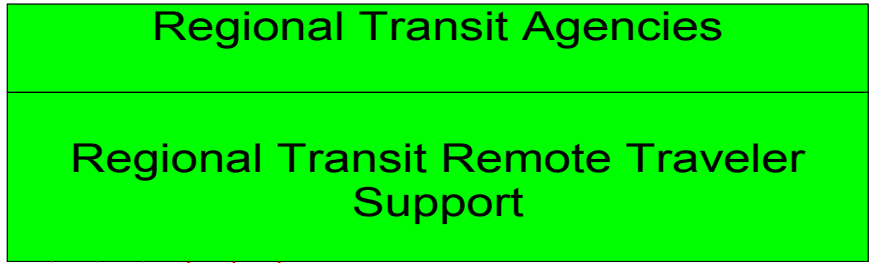
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Regional Transit Remote Traveler Support Interconnect Diagram

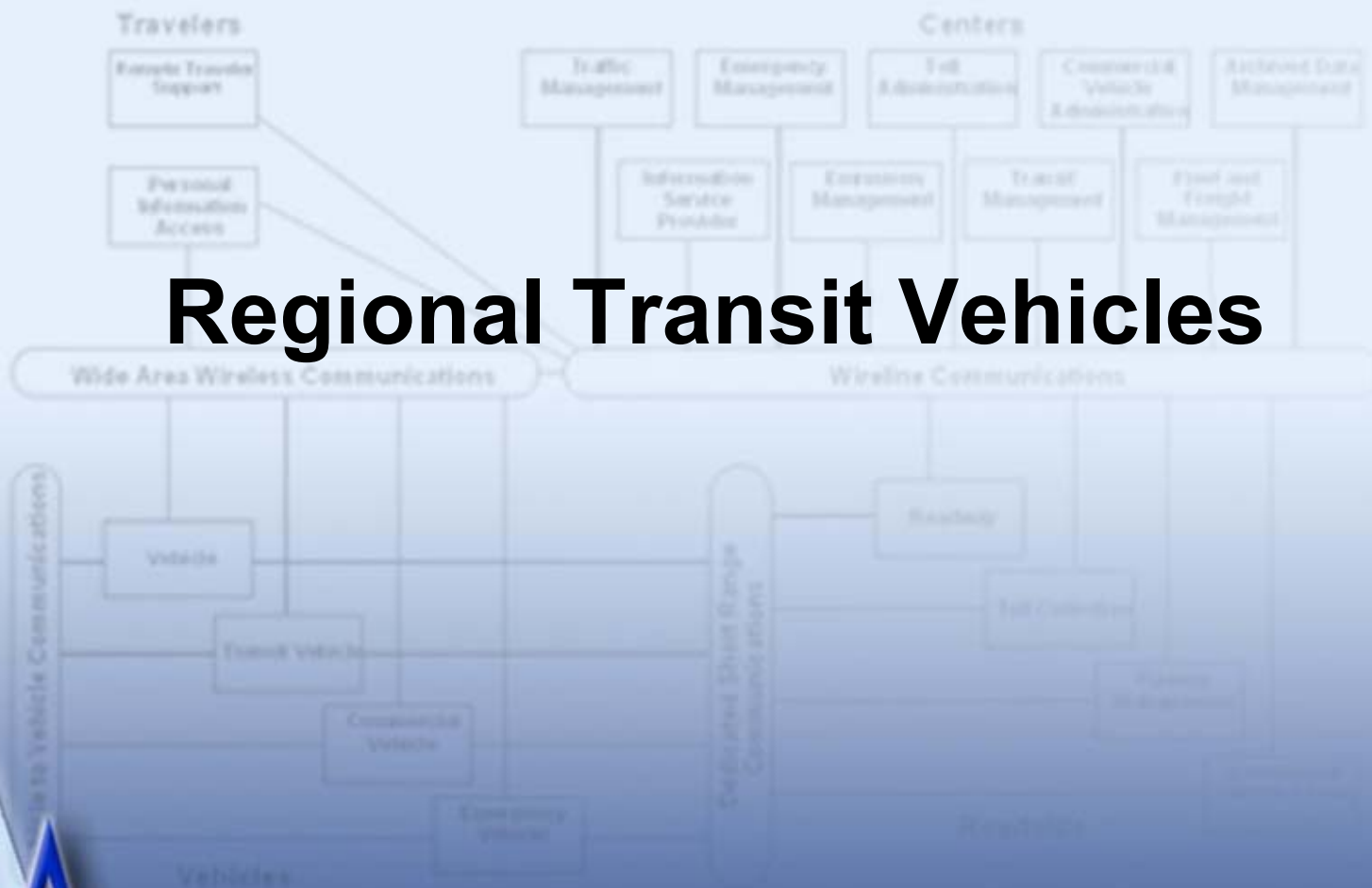


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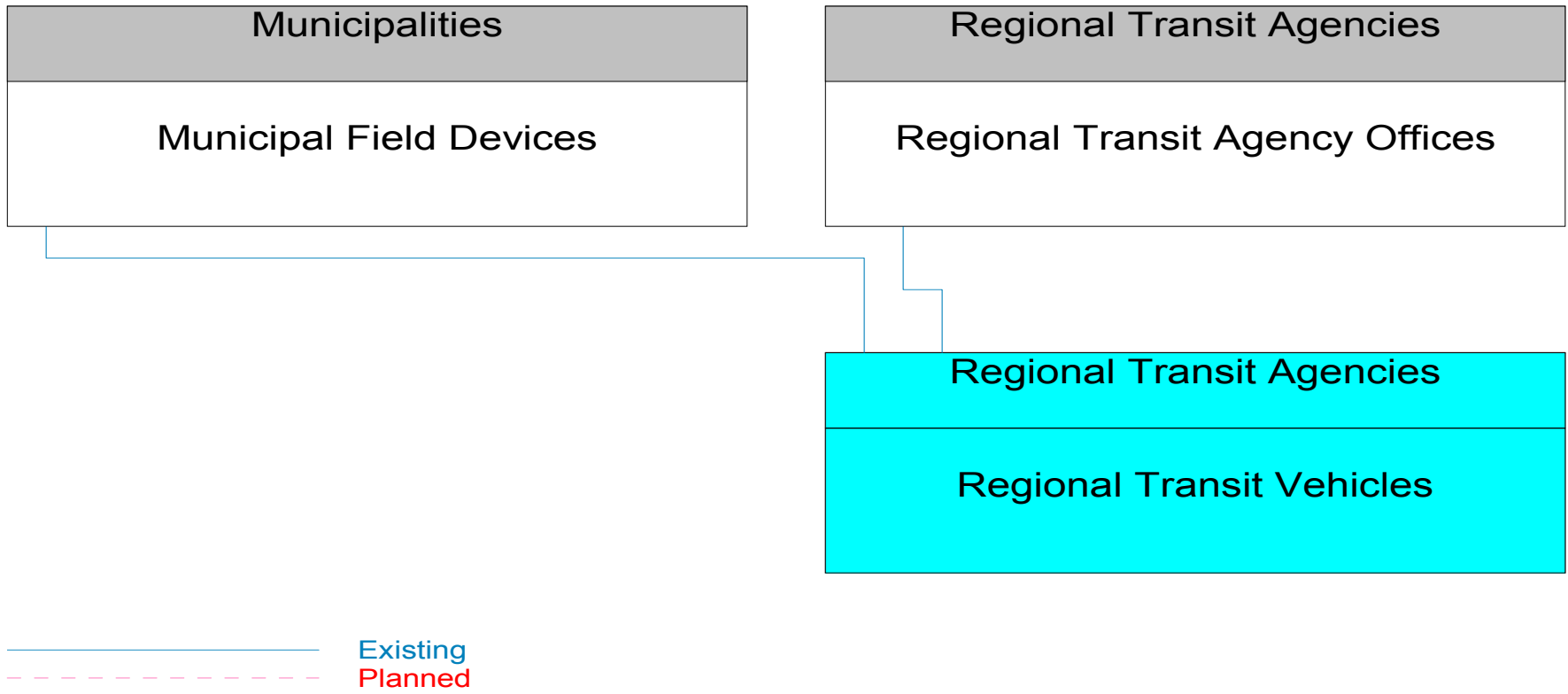


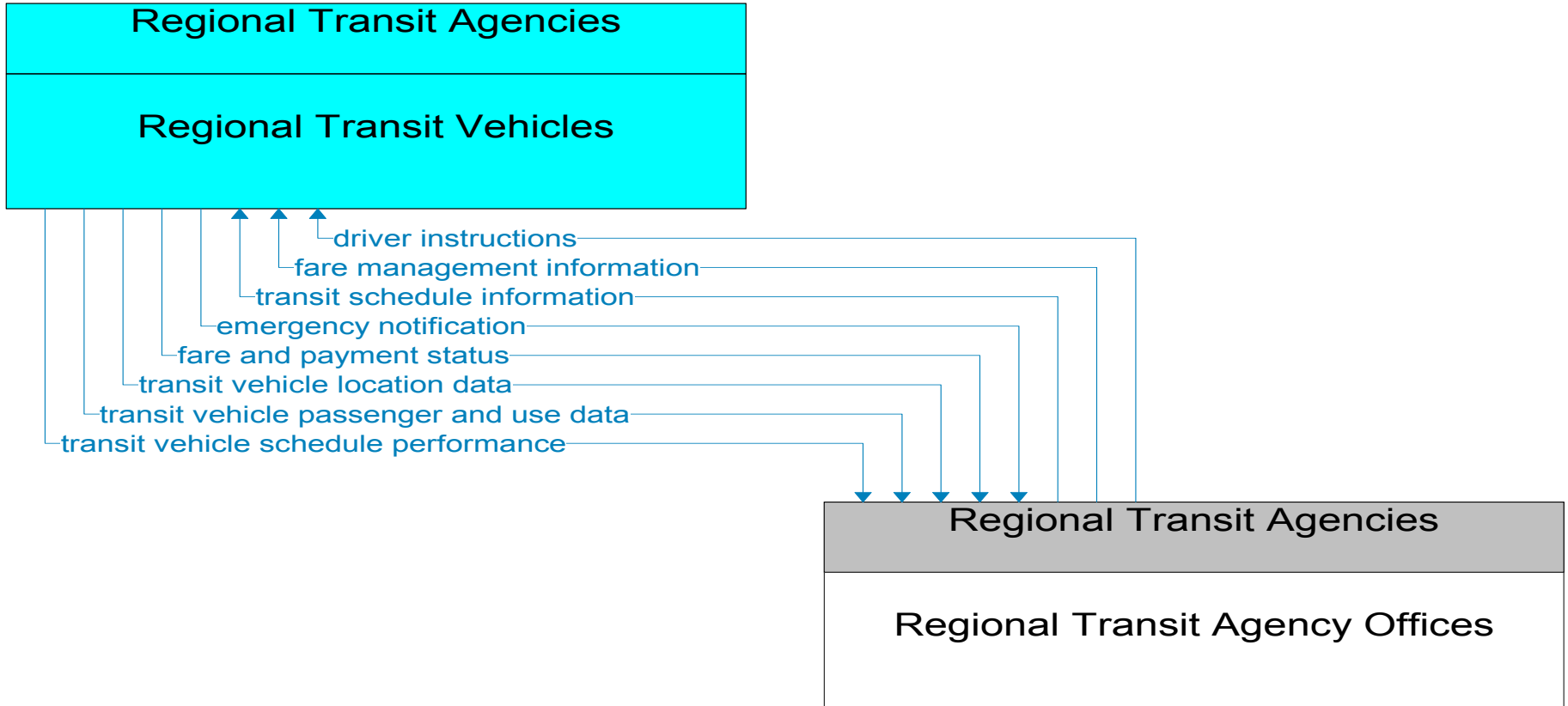
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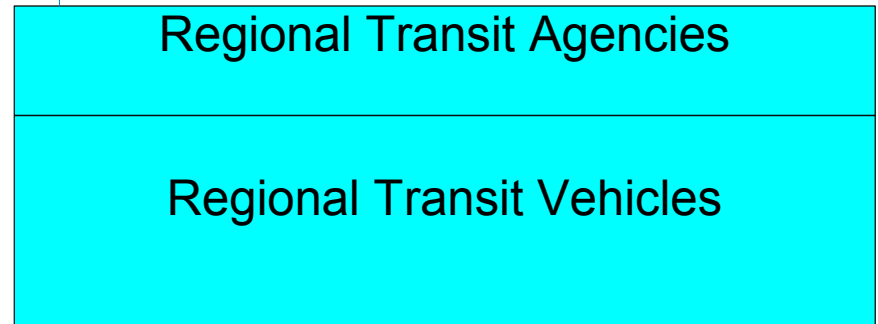
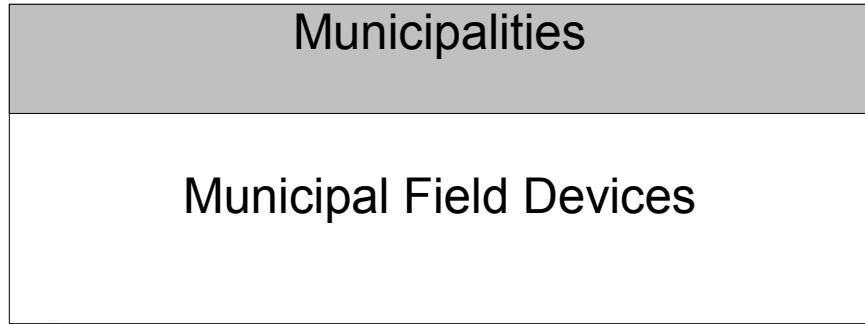


Regional Transit Vehicles Interconnect Diagram



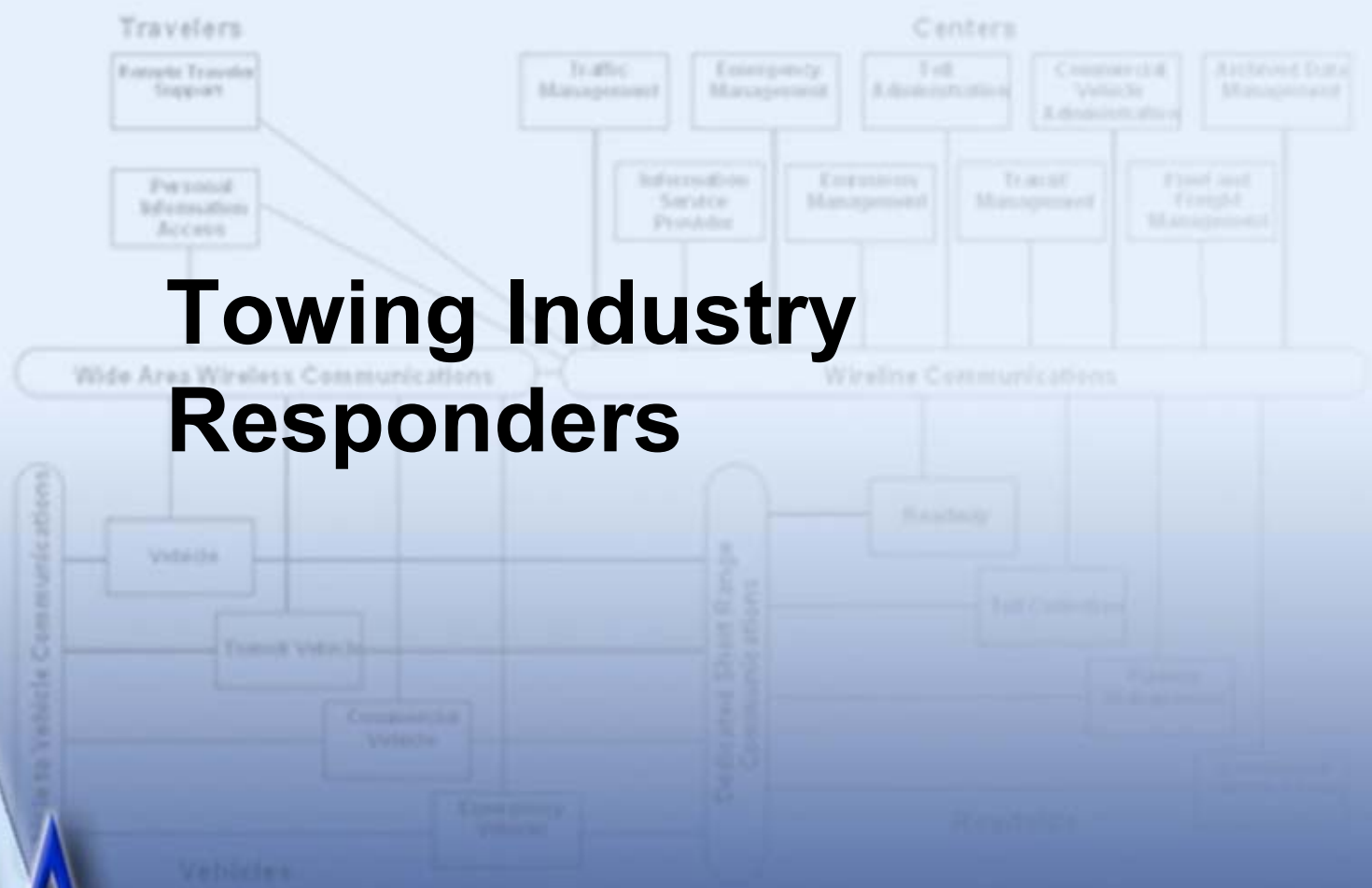


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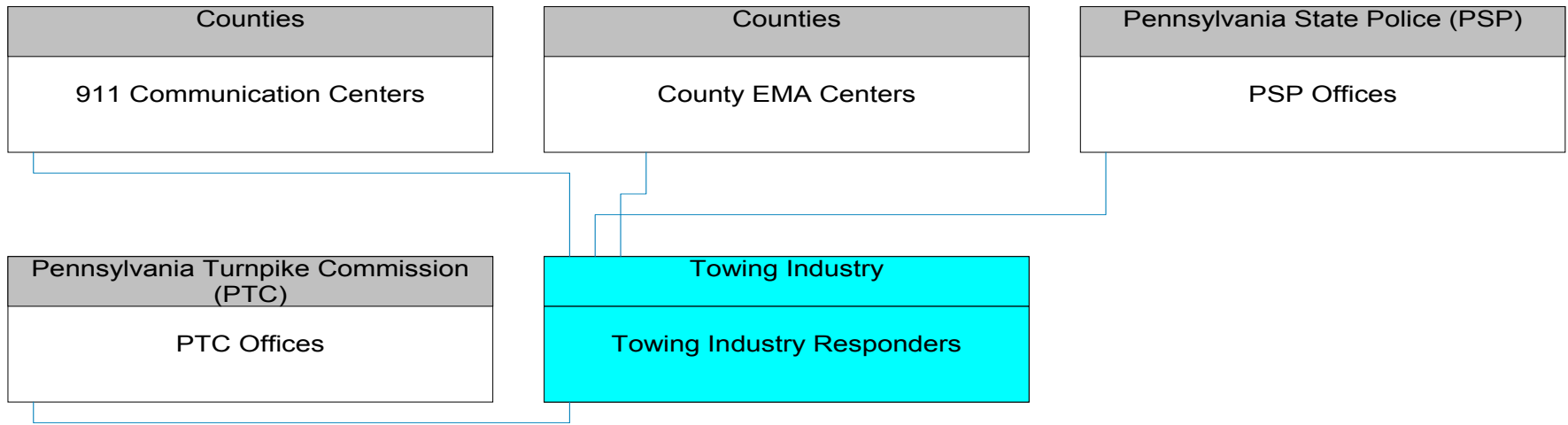


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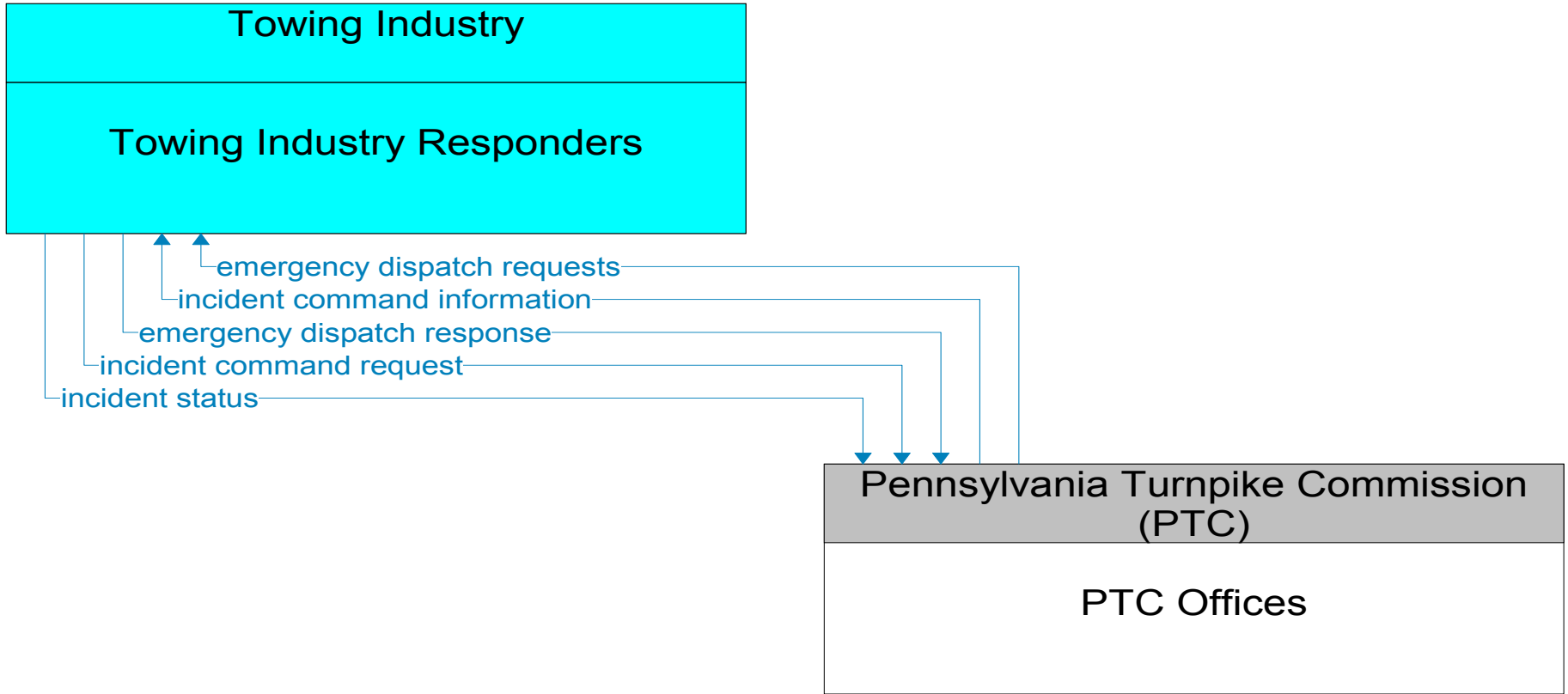
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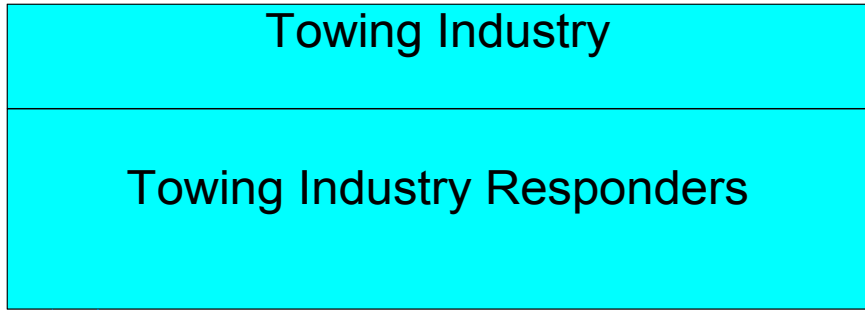
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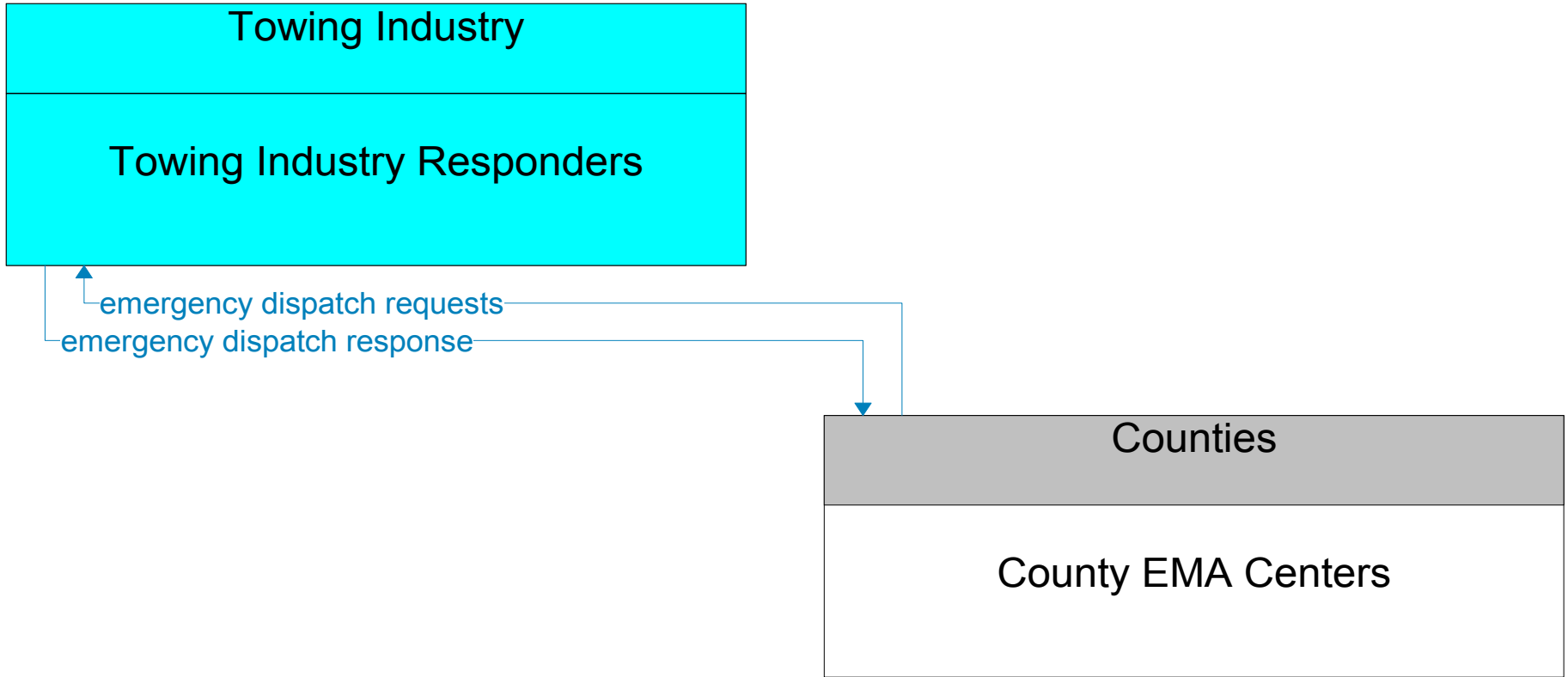


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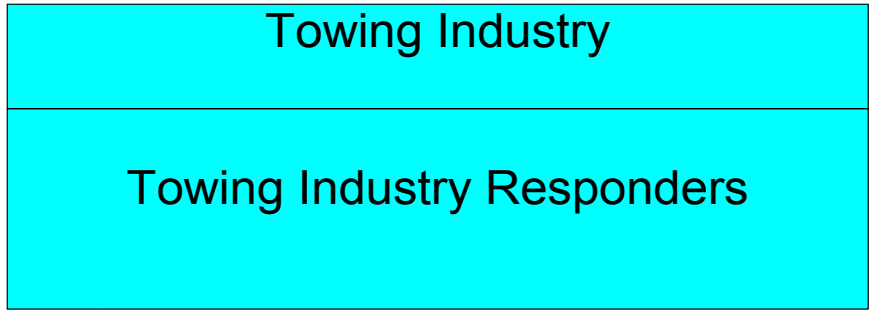


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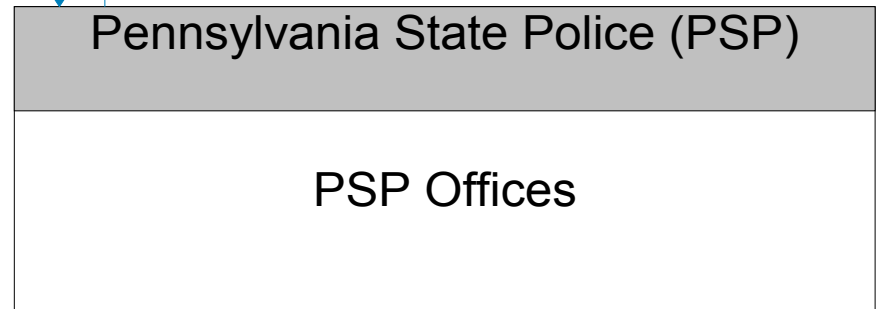


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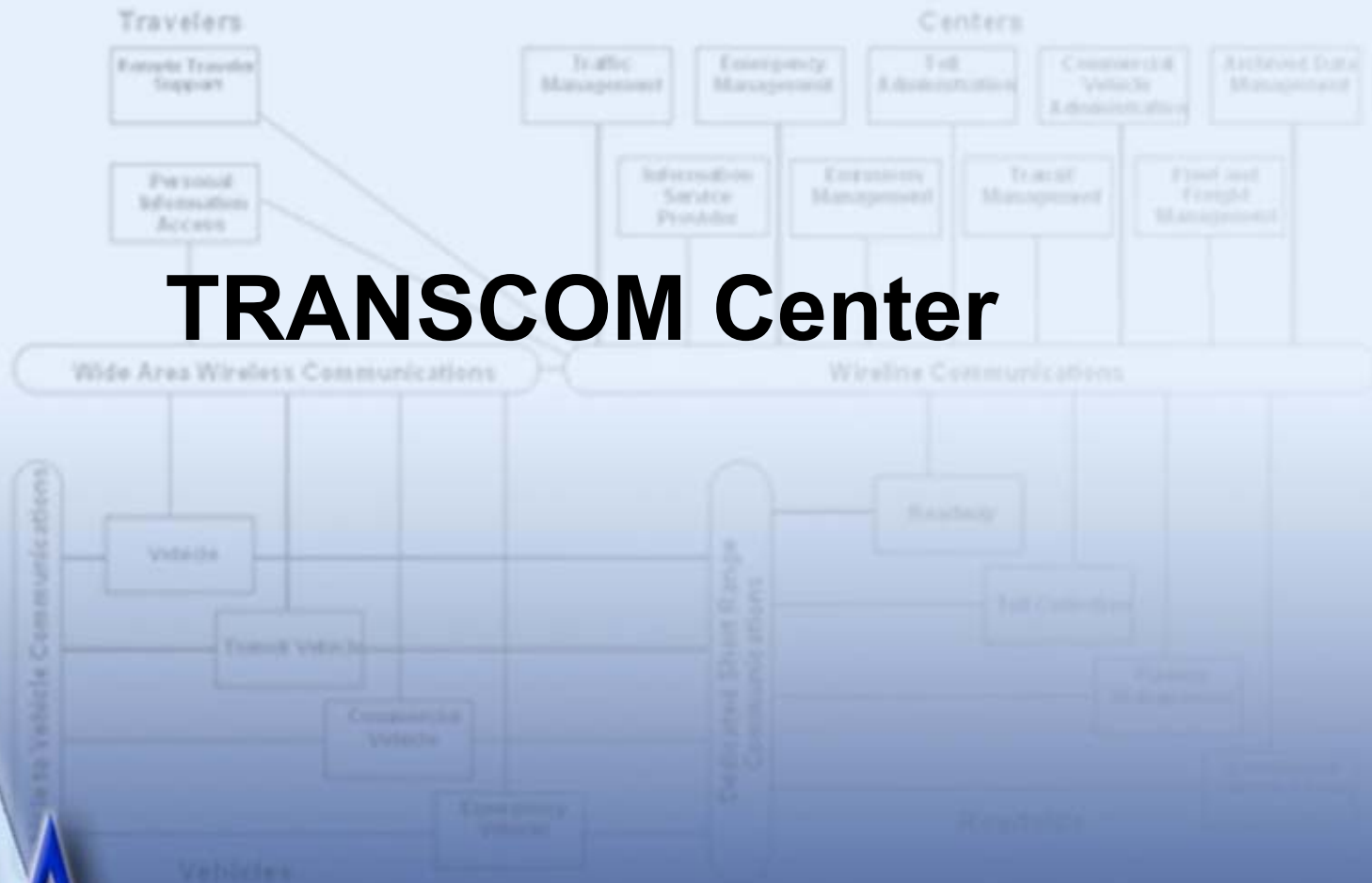
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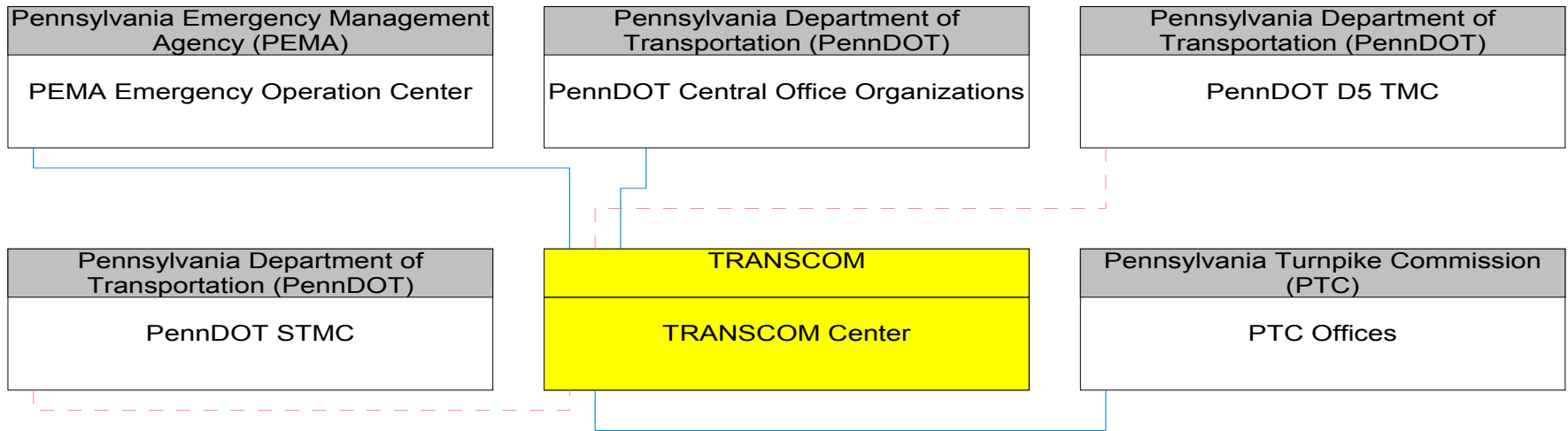
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TRANSCOM Center

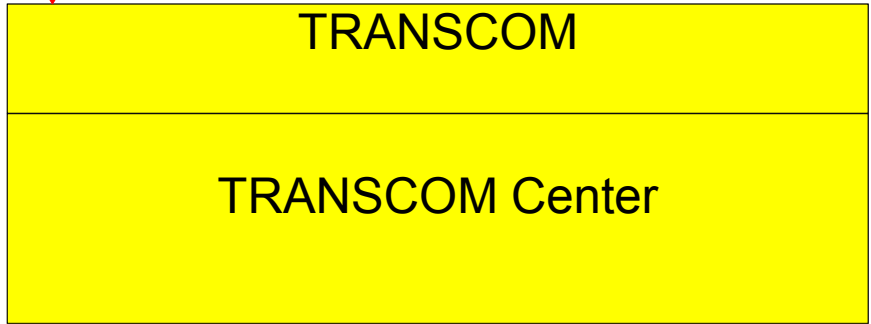
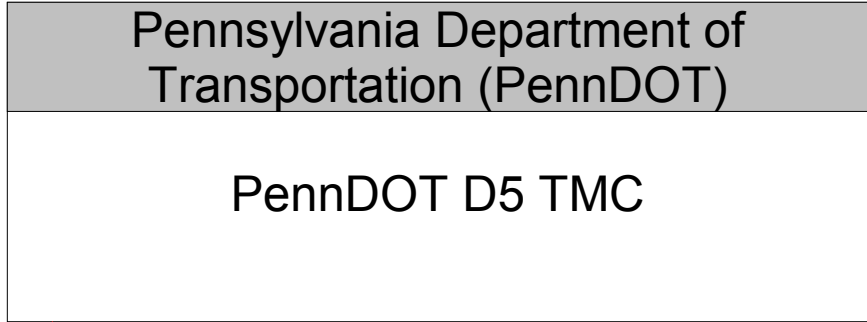


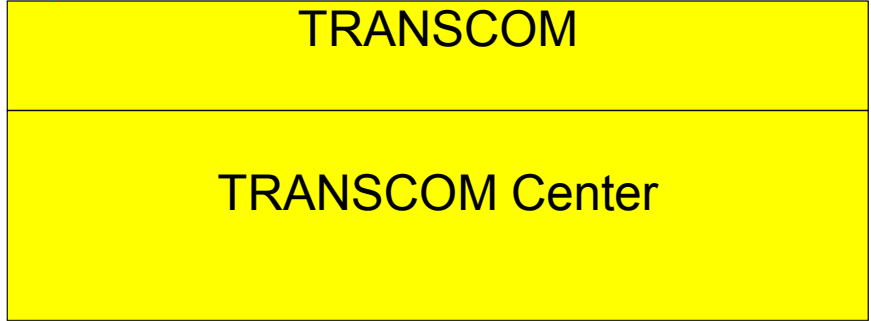
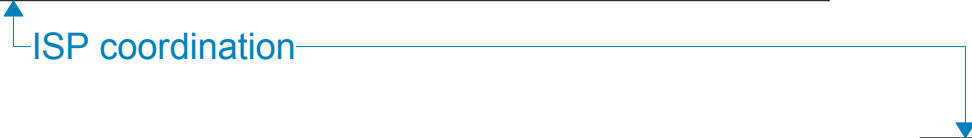
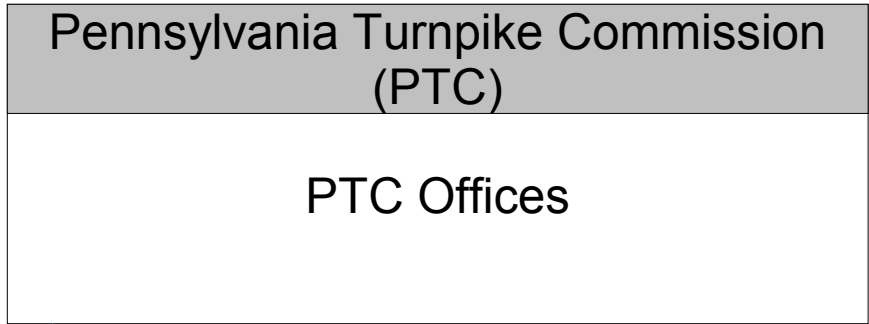
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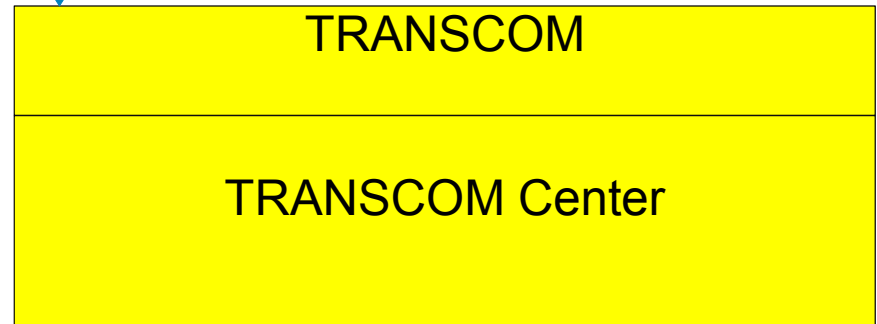
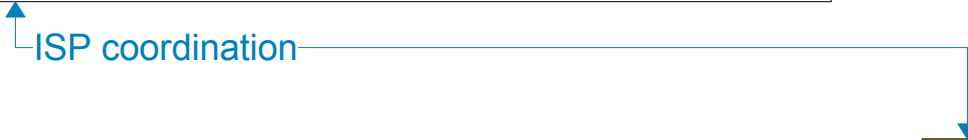
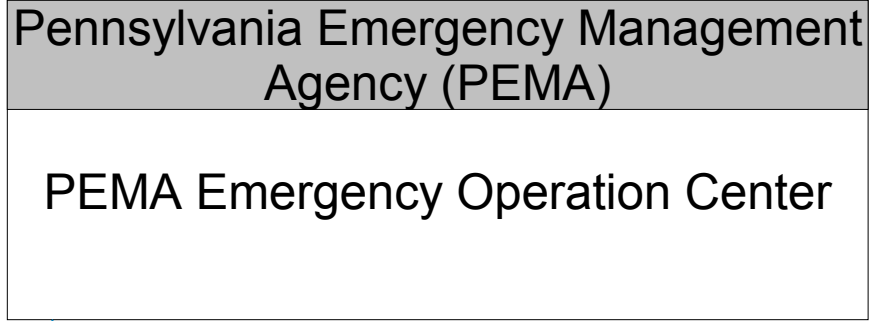


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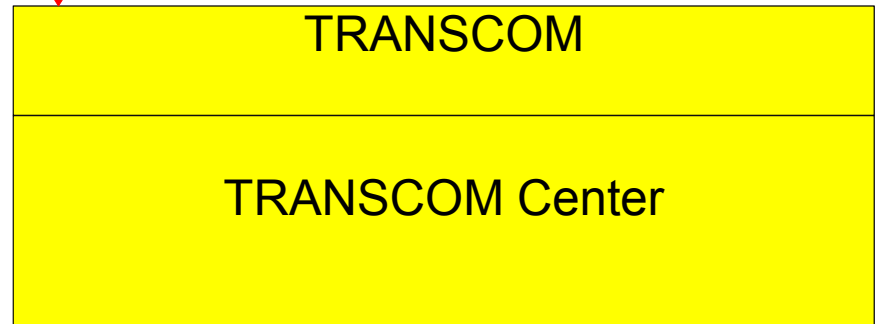
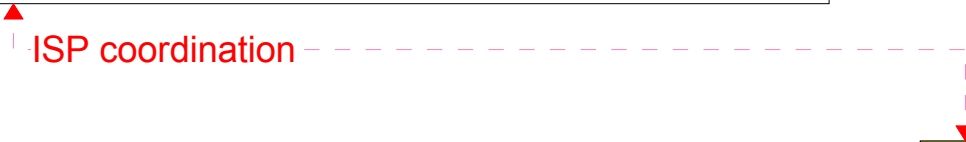
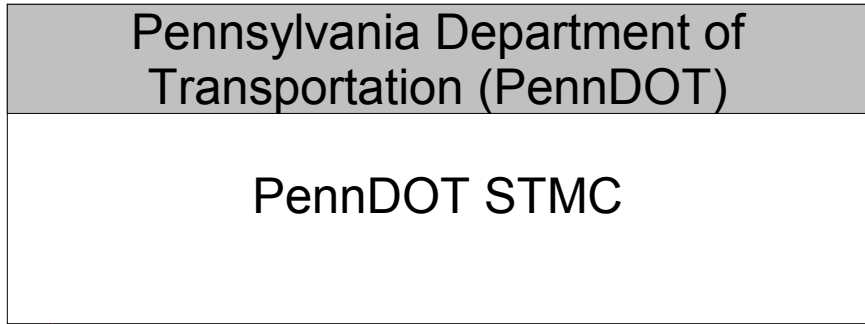


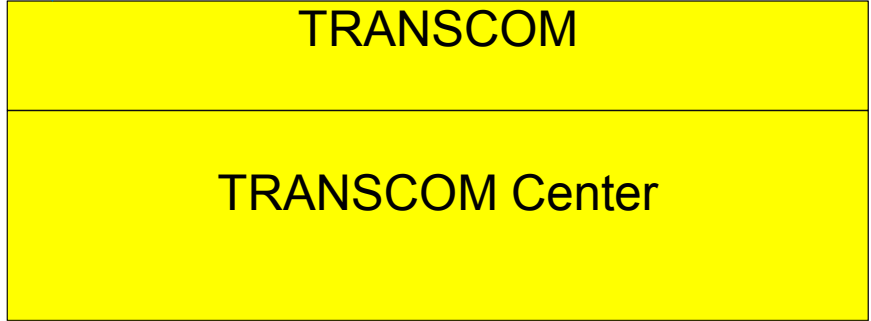
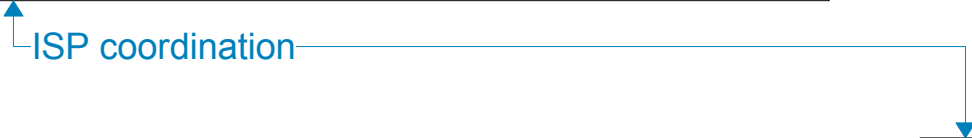
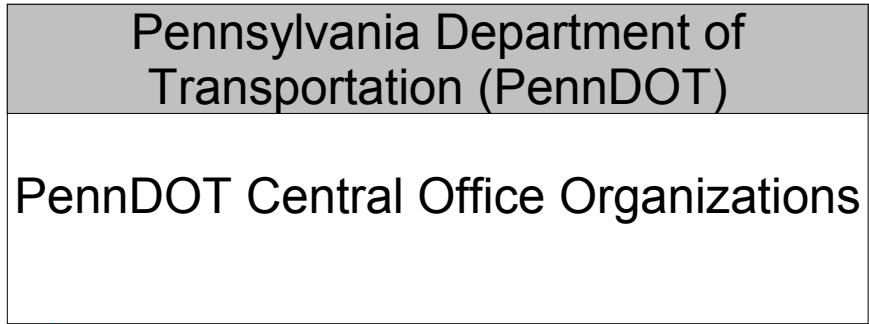


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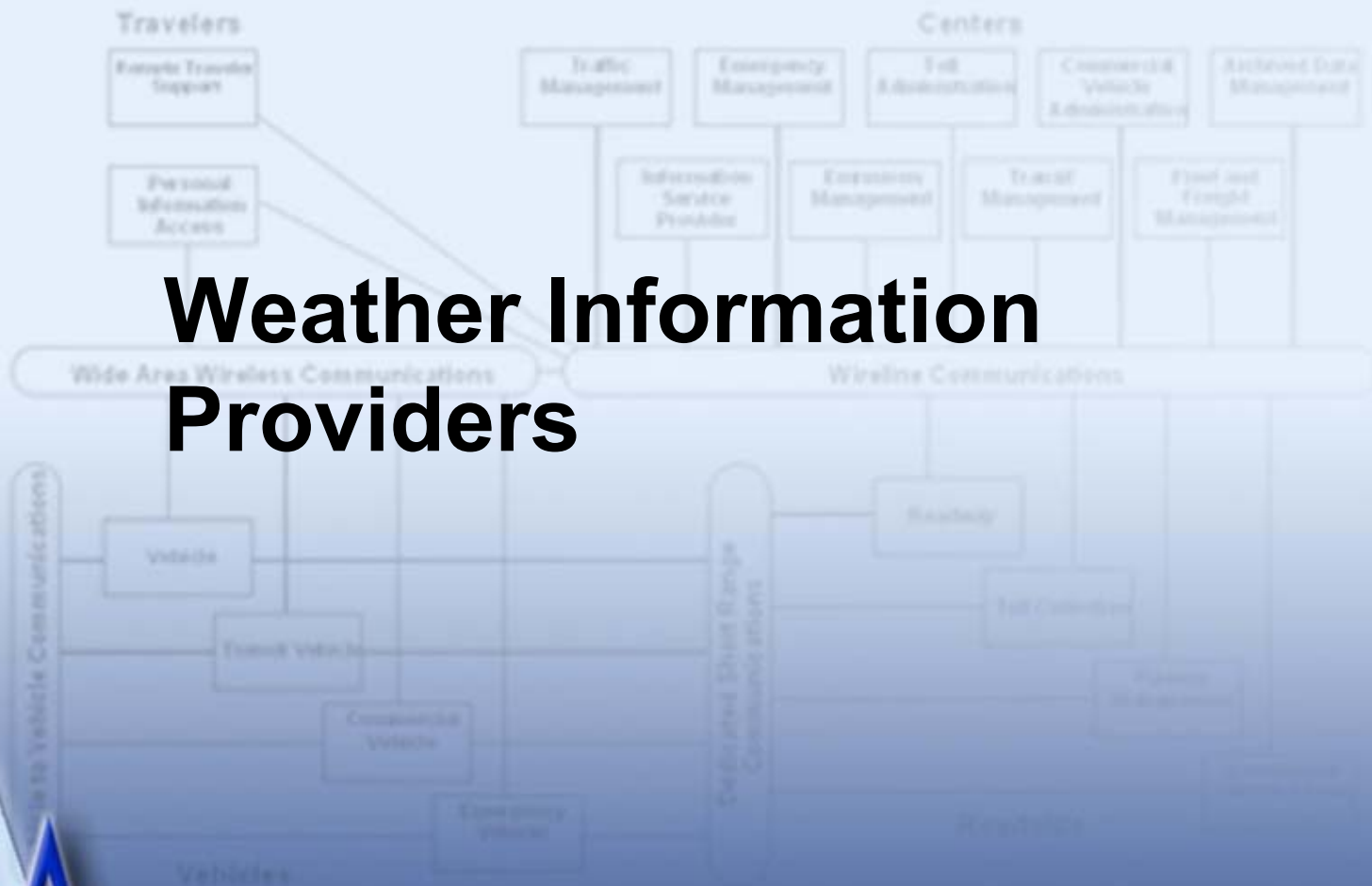


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Weather Information Providers

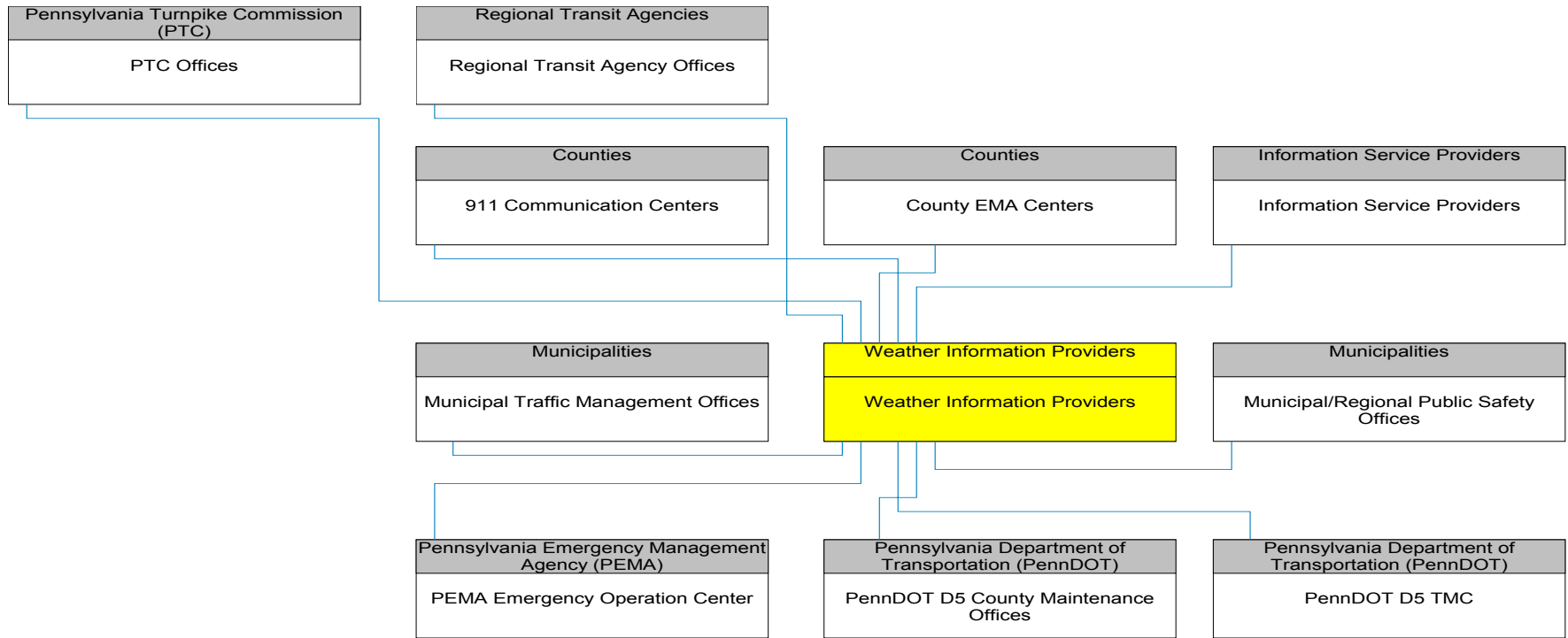


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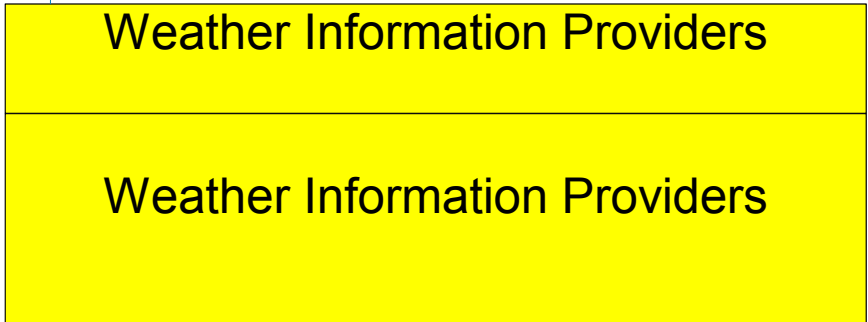
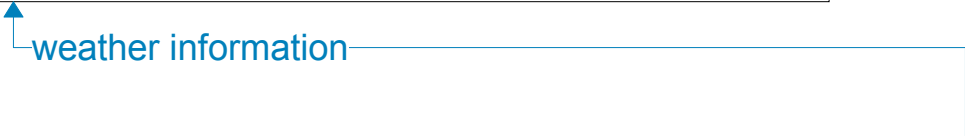
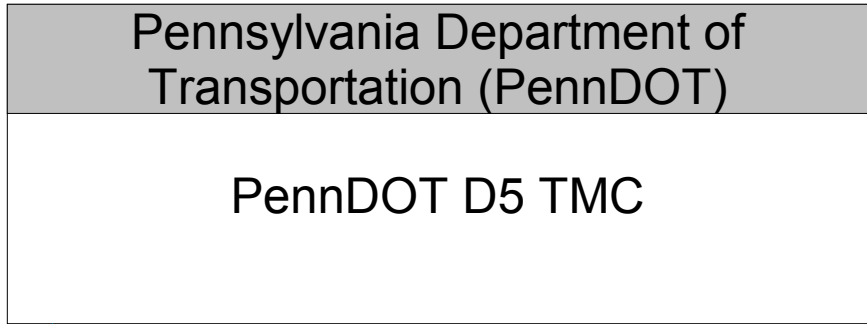
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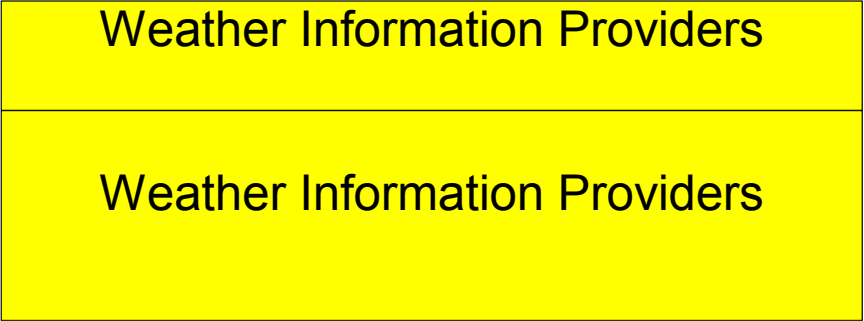
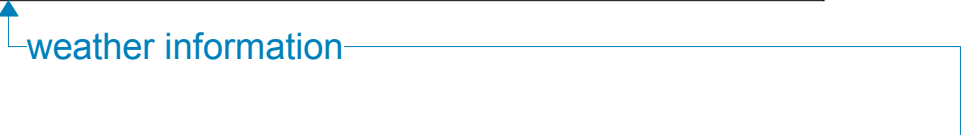
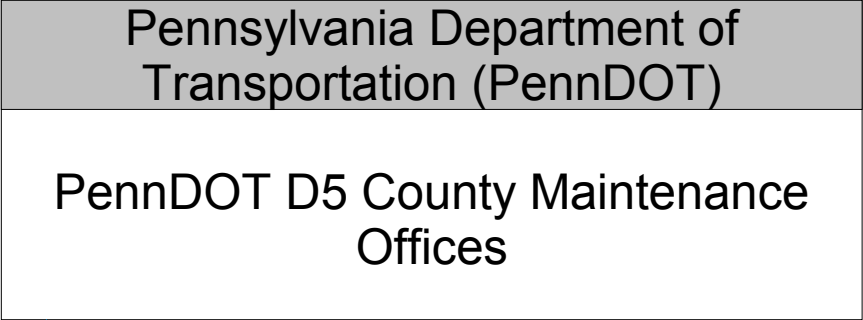
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Weather Information Providers Interconnect Diagram

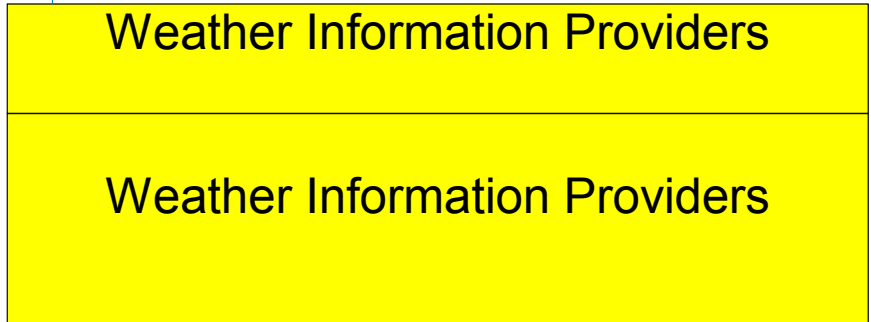
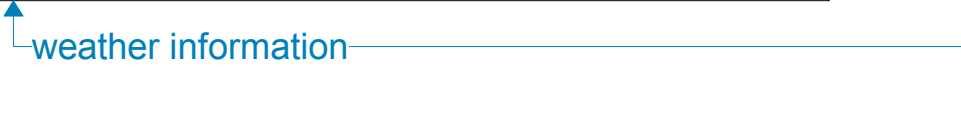
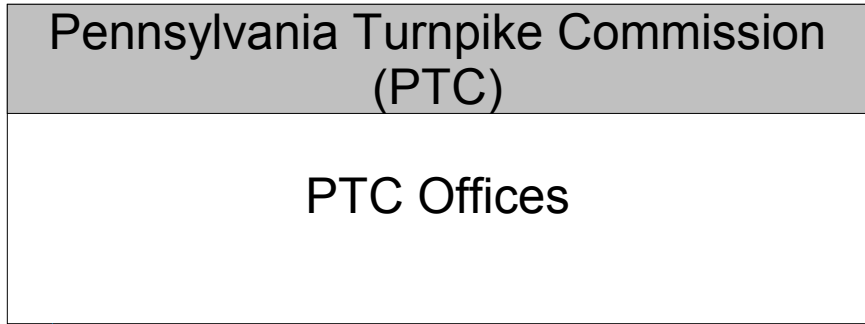


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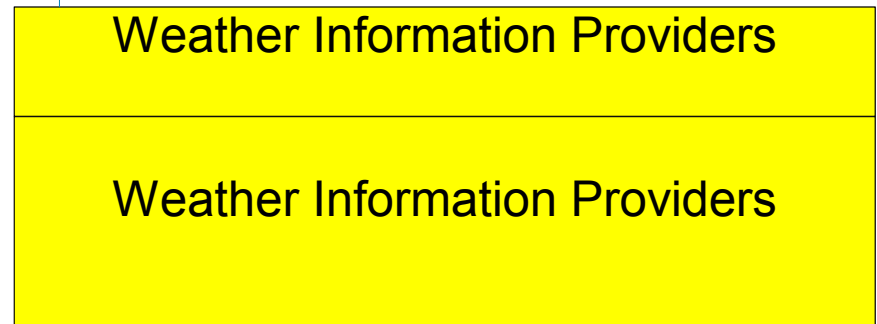
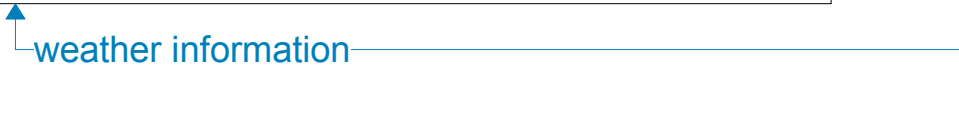
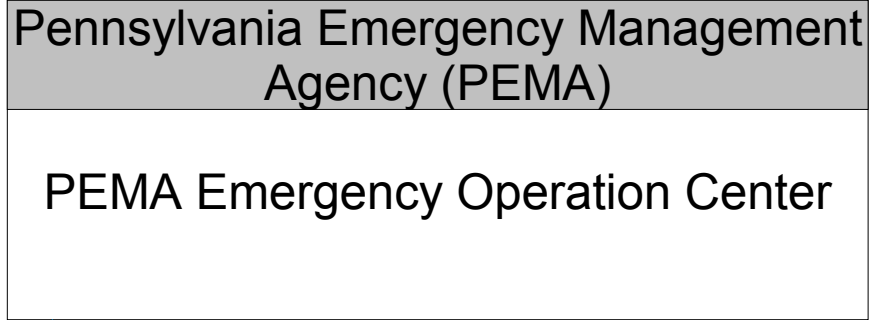




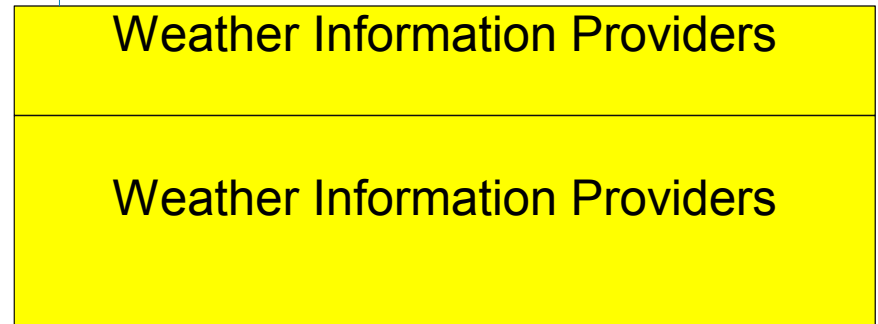
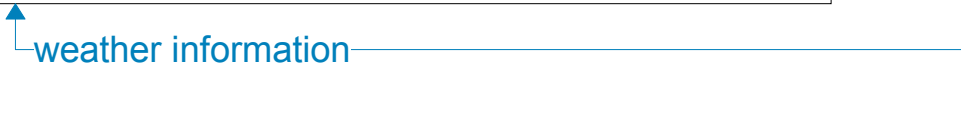
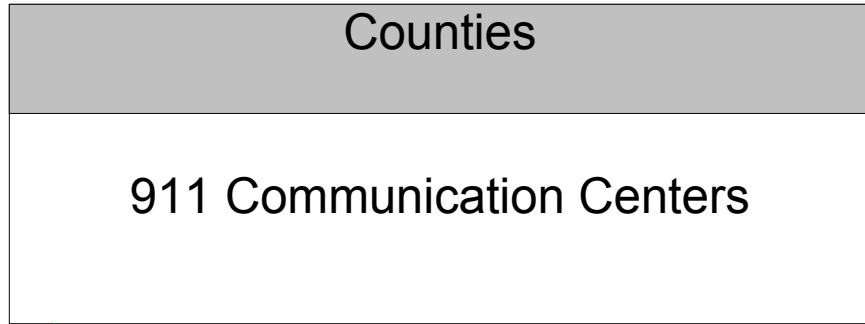
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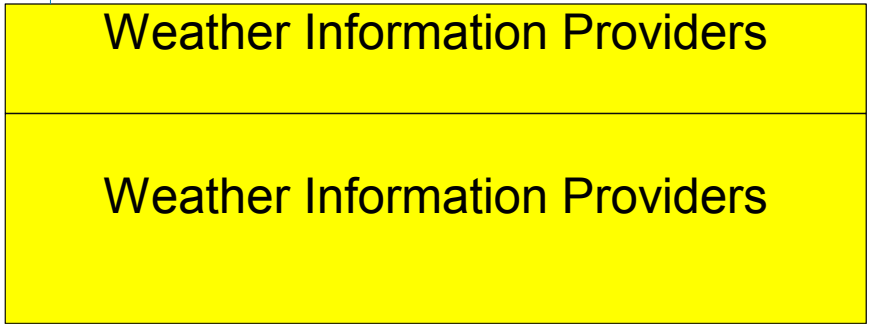
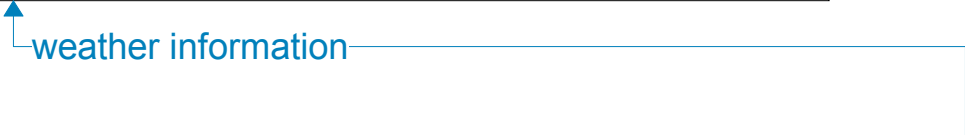
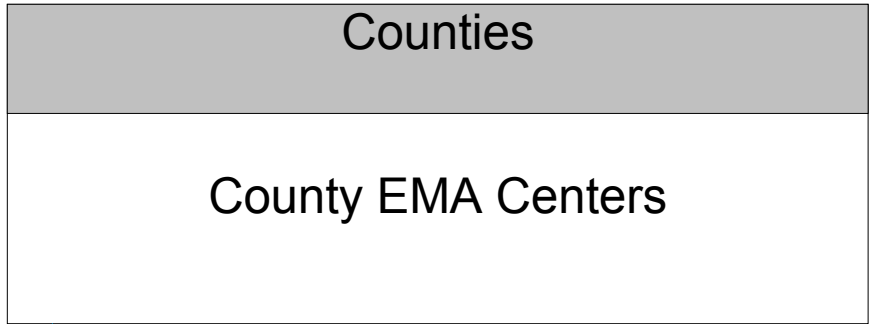
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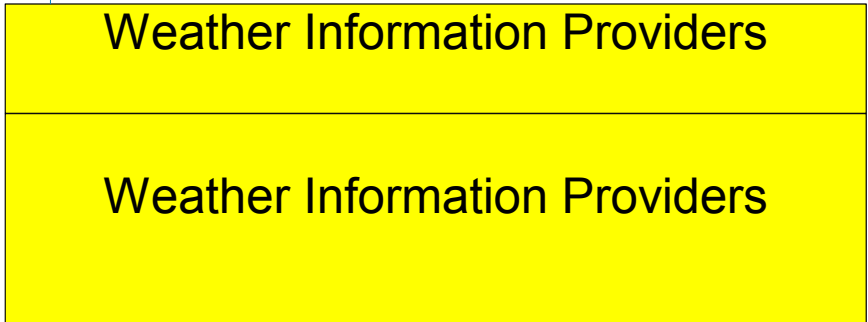
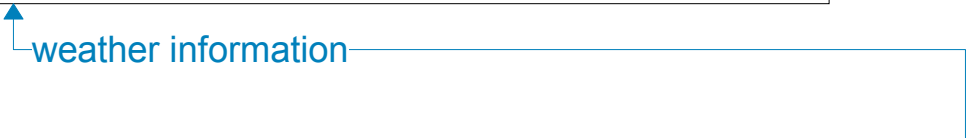
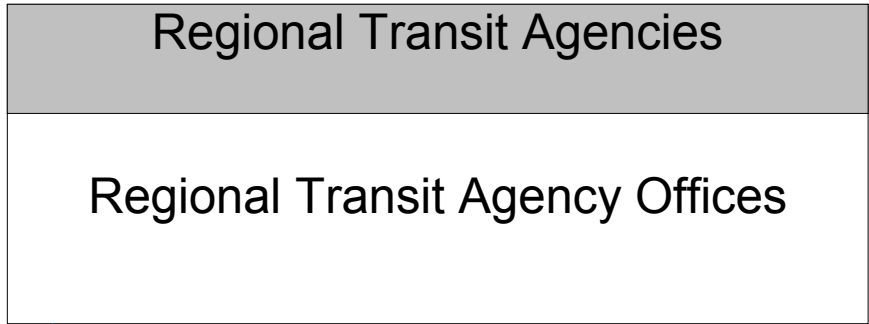
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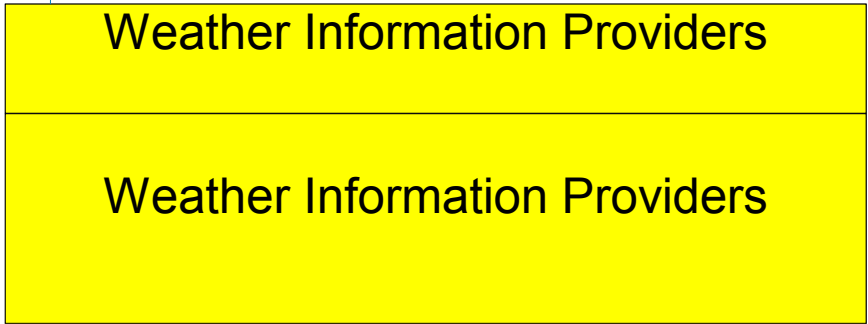
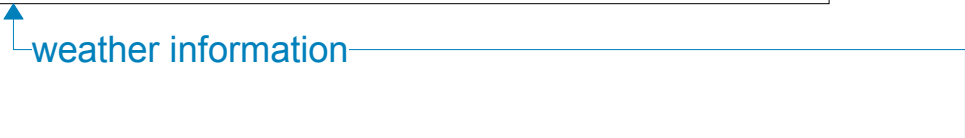
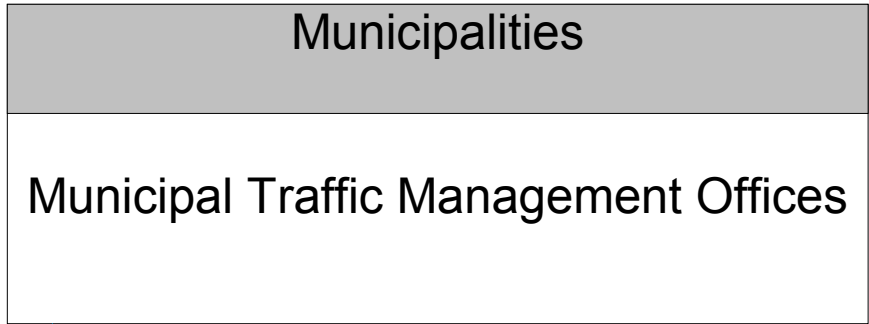


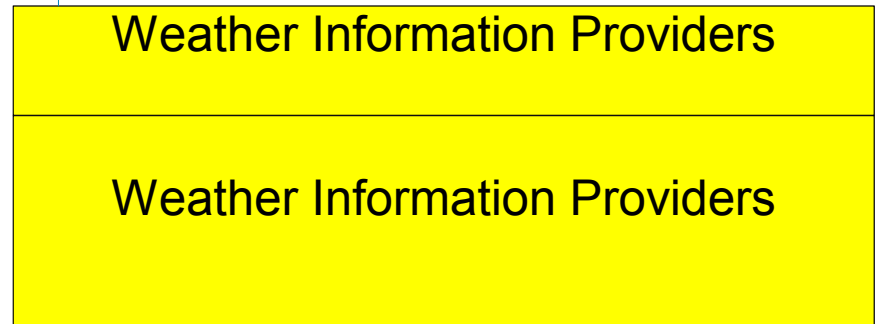
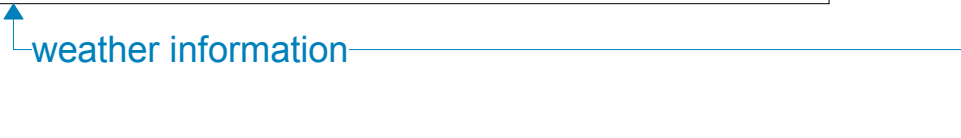
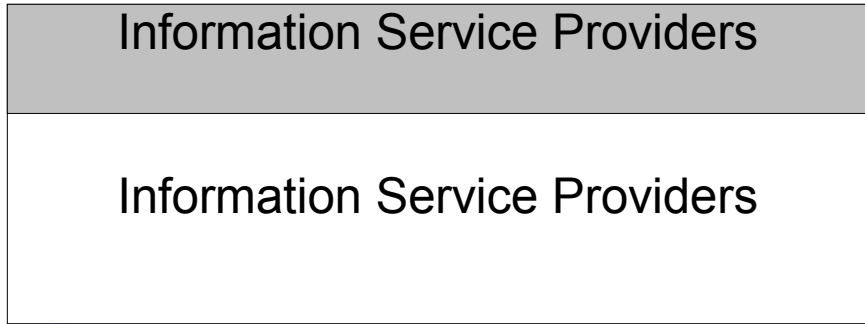
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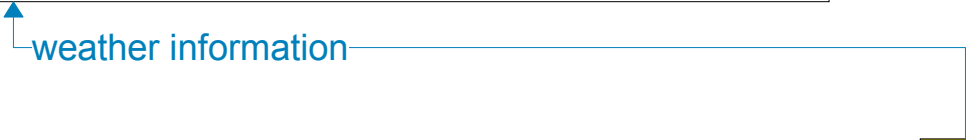
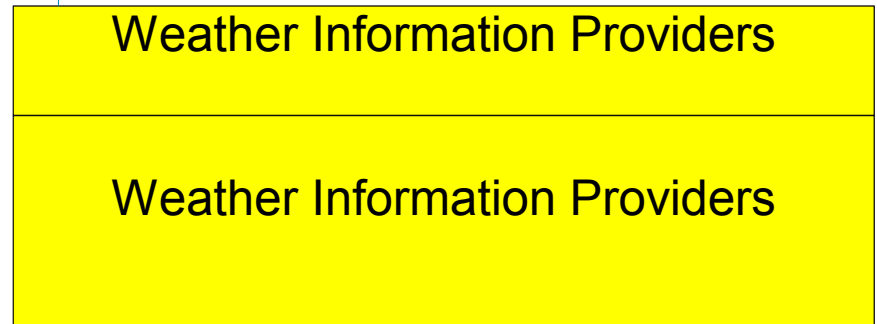
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References

The following references were utilized in the development of the Region 5 ITS Architecture:

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- *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
BARTA	Berks Area Reading Transit Authority
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
DRJTBC	Delaware River Joint Toll Bridge Commission
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
E-Z Pass	Electronic toll collection system used by a consortium of toll authorities in northeast United States
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	Hazleton 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
LANTA	Lehigh and Northampton Transit Authority
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
PTC	Pennsylvania Turnpike Commission
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.

Archived Data User Systems: This terminator represents the systems users employ to access archived data. The general interface provided from this terminator allows a broad range of users (e.g. planners, researchers, analysts, operators) and their systems (e.g. databases, models, analytical tools, user interface devices) to acquire data and analyses results from the archive.

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 in the electronic clearance

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. In addition, the subsystem will automatically collect and record mileage, fuel usage, and border

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.

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.

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.

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:

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 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.

data collection and monitoring control: Information used to configure and control data collection and monitoring systems.

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 acknowledge: Acknowledge request for emergency assistance and provide additional details regarding actions and verification requirements.

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.

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).

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 notification: The notification of an incident including its nature, severity, and location.

incident notification response: Interactive acknowledgement and verification of the incident information received, requests for additional information, and general information on incident response status.

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.

infrastructure monitoring sensor control: Data used to configure and control infrastructure monitoring sensors.

infrastructure monitoring sensor data: Data read from infrastructure-based sensors that monitor the condition of pavement, bridges, culverts, signs, and other roadway infrastructure.

ISP coordination: Coordination and exchange of transportation information between centers. This flow allows a broad range of transportation information collected by one ISP to be redistributed to many other ISPs and their clients.

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.

local signal priority request: Request from a vehicle to a signalized intersection for priority at that intersection.

maint and constr archive data: Information describing road construction and maintenance activities identifying the type of activity, the work performed, and work zone information including work zone configuration and safety (e.g., a record of intrusions and vehicle speeds) information.

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, spreader).

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.

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.

remote surveillance control: The control commands used to remotely operate another center's sensors or surveillance equipment so that roadside surveillance assets can be shared by more than one agency.

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 tag data: Request for tag information including credit identity, stored value card cash, etc.

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).

roadway treatment system control: Control data for remotely located, automated devices that affect the roadway surface (e.g. de-icing applications).

roadway treatment system status: Current operational status of automated roadway treatment devices (e.g., anti-icing systems).

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.

secure area monitoring support: Commands that control surveillance equipment and security sensors that monitor secure public transportation areas. Also includes information for general advisories and alerts intended for general dissemination in these same public areas.

secure area surveillance data: Data collected from surveillance systems used to monitor secure areas. Includes video, audio, and other security sensor outputs.

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.

suggested route: Suggested route for a dispatched emergency or maintenance vehicle that may reflect current network conditions and the additional routing options available to en route emergency or maintenance vehicles that are not available to the general public.

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.

toll instructions: Demand management toll pricing information based on current congestion.

toll transactions: Detailed list of transactions from a toll station.

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.

traffic sensor control: Information used to configure and control traffic sensor systems.

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 information user request: Request for special transit routing, real-time schedule information, and availability information.

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

transit schedule information: Current and projected transit schedule adherence.

transit traveler information: Transit information prepared to support transit users and other travelers. It contains transit schedules, real-time arrival information, fare schedules, and general transit service information.

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 plan feedback: Comments and suggested changes to proposed construction and maintenance work schedules and activities. This information influences work plan schedules so that they minimize impact to other system operations and the overall transportation system.

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, alternate routes, and suggested speed limits.

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.



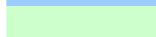
work zone warning status: Status of a work zone safety monitoring and warning devices. This flow documents system activations and includes additional supporting information (e.g., an image) that allows verification of the alarm.

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.

County	Highway Corridors	Primary Operations	Secondary Operations
Berks	I-78/US-22	PennDOT District 5-0	Pennsylvania State Police ³
	I-76	Pennsylvania Turnpike Commission	
	PA-61	Municipalities ¹	
	US-222	Municipalities ¹ (Bus Only)	
	US-422	Municipalities ¹	
Carbon	I-476	Pennsylvania Turnpike Commission	
	I-80	PennDOT District 4-0	
Lehigh	I-476	Pennsylvania Turnpike Commission	
	I-78	PennDOT District 5-0	Pennsylvania State Police
	I-78/US-22	PennDOT District 5-0	Pennsylvania State Police
	PA-309		Pennsylvania State Police
	US-22	PennDOT D5-0	Pennsylvania State Police
	US-222	Municipalities ¹	PennDOT District 5-0
Monroe	I-380	PennDOT District 5-0 (Portable Devices)	
	I-80	PennDOT D5-0 ⁴	Pennsylvania State Police
	PA-611	Municipalities ¹	
Northampton	I-78	PennDOT District 5-0	Pennsylvania State Police
	PA-33	PennDOT District 5-0	Pennsylvania State Police
	US-22	PennDOT District 5-0	Pennsylvania State Police; 911 Communication Centers ⁵

County	Highway Corridors	Primary Operations	Secondary Operations
Schuylkill	I-81	PennDOT District 5-0	Pennsylvania State Police
	PA-309	Municipalities ¹	
	US-209	Municipalities ¹	

-  Existing Operations
-  Planned 1 Operations
-  Planned 2 Operations

¹ Closed Loop Traffic Signals

² PennDOT D5-0 operates devices where PA 309 runs concurrent with I-78. The Municipalities operate elsewhere.

³ PSP will have control of I-78/US-22

⁴ There are currently portable devices on I-80 in Monroe County operated by PennDOT D5-0. Future devices at Marshall's Creek will also be operated by PennDOT D5-0

⁵ The PSP currently handles secondary operations on US-22 in Northampton County. Northampton County 911 may handle future secondary operations.

Appendix F: Bookend I Meeting I Minutes

Date: Wednesday, October 13, 2004

Meeting of: PennDOT District 5-0 Stakeholders' Meeting – First Regional Meeting

Location: Days Inn – Allentown, PA

Presentation

- Amar Bhajandas, PennDOT District 5-0 executive, began the presentation with a welcome. He identified some of the agencies involved in the process, planning offices, townships, partnership organizations, enforcement community, transit, counties, emergency management agencies, and economic development agencies. Amar also shared about lessons he learned from his 10 years of experience being in the maintenance division. While developing and implementing RWIS, he learned about the need for protocols and procedures in order to share information statewide. Getting stakeholder and PennDOT interested in such a process is important. In addition, Amar described the District 5-0 region which consists of a six county region. District 5-0 has 5 areas of strategic focus for 2005-2006. These areas are: system preservation, management and productivity, quality of life, mobility, and safety, with special emphasis on mobility. Mobility is defined as “innovative management of our transportation system and services to improve access and mobility, ensuring that people and goods can move efficiently. The strategic actions for District 5 include completing the traffic operations center, implementing freeway service patrol (which will begin in January 2005), minimizing construction related disruption to traffic flow in high volume traffic areas, and continuing utilization of DMS and HAR for incident management. He said that the stakeholders are here at the meeting because of their involvement with aspects of transportation such as planning, operation, and policy. Amar stressed the importance of their knowledge required to validate the critical baseline information. The stakeholders' insights and perspectives on regional conditions and activities are needed. He urged everyone to champion this effort by continuing participation in future meetings, telling others about ITS, and continuing the regional dialog beyond this effort.
- Michael Harris from PB Farradyne continued the presentation with a few slides defining ITS and ITS architecture. ITS is “simply technology applied 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.
- Craig Reed from PennDOT Bureau of Highway Safety and Traffic Engineering 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 themselves 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 solutions include building capacity, better managing capacity, and reducing demand. Operations are involved in better managing the capacity of the roadways. 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 stakeholders are closest in familiarity to the region’s operations. PennDOT needs to understand what these things are. The needs in each region will be different. 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. 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. Craig Reed 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.
 - Dennis Lebo from PennDOT Central Office – Center for Program Development and Management, gave an overview of statewide planning. He talked about using the mandate as a planning opportunity for creating a framework for regional and statewide integration, establishing a basis 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, Dennis Lebo helped to answer questions such as “How will this be used?” and “What will we need to do?” in the slides. Dennis 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.

- Dennis Toomey from PennDOT D5-0 talked about regional ITS operations. He gave an overview of the current 6-county Regional operations and ITS projects. Dennis began by talking about the first ITS project in District 5-0, implemented in 1997. This was the I-80 Congestion Alert System in which radar detectors were placed along two ramps. Message boards were activated based on input from the detectors. Dennis showed a series of photographs with different messages on the message boards. In addition the portion of I-80 that runs through Carbon and Monroe counties have various types of DMS located on it. This includes 2 portable DMS, 1 semi-permanent message boards, and 2 permanent DMS to be implemented after 2005. Along this corridor, other ITS projects include permanent emergency detour signing, two RWIS sites, congested corridor improvement program, and the safe 80 task force. On I-81 in Schuylkill County, there are several portable DMS installed, two RWIS sites, and call boxes. However, these call boxes were removed in 2004 because of high maintenance and low reliability issues. The general public can access information collected at the RWIS sites by going to the website: www.dot.state.pa.us. There are 5 RWIS sites in District 5-0. Berks County is the leader in upgrading traffic signals. Dennis showed a list of where these signals are located. Lehigh and Northampton Counties have a congestion management and incident management system. In 2002-2004, these counties underwent an upgrade of existing field devices, and they also created a PennDOT incident management position within the traffic unit. Short-term recommendations for District 5-0 include building a temporary traffic control center, installing permanent and semi-permanent message boards at key interchanges, installing HAR for congested locations, increase incident detection, and managing traffic demand regionally along I-78, Route 22, and Route 33. In the Lehigh Valley, Dennis showed slides of the HAR, the queue detectors along Route 22, and CHIPS (Computerized Highway Information Processing System). Medium term recommendations consist of permanent traffic operations center, install CCTV, and begin freeway service patrol. Pictures from the currently installed CCTV images were shown. Additionally, freeway service patrols will begin in the Lehigh Valley in 2005. The benefits of this service would include improved incident detection and verification, improved incident response time, improved clearance time, and reduced change of secondary incidents. The hours of operation would coincide with the peak periods.
- Alan Piper, transportation planner at the Berks County Planning Commission and Reading MPO, spoke on regional planning. There is need for ITS planning at the regional (MPO/RPO) level because of the mandate to receive federal funds for ITS projects in the future, inability to build their way out of congestion, and funding limitations. This is no longer just an urban problem. Better technologies, better communications, and facilitated economic can help them

make the existing transportation system more efficient. Informed decisions should be made by engaging major transportation providers, major municipalities, emergency management providers, and major event generators. District 5-0 is a transportation hub with the different interstates and its physical connection to east coast cities and links to the Midwest and the South. There are also significant truck and rail operations in the region. Internally, there is much interaction between the major cities of the region. Portions of urbanized areas for one MPO “spill over” into jurisdictions of another MPO or RPO. Planned regional actions include supporting the adoption of the ITS Architecture, continuing to advance ITS element of regional long range transportation plans, organizing ITS task force under District 5-0 umbrella to share experiences, continuing ITS regional dialogue beyond this effort, and developing the regional ITS implementation plan.

- Finally, Larry Bankert from PB Farradyne talked about the validation outreach. He discussed the ITS Strawman Architecture process step by step and talked about the characteristics of the document. He told the stakeholders that they were there because their knowledge is needed to validate information that they have begun to compile. The regional perspective is valued, and the stakeholders are involved in setting transportation policy in the region. Larry went on to describe what were in the validation packets. He described what the diagrams were and how they fit into the bigger picture. Larry 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

Kirby Parnell from Trans-Bridge complimented the group on their efforts. He asked why Park ‘n Ride was not mentioned. The current Park ‘n Rides are over-capacity. Kirby brought it up because he would like to see it be part of the agenda.

- Mike Harris encouraged Kirby to go to the validation meeting and get Park ‘n Ride on the agenda. There can be many applications of ITS, such as letting drivers know when the parking lot is full or when the next bus is coming. Larry Bankert added that these are projects that they would want to capture during the meeting.

Terry Johnson said that she was there because she was interested in the funding issues.

- Larry Bankert said that the national transportation bills provide the majority of the funding, and that current bill has been in limbo for a year. Funding levels look like they are remaining the same.

- Dennis Lebo said that the federal bill authorization is currently in its 6th extension. Pennsylvania gets about \$1.3 billion from that, and that amount is distributed throughout the state. There is an approved program for \$7 billion for the entire state. There are all types of capital available for transportation improvement, and ITS needs to get into this by getting prioritized in the funding process. ITS can be incorporated into projects such as road improvement or road expansion.
- Alan Piper adds that as ITS grows and develops, ITS should be isolated. Every highway project has some level of ITS involved. Planners need to understand what is needed to help mainstream ITS.

John Mehuri asked about the integration of 911 centers. What funding would be needed to integrate them into the national ITS architecture? There should be communication with new 911 centers to let them know what they should be requesting and building into these new centers.

- Larry Bankert said that partnerships were needed to help make these needs known. The funding would be discussed in the business plans and would depend on prioritization of the projects.

List of Attendees

Last Name	First Name	Agency	Email	Phone
Bailey	Laurie	Lehigh County 911 Communications Center	lauriebailey@lehighcounty.org	
Bhajandas	Amar	PennDOT District 5-0		
Bogari	William	West Easton Fire Company	wbogari@rcn.com	(610) 250-9231
Christman	Ryan	Hanover Township, Lehigh County	bhtlc@enter.net	(610) 264-1069
Churetta	Ron	St. Lukes Hospital	churetr@slhn.org	(610) 770-8300
DeAngelis	Kenneth	Lower Macungie Township		(610) 966-4343
DeRenne	Jeannette	City of Easton	jderenne@easton-pa.gov	(610) 250-6651
Edwards	Robert	Pennsylvania Emergency Management Agency (Eastern Office)	robertedwards@lehighcounty.org	(610) 782-3073
Ferryman	Jack	Pennsylvania Towing Association		(610) 432-9000
Fix	August	Lehigh Valley Rail Management, LLC	augiefix@bethintermodal.com	(610) 442-3448
Greco	Armand	Lehigh and Northampton Transit Authority (LANTA)	avgreco@erols.com	(610) 435-4052

Last Name	First Name	Agency	Email	Phone
Guers	John	Schuylkill County Planning		(570) 628-1424
Gurinko	Joesph	Lehigh Valley Planning Commission (LVPC)	jl@lvpc.org	(610) 264-4544
Hefele	Mike	City of Allentown	hefele@allentowncity.org	(610) 437-7611
Jensen	Amanda	Palmer Township	ajensen@rcn.com	(610) 253-7191
Johnson	Lt. Steve	Pennsylvania State Police (Troop L)	stejohnson@state.pa.us	(610) 378-4017
Jones	Charles	City of Reading	charles.jones@readingpa.org	(610) 655-6236
Kaplan	Art	Schuylkill County EMA Center	akaplan@schuylkillco.pa.us	(570) 622-3739
Keister	Irv	Lower Macungie Township		
Lebo	Dennis	PennDOT Central Office	dlebo@state.pa.us	(717) 787-5246
Levkulic	John	Schuylkill Transportation System (STS)		
Marnielle	Bob	State Representative Kelly Lewis		
Mercuri	John	Schuylkill County 911 Communication Center	jmercuri@co.schuylkill.pa.us	(570) 622-3739

Last Name	First Name	Agency	Email	Phone
Mittman	Steve	Clear Channel Entertainment		(570) 344-3990
Moyer	Dana	Schuylkill Transportation System (STS)	dlmoyer@redcogrp.com	
Nichol	Robert	PA Towing Association	rnichol@enter.net	(610) 554-2774
Pack	Mike	PennDOT Central Office	mpack@state.pa.us	(717) 783-4579
Parnell	Kirby	Trans-Bridge Line, Inc.		(610) 868-6001
Peters	Francis	Allentown Police Department	petersf@allentowncity.org	(610) 437-7713
Piper	Alan	Reading Metropolitan Planning Organization	apiper@countyofberks.com	(610) 478-6300
Pudliner	Bruce	Hanover Township, Lehigh County	spudliner@hanleco.org	(610) 266-1069
Reed	Craig	PENNDOT, Bureau of Highway Safety and Traffic Engineering		
Reinert	Eric	WFMZ	eric@wfmz.com	
Ross	Mike	Ross Body and Frame / PA towing	miker@rossbodyframe.com	
Roth	Mark	Alfred Benesch and Company (rep. NEPA)	mroth@benesch.com	(610) 439-7066

Last Name	First Name	Agency	Email	Phone
Sager	Roger P.	Delaware River Joint Toll Bridge Commission (DRJTBC)	rsager@drjtbc.com	(267) 290-1004
Simchak	Stephen	Carbon County Office of Planning and Development	ccopadd@ptd.net	(570) 325-3671
Sninsky	John	Schuylkill Transportation System (STS)	sninsky@ptd.net	(570) 429-2701
Tenges	Tim	Lower Nazareth Township		(610) 759-7434
Thomas	Meredith	Ross Body and Frame Works Inc.	mere@rossbodyframe.com	(610) 435-8013
Tierney	Vanyla	State Parks	vtierney@state.pa.us	(717) 783-2654
Toomey	Dennis	PennDOT District 5-0 (Traffic/ITS)	dtoomey@state.pa.us	(610) 798-4245
Townsend	John	PennDOT District 5-0 (Traffic/ITS)	jotownsend@state.pa.us	(610) 798-4257
Wallaesa	Jan	PennDOT District 5-0 (Traffic/ITS)	jwallaesa@state.pa.us	(610) 798-4237
Walter	Thomas	PennDOT District 5-0 (Traffic/ITS)	thwalter@state.pa.us	(610) 798-4304
Woodling	John	Monroe County Planning Commission	jwoodling@monroe2020.org	

Last Name	First Name	Agency	Email	Phone
Young	Ron	PennDOT District 5-0 (CRC)		
Zaia	Michael	PB&NE Railroad	michael.zaia@railquest.com	(610) 694-5930

Pennsylvania Intelligent Transportation Systems (ITS) Architecture

District 5 Region
Stakeholders' Meeting
October 13, 2004



Welcome

Amar Bhajandas
District 5 Executive
Pennsylvania Department of Transportation



Agenda

- Welcome – Amar Bhajandas, PennDOT District 5
- Background – Michael Harris, PB Farradyne
- Statewide Vision - Craig Reed, PennDOT
- Statewide Planning - Dennis Lebo, PennDOT
- Regional Operations – Dennis Toomey, PennDOT District 5
- Regional Planning – Alan Piper, Berks County Planning Commission
- ITS Architecture – Larry Bankert, PB Farradyne
- Questions and Answers



Welcome

- PennDOT
- PSP
- Transit
- Counties
- Cities
- Townships
- Emergency Management Agencies
- Planning Offices
- Partnership Organizations
- Enforcement Community
- Media
- Tourism and Event Destinations
- Towing Companies
- Policy



District 5 Strategic Focus Areas '05-'06

1. **System Preservation**
2. **Management and Productivity**
3. **Quality of Life**
4. **Mobility ***
5. **Safety**



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



District 5 Strategic Focus Areas

- **Mobility**

- *Innovative management of our transportation system and services to improve access and mobility, ensuring that people and goods can move efficiently.*

- ✓ *Effectively and efficiently operate the transportation system.*



District 5 Strategic Actions

1. Complete Traffic Operations Center
2. Implement Freeway Service Patrol
3. Continue utilizing/expanding electronic message boards & Highway Advisory Radio for Incident Management.
4. Minimize construction related disruption to traffic flow in high volume traffic areas.
5. Encourage planning organizations (MPOs/RPOs) to consider ongoing annual ITS funding within their Transportation Improvement Program.



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 (includes Emergency Response)
- 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**



Background

Michael Harris, PB Farradyne



ITS?

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

ITS:

- Improve Safety
- Maximize Mobility
- Fulfill Traveler Needs
- Support Enhanced Security
- Manage 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



In context

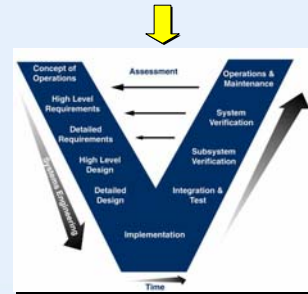


Projects



In context

ITS Project



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



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



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



The Expectation ...

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



Regional Benefits

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



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



Statewide Vision

Craig Reed

PennDOT Central Office
BSHTE



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

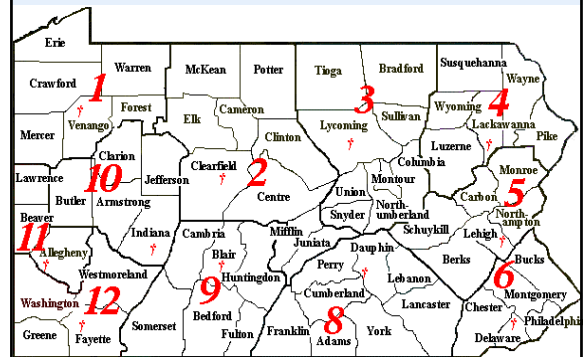


PA

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

Statewide Vision

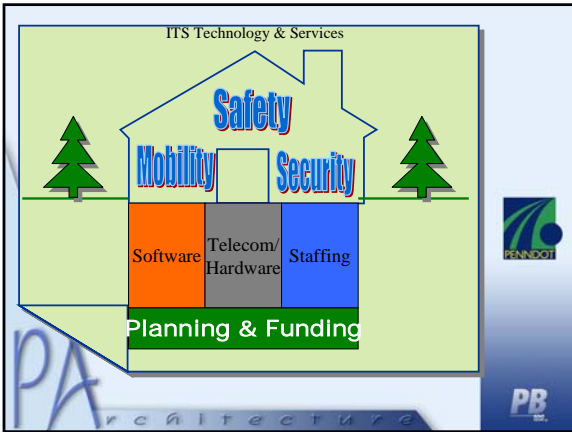
- Transportation Operations
 - Safety
 - Security
 - Mobility
 - Economic Vitality
 - Quality of Life
- ITS
 - Tools, Techniques, & Technology



PA

architecture

PB

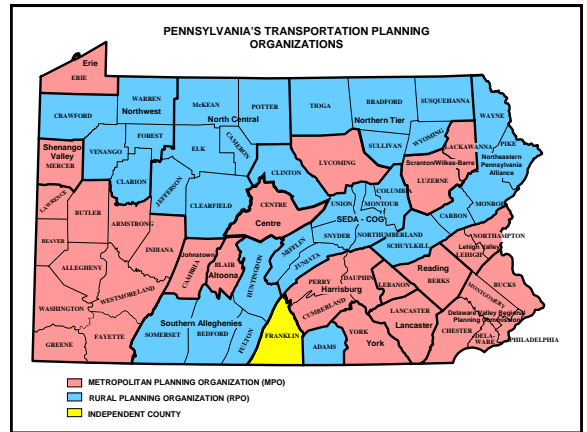


Statewide Planning

Dennis Lebo
 PennDOT Center for Program
 Development and Management

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



MPO / RPO Involvement

Need for ITS Planning at regional (MPO/RPO) level:

- Mandate to receive Federal funds for ITS projects in future
- Public expectations
- Need to make existing transportation system more efficient
- Better communication between the Program and those who operate the transportation systems

Priorities for limited Funding

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

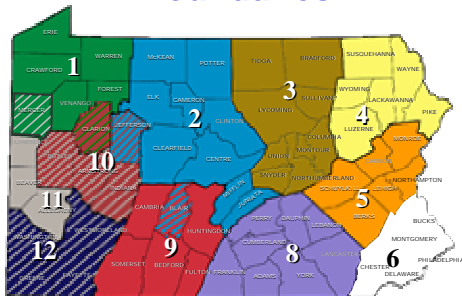


Project Organization

- 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 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 ...

- Statewide Transportation System Operations Plan
- Regional ITS Implementation Plans
 - Project priorities
 - Cost analysis for Business Planning
 - Available for 2007 Program Update



Regional Operations

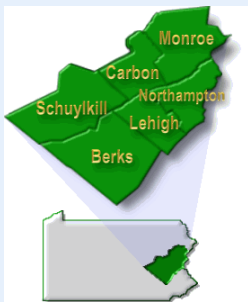
Dennis Toomey, PennDOT District 5



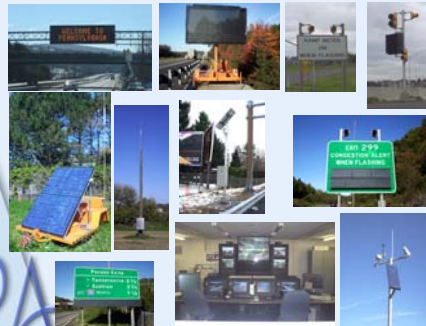
PennDOT District 5 ITS Operations



District 5 Region



District 5-0 Intelligent Transportation (ITS)



1997 1st ITS in District 5-0

- I-80 Congestion Alert System
 - Radar detectors along two Ramps
 - Hardware / Software processes input from detectors
 - Message Board activated
 - Blank Out Sign (One Message)
 - High Maintenance
 - Equipment becomes outdated
 - Still Working



I-80 Congestion Alert System

Located 2.5 miles in advance of Exit 299



"EXIT 299 CONGESTION ALERT"



I-80 Congestion Alert System

Located 0.8 miles before Exit 299



"USE EXIT 298 AS ALTERNATE"



I-80 Congestion Alert System

Located 0.3 miles in advance of Exit 299



"PA 715 USE EXIT 298"



I-80 Carbon / Monroe Counties

- 2 Portable Changeable Message Signs
 - Emergencies & Safety Messages
- 1 Semi Permanent Message Board I-80 WB operated by PENNDOT District 4-0
- 2006+ Two Permanent Dynamic Message Signs included with Marshalls Creek By-Pass Project
 - I-80 at Delaware River Toll
 - I-80 at I-380 Junction



I-80 Carbon / Monroe Counties

- Permanent Emergency Detour Signing
- Two RWIS Sites (Roadway Weather Information System)
- Congested Corridor Improvement Program
 - Route 611 Between Route 33 and Route 209
- Safe 80 Task Force



I-81 Schuylkill County

- Portable Changeable Message Signs
 - 2 Northbound, 2 Southbound
 - Semi-Permanent Installation
 - Solar Powered
 - Operated by PC or Telephone
 - PSP Accessible
- Two RWIS sites
- Call Boxes (Installed 2002)
 - Expensive Communications (108 cell phones)
 - High Maintenance / Low Reliability
 - Low Customer Usage
 - Removed in 2004



www.dot.state.pa Traveler Information Roadway Weather Information System



I-81 Delano
10/7/04
11:00 AM



RWIS (Roadway Weather Information System)

There are currently 5 RWIS Sites in District 5-0

- I 76 WB Exit 29 Hamburg, Berks County
- SR 33 at Wind Gap Monroe Co.
- I 48 Exit 293 at I 30 Monroe Co.
- I 81 SB Exit 134 Delano, Schuylkill Co.
- I 81 NB Exit 112 Hegins, Schuylkill Co.



Berks County

- Signal Systems
 - 2002 Shillington Traffic Signal Enhancement (7 signals)
 - 2004 State Hill Road Signal Enhancement (12 signals)
 - 2004 Route 422 Exeter Township (5 signals)
 - 2005 Bus. 222 Muhlenberg Township (11 signals)
 - 2005 City of Reading downtown (63 signals)
 - 2006 Bus. 222 City of Reading (5 signals)



Lehigh / Northampton Counties

- 1997 Design of Congestion Management / Incident Management System for Route 22 RENEW (Reconstruct 10 miles)
- 1998-1999 Route 22 RENEW Construction
- 2000-2001 Retrofit Route 22 RENEW field devices into a permanent ITS system



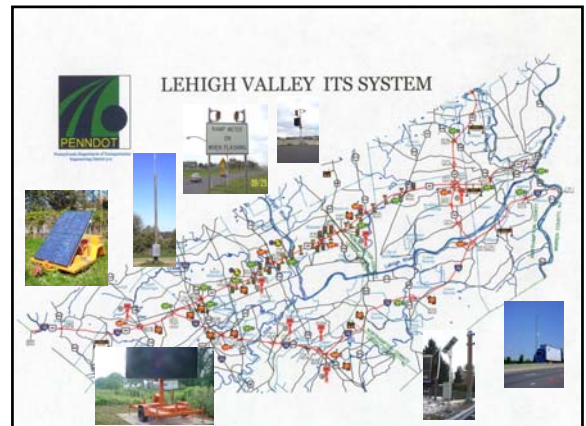
Lehigh / Northampton Counties

- 2002-2004
 - Ongoing Maintenance of ITS Devices
 - Upgrade of existing field devices to NTCIP compliance
 - Created PennDOT Incident Management Position within the Traffic Unit
 - Improving incident response operating procedures
 - Improving communications & coordination with emergency responder community



Lehigh Valley Area Early Deployment Study

Important document completed in 2000: *Development of Intelligent Transportation Systems for the Lehigh Valley*



Short Term (0-4 Years) Recommendations

- Build a Temporary Traffic Control Center
- Install permanent and semi permanent message boards at key interchanges (Airport, Turnpike, etc.)



Portable & Permanent VMS (Variable Message Signs)

4 permanent overhead VMS units are in operation.



10 Semi Permanent CMS along I-78 and Route 22.



4 portable CMS units that can be quickly moved; and programmed remotely.



Short Term (0-4 Years) Recommendations

- Install permanent Highway Advisory Radio for congested locations
- Increase incident detection
- Manage traffic demand regionally along I-78, Route 22, Route 33.



Highway Advisory Radio for the Lehigh Valley - 1630 AM



5 Permanent Transmitters



2 Portable Transmitters



Queue Detection

24 Queue Detectors on Route 22 between Cedar Crest Boulevard and Route 191.

Communicates with FCC Licensed Radio to Lehigh County's Radio Antenna on S. Mountain



CHIPS

Computerized Highway Information Processing System



Short Term (0-4 Years) Recommendations

- Manage Special Events
- Conduct study of Ramp Metering on Route 22



- Milepost Markers



Medium Term (5-8 Years) Recommendations

- Permanent Traffic Operations Center
- Install Closed Circuit Television System
- Begin Freeway Service Patrol



Camera System

- 22 planned locations
- 8 installed in 2004
- Used "Request for Proposal" procurement process



Camera System

- Installing Lowering Device



Camera System

Range: 2 to 3 miles
Leased T-1 Lines
Pan - Tilt - Zoom

- Rt 22 & Rt 145
- Rt 22 & Rt 987
- Rt 22 & Rt 512
- Rt 22 & Rt 33
- I-78 & Rt 100
- I-78 & Rt 222
- I-78 & Rt 309
- I-78 & Rt 33



Traffic Operations Center



Traffic Operations Center

- One stop phone number 610-798-"4300"
- Monitor CCTV
- Control all Electronic Message Boards
- Control/ Broadcast Highway Advisory Radio



Traffic Operations Center

- Run CHIPS system and Incident "Scenarios"
- Listen to Scanner for Emergency Responder info.
- Communicate via 800 Mega Hz Two-way Radio
- Dispatch of Freeway Service Patrol



CCTV Route 22 & Route 987



CCTV Route 22 & Route 145



CCTV I-78 & Route 309



CCTV I-78 & Route 309



CCTV I-78 & Route 222



NEXT STEPS

- Broadcast Traffic Information on Internet or Cable TV



Begin Freeway Service Patrols to the Lehigh Valley in 2005



Freeway Service Patrol

- A roving fleet of specially equipped trucks
- Intended to report accidents and other traffic problems
- And to assist motorists in the event of a minor incident
- That could otherwise cause a secondary incident.



Capabilities

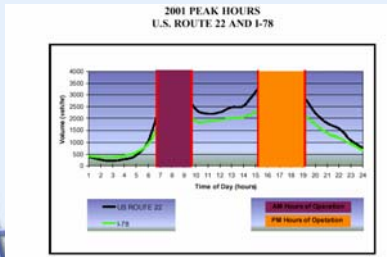
- Towing, or pushing, a disabled vehicle from travel lane
- Cell-phone availability, to permit motorists to call service stations, or other assistant services
- First aid to motorists
- Incident notification and location
- Incident verification
- Coordinate with Information Service Providers (e.g.: Metrotraffic, AccuTraffic, etc.)

Benefits of FSP

- Feeling Reduced non-recurring delay
- Improved incident detection and verification
- Improved incident response time
- Improved clearance time
- Reduced chance of secondary incidents
- Of safety and security for motorists
- Frees up law enforcement patrols and reduces the time spent on non-enforcement activities

Hours of Operation

Based on Peak Hour Traffic Volume Data
6:00 am to 9:00 am
3:00 pm to 7:00 pm



Patrol Area and Activity

Average 450 Crashes per year on Route 22 and I-78 between Route 100 and New Jersey, 69% of those on Route 22



Regional Planning

Alan Piper, Transportation Planner
Berks County Planning Commission
Reading MPO



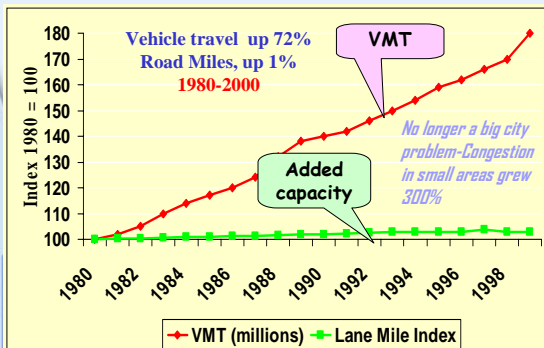
MPO / RPO Involvement

Need for ITS Planning at regional (MPO/RPO) level:

- Mandate to receive federal funds for ITS projects in future
- Cannot build way out of congestion
- Funding limitations
- No longer just an urban problem



This is why...



MPO / RPO Involvement

Need for ITS Planning at regional (MPO/RPO) level:

- Need to make existing transportation system more efficient
 - Better technologies (VMS, CCTV, traffic signal systems, etc.)
 - Better communication (between those who operate and rely on transportation system)
- Facilitate and not inhibit economic development



MPO / RPO Involvement

Need for ITS Planning at regional (MPO/RPO) level:

- Can make more informed decisions about transportation needs by engaging:
 - Major transportation providers
 - Truckers
 - AAA
 - Transit
 - Major municipalities
 - Emergency management providers (including law enforcement)
 - Major event generators



MPO / RPO Involvement

Need ITS Regional Architecture coordination between MPO/RPOs in Region:

- Region is a transportation hub
 - Major Interstates I-78, I-80, I-81 and I-476
 - Well-connected to East Coast cities and links to Midwest and South
 - Significant truck (warehousing) and rail operations in the region



MPO / RPO Involvement

Need ITS Regional Architecture coordination between MPO/RPOs in region:

- Much interaction between markets (Allentown, Bethlehem, Easton, Reading, Pottsville, Stroudsburgs, etc.) within region
- Portions of urbanized areas for one MPO area "spill over" into jurisdictions of another MPO or RPO area (example – Lehigh Valley and southern Carbon County)



MPO / RPO Involvement

Need ITS Regional Architecture coordination between MPO/RPOs in region:

- Region has significant tourist attractors
 - Reading's Outlets and Municipal Stadium
 - Cabelas
 - Pocono region and Raceway
 - Historic Bethlehem and Musikfest
 - Dorney Park
 - Many other smaller or more seasonal attractors
- Above factors point towards a strong need for coordination between MPO/RPO areas



Getting there ...

- Acceptance of ITS Architecture as a regional plan
- Build upon existing momentum to continue to work together (I-78 Corridor Coalition, Safe 80 Task Force)
- Create ITS Task Forces to work on technical and operational issues
- Find "homes" for the ITS Task Forces under the regional planning and programming groups (MPOs and RPO)
- Develop MPO and RPO ITS Implementation Plans



Planned Regional Actions

- Input to support Adoption
- Continue to advance ITS element of Regional Long Range Transportation Plans
- Organize ITS Task Force under District 5-0 umbrella to share experiences
- Continue ITS regional dialog beyond this effort
- Develop Regional ITS Implementation Plan



Validation Outreach

Larry Bankert, PB Farradyne



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 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**



Regional Validation Sessions

- Large-Group Stakeholder Meetings (2)
 - October 2004 & December 2004
 - Small-Group Validation Meetings (8)
 - October & November 2004
- PennDOT District 5-0 Office
1713 Lehigh Street
Allentown, PA 18103



Validation Meeting Schedule

- PennDOT Traffic Management October 26, 9:00AM
- Traffic Management-External October 26, 1:00PM
- Regional Emergency Management October 27, 9:00AM
- Local Emergency Management October 27, 1:00PM
- Public Transportation November 3, 9:00AM
- Transportation Planning November 3, 1:00PM
- Local Traffic Management November 4, 9:00AM
- Traveler Information/Tourism November 4, 1:00PM



Validating What?

- Regional ITS Architecture
 - 43 elements
 - 166 interconnects
 - 1,190 information flows
- Only items that pertain to **you**
 - You are the 'center of the universe'
 - Primarily existing knowledge



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

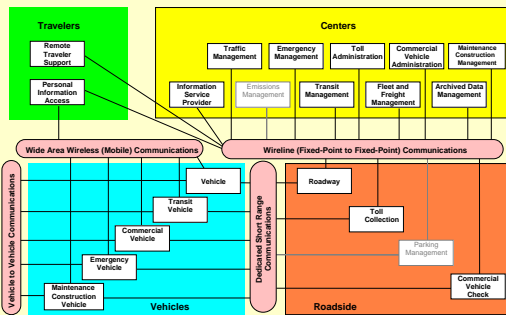


Sample Diagrams

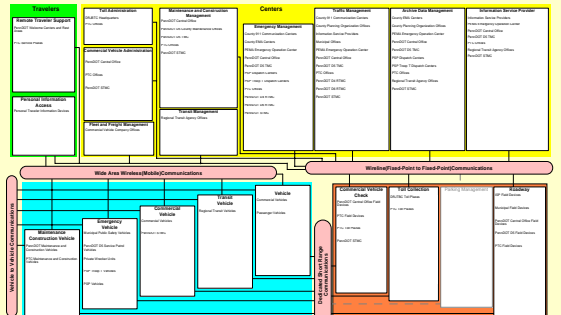
County 911 Communication Centers

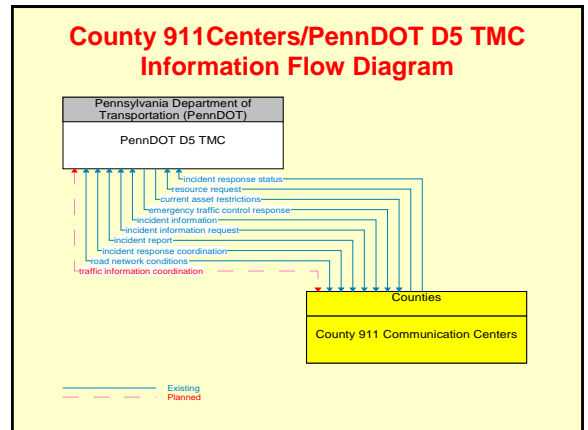
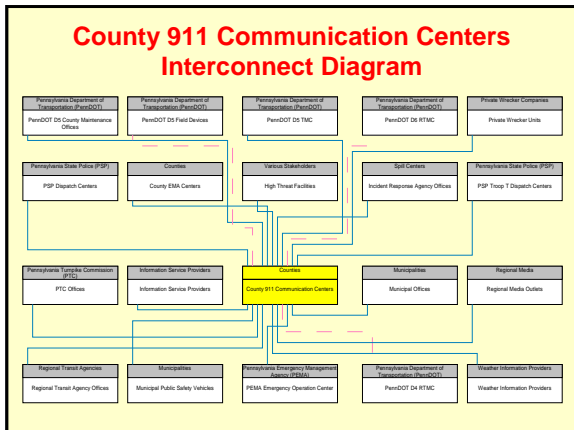


PennDOT D5-0 Regional ITS Architecture Framework



PennDOT District 5-0 Regional ITS Architecture County 911 Communication Centers





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 October 26, October 27, November 3, or November 4

Moving Forward

- Consolidate Validation Meeting inputs and comments
- Reconcile conflicts with the Regional Advisory Panel
- Finalize ITS Architecture
- Convene 2nd Stakeholder Session (December 2004 tentative)

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

- **Dennis Toomey, PennDOT District 5**
Phone: 610-798-4245
Email: dtoomey@state.pa.us
- **Larry Bankert, PB Farradyne**
Phone: 717-795-7153
Email: Bankert@pbworld.com
- **J.D. Schneeberger, PB Farradyne**
Phone: 703-742-5240
Email: Schneeberger@pbworld.com

Discussion



PA

rchitecture

PB

Appendix G: Validation Meeting Minutes

Date: October 26, 2004

Location: PennDOT District 5-0 Office; Allentown, PA

Attendees:

Dennis Toomey, PennDOT District 5-0
Mike Ross, Ross Body & Framing
Thomas Walter, PennDOT District 5-0
Jan Wallaesa, PennDOT District 5-0
John Townsend, PennDOT District 5-0
Michael Pack, PennDOT Central Office
Meredith Thomas, Ross Body & Framing
Frank Beruta, Delaware River Joint Toll Bridge Commission
Larry Bankert, PB Farradyne
J.D. Schneeberger, PB Farradyne

Minutes Prepared By: J.D. Schneeberger, PB Farradyne

A meeting was held on October 26, 2004 between 9:00 AM and 3:00PM at the PennDOT District 5-0 Office Conference Room to validate the following elements in the PennDOT District 5-0 Pennsylvania Regional ITS Architecture:

- PennDOT D5 County Maintenance Offices
- PennDOT D5 Field Devices
- PennDOT D5 Service Patrol Vehicles
- PennDOT D5 TMC
- PennDOT Maintenance and Construction Vehicles
- PennDOT Welcome Centers and Rest Areas
- Adjacent PennDOT Districts
- DRJTBC Headquarters
- DRJTBC Toll Plazas
- NJDOT Offices
- PennDOT D4 RTMC

- PennDOT D6 RTMC

A “package” was developed for each of the above elements in order to portray how an element (i.e., the “subject” element) fits into the regional architecture. The packages were then combined into a MS PowerPoint presentation and reviewed with the stakeholders in attendance. Copies of each element package are attached with these minutes. Specifically, the element packages consisted of:

- PennDOT District 5 Regional ITS Architecture Framework – a copy of the National ITS Architecture “Sausage Diagram”.
- Element Cover Sheets – The name, description and stakeholder of the subject element as defined in the DRAFT Regional ITS Architecture.
- “Sausage Diagrams” showing the context of the subject element and the relationship between other elements in the DRAFT Regional ITS Architecture – the subject element was shown alone within the “Sausage Diagram” framework to provide a sense of context as to where that particular element fits within the National ITS Architecture framework. In addition, a second drawing was provided to show the relationship (i.e., interconnects) between the subject element and other elements in the PennDOT District 5 Regional ITS Architecture.
- Interconnect Diagram – An Interconnect Diagram showing existing and planned interconnects between the subject element and other elements in the regional architecture were provided.
- Information Flow Diagrams – Existing and planned information flows by direction were shown on drawings for the subject element and each of the elements it interconnects with.

The following is a list of comments that we’re provided at the meeting. Comments are organized around additions and deletions by element, as well as general discussion items.

PennDOT D5 County Maintenance Offices

Additions

1. Interconnect and information flows to/from ‘PennDOT Central Office Field Devices’ relating to RWIS information
2. ‘work plan coordination’ to ‘PennDOT D5 TMC’
3. ‘road network conditions’ to ‘PennDOT D5 TMC’
4. ‘current asset restrictions’ from ‘PennDOT D5 TMC’
5. ‘incident response status’ to ‘PennDOT D5 TMC’

6. 'incident response status' to '911 Communication Centers'
7. 'maintenance and construction resource response' to 'County EMA Centers'
8. Element description for 'Municipal Traffic Management Offices' and 'Municipal Public Safety Offices'
9. 'request for information' from 'Regional Media Outlets'

Deletions

1. Delete interconnect to 'PennDOT D4 RTMC' and 'PennDOT D6 RTMC'. These elements will be removed from the architecture and be included in the 'Adjacent PennDOT Districts' element.
2. Interconnect with 'PTC Offices'
3. 'current asset restrictions' to 'County EMA Centers'
4. 'work zone information' to 'PSP Dispatch Centers'. Work zone information is sent out from the D5 Press Office to various stakeholders including PSP. D5 representatives will provide PB Farradyne with a list of all stakeholders they send lane closure information out to.
5. Interconnect with 'Regional Transit Agency Offices'
6. Interconnect with 'Municipal Traffic Management Offices'
7. Interconnect with 'PennDOT D5 Field Devices'

Changes

1. Element Name should be changed to 'PennDOT D5 County Maintenance & Construction Offices'
2. Make information flows between 'Information Service Providers' and 'Regional Media Outlets' to/from 'PennDOT D5 County Maintenance Offices' the same/similar
3. Make information flows to/from 'PennDOT Central Office' consistent with the rest of the Regional Architectures

PennDOT D5 Field Devices

Additions

1. Add 'ramp metering' to the element description

2. PSP currently has the capabilities to control PennDOT cameras (Bethlehem Barracks) and Frankville can control PennDOT DMS.
3. Interconnect and information flows relating to sharing control and images of PennDOT cameras with DRJTBC

Deletions

1. Interconnect with '911 Communication Centers'. This will be done thru the centers.
2. Interconnect with 'Information Service Providers'. This will be done thru the centers.
3. Interconnect with 'PennDOT D5 Field Devices'
4. Interconnect with 'PennDOT D4 RTMC' to be consistent with other Regions
5. Interconnect with 'PennDOT D6 RTMC' to be consistent with other Regions
6. Interconnect with 'PennDOT STMC' to be consistent with other Regions

Changes

1. Change 'VMS' to 'DMS' in element description

PennDOT D5 Service Patrol Vehicles

Additions

1. Planned interconnect with PSP Offices. PSP offices will be able to dispatch and coordinate with the service patrols vehicles in the future.

Deletions

1. Interconnects with 'PennDOT D4 RTMC' and 'PennDOT D6 RTMC'

Changes

1. Element description should read "PennDOT operated and contracted vehicles..."
2. Interconnect with 'PennDOT D5 TMC' should be shown as existing
3. 'emergency dispatch response', 'incident command request', 'incident status', 'emergency dispatch requests', and 'incident command information' should be depicted as existing flows

PennDOT D5 TMC

Additions

1. Add community relations to the element description
2. 'work plan coordination' to/from 'PTC Offices'
3. 'traffic control coordination' to/from 'PTC Offices'. PTC has the ability to operate/coordinate PennDOT portable DMS
4. Add flow related to CCTV images to '911 Communication Centers'
5. Flows relating to traffic images to 'PSP Dispatch Centers'
6. Planned 'incident information' from 'Regional Transit Agency Offices'
7. AVL traffic information flows from 'Regional Transit Agency Offices'
8. 'road weather information' from 'Adjacent PennDOT Districts'
9. Interconnect with 'PennDOT Central Office Field Devices' for RWIS and ATR data. Ensure ATR's are in the element descriptions for the field devices.
10. Flows related to event information to/from 'Municipal Traffic Management Offices'
11. 'current asset restrictions', 'incident response status' from 'Municipal Traffic Management Offices'
12. 'incident information request' and 'road network conditions' to 'Municipal Traffic Management Offices'
13. planned 'road weather information' to 'Regional Media Outlets'
14. Flows related to planned traffic images to 'Information Service Providers' and 'Regional Media Outlets'
15. 'incident information request' and 'request for road network conditions' to 'Information Service Providers'
16. TRANSCOM element and make consistent with other Regions
17. Add D8 RTMC to the element description for 'Adjacent PennDOT Districts'. Expand the definition of 'Adjacent PennDOT Districts' to include RTMC's, District Offices, and County Maintenance Offices.

18. 'incident information request' from 'Municipal Public Safety Offices'
19. 'incident response status' to 'Municipal Public Safety Offices'

Deletions

1. 'road weather information' to 'PTC Offices'
2. Interconnect with 'PEMA Emergency Operation Center'
3. 'current asset restrictions' to '911 Communication Centers'
4. 'emergency traffic control response' to '911 Communication Centers'
5. 'road network conditions' to/from '911 Communication Centers'
6. 'traffic information coordination' to/from '911 Communication Centers'
7. 'transit emergency coordination data' to 'Regional Transit Agency Offices'
8. 'transit information request' to 'Regional Transit Agency Offices'
9. 'transit emergency data' from 'Regional Transit Agency Offices'
10. 'transit incident information' from 'Regional Transit Agency Offices'
11. 'transit request confirmation' from 'Regional Transit Agency Offices'
12. Interconnect with 'Incident Response Agency Offices'
13. 'trip plan', 'yellow pages information', 'trip confirmation', 'trip request', and 'yellow pages request' to/from 'PennDOT Welcome Centers and Rest Areas'
14. Interconnect with 'ISP Field Devices'. This goes thru the centers instead
15. 'threat information coordination' and 'incident report' to 'NJDOT Offices'

Changes

1. Reword element description so that the PennDOT D5 TMC encompasses the PennDOT District 5-0 Office...
2. Make connections with 'County EMA Centers' consistent with connection with '911 Communication Centers'
3. Make all connections between 'PennDOT STMC' consistent with other Regions
4. Make all connections between 'PennDOT Central Office' consistent with other Regions

5. Change element name from 'ISP Field Devices' to 'Regional Media Field Devices'. The media owns the cameras.

PennDOT D5 Maintenance and Construction Vehicles

Additions

1. Interconnect with 'PennDOT D5 TMC' and flows pertaining to incident information and status, and resource request

Deletions

1. None

Changes

1. None

PennDOT Welcome Centers and Rest Areas

Additions

1. None

Deletions

1. None

Changes

1. Interconnect with 'PennDOT D5 TMC' should be depicted as planned 2
2. Make 'PennDOT Welcome Centers and Rest Areas' element consistent with District 8 and other Regions

Adjacent PennDOT Districts

Additions

1. See 'PennDOT D5 TMC'

Deletions

1. See 'PennDOT D5 TMC'

Changes

1. Revise element description to include RTMC's, District Offices, and County Maintenance Offices.

DRJTBC Headquarters

Additions

1. Connections with 'PSP Dispatch Centers' and flows related to the management and coordination of incidents
2. Connections with 'Municipal Traffic Management Offices' and flows relating to coordination during lane closures
3. Interconnect with 'NJDOT Offices' and flows related to incident coordination
4. Planned interconnect with 'PennDOT D5 Field Devices' for sharing of camera control and images
5. 'archived traffic data' to 'PennDOT D5 TMC'
6. Flows related to lane restrictions, incidents, construction projects to/from 'PennDOT D5 TMC'

Deletions

1. None

Changes

1. Element name should be changed to 'DRJTBC Offices'. The element description should include toll administration buildings, and the main office in Morrisville. DRJTBC has 4 (out of 7) toll bridges and 2 (out of 13) toll supported roads in D5. The element description should also be revised to include the 'toll supported' roads along with the bridges.
2. DRJTBC is planning on deploying field devices. Frank Beruta will send PB Farradyne a list of potential devices.

DRJTBC Toll Plazas

Additions

1. None

Deletions

1. None

Changes

1. None

NJDOT Offices

Additions

1. See 'PennDOT D5 TMC' notes

Deletions

1. See 'PennDOT D5 TMC' notes

Changes

1. See 'PennDOT D5 TMC' notes

PennDOT D4 RTMC

Additions

1. None

Deletions

1. Delete this element and include it in the 'Adjacent PennDOT Districts' element

Changes

1. Make consistent with statewide approach and other Regions

PennDOT D6 RTMC

Additions

1. None

Deletions

1. Delete this element and include it in the 'Adjacent PennDOT Districts' element

Changes

1. Make consistent with statewide approach and other Regions

Date: October 27, 2004

Location: PennDOT District 5-0 Office; Allentown, PA

Attendees:

Mike Ross, Ross Body & Framing
Thomas Walter, PennDOT District 5-0
Jan Wallaesa, PennDOT District 5-0
John Townsend, PennDOT District 5-0
Corporal Cumer, PSP
Meredith Thomas, Ross Body & Framing
Dennis Toomey, PennDOT District 5-0
Larry Bankert, PB Farradyne
J.D. Schneeberger, PB Farradyne

Minutes Prepared By: J.D. Schneeberger, PB Farradyne

A meeting was held on October 26, 2004 between 9:00 AM and 11:00 AM at the PennDOT District 5-0 Office Conference Room to validate the following elements in the PennDOT District 5-0 Pennsylvania Regional ITS Architecture:

- Private Wrecker Units
- PSP Dispatch Centers
- PSP Vehicles

A “package” was developed for each of the above elements in order to portray how an element (i.e., the “subject” element) fits into the regional architecture. The packages were then combined into a MS PowerPoint presentation and reviewed with the stakeholders in attendance. Copies of each element package are attached with these minutes. Specifically, the element packages consisted of:

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The following is a list of comments that we're provided at the meeting. Comments are organized around additions and deletions by element, as well as general discussion items.

Private Wrecker Units

Additions

1. 'incident command request' from 'PSP Dispatch Centers' (this flow need improvement)
2. 'incident command response' to 'PSP Dispatch Centers' (this flow need improvement)

Deletions

1. None

Changes

1. Change element name to 'Towing Agency Responders'
2. Change stakeholder name to 'Towing Agencies'
3. All flows to/from 'PTC Offices' should be existing

Comments

1. 911 Communication Centers dispatch tow truck locally
2. If an incident is in the PSP jurisdiction, the PSP Offices will dispatch the private wrecker unit
3. 'PTC Offices' have their own contractor for towing.
4. PSP contact Towing Agencies and tells them what equipment is needed.
5. Timing and coordination between the various agencies responsible for a clean-up is off.
6. Private Wreckers want more detailed information (i.e., vehicle weight, number of axles, make, model, etc.)

PSP Dispatch Centers

Additions

1. None

Deletions

1. Interconnect with 'PennDOT D4 RTMC'
2. Interconnect with 'PennDOT D6 RTMC'
3. Interconnect with 'Regional Transit Agency Offices'

Changes

1. Change element name to 'PSP Offices'
2. Include existing Dispatch Centers and future Consolidated Dispatch Centers in the element description.

Comments

1. 'PSP Offices' are contacted by the 911 Communication Centers when an incident occurs.
2. 'PSP Offices' contact 'PennDOT County Maintenance Offices' for sand, barrels, etc.
3. 'PSP Offices' dispatch their own vehicles
4. 'PSP Offices' contact Hazmat is necessary
5. 'PSP Offices' contacts PennDOT for DMS messages if applicable

PSP Vehicles

Additions

1. None

Deletions

1. None

Changes

1. None

Date: October 27, 2004

Location: PennDOT District 5-0 Office; Allentown, PA

Attendees:

Rob Smith, St. Lukes Hospital
Jan Wallaesa, PennDOT District 5-0
Dennis Toomey, PennDOT District 5-0
Larry Bankert, PB Farradyne
J.D. Schneeberger, PB Farradyne

Minutes Prepared By: J.D. Schneeberger, PB Farradyne

A meeting was held on October 27, 2004 between 1:00 PM and 3:00PM at the PennDOT District 5-0 Office Conference Room to validate the following elements in the PennDOT District 5-0 Pennsylvania Regional ITS Architecture:

- Municipal Public Safety Offices
- Municipal Public Safety Vehicles

A “package” was developed for each of the above elements in order to portray how an element (i.e., the “subject” element) fits into the regional architecture. The packages were then combined into a MS PowerPoint presentation and reviewed with the stakeholders in attendance. Copies of each element package are attached with these minutes. Specifically, the element packages consisted of:

- PennDOT District 5 Regional ITS Architecture Framework – a copy of the National ITS Architecture “Sausage Diagram”.
- Element Cover Sheets – The name, description and stakeholder of the subject element as defined in the DRAFT Regional ITS Architecture.
- “Sausage Diagrams” showing the context of the subject element and the relationship between other elements in the DRAFT Regional ITS Architecture – the subject element was shown alone within the “Sausage Diagram” framework to provide a sense of context as to where that particular element fits within the National ITS Architecture framework. In addition, a second drawing was provided to show the relationship (i.e., interconnects) between the subject element and other elements in the PennDOT District 5 Regional ITS Architecture.
- Interconnect Diagram – An Interconnect Diagram showing existing and planned interconnects between the subject element and other elements in the regional architecture were provided.

- Information Flow Diagrams – Existing and planned information flows by direction were shown on drawings for the subject element and each of the elements it interconnects with.

The following is a list of comments that we're provided at the meeting. Comments are organized around additions and deletions by element, as well as general discussion items.

Municipal Public Safety Offices

Additions

1. Information flows to/from '911 Communication Centers' pertaining to suggested route/road closures.

Deletions

1. Interconnect with 'PennDOT D5 TMC'.
2. 'suggested route' flow to 'Municipal Public Safety Vehicles'
3. 'emergency vehicle tracking data' from 'Municipal Public Safety Vehicles'
4. 'environmental probe data' from 'Municipal Public Safety Vehicles'

Changes

1. Consider revising element name. Ambulances and hospitals are not municipally owned. Consider changing element name to 'Municipal Local Safety and Emergency Centers'
2. Revise element description to include language on "public non-profit agencies (St. Luke's Hospital)"
3. Include reference to 'Centrona' (EMS) to element description
4. Include reference to 'Eastern PA Metcom' to Architecture. This systems labels emergencies and feeds the information to the radio. Do a web search to find more information.
5. Make flows to/from 'County EMA Centers' and 'PSP Dispatch Centers' consistent to those shown to '911 Communication Centers'

Notes

1. All hospitals have 800 mHz

Municipal Public Safety Vehicles

Additions

1. Add interconnect with '911 Communication Centers'. The 911 Communication Centers dispatch the emergency vehicles.

Deletions

1. Interconnect with 'PSP Dispatch Centers'

Changes

1. Interconnect with 'Municipal Field Devices' should be shown as existing. Signal preemption currently exists.

Date: November 3, 2004

Location: PennDOT District 5-0 Office; Allentown, PA

Attendees:

Armand Greco, LANTA
Dana Moyer, STS
Thomas Walter, PennDOT District 5-0
Dennis Toomey, PennDOT District 5-0
Peggy Howarth, MCTA
John Sninsky, STS
Larry Bankert, PB Farradyne
J.D. Schneeberger, PB Farradyne

Minutes Prepared By: J.D. Schneeberger, PB Farradyne

A meeting was held on November 3, 2004 between 9:00 AM and 11:00 AM at the PennDOT District 5-0 Office Conference Room to validate the following elements in the PennDOT District 5-0 Pennsylvania Regional ITS Architecture:

- Regional Transit Agency Offices
- Regional Transit Vehicles

A “package” was developed for each of the above elements in order to portray how an element (i.e., the “subject” element) fits into the regional architecture. The packages were then combined into a MS PowerPoint presentation and reviewed with the stakeholders in attendance. Copies of each element package are attached with these minutes. Specifically, the element packages consisted of:

- PennDOT District 5 Regional ITS Architecture Framework – a copy of the National ITS Architecture “Sausage Diagram”.
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- “Sausage Diagrams” showing the context of the subject element and the relationship between other elements in the DRAFT Regional ITS Architecture – the subject element was shown alone within the “Sausage Diagram” framework to provide a sense of context as to where that particular element fits within the National ITS Architecture framework. In addition, a second drawing was provided to show the relationship (i.e., interconnects) between the subject element and other elements in the PennDOT District 5 Regional ITS Architecture.
- Interconnect Diagram – An Interconnect Diagram showing existing and planned interconnects between the subject element and other elements in the regional architecture were provided.

- Information Flow Diagrams – Existing and planned information flows by direction were shown on drawings for the subject element and each of the elements it interconnects with.

The following is a list of comments that we're provided at the meeting. Comments are organized around additions and deletions by element, as well as general discussion items.

Regional Transit Agency Offices

Additions

1. New element, 'Remote Traveler Support', to depict future/planned NextBus systems
2. New element, 'County Social Service Offices' (Daycare, MH & R Mental Health and Retardation, Senior Services, Area Agency on Aging, County Assistance Office, County Human Services, County Grants Office, Career Link, OVR Occupation Vocational Relocation Services)
3. Planned information flows to 'PennDOT D5 TMC' pertaining to AVL and travel time (probe vehicles)
4. Existing information flows pertaining to maintenance and construction from 'PennDOT D5 TMC'
5. Flows pertaining to camera images from 'PennDOT D5 TMC'

Deletions

1. Interconnect to 'PEMA EOC'. Coordination with PEMA goes through the County EMA's.
2. Interconnect to 'PSP Dispatch Centers'. This goes through the 911 Centers.
3. 'request transit information' flow from ISP. This flow is shown twice in the diagram.

Changes

1. Make information flows with PennDOT Central Office/STMC consistent with other Architectures
2. 'Transit emergency data, transit incident information, and transit request confirmation' to 'PennDOT D5 TMC' should be depicted as planned.
3. Flow shown from 'PennDOT D5 County Maintenance Offices' to 'Regional Transit Agency Offices' shows archived maint. & const. data being shared. This flow should be changed to show real-time information, not archived.

4. All flows to/from 'Personal Traveler Information Devices' should be shown as existing

Notes

1. Revisit why airports are included in the element description. Consider their removal
2. Ron Young (CRC) emails transit agencies information of road closures, construction, etc.
3. There are communication challenges with vehicles, especially in mountainous areas.
4. Transit agencies need to do a better job of providing scheduling/delay information to the public.
5. Weather information is shared via NOAA and the internet
6. MCTA
 - a. 13 fixed-route vehicles
 - b. 30 paratransit vehicles serving 12,000 people (medical assistance)
 - c. Currently does not utilize AVL
 - d. Having problems with their GIS system (geo-coding). Needs to work with planning agencies to resolve this problem.
 - e. Work with County EMA's during emergencies
 - f. Transit vehicles are utilized to evacuate elderly homes
7. STS
 - g. Fixed-route and paratransit services
 - h. Currently has an ITS Grant in place (\$636,000)
 - i. Needs Assessment
 - i. Has good relations with 911 and County EMA's who serve as the dispatchers
 - j. Work with planning and zoning people (GIS and other information)
 - k. STS is getting ready to put out an RFP for AVL and MDT

- I. Working on interoperability with other agencies (911 and EMA) – future project

Regional Transit Vehicles

Additions

1. None

Deletions

1. None

Changes

1. None

Date: November 3, 2004

Location: PennDOT District 5-0 Office; Allentown, PA

Attendees:

Steve Simchak, Carbon County Planning

Joe Gurinko, LVPC

Dennis Toomey, PennDOT District 5-0

Larry Bankert, PB Farradyne

J.D. Schneeberger, PB Farradyne

Minutes Prepared By: J.D. Schneeberger, PB Farradyne

A meeting was held on November 3, 2004 between 1:00 PM and 3:00pM at the PennDOT District 5-0 Office Conference Room to validate the following elements in the PennDOT District 5-0 Pennsylvania Regional ITS Architecture:

- County Planning Organization Offices

A “package” was developed for each of the above elements in order to portray how an element (i.e., the “subject” element) fits into the regional architecture. The packages were then combined into a MS PowerPoint presentation and reviewed with the stakeholders in attendance. Copies of each element package are attached with these minutes. Specifically, the element packages consisted of:

- PennDOT District 5 Regional ITS Architecture Framework – a copy of the National ITS Architecture “Sausage Diagram”.
- Element Cover Sheets – The name, description and stakeholder of the subject element as defined in the DRAFT Regional ITS Architecture.
- “Sausage Diagrams” showing the context of the subject element and the relationship between other elements in the DRAFT Regional ITS Architecture – the subject element was shown alone within the “Sausage Diagram” framework to provide a sense of context as to where that particular element fits within the National ITS Architecture framework. In addition, a second drawing was provided to show the relationship (i.e., interconnects) between the subject element and other elements in the PennDOT District 5 Regional ITS Architecture.
- Interconnect Diagram – An Interconnect Diagram showing existing and planned interconnects between the subject element and other elements in the regional architecture were provided.
- Information Flow Diagrams – Existing and planned information flows by direction were shown on drawings for the subject element and each of the elements it interconnects with.

The following is a list of comments that we're provided at the meeting. Comments are organized around additions and deletions by element, as well as general discussion items.

County Planning Organization Offices

Additions

1. Interconnect with '911 Communication Centers'. The planning offices currently share GIS information with the '911 Communication Centers'
2. Flows pertaining to maintenance and construction projects and road closures from 'PennDOT D5 TMC'
3. Flows pertaining to real-time traffic data from 'PennDOT D5 TMC'
4. 'traffic archive data' to 'Municipal Traffic Management Offices' – existing (GIS data)
5. 'archive coordination' to/from 'Municipal Traffic Management Offices'
6. Flows pertaining to emissions data to/from 'PennDOT Central Office'

Deletions

1. None

Changes

1. Revise element description to include all of the county planning offices and MPO/RPO's in the Region. Also add discussion on GIS systems.
2. Make flows to/from 'PennDOT Central Office' and 'PennDOT STMC' consistent with other Regions.

Notes

1. During the '22 Renew' project, radar was tied into queue detectors and real-time information was provided over the internet. The website had a map that showed congestion. The counties would like to see more of this in the future.
2. MPO/RPO do traffic counts (60-70 year). The counts are emailed to PennDOT Central Office (BPR)
3. MPMS is the national program and basis for funding
4. Metro Plus Project – LVPC is in the process of working with LANTA (GIS) with door-to-door service (Are they allocating trips appropriately?)

Date: November 4, 2004

Location: PennDOT District 5-0 Office; Allentown, PA

Attendees:

Tim Tenges, Lower Nazareth Township
Chris Bartleson, Bethlehem Township
Paul Johnson, PSP
Dennis Toomey, PennDOT District 5-0
Tony Demarco, Palmer Police
Thomas Walter, PennDOT District 5-0
Jeanette DeRenne, City of Easton
Charlie Jones, City of Reading
James Decker, Stroud Township
Amanda Jensen, Palmer Township
Larry Bankert, PB Farradyne
J.D. Schneeberger, PB Farradyne

Minutes Prepared By: J.D. Schneeberger, PB Farradyne

A meeting was held on November 4, 2004 between 9:00 AM and 11:00AM at the PennDOT District 5-0 Office Conference Room to validate the following elements in the PennDOT District 5-0 Pennsylvania Regional ITS Architecture:

- Municipal Field Devices
- Municipal Traffic Management Offices

A “package” was developed for each of the above elements in order to portray how an element (i.e., the “subject” element) fits into the regional architecture. The packages were then combined into a MS PowerPoint presentation and reviewed with the stakeholders in attendance. Copies of each element package are attached with these minutes. Specifically, the element packages consisted of:

- PennDOT District 5 Regional ITS Architecture Framework – a copy of the National ITS Architecture “Sausage Diagram”.
- Element Cover Sheets – The name, description and stakeholder of the subject element as defined in the DRAFT Regional ITS Architecture.
- “Sausage Diagrams” showing the context of the subject element and the relationship between other elements in the DRAFT Regional ITS Architecture – the subject element was shown alone within the “Sausage Diagram” framework to provide a sense of context as to where that particular element fits within the National ITS Architecture framework. In addition, a second drawing was provided to show the relationship (i.e., interconnects) between the subject element and other elements in the PennDOT District 5 Regional ITS Architecture.

- Interconnect Diagram – An Interconnect Diagram showing existing and planned interconnects between the subject element and other elements in the regional architecture were provided.
- Information Flow Diagrams – Existing and planned information flows by direction were shown on drawings for the subject element and each of the elements it interconnects with.

The following is a list of comments that we're provided at the meeting. Comments are organized around additions and deletions by element, as well as general discussion items.

Municipal Field Devices

Additions

1. Existing interconnect with 'Municipal Public Safety Offices' – they want some control of traffic signals and would like video in the future.
2. Existing interconnect with 'PennDOT D5 TMC' – currently have dial-up connection with some traffic signals
3. Planned interconnect with 'County 911 Communication Centers' – would like control of traffic signals in the future
4. Planned CCTV images to 'Municipal Traffic Management Offices'

Deletions

1. None

Changes

1. Revise element description to include (1) video/loop detection, spread spectrum (Stroud Township). Closed loop and traffic responsive signals exist and/or planned for all municipalities.
2. 'local signal preemption request' from 'Municipal Public Safety Vehicles' – existing

Municipal Traffic Management Offices

Additions

1. Interconnect with DRJTBC (with city of Pleasant). Information flows should show incident/emergency management and maintenance & construction.
2. Interconnect with new element 'Local School Districts'. Information flows should be for road closures.

Deletions

1. Interconnect with 'Regional Media Outlets'
2. Interconnect with 'PennDOT D5 County Maintenance Offices'
3. Interconnect with 'Information Service Providers'

Changes

1. Revise the element description. The current element description is for 'Municipal Public Safety Offices'. Be consistent with other Architectures.
2. Ensure consistency of architecture flows with 'PTC Offices'

Notes

1. Municipal Public Safety Offices want camera images from Municipal Traffic Management Offices.
2. 911 Centers dispatch local police, fire, etc.
3. Municipal police communicate with 'Regional Media Outlets'
4. During interstate closures, PennDOT uses DMS to help Municipalities
5. PROJECT – The Municipalities would like an automated system that shares GIS traffic count information with County Planning Organizations. Traffic count information is currently being shared.
6. PennDOT D5 TMC (Ron Young) sends incident/closure information via email/fax to the Municipalities. Municipalities wanted to be added to this list.

Date: November 4, 2004

Location: PennDOT District 5-0 Office; Allentown, PA

Attendees:

Dennis Toomey, PennDOT
Thomas Walter, PennDOT
Eric Reinert, WFMZ-TV
Mathilda Sheptak, Pocono Mountains Vacation Bureau
Steve Mittman, Clear Channel Radio
Larry Bankert, PB Farradyne
J.D. Schneeberger, PB Farradyne

Minutes Prepared By: J.D. Schneeberger, PB Farradyne

A meeting was held on November 4, 2004 between 1:00 PM and 3:00 PM at the PennDOT District 5-0 Office Conference Room to validate the following elements in the PennDOT District 5-0 Pennsylvania Regional ITS Architecture:

- Event Promoters
- Information Service Providers
- ISP Field Devices
- Personal Traveler Information Devices
- Regional Media Outlets
- Weather Information Providers

A “package” was developed for each of the above elements in order to portray how an element (i.e., the “subject” element) fits into the regional architecture. The packages were then combined into a MS PowerPoint presentation and reviewed with the stakeholders in attendance. Copies of each element package are attached with these minutes. Specifically, the element packages consisted of:

- PennDOT District 5 Regional ITS Architecture Framework – a copy of the National ITS Architecture “Sausage Diagram”.
- Element Cover Sheets – The name, description and stakeholder of the subject element as defined in the DRAFT Regional ITS Architecture.
- “Sausage Diagrams” showing the context of the subject element and the relationship between other elements in the DRAFT Regional ITS Architecture – the subject element was shown alone within the “Sausage Diagram” framework to provide a sense of context as to where that particular element fits within the

National ITS Architecture framework. In addition, a second drawing was provided to show the relationship (i.e., interconnects) between the subject element and other elements in the PennDOT District 5 Regional ITS Architecture.

- Interconnect Diagram – An Interconnect Diagram showing existing and planned interconnects between the subject element and other elements in the regional architecture were provided.
- Information Flow Diagrams – Existing and planned information flows by direction were shown on drawings for the subject element and each of the elements it interconnects with.

The following is a list of comments that we're provided at the meeting. Comments are organized around additions and deletions by element, as well as general discussion items.

Event Promoters

Additions

1. Interconnect and information flows to/from 'PennDOT D5 County Maintenance Offices'. Information flows pertaining to maintenance and event information should be included. This relationship could be better.
2. Interconnect with 'Municipal Public Safety Offices'. Information flows should pertain to event information.
3. Interconnect with 'DRJTBC Offices'. Information flows should pertain to event information.
4. Interconnect with 'County EMA Centers'. Information flows should pertain to emergency information.

Deletions

1. Interconnect with 'PennDOT STMC'

Changes

1. Revise element name to reflect attractions. A possible element name may be 'Attractions and Event Promoters'.
2. Revise element description to read "Regional attractions and tourist destinations..."

Information Service Providers

Additions

1. None

Deletions

1. Interconnect with 'PennDOT D5 Field Devices'. This will go thru the offices instead!

Changes

1. Include the mention of MSN Autos to them element description.

ISP Field Devices

Additions

1. None

Deletions

1. None

Changes

1. Change element name to 'Regional Media Field Devices'. The media owns the cameras.

Personal Traveler Information Devices

This element was validated thru other elements at various validation meetings.

Regional Media Outlets

Additions

1. None

Deletions

1. Interconnect with 'PennDOT Central Office'

Changes

1. None

Weather Information Providers

This element was validated thru other elements at various validation meetings.

Notes

1. ISP: Does PennDOT provide alternate route information during incidents?

PennDOT: Yes, PennDOT has alternate routes for long-term incidents. Information is provided on DMS and detour signing is utilized.

The media and ISP's would love to have this information to share with the public!

2. ISP would like better information, i.e. how long the incidents last. This is where camera sharing may come into play.
3. ISP wants severity of incidents. They said 10% of the time; they didn't know the incident existed.
4. The media would like advanced maintenance and construction information. The media will be added to Ron Young's email list.
5. Coordination between Transit and the media could be better. Transit agencies want to ensure their information is broadcasted at an appropriate time (i.e. not during school cancellations) via radio.

Appendix H: Bookend II Meeting Minutes

Date: Thursday, February 3, 2005
Meeting of: PennDOT District 5-0 Region – Second Meeting
Location: Days Inn—Allentown, PA

Presentation

- Amar Bhajandas from PennDOT welcomed everyone to the meeting. Stakeholders include PA State Police, transit operators, national weather service, counties, cities, townships, emergency management agencies, planning offices, economic development agencies, and many more entities. Amar explained that this meeting is the final regional stakeholder meeting of the ITS Architecture effort. The first regional meeting was held in October 2004; it was followed by a series of smaller working meetings in October and November 2004. Material from the first regional meeting is available upon request or via the web at www.paits.org. The purposes of the meeting include concluding the ITS Architecture effort, meeting the federal mandate for architecture conformity, discussing next steps, and discussing continuing regional operations dialogue. Amar quickly listed the agenda for the meeting. First, Larry Bankert from PB would give an overview of the ITS Architecture. Then, Noah Goodall, also from PB, would describe the website and how users would access information and provide input for updating the architecture. Next, Dennis Lebo from PennDOT would talk about next steps. Joe Gurinko, from LVPC, would explain the role of the regional planning bodies for a local perspective. Dennis Toomey from PennDOT would facilitate discussion at the end.
- Larry Bankert 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 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. The federal funds can continue to be used for ITS projects in the District 5-0 Region because the regional ITS Architecture has been successfully completed. Then, Larry explained the process for creating the ITS Architecture. He started by showing the regional architecture boundaries for the entire state of Pennsylvania. District 5-0 includes six counties. Larry showed a diagram which detailed the different steps in the process of generating the ITS Architecture. The process is based on information sharing. The pre-planning stage, which occurred in August 2003, includes developing the process for generating this ITS Architecture and identifying the champions and the regional advisory panel. In the information gathering stage, stakeholders are identified and information on regional projects

are gathered. In the analysis stage, interconnects and flows are identified. The Strawman architecture results from the analysis. In the outreach stage, stakeholders are invited to regional meetings and validation meetings. Afterwards, the information gathering stage is revisited. The architecture is rebuilt and is used to populate the website. A second regional meeting is held, and finally, the ITS Architecture is presented.

- Larry continued by summarizing each of the chapters in the District 5-0 Regional ITS Architecture Document. The new sections include using the architecture document, ITS Standards, utility of the architecture, maintenance of the architecture, and mainstreaming ITS. 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. More than 50 standards exist for Pennsylvania Regional ITS Architecture. The ITS architecture provides structure for ITS planning and deployments. Also, an institutional mechanism that promotes development and deployment of ITS is established. ITS Architecture helps to promote interoperability, encourages efficient investment, and satisfies the federal mandate. In the following slide, Larry talked about how the ITS Architecture is to be maintained. The ITS Architecture is to be updated every four years, and the next update should be Fall 2008. In order to maintain statewide consistency, the ITS Architecture updates will most likely be led by PennDOT Central office. 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. To move forward and mainstream 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. Educational scanning tours may also be provided to county commissioners, executive boards, managers, operations staff, and public safety officials.
- Noah Goodall gave 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. The website is www.paits.org. Noah guided the users through the website links by using the menus on the left-hand side and across the top of the screen. Elements on the menu include a description of District 5-0 region, list of the organizational entities that operate in the transportation environment, interconnect diagrams, definitions and acronyms, full architecture document, help on using the architecture, and forms for updating the architecture.

- 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. The regional architecture sits between the vision and the long range plans / transportation improvement plans. 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.
- Joe Gurinko, from the Lehigh Valley 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. Furthermore, projects documented in the Architecture should be regionally prioritized. The region needs to support the ITS/Operations project in the TIP and the PennDOT statewide TSOP. The region should continue regional discussions to address ITS/operations at regional level. PennDOT should hold focused ITS meetings when it is needed, and all stakeholders are welcome to attend.

Open Discussion

- Dennis Toomey facilitated the open discussion. He said that he was thankful for the following things: Dennis Lebo, central office managing the effort, PB team, stakeholders, and the freeway service patrol stepping into the operations mindset. He encouraged the stakeholders to visit the operations center. The region is proceeding with designing and constructing CCTV to fill in strategic gaps. This will help them see the traffic conditions in real time.
- Dana Moyer asked about ITS funding. How will regions and municipalities receive money for ITS in the future? Dennis Lebo said that the goal is to mainstream ITS so that there would be no funds earmarked specifically "ITS". Planning for ITS will become part of the planning process, such as TIPS. The long range plan is an opportunity for ITS to be considered. It will be competing with funds for roadways and bridges.

List of Attendees

Last Name	First Name	Agency	Email	Phone
Albright	Lynda	Borough of Hamburg	borohmbg@comcast.net	(610) 562-7821
Anastasiadis	Manny	PennDOT District 6-0 (Traffic)	eanastasia@state.pa.us	(610) 205-6581
Bhajandas	Amar	PennDOT D5-0		
Churetta	Ron	St. Lukes Hospital	churetr@slhn.org	(610) 770-8300
Decker	James	Stroud Township	stroudjdecker@enter.net	(570) 421-3362
Demarco	Tony	Palmer Police	acdemjr@aol.com	(610) 253-5844
DeRenne	Jeannette	City of Easton	jderenne@easton-pa.gov	(610) 250-6651
Greco	Armand	Lehigh and Northampton Transit Authority (LANTA)	avgreco@erols.com	(610) 435-4052
Guers	John	Schuylkill County Planning		(570) 628-1424
Gurinko	Joesph	Lehigh Valley Planning Commission	jlg@lvpc.org	(610) 264-4544

Last Name	First Name	Agency	Email	Phone
Hanosek	John	Lehighton Borough	lehboro@ptd.net	(610) 377-4002
Jones	Charles	City of Reading	charles.jones@readingpa.org	(610) 655-6236
Lebo	Dennis	PennDOT Central Office		
Luthar	Charles	Hellertown Borough	clutha@ptd.net	(610) 838-7041
MacLean	Stephen	PennDOT District 5-0 (Construction)	smaclean@state.pa.us	(610) 791-6049
Marnielle	Bob	State Representative Kelly Lewis		
Matz	John	Schuylkill County EMA Center		
Moyer	Dana	Schuylkill Transportation System (STS)	dlmoyer@redcogrp.com	
Pack	Mike	PennDOT Central Office	mpack@state.pa.us	(717) 783-4579
Peters	Frank	Allentown Police Department	petersf@allentowncity.org	(610) 437-7713
Ross	Mike	Ross Body and Frame	miker@rossbodyframe.com	

Last Name	First Name	Agency	Email	Phone
Ross	Charles	Schuylkill County Planning		
Simchak	Stephen	Carbon County Office of Planning and Development	ccopadd@ptd.net	(570) 325-3671
Sninsky	John	Schuylkill Transportation System (STS)	sninsky@ptd.net	(570) 429-2701
Spanier	George	Exeter County		
Thomas	Meredith	Ross Body and Frame Works Inc.	mere@rossbodyframe.com	(610) 435-8013
Toomey	Dennis	PennDOT District 5-0 (Traffic/ITS)	dtoomey@state.pa.us	(610) 798-4245
Townsend	John	PennDOT District 5-0 (Traffic/ITS)	jotownsend@state.pa.us	(610) 798-4257
Wallaesa	Jan	PennDOT District 5-0 (Traffic/ITS)	jwallaesa@state.pa.us	(610) 798-4237
Walter	Thomas	PennDOT District 5-0 (Traffic/ITS)	thwalter@state.pa.us	(610) 798-4304
Woodling	John	Monroe County Planning Commission	jwoodling@monroe2020.org	

Pennsylvania ITS Architecture – Update and Next Steps

District 5-0 Region
Second Regional Meeting
February 3, 2005



Welcome

Amar Bhajandas
District 5 Executive
Pennsylvania Department of
Transportation



Welcome

- PennDOT
- PSP
- Transit
- Counties
- Cities
- Townships
- Emergency Management Agencies
- Planning Offices
- Partnership Organizations
- Enforcement Community
- Media
- Tourism and Event Destinations
- Towing Companies
- Policy



Meeting Series

- This is the final regional stakeholder meeting of the ITS Architecture effort
 - First Regional Stakeholder Meeting was held in October 2004
 - Followed by a series of smaller working meetings in October & November 2004
- Material from the First Regional Meeting is available upon request or via the web at: <http://www.paits.org>



Meeting Purpose

- Conclude the ITS Architecture Effort
- Meet the Federal Mandate for Architecture Conformity
- Discuss Next Steps
- Discuss Continuing Regional Operations Dialog



Agenda

- **Welcome** –
Amar Bhajandas, PennDOT 5-0
- **ITS Architecture Overview** –
Larry Bankert, PB
- **ITS Architecture Web Site** –
Noah Goodall, PB
- **Next Steps** –
Dennis Lebo, PennDOT
- **Role of the Regional Planning Bodies** –
Joe Gurinko, LVPC
- **Open Discussion** –
Dennis Toomey, PennDOT 5-0



ITS Architecture Overview

Larry Bankert
Parsons Brinckerhoff



Mandate Conformity

Conformity Statement

The Intelligent Transportation System Architecture and Standards final rule issued by the United States Department of Transportation, USDOT, Section: 940.5 (and 49 CFR Part 613 and 621) has been met for this region in Pennsylvania.



Meaning

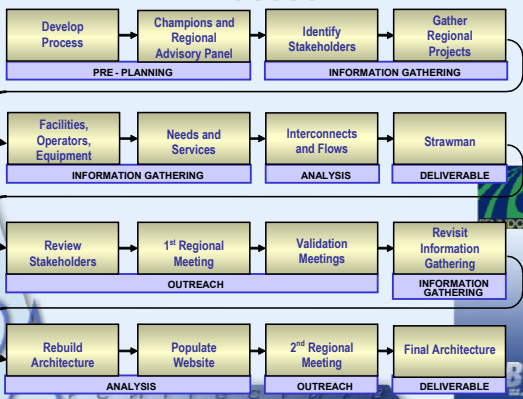
- Federal rule from FHWA and policy from FTA have been met
- Federal funds can continue to be used for ITS projects in this region
- The Region has been successful



Regional Architecture Boundaries



Process



Final Report

- Introduction
- Architecture Scope
- Regional Systems Inventory, Needs, and Services
- Regional ITS Architecture
- References
- 7 Appendices



New Sections

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



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PB

ITS Standards

- ITS Standards
 - 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
- More than 50 Standards for Pennsylvania Regional ITS Architectures



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Utility of the Architecture

- The Regional ITS 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



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ITS Architecture Maintenance

- **When** - ITS Architecture to be updated every four (4) years, next one should be updated by Fall 2008
- **Who** - ITS Architecture updates most likely will be led by PennDOT Central Office for statewide consistency



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ITS Architecture Maintenance

- **What** - Will be Maintained?
 - Description of the Region
 - Stakeholders
 - Elements
 - System Inventory
 - Needs and Services
 - Interconnect Diagrams
 - Architecture Flows
 - Applicable ITS Standards



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Mainstreaming ITS

- Regional Stakeholders
 - Get Transportation Technology Issues in Front of Decision Makers
 - ITS in Long Range Plans
 - Modify TIP Project Selection Criteria to More Fairly Evaluate Technology and ITS
 - Regular Updates to Elected Officials
 - Regional ITS / Operations Coordination Committees



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Mainstreaming ITS

- Educational Training Courses (e.g.: National Highway Institute)
 - Introduction to Systems Engineering
 - ITS Procurement
 - Managing Traffic Incidents for Roadway Emergencies
- Others

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



PB

Mainstreaming ITS

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



PB

ITS Architecture Web Site

Noah Goodall
Parsons Brinckerhoff



PB

How to Use the Architecture

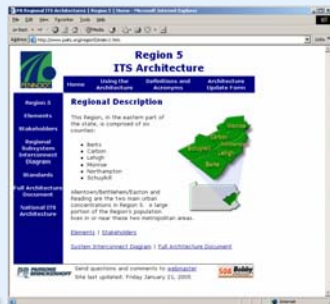
- Web-based
- Easy to use
- Will serve as the historical library
- Submittal form for new information
 - Stakeholder updates
 - Project updates

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



PB

PA ITS Architecture Web Site Example Slides...



PB

PA Regional ITS Architectures | Region 5 | Home - Microsoft Internet Explorer

Address: <http://www.paits.org/region5/index1.htm>

Region 5 ITS Architecture

Home | Using the Architecture | Definitions and Acronyms | Architecture Update Form

Region 5 Regional Description

This Region, in the eastern part of the state, is comprised of six counties:

- Berks
- Carbon
- Lehigh
- Monroe
- Northampton
- Schuylkill

Atlanta/Bethlehem/Easton and Reading are the two main urban concentrations in Region 5. A large portion of the Region's population lives in or near these two metropolitan areas.

Elements | Stakeholders

PA Regional ITS Architectures | Region 5 | Elements - Microsoft Internet Explorer

Address: http://www.pats.org/region5/e/index.htm

Region 5 ITS Architecture

Home Using the Architecture Definitions and Acronyms Architecture Update Form

Region 5 Elements

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. 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.

- 911 Communication Centers
- Adjacent PennDOT District and County Offices
- Attractions and Event Promoters
- Commercial Vehicle Company Offices
- Commercial Vehicles
- County EMA Centers
- County/Regional Planning Organizations
- County Social Service Offices
- DOT/TC Offices

PA Regional ITS Architectures | Region 5 | Elements - Microsoft Internet Explorer

Address: http://www.pats.org/region5/e/index.htm

- DOT/TC Toll Plazas
- High Throat Facilities
- Incident Response Agency Offices
- Information Service Providers
- Local School District Offices
- Municipal Field Devices
- Municipal Traffic Management Offices
- Municipal/Regional Public Safety Offices
- Municipal/Regional Public Safety Vehicles
- NBDOT Offices
- NEMA Emergency Operation Center
- NISP Offices
- Passenger Vehicles
- PEMA Emergency Operation Center
- PennDOT Central Office Field Devices
- PennDOT Central Office Organizations
- PennDOT D4 RTMC
- PennDOT D5 County Maintenance Offices
- PennDOT D5 Field Devices
- PennDOT D5 Maintenance and Construction Vehicles
- PennDOT D5 Service Patrol Vehicles
- PennDOT D5 TMC
- PennDOT D8 TMC
- PennDOT STMC
- PennDOT Welcome Centers and Rest Areas
- Pennsylvania Office of Homeland Security
- Personal Traveler Information Devices
- PSP Offices
- PSP Troop T Highcoire

PA Regional ITS Architectures | Region 5 | PennDOT D5 TMC - Microsoft Internet Explorer

Address: http://www.pats.org/region5/e/25.htm

Region 5 ITS Architecture

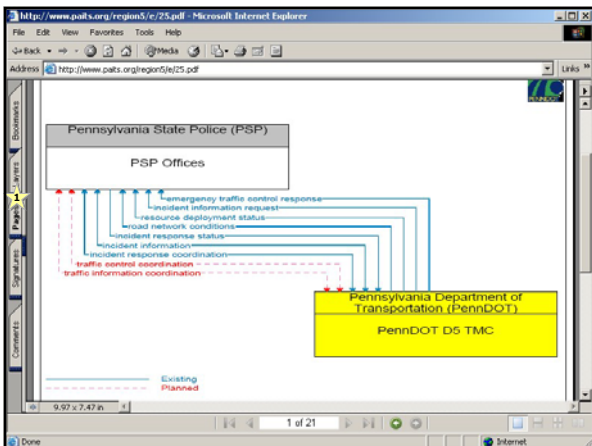
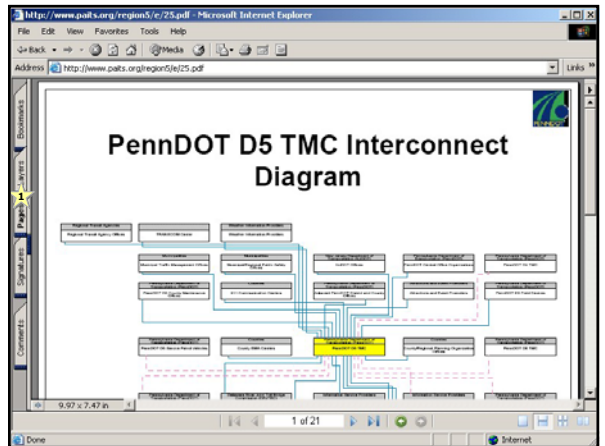
Home Using the Architecture Definitions and Acronyms Architecture Update Form

Region 5 PennDOT D5 TMC

The Pennsylvania Department of Transportation Engineering District 5-0 Office, in Allentown, PA responsible for Carbon, Berks, Lehigh, Northampton, and Schuylkill counties within the Region. This element includes personnel and existing/future systems, housed in the District 5-0 Office, including the Transportation Management Center (TMC) and the Community Relations department. The PennDOT D5 TMC is responsible for providing traffic management, incident/emergency response, maintenance and construction coordination, and traveler information on PennDOT roadways.

Flow definitions - General definitions of the architecture flows used in the document.

*Viewing the architecture flows requires Adobe Reader, a free software for downloading PDF documents. [Click here](#) to download Adobe Reader.



PA Regional ITS Architectures | Region 5 | Stakeholders - Microsoft Internet Explorer

Address: http://www.pats.org/region5/stake/index.htm

Region 5 ITS Architecture

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Region 5 Stakeholders

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

- Attractions and Event Promoters
- Commercial Vehicle Companies
- Counties
- Delaware River Joint Toll Bridge Commission (DRJTC)
- General Public
- Information Service Providers
- Local School Districts
- Municipalities
- New Jersey Department of Transportation (NJDOT)
- New Jersey Emergency Management Agency (NJEMA)
- New Jersey State Police (NJSP)
- Pennsylvania Emergency Management Agency (PEMA)
- Pennsylvania Office of Homeland Security
- Pennsylvania State Police (PSP)
- Pennsylvania Turnpike Commission (PTC)

PA Regional ITS Architectures | Region 5 | Pennsylvania Department of Transportation (PennDOT) - Microsoft Internet Explorer

Address: http://www.pats.org/region5/stake/penndot.htm

Region 5 ITS Architecture

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Region 5 Elements Stakeholders Regional Subsystem Interconnect Diagram Standards Full Architecture Document National ITS Architecture

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 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 | Region 5 | Pennsylvania Department of Transportation (PennDOT) - Microsoft Internet Explorer

Address: http://www.pats.org/region5/stake/penndot.htm

Region 5 ITS Architecture

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Full Architecture Document National ITS Architecture

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 District and County Offices
- PennDOT Central Office Field Devices
- PennDOT Central Office Organizations
- PennDOT D4 RTMC
- PennDOT D5 County Maintenance Offices
- PennDOT D5 Field Devices
- PennDOT D5 Maintenance and Construction Vehicles
- PennDOT D5 Patrol Vehicles
- PENNDOT-EC-TMC
- PennDOT D9 TMC
- PennDOT STMC
- PennDOT Welcome Centers and Rest Areas

Send questions and comments to [webmaster](#)
Site last updated: Monday January 31, 2005

PARSONS BRINCKERHOFF

PA Regional ITS Architectures | Region 5 | PennDOT D5 TMC - Microsoft Internet Explorer

Address: http://www.pats.org/region5/e/25.htm

Region 5 ITS Architecture

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Region 5 Elements Stakeholders Regional Subsystem Interconnect Diagram Standards Full Architecture Document National ITS Architecture

PennDOT D5 TMC

The Pennsylvania Department of Transportation Engineering District 5-O Office, in Allentown, PA responsible for Carbon, Berks, Lehigh, Northampton, and Schuylkill counties within the Region. This element includes personnel and existing/future systems, housed in the District 5-O Office, including the Transportation Management Center (TMC) and the Community Relations department. The PennDOT D5 TMC is responsible for providing traffic management, incident/emergency response, maintenance and construction coordination, and traveler information on PennDOT roadways.

PennDOT D5 TMC Element Architecture (66KB PDF)*

[Flow definitions](#) - General definitions of the architecture flows used in the document.

*Viewing the architecture flows requires Adobe Reader, a free software for downloading PDF documents. [Click here](#) to download Adobe Reader.

PA Regional ITS Architectures | Region 5 | Regional Subsystem Interconnect Diagram - Microsoft Internet Explorer

Address: http://www.pats.org/region5/diagram/index.htm

Region 5 ITS Architecture

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Regional Subsystem Interconnect Diagram

Click on the subsystem category (in the white boxes) for a listing of the category's elements.

The diagram illustrates the interconnectivity between various subsystems. At the top, 'Trainers' (Vehicle Traveler Support, Traveler Information Service) and 'Centers' (Emergency Management, Toll Administration, Commercial Vehicle Registration, Maintenance & Construction Management, Information Service Provider, Operations Management, Traffic Management, Field and Freigh Management, WOVLED Data Management) are connected to a central 'Information Service Provider'. Below this, subsystems are categorized into 'Vehicle' (VMS, IBS, VMS-i, IBS-i, Call/Alert/Info, Toll Vehicle), 'Roadway' (Roadway, Toll), and 'Other' (VMS, IBS, VMS-i, IBS-i, Call/Alert/Info, Toll Vehicle).

PA Regional ITS Architectures | Region 5 | Traffic Management - Microsoft Internet Explorer

Address: http://www.pats.org/region5/diagram/trafm.htm

Region 5 ITS Architecture

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Region 5 Elements Stakeholders Regional Subsystem Interconnect Diagram Standards Full Architecture Document National ITS Architecture

Traffic Management

The Traffic Management Subsystem monitors and controls traffic and the road network. It represents centers that manage a broad range of transportation facilities including freeway systems, rural and suburban highway systems, and urban and suburban traffic control systems. This subsystem communicates with the Roadway Subsystem to monitor and manage traffic flow and monitor the condition of the roadway, surrounding environmental conditions, and field equipment status. This subsystem coordinates with the Maintenance and Construction Management Subsystem to maintain the road network and coordinate and adapt to maintenance activities, closures, and detours. Incidents are detected, verified, and incident information is provided to allied agencies, drivers (through Roadway Subsystem highway advisory radio and dynamic message signs), and information service providers. This subsystem also manages traffic and transportation resources to support allied agencies in responding to, and recovering from, incidents ranging from minor traffic incidents through major disasters. When required, special traffic management strategies are implemented to support evacuation and reentry. The Traffic Management Subsystem

PA Regional ITS Architectures | Region 5 | Traffic Management - Microsoft Internet Explorer

Address: http://www.pats.org/region5/diagram/trafm.htm

Region 5 ITS Architecture

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and influence mode selection. It also manages reversible lane facilities and barrier and safeguard systems that control access to transportation infrastructure. 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 automated highway system (AHS) traffic and vehicle control.

Elements

- 911 Communication Centers
- County/Regional Planning Organizations
- Information Service Providers
- Municipal Traffic Management Offices
- PEMA Emergency Operation Center
- PennDOT Central Office Organizations
- PennDOT D4 RTMC
- PENNDOT-EC-TMC
- PennDOT D9 TMC
- PennDOT STMC
- TTC Offices

Send questions and comments to [webmaster](#)
Site last updated: Monday January 31, 2005

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Region 5 Elements Stakeholders Regional Subsystem Interconnect Diagram Standards Full Architecture Document National ITS Architecture

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PennDOT D5 TMC Element Architecture (66KB PDF)*

Flow definitions - General definitions of the architecture flows used in the document

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PA Regional ITS Architectures | Region 5 | Full Architecture Document - Microsoft Internet Explorer

Region 5 ITS Architecture

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Region 5 Elements Stakeholders Regional Subsystem Interconnect Diagram Standards Full Architecture Document National ITS Architecture

Full Architecture Document

The Northwest 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.

Region 5 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.

PA Regional ITS Architectures | Region 5 | Help - Microsoft Internet Explorer

Region 5 ITS Architecture

Home Using the Architecture Definitions and Acronyms Architecture Update Form

Region 5 Elements Stakeholders Regional Subsystem Interconnect Diagram Standards Full Architecture Document National ITS Architecture

Using the Architecture

This section will help guide you through the Region 5 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

PA Regional ITS Architectures | Region 5 | Definitions and Acronyms - Microsoft Internet Explorer

Region 5 ITS Architecture

Home Using the Architecture Definitions and Acronyms Architecture Update Form

Region 5 Elements Stakeholders Regional Subsystem Interconnect Diagram Standards Full Architecture Document National ITS Architecture

Definitions and Acronyms

Definitions are grouped into four categories. Choose yours from the list below.

- Acronyms** - An alphabetical listing of all acronyms 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

PA Regional ITS Architectures | Region 5 | Architecture Flow Definitions - Microsoft Internet Explorer

Region 5 ITS Architecture

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Region 5 Elements Stakeholders Regional Subsystem Interconnect Diagram Standards Full Architecture Document National ITS Architecture

Architecture Flow Definitions

(Source: National ITS Architecture)

Below are the architecture flow definitions from the National ITS Architecture exclusive to the Region 5 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.

PA Regional ITS Architectures | Region 5 | Home - Microsoft Internet Explorer

Region 5 ITS Architecture

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Region 5 Elements Stakeholders Regional Subsystem Interconnect Diagram Standards Full Architecture Document National ITS Architecture

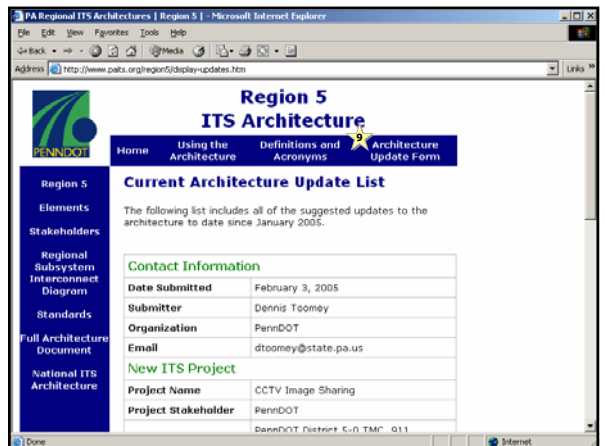
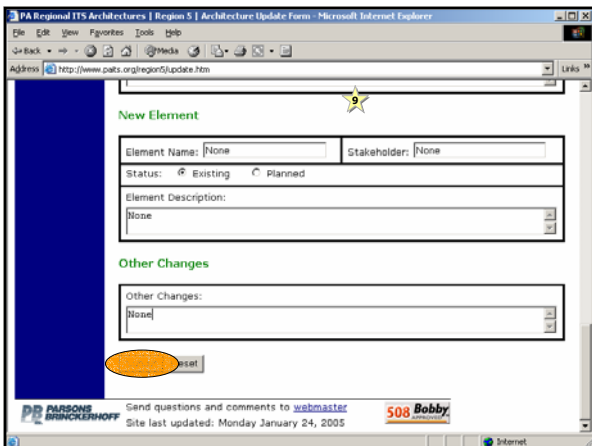
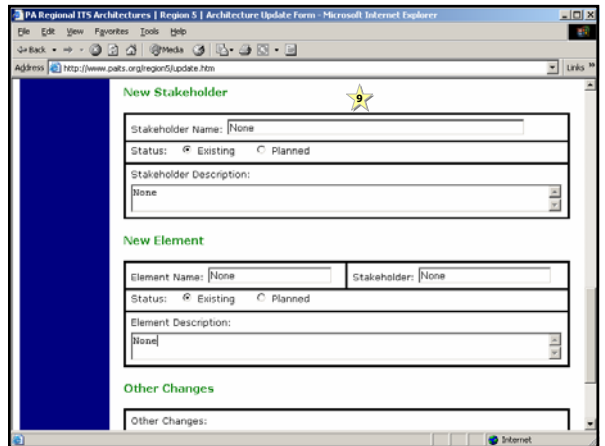
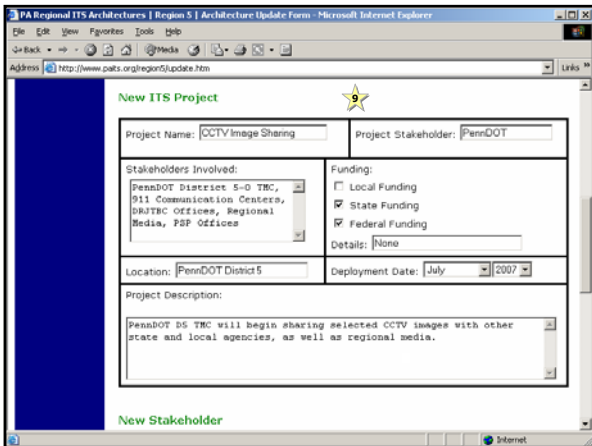
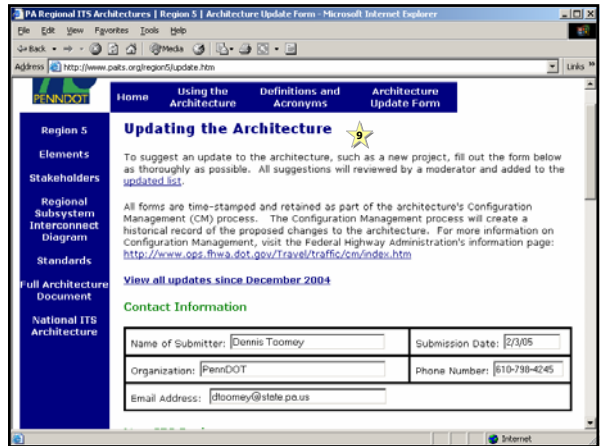
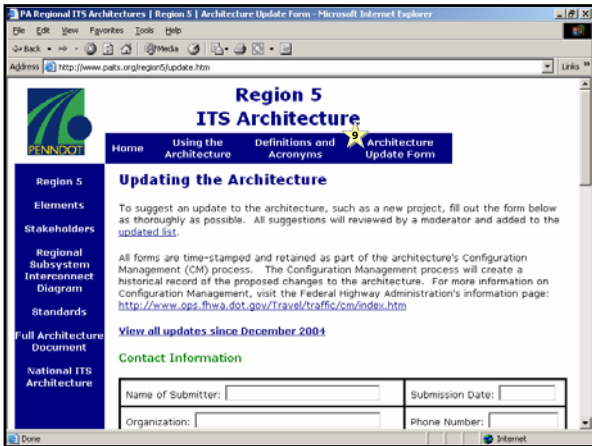
Regional Description

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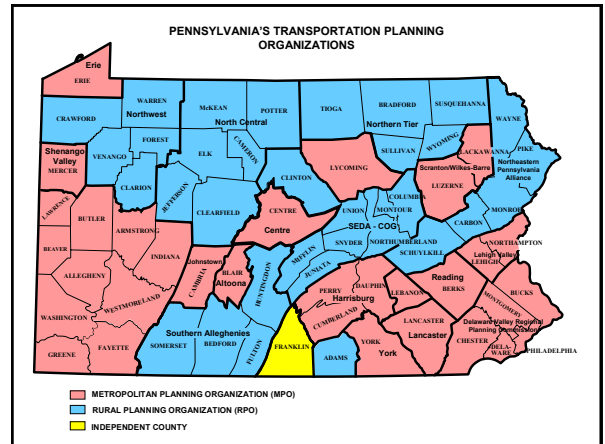
Allentown/Bathlehem/Easton and Reading are the two main urban concentrations in Region 5. A large portion of the Region's population lives in or near these two metropolitan areas.

[Elements](#) | [Stakeholders](#)

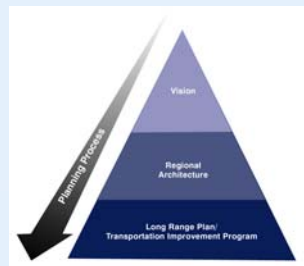


Moving Forward – Next Steps

Dennis Lebo
PennDOT Center for Program
Development and Management



Business Context



Projects



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)



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



Regional Planning and Operations Dialog

Joe Gurinko
Lehigh Valley Planning Commission



Regional ITS Planning Overview

- Adoption of the ITS Architecture by the Region
- Incorporate ITS Architecture into the Region's long-range plans
- Support ITS/Operations projects in TIP
- Mainstream ITS elements into other transportation projects
- Continue regional and statewide dialogue to address ITS, operations, and mobility at the regional level



Next Steps within Region

- MPO's/RPO's adopt the Regional ITS Architecture
- Continue Regional ITS/Operations dialogue
 - Focused ITS Meetings led by PennDOT on an as needed basis
 - All stakeholders are welcome to attend



Open Discussion

Dennis Toomey
PennDOT District 5-0

