Feasibility Study for the National Intelligent Transportation Systems (ITS) Architecture Project - Chile

Task 10: Final Report

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1 EXECUTIVE SUMMARY

The National ITS Architecture of Chile was developed by a team of consultants from Lockheed Martin and Consensus Systems Technologies Corporation (ConSysTec) from the United States, and Aristo Consultores from Santiago, Chile. It describes at a high level the current, as well as proposed future, ITS inventory and system requirements for ITS projects in Chile. It is a framework around which multiple design approaches can be developed, each one specifically tailored to meet the individual needs of the user, while maintaining the benefits of a common architecture

The architecture defines the functions (e.g., gather traffic information or request a route) that must be performed to implement transportation services, the systems where these functions reside (e.g., the roadside or the vehicle), the interfaces/information exchanges between systems, and the communication requirements for the moving of information from one system to another, whether wireline or wireless. In addition, it identifies and specifies the requirements for the standards needed to support national and regional interoperability, as well as product standards needed to support economy of scale considerations in deployment. The result is a nationwide plan for integrated transportation management systems in Chile, from which technical ITS project specifications can be shaped.

A major finding reached during the development of the National ITS Architecture of Chile was that no single government agency nor institution was charged with coordination of ITS planning and deployment in Chile. A notable exception is the technical specifications and standards developed for the wide-scale deployment of electronic toll collection systems. These standards have permitted the development of compatible systems and the use of a single transponder tag for electronic toll payment on roadways within the Metropolitan Region. Another factor affecting the development and deployment of ITS is the lack of general information available about ITS within the transportation community, both public and private sectors, in Chile -- and, in particular, information regarding concrete benefits realizable from the application of ITS-based solutions to transportation problems.

The National ITS Architecture of Chile was developed through involvement from participating agencies and stakeholders from all areas of transportation (e.g., traffic management, public transportation, port operations, commercial vehicle operations, and planning, to mention a few). The National ITS Architecture identifies the stakeholders and provides a description of the agency, department, or organization represented by the stakeholder. A listing of stakeholders and their ITS systems inventory is included. A system interconnect diagram, or sausage diagram, shows the systems and primary types of interconnections in the region. This diagram depicts all the subsystems in the National ITS Architecture and the basic communication channels between these subsystems. The National ITS Architecture of Chile interconnect diagram has been

customized based on the information gathered from the stakeholders and the system inventory. The sausage diagram summarizes the existing and planned ITS elements for the region in the context of their physical interconnects. Customized Market Package Diagrams are shown on the National ITS Architecture of Chile web site, organized by transportation functional area.

Equipment packages are the building blocks of the subsystems in the National ITS Architecture. Equipment Packages group processes from a particular subsystem together into a set of high level functional requirements that can be implemented as a package. Each ITS element (ITS system in the inventory) contains a set of equipment packages, that when taken together, constitute the system functional requirements for that system.

The discussion of interoperability focuses on two areas: Center-to-Center System Interoperability and Center-to-Field System Interoperability. In general, center-to-center interoperability refers to interoperability between systems inside of centers, and primarily covers information exchanges (information formats, information exchange sequences) between systems, and command and control. Center-to-field interoperability involves interoperability not only of information exchanges, and command and control between center and field systems, but also interoperability between different manufacturers' equipment, including electrical and mechanical specifications.

The National ITS Action Plan presents a multiyear, inter-modal and multi-modal program of transportation projects that is consistent with the metropolitan and inter-urban transportation plans of Chile. The National ITS Action Plan is a program for ITS project development and identifies national metropolitan and inter-urban transportation goals and objectives. Additionally, the following recommendations are included:

- Establish a coordinating authority for ITS in Chile
- Define normative guides and ITS standards
- Develop a professional capacity building program for Ministry of Public Works, Vice-Ministry of Transportation and other public institutions
- Establish a national registry of commercial vehicles
- Develop incident detection and management systems along interurban routes
- Develop and maintain an ITS cost-benefits database

Once a project has been selected for consideration, the project description information for the ITS components could be entirely, or for the most part, taken from the outputs of the National ITS Architecture effort. The National ITS Architecture is not a static product or set of outputs, but must change as needs evolve in Chile. The definition of how often to update the National ITS Architecture should be tied to some aspect of the overall transportation planning cycle.

Considering the great potential for ITS as outlined in this document, information gathered from national and international experience, and the expectations for ITS deployment over the medium term in Chile, it is possible to formulate a vision for the transformation of the transportation system of the nation. As a result, the citizens of Chile throughout the country can be assured:

- That the transportation system of Chile is administered and operated to provide intermodal services door-to-door without regard to the location of the passengers being transported, or the location or type of cargo being transported; and,
- That transport within Chile is safe, oriented towards the user, and efficiently and economically engineered using the most advanced telecommunications and transportation monitoring systems available.

2 INTRODUCTION

2.1 Acknowledgements

The National ITS Architecture of Chile was developed by a team of consultants from Lockheed Martin and Consensus Systems Technologies Corporation (ConSysTec) from the United States, and Aristo Consultores from Santiago, Chile. The consultant team greatly appreciates the participation and support of the Ministry of Public Works (Ministerio de Obras Públicas - MOP) of Chile, especially José Miguel Ortega, Sergio Acuña, and Georgina Febré from the Vice-Ministry of Transportation, and all the ITS stakeholders from Chile whose participation was crucial to the successful development of a National ITS Architecture for Chile.

2.2 Report Organization

This report is organized into 6 sections and 4 appendices:

- Section 1 Executive Summary – provides a thumbnail sketch of the National ITS Architecture and its relevance to transportation system deployment in Chile.
- Section 2 Introduction - provides introductory and background information about this document, a definition of the National ITS Architecture, its purpose and why it is needed.
- Section 3 Overview of the Project - identifies the process used to develop the National ITS Architecture of Chile, including major study tasks, training, stakeholder workshops and the comment review process, and provides definitional information and background about the contents of the National ITS Architecture of Chile.
- Section 4 Major Findings - provides a summary of findings regarding ITS systems in Chile, contains an overview of the technical information included in the National ITS Architecture, and a brief discussion of the issues and challenges regarding interoperability of ITS systems in Chile.
- Section 5 Recommendations – provides general recommendations regarding ITS systems in Chile, contains an overview the National ITS Action Plan, suggested practices for incorporating the National ITS Architecture of Chile into the transportation planning cycle, and outlines considerations for keeping the National ITS Architecture of Chile up-to-date.
- Section 6 Conclusions – summarizes the vision and intent of the National ITS Architecture of Chile and benefits to its citizens.
- Appendix A – provides a listing of stakeholders and their ITS systems, a summary of system requirements and functional specifications derived from the National ITS Architecture.

- Appendix B – provides a discussion of existing ITS standards and candidate ITS standards for future deployments in Chile.
- Appendix C – provides contact information for ITS system and service providers in the United States.
- Appendix D – provides contact information for the companies that participated in the execution of this study.
- Appendix E – includes a copy of each task-specific technical and planning report developed and delivered during the study. There is one for each of the 9 project tasks.

3 OVERVIEW OF THE PROJECT

3.1 National ITS Architecture of Chile Background

The National ITS (Intelligent Transportation Systems) Architecture of Chile is a roadmap for transportation systems integration over the next approximately 15 years. The architecture has been developed through a cooperative effort by the country's transportation agencies, covering all modes and all roadways in the country. The architecture represents a shared vision of how each agency's systems will work together in the future, sharing information and resources to provide a safer, more efficient, and more effective transportation system for travelers in the region.

The ITS architecture is an important new tool that will be used by:

- Operating Agencies to recognize and plan for transportation integration opportunities in the region.
- Planning Agencies to better reflect integration opportunities and operational needs into the transportation planning process.
- Other organizations and individuals that use the transportation system in Chile.

The ITS architecture provides an overarching framework that spans all of these organizations and individual transportation projects. Using the ITS architecture, each transportation project can be viewed as an element of the overall transportation system, providing visibility into the relationships between individual transportation projects and ways to cost-effectively build an integrated transportation system over time. This plan describes at a high level the current, as well as proposed future, ITS inventory and system requirements for ITS projects in Chile.

3.2 Why a National ITS Architecture is Needed for Chile?

A safe and effective transportation infrastructure is crucial to the realization of the individual and national aspirations of citizens everywhere. Until recently, the building and improvement of a transportation infrastructure meant the civil and mechanical construction or enlargement of roads, bridges and tunnels, as well as the associated enterprises that provide the vehicles (including trucking, safety and personal) that travel on the infrastructure. Today, the application of data processing and data communications to surface transportation promises additional safety and efficiency benefits.

For example, while ITS (Intelligent Transportation Systems) may not be able to reduce the travel time in highly congested regions and corridors, still ITS may be able to improve the ability of shippers and travelers to more accurately estimate actual travel times and arrival times. Reducing the variance of these travel and arrival time estimates can significantly increase the utility of the transportation infrastructure, especially in the new economies where just-in-time manufacturing and other enterprises are crucial for success. This is important for Chile where

highways are the major mode of transporting passengers and goods -- cross-country trucking accounts for most freight movement within the nation, and interstate buses carry most of the passengers.

One definition of Intelligent Transportation Systems (ITS) is: the application of data processing and data communications to surface transportation. The distributed nature of surface transportation, both geographically and institutionally, requires careful planning for information to be effectively exchanged between distributed components in the transportation enterprise. Like any other distributed system, the planning of ITS can benefit from a systematic requirements-driven approach. The goal is to have conventions for how the ITS functions are partitioned between transportation elements, and standards for how the separate functions exchange information between them. This is the role of an ITS Architecture.

Today, the acronym ITS stands for Intelligent Transportation Systems – but another definition, which the consultant team often referred to was that of – *Integrated* Transportation Systems.

3.3 ITS Architecture Development Objectives

The top-level objective is to develop a Chile National ITS Architecture and identify applicable ITS interface standards. This objective supports the broader and related ITS objectives of achieving interoperability between ITS deployments and reducing the cost of ITS deployments. The objective of an ITS architecture is to document the current and future information sharing relationships between existing and planned ITS elements. These elements and their information sharing relationships must reflect the current and expected institutional stakeholder relationships in Chile.. The objective of the standards is to guide the implementation of the external interfaces of identified architecture elements (i.e. the interfaces between specific centers, field equipment, vehicles and traveler equipment).

The National ITS Architecture of Chile identifies the existing and best consensus stakeholder estimates of the future ITS elements, and identify the information exchange requirements between these elements, including options for open ITS standards to facilitate the exchange of information between the ITS elements. As such, the focus of the ITS Architecture is on external interfaces to the elements (i.e. the interfaces between ITS elements, not the technology within ITS elements). This focus on external interfaces acknowledges that usually the most difficult and time consuming barrier to deployment of interoperable ITS elements in a region or country is achieving the institutional agreement between stakeholders to exchange specific information between specific ITS elements. An objective of the National ITS Architecture of Chile is to specifically identify these information exchange requirements very early in the process of deployment, so that the time consuming process of achieving prerequisite institutional agreements can proceed as early as possible.

An objective of the National ITS Architecture of Chile is that each ITS element in Chile is mapped to one or more National ITS Architecture entities (e.g. subsystems or terminators). The US National ITS Architecture was used as a starting framework, but was augmented and adapted to enable solutions to physical and high-level functional requirements unique to Chile or Chile regions (and were, of course, not included in the US National ITS Architecture). Notable of Chilean requirements which expanded the US National ITS Architecture included enhancements to support Port and "Ante-Port" operations, and development of an integrated model of the privatized network of freeways (tollways) in the country. The resulting customized National ITS Architecture became the National ITS Architecture of Chile.

3.4 National ITS Architecture Development Process

3.4.1 Feasibility Study Project

The National ITS Architecture of Chile was developed under an agreement between the U.S. Trade and Development Agency (USTDA) and the Ministry of Public Works of Chile. The feasibility study provided the following analyses leading to the National ITS Architecture of Chile:

- Review of Existing Conditions and Define Goals and Objectives. The goal of this task was to perform an inventory of ITS technologies in Chile and to define the objectives and goals of the study. These items became a starting point for the development of an ITS architecture.
- Review Institutional and Legal Issues. The goal of this task was to examine the legal and institutional structure as it pertains to the implementation of ITS in Chile. The analysis identified the institutional and legal aspects that could benefit or limit the development of ITS.
- Technical Analysis. The main goal of this task was to develop an operational concept of how the current ITS equipment deployed throughout Chile works, how it can be integrated to ensure interoperability, and what standards and user services should be used in Chile. This analysis included development of a high-level concept of operations, a list of current systems and their potential impacts on future interoperability, and a list of standards that Chile may need to consider in future deployments.
- Economic and Financial Analysis. Under this task, the skills of Lockheed Martin Finance Corporation (LMFC) were used to identify several options to MOPTT on funding sources. Beneficial customer financing identified included sources of funds such as banks, export credit agencies, and institutional investors.
- Environmental Impacts. This task identified benefits for the ITS implementations considered by the Chile National ITS Architecture. This included a characterization of

these benefits by each type of system (rather than for every individual system). Key benefits were defined based on a comparison with US developed information (primarily the US ITS Benefits Database). Benefits that have an environmental impact, such as reduction in emissions due to reduced congestion, were highlighted.

- Develop System Requirements and Capabilities. System Requirements (also called System Functions) describe what the system has to do. Under this task, high-level system requirements were identified. System requirements at several different levels, ranging from general subsystem descriptions through more specific equipment package descriptions have also been developed.
- Develop ITS Architecture. The National ITS Architecture of Chile is published at ConSysTec's web site, www.consystec.com. An image of the web site was delivered to the Ministry of Public Works of Chile on CDROM. The National ITS Architecture will also be published to a website of the Chilean Program Manager's choosing. The website allows users to rapidly, easily and more economically and ecologically find the elements and interfaces of interest to specific parts of the ITS architecture, and supports printing of portions of interest to a user directly from any current web browser.
- Propose Systems and Services. This task identified potential sources of planned equipment, systems, and services defined in the architecture. This included documenting a list of vendors of ITS products, systems and services identified as planned elements and services of the architecture.
- Develop National ITS Action Plan. This task consisted in the definition of a program for activating the National ITS Architecture in Chile. The action plan considers institutional, legal, financial and technical aspects needed for the implementation of an integrated ITS system in Chile.

3.4.2 Technical Approach

The overall approach used to develop the National ITS Architecture of Chile was to use the US National ITS Architecture as a starting framework for the development of ITS architectures in Chile. This is similar to the strategy followed recently by Canada in developing their National ITS Architecture. This approach enabled Chile to economically benefit from the work already done elsewhere in North America.

The consultant team first systematically identified the existing and future inventory of stakeholder elements at the subsystem level (as defined in the National ITS Architecture) based on existing regional and corridor deployments, existing ITS architectural and planning documentation, and articulation of stakeholder needs in the workshops. Next, the consultants identified generic services through National ITS Architecture Market Packages, and where stakeholders indicated a need, the consultants customized those Market Packages for specific

applications (existing or future) identified by the stakeholders. This customization identified information exchange at the architecture flow level. Finally, a roll-up of all information exchange requirements at the architecture flow level for each subsystem level entity was reviewed with stakeholders. The result was a consensus architecture for the National ITS Architecture of Chile.

While high-level functional requirements were identified for each element mapped to a National ITS Architecture subsystem, an objective was to as much as possible avoid identifying specific technologies with the National ITS Architecture of Chile elements. This was done to give the National ITS Architecture of Chile a "long shelf life," avoiding rapid technological obsolescence that would be unavoidable if specific technology choices were made now. As such, it is recommended that technology choices related to the ITS architecture be made as close as possible to the actual time of deployment (e.g., during the design phase of a project).

3.4.3 ITS Architecture Training

ConSysTec is the lead developer, for the US DOT, of an award winning two-day course titled "Using the National ITS Architecture for Deployment" which is intended to train ITS stakeholders about ITS architecture and standards so that they are prepared to participate in the development of their own National ITS Architecture. ConSysTec translated into Spanish and adapted the course materials to prepare Chilean stakeholders for development of the National ITS Architecture of Chile. The 2-day course was held immediately following the First Annual ITS Chile Conference in Santiago in September of 2002.

3.4.4 Workshops Leading to a National ITS Architecture

In connection with the development phase of the National ITS Architecture of Chile, two 3-day workshops were conducted. The key overall objective of the workshops is that the resultant National ITS Architecture should be a consensus architecture, that is, each of the participants understands and agrees to the ITS elements and specific information exchanges between the ITS elements identified in the National ITS Architecture that they participated in defining.

The objective of the first workshop was to develop a first draft National ITS Architecture of Chile. The initial architecture development workshop was held in Santiago, Chile on the 11th, 13th, and 15th of November 2002. The initial tasks of compiling information from existing documents, definition of goals and objectives, assessment of legal and institutional issues, and development of an initial systems inventory was managed in Chile by Aristo Consultores. Having collected and assimilated information from existing documentation about ITS systems and transportation needs in Chile, ConSysTec developed a Turbo Architecture database model. The Turbo Architecture database model allowed workshop participants to review information from a wide variety of sources, but formatted in a consistent manner.

The objective of the second 3-day workshop was to conduct a systematic review of the third draft National ITS Architecture of Chile. (The second and third draft architectures were updated based on comments received via e-mail or during teleconferences held approximately every other week between the consultant team and representatives from the Ministry of Public Works.) The second architecture development workshop was held in Santiago the 28th through 30th of April 2003.

Stakeholders contributed toward the development of the architecture in three key ways during each of the workshops. First, the stakeholders validated and added to the ITS systems inventory. Next, stakeholders reviewed the customized market packages from the National ITS Architecture, which provide an easily accessible means to describe ITS transportation services. The National ITS Architecture market packages were extended with new market packages to represent requirements and concepts of operations that are unique to Chile or had not been anticipated by the US National ITS Architecture. Finally, the stakeholders reviewed the external interfaces for each stakeholder element of the inventory.

4 MAJOR FINDINGS

4.1 General Findings

A major finding reached during the development of the National ITS Architecture of Chile was that no single government agency nor institution was charged with coordination of ITS planning and deployment in Chile. Moreover, no specific legislation existed regarding ITS infrastructure planning and development. While this has not impeded the progress of development of ITS systems by the public and private sectors, the possibility remains that systems may be deployed that are incompatible and/or not able to interoperate. More importantly, in the future the situation may make more difficult the ability for ITS systems to exchange information in the future, thus limiting the full potential of ITS deployment.

A notable exception to the statements in the previous paragraph is the technical specifications and standards developed for the wide-scale deployment of electronic toll collection systems. These standards have permitted the development of compatible systems and the use of a single transponder tag for electronic toll payment on roadways within the Metropolitan Region.

From the financial perspective, the lack of funding available for the research, development, and deployment of ITS systems has been a strong impediment to the possibility of ITS solutions in Chile. For example, the study of ITS systems is only now being incorporated into the curriculum of those choosing a career in transportation, and the consideration of ITS-based solutions is only recently emerging among transportation professionals in Chile.

Another factor affecting the development and deployment of ITS is the lack of general information available about ITS within the transportation community, both public and private sectors, in Chile -- and, in particular, information regarding concrete benefits realizable from the application of ITS-based solutions to transportation problems. An understanding of the benefits realizable through the deployment of ITS is extremely important as public projects are required to provide a certain minimum return in terms of social and cost benefits in order for the project to be eligible for public funds. The US Department of Transportation for a number of years has accumulated cost-benefit information about ITS deployments (e.g., reduction in crashes, travel time, emissions, etc. and associated costs). The results from the US experience, however, are not directly applicable to projects deployed in Chile, though US results may provide a base reference for potential benefits that may be achieved.

One final item of note for companies doing business in Chile is the importance of being able to speak Spanish very well and to write Spanish fluently. Most communication with MOP and ITS stakeholders in Chile was conducted in Spanish. Furthermore, Chileans are particularly proud of their language and feel it is important that written communication in Spanish be excellent –

misspellings, incorrectly placed accent marks and punctuation, and grammar are frowned upon, though the extremely friendly Chileans will draw attention to the matter in a very polite manner.

4.2 National ITS Architecture Technical Content

This section provides an overview of the technical content of the National ITS Architecture of Chile.

4.2.1 Stakeholders

Stakeholders is a widely used term that denotes public agency, private organization or the traveling public with a vested interest in one or more transportation elements (systems) within the National ITS Architecture.

Stakeholder coordination and involvement is one of the key elements of the development of a National ITS Architecture of Chile. Because ITS often transcends traditional transportation infrastructure, it is important to consider a range of stakeholders beyond the traditional traffic, transit, and maintenance areas. In addition, it is important to consider stakeholders in another adjoining country.

The National ITS Architecture of Chile includes a wide range of stakeholders. The National ITS Architecture identifies the stakeholders and provides a description of the agency, department, or organization represented by the stakeholder.

4.2.2 ITS Systems Inventory

Based on the high-level definitions of the National ITS Architecture subsystems and terminators, an ITS Systems Inventory was developed, using locally understood terms.

With the assistance of moderators experienced in the development of ITS architectures, the stakeholders identified local ITS elements (systems), and classified these elements to subsystems and/or terminators of the National ITS Architecture (e.g., traffic management systems, traveler information systems, public transportation systems, etc.). Furthermore, the ITS systems in the inventory were classified as to whether they were either:

- Existing – the entity already exists or
- Future – the entity may be deployed in the future.

A listing of stakeholders and their ITS systems inventory is included in Appendix A.1.

4.2.3 Top Level System Interconnect Diagram – "Sausage Diagram"

A system interconnect diagram, or sausage diagram, shows the systems and primary types of interconnections in the region. This diagram depicts all the subsystems in the National ITS Architecture and the basic communication channels between these subsystems. The National ITS

Architecture of Chile interconnect diagram has been customized based on the information gathered from the stakeholders and the system inventory. The sausage diagram summarizes the existing and planned ITS elements for the region in the context of their physical interconnects. ITS elements identified for Chile ITS deployments (and their primary associated architecture entity) are called out in the boxes surrounding the central interconnect diagram.

In the center of the figure the rectangles represent the subsystems of the National ITS Architecture of Chile. The National ITS Architecture of Chile has elements that map to all 21 subsystems defined. In addition, the architecture has elements that map to the terminators of the National ITS Architecture. These terminators are represented by the rightmost column of boxes (shown in yellow) on the diagram.

The diagram also identifies the three basic types of communications used to interconnect the elements of the ITS architecture. These communications types are defined as:

- Wireline Communications:
  A communications link serving stationary sources. It may be implemented using a variety of public or private communications networks that may physically include wireless (e.g., microwave) as well as wireline infrastructure. Both dedicated and shared communications resources may be used.
- Wide Area Wireless Communications:
  A communications link that provides communications via a wireless device between a user and an infrastructure-based system. Both broadcast (one-way) and interactive (two-way) communications services are grouped into wide-area wireless communications. These links support a range of services including real-time traveler information and various forms of fleet communications.
- Dedicated Short Range Communications:
  A wireless communications channel used for close-proximity communications between vehicles and the immediate infrastructure. It supports location-specific communications for ITS capabilities such as toll collection, transit vehicle management, driver information, and automated commercial vehicle operations.

The sausage diagram for the National ITS Architecture of Chile is included in Appendix A.2.

4.2.4 Market Packages

The National ITS Architecture of Chile documents each stakeholder's current and future roles and responsibilities in the operation of regional or national ITS systems. Market packages collect together two or more system elements (from the same or multiple stakeholders) that must work together to deliver a given transportation service and the architecture flows that connect them and other important external systems on the boundary of ITS. In other words, they identify

the ITS system elements required to implement a particular transportation service. In the context of an operational concept, market packages provide an expansion on the role of the stakeholder. Market packages included in the National ITS Architecture of Chile were tailored to fit, separately or in combination, real-world Chilean transportation problems and needs.

Market packages, customized for the specific consensus requirements, represent the information that may be exchanged between specific stakeholder elements to effect specific sets of user services. As such, they collectively represent the concept of operations for a region.

Customized Market Package Diagrams are shown on the National ITS Architecture of Chile web site, and organized by transportation functional area as follows:

- Archived Data Management Systems (AD). These are systems used to collect transportation data for use in non-operational purposes (e.g. planning and research).
- Advanced Public Transportation Systems (APTS). These are systems used to more efficiently manage fleets of transit vehicles or transit rail. Includes systems to provide transit traveler information both pre-trip and during the trip.
- Advanced Traveler Information Systems (ATIS). These are systems used to provide static and real time transportation information to travelers.
- Advanced Traffic Management Systems (ATMS). These are traffic signal control systems that react to changing traffic conditions and provide coordinated intersection timing over a corridor, an area, or multiple jurisdictions. This functional area also included systems used to monitor freeway (or tollway) traffic flow and roadway conditions, and provide strategies such as ramp metering or lane access control to improve the flow of traffic on the freeway. These systems may also provide information to motorists on the roadway.
- Commercial Vehicle Operations (CVO). These are system used to more efficiently manage commercial fleets, monitor freight movements, hazardous materials movement, safety inspections, and electronic clearance (both domestic and international).
- Emergency Management (EM). These are systems that provide emergency call taking, public safety dispatch, and support emergency operations center operations.
- Maintenance and Construction (MC). These are systems used to manage the maintenance of roadways in the region, including winter snow and ice clearance, and construction operations.

Incident management systems are generally associated to some degree with each of the transportation functional areas shown above - for example, within the functional area of traffic management (ATMS), a market package exists called ATMS08 - Incident Management; within

public transportation (APTS), the Transit Security market package APTS5 exists; and for commercial vehicle operations (CVO), market package CVO10 - HAZMAT Management exists.

4.2.5 Architecture Flows

Architecture flows represent the information that is exchanged between subsystems and terminators in the National ITS Architecture. Architecture flows are the primary tool that is used to define system interfaces. These architecture flows define communication requirements of the interfaces. Architecture flows can form a basis for a national ITS standards program. For example, each architecture flow can be associated with a particular standard (or standards). Appendix B includes an analysis of existing and potential future ITS Standards applicable in Chile.

4.2.6 Equipment Packages and System Functional Requirements

Equipment packages are the building blocks of the subsystems in the National ITS Architecture. Equipment Packages group similar processes of a particular subsystem together into a set of high level functional requirements that can be implemented as a package. The grouping of processes takes into account the need to accommodate various levels of functionality. Equipment packages are both the most detailed elements of the National ITS Architecture of Chile and are tied to specific market packages. Each ITS element (or system – not including terminators) contains a set of equipment packages, that when taken together, constitute the functional requirements for that individual system.

A listing of Equipment Packages by system, comprising the high-level functional specifications / requirements, is included in Appendix A.3. The definitions of the Equipment Packages are included in Appendix A.4.

4.3 System Interoperability and ITS Standards

4.3.1 Interoperability Issues

This discussion of interoperability issues is divided into two sections: Center-to-Center Interoperability and Center-to-Field Interoperability. In general, center-to-center interoperability refers to interoperability between systems inside of centers, and primarily covers information exchanges (information formats, information exchange sequences) between systems, and command and control. Center-to-field interoperability involves interoperability not only of information exchanges, and command and control between center and field systems, but also interoperability between different manufacturers' equipment, including electrical and mechanical specifications.

4.3.2 Center-to-Center Communications Interoperability

Interoperability between center systems allows them to share the following kinds of information:

- Incident information (type, location, severity, type of vehicles involved), incident response and status
- Traffic and road network conditions, road weather information, road closure (type, location, number of lanes).
- Location (of incidents, vehicles, ITS devices)
- Traffic images and video surveillance control
- Shared device control, and device control requests (sign messages, traffic patterns, highway advisory radio)
- Maintenance resource requests (equipment for incident removal, weather emergencies, roadway disasters)

The impact of not having interoperable center-to-center communication formats and protocols is that unique interfaces will need to be developed for each center-to-center pair.

4.3.2.1 Interoperability Impacts of Center-to-Center ITS Standards

Center-based standards are applicable to the current environment in Chile, especially given the fact that government agencies desire the ability to collect information directly from private concessionaire's systems for audit, regulation, and planning purposes. The introduction of standards-based (or retrofitting of existing systems) of private concessionaires systems would significantly reduce the cost of implementing public agency systems to monitor concessionaire systems due to the fact that only a single interface need be designed, developed, and implemented, instead of one custom interface being developed for each concessionaire.

Additionally, in the future, should a reciprocity network be developed to allow, for example, a single tag or fare card to be used across various concessionaire systems – including toll, transit, or parking – only a single interface need be designed and implemented, versus custom interfaces between the reciprocity system and each concessionaire's systems.

4.3.3 Center-to-Field Communications Interoperability

Interoperability between center and field-based systems, and between equipment manufacturers equipment, may include the following:

- Passenger fare cards and readers
- Toll tags and readers
- Motorist Information Systems (highway advisory radio, dynamic message signs)
- Transit Customer Information Systems (information displays at stations and stops, kiosk systems, electronic passenger point-of-sale systems)

- Surveillance equipment (CCTV, vehicle sensors, traffic image formats, camera control)
- Environmental Sensors (weather and air quality sensors, flood warning devices)
- Traffic Control (traffic signal controllers, ramp meters, lane controllers)

The primary impact of not having interoperability between manufacturers equipment is that it limits system expansion opportunities to a limited number (or perhaps a single) manufacturer or vendor.

4.3.3.1 Interoperability Impacts of Center-to-Field ITS Standards

Toll Tags and Readers. One of the categories of interoperability is Toll Tags and Readers. Incompatible tags and reader equipment presents the problem of users needing to have more than one tag to travel on multiple tollways. Due to the investment in Toll Equipment and Tags, introduction of new standards would require the replacement of equipment and tags.

Traffic Control Equipment. In the case of traffic control equipment (e.g., dynamic message signs, camera control, traffic signal controllers, traffic counters, etc.) introduction of new standards may be applicable and feasible due to the reduced cost in equipment replacement and/or the ability to purchase entirely new systems based on standards-based specifications.

5 RECOMMENDATIONS

5.1 Specific Actions

The consultant team proposes a set of actions that the Chilean authorities may consider in order to facilitate the development of integrated ITS systems in Chile. These actions are directly related to the ITS projects and priorities outlined in the National ITS Action Plan, described in the following section.

5.1.1 Coordinating Authority

The consultant team recommends the establishment of a coordinating authority for ITS. The Ministry of Transport and Telecommunications, in accordance with its role of providing the general direction for transportation in the country, possesses the necessary attributes to act as the public authority in charge of planning and coordinating the development of ITS in Chile. Moreover, the Vice-Ministry of Transportation could orient itself to activities related to the development of normative references that would facilitate the practice of ITS. Representative activities may include the obligatory use of the National ITS Architecture of Chile in the functional specification of ITS systems, and the provision of a general support role for the development of technical normative guides and specifications, such as has been accomplished with electronic toll payment systems. In addition, the Inter-Ministerial Agency for Transportation Planning (Secretaría Interministerial de Planificación de Transporte - SECTRA), and the Bureau of Planning (Dirección de Planeamiento - DIRPLAN) of MOP could allocate resources towards research and development, and planning for ITS systems in the country. In a supporting role, ITS Chile, should continue to provide an environment where public and private sectors and academia can elaborate and share information and lessons learned from the application and investigation of ITS in Chile.

5.1.2 Guides and Standards

The consultant team recommends the definition of normative guides and standards. The coordinating authority for ITS in Chile should take on as a primary task, the definition of normative guides and ITS standards that would regulate the development of ITS. The application of the National ITS Architecture of Chile in projects financed in part or fully by the Government of Chile would provide a basis for initial standards-based deployments. This would require advancing communications standards required to facilitate the interconnection of ITS systems. This study advances the concept of using proven ITS standards from the US – these may be tailored to fit the needs of ITS in Chile. The MOP and the Vice-Ministry of Telecommunications should take on this important task.

5.1.3 Capacity Building Program

The consultant team recommends the development of a professional capacity building program for Ministry of Public Works, Vice-Ministry of Transportation and other public institutions. Knowledge with respect to ITS in the public sector is concentrated within a small group of professionals who have over time gathered ITS experience either directly through the deployment of ITS in Chile or through participation in workshops and conferences. Given the multidisciplinary and multimodal nature of ITS it is important to provide capacity building to enable public sector personnel to lead and coordinate with each other the development of ITS systems and help realize the benefits of ITS deployments. Professional capacity workshops may cover matters such as: ITS architecture, benefits and cost of ITS systems, ITS standards and communications.

5.1.4 National Registry

The consultant team recommends the establishment of a national registry of commercial vehicles. Establishment of a National Registry of Commercial Vehicles would have a significant impact in the development of ITS in the country since it would constitute the foundation for a series of other initiatives with high economic potential. The use of transponder tags in the urban freeway system of the Metropolitan Region provided an important first step in this direction. It is estimated that in 2006 there will exist nearly 900,000 vehicles with transponder tags in the region alone.

It is not difficult to imagine establishing the obligatory use of transponder tags for certain vehicles, including those owned by the Government of Chile and following with commercial vehicles. The Vice-Ministry of Transportation could make the use of transponder tags a requirement in the same way that a license plate is required. This may require modification of the Transit Law that establishes sanctions for certain vehicles owners (e.g., commercial fleet operators) whose vehicles enter public pathways without a transponder in which an electronic toll collection system operates. In addition, the tag may be required to store certain information that would enable the electronic inspection of commercial vehicles and their cargo.

5.1.5 Incident Detection and Management

The consultant team recommends the development of incident detection and management systems along interurban routes. Chile has advanced greatly since the early 1990's with regard to the detection and management of roadway incidents. For example, the installation of emergency roadside assistance telephones (call boxes) along concessionaire highways provide immediate notification of roadway incidents and emergencies to law enforcement, fire and emergency medical responders. Despite these advances, additional ITS elements may provide additional benefits. Notable examples include: extension of the system to cover non-concessionaire routes, addition of fixed and portable dynamic message signs to inform motorists of incident occurrence,

systems to assist emergency vehicles reach their destinations more quickly, and automated incident detection systems at strategic points of the interurban road network.

The proposal phase for a pilot project within the Metropolitan Region is underway. Analysis of project costs and benefits should be conducted to help determine the best way to implement similar capabilities of automated incident detection and management for all interurban routes.

5.1.6 ITS Cost-Benefits Database

The consultant team recommends that an ITS cost-benefits database be developed and maintained. Information regarding the benefits of ITS technologies is limited in Chile. The Ministry of Public Works may consider requiring that prior to implementation of ITS projects, a data collection plan be developed to help assess improvements (vis-à-vis expected results) to the transportation system resulting from ITS. Thus, the data collected would make it possible to conduct a before-and-after comparison of expected and realized benefits to the transportation system. Furthermore, this information would be gathered and stored in a standardized manner, for example, by the Ministry of Public Works to generate a database of ITS benefits and costs, similar to that which is administered by the US Department of Transportation.

5.2 National ITS Action Plan

The National ITS Action Plan presents a multiyear, inter-modal and multi-modal program of transportation projects that is consistent with the metropolitan and inter-urban transportation plans of Chile. The National ITS Action Plan is a program for ITS project development and identifies national metropolitan and inter-urban transportation goals and objectives.

ITS projects included in the National ITS Action Plan come from several sources:

- The National ITS Architecture Market Packages which outlines possible multi-agency, multi-jurisdictional integration projects to bring together transportation elements from across the country.
- Set of projects generated through corridor or subarea studies (of which ITS is a part).
- A prioritization and project selection process conducted as part of study preparation. The National ITS Action Plan should play a key role in the prioritization and project selection process.

All projects defined in the National ITS Action Plan are subject to some form of prioritization. Some of the factors that are typically used in developing these priorities include:

- Urgency of need for the project
- Project effectiveness versus cost

- Sequencing as related to other ITS and non-ITS projects (e.g. Is it best if ITS implementation is done at the same time as a construction project?)
- Type of funds available and their applicability

5.3 Using the National ITS Architecture to Support Project Implementation

Once a project has been selected for consideration, the project description information for the ITS components could be entirely, or for the most part, taken from the outputs of the National ITS Architecture effort. Projects have a typical life cycle that begins in the planning / programming phase and moves through implementation and into operations and maintenance.

5.3.1 Project Definition

Project Definition may occur at several levels of detail. Early in the planning process, a project may be defined only in terms of the transportation services it will provide or by the major system pieces it contains. At some point prior to the beginning of implementation the details of the project must be developed. This could include further system definition and interface definition including exactly what systems or parts of systems will make up the project, what interconnections the project entails, and what information needs to flow across the system interconnections. Requirements definition may go through similar levels of detail, starting with very high-level description of project functions and moving toward system specifications. By identifying the portions of the National ITS Architecture that define the project, the National ITS Architecture outputs can be used to create key aspects of the project definition.

The areas that a National ITS Architecture can assist in project definition are:

- The identification of agency roles and responsibilities (including any inter-agency cooperation) can come from the customized market packages (stakeholders, ITS service provided in the market package, and ITS systems) developed as part of the National ITS Architecture. This market packages can either serve as a starting point for a more detailed definition, or possibly provide all the needed information.
- High-level requirements definition can be completely or partly defined by using the National ITS Architecture equipment packages (functional requirements) applicable to the project.
- The National ITS Architecture includes a map to ITS standards and the project mapping to the National ITS Architecture can extract the applicable ITS standards for the project. This would be done by analyzing the architecture flows contained in the market packages and identifying applicable ITS standards.

5.3.2 RFP Generation

Once a project is defined, and funding for it is committed, the implementation process can commence with the generation of a Request For Proposal (RFP), which is the common

governmental practice for initiating a contract with the private sector to implement the project. Once a contract is in place, project implementation begins and moves through design, development, integration, and testing.

The National ITS Architecture, and the products produced during its development, can support this RFP generation. First, the project definition described above forms the basis for what is being procured. Mapping the project to the National ITS Architecture allows bidders to have a clear understanding of the scope of the project and of the interfaces that need to be developed. The functional requirements created as part of the National ITS Architecture can be used to describe the functional requirements for the project. In addition, a subset of the ITS Standards identified as part of the National ITS Architecture development can be specified in the RFP.

5.4 Maintaining the National ITS Architecture

The National ITS Architecture is not a static product or set of outputs, but must change as needs evolve in Chile. The National ITS Architecture is created as a consensus view of what ITS elements the stakeholders have currently implemented and what projects or elements they plan on implementing in the future. It can be used to support both the transportation planning process and project implementation. The National ITS Architecture will need to be updated to reflect changes resulting from either of these uses. What are some of the ways that project implementation can affect the National ITS Architecture?

- Changes for project definition- when actually defined, a project may add, subtract or modify elements, interfaces, or information flows from the mapping of the project to the regional architecture. Because the National ITS Architecture is meant to describe the current (as well as future) regional implementation of ITS it must be updated to correctly reflect how the developed projects integrate into the region.
- Changes for Project Deletion- occasionally a project will be deleted from the planning process and some aspects of the regional architecture that map to the project may be changed or removed.

In addition, new stakeholders may come to the table and in order to plan for their inclusion into projects the National ITS Architecture should be updated to reflect their place in the regional view of ITS elements, interfaces, and information flows.

The definition of how often to update the National ITS Architecture should be tied to some aspect of the overall transportation planning cycle. In addition, updates to reflect project development or changes in the stakeholders/element definition are also possible. The key is to define as part of the initial development what will drive the update cycle.

Additionally, when a National ITS Architecture is first developed, it may be useful to go through a maintenance cycle at about one year after the National ITS Architecture has been initially

accepted and published, to incorporate additional stakeholder input that may not have been forthcoming or complete in the initial development effort.

It is recommended that the plan for the National ITS Architecture maintenance address the following key issues:

- Who will be responsible for maintenance of the National ITS Architecture? What individual or group of individuals will be responsible for maintaining the National ITS Architecture? Also who will support the effort, and who will manage or have oversight for the maintenance effort?
- What is the architecture baseline? What outputs / documents will be maintained? Will you maintain only the databases or the graphic representations of the National ITS Architecture as well?
- What is the Change Management Process? How will changes be introduced and by whom? How often will changes to the National ITS Architecture baseline be performed? Who will evaluate the changes for inclusion into the baseline? What group will review the change recommendations and make the decisions on what changes are accepted and which are not? Who will actually modify the National ITS Architecture baseline?

6 CONCLUSIONS

Considering the great potential for ITS as outlined in this document, information gathered from national and international experience, and the expectations for ITS deployment over the medium term in Chile, it is possible to formulate a vision for the transformation of the transportation system of the nation. In this context, the weaving of ITS more deeply into the framework of the transportation infrastructure of Chile will achieve the following.

- An infrastructure of information for users of the transportation system that works in coordination with the physical infrastructure to maximize the efficiency and utility of the transportation system and promote modal integration.
- A safe and secure transportation system, able to detect and to respond promptly to incidents along the nation's roadways.
- A significant reduction in the number and severity of traffic accidents, and improved response times to traffic accidents when they occur.
- An information system for operators and users of the transportation system to help reduce traffic congestion and to more efficiently utilize the capacity of roadways, diminishing the need for additional roadway infrastructure.
- An infrastructure of devices, technologies and information to reduce the consumption of energy and limit adverse impact to the environment.
- And, to establish Chile as the predominant leader in the application and development of ITS technologies in Latin America.

As a result, the citizens of Chile throughout the country can be assured:

- That the transportation system of Chile is administered and operated to provide intermodal services door-to-door without regard to the location of the passengers being transported, or the location or type of cargo being transported; and,
- That transport within Chile is safe, oriented towards the user, and efficiently and economically engineered using the most advanced telecommunications and transportation monitoring systems available.

APPENDIX A – SYSTEM REQUIREMENTS AND FUNCTIONAL SPECIFICATIONS

A.1 List of Stakeholders and ITS Systems

A.2 Sausage Diagram

A.3 System Functional Requirements / Equipment Packages

A.4 Equipment Package Definitions

A.1 List of Stakeholders and ITS Systems

Stakeholder	*ITS System*	*Status*
Administrador de TAG de Vehículos Comerciales		
	TAG de Vehículo Comercial	Planned
Administrador de TAG Regional		
	TAG Regional	Planned
Administrador del Archivo de Datos Operacionales de VC		
	DG Archivo de Datos Operacionales de VC	Planned
Administrador del Archivo Regional de Planes de Contingencia		
	Archivo de Planes de Contingencia	Planned
Administrador del Espacio Público		
	Administrador del Espacio Público	Existing
Aeropuerto Aerosur		
	Aeropuerto Aerosur	Existing
	Aeropuerto Aerosur Equipo de Vías	Existing
	Aeropuerto Aerosur Sitio Web	Planned
Aeropuerto Austral		
	Aeropuerto Austral	Existing
	Aeropuerto Austral Equipo de Vías	Existing
	Aeropuerto Austral Sitio Web	Planned
Aeropuerto Chucumata		
	Aeropuerto Chucumata	Existing
	Aeropuerto Chucumata Equipo de Vías	Existing
	Aeropuerto Chucumata Sitio Web	Planned
Aeropuerto Cintra Chile		
	Aeropuerto Cintra Chile	Existing
	Aeropuerto Cintra Chile Equipo de Vías	Existing
	Aeropuerto Cintra Chile Sitio Web	Planned
Aeropuerto Gestión e Ing. IDC		
	Aeropuerto Gestión e Ing. IDC	Existing
	Aeropuerto Gestión e Ing. IDC Equipo de Vías	Existing
	Aeropuerto Gestión e Ing. IDC Sitio Web	Planned
Aeropuerto SCL Terminal Aéreo de Santiago		
	Aeropuerto SCL Terminal Aéreo de Santiago	Existing
	Aeropuerto SCL Terminal Aéreo de Santiago Equipo de Vías	Planned
	Aeropuerto SCL Terminal Aéreo de Santiago Sitio Web	Planned
Antepuertos		
	Antepuertos Equipo de Acceso y Monitoreo de Vehículos	Planned
	Antepuertos Letreros Electrónicos	Planned
	Antepuertos Sistema Central de Control de Tráfico	Planned
	Antepuertos Sistema de Registro Electrónico de Vehículos	Planned
	Antepuertos Sitio Web	Planned
Autopista Aeropuerto AMB		
	Autopista Aeropuerto AMB Equipo de Telepeaje	Existing
	Autopista Aeropuerto AMB Equipo de Vías	Planned

Stakeholder	*ITS System*	*Status*
Autopista Aeropuerto AMB		
	Autopista Aeropuerto AMB Sistema Central de Control	Existing
	Autopista Aeropuerto AMB Sitio Web	Planned
Autopista Camino de la Madera		
	Autopista Camino de la Madera Equipo de Telepeaje	Existing
	Autopista Camino de la Madera Equipo de Vías	Existing
	Autopista Camino de la Madera Sistema Central de Control	Existing
	Autopista Camino de la Madera Sitio Web	Planned
Autopista Camino Nogales - Puchuncaví		
	Autopista Camino Nogales Puchuncaví Equipo de Telepeaje	Existing
	Autopista Camino Nogales Puchuncaví Equipo de Vías	Existing
	Autopista Camino Nogales Puchuncaví Sistema Central de Control	Existing
	Autopista Camino Nogales Puchuncaví Sitio Web	Planned
Autopista Costanera Norte		
	Autopista Costanera Norte Equipo de Telepeaje	Planned
	Autopista Costanera Norte Equipo de Túnel	Planned
	Autopista Costanera Norte Equipo de Vías	Planned
	Autopista Costanera Norte Sistema Central de Control	Planned
	Autopista Costanera Norte Sistema Control de Túneles	Existing
	Autopista Costanera Norte Sitio Web	Planned
Autopista de los Lagos		
	Autopista de los Lagos Equipo de Telepeaje	Existing
	Autopista de los Lagos Equipo de Vías	Existing
	Autopista de los Lagos Sistema Central de Control	Existing
	Autopista de los Lagos Sitio Web	Planned
Autopista del Aconcagua		
	Autopista del Aconcagua Equipo de Telepeaje	Existing
	Autopista del Aconcagua Equipo de Túnel	Existing
	Autopista del Aconcagua Equipo de Vías	Existing
	Autopista del Aconcagua Sistema Central de Control	Existing
	Autopista del Aconcagua Sistema Control de Túneles	Existing
	Autopista del Aconcagua Sitio Web	Planned
Autopista del Bosque		
	Autopista del Bosque Equipo de Telepeaje	Existing
	Autopista del Bosque Equipo de Vías	Existing
	Autopista del Bosque Sistema Central de Control	Existing
	Autopista del Bosque Sitio Web	Planned
Autopista del Elqui		
	Autopista del Elqui Equipo de Telepeaje	Existing
	Autopista del Elqui Equipo de Vías	Existing
	Autopista del Elqui Sistema Central de Control	Existing
	Autopista del Elqui Sitio Web	Planned
Autopista del Maipo		
	Autopista del Maipo Equipo de Telepeaje	Existing
	Autopista del Maipo Equipo de Túnel	Existing

Stakeholder	ITS System	Status
Autopista del Maipo		
	Autopista del Maipo Equipo de Vías	Existing
	Autopista del Maipo Sistema Central de Control	Existing
	Autopista del Maipo Sistema Control de Túneles	Existing
	Autopista del Maipo Sitio Web	Planned
Autopista del Sol		
	Autopista del Sol Equipo de Telepeaje	Existing
	Autopista del Sol Equipo de Vías	Existing
	Autopista del Sol Sistema Central de Control	Existing
	Autopista del Sol Sitio Web	Planned
Autopista Litoral Central		
	Autopista Litoral Central Equipo de Telepeaje	Planned
	Autopista Litoral Central Equipo de Vías	Planned
	Autopista Litoral Central Sistema Central de Control	Planned
	Autopista Litoral Central Sitio Web	Planned
Autopista Los Libertadores		
	Autopista Los Libertadores Equipo de Telepeaje	Existing
	Autopista Los Libertadores Equipo de Túnel	Existing
	Autopista Los Libertadores Equipo de Vías	Existing
	Autopista Los Libertadores Sistema Central de Control	Existing
	Autopista Los Libertadores Sistema Control de Túneles	Existing
	Autopista Los Libertadores Sitio Web	Planned
Autopista Norte - Sur		
	Autopista Norte Sur Equipo de Telepeaje	Existing
	Autopista Norte Sur Equipo de Vías	Existing
	Autopista Norte Sur Sistema Central de Control	Existing
	Autopista Norte Sur Sitio Web	Planned
Autopista Ruta 5 Collipulli - Temuco		
	Autopista Ruta 5 Collipulli - Temuco Equipo de Telepeaje	Existing
	Autopista Ruta 5 Collipulli - Temuco Equipo de Vías	Existing
	Autopista Ruta 5 Collipulli - Temuco Sistema Central de Control	Existing
	Autopista Ruta 5 Collipulli - Temuco Sitio Web	Planned
Autopista Ruta de los Ríos		
	Autopista Ruta de los Ríos Equipo de Telepeaje	Existing
	Autopista Ruta de los Ríos Equipo de Vías	Existing
	Autopista Ruta de los Ríos Sistema Central de Control	Existing
	Autopista Ruta de los Ríos Sitio Web	Planned
Autopista Talca - Chillán		
	Autopista Talca - Chillán Equipo de Telepeaje	Existing
	Autopista Talca - Chillán Equipo de Vías	Existing
	Autopista Talca - Chillán Sistema Central de Control	Existing
	Autopista Talca - Chillán Sitio Web	Planned
Autopista Tribasa Bío Bío		
	Autopista Tribasa Bío Bío Equipo de Telepeaje	Existing
	Autopista Tribasa Bío Bío Equipo de Vías	Existing

Stakeholder	*ITS System*	*Status*
Autopista Tribasa Bío Bío		
	Autopista Tribasa Bío Bío Sistema Central de Control	Existing
	Autopista Tribasa Bío Bío Sitio Web	Planned
Autopista Túnel El Melón		
	Autopista Túnel El Melón Equipo de Telepeaje	Existing
	Autopista Túnel El Melón Equipo de Túnel	Existing
	Autopista Túnel El Melón Equipo de Vías	Existing
	Autopista Túnel El Melón Sistema Central de Control	Existing
	Autopista Túnel El Melón Sistema Control de Túneles	Existing
	Autopista Túnel El Melón Sitio Web	Planned
Autopista Variante Melipilla		
	Autopista Variante Melipilla Equipo de Telepeaje	Existing
	Autopista Variante Melipilla Equipo de Vías	Existing
	Autopista Variante Melipilla Sistema Central de Control	Existing
	Autopista Variante Melipilla Sitio Web	Planned
Autopista Vespucio Norte		
	Autopista Vespucio Norte Equipo de Telepeaje	Planned
	Autopista Vespucio Norte Equipo de Vías	Planned
	Autopista Vespucio Norte Sistema Central de Control	Planned
	Autopista Vespucio Norte Sitio Web	Planned
Autopistas		
	Autopistas Centros de Atención al Cliente	Existing
	Autopistas Otras Equipo de Telepeaje	Planned
	Autopistas Otras Equipo de Vías	Planned
	Autopistas Otras Sistema Central de Control	Planned
	Autopistas Otras Sitio Web	Planned
	Autopistas Punto de Venta	Planned
	Autopistas Vehículos de Emergencia	Existing
Autopistas Metropolitanas		
	Autopistas Metropolitanas Equipo de Telepeaje	Planned
	Autopistas Metropolitanas Equipo de Vías	Planned
	Autopistas Metropolitanas Sistema Central de Control	Planned
	Autopistas Metropolitanas Sitio Web	Planned
Autopistas Rutas del Pacífico		
	Autopistas Rutas del Pacífico Equipo de Telepeaje	Planned
	Autopistas Rutas del Pacífico Equipo de Túnel	Existing
	Autopistas Rutas del Pacífico Equipo de Vías	Existing
	Autopistas Rutas del Pacífico Sistema Central de Control	Existing
	Autopistas Rutas del Pacífico Sistema Control de Túneles	Existing
	Autopistas Rutas del Pacífico Sitio Web	Planned
Bomberos		
	Bomberos Sistema Central	Existing
	Bomberos Vehículos de Emergencia	Existing
Broker de Carga		
	Broker de Carga	Existing

Stakeholder	ITS System	Status
Carabineros		
	Carabineros	Existing
	Carabineros Registro de Accidentes	Existing
	Carabineros Vehículos de Emergencia	Existing
CONAMA		
	CONAMA Sistema de Permiso de Carga (HAZMAT)	Planned
CONASET		
	Comisión de Seguridad de Transito Sistema Central	Existing
Concesionarios de Estacionamientos Públicos		
	Concesionarios de Estacionamientos Públicos Sistemas de Estacionamiento	Planned
	Concesionarios de Estacionamientos Sitio Web	Planned
DG		
	DG Seguridad de Puertos y Aeropuertos	Existing
	DGAC Sistema de Gestión de Estacionamientos	Planned
	DGAC Sitio Web	Existing
Institución Financiera		
	Institución Financiera	Existing
Juzgado Policía Local		
	Juzgado Policía Local	Existing
Marina		
	Marina	Planned
METRO		
	Metro Centro de Control	Existing
	Metro Estación	Existing
	Metro Información a Usuario en Viaje	Existing
	Metro Punto de Venta	Existing
	Metro Sitio Web	Existing
	Metro Tarjeta Electrónica Multivía	Existing
MOP CGC		
	MOP CGC Almacenamiento de Datos de Tránsito Concesiones	Planned
MOP Dirección de Vialidad		
	MOP DV Contadores Automáticos de Flujos Vehiculares	Existing
	MOP DV Cruce Fronterizo Equipo de Vías	Planned
	MOP DV Cruce Fronterizo Sistema de Registro Electrónico de Vehículos	Planned
	MOP DV Equipo Pesaje en Movimiento y Control de Seguridad	Existing
	MOP DV Información de la Red Vial Interurbana Sitio Web	Existing
	MOP DV Sistema de Almacenamiento de Datos de Tránsito en Vías	Existing
	MOP DV Sistema de Emergencia	Planned
	MOP DV Sistema de Monitoreo de Vehículos Comerciales	Planned
	MOP DV Sistema de Registro y Revisión de Credenciales (Pesaje, Sobredimensiones, y Seguridad)	Planned
	MOP DV Subdirección de Explotación	Existing
	MOP DV Subdirección de Explotación Equipo de Vías	Planned
	MOP DV Subdirección de Explotación Facilidad de Almacenaje	Existing
	MOP DV Subdirección de Explotación Sitio Web	Planned

Stakeholder	ITS System	Status
MOP Dirección de Vialidad		
	MOP DV Subdirección de Explotación Vehículos	Existing
	MOP DV Taller de Vehículos	Planned
MOP Subsecretaría		
	MOP Planificación Almacenamiento de Datos Multimodal	Planned
	MOP Sistema de Información Geográfico	Existing
MTT		
	MTT Almacenamiento de Datos de Transporte Público	Planned
	MTT Coordinación General de Transporte	Existing
	MTT Fiscalización y Control del Transporte Público (CCB)	Existing
	MTT Fiscalización y Control del Transporte Público Sitio Web	Existing
	MTT Información a Usuario Sitio Web	Planned
	MTT Información en Paraderos	Planned
	MTT Punto de Venta	Existing
	MTT Tarificación Vial	Planned
	MTT Tarificación Vial Equipo de Vías / Estacionamientos	Planned
Municipalidad		
	Municipalidad Dirección de Obras	Planned
	Municipalidad Dirección de Obras Equipo de Vías	Existing
	Municipalidad Dirección de Obras Facilidad de Almacenaje	Existing
	Municipalidad Dirección de Obras Sitio Web	Existing
	Municipalidad Dirección de Obras Taller de Vehículos	Planned
	Municipalidad Dirección de Obras Vehículos	Existing
	Sistema Municipal de Permiso de Carga	Planned
	Sistema Municipal Equipo de Vías	Planned
	Sistema Municipal Sistema Central de Control de Tránsito	Existing
	Sistema Municipal Sitio Web	Planned
Onemi		
	Onemi Gestión de Emergencia	Existing
Operadores de Centros de Cuidado		
	Centro de Cuidado	Planned
Operadores de Ferrocarril		
	Operadores de Ferrocarril	Existing
	Operadores de Ferrocarril Equipo del Riel	Planned
	Operadores de Ferrocarril Vehículos	Existing
Operadores de Sistemas de Pronóstico del Tiempo		
	Sistema de Prónostico del Tiempo	Planned
Operadores de Sistemas de Transporte Público Regionales		
	Operadores del Transporte Público Tarjeta Electrónica	Planned
Operadores Privados de Emergencia Médica		
	Operadores Privados de Emergencia Médica Centro de Despacho	Existing
	Operadores Privados de Emergencia Médica Vehículos	Planned
Operadores Privados de Grúas		
	Operadores Privados de Grúas Sistema de Despacho	Planned
Operadores Privados de Sistemas de Transporte Público		
	Operadores Privados del Transporte Público Centro de Control	Planned

Stakeholder	*ITS System*	*Status*
Operadores Privados de Sistemas de Transporte Público		
	Operadores Privados del Transporte Público Vehículos	Existing
Operadores Privados de Telemática		
	Operadores Privados de Telemática	Planned
Operadores Privados de VC		
	Operadores Privados de VC Sistema Móvil del Conductor	Existing
	Operadores Privados de Vehículos Comerciales Sistemas Central	Planned
	Operadores Privados de Vehículos Comerciales Vehículos	Existing
Proveedor de Información Sobre Materiales Peligrosos		
	Proveedor de Información Sobre Materiales Peligrosos	Planned
Proveedores de Medios de Comunicaciones		
	Medios de Comunicación	Existing
Puerto de Mejillones		
	Puerto de Mejillones Equipo de Acceso y Monitoreo de Vehículos	Planned
	Puerto de Mejillones Letreros Electrónicos	Planned
	Puerto de Mejillones Sistema Central de Control de Tráfico	Planned
	Puerto de Mejillones Sistema de Registro Electrónico de Vehículos	Planned
	Puerto de Mejillones Sitio Web	Planned
Puerto de San Antonio		
	Puerto de San Antonio Equipo de Acceso y Monitoreo de Vehículos	Planned
	Puerto de San Antonio Letreros Electrónicos	Planned
	Puerto de San Antonio Sistema Central de Control de Tráfico	Planned
	Puerto de San Antonio Sistema de Registro Electrónico de Vehículos	Planned
	Puerto de San Antonio Sitio Web	Planned
Puerto de Valparaíso		
	Puerto de Valparaíso Terminal de Pasajeros	Existing
Puertos		
	Puertos Equipo de Acceso y Monitoreo de Vehículos	Planned
	Puertos Letreros Electrónicos	Existing
	Puertos Sistema Central de Control de Tráfico	Planned
	Puertos Sistema de Registro Electrónico de Vehículos	Planned
	Puertos Sitio Web	Planned
Red de Sistemas de Concesionarias		
	Red de Reciprocidad de Pago Electrónico del Transporte Público	Planned
	Red de Servicio y Reciprocidad de Concesionarias	Planned
Red de Sistemas de Gestión de Incidentes y Respuestas		
	Red de Información de Incidentes y Respuesta	Planned
Red de Sistemas de Información y Condiciones de Tránsito		
	Red de Información y Condiciones de Tránsito	Planned
SAMU		
	SAMU Sistema Central	Existing
	SAMU Vehículos de Emergencia	Existing
SECTRA		
	SECTRA Controladores de Semáforos	Existing
	SECTRA Letreros de Mensaje Variable	Existing
	SECTRA Sensores de Tránsito	Planned

Stakeholder	*ITS System*	*Status*
SECTRA		
	SECTRA Sistemas Central de Control de Tránsito	Existing
	SECTRA Sistemas de Almacenamiento de Datos de Tránsito	Existing
	SECTRA Sistemas de Control de Semáforos Sitio Web	Planned
	SECTRA Sistemas de Planificación Multimodal	Planned
Servicio Agrícola Ganadero		
	Servicio Agrícola Ganadero	Existing
Servicio de Impuestos Internos		
	Servicio de Impuestos Internos	Existing
Servicio de Salud		
	Servicio de Salud	Existing
Servicio General de Aduana		
	Servicio General de Aduana	Existing
SESMA		
	SESMA Centro de Análisis	Existing
	SESMA Estaciones de Monitoreo Ambiental	Existing
Terminales Multimodales		
	Terminales Multimodales	Existing
UOCT		
	UOCT Centro de Control de Gestión de Tránsito	Existing
	UOCT Circuito Cerrado de Televisión	Existing
	UOCT Controladores de Semáforos	Existing
	UOCT Equipo Control de Tráfico Autopistas	Existing
	UOCT Estaciones de Monitoreo Ambiental	Existing
	UOCT Letreros de Mensaje Variable	Existing
	UOCT Sensores Ambientales	Planned
	UOCT Sensores de Tránsito	Planned
	UOCT Sitio Web	Existing
Usuarios de Sistemas de Almacenamiento de Datos		
	Sistemas de Usuarios de Almacenamiento de Datos	Existing
Viajeros		
	Viajeros Equipo Personal de Viajeros	Planned
	Viajeros Vehículos Privados	Planned
VLT		
	VLT Equipo de Acceso y Monitoreo de Vehículos	Existing
	VLT Letreros Electrónicos	Existing
	VLT Sistema Central de Control de Tráfico	Existing
	VLT Sistema de Registro Electrónico de Vehículos	Existing
	VLT Sitio Web	Existing

Lockheed Martin Corporation
Consensus Systems Technologies
Aristo Consultores

A.2 National ITS Architecture of Chile
Sausage Diagram

Archived Data Management
- Carabineros Registro de Accidentes
- DG Archivo de Datos Operacionales de VC
- MOP CGC Almacenamiento de Datos de Tránsito Concesiones
- MOP DV Sistema de Almacenamiento de Datos de Tránsito en Vías
- MOP Planificación Almacenamiento de Datos Multimodal
- MTT Almacenamiento de Datos de Transporte Público
- SECTRA Sistemas de Almacenamiento de Datos de Tránsito
- SECTRA Sistemas de Planificación Multimodal

Transit Management
- Metro Centro de Control
- MTT Coordinación General de Transporte
- MTT Fiscalización y Control del Transporte Público (CCB)
- Operadores Privados del Transporte Público Centro de Control
- Red de Reciprocidad de Pago Electrónico del Transporte Público

Toll Administration (1)
- Autopista Aeropuerto AMB Sistema Central
- Autopista Camino de la Madera Sistema Central
- Autopista Camino Nogales Puchuncaví Sistema Central
- Autopista Costanera Norte Sistema Central
- Autopista de los Lagos Sietema Central
- Autopista del Aconcagua Sistema Central
- Autopista del Bosque Sistema Central
- Autopista del Elqui Sistema Central
- Autopista del Maipo Sistema Central
- Autopista del Sol Sistema Central
- Autopista Litoral Central Sistema Central
- Autopista Los Libertadores Sistema Central

Maintenance and Construction Management
- MOP DV Subdirección de Explotación
- Municipalidad Dirección de Obras

Toll Administration (2)
- Autopista Norte Sur Sistema Central
- Autopista Ruta 5 Collipulli - Temuco Sistema Central
- Autopista Ruta de los Ríos Sistema Central
- Autopista Talca - Chillán Sistema Central
- Autopista Tribasa Bío Bío Sistema Central
- Autopista Túnel El Melón Sistema Central
- Autopista Variante Melipilla Sistema Central
- Autopista Vespucio Norte Sistema Central
- Autopistas Metropolitanas Sistema Central
- Autopistas Otras Sistema Central
- Autopistas Rutas del Pacífico Sistema Central
- MOP DV Sistema de Monitoreo de Vehículos Comerciales
- Red de Servicio y Reciprocidad de Concesionarias

Emissions Management
- SESMA Centro de Análisis

Traffic Management
- Aeropuertos Aerosur, Austral, Chucumata, Cintra Chile, Gestión e Ing. IDC, SCL Terminal Aereo de Santiago
- Archivo de Planes de Contingencia
- Autopistas Equipo de Control de Túneles
- MOP DV Sistema de Monitoreo de Vehículos Comerciales
- MTT Tarificación Vial
- Red de Información y Condiciones de Tránsito
- SECTRA Sistemas Central de Control de Tránsito
- Sistema Municipal Sistema Central de Control de Tránsito
- UOCT Centro de Control de Gestión de Tránsito

Fleet and Freight Management (1)
- Antepuertos Sistema Central de Control de Tráfico
- Broker de Carga
- MOP DV Sistema de Monitoreo de Vehículos Comerciales
- Operadores de Ferrocarril
- Operadores Privados de Vehículos Comerciales Sistemas Central

Information Service Provider
- Operadores Privados de Telemática
- Varios Sitios Web de los Actores ITS

Fleet and Freight Management (2)
- Operadores Privados de Vehículos Comerciales Sistemas Central
- Puerto de Mejillones Sistema Central de Control de Tráfico
- Puerto de San Antonio Sistema Central de Control de Tráfico
- Puertos Sistema Central de Control de Tráfico
- VLT Sistema Central de Control de Tráfico

Emergency Management
- Archivo de Planes de Contingencia
- Bomberos Sistema Central
- Carabineros
- Comisión de Seguridad de Transito Sistema Central
- DG Seguridad de Puertos y Aeropuertos
- MOP DV Sistema de Emergencia
- Onemi Gestión de Emergencia
- Operadores Privados de Emergencia Médica Centro de Despacho
- Operadores Privados de Grúas Sistema de Despacho
- Red de Información de Incidentes y Respuesta
- SAMU Sistema Central

Commercial Vehicle Administration
- Antepuertos Sistema de Registro Electrónico de Vehículos
- CONAMA Sistema de Permiso de Carga (HAZMAT)
- MOP DV Cruce Fronterizo Sistema de Registro Electrónico de Vehículos
- MOP DV Sistema de Registro y Revisión de Credenciales (Pesaje, Sobredimensiones, y Seguridad)
- Puerto de Mejillones Sistema de Registro Electrónico de Vehículos
- Puerto de San Antonio Sistema de Registro Electrónico de Vehículos
- Puertos Sistema de Registro Electrónico
- Sistema Municipal de Permiso de Carga
- VLT Sistema de Registro Electrónico

Remote Traveler Support
- Autopistas Punto de Venta
- Metro Información a Usuario en Viaje
- Metro Punto de Venta
- MTT Información en Paraderos
- MTT Punto de Venta

Personal Information Access
- Operadores Privados de VC Sistema Móvil del Conductor
- Viajeros Equipo Personal de Viajeros

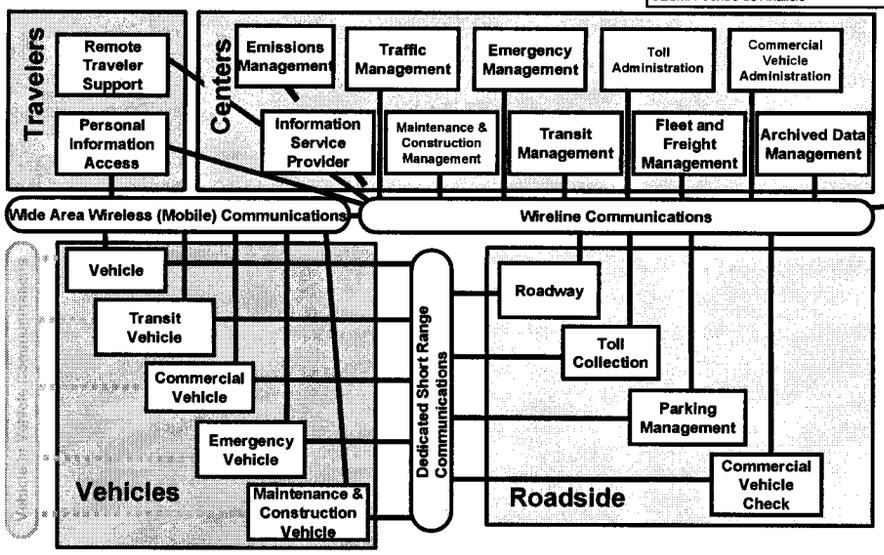
Vehicle
- Viajeros Vehículos Privados

Commercial Vehicle
- Operadores de Ferrocarril Vehículos
- Operadores Privados de Vehículos Comerciales Vehículos

Emergency Vehicle
- Autopistas Vehículos de Emergencia
- Bomberos Vehículos de Emergencia
- Carabineros Vehículos de Emergencia
- Operadores Privados de Emergencia Medica Vehículos
- SAMU Vehículos de Emergencia

Transit Vehicle
- Metro Estación
- Operadores Privados del Transporte Público Vehículos

Maintenance and Construction Vehicle
- MOP DV Subdirección de Explotación Vehículos
- Municipalidad Dirección de Obras Vehículos



Terminators

Regulatory Agencies
- Servicio Agrícola Ganadero
- Servicio de Impuestos Internos
- Servicio de Salud
- Servicio General de Aduana

Care Facility
- Centro de Cuidado

Weyside Equipment
- Operadores de Ferrocarril Equipo del Riel

Storage Facility
- MOP DV Subdirección de Explotación Facilidad de Almacenaje
- Municipalidad Dirección de Obras Facilidad de Almacenaje

Equipment Repair Facility
- MOP DV Taller de Vehículos
- Municipalidad Dirección de Obras Taller de Vehículos

Enforcement
- Carabineros
- Juzgado Policía Local
- Marina

Financial Institution
- Institución Financiera

Rail Operations
- Operadores de Ferrocarril

Other Toll Administration
- Autopistas Centros de Atención al Cliente

Media
- Medios de Comunicación

Event Promoter
- Administrador del Espacio Público

Weather Service Provider
- Sistema de Pronóstico del Tiempo

Map Update Provider
- MOP Sistema de Información Geográfico

Multimodal Transportation Service Provider
- Aeropuerto Aerosur
- Aeropuerto Austral
- Aeropuerto Chucumata
- Aeropuerto Cintra Chile
- Aeropuerto Gestión e Ing. IDC
- Aeropuerto SCL Terminal Aéreo de Santiago
- Puerto de Valparaíso Terminal de Pasajeros
- Terminales Multimodales

Archived Data User Systems
- Sistemas de Usuarios de Almacenamiento de Datos

Traveler Card
- Metro Tarjeta Electrónica Multivía
- Operadores del Transporte Público Tarjeta Electrónica
- TAG de Vehículo Comercial
- TAG Regional

Toll Collection
- Autopistas Equipo de Telepeaje

Roadway Subsystem (1)
- Aeropuerto Aerosur Equipo de Vías
- Aeropuerto Austral Equipo de Vías
- Aeropuerto Chucumata Equipo de Vías
- Aeropuerto Cintra Chile Equipo de Vías
- Aeropuerto Gestión e Ing. IDC Equipo de Vías
- Aeropuerto SCL Terminal Aéreo de Santiago Equipo de Vías
- Antepuertos Equipo de Acceso y Monitoreo de Vehículos
- Antepuertos Letreros Electrónicos
- Autopistas Equipo de Vías

Roadway Subsystem (2)
- MOP DV Contadores Automáticos
- MOP DV Equipo Pesaje en Movimiento y Control de Seguridad
- MOP DV Subdirección de Explotación Equipo de Vías
- MTT Tarificación Vial Equipo de Vías / Estacionamientos
- Municipalidad Dirección de Obras Equipo de Vías
- Puertos Equipo de Acceso y Monitoreo de Vehículos – VLT, San Antonio, y Mejillones
- Puertos Letreros Electrónicos
- SECTRA Controladores de Semáforos
- SECTRA Letreros de Mensaje Variable
- SECTRA Sensores de Tránsito

Roadway Subsystem (3)
- SESMA Estaciones de Monitoreo Ambiental
- Sistema Municipal Equipo de Vías
- UOCT Circuito Cerrado de Televisión
- UOCT Controladores de Semáforos
- UOCT Equipo Control de Tráfico Autopistas
- UOCT Estaciones de Monitoreo Ambiental
- UOCT Letreros de Mensaje Variable
- UOCT Sensores Ambientales
- UOCT Sensores de Tránsito

Parking Management
- Antepuertos Equipo de Acceso y Monitoreo de Vehículos
- Antepuertos Sistema Central de Control de Tráfico
- Concesionarios de Estacionamientos Públicos Sistemas de Estacionamiento
- DGAC Sistema de Gestión de Estacionamientos
- MTT Tarificación Vial Equipo de Vías / Estacionamientos

Commercial Vehicle Check
- Antepuertos y Puertos Equipo de Acceso y Monitoreo de Vehículos
- MOP DV Cruce Fronterizo Equipo de Vías
- MOP DV Equipo Pesaje en Movimiento y Control de Seguridad

A.3 System Functional Requirements / Equipment Packages

ITS System	*Equipment Package*
Aeropuerto Aerosur	
	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
Aeropuerto Aerosur Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Traffic Information Dissemination
Aeropuerto Austral	
	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
Aeropuerto Austral Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Traffic Information Dissemination
Aeropuerto Chucumata	
	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
Aeropuerto Chucumata Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Traffic Information Dissemination
Aeropuerto Cintra Chile	
	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
Aeropuerto Cintra Chile Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Traffic Information Dissemination
Aeropuerto Gestión e Ing. IDC	
	Collect Traffic Surveillance

Aeropuerto Gestión e Ing. IDC

TMC Incident Detection

TMC Incident Dispatch Coordination/Communication

TMC Regional Traffic Control

TMC Traffic Information Dissemination

Aeropuerto Gestión e Ing. IDC Equipo de Vías

Roadway Basic Surveillance

Roadway Traffic Information Dissemination

Aeropuerto SCL Terminal Aéreo de Santiago

Collect Traffic Surveillance

TMC Incident Detection

TMC Incident Dispatch Coordination/Communication

TMC Regional Traffic Control

TMC Traffic Information Dissemination

Aeropuerto SCL Terminal Aéreo de Santiago Equipo de Vías

Roadway Basic Surveillance

Roadway Traffic Information Dissemination

Antepuertos Equipo de Acceso y Monitoreo de Vehículos

Citation and Accident Electronic Recording

Parking Electronic Payment

Roadside Electronic Screening

Roadside Safety Inspection

Roadside WIM

Roadway Basic Surveillance

Roadway Freeway Control

Roadway Probe Beacons

Roadway Reversible Lanes

Roadway Signal Controls

Antepuertos Letreros Electrónicos

Roadway Traffic Information Dissemination

Antepuertos Sistema Central de Control de Tráfico

Collect Traffic Surveillance

TMC Freeway Management

TMC Incident Detection

TMC Incident Dispatch Coordination/Communication

TMC Probe Information Collection

TMC Regional Traffic Control

TMC Reversible Lane Management

TMC Signal Control

TMC Traffic Information Dissemination

Antepuertos Sistema de Registro Electrónico de Vehículos

Antepuertos Sistema de Registro Electrónico de Vehículos

Credentials and Taxes Administration

CV Information Exchange

CV Safety Administration

Antepuertos Sitio Web

ISP Probe Information Collection

Autopista Aeropuerto AMB Equipo de Telepeaje

Toll Plaza Toll Collection

Autopista Aeropuerto AMB Equipo de Vías

Roadway Basic Surveillance

Roadway Freeway Control

Roadway Probe Beacons

Roadway Traffic Information Dissemination

Autopista Aeropuerto AMB Sistema Central de Control

Collect Traffic Surveillance

Emergency Response Management

Mayday Support

TMC Freeway Management

TMC Incident Detection

TMC Incident Dispatch Coordination/Communication

TMC Probe Information Collection

TMC Regional Traffic Control

TMC Traffic Information Dissemination

Toll Administration

Autopista Aeropuerto AMB Sitio Web

Interactive Infrastructure Information

ISP Probe Information Collection

Autopista Camino de la Madera Equipo de Telepeaje

Toll Plaza Toll Collection

Autopista Camino de la Madera Equipo de Vías

Roadway Basic Surveillance

Roadway Freeway Control

Roadway Probe Beacons

Roadway Traffic Information Dissemination

Autopista Camino de la Madera Sistema Central de Control

Collect Traffic Surveillance

Emergency Response Management

Mayday Support

TMC Freeway Management

TMC Incident Detection

TMC Incident Dispatch Coordination/Communication

ITS System	*Equipment Package*
Autopista Camino de la Madera Sistema Central de Control	
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Camino de la Madera Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Camino Nogales Puchuncaví Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Camino Nogales Puchuncaví Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Camino Nogales Puchuncaví Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Camino Nogales Puchuncaví Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Costanera Norte Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Costanera Norte Equipo de Túnel	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Traffic Information Dissemination
Autopista Costanera Norte Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Costanera Norte Sistema Central de Control	
	Collect Traffic Surveillance

ITS System	*Equipment Package*
Autopista Costanera Norte Sistema Central de Control	
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Costanera Norte Sistema Control de Túneles	
	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
Autopista Costanera Norte Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista de los Lagos Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista de los Lagos Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista de los Lagos Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista de los Lagos Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista del Aconcagua Equipo de Telepeaje	

ITS System	*Equipment Package*
Autopista del Aconcagua Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista del Aconcagua Equipo de Túnel	
	Roadway Basic Surveillance
	Roadway Traffic Information Dissemination
Autopista del Aconcagua Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista del Aconcagua Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista del Aconcagua Sistema Control de Túneles	
	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
Autopista del Aconcagua Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista del Bosque Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista del Bosque Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista del Bosque Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support

ITS System	*Equipment Package*
Autopista del Bosque Sistema Central de Control	
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista del Bosque Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista del Elqui Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista del Elqui Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista del Elqui Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista del Elqui Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista del Maipo Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista del Maipo Equipo de Túnel	
	Roadway Basic Surveillance
	Roadway Traffic Information Dissemination
Autopista del Maipo Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons

ITS System	*Equipment Package*
Autopista del Maipo Equipo de Vías	
	Roadway Traffic Information Dissemination
Autopista del Maipo Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista del Maipo Sistema Control de Túneles	
	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
Autopista del Maipo Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista del Sol Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista del Sol Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista del Sol Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista del Sol Sitio Web	

ITS System	*Equipment Package*
Autopista del Sol Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Litoral Central Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Litoral Central Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Litoral Central Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Litoral Central Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Los Libertadores Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Los Libertadores Equipo de Túnel	
	Roadway Basic Surveillance
	Roadway Traffic Information Dissemination
Autopista Los Libertadores Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Los Libertadores Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication

ITS System	*Equipment Package*
Autopista Los Libertadores Sistema Central de Control	
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Los Libertadores Sistema Control de Túneles	
	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
Autopista Los Libertadores Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Norte Sur Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Norte Sur Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Norte Sur Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Norte Sur Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Ruta 5 Collipulli - Temuco Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Ruta 5 Collipulli - Temuco Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons

ITS System	*Equipment Package*
Autopista Ruta 5 Collipulli - Temuco Equipo de Vías	
	Roadway Traffic Information Dissemination
Autopista Ruta 5 Collipulli - Temuco Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Ruta 5 Collipulli - Temuco Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Ruta de los Ríos Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Ruta de los Ríos Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Ruta de los Ríos Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Ruta de los Ríos Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Talca - Chillán Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Talca - Chillán Equipo de Vías	
	Roadway Basic Surveillance

ITS System	*Equipment Package*
Autopista Talca - Chillán Equipo de Vías	
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Talca - Chillán Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Talca - Chillán Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Tribasa Bío Bío Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Tribasa Bío Bío Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Tribasa Bío Bío Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Tribasa Bío Bío Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Túnel El Melón Equipo de Telepeaje	
	Toll Plaza Toll Collection

ITS System	*Equipment Package*
Autopista Túnel El Melón Equipo de Túnel	
	Roadway Basic Surveillance
	Roadway Traffic Information Dissemination
Autopista Túnel El Melón Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Túnel El Melón Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Túnel El Melón Sistema Control de Túneles	
	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
Autopista Túnel El Melón Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Variante Melipilla Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Variante Melipilla Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Variante Melipilla Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection

ITS System	*Equipment Package*
Autopista Variante Melipilla Sistema Central de Control	
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Variante Melipilla Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Vespucio Norte Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Vespucio Norte Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Vespucio Norte Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Vespucio Norte Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopistas Metropolitanas Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopistas Metropolitanas Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Traffic Information Dissemination
Autopistas Metropolitanas Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management

ITS System	*Equipment Package*
Autopistas Metropolitanas Sistema Central de Control	
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopistas Metropolitanas Sitio Web	
	Interactive Infrastructure Information
Autopistas Otras Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopistas Otras Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopistas Otras Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopistas Otras Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopistas Rutas del Pacífico Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopistas Rutas del Pacífico Equipo de Túnel	
	Roadway Basic Surveillance
	Roadway Traffic Information Dissemination
Autopistas Rutas del Pacífico Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopistas Rutas del Pacífico Sistema Central de Control	
	Collect Traffic Surveillance

ITS System	*Equipment Package*
Autopistas Rutas del Pacífico Sistema Central de Control	
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopistas Rutas del Pacífico Sistema Control de Túneles	
	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
Autopistas Rutas del Pacífico Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Bomberos Sistema Central	
	Emergency Dispatch
	Emergency Response Management
	Mayday Support
Bomberos Vehículos de Emergencia	
	On-board EV En Route Support
Broker de Carga	
	Fleet Credentials and Taxes Management and Reporting
	Freight Administration and Management
Carabineros	
	Emergency Call-Taking
	Emergency Dispatch
	Emergency Response Management
	Emergency Secure Area Surveillance
	Mayday Support
Carabineros Registro de Accidentes	
	ITS Data Repository
Carabineros Vehículos de Emergencia	
	On-board EV En Route Support
Comisión de Seguridad de Transito Sistema Central	
	Emergency Response Management

ITS System	*Equipment Package*
Comisión de Seguridad de Transito Sistema Central	
	Mayday Support
CONAMA Sistema de Permiso de Carga (HAZMAT)	
	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration
Concesionarios de Estacionamientos Públicos Sistemas de Estacionamiento	
	Parking Electronic Payment
	Parking Management
DG Archivo de Datos Operacionales de VC	
	ITS Data Repository
DG Seguridad de Puertos y Aeropuertos	
	Emergency Call-Taking
	Emergency Response Management
	Mayday Support
DGAC Sistema de Gestión de Estacionamientos	
	Parking Electronic Payment
	Parking Management
Metro Centro de Control	
	Transit Center Fare and Load Management
	Transit Center Information Services
	Transit Center Security
Metro Estación	
	On-board Transit Fare and Load Management
Metro Información a Usuario en Viaje	
	Remote Transit Information Services
Metro Punto de Venta	
	Remote Mayday I/F
	Remote Transit Fare Management
	Remote Transit Information Services
	Secure Area Monitoring
Metro Sitio Web	
	Interactive Infrastructure Information
MOP CGC Almacenamiento de Datos de Tránsito Concesiones	
	ITS Data Repository
	Virtual Data Warehouse Services
MOP DV Cruce Fronterizo Equipo de Vías	
	Citation and Accident Electronic Recording
	International Border Crossing
	Roadside Electronic Screening

ITS System	*Equipment Package*
MOP DV Cruce Fronterizo Equipo de Vías	
	Roadside Safety Inspection
MOP DV Cruce Fronterizo Sistema de Registro Electrónico de Vehículos	
	CV Information Exchange
	International CV Administration
MOP DV Equipo Pesaje en Movimiento y Control de Seguridad	
	Citation and Accident Electronic Recording
	Roadside Electronic Screening
	Roadside Safety Inspection
	Roadside WIM
MOP DV Sistema de Almacenamiento de Datos de Tránsito en Vías	
	ITS Data Repository
	Virtual Data Warehouse Services
MOP DV Sistema de Emergencia	
	Emergency Response Management
	Mayday Support
MOP DV Sistema de Monitoreo de Vehículos Comerciales	
	Fleet Administration
	Fleet HAZMAT Management
	TMC Traffic Information Dissemination
	Toll Administration
MOP DV Sistema de Registro y Revisión de Credenciales (Pesaje, Sobredimensiones, y Seguridad)	
	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration
MOP DV Subdirección de Explotación	
	MCM Environmental Information Collection
	MCM Environmental Information Processing
	MCM Incident Management
	MCM Roadway Maintenance and Construction
	MCM Vehicle and Equipment Maintenance Management
	MCM Winter Maintenance Management
	MCM Work Activity Coordination
	MCM Work Zone Management
MOP DV Subdirección de Explotación Equipo de Vías	
	Roadway Infrastructure Monitoring
	Roadway Work Zone Safety
MOP DV Subdirección de Explotación Vehículos	
	MCV Infrastructure Monitoring

MOP DV Subdirección de Explotación Vehículos

MCV Roadway Maintenance and Construction
MCV Vehicle Location Tracking
MCV Vehicle Safety Monitoring
MCV Vehicle System Monitoring and Diagnostics
MCV Winter Maintenance
MCV Work Zone Support

MOP Planificación Almacenamiento de Datos Multimodal

ITS Data Repository
Virtual Data Warehouse Services

MTT Almacenamiento de Datos de Transporte Público

ITS Data Repository
Virtual Data Warehouse Services

MTT Coordinación General de Transporte

Transit Center Fixed-Route Operations

MTT Fiscalización y Control del Transporte Público (CCB)

Transit Center Fare and Load Management
Transit Center Fixed-Route Operations
Transit Center Information Services
Transit Center Multi-Modal Coordination
Transit Center Security
Transit Center Tracking and Dispatch
Transit Garage Operations

MTT Información a Usuario Sitio Web

Interactive Infrastructure Information

MTT Información en Paraderos

Remote Transit Information Services

MTT Punto de Venta

Remote Mayday I/F
Remote Transit Fare Management
Remote Transit Information Services
Secure Area Monitoring

MTT Tarificación Vial

TMC Toll/Parking Coordination
TMC Traffic Network Performance Evaluation

MTT Tranvía

Transit Center Fixed-Route Operations
Transit Center Information Services
Transit Center Multi-Modal Coordination
Transit Center Security
Transit Center Tracking and Dispatch

ITS System	*Equipment Package*
MTT Tranvía	
	Transit Garage Operations
Municipalidad Dirección de Obras	
	MCM Environmental Information Collection
	MCM Environmental Information Processing
	MCM Incident Management
	MCM Roadway Maintenance and Construction
	MCM Vehicle and Equipment Maintenance Management
	MCM Winter Maintenance Management
	MCM Work Activity Coordination
	MCM Work Zone Management
Municipalidad Dirección de Obras Equipo de Vías	
	Roadway Infrastructure Monitoring
	Roadway Work Zone Safety
Municipalidad Dirección de Obras Vehículos	
	MCV Infrastructure Monitoring
	MCV Roadway Maintenance and Construction
	MCV Vehicle Location Tracking
	MCV Vehicle Safety Monitoring
	MCV Vehicle System Monitoring and Diagnostics
	MCV Winter Maintenance
	MCV Work Zone Support
Onemi Gestión de Emergencia	
	Emergency Response Management
	Mayday Support
Operadores de Ferrocarril	
	Fleet HAZMAT Management
Operadores de Ferrocarril Vehículos	
	On-board Cargo Monitoring
	Vehicle Mayday I/F
Operadores Privados de Emergencia Medica Centro de Despacho	
	Emergency Response Management
Operadores Privados de Grúas Sistema de Despacho	
	Emergency Response Management
Operadores Privados de Telemática	
	Basic Information Broadcast
	Emergency Secure Area Surveillance
	Infrastructure Provided Route Selection
	Interactive Infrastructure Information
	Mayday Support

ITS System	*Equipment Package*
Operadores Privados de Vehículos Comerciales Sistemas Central	
	Fleet Administration
	Fleet Credentials and Taxes Management and Reporting
	Fleet HAZMAT Management
	Fleet Maintenance Management
	Freight Administration and Management
Operadores Privados de Vehículos Comerciales Vehículos	
	Interactive Vehicle Reception
	On-board Cargo Monitoring
	On-board CV Electronic Data
	On-board CV Safety
	On-board Trip Monitoring
	Vehicle Mayday I/F
	Vehicle Probe Support
	Vehicle Provider-Based Route Guidance
	Vehicle Toll/Parking Interface
Operadores Privados del Transporte Público Centro de Control	
	Transit Center Fare and Load Management
	Transit Center Security
	Transit Garage Maintenance
Operadores Privados del Transporte Público Vehículos	
	Interactive Vehicle Reception
	On-board Maintenance
	On-board Transit Fare and Load Management
	On-board Transit Security
	On-board Transit Signal Priority
	On-board Transit Trip Monitoring
	Vehicle Mayday I/F
	Vehicle Probe Support
	Vehicle Provider-Based Route Guidance
	Vehicle Toll/Parking Interface
Puerto de Mejillones Equipo de Acceso y Monitoreo de Vehículos	
	Citation and Accident Electronic Recording
	Roadside Electronic Screening
	Roadside Safety Inspection
	Roadside WIM
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Reversible Lanes

ITS System	*Equipment Package*
Puerto de Mejillones Equipo de Acceso y Monitoreo de Vehículos	
	Roadway Signal Controls
Puerto de Mejillones Letreros Electrónicos	
	Roadway Traffic Information Dissemination
Puerto de Mejillones Sistema Central de Control de Tráfico	
	Collect Traffic Surveillance
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Reversible Lane Management
	TMC Signal Control
	TMC Traffic Information Dissemination
Puerto de Mejillones Sistema de Registro Electrónico de Vehículos	
	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration
Puerto de Mejillones Sitio Web	
	ISP Probe Information Collection
Puerto de San Antonio Equipo de Acceso y Monitoreo de Vehículos	
	Citation and Accident Electronic Recording
	Roadside Electronic Screening
	Roadside Safety Inspection
	Roadside WIM
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Reversible Lanes
	Roadway Signal Controls
Puerto de San Antonio Letreros Electrónicos	
	Roadway Traffic Information Dissemination
Puerto de San Antonio Sistema Central de Control de Tráfico	
	Collect Traffic Surveillance
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Reversible Lane Management
	TMC Signal Control

ITS System	*Equipment Package*
Puerto de San Antonio Sistema Central de Control de Tráfico	
	TMC Traffic Information Dissemination
Puerto de San Antonio Sistema de Registro Electrónico de Vehículos	
	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration
Puerto de San Antonio Sitio Web	
	ISP Probe Information Collection
Puertos Equipo de Acceso y Monitoreo de Vehículos	
	Citation and Accident Electronic Recording
	Roadside Electronic Screening
	Roadside Safety Inspection
	Roadside WIM
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Reversible Lanes
	Roadway Signal Controls
Puertos Letreros Electrónicos	
	Roadway Traffic Information Dissemination
Puertos Sistema Central de Control de Tráfico	
	Collect Traffic Surveillance
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Reversible Lane Management
	TMC Signal Control
	TMC Traffic Information Dissemination
Puertos Sistema de Registro Electrónico de Vehículos	
	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration
Puertos Sitio Web	
	ISP Probe Information Collection
Red de Información de Incidentes y Respuesta	
	Emergency Call-Taking
	Emergency Response Management
Red de Información y Condiciones de Tránsito	
	TMC Regional Traffic Control

ITS System	*Equipment Package*
Red de Información y Condiciones de Tránsito	
	TMC Work Zone Traffic Management
	Traffic Maintenance
SAMU Sistema Central	
	Emergency Dispatch
	Emergency Response Management
SAMU Vehículos de Emergencia	
	On-board EV En Route Support
SECTRA Controladores de Semáforos	
	Roadside Signal Priority
	Roadway Reversible Lanes
	Roadway Signal Controls
	Standard Rail Crossing
SECTRA Letreros de Mensaje Variable	
	Roadway Traffic Information Dissemination
SECTRA Sensores de Tránsito	
	Roadway Basic Surveillance
	Roadway Probe Beacons
SECTRA Sistemas Central de Control de Tránsito	
	Collect Traffic Surveillance
	HRI Traffic Management
	TMC Environmental Monitoring
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Multimodal Coordination
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Reversible Lane Management
	TMC Signal Control
	TMC Toll/Parking Coordination
	TMC Traffic Information Dissemination
	TMC Traffic Network Performance Evaluation
	Traffic Data Collection
SECTRA Sistemas de Almacenamiento de Datos de Tránsito	
	ITS Data Repository
	Virtual Data Warehouse Services
SECTRA Sistemas de Planificación Multimodal	
	ITS Data Repository
	Virtual Data Warehouse Services
SESMA Centro de Análisis	
	Emissions Data Management

ITS System	*Equipment Package*
SESMA Estaciones de Monitoreo Ambiental	
	Roadway Emissions Monitoring
Sistema Municipal de Permiso de Carga	
	Credentials and Taxes Administration
	CV Information Exchange
Sistema Municipal Equipo de Vías	
	Roadside Signal Priority
	Roadway Basic Surveillance
	Roadway Environmental Monitoring
	Roadway Reversible Lanes
	Roadway Signal Controls
	Roadway Traffic Information Dissemination
	Standard Rail Crossing
Sistema Municipal Sistema Central de Control de Tránsito	
	Collect Traffic Surveillance
	HRI Traffic Management
	TMC Environmental Monitoring
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Multimodal Coordination
	TMC Regional Traffic Control
	TMC Reversible Lane Management
	TMC Signal Control
	TMC Toll/Parking Coordination
	TMC Traffic Information Dissemination
	TMC Traffic Network Performance Evaluation
	Traffic Data Collection
UOCT Centro de Control de Gestión de Tránsito	
	Collect Traffic Surveillance
	HRI Traffic Management
	TMC Environmental Monitoring
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Multimodal Coordination
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Reversible Lane Management
	TMC Signal Control
	TMC Toll/Parking Coordination
	TMC Traffic Information Dissemination

ITS System	*Equipment Package*
UOCT Centro de Control de Gestión de Tránsito	
	TMC Traffic Network Performance Evaluation
	Traffic Data Collection
UOCT Circuito Cerrado de Televisión	
	Roadway Basic Surveillance
UOCT Controladores de Semáforos	
	Roadside Signal Priority
	Roadway Reversible Lanes
	Roadway Signal Controls
	Standard Rail Crossing
UOCT Equipo Control de Tráfico Autopistas	
	Roadway Freeway Control
UOCT Estaciones de Monitoreo Ambiental	
	Roadway Emissions Monitoring
UOCT Letreros de Mensaje Variable	
	Roadway Traffic Information Dissemination
UOCT Sensores Ambientales	
	Roadway Environmental Monitoring
UOCT Sensores de Tránsito	
	Roadway Basic Surveillance
	Roadway Probe Beacons
UOCT Sitio Web	
	ISP Probe Information Collection
Vehículos Tranvía	
	On-board Transit Security
	On-board Transit Trip Monitoring
Viajeros Equipo Personal de Viajeros	
	Personal Interactive Information Reception
	Personal Mayday I/F
	Personal Provider-Based Route Guidance
Viajeros Vehículos Privados	
	Interactive Vehicle Reception
	Vehicle Mayday I/F
	Vehicle Probe Support
	Vehicle Provider-Based Route Guidance
	Vehicle Toll/Parking Interface
VLT Equipo de Acceso y Monitoreo de Vehículos	
	Citation and Accident Electronic Recording
	Roadside Electronic Screening
	Roadside Safety Inspection
	Roadside WIM

ITS System	*Equipment Package*
VLT Equipo de Acceso y Monitoreo de Vehículos	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Reversible Lanes
	Roadway Signal Controls
VLT Letreros Electrónicos	
	Roadway Traffic Information Dissemination
VLT Sistema Central de Control de Tráfico	
	Collect Traffic Surveillance
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Reversible Lane Management
	TMC Signal Control
	TMC Traffic Information Dissemination
VLT Sistema de Registro Electrónico de Vehículos	
	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration
VLT Sitio Web	
	ISP Probe Information Collection

A.4 - Equipment Package Definitions

Equipment Package	*Definition*
Credentials and Taxes Administration	This Equipment package provides administrative capabilities for commercial vehicle operations including database management and administrator-to-roadside and administrator-to-administrator interfaces. For example, this Equipment package would manage the electronic credentials database for a state, perform reconciliation of mileage and fuel taxes (possibly post trip), and interface with roadsides performing credential checks. This equipment package communicates with similar packages in other CVAS locations to exchange credentials database information. Example locations would be state agency or regional offices that are involved with commercial vehicle operations.
Fleet Administration	This Equipment package provides vehicle tracking, dispatch, and reporting capabilities to fleet management center personnel. It gathers current road conditions and traffic information, prepares vehicle routes, and provides a fleet interface for toll collection. It also provides route plan information for network performance evaluation.
Toll Administration	This Equipment package provides the capability to maintain database information with pricing structure information. This capability shall be provided through database software containing pricing structure and current traffic conditions on the transportation network obtained from the transportation management center. This capability allows the determination of dynamic tolls according to congestion levels for demand management. Secure wireline communications with the financial infrastructure and distributed toll plazas supports electronic payments and other ancillary requirements such as lost/stolen tag identification and management. Dependent on customer account requirements and the clearinghouse arrangement, this Equipment package may also contain a billing database.
CV Safety Administration	This Equipment package augments the Credentials and Taxes Administration Equipment package with safety data. This package ensures that safety criteria are available for automated roadside safety checks. It supports the collection and review of carrier safety data and determines the carrier safety rating.
Transit Garage Operations	This Equipment package automates and supports the assignment of transit vehicles and drivers to enhance the daily operation of a transit service. It provides the capability to assign drivers to routes or service areas in a fair manner while minimizing labor and overtime services, considering driver preferences and qualifications, and automatically tracking and validating the number of work hours performed by each individual driver.
International CV Administration	This Equipment package is used by government agencies such as customs and immigration, carriers, and service providers (e.g., brokers) to generate and process the entry documentation necessary to obtain release of vehicle, cargo, and driver across and international border, report the results of the crossing event, and handle duty fee processing.
Freight Administration and Management	This equipment package provides the communication necessary to track cargo from source to destination via links to intermodal freight shippers and depots. There are also communication links to cargo routing services.

Equipment Package	*Definition*
ITS Data Repository	This equipment package collects data and data catalogs from one or more data sources and stores the data in a focused repository that is suited to a particular set of ITS data users. This equipment package includes capabilities for performing quality checks on the incoming data, error notification, and archive to archive coordination. This equipment package supports a broad range of implementations, ranging from simple data marts that collect a focused set of data and serve a particular user community to large-scale data warehouses that collect, integrate, and summarize transportation data from multiple sources and serve a broad array of users within a region.
Vehicle Probe Support	This Equipment package includes capabilities for the probe vehicle to identify its location, measure traffic conditions such as link travel time and speed and possibly environmental hazards such as icy road conditions, and transmit these data to either the ISP or TMC.
MCV Work Zone Support	This equipment package provides communications and support for local management of a work zone.
On-board EV En Route Support	This Equipment package provides capabilities that support safe and expedient arrival to and departure from the incident scene. This package provides dispatch and routing information, tracks the vehicle, and preempt signals via short range communication directly with traffic control equipment at the roadside.
Mayday Support	This Equipment package receives Mayday messages, determines an appropriate response, and either uses internal resources or contacts a local agency to provide that response. The nature of the emergency is determined based on the information in the mayday message as well as other inputs. This package effectively serves as an interface between automated mobile mayday systems and the local public safety answering point for messages which require a public safety response.
Transit Center Multi-Modal Coordination	This Equipment package provides the transit management subsystem the capability to determine the need for transit priority on routes and at certain intersections and request transit vehicle priority at these locations. It also supports schedule coordination between transit properties and coordinates with other surface and air transportation modes.
Transit Center Fixed-Route Operations	This Equipment package enhances the planning and scheduling associated with fixed route transit services. The package allows fixed-route services to develop, print and disseminate schedules and automatically updates customer service operator systems with the most current schedule information. Current vehicle schedule adherence and optimum scenarios for schedule adjustment shall also be provided.
Transit Center Tracking and Dispatch	This Equipment package provides the capabilities for monitoring transit vehicle locations and determining vehicle schedule adherence. The Equipment package shall also furnish users with real-time travel related information, continuously updated with real-time information from each transit system within the local area of jurisdiction, inclusive of all transportation modes, from all providers of transportation services, and provide users with the latest available information on transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents conditions, weather conditions, and special events. This Equipment package also supports the capability for two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility.

Equipment Package	*Definition*
Transit Center Security	This Equipment package provides the capability to monitor key transit locations and transit vehicles with both video and audio systems automatically alerting operators and police of potential incidents and supporting traveler activated alarms. The monitoring equipment shall also include capabilities to assist in responding to terrorist incidents.
Transit Center Information Services	This equipment package collects the latest available information for a transit service and makes it available to transit customers and to Information Service Providers for further distribution. Customers are provided information at transit stops and other public transportation areas before they embark and on-board the transit vehicle once they are enroute. Information provided can include the latest available information on transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, and special events. In addition to general service information, tailored information (e.g, itineraries) are provided to individual transit users.
Transit Center Fare and Load Management	This Equipment package provides the capability to accept collected data required to determine accurate ridership levels and implement variable and flexible fare structures. Support shall be provided for the traveler for use of a fare medium for all applicable surface transportation services, to pay without stopping, have payment media automatically identified as void and/or invalid and eligibility verified, and allow for third party payment. In addition, capability to provide expansion into other uses for payment medium such as retail and telephone and for off-line billing for fares paid by agencies shall be supported. This Equipment package also supports the capability for two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis if desired. These capabilities shall be provided through a workstation type processor with GUI, high capacity storage, ride share software housed in a building with dialup lines and wireline telephone and require integration with an existing Transit Center Tracking and Dispatch Equipment package.
Roadway Freeway Control	Ramp meters, CMS and other freeway control effects which will control traffic on freeways.
TMC Signal Control	This Equipment package provides the capability for traffic managers to monitor and manage the traffic flow at signalized intersections. This capability includes analyzing and reducing the collected data from traffic surveillance equipment and developing and implementing control plans for signalized intersections. Control plans may be developed and implemented that coordinate signals at many intersections under the domain of a single traffic management subsystem. In advanced implementations, this package collects route planning information and integrates and uses this information in predicting future traffic conditions and optimizing the traffic control strategy for these conditions. These capabilities are achieved through real-time communication of logged routes from an Information Service Provider. The planned control strategies can be passed back to the Information Service Provider so that the intended strategies can be reflected in future route planning.
Roadway Signal Controls	This Equipment package provides the capabilities to control traffic signals at major intersections and on main highways for urban areas. This Equipment package is generally constrained to a single jurisdiction.

Equipment Package	*Definition*
Roadway Reversible Lanes	This Equipment package provides the capability for control of reversible lanes using sensor and actuator type equipment. This Equipment package also provides the capability to notify users the direction of the reversible lanes using electronic lane signs.
TMC Regional Traffic Control	This Equipment package provides capabilities in addition to those provided by the TMC Basic Signal Control Equipment package for analyzing, controlling, and optimizing area-wide traffic flow. These capabilities provide for wide area optimization integrating control of a network signal system with control of freeway, considering current demand as well as expected demand with a goal of providing the capability for real-time traffic adaptive control while balancing inter-jurisdictional control issues to achieve regional solutions. These capabilities are best provided using a Traffic Management Center (TMC) to monitor and manage freeway ramp meters and intersection traffic signals and software to process traffic information and implement traffic management measures (e.g., ramp metering, signalization, and traffic coordination between both local and regional jurisdiction). The TMC shall be able to communicate with other TMCs in order to receive and transmit traffic information on other jurisdictions within the region.
MCM Work Activity Coordination	This equipment package disseminates work activity schedules to other agencies. Work schedules are coordinated, factoring in the needs and activities of other agencies and adjacent jurisdictions.
TMC Incident Dispatch Coordination/Communication	This Equipment package provides the capability for an incident response formulation function minimizing the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as coordinating response with all appropriate cooperating agencies.
TMC Multimodal Coordination	This Equipment package provides traffic signal priority for transit vehicles. Two options are provided including a wide-area option based on center to center communications between the Traffic Management and Transit Managemetn Subsystems and a localized option based on direct communications between the transit vehicle and the individual intersection.
TMC Toll/Parking Coordination	This Equipment package provides the transportation management center with the capability to transform and transmit network traffic congestion information to the Toll Administration or Parking Management so that dynamic pricing for demand management is possible.
Standard Rail Crossing	This Equipment Package manages highway traffic at highway-rail intersections (HRIs) where operational requirements do not dictate advanced features (e.g., where rail operational speeds are less than 80 miles per hour). Either passive (e.g., the crossbuck sign) or active warning systems (e.g., flashing lights and gates) are supported depending on the specific requirements for each intersection. These traditional HRI warning systems may also be augmented with other standard traffic management devices. The warning systems are activated on notification by interfaced wayside equipment of an approaching train. The equipment at the HRI may also be interconnected with adjacent signalized intersections so that local control can be adapted to highway-rail intersection activities. Health monitoring of the HRI equipment and interfaces is performed; detected abnormalities are reported through interfaces to the wayside interface equipment and the traffic management subsystem.
International Border Crossing	This Equipment package is used by government agencies such as customs and immigration to check compliance with import/export and immigration regulations to allow release of cargo, vehicle, and driver across an international border.

Equipment Package	*Definition*
On-board CV Electronic Data	This Equipment package provides the Commercial Vehicle Subsystem the capability for two-way data exchange between the vehicle and the roadside facility with the transmission of information such as status of driver, vehicle, and carrier IDs and cargo information. The driver, vehicle and carrier are identified via the tag so that actual weight from roadside mainline weigh-in-motion may be checked. This includes only the equipment on the commercial vehicle including a processor/tag for identification, especially a HAZMAT identification. The actual reading and processing required for the credential checking and weigh-in-motion will be performed by the roadside.
Emergency Dispatch	This Equipment package supports efficient dispatch of emergency vehicles. It tracks emergency vehicles, dispatches these vehicles to an incident, and provides safe and efficient routes based on real-time traffic information.
TMC Incident Detection	This Equipment package provides the capability to traffic managers to detect and verify incident. This capability includes analyzing and reducing the collected data from traffic surveillance equipment, including planned incidents and hazardous conditions.
TMC Traffic Information Dissemination	This Equipment package provides the capability to disseminate incident related information to travelers, potential travelers, and private information service providers. These capabilities shall be provided using a workstation type processor within a facility connected to traveler information providers by utilizing existing wireline links.
Roadway Traffic Information Dissemination	This Equipment package provides the roadside elements of traffic information dissemination including DMS, HAR, and talking pedestrian signs.
Basic Information Broadcast	This Equipment package provides the capabilities to collect, process, store, bill, and disseminate traveler information including traveler, transit, ride matching, traffic, and parking information. The traveler information shall include maintaining a database of local area services available to travelers with up-to-the-minute information and providing an interactive connectivity between, sponsors, and providers of services. The transit information shall include the latest available information on transit routes and schedules, transit transfer options, transit fares, and real-time schedule adherence. The traffic information shall include latest available information on traffic and highway conditions, and current situation information in real-time including incidents, road construction, recommended routes, current speeds on specific routes, current parking conditions in key areas, schedules for any current or soon to start events, and current weather situations. This Equipment package shall also provide users with real-time travel related information while they are traveling, and disseminate to assist the travelers in making decisions about transfers and modification of trips. These capabilities shall be provided using equipment such as a fixed facility with a communications system such as a data Subcarrier multiplexing device.
On-board Transit Signal Priority	This Equipment package provides the capability for transit vehicles to request signal priority through short range communication directly with traffic control equipment at the roadside.
TMC Traffic Network Performance Evaluation	This Equipment package provides the capability to predict travel demand patterns to support traffic flow optimization, demand management, and incident management. This Equipment package requires the data collected by surveillance Equipment packages as well as input from other management subsystems including the ISP Subsystem, Transit Management Subsystem.

Equipment Package	*Definition*
TMC Freeway Management	Control system for efficient freeway management including integration of surveillance information with freeway road geometry, vehicle control such as ramp metering, CMS, HAR. Interface to coordinated traffic subsystems for information dissemination to the public.
Emissions Data Management	This Equipment package assimilates and stores air quality measures and roadside collected emissions data. General air quality measures are distributed as general traveler information and also may be used for in demand management programs. Collected roadside emissions are analyzed and used to detect, identify, and notify concerned parties regarding vehicles that exceed emissions standards.
Parking Management	This Equipment package provides the capability to detect and classify properly equipped vehicles entering and exiting the parking facility, and to maintain database information with parking availability and pricing structure information. This capability shall be provided through the utilization of active/passive tag readers and database software containing parking pricing structure and current availability. Wireline communications with clearinghouse operators (the Financial Institution terminator) enable processing of financial transactions.
Fleet HAZMAT Management	This Equipment package provides the Fleet and Freight Management Subsystem the capabilities to enhance the Fleet Administration Equipment package functions by adding HAZMAT tracking. The additional requirements to perform this function include enhanced processing and enhanced fleet management software. In order to effectively track HAZMAT cargo, communication interfaces to Information Service Providers, and Emergency Management Subsystems shall be provided, including additional communication software.
MCM Incident Management	This equipment package supports coordinated response to highway incidents. Incident notifications are shared, incident response resources are managed, and the overall incident situation and incident response is coordinated among allied response organizations.
Fleet Maintenance Management	This Equipment package provides the capability to use vehicle mileage data to automatically generate preventative maintenance schedules for each specific vehicle by utilizing vehicle tracking data from the prerequisite tracking Equipment package. In addition, capability to automatically ensure that proper service personnel are provided information for maintenance activities and to record and verify that maintenance work was performed shall be provided.
MCM Winter Maintenance Management	This equipment package manages winter road maintenance, tracking and controlling snow plow operations, roadway treatment (e.g., salt spraying and other material applications) based on weather information.
TMC Reversible Lane Management	This Equipment package provides the capability for access and management of reversible lane facilities, including the direction of traffic flow changes during the day, especially between the peak hours and dedication of more lanes to the congestion direction during special events.
Emergency Response Management	This Equipment package develops and stores emergency response plans and manages overall coordinated response to emergencies. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. This Equipment package provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It provides vital communications linkages which provide real-time information to emergency response personnel in the field.

Equipment Package	*Definition*
On-board Transit Fare and Load Management	This Equipment package provides the capability to collect data required to determine accurate ridership levels and implement variable and flexible fare structures. Support shall be provided for the traveler for use of a fare medium for all applicable surface transportation services, to pay without stopping, have payment media automatically identified as void and/or invalid and eligibility verified, and allow for third party payment. In addition, capability to provide expansion into other uses for payment medium such as retail and telephone and for off-line billing for fares paid by agencies shall be supported. This Equipment package also supports the capability for two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis if desired. These capabilities require integration with an existing On-board Trip Monitoring Equipment package.
HRI Traffic Management	This equipment package monitors highway-rail intersection (HRI) equipment at the roadside which manages highway traffic. Various levels of roadside equipment may be interfaced to, and supported by, this equipment package to include standard speed active warning systems and high speed systems which provide additional information on approaching trains and detect and report on obstructions in the HRI. This equipment package remotely monitors and reports the status of this roadside equipment. A two way interface supports explicitly status requests or remote control plan updates to be generated by this equipment package. Status may also be received periodically in the absence of a request or asynchronously in the event of a detected failure or other unsafe condition at the intersection.
TMC Work Zone Traffic Management	This equipment package supports coordination with maintenance systems so that work zones are established that have minimum traffic impact. Traffic control strategies are implemented to further mitigate traffic impacts associated with work zones that are established.
MCM Work Zone Management	This equipment package remotely monitors and supports work zone activities, controlling traffic through portable dynamic message signs (DMS) and informing other groups of activity (e.g., ISP, TM, other maintenance and construction centers) for better coordination management. Work zone speeds and delays are provided to the motorist prior to the work zones.
MCM Vehicle and Equipment Maintenance Management	This equipment package monitors vehicle and equipment condition, tracks maintenance history, and schedules routine and corrective maintenance.
Remote Transit Fare Management	This Equipment package provides the capability for the traveler to use a common fare medium for all applicable surface transportation services, to pay without stopping, have payment media automatically identified as void and/or invalid and eligibility verified. This may be implemented as a payment instrument reader at a kiosk. In addition, capability to provide expansion into other uses for payment medium such as retail and telephone and for off-line billing for fares paid by agencies shall be supported.

Equipment Package	*Definition*
Fleet Credentials and Taxes Management and Reporting	This Equipment package provides the Fleet and Freight Management Subsystem the capabilities to purchase credentials and file trip reports electronically by the fleet managers, to perform automated enrollment at the roadside facilities, and electronically manage the credentials checking by the roadside commercial vehicle inspectors. The electronic purchase shall be performed in accordance with developing standards such that a single integrated system for electronic payments might develop ensuring that deployment across multiple agency political boundaries is performed without degradation. Inherent to credential management shall be the management of the vehicles, with a prerequisite of the vehicle tracking software from the Fleet Administration Equipment package.
Personal Provider-Based Route Guidance	This Equipment package coordinates with an ISP-Based route planning service to select a suggested route plan that is tailored to the traveler's preferences. Coordination may continue during the trip so that the route plan can be modified to account for new information. Many equipment configurations are possible including systems that provide a basic route plan to the traveler as well as more sophisticated systems that can provide transition by transition guidance to the traveler along a multi-modal route plan.
Vehicle Provider-Based Route Guidance	This Equipment package coordinates with an ISP-Based route planning service to select a suggested route plan that is tailored to the driver's preferences. Coordination continues during the trip so that the route plan can be modified to account for new information and vehicle probe data can be returned to the ISP. Many equipment configurations are possible including basic systems that provide only a route plan to the driver as well as systems that include the necessary on-board equipment to provide turn by turn route guidance following the selected route.
Interactive Infrastructure Information	This Equipment package shall have as prerequisite the capabilities of the Basic Information Broadcast Equipment package. This Equipment package augments the Basic Information Broadcast Equipment package by providing the capabilities for interactive traveler information.
Infrastructure Provided Route Selection	This Equipment package shall have as prerequisite the capabilities of the Interactive Infrastructure Information Equipment package. In addition, this Equipment package provides the capability to provide specific directions to travelers by receiving origin and destination requests from travelers, generating route plans, returning the calculated plans to the users, and then potentially logging the route plans with Traffic Management Subsystem. Route plans can include bicycle routes, walkways, skyways, and multi-use trails. This additional capability shall be provided using equipment such as a workstation type processor and software for route planning and traffic measurements along with additional communications capabilities including dialup lines, PCS telephones, and wireless data transceivers.
CV Information Exchange	This equipment package supports the exchange of safety and credentials data among jurisdiction. The package also supports the exchange of safety and credentials data between agencies (for example, an administrative center and the roadside check facilities) within a single jurisdiction. Data are collected from multiple authoritative sources and packaged into snapshots (top-level summary and critical status information) and profiles (detailed and historical data).
Vehicle Toll/Parking Interface	This Equipment package shall provide the capability for vehicle operators to pay toll without stopping their vehicles and pay for parking without the use of cash. These capabilities shall be provided through the use of equipment such as an active tag interface and debit/credit card interface.

Equipment Package	*Definition*
MCV Vehicle Location Tracking	This equipment package tracks vehicle location and reports this location to a dispatch center.
Traffic Maintenance	This Equipment package provides monitoring and remote diagnostics of field equipment to detect field equipment failures, issues problem reports, and tracks the repair or replacement of the failed equipment.
MCV Winter Maintenance	This equipment package supports snow plow operations and other roadway treatments (e.g., salt spraying and other material applications).
MCM Roadway Maintenance and Construction	This equipment package provides overall management and support for routine maintenance on a roadway system or right-of-way. Services managed are landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment on the roadway (e.g., signs, traffic controllers, traffic detectors, dynamic message signs, traffic signals, etc.). Environmental conditions information is also received from various weather sources to aid in scheduling routine maintenance activities.
MCV Roadway Maintenance and Construction	This equipment package includes the on-board systems that support routine non-winter maintenance on a roadway system or right-of-way. Routine maintenance includes landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment on the roadway (e.g., signs, traffic controllers, traffic detectors, dynamic message signs, traffic signals, etc.).
On-board Maintenance	This Equipment package provides the capability to use transit vehicle mileage data to automatically generate preventative maintenance schedules for each specific bus by utilizing vehicle tracking data and storing with a trip computer. It also provides the capability for real-time condition monitoring on board the vehicle, and transmission of this information via two-way communication to the management center.
Emergency Secure Area Surveillance	This Equipment package monitors Remote Traveler Subsystem locations such as transit stations, rest areas, tourist centers, park and ride lots, and other locations frequented by travelers. It provides both video and audio surveillance information to emergency personnel. It automatically alerts emergency personnel of potential incidents and supports traveler activated alarms at these locations.
Roadway Basic Surveillance	This Equipment package provides the capabilities to monitor traffic flow in major intersections and on main highways for urban areas and to monitor road conditions using fixed equipment such as loop detectors and wireline communication.
Secure Area Monitoring	This Equipment package provides the capability to monitor the safety of travelers at Remote Traveler Subsystem locations such as transit stations, rest areas, tourist centers, park and ride lots, and other locations frequented by travelers. It collects surveillance images and data and relays this information back to the Transit Management and Emergency Management Subsystems.
Roadway Emissions Monitoring	This Equipment package monitors emissions and general air quality and communicates the collected information back to the emissions management subsystem where it can be monitored, analyzed, and used. This equipment package supports point monitoring of individual vehicle emissions as well as general monitoring of standard air quality measures.

Equipment Package	*Definition*
Roadway Infrastructure Monitoring	This equipment package monitors the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts). It includes sensors that monitor the infrastructure and the communications necessary to report this data to a center or vehicle-based maintenance system.
MCV Infrastructure Monitoring	This on-board equipment package monitors the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts). It includes vehicle-based sensors that directly monitor the infrastructure, communications that allow roadway-based infrastructure monitoring sensors to be controlled and read, and data communications that allows collected infrastructure condition information to be reported back to a center.
MCV Vehicle Safety Monitoring	This equipment package detects vehicle intrusions in the vicinity of the vehicle and warns crew workers and drivers of imminent encroachment. Crew movements are also monitored so that the crew can be warned of movement beyond the designated safe zone. This equipment package can be used for stationary work zones or in mobile applications where a safe zone is maintained around the moving vehicle.
TMC Environmental Monitoring	This equipment package assimilates current and forecast road conditions and surface weather information using a combination of weather service provider information and an array of environmental sensors deployed on and about the roadway. The collected environmental information is monitored and presented to the operator. This information can be used to more effectively deploy road maintenance resources, issue general traveler advisories, and support location specific warnings to drivers. Other equipment packages process the collected information and provide decision support.
Roadway Environmental Monitoring	This Equipment package measures environmental conditions and communicates the collected information back to a center where it can be monitored and analyzed. A broad array of general weather and road surface information may be collected. Weather conditions that may be measured include temperature, wind, humidity, precipitation, and visibility. Surface and sub-surface sensors can measure road surface temperature, moisture, icing, salinity, and other measures.
On-board Trip Monitoring	This Equipment package provides the capabilities to support fleet management with automatic vehicle location and automated mileage and fuel reporting and auditing. This package may also record other special events resulting from communication with roadside equipment. This includes only the equipment on board the vehicle to support this function including the vehicle location devices such as GPS equipment, communication interfaces, a processor to record trip length, and the sensors/actuators/interfaces necessary to record mileage and fuel usage.
On-board Transit Trip Monitoring	This Equipment package provides the capabilities to support fleet management with automatic vehicle location and automated mileage and fuel reporting and auditing. This package may also record other special events resulting from communication with roadside equipment. This includes only the equipment on board the vehicle to support this function including the vehicle location devices such as GPS equipment, communication interfaces, a processor to record trip length, and the sensors/actuators/interfaces necessary to record mileage and fuel usage.
Parking Electronic Payment	This Equipment package supports electronic payment of parking fees.

Equipment Package	*Definition*
Toll Plaza Toll Collection	This Equipment package provides existing toll plazas the capability to identify properly equipped vehicles and automatically perform toll collection. These capabilities are provided with active tag readers and vehicle identification software running on a workstation type processor. A camera for performing violation identification shall interface to a monitor, the workstation, and database software. Automated account reconciliation and notification to authorities of violations shall be supported using wireline communications.
Roadside WIM	This Equipment package allows for roadside high speed weigh in motion. This package can be fixed to a location or mobile. It can include an interface to the credential check package and augment electronic credentials check with electronic weight check or it can be a stand alone package with display.
Roadway Probe Beacons	This Equipment package monitors traffic and road conditions by collecting information from passing vehicles that are equipped with a transponder or other short range communications device. The probe data collected by this equipment package may include link travel times, average speeds, road conditions, and any other data that can be measured and communicated by passing vehicles. This equipment package consists of roadside equipment that communicates with passing vehicles using dedicated short range communications, collects the information provided by the vehicles, and forwards this information back to the Traffic Management Subsystem.
MCM Environmental Information Processing	This equipment package processes current and forecast weather data, road condition information, local environmental data, and uses internal models to develop specialized detailed forecasts of local weather and surface conditions. The processed environmental information products are presented to the user.
Emergency Call-Taking	This Equipment package supports the emergency call-taker, collecting available information about the caller and the reported emergency, and forwarding this information to other equipment packages that formulate and manage the emergency response. This equipment package receives 9-1-1, 7-digit local access, and motorist call-box calls and interfaces to other agencies to assist in the verification and assessment of the emergency and to forward the emergency information to the appropriate response agency.
Interactive Vehicle Reception	This Equipment package shall provide the capability for drivers to interface with the ISP Subsystem Infrastructure Equipment packages including the Interactive Infrastructure Information Equipment package, the Infrastructure Provided Route Selection, Yellow Pages and Reservation, and Dynamic Ridesharing Equipment packages. These capabilities shall be provided using the Vehicle Subsystem equipment.
Traffic Data Collection	This equipment package collects and stores traffic information that is collected in the course of traffic operations performed by the Traffic Management Subsystem. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
Collect Traffic Surveillance	This Equipment package collects, stores, and provides electronic access to the traffic surveillance data.
MCM Environmental Information Collection	This equipment package collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway. In addition to fixed sensor stations at the roadside, this equipment package also collects environmental information from sensor systems located on Maintenance and Construction Vehicles, and sensor data that is made available by other systems..

Equipment Package	*Definition*
ISP Probe Information Collection	This Equipment package supports the collection of vehicle probe data by the ISP. It provides the capability to accept and process probe vehicle information. This capability shall be provided through the use of additional hardware and probe vehicle control and tracking software.
TMC Probe Information Collection	This Equipment package provides the capability to accept and process probe vehicle information. This capability shall be provided through the use of additional hardware and probe vehicle control and tracking software.
Citation and Accident Electronic Recording	The equipment package documents violations and forwards the information to the Commercial vehicle if available and to the CVAS for processing as part of the normal credentials processing package
Roadside Safety Inspection	This Equipment package provides the Commercial Vehicle Check Subsystem the capabilities for operators to automate the roadside safety inspection process including the support of use of hand held devices to rapidly inspect the vehicle and driver. In addition this Equipment package provides the Roadside Check Subsystem the capabilities for operators to automate the roadside safety inspection process including the support of automated mainline speed reading of on-board safety data to rapidly screen the vehicle and driver. This Equipment package shall also provide the capabilities to collect, store, maintain, and provide safety data and access historical safety data after receiving identification from vehicles at mainline speeds or while stopped at the roadside. Results of screening and summary safety inspection can be written back onto the tag. The capabilities to process safety data and issue pull-in messages or provide warnings to the driver, carrier, and enforcement agencies shall be provided. These capabilities have a prerequisite of the Roadside Electronic Screening Equipment package and shall be provided primarily through the utilization of an additional safety database.Since a vehicle may cross jurisdiction boundaries during a trip, this equipment package supports the concept of a last clearance event record (aka trip ticket) carried on the vehicle s tag. The last clearance event record reflects the results of the roadside verification action. For example, if the vehicle is pulled over in State A and undergoes credential, weight, and safety checks, the results of the clearance process are written to the vehicle s tag. If the vehicle continues the trip and passes a roadside station in State B, the State B station has access to the results of the previous pull-in because it can read the last clearance event record written by the State A roadside station.
On-board CV Safety	This Equipment package provides the Commercial Vehicle Subsystem the capability to collect and process on board vehicle and driver safety information to monitor the safety status and supply this information to the roadside facilities both at mainline speeds and while stopped for inspections. The capability to alert the commercial vehicle driver whenever there is a critical safety problem or potential emergency shall also be provided. These capabilities include only the equipment on the commercial vehicle including the sensors and processors to monitor the vehicle and driver with the information stored on the vehicle. When the information is transmitted to the roadside facility or after the trip, it will utilize the communication devices already in place. The package will also support onboard driver safety log maintenance and checking.
On-board Transit Security	This Equipment package provides the capability to monitor the safety of transit vehicles using on-board safety sensors, processors and communications from the prerequisite On-board Trip Monitoring Equipment package.

Equipment Package	*Definition*
Roadway Work Zone Safety	This equipment package detects vehicle intrusions in work zones and warns crew workers and drivers of imminent encroachment. Crew movements are also monitored so that the crew can be warned of movement beyond the designated safe zone.
Roadside Electronic Screening	This Equipment package provides the Commercial Vehicle Check Subsystem the capabilities for two-way communication with approaching properly equipped commercial vehicles at mainline speeds, reading tags for automated vehicle identification and credential checking. There will be a capability to appropriately screen all vehicles, not just those that are equipped. This Equipment package shall be able to process the data from the commercial vehicles along with accessed database information to determine whether a pull-in message is needed or to generate random pull-in messages with provisions for facility operators and enforcement officials to have manual override capabilities. Support shall be provided to both interstate and intrastate carriers.
Roadside Signal Priority	This Equipment package shall provide the capability to receive vehicle signal priority requests and control roadside signals accordingly.
Virtual Data Warehouse Services	This equipment package provides capabilities to access "in-place" data from geographically dispersed archives and coordinate information exchange with a local data warehouse. While many of the functions performed by this equipment package are similar to the functions inherent in other archived data management subsystem equipment packages (e.g. data management, fusion, analysis) this equipment package also provides the specialized publishing, directory services, and transaction management functions associated with coordinating remote archives. In addition, this equipment package performs functions on an as-needed basis, thereby negating the need to maintain the comprehensive set of data from the remote archives in the local data warehouse.
MCV Vehicle System Monitoring and Diagnostics	This equipment package includes on-board sensors capable of monitoring the condition of each of the vehicle systems and diagnostics that can be used to support vehicle maintenance.
Personal Interactive Information Reception	This Equipment package shall provide the capability for travelers to interface with the ISP Subsystem Infrastructure Equipment packages including the Interactive Infrastructure Information Equipment package, and the Infrastructure Provided Route Selection, Yellow Pages and Reservation, and Dynamic Ridesharing Equipment packages. These capabilities shall be provided using the Personal Information Access Subsystem equipment such as cellular telephone, interactive TV, Personal Computer, and pager with alpha display using communication medium and equipment such as two-way radio, CATV, and wireless data transceivers.
Personal Mayday I/F	This Equipment package shall provide the capability to initiate a distress signal and cancel a prior issued manual request for help using the Personal Information Access Subsystem. This capability shall be provided using equipment such as a processor to automatically dial the Emergency Management Subsystem and provide location.

Equipment Package	*Definition*
Remote Transit Information Services	The Equipment package furnishes transit users with real-time travel-related information at transit stops, multi-modal transfer points, and other public transportation areas. It provides transit users with the latest available information on transit routes, schedules, transfer options, bicycle accessibility, fares, real-time schedule adherence, current incidents, weather conditions, and special events. In addition to tailored information for individual transit users, this equipment package supports general annunciation and/or display of imminent arrival information and other information of general interest to transit users.
Remote Mayday I/F	This Equipment package provides the capability to report an emergency and summons assistance. The equipment includes a traveler interface that facilitates generation of a distress signal under duress and wireline communications that carries this distress signal and allows follow-up verification and determination of the nature of the emergency and the required response. This equipment package notifies either the Emergency Management or Transit Management Subsystem depending on the implementation.
Vehicle Mayday I/F	This Equipment package shall provide the capability for an in-vehicle manually initiated distress signal with cancel a prior issued manual request for help feature. This capability shall include automatically identifying that a collision had occurred using equipment such as collision detection sensors with interface to mayday type equipment that would automatically detect vehicle problems and for some cases, automatically send appropriate distress signals to the Emergency Management Subsystem.
On-board Cargo Monitoring	This Equipment package provides the Commercial Vehicle Subsystem the capability to monitor both interstate and intrastate cargo safety such that enforcement and HAZMAT response teams can be provided with timely and accurate information. This includes only the equipment on board the cargo container such as a communication device, possibly the addition of a cell-based radio, and equipment for the processing and storage of cargo material. This can also include optional sensors for temperature, pressure, load leveling, or acceleration depending upon the items monitored. It is already expected that the cargo location devices such as GPS equipment and an integration processor already exist. These items are presented as part of the On-board Trip Monitoring Equipment package.
Transit Garage Maintenance	This Equipment package provides advanced maintenance functions for the transit property. It collects operational and maintenance data from transit vehicles, manages vehicle service histories, and monitors drivers and vehicles. It collects vehicle mileage data and uses it to automatically generate preventative maintenance schedules for each vehicle by utilizing vehicle tracking data from a prerequisite vehicle tracking equipment package. In addition, it provides information to proper service personnel to support maintenance activities and records and verifies that maintenance work was performed. This equipment package receives special events and real-time incident data from the traffic management subsystem and assigns operators to vehicles and transit routes. Garage maintenance also receives information about incidents involving transit vehicles from the TMC in order to dispatch tow trucks and other repair vehicles.

APPENDIX B – ITS STANDARDS

B.1 Key Standards and Interoperability in Chile

ITS standards establish a common way in which devices connect and communicate with one another. This allows transportation agencies to implement systems that cost-effectively exchange pertinent data and accommodate equipment replacement, system upgrades, and system expansion. Standards benefit the traveling public by providing products that will function consistently and reliably throughout the region. ITS standards contribute to a safer and more efficient transportation system, facilitate regional interoperability, and promote an innovative and competitive market for transportation products and services. Use of ITS standards will be very important to project development in Chile.

Electronic toll collection standards used by tollway operators in Chile have been standardized around the Chilean MOPTT-ST standard. At the present time official norms related directly to the ITS do not exist. However, engineering specifications, some of them still in preparation on the part of the MOP, exist for electronic toll collection. A listing of these appears in the following table.

Table B.1 – Existing or Developing ITS Standards in Chile

Standard	Name	Status
MOPTT-ST1	Systems for Electronic Toll Collection and Other Applications Specification for the Interoperability between Antenna and Transponder	Existing
MOPTT-ST2	Systems for Electronic Toll Collection and Other Applications Conformity Tests for Specification for the Interoperability between Antenna and Transponder	Existing
MOPTT-ST3	Systems for Electronic Toll Collection and Other Applications Security Management	Development
MOPTT-ST4	Systems for Electronic Toll Collection and Other Applications Specification of Minimum Parameters for Interoperable Transactions	Development
MOPTT-ST5	Systems for Electronic Toll Collection and Other Applications National Registry of Toll Users	Development
MOPTT-ST6	Systems for Electronic Toll Collection and Other Applications Interface Specification for Exports	Development

The MOPTT-ST1 specification is used by the Concessionaires of the Metropolitan Region. Resolution N°1476 of 9 November of 2001 of the Vice Ministry of assigns frequency band 5.725 to 5.850 Mhz for use by the electronic toll collection systems of the roadway concessions. Article N°2 of this resolution defines the characteristics of the equipment that operates in the assigned frequency band. For example, equipment that operates in band 5,725 - 5,850 Mhz must use one of the following modalities: dynamic selection of channels and frequency jumping, such that multiple users and systems may coexist within the same geographic zone. Article N°3 of the resolution defines norms for radio communications transmission equipment as not to cause interference with the equipment of automatic collection electronic of toll that operates in the 5.795 – 5.815 Mhz band.

B.2 Potential Applicable US Standards in Chile

US, European, and Asian ITS standards are potentially applicable in Chile. This section identifies the standards efforts of US Standards Development Organizations (SDO). US ITS Standards initiatives are categorized as Communication Protocol Standards, Message Sets and Data Dictionary Standards.

The SDOs developing ITS standards at present include:

- American Association of State Highway and Transportation Officials (AASHTO)
- American National Standards Institute (ANSI)
- American Society for Testing and Materials (ASTM)
- Electronic Industries Alliance/Consumer Electronic Association (EIA/CEA)
- Institute of Electrical and Electronics Engineers (IEEE)
- Institute of Transportation Engineers (ITE)
- Society of Automotive Engineers (SAE)

For more information on standards please contact the SDOs directly or visit the US ITS standards web site at www.its-standards.net. Most standards are available for a fee.

The tables below identify US ITS standards that are potentially applicable in Chile. The tables list the Standards Development Organization (SDO) in the first column followed by the standard and document title. The first table identifies applicable Communication Protocol Standards, while the second table shows applicable Message Set and Data Dictionary Standards.

Table B.2 – Potential ITS Communications Protocol Standards

SDO	Standard Title	Document Title
AASHTO/ITE/NEMA	Application Profile for Common Object Request Broker Architecture (CORBA)	NTCIP 2305
AASHTO/ITE/NEMA	Application Profile for Data Exchange ASN.1 (DATEX)	NTCIP 2304
AASHTO/ITE/NEMA	Application Profile for File Transfer Protocol (FTP)	NTCIP 2303
AASHTO/ITE/NEMA	Base Standard: Octet Encoding Rules (OER)	NTCIP 1102
AASHTO/ITE/NEMA	Information Profile for CORBA	NTCIP 2502
AASHTO/ITE/NEMA	Information Profile for DATEX	NTCIP 2501
AASHTO/ITE/NEMA	Internet (TCP/IP and UDP/IP) Transport Profile	NTCIP 2202
AASHTO/ITE/NEMA	Subnet Profile for Ethernet	NTCIP 2104
AASHTO/ITE/NEMA	Application Profile for File Transfer Protocol (FTP)	NTCIP 2303
AASHTO/ITE/NEMA	Application Profile for Simple Transportation Management Framework (STMF)	NTCIP 2301
AASHTO/ITE/NEMA	Application Profile for Trivial File Transfer Protocol	NTCIP 2302
AASHTO/ITE/NEMA	Base Standard: Octet Encoding Rules (OER)	NTCIP 1102
AASHTO/ITE/NEMA	Class B Profile	NTCIP 2001
AASHTO/ITE/NEMA	Internet (TCP/IP and UDP/IP) Transport Profile	NTCIP 2202
AASHTO/ITE/NEMA	Point to Multi-Point Protocol Using RS-232 Subnetwork Profile	NTCIP 2101
AASHTO/ITE/NEMA	Simple Transportation Management Framework (STMF)	NTCIP 1101
AASHTO/ITE/NEMA	Simple Transportation Management Protocol (STMP)	NTCIP 1103
AASHTO/ITE/NEMA	Subnet Profile for Ethernet	NTCIP 2104
AASHTO/ITE/NEMA	Subnet Profile for PMPP Over FSK modems	NTCIP 2102
AASHTO/ITE/NEMA	Subnet Profile for Point-to-Point Protocol using RS 232	NTCIP 2103
AASHTO/ITE/NEMA	Transportation Transport Profile	NTCIP 2201
SAE	ITS Data Bus Data Security Services Recommended Practice	SAE J1760
SAE	ITS Data Bus Protocol - Link Layer Recommended Practice	SAE J2366-2
SAE	ITS Data Bus Protocol - Physical Layer Recommended Practice	SAE J2366-1
SAE	ITS Data Bus Protocol - Thin Transport Layer Recommended Practice	SAE J2366-4
SAE	ITS Data Bus Protocol - Application Layer Recommended Practice	SAE J2366-7
SAE	ITS Data Bus Gateway Recommended Practice	SAE J2367
SAE	Standard for ATIS Message Sets Delivered Over Bandwidth Restricted Media	SAE J2369

Table B.3 – Potential ITS Message Set and Data Dictionary Standards

SDO	Std Title	Document Title	Msg Set	Data Dic
AASHTO/ITE/NEMA	Data Collection & Monitoring Devices	NTCIP 1206	M	D
AASHTO/ITE/NEMA	Data Dictionary for Closed Circuit Television (CCTV)	NTCIP 1205	M	D
AASHTO/ITE/NEMA	Global Object Definitions	NTCIP 1201	M	D

SDO	Std Title	Document Title	Msg Set	Data Dic
AASHTO/ITE/NEMA	Message Set for Weather Reports	NTCIP 1301	M	
AASHTO/ITE/NEMA	Object Definitions for Actuated Traffic Signal Controller Units	NTCIP 1202	M	D
AASHTO/ITE/NEMA	Object Definitions for Dynamic Message Signs	NTCIP 1203	M	D
AASHTO/ITE/NEMA	Object Definitions for Environmental Sensor Stations & Roadside Weather Information System	NTCIP 1204	M	D
AASHTO/ITE/NEMA	Object Definitions for Video Switches	NTCIP 1208	M	D
AASHTO/ITE/NEMA	Objects for Signal Control Priority	NTCIP 1211	M	D
AASHTO/ITE/NEMA	Objects for Signal Systems Master	NTCIP 1210	M	D
AASHTO/ITE/NEMA	Ramp Meter Controller Objects	NTCIP 1207	M	D
AASHTO/ITE/NEMA	TCIP - Common Public Transportation (CPT) Business Area Standard	NTCIP 1401	M	D
AASHTO/ITE/NEMA	TCIP - Control Center (CC) Business Area Standard	NTCIP 1407	M	D
AASHTO/ITE/NEMA	TCIP - Fare Collection (FC) Business Area Standard	NTCIP 1408	M	D
AASHTO/ITE/NEMA	TCIP - Incident Management (IM) Business Area Standard	NTCIP 1402	M	D
AASHTO/ITE/NEMA	TCIP - Onboard (OB) Business Area Standard	NTCIP 1406	M	D
AASHTO/ITE/NEMA	TCIP - Passenger Information (PI) Business Area Standard	NTCIP 1403	M	D
AASHTO/ITE/NEMA	TCIP - Scheduling/Runcutting (SCH) Business Area Standard	NTCIP 1404	M	D
AASHTO/ITE/NEMA	TCIP - Spatial Representation (SP) Business Area Standard	NTCIP 1405	M	D
AASHTO/ITE/NEMA	Transportation System Sensor Objects	NTCIP 1209	M	D
ANSI	Commercial Vehicle Credentials	ANSI TS286	M	D
ANSI	Commercial Vehicle Safety and Credentials Information Exchange	ANSI TS285	M	D
ANSI	Commercial Vehicle Safety Reports	ANSI TS284	M	D
ASTM	ADMS Data Dictionary Specifications	ASTM DD 17.54.00.2		D
IEEE	Standard for Common Incident Management Message Sets (IMMS) for use by EMCs	IEEE P1512-2000	M	D
IEEE	Standard for Emergency Management Data Dictionary	IEEE P1512.a		D
IEEE	Standard for Hazardous Material IMMS for use by EMCs	IEEE P1512.3	M	D

SDO	Std Title	Document Title	Msg Set	Data Dic
IEEE	Standard for Interface Between the Rail Subsystem and the Highway Subsystem at a Highway Rail Intersection	IEEE P1570	M	D
IEEE	Standard for Message Sets for Vehicle/Roadside Communications	IEEE Std 1455-1999	M	D
IEEE	Standard for Public Safety IMMS for use by EMCs	IEEE P1512.2	M	D
IEEE	Standard for Traffic Incident Management Message Sets for Use by EMCs	IEEE P1512.1	M	D
ITE	Message Sets for External TMC Communication (MS/ETMCC)	ITE TM 2.01	M	
ITE	Standard for Functional Level Traffic Management Data Dictionary (TMDD)	ITE TM 1.03		D
ITE	TCIP - Traffic Management (TM) Business Area Standard	ITE TS 3.TM	M	D
SAE	Data Dictionary for Advanced Traveler Information System (ATIS)	SAE J2353		D
SAE	ISP-Vehicle Location Referencing Standard	SAE J1746		D
SAE	ITS Data Bus Data Security Services Recommended Practice	SAE J1760	M	D
SAE	ITS Data Bus Gateway Recommended Practice	SAE J2367	M	D
SAE	ITS Data Bus Protocol - Application Layer Recommended Practice	SAE J2366-7	M	D
SAE	Message Set for Advanced Traveler Information System (ATIS)	SAE J2354	M	
SAE	Messages for Handling Strings and Look-Up Tables in ATIS Standards	SAE J2540	M	
SAE	On-Board Land Vehicle Mayday Reporting Interface	SAE J2313	M	D
SAE	Rules for Standardizing Street Names and Route IDs	SAE J2529	M	
SAE	Standard for ATIS Message Sets Delivered Over Bandwidth Restricted Media	SAE J2369	M	D

APPENDIX C – U.S. ITS SYSTEM AND SERVICE PROVIDERS

C.1 Introduction

This section identifies potential US sources of equipment, systems, and services defined by the National ITS Architecture of Chile. The information included here is current through June 2003. The investigation of ITS system and service providers focused on the planned equipment, systems and services defined in the architecture. This section also includes a list of US vendors of ITS products, systems and services and a description of applicable planned elements and services of the architecture. Finally, a list of transportation consulting companies specializing in the field of ITS is included.

C.2 U.S. Vendors of ITS Products and Services

3M Traffic Safety & Management
3M Center, Building 0225-05-S-08
St. Paul, MN 55144-1000
Tel: (800) 553-1380
Fax: (800) 224-2085
Web: www.3M.com/its
Services/technologies: Vehicle detectors, priority control systems, vehicle ID tracking and scheduling and ATMS, dynamic message systems for changeable message signs, transportation asset management, signal priority control, traffic sensing and lane awareness systems.

ADDCO
240 Arlington Avenue East
St. Paul, Minnesota 55117
Tel: 651-488-8600
Fax: 651-558-3600
E-mail: info@addcoinc.com
Web: www.addco.com
Services/technologies: Dynamic message signs, vehicle mount and arrow signs, portable traffic management systems that incorporates video, sensors, solar power and wireless communications.

Ademco Video (Previously Javelin Systems)
Tel: 1-877-653-0302
E-mail: comments@ademcovideo.com
Web: www.ademcovideo.com
Services/technologies: Closed circuit television for ATMS, incident detection, video matrix switches.

Adesta, LLC
1200 Landmark Center, Suite 1300
Omaha, NE 68102-1892
Tel: (402) 233-7700 or (866) 221-5641
Fax: (402) 233-7650
E-mail: info@adestagroup.com
Web: www.adestagroup.com
Services/technologies: Electronic toll collection and traffic management systems.

AECOM
Systems Integration Group, Inc.
2950 Professional Place

Colorado Springs, CO 80904
Tel: (719) 471-9866
Fax: (719) 471-9063
E-mail: bob.russo(@aecom-sig.com
Web: www.sysig.com
Services/technologies: Electronic toll collection and traffic management systems and control centers.

American Electronic Sign Company
Spokane Industrial Park
3808 North Sullivan Road Building 10
Spokane, Washington 99216-1670
United States
Phone: 509-928-2296
Fax: 509-928-2968
Services/technologies: Variable message signs.

ARINC, Inc.
2551 Riva Road
Annapolis, MD 21401-7465
Tel: (800) 633-6882
Tel: (410) 266-4000
Fax: (410) 573-3300
Web: www.arinc.com
Services/technologies: Integration of control, communications, computer navigation, surveillance and sensor systems, rail and bus systems, ITS systems engineering and program management.

Barco America-Visual Systems
3240 Town Point Dr. NW
Kennesaw, GA 30144-7023
Tel: (770) 218-3200
Fax: (770) 218-3250
E-mail: bpsmarketing@barco.com
Web: www.barco.com
Services/technologies: High resolution large screen display systems

Base Technologies, Inc.
1749 Old Meadow Road Suite 500
McLean, VA 22102
Tel: (800) 284-1355
Tel: (703) 848-2400
Fax: (703) 848-0804
E-mail: info@basetech.com
Web: www.bastetech.com
Services/technologies: Systems integration, computer based information systems and telecommunications systems.

Battelle
505 King Avenue
Columbus, OH 43201
Tel: (800) 201-2011
Tel: (614) 424-6424
Fax: (614) 424-3633
E-mail: solutions@battelle.org
Web: www.battelle.org
Services/technologies: Advanced control systems, traveler information systems, crash avoidance technologies, ITS standards testing.

COHU, Inc. - Electronic Division

P.O. Box 85623
San Diego, CA 92186, USA
Tel: (858) 277-6700 ext. 215
Fax: (858) 277-0221
E-mail: info@cohu.com
Web: www.cohu-cameras.com
Services/technologies: CCTV systems and cameras.

CORE TEC Communications, Inc.
49 Leavenworth Street, Suite 200
Waterbury, CT 06702
Tel: (203) 759-2003
Fax: (203) 759-2004
E-mail: sales@gocoretec.com
Web: www.gocoretec.com
Services/technologies: State of the art digital video systems.

Comarco Wireless Technologies, Inc.
2 Cromwell
Irvine, CA 92618
Tel: (949) 599-7400
Fax: (949) 599-1415
E-mail: info@comarco.com
Web: www.comarco.com
Services/technologies: Call box system components, ITS call applications, Tex telephony call box, and intelligent transportation systems.

Computran Systems Corporation
100 First Street
Hackensack, NJ 07601
Tel: (201) 489-7500
Fax: (201) 487-5977
E-mail: computranh@aol.com
Services/technologies: Traffic management systems and software.

Cornet Technology, Inc.
6800 Versar Center
Springfield, VA 22151
Tel: (703) 658-3400
Fax: (703) 658-3440
E-mail: sales@cornet.com
Web: www.cornet.com
Services/technologies: Traffic monitoring, airport, bus and train surveillance, large buildings security systems, broadcast television equipment, outside perimeter security, and emergency management centers.

Daktronics, Inc.
P.O. Box 5128
331 32nd Avenue
Brookings, SD 57006
Tel: (888) 325-8425
Tel: (605) 697-4300
Fax: (605) 697-4700
E-mail: sales@daktronics.com
Web: www.daktronics.com
Services/technologies: Dynamic message signs, variable message signs.

Diamond Electronics

2530 East Main Street
P.O. Box 787
Lancaster, Ohio 43130
Tel: (800) 700-2791
Tel: (740) 687-4032
Fax: (740) 687-4201
Web: http://ebiz.diamondpower.com/DP/DiamondElectronics
Web: www.diamondelectronics.com
Services/technologies: Development of closed circuit remote viewing systems.

DMJM+HARRIS
605 Third Avenue
New York, NY 10158
Phone: 212-973-2900
E-mail: joe.oneill@dmjmharris.com (732-596-5344)
Web: www.dmjmharris.com
Services/technologies: Intelligent Transportation Systems.

Dynamic Technology Systems, Inc.
4900 Seminary Road, Suite 701
Alexandria, VA 22311
Tel: (703) 379-4800
Fax: (703) 379-4901
E-mail: chongj@dts-inc.com
Web: www.imvds-itms.com
Services/technologies: CCTV monitoring and surveillance systems, video communications and networks.

Econolite Control Products, Inc.
3360 East La Palma Avenue
Anaheim, CA 92806-2856
Tel: (714) 630-3700
Fax: (714) 630-6349
E-mail: sales@econolite.com
Web: www.econolite.com
Services/technologies: Traffic signal control systems.

Ecotek
8840 Warner Ave., Suite 304
Fountain Valley, CA 92708
Tel: (714) 596-8836
Fax (714) 596-8837
Web: www.ecotek.com
Services/technologies: Air quality software, environmental consulting.

ECM, Inc.
P.O. Box 888
Manor, TX 78653-0888
Tel: (512) 272-4346
Fax: (512) 272-4966
Web: www.ecmusa.com
Services/technologies: Weigh-in motion systems, traffic counting and classification systems.

Eaton Corporation
Eaton Center
1111 Superior Avenue
Cleveland, OH 44114-2584
Tel: (800) 386-1911

Tel: (216) 523-5000
E-mail: customer@eaton.com
Web: www.eaton.com
Services/technologies: Collision warning systems, advanced technology radar systems.

Fiberoptic Display Systems, Inc.
90 Douglas Pike
Smithfield, RI 02917
Tel: (800) 252-6220
Tel: (401) 232-3370
Fax: (401) 232-7130
E-mail: sales@fds-inc.com
Web: www.fds-inc.com
Services/technologies: Fiber optic variable message signs (VMS), changeable message signs (CMS), and lane control signals (LCS).

Harris - Intraplex
1025 West NASA Boulevard
Melbourne, Florida 32919-0001
U.S. and Canada: 1-800-4-HARRIS
International: 1-321-727-9207
Web: www.broadcast.harris.com/network-access
Services/technologies: Intraplex multiplexers, transport rail, highway and public safety monitoring and traffic control, voice and data communications, public address and audio systems, video over TI, El, ISDN, DDS, fiber optics, microwave, and coax private and public networks.

Intuicom, Inc.
1880 Flatiron Court, Suite R
Boulder, Colorado 80301
Tel: (303) 449-4330
Fax: (303) 449-4346
E-mail: info@intuicom.com
Web: www.intuicom.com
Services/technologies: Provide wireless network and GPS solutions for ITS and AVL.

IFS - International Fiber Systems Inc.
16 Commerce Road
Newton, CT 06470
Tel: (203) 426-1180
Fax: (203) 426-3326
E-mail: sales@ifs.com
Web: www.ifs.com
Services/technologies: Development and manufacture of fiber optic video, audio and data transmission equipment for ITS applications.

Image Sensing Systems, Inc.
500 Spruce Tree Centre
1600 University Ave West
St. Paul, MI 55104-3825
Tel: (651) 603-7700
Fax: (651) 603-7795
E-mail: iss@imagesensing.com
Web: www.imagesensing.com
Services/technologies: Mobile video detection laboratory and incident command center systems.

ITERIS
1515 S, Manchester Ave.

Anaheim, CA 92802-3907
Tel: (714) 780-7285
Fax: (714) 780-7246
E-mail: akm@iteris.com
Web: www.iteris.com
Services/technologies: Video-based vehicle detection systems.

KLD Associates, Inc.
47 Mall Drive, Suite 8, Commack, NY 11725
Tel: (631) 543-6500
Fax: (631) (631) 543-4330
E-mail: kldhunt@aol.com
Web: www.kldassociates.com
Services/technologies: Simulation of any traffic environment arterials, freeways, ramp metering, toll plazas, LRT/BRT, transit signal, grade crossings, construction staging.

McCain Traffic Supply
2575 Pioneer Ave
Vista, CA 92083
Tel: (760) 727-8100
Fax: (760) 727-8184
E-mail: International_sales@mccaintraffic.com
Web: www.mccaintraffic.com
Services/technologies: ITS systems including ATMS, VMS, traffic signal control systems, bus priority systems, video detection systems.

Motorola Telematics Information Systems
50 East Commerce Drive
Schaumburg, IL 60173
Tel: (847) 538-3224
Fax: (847) 538-4343
E-mail: telematics@motorola.com
Web: www.motorola.com/automotive/telematics
Services/technologies: In-vehicle navigation systems, telematics, and GPS Systems.

Metro Dynamics
378 Cambridge Avenue, Suite A
Palo Alto, CA 94306
Tel: 650-325-4949
E-mail: metro@metrodynanics.com
Web : www.metrodynamics.com
Services/technologies: ATIS, ATMS, market research, kiosk/web site development, user needs assessment.

MULTIDYNE, Inc.
191 Forest Avenue
Locust Valley, NY 11560-2132
Tel: (800) 488-8378 or 800 4TV TEST
Tel: (516) 671-7278
Fax: (516) 671-3362
E-mail: sales@multidyne.com
Web: www.multidyne.com
Services/technologies: Fiber optic communications for ITS.

Nestor Traffic Systems, Inc.
400 Massasoit Avenue
Suite 200
East Providence, RI 02914

Tel: (401) 434-5522
Fax: (401) 434-5809
Web: www.nestor.com/nts
Services/technologies: Video imaging, imaging detection systems.

Nortel Networks
Nortel Networks de Chile S.A.
Avenida del Valle 662
Ciudad Empresarial
Huechuraba
Santiago de Chile
Tel : (56-2) 751 00 00
E-mail: COMUNIC@nortelnetworks.com
Web: www.nortelnetworks.com
Services/technologies: Telecommunications, voice, data and video telecommunications products for ITS applications.

Optelecom
12920 Cloverleaf Center Drive
Germantown, MD 20874
Tel: (800) 293-4237
Tel: (301) 444-2200
Fax: (301) 444-2299
E-mail: marketing@optelecom.com
Web: www.optelecom.com
Services/technologies: Fiber optic communications systems for ITS.

Optical Cable Corporation
P.O. Box 11967
Roanoke, VA 24022-1967
Tel: (540) 265-0690
Fax: (540) 563-9829
E-mail: sadams@occfiber.com
Web: www.occfiber.com
Services/technologies: Manufacture and sale of indoor/outdoor tight-buffer fiber optic cable.

Orbital Sciences Corporation
Transportation Management Systems
7160 Riverwood Drive
Columbia, MD 21046
Tel: (443) 259-7125
Fax: (443) 259-7105
E-mail: yuhas.franny@orbital.com
Web: www.orbital.com/TMS
Services/technologies: Supplier of GPS based automatic vehicle location systems for fleet management, including mobile data communications, and advance traveler information systems.

Orincon Technologies, Inc.
4770 Eastgate Mall
San Diego, California 92121
Tel: (858) 455-5530
Fax: (858) 795-8534
Web: www.orincon.com
Services/technologies: Intelligent traffic management systems, traffic reporting and control systems.

Peek Traffic Systems, Inc.
1500 N Washington Blvd

Sarasota, FL 34236
Tel: (866) 260-7335
Tel: (941) 845-1200
Fax: (941) 365-0837
E-mail: usinfo@peekglobal.com
Web: www.peek-traffic.com
Services/technologies: Traffic controllers, freeway management, parking systems, video imaging detection, centralized and closed loop systems.

Raytheon Highway Transportation Management Systems Division
1801 Hughes Drive
Fullerton, CA 92633
Tel: (800) 494-5509
Tel: (714) 446-3449
Fax: (714) 446-2290
Web: www.raytheon.com/products/htms
Services/technologies: Electronic toll collection, traffic management centers.

SAIC Transportation Technologies Group
8301 Greensboro Drive
MS E-7-6
McLean, Virginia 22102
Tel: (800) 430-7629
E-mail: wengerj@saic.com
Web: www.saicttg.com
Services/technologies: Digital imaging solutions, commercial vehicle operations, rail vehicle/container tracking systems.

Skyline Products, Inc.
2903 Delta Drive
Colorado Springs, CO 80910-1012
Tel: (800) 759-9046
Tel: (719) 392-9046
Fax: (719) 392-7107
E-mail: TrafficSystems@SkylineProducts.com
Web: www.SkylineProducts.com
Services/technologies: Dynamic message signs and central control systems, and in-house design.

Siemens ITS
Gardner Transportation Systems
Eagle Traffic Control Systems
8004 Cameron Rd.
Austin TX 78754
Tel: (512) 837-8310
Fax: (512) 837-0196
Web: www.itssiemens.com
Services/technologies: Traffic signal control systems.

TransCore
19111 Dallas Parkway, Suite 300
Dallas, TX 75287
Tel: (800) 923-4824
Tel: (972) 387-8197
Fax: (972) 733-6486
E-mail: contactus@transcore.com
Web: www.transcore.com
Services/technologies: ITS systems, transportation engineering and planning, electronic toll collection,

traffic safety enforcement systems for red light, speed, and rail crossings, ground transportation management systems for airports, toll violation video enforcement, traveler information service.

Texas Instruments
Radio Frequency Identification Systems (RFID)
13020 Floyd Road
MS 3626
Dallas TX 75243
Tel: (888) 937-6536
Fax: (214) 567-2492
E-mail: rfidsupport@ti.com
Web : www.ti.com
Services/technologies: Transponders, electronic toll collection (ETC), vehicle identification.

Vultron Incorporated
2600 Bond
Rochester Hill, MI 48309
Tel: (248) 853-2200
Fax: (248) 853-7571
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Web: www.vultron.com
Services/technologies: Variable message signs (VMS), ATMS, electronic toll collection (ETC), LED, Fiber Optics.

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Web : www.arcadis-us.com

Booz-Allen & Hamilton, Inc.
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Web: www.dksassociates.com

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Fax: (631) 288-2544

Web: www.dunn-pc.com

Fay, Spofford & Thorndike, LLC
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Burlington, MA 01803
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E-mail: marketing@fstinc.com
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Tel: (215) 735-1932
Fax: (215) 735-5954
E-mail: philly-pa@orth-rodgers.com
Web: www.orth-rodgers.com

PB Farradyne Inc.
3200 Tower Oaks Boulevard, Suite 200
Rockville, MD 20852
Tel: (301) 468-5568
Fax: (301) 816-5594
E-mail: yermack@pbworld.com
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Pennoni Associates
One Drexel Plaza, 3001 Market Street
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Tel: (215) 222-3000
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1560 Orange Avenue, Suite 700
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Tel: (407) 647-7275
Fax: (407) 647-4281
E-mail: bobmccqueen@pbsj.com
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Parsons Transportation Group, Inc.
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E-mail: richard.tansill@parsons.com
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Street Smarts
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Duluth, Georgia 30097-3281
Tel: (770) 813-0882
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APPENDIX E – TASK 1 THROUGH 9 REPORTS

The remainder of this Task 10 document consists of the contents of the first 9 reports prepared as part of this Feasibility Study for the National ITS Architecture for Chile.

E.1 Task 1: Review of Existing Conditions and Definition of Goals and Objectives

E.2 Task 2: Review Institutional and Legal Issues

E.3 Task 3: Technical Analysis

E.4 Task 4: Economic and Financial Analysis

E.5 Task 5: Environmental Impacts

E.6 Task 6: Development of Systems Requirements and Capabilities

E.7 Task 7: Development of an ITS Architecture

Please Note, the diagrams developed during the Task 7 activity were done during interactive workshops with the Chilean stakeholders; therefore those diagrams appear in Spanish only. These so-called Market Package Diagrams were then used as the basis to complete the report contents that were done in both English and Spanish.

E.8 Task 8: ITS Systems and Service Providers

E.9 Task 9: Development of an ITS "Action Plan" for Implementation

Feasibility Study for the National Intelligent Transportation Systems (ITS) Architecture Project - Chile

Task 1: Review of Existing Conditions and Definitions of Goals and Objectives

Prepared for

United States Trade and Development Agency

Ministerio de Obras Públicas de Chile

Prepared by

Lockheed Martin Corporation

Consensus Systems Technologies Corp.

Aristo Consultores

August 15, 2003

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The U.S. Trade and Development Agency

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USTDA's strategic use of foreign assistance funds to support sound investment policy and decision-making in host countries creates an enabling environment for trade, investment and sustainable economic development. Operating at the nexus of foreign policy and commerce, USTDA is uniquely positioned to work with U.S. firms and host countries in achieving the agency's trade and development goals. In carrying out its mission, USTDA gives emphasis to economic sectors that may benefit from U.S. exports of goods and services.

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1 INTRODUCTION

This document initiates the development of National ITS Architecture by means of the identification of existing, planned and future transportation systems in Chile. The "Feasibility Study for the National ITS Architecture Project" will provide a common structure for the design and development of future intelligent systems, providing support and complementing the significant technological advances of the country. Reports of Tasks 1 and 2 will provide a base for the technical analysis performed in Task 3.

To date, Chile has demonstrated the advanced development of ITS technologies, which constitute an important foundation of support and experience required to obtain maximum benefit from future efforts. It should be pointed out the experience of the Unidad Operativa de Control de Tránsito (UOCT) (Traffic Control Operating Unit) of the city of Santiago in urban traffic management and the cumulative experience in the phases previous to the implementation of electronic toll collection systems in Santiago's urban road concessions, in addition to other regarding urban and interurban transportation projects.

The knowledge that has been generated in the country during the last years in the ITS field, both in the public and private sector, helped to emphasize the relevance of building an National ITS Architecture, and thus the Ministerio de Obras Públicas (MOP) (Ministry of Public Works), financed by the U.S. Trade and Development Agency, selected the professional team led by Lockheed Martin to gather representative international experience in the building of a national and regional ITS Architecture for Chile.

One of the essential aspects of the methodology and work plan of the study consists of incorporating from the very beginning, in the basic definitions, a deep knowledge of the present state of things in the national ITS field, both from the technological equipment point of view and institutional and legal structures; aspects that correspond to Tasks1 and 2, respectively. Moreover, it is of great importance to achieve a common language within the main national actors, both of public and private sectors, related to the present and future ITS systems in the country. Therefore, during the month of September 2002 a two-day workshop about ITS Architecture was held.

The main objective of this first task of the work plan is to make a list of the ITS technologies that are operating in the country (Chapter 3). This list includes compilation and analysis of existing documents where intelligent transportation systems are described, starting from the original document where the definition of the mission for the TDA is described. The information included in the documents under study is updated and complemented as new records are obtained.

In this task, goals and objectives of the study are reviewed, principally aimed at achieving a full agreement with the national counterpart, so that it is used as a guiding element for the decisions that will be generated during the course of the study (Chapter 4).

The analysis of ITS systems that are operating in the country is fundamental for the development of the National ITS Architecture, since it allows an analysis of the physical and operating characteristics of the developing projects. Thus, the proposed architecture should internalize those characteristics in order to be an adequate tool for the realities within the country. This aspect is analyzed more deeply in Task 3.

Task 1, the subject of this report, as well as Task 2, which will be delivered in the next phase, constitute support material to the development of the national architecture. These two first tasks will be permanently completed when a new specific architecture is proposed; both through a parallel survey of the principal ITS system actors in the country and through the information collected during workshops carried out during the next months.

2 EXISTING CONDITIONS

The physical and operating characteristics of the ITS projects operating in the country or those being implemented or planned, and which have access to financing, will be denominated Existing.

Existing conditions are relevant in the development of National ITS Architecture since they allow one to:

- identify existing versus planned ITS projects and their main characteristics;
- know which institutions or companies own the projects, and those in charge of their operation and maintenance;
- know which institutions and companies' experience in the development, operation or planning of ITS projects;
- determine the coordination and cooperation procedures among ITS projects in order to strengthen their capabilities.
- understand institutions' needs and objectives within the transportation system scope.

An analysis of existing conditions begins with the generation of a list of ITS projects. This list was made by the compilation of documents and inquiries to the representative of each initiative. Each project is defined through its systems and its associated infrastructure.

There follows sections includes a list of documents, systems and infrastructure of ITS projects in Chile.

3 DOCUMENTATION

The compilation of documents related with ITS projects was generated mainly through previous studies. These studies were carried out in the country during year 2000. To date, 4 methodological or general studies related to ITS were performed and are shown in Table 3.1(next). Three of these studies describe ITS projects existing in the country; thus, they are particularly useful for the objective of this survey.

Table 3.1 Documents related to ITS

No.	Title	Author	Year	Subject	Summary
1	Análisis del Estado del Arte en Tecnologías para el Transporte y Formulación de Ideas de Proyecto (Analysis of State-of-the Art for Transportation and Project Ideas)	Kyber S.A. requested by the Ministerio de Planificación y Cooperación-SECTRA (Ministry of Planning and Cooperation)	2001	ITS analysis in Chile	The objective of this survey is to identify and provide ideas of technology application projects in the transportation sector based on worldwide state-of-the art technologies and the needs of our country, particularly applied to the city of Santiago. It includes a list of existing and planned ITS projects in Chile
2	Aspectos Generales y Metodológicos Específicos de Sistemas de Transportes Inteligentes-ITS (General and Specific Methodological Aspects of Intelligent Transportation Systems – ITS)	Aristo Consultores requested by the Ministerio de Planificación y Cooperación-SECTRA (Ministry of Planning and Cooperation)	2000	Methodologies for ITS analysis	Contains a revision of concepts and specific methodologies related to ITS. Within these methodologies, methods for ITS cost information compilations and ITS project evaluation are included
3	Análisis y Definición de Estrategias de Mejoramiento del Sistema de Control de Tránsito de Santiago (SCAT) (Analysis and Definition of Improvement Strategies for Santiago Traffic Control System.	Aristo Consultores Ltda requested by the Ministerio de Planificación y Cooperación SECTRA (Ministry of Planning and Cooperation)	2002	ITS analysis in Santiago	The objective of this study is to define an improvement strategy of Santiago's traffic control system, especially through the implementation of control, communication and information technologies to the transportation system (ITS). It includes a detailed description of the existing systems in the UOCT (Traffic Control Operating Unit) and a proposal of short and medium term improvements consistent with an ITS architecture also developed as a part of the survey.
4	Definitional Mission for ITS Projects in Chile	Hernán Peña for the US Trade and Development Agency (TDA)	2001	ITS analysis in Chile	Make a list of technologies and infrastructure available in Chile for ITS development and thus, account for resources donation to elaborate a National ITS Architecture survey for Chile. It includes a description of ITS existing projects in the country.
5	Presentaciones realizadas en el Primer Congreso Chileno de Sistemas Inteligentes de Transporte (Presentations made in the First Chilean Congress of Intelligent Transportation Systems)	Various authors	2002	ITS projects in Chile	First presentations of ITS initiatives in Chile. This event was organized by ITS Chile.

3.1 ITS Systems

The list of intelligent transportation systems was made from the records included in the documents indicated in Table 3.1, from the presentations made by different companies or institutions at the First Chilean Congress of Intelligent Transportation System and through inquiries to representatives of several initiatives.

Table 3.2 shows ITS systems in operation, implementation or under study. For each of the systems, name, owner, operator, ITS Architecture physical entities related to it, present state and/or date of implementation are indicated.

Table 3.2 ITS Systems List

Name	Description	Owner	Operator	Related Physical Entities	State	Date of Implementation
Unidad Operativa de Control de Tránsito OCT (Traffic Control Operating Unit)	Traffic Control Center	State of Chile	Unidad Operativa de Control de Tránsito UOCT (www.uoct.cl) (Traffic Control Operating Unit)	Traffic Management System (TMS) Remote Traveler Support (RTS) Emergency Management (EM) Roadway Subsystem (RS)	Existing	N/A
Sistema de Control de Áreas de Tránsito del Gran Valparaíso SCAT-GV (Gran Valparaíso Traffic Areas Control System)	Traffic Control Center	State of Chile	Secretaria Interministerial de Planificación de Transporte - SECTRA (www.scat-gv.cl) (Transportation Planning Interministerial Secretary)	Traffic Management System (TMS) Remote Traveler Support (RTS) Emergency Management (EM) Roadway Subsystem (RS)	Existing	N/A
Valparaíso Logistic Trade VLT	Internet based system that provides services to facilitate product exportation and importation through Valparaíso harbor.	Several companies	Several Companies (www.vlt.cl)	Commercial Vehicle Subsystem (CVAS) Fleet and Freight Management (FMS) Commercial Vehicle Subsystem (CVS)	Existing	N/A
Sistema de Cobro Electrónico de Peajes Autopista del Sol (Electronic Toll Collection System Autopista del Sol)	Toll Collection through channeled system	State of Chile	Autopista del Sol S.A.	Toll Administration (TAS) Roadway Subsystem (RS) Toll Collection (TCS)	Existing	N/A
Sistema de Cobro Electrónico de Peajes Acceso Aeropuerto Comodoro Arturo Merino Benitez (Electronic Toll Collection System Access to Comodoro Arturo Merino Benitez Airport).	Toll Collection through channeled system	State of Chile	Aerovías S.A.	Toll Administration (TAS) Roadway Subsystem (RS) Toll Collection (TCS)	Existing	N/A

Table 3.2 ITS Systems List (cont'd)

Name	Description	Owner	Operator	Related Physical Entities	State	Date of Implementation
Sistema Cobro Electrónico de Peajes Camino Santiago-Colina-Los Andes (Electronic Toll Collection System Santiago-Colina-Los Andes Road)	Toll collection through channeled system and contactless cards	State of Chile	Autopista Los Libertadores S.A.	Toll Administration (TAS) Roadway Subsystem (RS) Toll Collection (TCS)	Existing	N/A
Sistema Cobro Electrónico de Peajes Autopista Rutas del Pacífico (Electronic Toll Collection System Rutas del Pacífico Highway)	Channeled electronic Toll collection	State of Chile	Rutas del Pacífico S.A.	Toll Administration (TAS) Roadway Subsystem (RS) Toll Collection (TCS)	Existing	N/A
Sistema de Cobro Electrónico de Peajes Autopista Ruta 5, Tramo Santiago-Talca y Acceso Sur a Santiago (Electronic Toll Collection System Autopista Ruta 5, Santiago-Talca stretch and Southern Access to Santiago	Channeled electronic Toll collection	State of Chile	Autopistas del Maipo Sociedad Concesionaria S.A.	Toll Administration (TAS) Roadway Subsystem (RS) Toll Collection (TCS) TAG in vehicles	Existing	N/A
Red Interurbana de Contadores Automáticos Vehiculares (Automatic Vehicle Counters Interurban Network)	Automatic vehicle counter system	State of Chile	Dirección de Vialidad MOP, (Highway Administration Direction - Ministry of Public Works) Concessioned Corporations	Roadway Subsystem (RS)	Existing	N/A
Sistemas de Control Túneles Lo Prado y Zapata (Lo Prado and Zapata Tunnel Control System)	Tunnel Control System, user information and emergency management	State of Chile	Rutas del Pacífico S.A.	Emergency Management (EM) Traffic Management (TMS) Roadway Subsystem (RS)	Existing	N/A

Table 3.2 ITS Systems List (cont'd)

Name	Description	Owner	Operator	Related Physical Entities	State	Date of Implementation
Sistema de Información Vial (Road Information System)	Information system that provides road and border crossing conditions, road weather and toll rates	State of Chile	Dirección de Vialidad MOP, (Highway Administration Direction - Ministry of Public Works) (www.vialidad.cl)	Remote Traveler Support (RTS)	Existing	N/A
Sistema de Control de Peso en Movimiento (Weigh-In-Motion Control System)	Non-stop vehicle weighing system	State of Chile	Dirección de Vialidad II Región MOP (Highway Administration Direction, 2nd Region) (Ministry of Public Works)	Commercial Vehicle Check (CVCS) Roadway Subsystem (RS)	Existing	N/A
Sistema de Información a Usuarios mediante VMS (VMS Information System to Users)	Information system to users of concessioned roads through variable message signs (VMS)	State of Chile	Different Concessioned Corporations	Roadway Subsystem (RS)	Existing	N/A
Sistema de cobro electrónico de peajes - Sistema Oriente-Poniente Costanera Norte (Oriente Poniente Costanera Norte Electronic Toll Collection System)	Electronic Toll Collection - Free-flow System	State of Chile	Costanera Norte S.A. (www.costaneranorte.cl)	Toll Administration (TAS) Roadway Subsystem (RS) Toll Collection (TCS) TAG in all vehicle types (CVS, EVS, MCVS, TRVS, VS)	Under implementation	Operating as of May 2004

Table 3.2 ITS Systems List (cont'd)

Name	Description	Owner	Operator	Related Physical Entities	State	Date of Implementation
Sistema de Cobro Electrónico de Peajes Sistema Norte Sur, General Velásquez (Electronic Toll Collection System Oriente Poniente Costanera Norte System)	Electronic Toll Collection - Free-flow System	State of Chile	Autopista Norte Sur S.A. (www.autopistacentral.cl)	Toll Administration (TAS) Roadway Subsystem (RS) Toll Collection (TCS) TAG in all vehicle types (CVS, EVS, MCVS, TRVS, VS)	Under implementation	Operating as of 2005
Sistema de Control de Tránsito Sistema Oriente Poniente Costanera Norte (Traffic Control System Oriente Poniente Costanera Norte System)	Several systems to inform users, and manage traffic and emergencies in freeways	State of Chile	Costanera Norte S.A. (www.costaneranorte.cl)	Traffic Management (TMS) Emergency Management (EM) Roadway Subsystem (RS) Emergency Vehicle Subsystem (EVS)	Under implementation	Operating as of 2004
Sistema de Control de Tránsito Sistema Norte-Sur, General Velásquez (Traffic Control System Norte-Sur, General Velásquez System)	Several systems to inform users, and manage traffic and emergencies in freeways	State of Chile	Autopista Central S.A. (www.autopistacentral.cl)	Traffic Management (TMS) Emergency Management (EM) Roadway Subsystem (RS) Emergency Vehicle Subsystem (EVS)	Under implementation	Operating as of 2005
Sistema de Censo de Flujos de Tráfico en Santiago (Traffic Flow Census System in Santiago)	System to determine real time vehicle flow by means of detectors installed in roads	State of Chile	Unidad Operativa de Control de Tránsito UOCT (www.uoct.cl) (Traffic Control Operating Unit)	Roadway Subsystem (RS) Archived Data Management Subsystem (ADMS)	Under implementation	Operating as of 2003
Sistema de Control de Área de Tránsito en el Gran Concepción (Traffic Area Control System in Gran Concepción)	Traffic Control Center	State of Chile	Secretaría Interministerial de Planificación de Transporte SECTRA (Transportation Planning Interministerial Secretary) (www.sectra.cl)	Traffic Management (TMS) Remote Traveler Support (RTS) Roadway Subsystem (RS)	Under implementation	W/O/D

Table 3.2 ITS Systems List (cont'd)

Name	Description	Owner	Operator	Related Physical Entities	State	Date of Implementation
Sistema de Control de Área de Tránsito en Antofagasta (Traffic Area Control System in Antofagasta)	Traffic Control Center	State of Chile	Secretaria Interministerial de Planificación de Transporte (SECTRA) (Transportation Planning Interministerial Secretary) (www.sectra.cl)	Traffic Management (TMS) Remote Traveler Support (RTS) Roadway Subsystem (RS)	Under implementation	W/O/D
Sistema de Cobro de Tarifas Mediante Tarjetas sin Contacto en Metro y Metrobus (Rate Collection System through Contactless Cards in Metro and Metrobus)	Rate collection system in Santiago's Metro and buses (Metrobus) through contactless cards	State of Chile Metrobus Operators	Empresa de Transporte de Pasajeros Metro S.A. (METRO) (Subway Service Corporation) (www.metrosantiago.cl) Bus operators	Transit Management (TRMS) Transit Vehicle Subsystem (TRVS)	Under implementation	Operating as of 2003
Sistema de Cobro Electrónico de Peajes Américo Vespucio Sur (Américo Vespucio Sur Electronic Toll Collection System)	Electronic Toll Collection - Free-flow System	State of Chile	Autopistas Metropolitanas S.A.	Toll Administration (TAS) Roadway Subsystem (RS) Toll Collection (TCS) TAG in all vehicle types (CVS, EVS, MCVS, TRVS, VS)	Under study	Operating as of 2005
Sistema de Cobro Electrónico de Peajes Américo Vespucio Nor Poniente (Américo Vespucio Nor Poniente Electronic Toll Collection System)	Electronic Toll Collection - Free-flow System	State of Chile	Concessioned Corporation Autopista Vespucio Norte S.A.	Toll Administration (TAS) Roadway Subsystem (RS) Toll Collection (TCS) TAG in all vehicle types (CVS, EVS, MCVS, TRVS, VS)	Under study	Operating as of 2005
Sistema de Control de Tránsito Américo Vespucio Sur (Américo Vespucio Sur Traffic Control System)	Several systems to inform users, and manage traffic and emergencies in highways	State of Chile	Autopistas Metropolitanas S.A.	Traffic Management (TMS) Emergency Management (EM) Roadway Subsystem (RS) Emergency Vehicle Subsystem (EVS)	Under study	Operating as of 2005

Table 3.2 ITS Systems List (cont'd)

Name	Description	Owner	Operator	Related Physical Entities	State	Date of Implementation
Sistema de Control de Tránsito Américo Vespucio Nor Poniente (Américo Vespucio Nor Poniente Traffic Control System)	Several systems to inform users, and manage traffic and emergencies in highways	State of Chile	Sociedad Concesionaria Autopista Vespucio Norte S.A.	Traffic Management (TMS) Emergency Management (EM) Roadway Subsystem (RS) Emergency Vehicle Subsystem (EVS)	Under Study	Operating as of 2005
Sistema de Supervisión y Control de Autopistas Concesionadas (Concessioned Highway Monitoring and Control System)	System to audit contractors' project functioning related to revenues received through toll collection	State of Chile	Coordinación General de Concesiones (www.concesioneschile.cl) (General Coordination of Concessions)	Toll Administration (TAS)	Under Study	W/O/D
Sistema de Fiscalización y Control del Transporte Público (Public Transportation Monitoring and Control System)	Center for public transportation services monitoring and control and information provision for users in Santiago	State of Chile	Ministerio de Transporte y Telecomunicaciones (MINTRATEL). (Ministry of Transportation and Telecommunications)	Transit Management (TRMS) Transit Vehicle Subsystem (TRVS) Roadway Subsystem (RS)	In September 2002 consultants have been invited to tender for the study that will define) all the necessary characteristics for the future implementation of a Centro de Control de Buses (CCB) (Buses Control Center)	Operating as of Dic 2004

Table 3.2 ITS Systems List (cont'd)

Name	Description	Owner	Operator	Related Physical Entities	State	Date of Implementation
Zona Extraportuaria de Actividad Logística (ZEAL) - Valparaíso (Logistic Activity Off-Harbor Zone - (ZEAL) - Valparaiso)	Administration center for commercial vehicles and fleet and freight management that is shipped in Valparaiso harbor	Several Companies	Several Companies	Commercial Vehicle Administration (CVAS) Fleet and Freight Management (FMS) Commercial Vehicle Check (CVS)	Under study	W/O/D
Sistemas para Facilitar los Controles Fronterizos (Systems to expedite Border Controls)	Several systems to expedite administrative processes at the country's border crossings, in addition to providing information to users about traffic conditions in border crossings	State of Chile	Dirección de Vialidad MOP, (Highway Administration Direction - Ministry of Public Works)	Commercial Vehicle Administration (CVAS) Fleet and Freight Management (FMS) Remote Traveler Support (RTS) Roadway Subsystem (RS) Commercial Vehicle Check (CVS)	Planned	W/O/D
Sistemas de Gestión de Tránsito (Traffic Management Systems)	Traffic Management Systems for the cities of Iquique, Copiapó, Temuco, Puerto Montt y Punta Arenas	State of Chile	Secretaría Interministerial de Planificación de Transporte SECTRA (www.sectra.cl) (Transportation Planning Interministerial Secretary)	Traffic Management (TMS) Roadway Subsystem (RS)	Planned	W/O/D

3.1.1 ITS Infrastructure

Presently the infrastructure related to ITS systems is strongly focused in Santiago and Valparaíso Centros de Control de Tránsito (Traffic Control Centers). These centers have traffic light controllers, variable message signs and CCTV systems. Nevertheless, several important projects, that will incorporate several ITS appliances and systems, will start operating by 2004. (See Table 3.2)

Table 3.3. shows existing ITS infrastructure in the country to date and infrastructure under implementation or study. In each case name, owner, operator, ITS Architecture related physical entities, system status and types of communication used in the operation are indicated.

Table 3.3 ITS Infrastructure List

Name	Description	Owner	Operator	Related Physical Entities	Status	Types of Communication
Traffic Light Controllers in Santiago	1453 traffic lights with pre-defined time plans	State of Chile	Unidad Operativa de Control de Tránsito UOCT (Traffic Control Operating Unit)	Traffic Management (TMS) Roadway Subsystem (RS)	Existing	Dedicated point to point connection (telephone line)
Traffic Light Controllers in Santiago	246 traffic lights equipped to operate with dynamic control	State of Chile	Unidad Operativa de Control de Tránsito UOCT (Traffic Control Operating Unit)	Traffic Management (TMS) Roadway Subsystem (RS	Existing	Dedicated point to point connection (telephone line
Traffic Light Controllers in Santiago	30 traffic lights are being equipped to operate with dynamic control in the arterial road Av. Grecia	State of Chile	Unidad Operativa de Control de Tránsito UOCT (Traffic Control Operating Unit)	Traffic Management (TMS) Roadway Subsystem (RS)	Under implementation	Dedicated point to point connection (telephone line)
Closed Circuit Television-UOCT (Traffic Control Operating Unit)	37 television cameras distributed in the city (see Table 3.4)	State of Chile	Unidad Operativa de Control de Tránsito UOCT (Traffic Control Operating Unit)	Traffic Management (TMS) Roadway Subsystem (RS)	Existing	Fiber Optic
Variable message signs (-UOCT) (Traffic Control Operating Unit)	8 variable message signs	State of Chile	Unidad Operativa de Control de Tránsito UOCT (Traffic Control Operating Unit)	Traffic Management (TMS) Roadway Subsystem (RS)	Existing	Commuted telephone connection
Vehicle flow automatic counter station -UOCT (Traffic Control Operating Unit)	50 vehicle flow automatic counter stations in Santiago	State of Chile	Unidad Operativa de Control de Tránsito UOCT (Traffic Control Operating Unit) AUTER S.A.	Roadway Subsystem (RS) Archived Data Management Subsystem (ADMS)	Existing	Dedicated connection
Traffic Light Controllers Gran Valparaiso-SCAT-GV	79 intersections with pre-defined time plans	State of Chile	Secretaría Interministerial de Planificación de Transporte (SECTRA) (Transportation Planning Interministerial Secretary)	Traffic Management (TMS) Roadway Subsystem (RS)	Existing	
Closed Circuit Television SCAT-GV	6 CCTV cameras	State of Chile	(SECTRA) Transportation Planning Interministerial Secretary)	Traffic Management (TMS) Roadway Subsystem (RS)	Existing	

Table 3.3 ITS Infrastructure List (cont'd)

Name	Description	Owner	Operator	Related Physical Entities	Status	Types of Communication
Vehicle flow automatic counter station SCAT-GV	12 Vehicle flow automatic counter stations	State of Chile	Secretaría Interministerial de Planificación de Transporte (SECTRA) (Transportation Planning Interministerial Secretary)	Roadway Subsystem (RS) Archived Data Management Subsystem (ADMS)	Existing	
Valparaiso Logistic Trade VLT	- GPS Vehicle and cargo tracking -SIG use for internet vehicle location -Electronic registration of vehicle and cargo entry and exit - Open and shut door control and cold storage temperature control in vehicles	Several companies	Several companies	Commercial Vehicle Administration (CVAS) Fleet and Freight Management (FMS) Commercial Vehicle Check (CVS)	Existing	
Cobro Electrónico Peajes Autopista del Sol (Autopista del Sol Electronic Toll Collection)	2.000 TAG channeled system	State of Chile	Autopista del Sol S.A.	Toll Administration (TAS) Roadway Subsystem (RS) Toll Collection (TCS) TAG in some type of vehicles (CVS, EVS, MCVS, TRVS, VS)	Existing	
Cobro electrónico de peajes Acceso Aeropuerto Comodoro Arturo Merino Benitez (Access to Comodoro Arturo Merino Benitez Airport Electronic Toll Collection)	2.000 TAG channeled system	State of Chile	Aerovías S.A.	Toll Administration (TAS) Roadway Subsystem (RS) Toll Collection (TCS) TAG in some type of vehicles (CVS, EVS, MCVS, TRVS, VS)	Existing	

Table 3.3 ITS Infrastructure List (cont'd)

Name	Description	Owner	Operator	Related Physical Entities	Status	Types of Communication
Contadores automáticos de flujos vehiculares (Vehicle flow automatic counters)	The Ministry of Public Works, MOP has 70 counters installed all around the country. In addition, concessioned road projects are considering counters installation. In this case, they will be installed in: Ruta 5, from Puerto Montt to La Serena; Autopista del Sol, Road Santiago-Colina-Los Andes; Road Interconnection Stgo-Valparaíso-Viña del Mar; Northern Access to Concepción, Red Vial Litoral Central; and Camino Nogales-Puchuncaví. Counters will use technology based on spheres	State of Chile	Dirección de Vialidad MOP, (Highway Administration Direction - Ministry of Public Works) and Concessioned Corporations	Roadway Subsystem (RS)	Existing	

Table 3.3 ITS Infrastructure List (cont'd)

Name	Description	Owner	Operator	Related Physical Entities	Status	Types of Communication
Información de la Red Vial Interurbana (Interurban Road Network Information)	System that provides information about toll rates, highway conditions, border crossings and road emergencies, in each region of the country	State of Chile	Dirección de Vialidad MOP, (Highway Administration Direction - Ministry of Public Works)	Remote Traveler Support (RTS)	Existing	In general, manual methods are used to collect the information generated by weather stations, vehicle weighing systems, and maintenance work done on the roads.
Peaje 201 Movimiento-MOP (Weigh-in-Motion) (Ministry of Public Works)	1 Weigh-in-Motion station in Antofagasta-Chuquicamata route	State of Chile	Dirección de Vialidad II Región MOP, (Highway Administration Direction - 2nd Region -Ministry of Public Works)	Commercial Vehicle Check (CVCS) Roadway Subsystem (RS)	Existing	Wireless
Sistema de Información a Usuarios mediante VMS (VMS User Information System)	- Variable Message Signs located at Route 5 (Temuco - Río Bueno stretch), Santiago - San Antonio, Highway and Road Interconnection Santiago-Valparaíso-Viña del Mar.	State of Chile	Ruta de los Ríos Sociedad Concesionaria S.A. Autopista del Sol S.A.	Roadway Subsystem (RS)	Existing	
Cobro Electrónico de Peajes Sistema Oriente-Poniente Costanera Norte (Oriente- Poniente Costanera Norte Electronic Toll Collection System)	-Free flow and multilane system (not channeled) -300.000 tags -Technical Specification MOPTT-ST1 (Ministry of Public Works, Transportation and Telecommunications)	State of Chile	Costanera Norte S.A.	Toll Administration (TAS) Roadway Subsystem (RS) Toll Collection (TCS) TAG in all vehicle types (CVS, EVS, MCVS, TRVS, VS)	Under implementation Operating as of May 2004	

Table 3.3 ITS Infrastructure List (cont'd)

Name	Description	Owner	Operator	Related Physical Entities	Status	Type of Communication
Traffic Control Oriente Poniente Costanera Norte System	- 32 Variable Message Signs (VMS) - 20 CCTV cameras - 300 Automatic vehicle counters - SOS Posts: 60 units and one every 50 meters in tunnels - Emergency Automatic Detection System for tunnels	State of Chile	Costanera Norte S.A.	Traffic Management (TMS) Emergency Management (EM) Roadway Subsystem (RS) Emergency Vehicle Subsystem (EVS)	Under implementation Operating as of May 2004	
Traffic Control Norte- Sur, General Velázquez System	- 39 Variable Message Signs - 70 CCTV cameras - 350 Automatic vehicle counters - 101 Pairs of SOS Posts - Emergency Management System	State of Chile	Autopista Central S.A.	Traffic Management (TMS) Emergency Management (EM) Roadway Subsystem (RS) Emergency Vehicle Subsystem (EVS)	Under implementation Operating as of May 2005	
Vehicle flow automatic counter station -UOCT (Traffic Control Operating Unit)	106 new automatic counter stations of vehicle flow and other parameters (speed, vehicle type, occupancy rate, congestion rate) in Santiago	State of Chile	Unidad Operativa de Control de Tránsito UOCT (Traffic Control Operating Unit)	Roadway Subsystem (RS) Archived Data Management Subsystem (ADMS)	Under implementation Operating as of May 2003	Dedicated wide band connection and TCP/IP protocol

Table 3.3 ITS Infrastructure List (cont'd)

Name	Description	Owner	Operator	Related Physical Entities	Status	Types of Communication
Control de Área de Tránsito en el Gran Concepción (Traffic Area Control in Gran Concepción)	-190 intersections with centralized control (pre-defined time plans and dynamic control) - CCTV Cameras - Variable Message Signs -Vehicle Count Stations - Website with information	State of Chile	Secretaría Interministerial de Planificación de Transporte (SECTRA) (Transportation Planning Interministerial Secretary)	Traffic Management (TMS) Remote Traveler Support (RTS) Roadway Subsystem (RS)	Under implementation	
Control de Área de Tránsito en Antofagasta (Traffic Area Control in Antofagasta)	-75 intersections with centralized control - CCTV Cameras - Vehicle Count Stations -SIG	State of Chile	(SECTRA) (Transportation Planning Interministerial Secretary)	Traffic Management (TMS) Remote Traveler Support (RTS) Roadway Subsystem (RS)	Under implementation	
Cobro de Tarifas Mediante Tarjetas sin Contacto en Metro y Metrobus (Rate Collection through Contactless Cards in Metro and Metrobus	-315 Card readers in Metro network - 380 buses with card readers -160 Points of sale and card load in Metro network	State of Chile Metrobus Operators	Empresa de Transporte de Pasajeros Metro S.A. (METRO) (Subway Service Corporation) (www.metrosantiago.cl) Buses operators	Transit Management (TRMS) Transit Vehicle Subsystem (TRVS)	Under implementation Operating as of 2003	Communication systems for contactless cards
Cobro Electrónico de Peajes Autopista Américo Vespucio Sur (Américo Vespucio Sur Highway Toll Electronic Collection)	- Free flow and multilane system (not channeled) -300.000 tags -Technical Specifications MOPTT-ST1 (Ministry of Public Works, Transportation and Telecommunications)	State of Chile	Autopistas Metropolitanas S.A.	Toll Administration (TAS) Roadway Subsystem (RS) Toll Collection (TCS) TAG in all vehicle types (CVS, EVS, MCVS, TRVS, VS)	Under study Operating as of 2005	

Table 3.3 ITS Infrastructure List (cont'd)

Name	Description	Owner	Operator	Related Physical Entities	Status	Types of Communication
Cobro electrónica de peajes Autopista América Vespucio Nor Poniente (América Vespucio Nor Poniente Highway Toll Electronic Collection)	- Free flow and multilane system (not channeled) -300.000 tags -Technical Specifications MOPTT-ST1 (Ministry of Public Works, Transportation and Telecommunications)	State of Chile	Sociedad Concesionaria Autopista Vespucio Norte S.A.	Toll Administration (TAS) Roadway Subsystem (RS) Toll Collection (TCS) TAG in all vehicle types (CVS, EVS, MCVS, TRVS, VS)	Under study Operating as of 2005	
Control de Tránsito Autopista Américo Vespucio Sur (Traffic Control Américo Vespucio Sur Highway)	- Variable message signs - Automatic vehicle counter - SOS Posts - Emergency Management	State of Chile	Autopistas Metropolitanas S.A.	Traffic Management (TMS) Emergency Management (EM) Roadway Subsystem (RS) Emergency Vehicle Subsystem (EVS)	Under study Operating as of 2005	
Control de Tránsito Autopista América Vespucio Nor Poniente (Traffic Control Américo Vespucio Nor Poniente Highway)	- Variable message signs - Automatic vehicle counter - Emergency phones - Emergency Management	State of Chile	Sociedad Concesionaria Autopista Vespucio Norte S.A.	Traffic Management (TMS) Emergency Management (EM) Roadway Subsystem (RS) Emergency Vehicle Subsystem (EVS)	Under study Operating as of 2005	

Table 3.3 ITS Infrastructure List (cont'd)

Name	Description	Owner	Operator	Related Physical Entities	Status	Types of Communication
Mejoras al Sistema de Control de Tránsito de Santiago (Santiago's Traffic Control System Improvement)	- New traffic light network with dynamic control - CCTV system expansion - Emergency automatic detection and vehicle detection system through video - User information system improvement: automated travel time measuring system (under implementation) - New business or services - Urban ITS Architecture	State of Chile	Unidad Operativa de Control de Tránsito (Traffic Control Operating Unit)	Traffic Management (TMS) Emergency Management (EM) Remote Traveler Support (RTS) Roadway Subsystem (RS)	Under study	
Fiscalización y Control del Transporte Público (Public Transportation Monitoring and Control)	Systems for the monitoring and management of tendered bus services that operate, real-time information provision, information generation for bus system planning and interfaces for information exchange with other related systems	State of Chile	Ministerio de Transporte y Telecomunicaciones (MINTRATEL) (Ministry of Transportation and Telecommunications)	Transit Management (TRMS) Transit Vehicle Subsystem (TRVS) Roadway Subsystem (RS)	In September 2002 consultants have been invited to tender for the study that will define the Centro de Control de Buses (CCB) (Buses Control Center)	To be defined in the study

Table 3.3 ITS Infrastructure List (cont'd)

Name	Description	Owner	Operator	Related Physical Entities	Status	Types of Communication
Zona Extraportuaria de Actividad Logística (Logistic Activity Off-Harbor zone)	-Vehicle and cargo tracking through GPS - SIG use for internet display of vehicle position -Electronic registration of vehicle and cargo entry and exit	Several companies	Several companies	Commercial Vehicle administration (CVAS) Fleet and Freight Management (FMS) Commercial Vehicle Subsystem (CVS)	Under study	
Contadores automáticos de flujos vehiculares (Vehicle flow automatic counters)	Expansion to 240 vehicle flow measuring points in the interurban road network	State of Chile	Dirección de Vialidad MOP, (Highway Administration Direction - Ministry of Public Works)	Roadway Subsystem (RS)	Under study	

Table 3.4 Cameras and Lenses Location and brand-model in the UOCT (Traffic Control Operating Unit) -Santiago

Nbr.	Location	Brand- Model	Brand – Lens Model
1	V.Mackenna / Alameda	Burle Mod. TC392 n/s MV918489	Burle model M8Z10SA 8/80mm 1:1.4 n/s G300207
2	Bellavista / Purisima	PHILIPS LTC0450/21 n/s OP049928003750	Burle model M8Z10SA 8/80mm 1:1.4 n/s G300249
3	Recoleta / Sta. Maria	Burle Mod. TC385 n/s 902583	Cosmicar 7.5/75mm 1:1.4 s/n
4	Balmaceda / Bandera	PHILIPS CCD n/s 3XB09230	Burle model M8Z10SA 8/80mm 1:1.4 n/s G300213
5	Alameda / Mac-Iver	PHILIPS CCD n/s 41B12717	Burle model M8Z10SA 8/80mm 1:1.4 n/s G300250
6	J.M.Caro / J.M.de la Barra	PHILIPS CCD s/n	Burle model M8Z10SA 8/80mm 1:1.4 n/s G300257
7	Alameda / Matucana	PHILIPS CCD n/s 41B12729	Burle model M8Z10SA 8/80mm 1:1.4 n/s G300253
8	Alameda / G.Velasquez	PHILIPS LTC0450/21 n/s OP049928003750	Burle model M8Z10SA 8/80mm 1:1.4 n/s G300267
9	Sta.Rosa / A.Vespucio	PHILIPS CCD n/s 41B12669	Burle model TC1841APD2 12,5/75mm 1:1.8 n/s G300291
10	Gran Avenida / A.Vespucio	PHILIPS CCD n/s 41B12763	Burle model M8Z10SA 8/80mm 1:1.4 n/s G300252
11	Irarrazaval / J. P. Alessandri	PHILIPS CCD n/s 41B12669	Burle model M8Z10SA 8/80mm 1:1.4 n/s G300255
12	V.Mackenna / A.Vespucio	PHILIPS LTC0450/61 n/s OP090046003244	Burle model M8Z10SA 8/80mm 1:1.4 n/s G300203
13	A.Bello / Puente El Cerro	Video Produc UL n/s 41B12726	Burle model M8Z10SA 8/80mm 1:1.4 n/s G300256

Nbr.	Location	Brand- Model	Brand – Lens Model
14	Las Condes / Estoril	Burle Mod. TC372 n/s 048612	Burle model M8Z10SA 8/80mm 1:1.4 n/s G300215
15	V.Mackenna / D.Paraguay	Burle Mod. TC385 n/s 4926	Burle model M8Z10SA 8/80mm 1:1.4 n/s G300210
16	V.Mackenna / A.Matta	PHILIPS CCD n/s 3XB09127	Burle model M8Z10SA 8/80mm 1:1.4 n/s G300296
17	P.de Valdivia / Providencia	PHILIPS CCD n/s 3XB09215	Burle model M8Z10SA 8/80mm 1:1.4 n/s G300295
18	Apoquindo / Manquehue	PHILIPS CCD n/s 3XB09219	Burle model M8Z10SA 8/80mm 1:1.4 n/s G300247
19	R.Lyon / 11 de Septiembre	PHILIPS LTC0450/21 n/s OP059948013626	Burle model M8Z10SA 8/80mm 1:1.4 n/s G300248
20	Providencia / E.Yañez	PHILIPS LTC0450101 n/s OP140129005162	Burle model M8Z10SA 8/80mm 1:1.4 n/s G300292
21	Independencia / A.Vespucio	Burle Mod. TC385 n/s 4909	Ermitec of Denmark 483WC 8/80mm 1:1.8 n/s A601327
22	Alameda / Las Rejas	Burle Mod. TC385 n/s 4921	Ermitec of Denmark 483WC 8/80mm 1:1.8 n/s A601322
23	V.Mackenna / 10 de Julio	Burle Mod. TC392 n/s 902589	Burle model 483WC 8/80mm 1:1.8
24	J.J.Prieto / Departamental	Burle Mod. TC385 n/s 4920	Ermitec of Denmark 483WC 8/80mm 1:1.8 n/s A601125
25	P.A.C. / Departamental	Burle Mod. TC385 n/s 004911	Ernitec of Denmark 483WC 8/80mm 1:1.8 n/s A601328
26	Colon / A.Vespucio	Burle Mod. TC385 n/s 902586	Ermitec 483WC 8/80mm 1:1.8 n/s 601972
27	A.Vespucio / P.P. De Gales	PHILIPS LTC0450/21 n/s OP049940010177	Ermitec of Denmark 483WC 6/60mm 1:1.4 n/s B801058
28	P.A.C. / Lo Errazuriz	Burle Mod. TC392 n/s 916421	Burle TC1841APD2 12.5/75mm 1:1.8 n/s C6Z1218M2ESP-2
29	Las Condes / Camino Asis	Pelco ES30C	Pelco
30	Rot.Perez Zujovic Móvil	Sony Hyperhad	Pelco 8/120mm 1:1.8
31	Rotonda P.Zujovic acc. Kennedy	Sony, color (fixed)	
32	Rotonda P.Zujovic acc.Sta.María	Autoscope, black and white mod. AS-CAM-08 (fixed)	
33	Rotonda P.Zujovic acc.A.Bello	Autoscope, black and white mod. AS-CAM-08 (fixed)	

3.1.2 Communication Infrastructure

ITS technologies application requires an adequate communication system, capable of responding to users' demands of those technologies. Thus, for example, wireless communications are essential to provide information to users while they move along cities and highways. It is also required to transfer huge data volumes related to remittance of images received by CCTV systems.

The country counts with a modern communication system with mobile phone coverage in the most important parts of the country and a great capacity to transfer data through fiber optic networks. In addition, the number of mobile phone users has strongly increased, 55% between years 2000 and 2001, reaching 34 every 100 inhabitants. Thus, presently more than 5 million mobile phones exist in the country. This growth has made the country lead the ranking among Latin American countries, as regards service penetration rate. For reference purposes, the United States and Canada have 44.4 and 32 users every 100 inhabitants, respectively.

Table 3.5 Mobile Phone Figures by region, period 1995-2000

Region	1995	1996	1997	1998	1999	2000
I Iquique Region	4,166	6,405	8,705	20,228	66,290	85,993
II Antofagasta Region	4,396	5,515	10,298	24,284	78,010	100,929
III Copiapó Region	894	1,977	2,522	8,538	19,932	31,719
IV La Serena Region	3,294	6,205	9,303	23,614	63,124	103,524
V Valparaíso Region	24,095	39,787	47,203	97,620	219,957	322,115
VI Rancagua Region	5,778	12,668	13,199	29,340	66,229	123,561
VII Talca Region	6,080	9,537	12,678	31,317	89,192	110,964
VIII Concepción Region	10,034	20,382	21,458	64,652	163,310	260,422
LX Temuco Region	4,422	10,648	9,101	21,647	78,534	111,971
X Puerto Montt Region	11,107	15,761	20,572	40,581	76,926	143,506
XI Coihaique Region	0	176	750	1,510	7,705	8,817
XII Punta Arenas Region	494	871	2.451	5,752	15,176	25,291
RM, Santiago	122,554	189,542	251,500	595,165	1,316,302	1,972,714
TOTAL	197,314	319,474	409,740	964,248	2,260,687	3,401,525
Phone Penetration	1.4	2.2	2.8	6.5	15.0	22.2

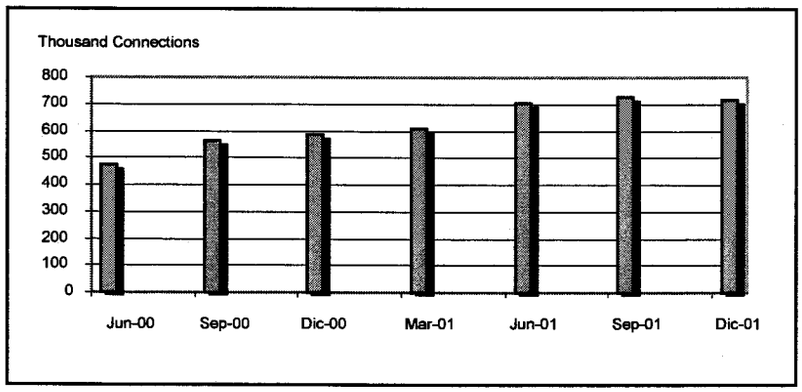
Although there is a large quantity of mobile phones, it is important to bear in mind that the distribution along the country is deeply concentrated in the Metropolitan Region. Thus, as it is observed in Table 3.5, that region constitutes more than half of the market followed by Region V

and VIII. The reason for this distribution is that population and larger activity levels are concentrated in these regions.

Another relevant communication system for ITS implementation is Internet. Presently, there are 52 internet providers in the country, being some of them branch offices or companies related to telecommunication companies and other independent internet providers. Additionally, an important number of Internet Service Providers (ISP, over a 30% of them are virtual ISP (VISP) that provide commuted access to Internet to final users, residential customers and companies, over third parties infrastructure, that at the same time, may be traditional Internet Service Providers.

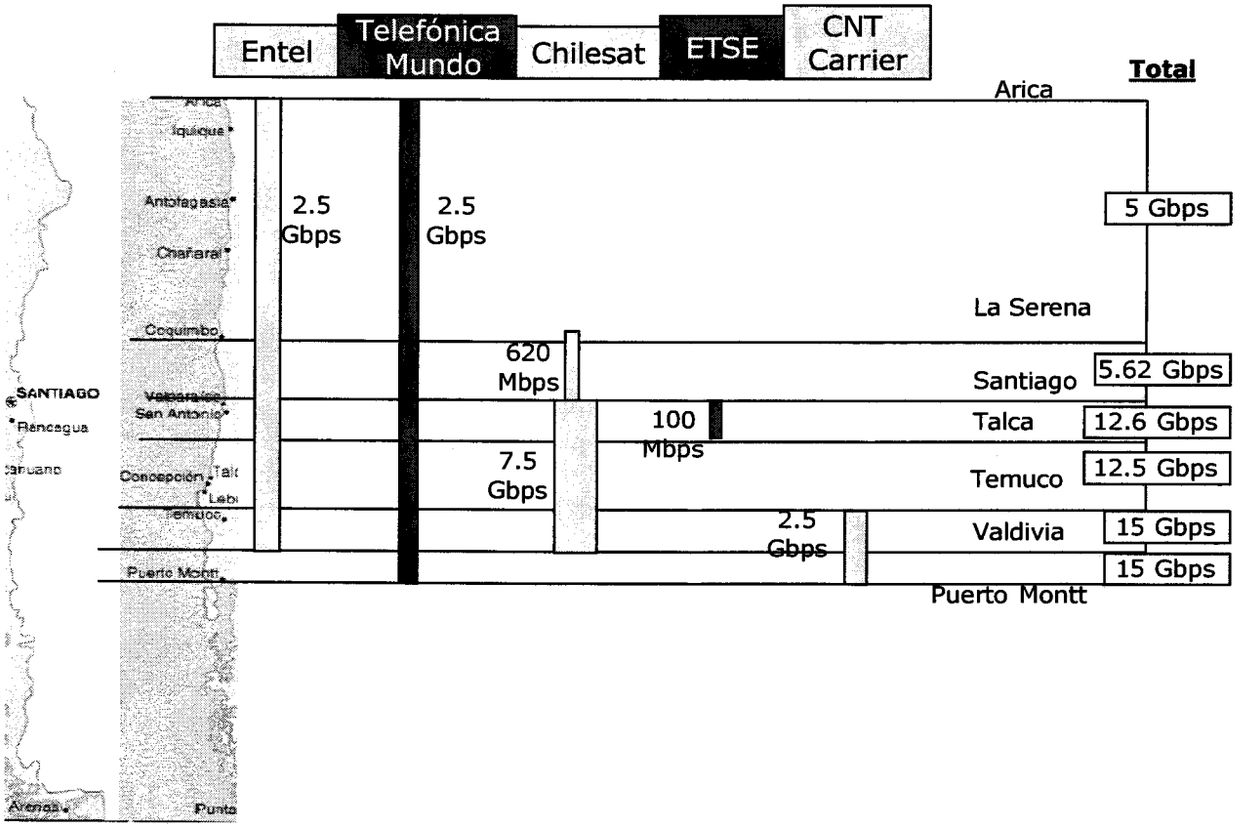
As regards the quantity of access connections to Internet, Figure 3.1 shows the evolution of the number of connections during the period June-2000 to December –2001. Thus, about 700,000 internet connections exist in the country, including both commuted connections and delicate ones.

Figure 3.1 Quantity of Internet connections in the country



Another important element in the communications network of the country is the coverage of fiber optic systems. Figure 3.2 shows longitudinal connectivity capacity by means of fiber optic along the country. The southern part of the country, between Valdivia and Puerto Montt, is the maximum connection capacity zone (15 Gbps) and from Arica to Puerto Montt there is connectivity with a capacity of at least 5 Gbps. On the contrary, the southern zone of Puerto Montt does not presently count with a fiber optic connection, nevertheless the generation of a connection for this zone through an underwater cable is under study.

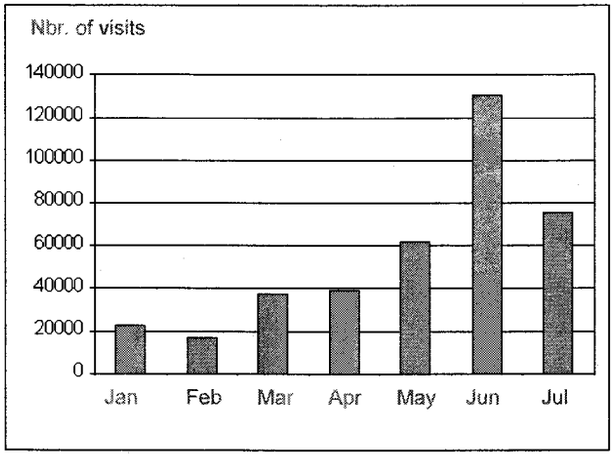
Figure 3.2 Longitudinal connectivity capacity through fiber optic.



Through these connections, users may access different sources of information related to transportation available through the internet. One of those sources is the UOCT (Traffic Control Operating Unit) website. This site receives a very important quantity of visits, an average of 55,000 monthly visits during January-July 2002 period, as shown in Figure 3.3. The reason for that large quantity of visits during the month of June was vehicle circulation problems on different streets of Santiago during that month because of floods. These problems are informed through the website.

Figure 3.3 UOCT website number of Visits

January-July 2002 Period



Although the country counts with a modern communication infrastructure and a wide coverage, this has not been used profitably by public institutions that has ITS systems as a way of sharing and distributing information. As a matter of fact, to date, a fluid information exchange does not exist among ITS systems operated by public institutions. In practice, each institution operates its system without connecting to other operators; the only communication channels established are the ones with entities that provide the necessary information for the functioning of each ITS system.

For example, the Sistema de Información de la Red Vial Interurbana (Interurban Road Network Information System) that belongs to the Dirección de Vialidad- MOP (Highway Administration Direction -Ministry of Public Works) compiles the information provided to users in many different ways.

Type of Information	Instrument / Equipment	Types of Communication
Weather Condition	Weather Stations	Regional Highway Administration Direction collect manually the information generated from weather stations and they transfer it to the media
Road closures	Stations Report and Regional Highway Administration Direction	Regional Highway Administration Direction process the information and they transfer it to the media
Traffic Volumes	Approx. 60 counter and classification stations located in highways along the country	Presently, the Regional Highway Administration Direction does the compilation of information generated by the counter stations manually. There is a project to automate information transfer in real time
Weigh Stations	Weigh Classification by axle, at low speed through 33 stations, 23 fixed stations y 10 mobile stations.	Regional Highway Administration Direction process information and they transfer it to the media.

Once information is compiled and processed Dirección de Vialidad (Highway Administration Direction) broadcasts it to the users through different mechanisms, telephone, WAP or internet.

The Unidad Operativa de Control de Tránsito (UOCT) (Traffic Control Operating Unit) counts with automatic and manual systems to obtain information for users. In the first case, telephone lines are used to obtain data collected by the vehicle counter stations or the spheres from SCOOT control system, fiber optic connections are also used to receive the images from CCTV system cameras in the control room. As regards de manual systems, they are used for travel time measuring in special circuits (an operator reports by phone the time it takes to go over a circuit) and for emergency reports from the Carabineers or users. The UOCT informs through its website the compiled information and moreover, some television channels broadcast CCTV images. Presently, the UOCT is elaborating an improvement plan for its operations that includes the use of new technologies such as: band dedicated connections for transmitting, using TCP/IP protocol, the information that new automatic vehicle counter stations collect; travel time automatic report system by means of GPS systems and wireless communication; communication and coordination systems among the concessioned highways Traffic Control Centers from the Metropolitan Region and the UOCT.

As previously mentioned, communication among ITS systems operated by public institutions is not adequate and should improve in

order to profit from ITS benefits. Some institutions have the power to encourage the improvement of this communication, among them we can mention the Coordinación General de Concesiones (General Coordination of Concessions), the Subsecretaría de Transportes (Department of Transportation) and the Subsecretaría de Telecomunicaciones (Department of Telecommunications)

The Coordinación General de Concesiones (CGC) (General Coordination of Concessions,) according to their concession agreements, establish technical requirements regarding communication systems used in ITS, for example, the electronic toll collection system.

As regards the Department of Transportation, which has several powers regarding regulations related to transportation, will soon invite consultants to tender for a study to define technical characteristics for the Centro de Control de Buses (CCB) Buses Control Center that will operate in the Metropolitan Region. It is required that CCB should exchange information with other systems related to buses operation and with other ITS systems, including automated rate collection system, traffic signs control system (UOCT) and planning corporate databases, such as Subsecretaría de Transporte (Department of Transportation), Seremi de Transportes (Transportation Ministerial Regional Secretary), CGTS, Secretaría Interministerial de Planificación de Transporte (SECTRA) (Transportation Planning Interministerial Secretary) Empresa de Transporte de Pasajeros Metro S.A. (METRO) (Subway Service Corporation) and other.

Finally, the Subsecretaría de Telecomunicaciones (Department of Telecommunications) has the power to define regulations about the way ITS appliances communicate. More information in Task 2.

4 GOALS AND OBJECTIVES OF THE STUDY

The main objectives of this study are basically two, first, elaborate an ITS architecture proposal at national level for Chile and, second, generate an "Action Plan" proposal for the implementation of ITS systems in the country. Both objectives complement themselves, since the action plan is generated from the processes required by architecture development and may include institutional, legal, financial, technical and other actions that together guarantee the successful implementation of an integrated national ITS system.

The goals of the study are principally related to the communication of concepts and benefits from ITS use at national level, in order to generate a favorable environment for the development of those systems. This goal will be achieved with the participation of institutions in the workshops held as part of the study, with the communication of the respective reports and the generation of a National ITS Architecture website.

The proposed ITS Action Plan in this study may constitute the basis to build a National ITS Program, that should offer the transportation community new approaches and alternatives to solve transportation problems, especially with better tools for transportation system management at the national level.

ITS system implementation differs from the implementation of other systems, since it requires a high level of coordination between jurisdictions, data sharing, homogeneous technical knowledge levels and sets forth the incorporation of new actors in transportation analysis and problem solving, that have been absent up to now.

The main objectives to develop ITS Architecture and to propose an Action Plan are directly related to ITS systems general objectives and, at the same time, these objectives are related to national transportation system general objectives. Through the development of the transportation plans that have been carried out in the country lately, called Plan de Transporte Urbano de Santiago (PTUS), (Santiago's Urban Transportation Plan) and Plan de Transporte Interurbano (PTI), (Interurban Transportation Plan), both built by Ministry of Public Works, Transportation and Telecommunications (MOPTT) request, it is possible to identify which are the national transportation strategic objectives. They are:

a) Increase economic efficiency levels in the transportation system. This objective tries to minimize the consumption of necessary resources for the mobility of people and cargo.

b) Increase safety in the transportation system. Seeks accident reduction and its consequences, mainly in terms of human lives and material damages.

c) Reduce negative effects that transportation system produces to the environment.

d) Improve transportation system quality.

e) Seek for a larger equity in the access of people and goods to the transportation system.

ITS systems have demonstrated through their operation during the last years a capacity for:

a) Increase operational efficiency and capacity of land transportation systems.

b) Reduce energy consumption and environmental costs in land transportation systems.

c) Improve safety levels in land transportation systems.

d) Improve transportation system's quality from the users' point of view, since a wide capacity to deliver timely information about the transportation system is generated that, at the same time, allows better decision-making.

e) Improve information and data collection about transportation system for the planning of policies, projects and action planning and evaluation, in addition to congestion control and monitoring. Moreover, in the countries where ITS architectures have been developed the following objective has been incorporated:

f) Create opportunities for national companies in ITS systems international market.

It is important to mention that the increase of efficiency, the energy consumption reduction and the improvement in safety levels of transportation systems have been quantified for several projects developed in the United States and Europe, those backgrounds may be useful as a basis for the evaluation of future ITS projects in Chile.

In specific terms regarding the national ITS architecture design criteria, an ITS development framework is sought based on open standards. This will result in the following benefits:

- Integration: Architecture simplifies the integration of more complex systems. This is achieved by presenting the structure around which the standard may be developed. With a better integration it is possible to improve information sharing to be delivered to travelers, congestion information and obtain a better use of the resources that may be shared.
- Compatibility: Look for equal ITS system solutions and equipment all over the country. Thus, market broadens, resulting in higher capacity and cost-effective products.
- Interoperability: Systems should be interoperable, particularly thinking about the users, for whom technology should be transparent and user friendly.

The creation and startup of an ITS Development Plan should particularly generate a new working environment for sectors related to transportation systems. New ways of relationships should be structured between public and private agencies, where collaboration and the sharing of needs and solutions is an essential factor for future work. It has been experimented in some smaller scale samples in the country, and the only fact that complex transportation systems actors share their experience and needs has made it possible to generate multiple benefits.

5 SUMMARY

In this task, existing conditions in the country related to ITS have been described. The description considered a group of relevant documents on the subject, the existing and planned ITS system identification, and the description of infrastructure related to those systems. It should be pointed our that the major part of ITS infrastructure, existing or planned, is and will be owned by the State (including, in this last sense the concessioned systems)

It is expected to complement system identification and enhance ITS infrastructure description with a survey made to several institutions and companies in the country. Such survey is being defined according to the Contraparte del Estudio (Study Counterpart) and results are expected to enhance the study. The workshop carried out in November 2002 was a good opportunity to complete the ITS system list in the country, that has been presented in this report.

The knowledge of existing conditions related to ITS is relevant for the development of the National Architecture, since starting from these conditions, relationships and information flow will be defined and will allow an integrated ITS system operation. The definition of these relationships and information flows will be particularly important in the cases of systems that are not operating since it will be possible to make necessary changes before implementation.

Summarizing, Table 5.1 shows existing ITS infrastructure main systems in the country, indicating their owner and operator and physical entities (Subsystems) to which each infrastructure element is related to. This information will be used to develop architecture elements, in addition to Paquetes de Mercado (Market Packages) and their functionality. An existing and planned system analysis was done in this task that, together with Task 2 backgrounds will define in Task 3 the preliminary architecture version.

Table 5.1 ITS Infrastructure in Chile

Name	Owner	Operator	Related Entity	Related Entity 2	Related Entity 3	Status
Traffic light controllers in Santiago 1453 traffic lights pre-defined time plans	State of Chile	Unidad Operativa de Control de Tránsito UOCT (Traffic Control Operating Unit)	Traffic Management (TMS)	Roadway Subsystem (RS)		Existing
Traffic light controllers in Santiago-2 246 traffic lights equipped to operate with dynamic control	State of Chile	Unidad Operativa de Control de Tránsito UOCT	Traffic Management (TMS)	Roadway Subsystem (RS)		Existing
Traffic light controllers in Santiago-3 30 traffic lights are being equipped to operate with dynamic control in the arterial road Av. Grecia	State of Chile	Unidad Operativa de Control de Tránsito UOCT	Traffic Management (TMS)	Roadway Subsystem (RS)		Under implementation
Television Closed Circuit UOCT 37 television cameras distributed in the city	State of Chile	Unidad Operativa de Control de Tránsito UOCT	Traffic Management (TMS)	Roadway Subsystem (RS)		Existing
Variable Message Signs-UOCT 8 variable message signs	State of Chile	Unidad Operativa de Control de Tránsito UOCT	Traffic Management (TMS)	Roadway Subsystem (RS)		Existing
Vehicle flow automatic counter stations-UOCT 50 vehicle flow automatic counter stations in Santiago	State of Chile	Unidad Operativa de Control de Tránsito UOCT	Roadway Subsystem (RS)	Archived Data Management Subsystem (ADMS)		Existing
Traffic light controllers in Gran Valparaiso-SCAT-GV 79 intersections with pre-defined time plans	State of Chile	(SECTRA) (Transportation Planning Interministerial Secretary)	Traffic Management (TMS)	Roadway Subsystem (RS)		Existing
Television Closed Circuit SCAT-GV 6 CCTV cameras	State of Chile	(SECTRA)	Traffic Management (TMS)	Roadway Subsystem (RS)		Existing
Vehicle flow automatic counter stations SCAT-GV 12 vehicle flow automatic counter stations	Estado de Chile	(SECTRA)	Roadway Subsystem (RS)	Archived Data Management Subsystem (ADMS)		Existing
Valparaiso Logistic Trade VLT GPS Vehicle and cargo tracking; web; electronic registration of vehicle and cargo entry and exit; open and shut door control and cold storage temperature control in vehicles	Several companies	Several companies	Commercial Vehicle Administration (CVAS)	Fleet and Freight Management (FMS)	Commercial Vehicle Subsystem (CVS)	Existing

Table 5.1 ITS Infrastructure in Chile (cont'd)

Name	Owner	Operator	Related Entity	Related Entity 2	Related Entity 3	Status
Cobro electrónico Peajes Autopista del Sol (Toll Electronic Collection Autopista del Sol) Channeled system; 2000 TAG	State of Chile	Autopista del Sol S.A.	Toll Administration (TAS)	Roadway Subsystem (RS)	Toll Collection (TCS)	Existing
Cobro electrónico de peajes Acceso Aeropuerto Comodoro Arturo Merino Benitez (Toll Electronic Collection Access to Comodoro Arturo Merino Benitez Airport) Channeled system; 2000 TAG	State of Chile	Aerovías S.A.	Toll Administration (TAS)	Roadway Subsystem (RS)	Toll Collection (TCS)	Existing
Contadores automáticos de flujos vehiculares (Vehicle flow automatic counters) 70 counters installed in the country administered by the Ministry of Public Works, several counters installed in road concessioned projects; sphere based technology	State of Chile	Dirección de Vialidad MOP, (Highway Administration Direction - Ministry of Public Works) Concessioned Corporations	Roadway Subsystem (RS)			Existing
Sistemas de Control Túneles Lo Prado y Zapata (Lo Prado and Zapata Tunnel Control System) Tunnel control (ventilation), user information (VMS) and emergency management (SOS posts)	State of Chile	Rutas del Pacífico S.A.	Traffic Management (TMS)	Roadway Subsystem (RS)		Existing
Información de la Red Vial Interurbana (Interurban Road Network Information) System that provides information about toll rates, highway conditions, border crossings and road emergencies, in each region of the country	State of Chile	Dirección de Vialidad MOP, (Highway Administration Direction - Ministry of Public Works)	Remote Traveler Support (RTS)			Existing
Pesaje en Movimiento –MOP Weigh-in-Motion -(Ministry of Public Works) 1 weigh in motion vehicle station in Antofagasta-Chuquicamata route	State of Chile	Dirección de Vialidad MOP, (Highway Administration Direction - Ministry of Public Works)	Commercial Vehicle Check (CVCS)	Roadway Subsystem (RS)		Existing
Sistema de Información de Usuarios a través de VMS (User information system through VMS) Variable message signs installed in different concessioned highways	State of Chile	Several Concessioned Corporations	Roadway Subsystem (RS)			Existing
Cobro Electrónico de Peajes Sistema Oriente-Poniente Costanera Norte (Toll Electronic Collection Oriente-Poniente Costanera Norte System) Free-Flow System; Technical Specifications MOPTT-ST1; 300.000 TAG	State of Chile	Costanera Norte S.A.	Toll Administration (TAS)	Roadway Subsystem (RS)	Toll Collection (TCS)	Under implementation
Cobro Electrónico de Peajes Sistema Norte Sur; General Velásquez (Toll Electronic Collection Norte-Sur, General Velásquez System) Free-Flow System; Technical Specifications MOPTT-ST1; 300.000 TAG	State of Chile	Autopista Central S.A.	Toll Administration (TAS)	Roadway Subsystem (RS)	Toll Collection (TCS)	Under implementation
Control de Tránsito Sistema Oriente-Poniente Costanera Norte (Traffic Control Oriente-Poniente Costanera Norte System) 32 VMS; 20 CCTV; 300 Automatic counters; SOS Posts ; Emergency Detection	State of Chile	Costanera Norte S.A.	Traffic Management (TMS)	Emergency Management (EM)	Roadway Subsystem (RS)	Under implementation

Table 5.1 ITS Infrastructure in Chile (cont'd)

Name	Owner	Operator	Related Entity	Related Entity 2	Related Entity 3	Status
Control de Tránsito Sistema Norte-Sur, General Velásquez (Traffic Control Norte-Sur, General Velásquez System) 39 VMS; 70 CCTV; 350 Counters; SOS Posts; Emergency Management	State of Chile	Autopista Central S.A.	Traffic Management (TMS)	Emissions Management (EMMS)	Roadway Subsystem (RS)	Under implementation
Estaciones de conteo automático de flujos vehiculares-UOCT (Vehicle flow automatic counter stations) 106 automatic stations: flow, speed, classification, occupancy rate, congestion rate	State of Chile	Unidad Operativa de Control de Tránsito UOCT (Traffic Control Operating Unit)	Roadway Subsystem (RS)	Archived Data Management Subsystem (ADMS)		Under implementation
Control de Área de Tránsito en el Gran Concepción (Traffic Control Area in Gran Concepción) 190 intersections; CCTV, VMS; counter stations; web	State of Chile	(SECTRA) (Transportation Planning Interministerial Secretary)	Traffic Management (TMS)	Remote Traveler Support (RTS)	Roadway Subsystem (RS)	Under implementation
Control de Área de Tránsito en Antofagasta (Traffic Control Area in Antofagasta) 75 intersections; CCTV; VMS; automatic counter stations, web	State of Chile	SECTRA (Transportation Planning Interministerial Secretary)	Traffic Management (TMS)	Remote Traveler Support (RTS)	Roadway Subsystem (RS)	Under implementation
Cobro de Tarifas Mediante Tarjetas sin Contacto en Metro y Metrobus (Rate Collection System through Contactless Cards in Metro and Metrobus) 315 readers in Metro, 380 readers in buses; 160 points of sale and card load	State of Chile	Metro S.A.; Metrobus operators	Transit Management (TRMS)	Transit Vehicle Subsystem (TRVS)		Under implementation
Cobro Electrónico de Peajes Autopista Américo Vespucio Sur (Toll Electronic Collection Américo Vespucio Sur Highway) Free-Flow System; Technical Specification MOPTT-ST1; 300.000 TAG	State of Chile	Autopistas Metropolitanas S.A.	Toll Administration (TAS)	Roadway Subsystem (RS)	Toll Collection (TCS)	Under study
Cobro electrónico de peajes Autopista Américo Vespucio Nor Poniente (Toll Electronic Collection Américo Vespucio Nor Poniente Highway) Free-Flow System; Technical Specification MOPTT-ST1; 300.000 TAG	State of Chile	Sociedad Concesionaria Autopista Vespucio Norte S.A.	Toll Administration (TAS)	Roadway Subsystem (RS)	Toll Collection (TCS)	Under study
Control de Tránsito Autopista Américo Vespucio Sur (Traffic Control Américo Vespucio Sur Highway) VMS; automatic counters; SOS post; emergency management	State of Chile	Autopistas Metropolitanas S.A.	Traffic Management (TMS)	Emissions Management (EMMS)	Roadway Subsystem (RS)	Under study
Control de Tránsito Autopista Américo Vespucio Nor Poniente (Traffic Control Américo Vespucio Nor Poniente Highway) VMS; automatic counters; SOS posts; emergency management	State of Chile	Sociedad Concesionaria Autopista Vespucio Norte S.A.	Traffic Management (TMS)	Emergency Management (EM)	Roadway Subsystem (RS)	Under study

Table 5.1 ITS Infrastructure in Chile (cont'd)

Name	Owner	Operator	Related Entity	Related Entity 2	Related Entity 3	Status
Mejoras al Sistema de Control de Tránsito de Santiago (Traffic Control System Improvement) Dynamic control network expansion; CCTV expansion; emergency automatic detection; automatic travel time measuring system	State of Chile	Unidad Operativa de Control de Tránsito (Traffic Control Operating Unit)	Traffic Management (TMS)	Emergency Management (EM)	Remote Traveler Support (RTS)	Under study
Fiscalización y Control del Transporte Público (Public Transportation Monitoring and Control) Bus tracking; frequency and route control; provide information to users; compilation of information for planning	State of Chile	Ministerio de Transporte y Telecomunicaciones (MINTRATEL). (Ministry of Transportation and Telecommunications)	Transit Management (TRMS)	Transit Vehicle Subsystem (TRVS)	Roadway Subsystem (RS)	In September 2002 consultants have been invited to tender for the study that will define the Centro de Control de Buses (CCB) (Buses Control Center)
Zona Extraportuaria de Actividad Logística (Logistic Activity Off-Harbor Zone) GPS Vehicle and cargo tracking; web; electronic registration of vehicle and cargo entry and exit	Several companies	Several companies	Commercial Vehicle Administration (CVAS)	Fleet and Freight Management (FMS)	Commercial Vehicle Subsystem (CVS)	Under study
Contadores automáticos de flujos vehiculares (Vehicle Flow Automatic Counters) Expansion to 240 vehicle flow measurement points in the interurban road network	State of Chile	Dirección de Vialidad MOP, (Highway Administration Direction - Ministry of Public Works)	Roadway Subsystem (RS)			Under study

Feasibility Study for the National Intelligent Transportation Systems (ITS) Architecture Project - Chile

Task 2: Review Institutional and Legal Issues

Prepared for

United States Trade and Development Agency
Ministerio de Obras Públicas de Chile

Prepared by

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The U.S. Trade and Development Agency

The U.S. Trade and Development Agency (USTDA) advances economic development and U.S. commercial interests in developing and middle income countries. The agency funds various forms of technical assistance, feasibility studies, training, orientation visits and business workshops that support the development of a modern infrastructure and a fair and open trading environment.

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1 INTRODUCTION

This task aims to examine current institutional and legal structure regarding ITS implementation in Chile. To achieve this, a review of documentation available, as related to the most important legislation, provisions and regulations, as well as organizational institutions and structures, primarily owned by the public sector throughout the country, have been thoroughly reviewed.

Task development is outlined in the following points. Firstly, some general aspects about the mode under which ITS have been developed in the country are discussed. Secondly, the most important institutions and organizations having certain relationship with Intelligent Transportation Systems (ITS) in Chile are introduced, and, thirdly, the most significant ITS enforceable or potential development-related laws are outlined here. Finally, the main conclusions are summarized.

The Task 1 and Task 2 reports will furnish a basis for the technical analysis performed in Task 3. As with Task 1, in so far as new background information becomes available throughout the development of this study, the Task 2 report will be gradually enriched.

2 INTELLIGENT TRANSPORTATION SYSTEMS-RELATED ORGANIZATIONS

2.1 Introduction

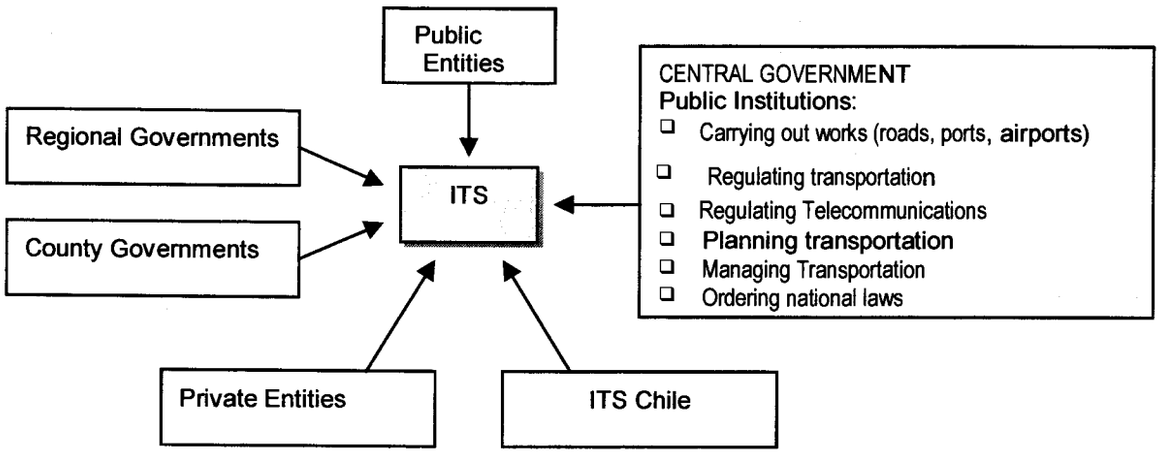
ITS systems have been developed in the country from initiatives coming from some public and private institutions or firms which have conjectured the benefits resulting from the utilization of these systems. These initiatives have been individually developed without the existence of any institutional organization or regulatory scope connected, for instance, with technical aspects or procedures specifically addressed for information exchange. Only recently have technical specifications regarding electronic toll collection systems have commenced to be developed.

2.2 Current Structure

Although there is no single ITS development-related entity in Chile, there does exist a significant number of institutions or firms becoming involved. Among them, we can mention the body of public entities empowered to carry out works, to provide rules, to regulate transportation and/or communication systems as well as to plan and develop studies referring to each sector. Although Chile is a highly centralized country in terms of decision-making policies, Regional Governments have full authority to make decisions about investment using government funds. Finally, in the public scope, the counties are fully empowered in their municipal geographic environment, but being subject to their budget regulations and to the performance of general laws and rules enacted by relevant Ministry.

Moreover, the development of ITS is entrusted to the public sector, which is subject to a legal structure, and private firms, for which no restrictions other than those expressly provided by law apply. The recently created ITS Chile must also be highlighted. ITS Chile is a non-profit private corporation whose role and purpose is the promotion of ITS systems domestic utilization.

Figure 2.1 ITS-Related Organizations in Chile



In most countries, and because of the social benefits created by ITS system utilization, for example the improving of the public infrastructure management (roads, railways, ports, airports, terminals) and reducing accidents, pollution and other impacts, the public sector has become the basic engine of ITS development and implementation. For these reasons, and others, Chile has become involved in the development of ITS.

At this time there exist no specific legal rules about ITS systems, except those dealing with electronic toll collection systems, each public institution (either a Ministry or a public entity) has been given the full freedom for developing its own systems. Expressed legal compliance has been the only requirement to encourage above development. Broadly speaking, in Chile, the public sector governs itself as from the authority which the law entrusts each institution with. On the other hand, private sector has full liberty to develop its activities provided that they are not expressly forbidden or restricted by law.

Section 2.3 below furnishes further details about the functions of each organization..

Regarding ITS development general framework, above situation has posed a problem which National ITS Architecture's building study must solve.

2.3 Institutional Structure

In general terms Figure 2.1 introduced ITS-related organizations in Chile, such as Public Entities and the Central Government. This section will identify and summarize the powers or lines of action of the institutions or firms composing these organizations

As far as it is concerned, the Chilean Central Government includes the following entities being connected with ITS-related transport (either actually or possibly):

- Ministerio de Obras Públicas (MOP) (Ministry of Public Works)
- Ministerio de Vivienda y Urbanismo (MINVU) (Ministry of Housing and Urbanism)
- Ministerio de Transportes y Telecomunicaciones (MINTRATEL) (Ministry of Transportation and Telecommunications)
- Directorio de Transporte de Santiago (DTS) (Santiago de Chile Transportation Board of Directors)
- Coordinación General de Transporte de Santiago (CGTS) (Santiago de Chile Transportation General Coordination)
- Secretaría Interministerial de Planificación de Transporte (SECTRA) (Transportation Planning Interministerial Secretary)
- Comisión Nacional de Seguridad de Tránsito (CONASET (National Traffic Safety Comission)
- Unidad de Innovación Tecnológica (MOP) (Technological Innovation Unit)

Among public corporations, those ones operating transportation systems are also included:

- Empresa de los Ferrocarriles del Estado (EFE) (Chilean Railway Corporation)
- Empresa de Transporte de Pasajeros Metro S.A. (METRO) Subway Service Corporation
- Port Corporations

Among those entities being not directly related to transportation, but being able to have a significant participation in terms of ITS development, the following lines of action should be highlighted:

- Instituto Nacional de Normalización (INN) (National Standardization Institute)
- Corporación de Investigación Tecnológica de Chile (INTEC) (Chilean Technological Research Corporation)
- Fundación País Digital Foundation

- Programa Prospectivo Tecnológico (PPT) (Technological Prospective Program)
- Several financing sources encouraging ITS research and implementation

Finally, the role of private corporations rendering ITS-related services and of the ITS Chile Corporation will be described.

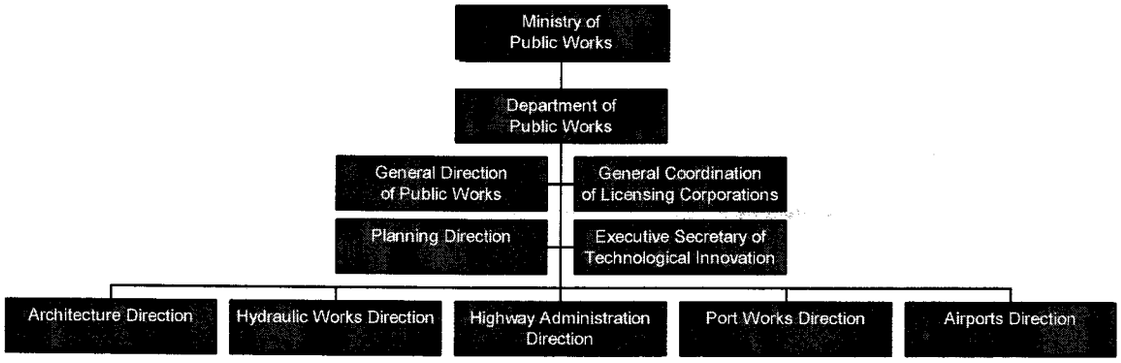
2.3.1. Central Government

2.3.1.1. Ministry of Public Works (www.mop.cl)

The Ministerio de Obras Públicas (MOP) (i.e. Chilean Ministry of Public Works) devotes itself to plan, project and build public infrastructure works. It also deals with their maintenance, deployment, operation and administration.

Besides, this Ministry is in charge of administering water resource nationally as regards its distribution, knowledge, allocation, utilization and maintenance.

Figure 2.2 MOP's Partial Organizational Chart



The Subsecretaría de Obras Públicas (Department of Public Works) focuses on supporting the Ministry of Public Works' management tasks, thus being in charge of its internal affairs administration and rendering services to its different Boards. The Deputy Secretary, in his dual capacity of Minister's immediate assistant and Department of Public Works' utmost officer, coordinates the actions from the different entities and public utilities of the sector. He also acts as faithful Minister and administers the Ministry internally.

The Deputy Secretary has been entrusted with general and specific powers within the following scopes: Management and General Secretary, Human Resources and Technical Counseling.

As shown in Figure 2.2 above, the Dirección General de Obras Públicas (DGOP) (General Direction of Public Works), belongs to the Chilean Ministerio de Obras Publicas, Transporte y Telecomunicaciones (MOPTT) (Chilean Ministry of Public Works, Transportation and

Telecommunications) whose main tasks are connected with both assuring and promoting public infrastructure management quality thus leveraging State resources to satisfy the growing demands from citizenship. This is accomplished by promoting procedure transparence, innovation support, citizenship responsible participation, environmental protection and a strong public-private sector alliance.

In turn, DGOP is composed of, among other entities, Planning Board, Highway Administration Board and General Coordination of Franchising Corporations (see Figure 2.2. above)

The Dirección de Planeamiento (Planning Direction)'s main functions are those specially provided under DFL 850 (dated in 1997), and under Section 22, Act number 18.902 (1990) the Board's officers must coordinate and suggest to the Minister the planning, general coordination and priorities of the General Plan of Studies, Projects and Execution of Works according to the needs of the country in near, middle and long terms

Within the legal scope of its relevant activities, the above Planning Direction must, among other things, report to the authorities about the performance of both general and annual plans; prepare, together with the Accounting & Finance Department, Ministry's Annual Budget; carry out the consolidation of the Annual Program of Public Works; and implement computerized models testing different investment structures in infrastructure.

This Planning Direction is also responsible for daily keeping of the information of study, outline, execution and improvement processes regarding works and investments in general.

Among the different Directions composing MOP, the Dirección de Vialidad (Highway Administration Direction) is the one that has displayed the most important role in ITS development. This Direction must improve the connectivity between Chilean locations and between Chile and foreign countries, by from time to time planning, outlining, building and maintaining a highway infrastructure necessary for the development of the country and its people, thus sheltering its quality and safety, protecting the environment and systematically incorporating innovatory technologies in road and transportation scope.

This Direction regulates mainly under DFL 850 (1997) and, upon the grounds derived from its normative and regulatory role, takes part in every highway work executed in the country and guarantees that all persons have access to public roads

The Coordinación General de Concesiones (CGC) (General Coordination of Licensing Corporations) seeks creating infrastructure works for domestic development, strengthening public-private association capable of accomplishing said works and consolidating State's role with respect to franchising, the actual Chilean developmental leverage whose main beneficiary is the society.

MOP-developed Public Infrastructure Franchising Program seeks out three main goals:

- Gathering private-owned resources to finance the development of future public works.
- Externalizing building capability and deploying public infrastructure works, by searching for optimum service levels that users feel available to pay for.
- Releasing public resources towards extremely high social profitability-based projects and programs.

The CGC is MOP's Agency strongly encouraging ITS utilization throughout Chile. This Agency has established technical requirements applicable to respective licensing agreements under which these technologies are incorporated in projects involved. Thus, for instance, electronic toll collection systems and the utilization of Variable Message Signs (VMSs) are integrating parts of the urban licensing projects in Chilean Metropolitan Area.

Finally, the Secretaría Ejecutiva de Innovación Tecnológica (Executive Secretary of Technological Innovation) is a cross-sectional division of above Dirección General de Obras Públicas (DGOP) (General Direction of Public Works), whose main task deals with both supporting and promoting technological innovation in infrastructure, building and hydric resources management areas, thus enabling technology transfer inducing their development and modernization.

This Secretary must timely direct the economic and financial resources as contributed by several National Directions in order to permit their coordination and participation in connection with the different projects involved.

This Secretary must seek out alternatives to have above MPO integrated in the Programas de Innovación Tecnológica (PIT) (Technological Innovation Programs) of both public and private sectors in building and infrastructure terms.

Another task of this Secretary deals not only with the application and incorporation of new technologies in infrastructure's projects, building and maintenance, but also with the management, preservation and monitoring of Hydric Resources, by making use of efficient validation methods and accreditation, authorization, certification and coordination mechanisms applicable within the ministerial scope and in the relation with different domestic infrastructure's characters. This task focuses on an attempt aimed to increase the effectiveness in the use of relevant resources by both creating new institutional capabilities and searching for an active participation of each MOP-dependent Direction or Service.

*2.3.1.2. Ministry of Housing and Urbanism (**www.minvu.cl**)*

The Chilean Ministerio de Vivienda y Urbanismo (MINVU) (Ministry of Housing and Urbanism) is in charge of domestic residential and urban policy. Among its specific functions outlining, executing and supervising all works necessary for the best performance of its duties

should be noted. In practice, under these powers, this Ministry is absolutely responsible to execute an important segment of road works in the country. Indeed, within the scope of urban development-associated works, road paving works have been considered. It must be taken into account that Ministry's funds shall be utilized for subsequent maintenance purposes regarding these paving works.

Considering that both road building and maintenance works have been placed within the scopes of action of ITS, it is reasonable to argue that above MINVU will make use of ITS in the future.

2.3.1.3. Ministerio de Transportes y Telecomunicaciones (Ministry of Transportation and Telecommunications) (www.mtt.cl)

The Ministerio de Transportes y Telecomunicaciones (MINTRATEL) (Ministry of Transportation and Telecommunications) is in charge of proposing domestic policies in this question pursuant to governmental directives and exercising the direction and control of their startup.

Specifically, under Act 19.059 (1981), MINTRATEL has been given the authority of national traffic regulatory body. In other words, it is the "national traffic regulatory entity suggesting policies with respect to traffic in streets and roads and other public ways, or routes open to public use, and coordinating, evaluating and controlling their compliance"

Besides, this Ministry must supervise both public and private corporations operating transportation and communications means located throughout the country. Likewise, it has to coordinate and promote the development of these activities and monitor the stringent compliance of applicable laws, rules and regulations.

As above stated, it is concluded that, unlike MOP or MINVU, Chilean MINTRATEL has not authority to execute public works.

As illustrated in Figure 2.3, the Subsecretaría de Transportes (Department of Transportation) depends upon this Ministry. Department's functions mainly deal with creating policies, conditions and rules under which transportation may safely and effectively develops with less pollution degree, providing transport users with an equitable access in terms of cargo and passenger carriers, and, last but not least, protecting transport users' rights.

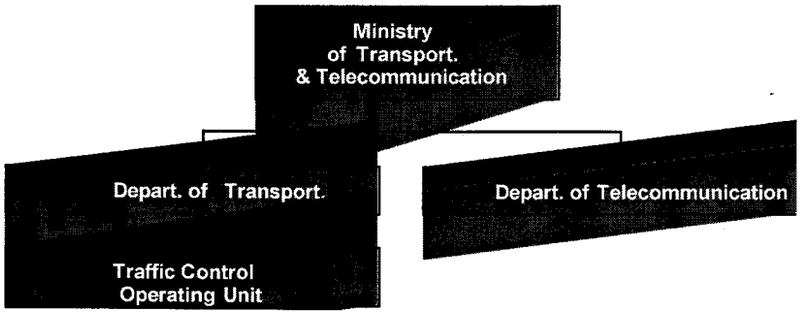
The Unidad Operativa de Control de Tránsito (UOCT) (Traffic Control Operating Unit) depends on the Subsecretaría de Transportes (Department of Transportation). It is a technical entity whose main tasks are related to the administration and operation of traffic control system in the city of Santiago de Chile, the execution of traffic management upgrading projects, the technical support to the counties, MOP and SERVIU concerning traffic management questions, and the certification of traffic controllers.

UOCT has been a pioneer in ITS utilization in the country. Until now, it is the institution having the higher number of ITS systems operating in the country. As previously stated in Task 1 report, UOCT has a network consisting in about 1,700 traffic lights, 37 traffic control surveillance cameras, 8 variable message signs (VMSs) and, during 2003, it will have a network of 104 automatic counter and vehicular flowing classification stations. Because of UOCT's large geographical coverage and broad experience in ITS, it is expected that this entity will have an active role upon creating the definite Traffic Control Regional Center once licensed Metropolitan Region Traffic Control Centers start operating

Also depending on MINTRATEL, the Subsecretaría de Telecomunicaciones (Department of Telecommunications) appears to be mainly concentrated upon promoting the access to telecommunication services on an adequate quality and price basis, thus encouraging economic development and improving population's living quality.

The foregoing remains applicable through the definition and enforceability of regulatory policies and frameworks stimulating the development of telecommunications, under fair and equitable competition conditions, and creates incentives to satisfy the requirements for all sectors.

Figure 2.3 MINTRATEL's Partial Organizational Chart



2.3.1.4. Santiago de Chile Transportation Board of Directors

In early 2002, a new institution was created which was about to play a major role regarding transportation modernization in Chilean capital city, the Directorio de Transporte de Santiago (DTS) (Santiago de Chile Transportation Board of Directors), being composed of the following members:

- The Minister of Transportation and Communication; acting as Chairman
- The Minister of Housing and Urbanism, acting as Vice Chairman;
- The Minister of Public Works;
- The Minister of National Goods;
- The Deputy Secretary of Transportation;
- The Deputy Secretary of Housing and Urbanism;
- The Deputy Secretary of Public Works;
- The Metropolitan Region Major; y
- CONAMA Executive Director.

DTS' tasks have been defined under Order N°24/2002, MINTRATEL. These tasks are listed as follows:

a) Preparing and proposing the guidelines for the Plan de Transporte Urbano para la Ciudad de Santiago (PTUS) (Santiago City Urban Transportation Plan) strategic accomplishment.

b) Formulating and proposing daily measures and actions being relevant to guarantee PTUS correct implementation or compliance.

c) Acting as a coordinating entity between the authorities and entities getting involved with PTUS implementation and acting as a qualified entity for executing programs, plans and measures being implemented within this legal framework.

d) Watching over PTUS stringent performance by making a permanent follow-up of the goals and terms as defined for the execution of its programs, plans and measures.

e) Watching over the existence of a consistency between the decisions taken by the authorities in their respective sectors or in those PRUS-related ones and the strategically defined guidelines for their implementation, thus suggesting corrective measures being actually relevant to keep due harmonization between said decisions and guidelines

f) Preparing and proposing actions being necessary to maintain both the coordination and leveraging of financial and technical resources of different governmental administrative and private sector entities upon implementing PTUS.

g) Making specific proposals about PTUS requirements in financial., resource management and communicational terms.

h) Making a follow-up of PTUS development-associated studies being in progress, evaluating them and identifying the requirements of those new studies as posed by the study being involved in order to suggest prevailing ordering for its accomplishment.

i) Designing and proposing communicational strategies which permit to create a series of conditions being necessary to PTUS progressive development and, from to time, notifying the several process characters about the requirements that such a Plan will create for them.

j) From time to time, and by means of the Minister of Transportation and Telecommunications, reporting to the President of the Republic about the upgrading extent and the compliance of its contents.

The Directorio de Transporte de Santiago (DTS) has a Executive Direction providing both technical and administrative support. Such an Executive Direction is called Coordinación General de Transporte de Santiago (CGTS) (Santiago de Chile City Transportation General Coordination).

2.3.1.5. Secretaría Interministerial de Planificación de Transporte (Transportation Planning Interministerial Secretary) (www.sectra.cl)

Another institution being relevant to transportation scope is the Secretaría Interministerial de Planificación de Transporte (SECTRA) (Transportation Planning Interministerial Secretary), which has been defined as a governmental technical entity depending on and coordinating the Ministries of Public Works, Transportation and Telecommunications, of Planning and Cooperation, of Housing and Urbanism, of National Goods and the General Secretary of the Presidency, in terms of transportation concerns.

Notwithstanding its main offices situated in Santiago de Chile, where Executive Secretary's headquarters are situated, and where the requirements coming from Metropolitan Region and 6th Region are attended, SECTRA has 2 regional offices: one office being located in Viña del Mar (for Chilean northern regions, from 1st to 5th Region) and another one being located in Concepción for attending those inquiries coming from 7th to 12th Region. The first of these regional offices is in charge of. the Centro de Control de Area de Tránsito del Gran Valparaiso (SCAT-GV) (Greater Valparaiso Traffic Area Control Center), while the second of these regional offices is currently implementing a Greater Concepción Control Center.

SECTRA professional staff is organized in six specialized areas:

- Urban Transportation: Urban Transportation Area is in charge of both designing and defining developmental policies and plans specifically addressed to urban transportation systems of the main urban surrounding areas and of middle-sized locations throughout the Chilean territory.
- Interurban Transportation: Interurban Transportation Area is in charge of both designing and defining policies and plans as well as proposing and building up initiatives to improve interurban transportation system's management and operation. This Area embraces strategic planning scopes, projects and interinstitutional coordination.
- Urbanism: Urbanism Area incorporates urban topics to transportation solutions. It consequently develops and implements policies, programs, projects and tools both complementing and leveraging transportation planning, in terms of urbanism.
- Models and Data: Models and Data Area are in charge of compiling the information and developing the methodologies and computerized models simulating urban transportation operating system that are utilized when assessing transportation policies, plans and projects.
- Tecnologías de Información y Sistemas de Transporte Inteligente (STI/ITS I Information Technology and Intelligent Transportation System): This Area maintains a research line concerning Intelligent Transportation Systems (ITS). As supporting unit, this Area manages the development, operation and maintenance of IT systems as well as those systems applicable intranet services and customer technical support.
- Environment and Energy for Transportation: Environment and Energy for Transportation Area conducts the linkage among transportation, energy, environment and life quality through the creation of methodological tools addressed to transportation overall planning, thus incorporating environmental and energetic variable with its social assessment and its shock over territorial development.

2.3.1.6. Comisión Nacional de Seguridad de Tránsito (CONASET) (National Traffic Safety Commission) (www.conaset.cl)

The Comisión Nacional de Seguridad de Tránsito (CONASET) (Chilean Traffic Safety Commission) was created under Order N° 223, dated last December 27, 1993, published in Official Gazette on March 22, 1994.

La CONASET advises Republic's President and proposes him its plans, projects and programs aimed to reduce traffic accident rates. Accordingly, such a commission makes use of existing capabilities and powers as granted by relevant legal provisions to each Commission member. This Commission is composed of the Minister of Domestic Affairs, the Minister of Education, the Minister of Justice, the Minister of Public Works, the Minister of Health, the Minister of Housing and Urbanism, the Minister of Transportation and Telecommunications, the General

Secretary of Government, the General Secretary of the Presidency and the General Director of Military Police.

Among its several functions, la CONASET must suggest changes applicable to enforceable legislation and regulations and to technical rules in the following areas: infrastructure, vehicles, technical inspections and drivers' examinations. In other words, these changes must be highly necessary for traffic safety improvement. It is in this scope of action where ITS might be deemed as Commission's main concerns. Indeed, CONSAET is presently preparing the First Variable Signaling Manual and should play a major role when defining the rules to be applied to ITS as a means for increasing traffic safety.

2.3.2. Transportation Operating Public Entities

Within the scope of different transportation systems operation, it is necessary to mention 2 of these systems, at least, to wit. "Empresa de Transporte de Pasajeros Metro S.A." (www.metrosantiago.cl) (Subway Services Corporation) and "Empresa de los Ferrocarriles del Estado" (www.efe.cl) (National Railways Corporation)

Empresa de Transporte de Pasajeros Metro S.A. (Subway Services Corporation)

In 1989, and through the enactment of Act number 18.772, the Chilean State was authorized to develop corporate activities connected with passenger transportation public utility. Said activities were to be accomplished by means of metropolitan urban and sub-urban railways or other supplementary electric media and additional services. For such a purpose, a corporation called "Empresa de Transporte de Pasajeros Metro S.A." was incorporated. This firm is often known as "METRO S.A.". This corporation may also incorporate or participate in other firms and perform any act(s), action(s), deed(s) or transaction(s) provided that being related to its corporate purpose.

Empresa de los Ferrocarriles del Estado (EFE) (National Railways Corporation)

On the other hand, in accordance with Executive Order N° 1/1993, the Empresa de los Ferrocarriles del Estado (EFE) (National Railways Corporation), shall set forth, develop, encourage, maintain and operate passenger and cargo transportation services to be rendered on a railway basis, or under similar grounds, as well as complementary services, notwithstanding their mode, including all related activities being necessary for the full performance of such a purpose. Moreover, this corporation may commercially operate the property owned by her. Above corporate purpose may be complied with either straightforwardly or by means of contracts, franchising licenses or through the creation, together with Chilean or foreign individuals or corporations, of other corporations that, pursuant to their legal effects following their incorporation, will be governed by the rules applicable to open corporations.

Any third party's participation in the corporations created by EFE for the performance of their purpose and the granting of franchising licenses (concessions) must be made by means of public bidding, the bases of which will clearly and accurately describe the essential elements of the Articles of Incorporation and of Concession Agreement. Those corporations and concessions whose purpose deals with less significant services are excluded.

Under no circumstances, EFE shall be entitled to execute deeds or contracts legally, or really, resulting in the sale of a lot of land, bridges and artworks forming the outline of the railroad. Those acts or contracts referring to lands not being used because of amendments to railway outline or of any location change of stations or because of any railroad removal arising from an expressed authorization as ordered by Republic's President. Likewise, All and every contract, concession or contribution resulting in railway partially or totally exclusive utilization, shall have an essential condition under which any third parties will be allowed to utilize said railway line on the basis of an equitable or non-discriminatory fare system basis.

Those acts and contracts made by EFE in its scope of business will be exclusively governed by private law rules provided that not being inconsistent with Executive Order N° 1/1993 provisions.

Port Corporations

In Chile, under Act N° 19542 (enacted in 1997), port system was re-structured by creating 10 (ten) public law corporations resulting in a public corporation having its own property. These corporations have unlimited existence and are connected with Chilean Government by means of the Ministerio de Transportes y Telecomunicaciones (Ministry of Transportation and Telecommunications). They are the legal followers of the Empresa Portuaria de Chile (EMPORCHI) (Chilean Port Corporation) as regards all its powers, rights, obligations and goods in full conformity with the legal provisions in force.

Above 10 corporations shall administer, operate, develop and maintain ports and terminals, as well as their property, including all related activities concerning port environment and scope and being fundamental to its appropriate accomplishment. These 10 corporations may consequently carry out all sorts of studies, projects and executions in works under construction, enlargement, improvement, reparation and dredging in ports and terminals. Besides, they will be able to render services to third parties regarding their corporate purpose.

2.3.3. Other Institutions

There exists a series of institutions that, although not being directly ITS-related, perform certain tasks which may be extremely useful upon laying out technical standards for ITS implementation, supervising the operation of ITS devices and spreading ITS utilization benefits. The functions of these institutions are described below

The Instituto Nacional de Normalización (INN – www.inn.cl) (National Standardization Institute) must elaborate National Technical Standards and participate in the study of Regional and International Standards. It also represents the country at both Regional and International specialized forums about the theme. Thus, INN must set forth the standards enabling ITS development.

The Superintendencia de Electricidad y Combustibles (SEC – www.sec.cl) (Board of Electricity and Fuels) must oversee the adequate operation of electricity-, gas- and fuel-related services. It also supervises the stringent performance of legal and regulatory provisions, and technical rules on generation, production, storage, transportation and distribution of liquid fuels, gas and electricity, for monitoring that the quality of services rendered to users remains being consistent with the one described in those provisions and technical rules. Likewise, this Board regulates that above mentioned operations and the utilization of energetic resources are not dangerous for persons or things. SEC also certifies electrical equipments marketed in the country. So, certain ITS devices will require such a certification.

Among those institutions being able to spread ITS benefits in order to massify its utilization within domestic environment, especially in productive entities, the following should be highlighted:

The Corporación de Investigación Tecnológica de Chile (INTEC – www.intec.cl) (Chilean Technological Research Corporation) attempts to strengthen domestic productive sector and contribute to national competition within a globalized context. Among corporate lines of action, Information Technology must be seen as a mean to generate and transfer knowledge, develop capabilities and promote IT upgraded practices to meet the needs coming from national public and private sectors.

The Fundación País Digital Foundation (www.paisdigital.org) has several goals: serving as platform for the cooperation among different agents being involved in the development of the society and IT throughout Chile; evaluating major points in the legal, administrative and economic scopes influencing over information and communication technologies to the service of individuals and corporations; elaborating proposals and measures approaching therefore; and, finally, diffusing the most innovative initiatives about the application of the new information and communication technologies, thus seeking to create favorable public opinion being actually compromised with said initiatives.

The Programa Prospectivo Tecnológico (PPT – www.ppt.cl) (Technological Prospective Program) belongs to the Technological Development and Innovation Program. It is performed by the Productive Development Division, depending upon Chilean Ministry of Economy. Its accomplishment becomes embraced within Bicentenary-related activities, thus responding the desire of leveraging Chilean socio-economic development during this first decade of the 21st Century. Complying with its own goals, PTT will identify the productive sectors or activities that

will become strategic for country's competitiveness in 2010 together with the specific needs, requirements and conditions they demand, within technological field, for their expansion.

Finally, and in relation to ITS funding sources, a set of institutions having resources which might be used for implementing projects or performing the studies about ITS may be highlighted. Firstly, those ministries being empowered to infrastructure building (MOP, MINVU) are called to play a fundamental role. However, regional (state) or local (county) governments might also contribute resources. As regards funding sources of studies involved, MIDEPLAN, DIRPLAN, CONICYT and FONDEF appear to be very good examples.

2.3.4. Private Entities

As far, some entities have independently developed ITS projects. Among them, there exist transportation and port corporations. Generally, these firms utilize this system for managing their fleet and performing cargo handling-associated tasks.

Highway-operation concessionaire corporations are specially noted. It should be emphasized that four of those are carrying out the necessary studies or implementing traffic control centers (VMS, CCTV), "Free Flow" Electronic toll collection systems, and incident management. Until now, it is well known that the free flow-type electronic toll collection systems do have ordinary specifications and standards, being defined as from public system.

On the other hand, Telecommunication corporations does have infrastructure being capable enough to provide high-tech wireless communication services throughout the country. Moreover, some of these corporations have been already involved in delivering GPS-based localization services.

Further details regarding the foregoing have been supplied in Task 1.

2.3.5. ITS Chile

ITS Chile is a non-profitable private law corporation composed of professionals coming from public and private sectors. Corporate main mission deals with both spreading and encouraging ITS utilization in Chile in order to improve traffic efficiency and safety, reduce traffic jams and minimize environmental shock.

As organization, ITS already exists in other countries: ITS America in the United States, ITS Canada, ITS Australia, ITS South Africa, ITS Japan, ERTICO in Europe. In Latin America, ITS systems are currently being made in Mexico, Uruguay and Brazil.

ITS Chile's main lines of works are as follows:

- Spreading ITS concepts and methods;

- Encouraging the development of ITS-applicable technology utilization policies;
- Promoting both research and studies in ITS scope as well as the development of their technologies in Chile;
- Becoming an instance to exchange experiences and training with other ITS-related national or foreign entities; y
- Developing publications seminars, fairs, exhibitions and other diffusion-oriented events.

As part of the activities accomplished by ITS Chile, the First Chilean Intelligent Transportation Systems Meeting was held last September. This event became the first national meeting where Chilean ITS utilization cumulative experiences were finally discussed.

3 LEGAL ASPECTS

This chapter focuses on legal antecedents regarding ITS operation or development in the Chilean country. Firstly, the authority of public institutions and private entities is discussed but emphasizing their differences. Secondly, the rules existing in ITS-related spaces are mentioned. Finally, different ITS-related laws are described.

3.1 Public Institutions

Pursuant to legislation presently in force, governmental bodies must subject their actions to the Constitution and their regulatory rules. This means that these bodies must only make those actions which they have been expressly empowered with. For example, as regards transportation public operators, it may be noted that METRO S.A. may incorporate, or have participation in, corporations and perform any act or business transaction if related to its corporate purpose. In the case of EFE, any third party's participation in a number of corporations forming this entity for the best performance of its corporate goals and concession / franchising granting, must be made by means of public bidding, the bases of which will clearly and accurately describe the essential elements of the Articles of Incorporation and of Concession Agreement. (See section 2.3.2 above)

Within these public institutions, there are also some entities specifically supervising the operation of ITS-related services, as displayed below.

3.2 Private Entities

Private entities are regulated under Private Law rules. Hence, these entities may perform all acts and actions dealt with their scope of business, but those expressly forbidden by law.

3.3 Existing Rules

Presently, there are no official rules being directly related to ITS. However, there do exist technical specifications, some of them being still prepared by MOP, in connection with electronic toll collection systems systems. These specifications have been displayed in Table 3.1 below.

Table 3.1 Already Existing and Developing Technical Specifications

Acronym	Description	Status
MOPTT-ST1	Electronic collection subsystems Systems and other Applications Interoperation Specification in Antenna – Transponder Transaction	Existing
MOPTT-ST2	Electronic Collection Subsystems and other Applications Conformity Test with the Specification regarding Interoperation in Antenna – Transponder Transaction	Existing
MOPTT-ST3	Electronic Collection Subsystems and other Applications Safety Key Management	Being prepared
MOPTT-ST4	Electronic Collection Subsystems and other Applications Specification applicable to Minimum Parameters of Interoperation Transaction	Being prepared
MOPTT-ST5	Electronic Collection Subsystems and other Applications National Record of Tele-toll Users	Being prepared
MOPTT-ST6	Electronic Collection Subsystems and other Applications Generating Interface Passwords upon Exporting Keys	Being prepared

MOPTT-ST1 specification has been already utilized by Metropolitan Region Concessionaires when developing their "Free Flow"- type toll electronic collection systems

On the other hand, Traffic Signaling Manual Chapter 9, referring to Dynamic Message Signs, will be shortly enacted.

Within the framework of telecommunications, Resolution N° 1476 (dated on November 9, 2001), Department of Telecommunications, has set forth the rule for the utilization of 5,725 – 5,850 MHz frequency band, as the band to be utilized by "Free Flow" systems in road concessions. Above Resolution (Section 2) has determined the features of the equipments operating in such a band. For instance, it has been stipulated that units operating in band 5,725 – 5,850 MHz must utilize one of the following modes: channel dynamic selection, widened spectrum with frequency jumps in such a way that multiple users and systems may co-exist in a same geographical zone. Section 3 has established that those transmissions made by any radiocommunication being authorized in conformity with the rule must not cause any interference in any toll electronic collection equipment operating in band 5,795 – 5,815 MHz, which will prevail notwithstanding their installation date.

3.4 Existing Laws

At this time, there are no laws specifically dealing with ITS. Nevertheless, it is only possible to identify a set of laws having a different extent of relation with ITS: These laws are the following ones:

3.4.1 Laws Governing Transportation and Public Works

i) Ministerio de Obras Públicas (Ministry of Public Works) Organic Law: Order Nº 850 (1998)

Legal Order Nº 850 (dated in 1990) has defined the Ministry of Public Work as the State Secretary being in charge of planning, studying, outlining, building, enlarging, restoring, maintaining and operating fiscal public works and as the body coordinating the implementation plans concerning the works made by related serving-providing companies.

It has also been ascertained that Ministries legally empowered to build works, as well as State-owned institutions or firms, public- and private-owned mining corporations or other entities which either the State or said institutions / firms are interested in, may delegate the Ministry of Public Works the authority for studying, outlining, building, enlarging and restoring said works in full agreement with their conditions, guidance and financing

ii) Act governing the Concession of Public Works: Order Nº 900 (1996) and Order Nº 956 (1999) (Concessions Act Regulations).

These two legal orders have established the rules for implementing, restoring or maintaining fiscal public works pursuant to the system provided under Section 87, Executive Order Nº 294 (1984). Such Section provides that fiscal public works may be also executed under a contract awarded after a national or international public bidding process, provided that the international public bid does not affect domestic safety, in exchange for the temporary operation concession or that of public utilization property, as previously agreed. Concession shall have such a duration as that determined by the awarding order involved. Said bid awarding order must contain Minister of Economy's seal and signature. Under no circumstances, these concessions will be beyond a 50-yr term. Either repairing or maintaining fiscal public works may be subject to concession contracts pursuant to the above statement.

The importance of the Act governing concessions lies in the chance given to domestic authorities to include ITS features in the contents of tender contracts as well as a list of private corporations being qualified to provide these systems. Without this authority, each firm might have individually developed its own systems without considering their interoperation regarding the systems created by other firms (for instance, in electronic toll collection systems)

iii) Act Nº 18.059

Under this law, the Ministry of Transportation and Telecommunications has been given the authority of national traffic control bureau. Accordingly, pursuant to Section 1, this Ministry shall:

a) provide the Republic's President with public traffic-related policies, plans and programs;
b) control and supervise the full compliance of the actions listed in item a) and evaluated the results thereof;
c) study and propose all legal and regulatory rules being necessary to accomplish an appropriate public traffic policy;
d) by following the specific instructions coming from Republic's President, order the rules being necessary and furnish the relevant instructions addressed to the appropriate compliance of road traffic (road and routes included)-related provisions
e) perform any other function(s) as ordered by law

iv) Traffic Law: Act Nº 18.290

Such a law established which all persons, as pedestrians, passengers or drivers of any vehicles, using or moving along roads, streets and other public rural or urban ways, either private- or public-owned, are subject to.

Among other aspects, the Traffic Act establishes a list of traffic infractions and their seriousness, as from which, relevant fines will be subsequently determined, Considering that, in next years, electronic toll collection systems will be surely implemented, and that said subsystems have not been mentioned in current legislation, it should be emphasized that an amendment which will allow to punish drivers still not paying any electronic toll collection systems-related due amounts is now pending. Such an amendment provides as follows:

At first, and in order to provide both current concessionaires and prospective investors with legal assurance, thus encouraging presently implemented road operation concession system's full success, Traffic Act now includes the prohibition under which all vehicles not having a toll electronic collection device (TAG), or any other similar device, will be prevented from moving along public-owned routes operating toll or fare electronic collection subsystems.

Secondly, in order to guarantee concession system's good operation and to enforce above prohibition, this Act expressly provides that the devices and any other media utilized for implementing above referred toll or fare electronic collection subsystem, are traffic infraction recording equipments whose technical standards as well as their installation, operation and using conditions shall be regulated by the Chilean Ministry of Public Works.

v) Public Transportation Law: Act Nº 19.011 (1990)

Under this law, the Chilean Ministerio de Transporte y Telecomunicaciones (MINTRATEL) (Ministry of Transportation and Telecommunications) has been duly empowered to establish the conditions and supply the rules under which fared passenger domestic public- or private-owned, individual or collective transportation services being rendered along streets and roads will operate. It must be noted that these conditions include technical aspects as well as those ones concerning the emission of pollutants from vehicles and the operating conditions of fared passenger transportation services and of the utilization of ways.

In addition to the foregoing, Act N° 19.011 empowers MINTRATEL to make use of the ways for certain types of vehicles and/or services, under public tender procedures, in the event of some specific cases such as: traffic jam conditions, environment deterioration and/or safety condition deterioration in persons or vehicles.

Under this authority, MINTRATEL has made tenders regarding transportation services to be rendered in Santiago de Chile geographical area. Among other benefits, these tenders have managed to improve the quality of vehicles authorized for passenger transportation. Hence, it has been planned that, by means of a new transportation service tender for Santiago starting at the end of 2002, ITS technologies will be legally required for supplying transportation services, and that a Santiago de Chile Buses Control Center will be created.

vi) Infraction Recording Units: Order N°151 (2000)

As from this MINTRATEL's Executive Order, the main technical features of infraction recording units have been established as described below:

3.4.1 Laws Governing Telecommunications

Within the scope of telecommunications, there exists a series of legal instruments having a certain extent of relation with ITS. All these laws have been passed by the Department of Telecommunications

i) Telecommunications Law: Act Nº 18.168 (1982)

Under this Act, the principles governing telecommunications operation throughout the country have been legally set forth. If considering that under Section 1, the term "telecommunications" refers to "every transmission, emission or reception of signs, signals, written texts, images, sounds and information of any nature made by means of physical lines, radioelectricity, optical means or any other electromagnetic systems", it is concluded that the application of certain ITS technologies, like road guidance systems and on-the-way vehicle-device communication systems, must be governed by this Act.

Basically, the Act states that both using and enjoying radioeletrical spectrum frequencies will be subject to a free and equitable access through mainly temporary telecommunication concessions, permissions or licenses granted by the State

It has also been provided that the Ministerio de Transporte y Telecomunicaciones (Ministry of Transportation and Telecommunications) shall monitor that all telecommunication systems as well as every electromagnetic wave-generating system and installation, notwithstanding its nature, must be installed, operated and operated in such a way it does not cause any injuries to persons or things, or harmful interferences to either national or foreign telecommunication systems, or interruptions in their operations.

ii) Radioelectrical Spectrum Utilization General Plan: Executive Order Nº 15 (1983)

Executive Order Nº 15 (1983) contains 2 (two) chapters. Chapter 1 defines the terminology that must be used within the context of radioelectrical spectrum utilization, frequency band and wavelength nomenclature, and the naming of emissions. Chapter 2 deals with the Authority of Frequency Bands. Here, "Authority" means registering a specific frequency band within the Frequency Band Authority Chart. In this senses, such a frequency band will be utilized by one or several terrestrial or spatial radiocommunication services, or, under expressly specified circumstances, by radioastronomy services.

iii) Order Nº 144 (1979) Regulating the Operation of Short-ranged Telecommunication Devices.

This Order defines the requirements that intercommunication devices, remote control units and alarms, using radioelectric waves must comply with, so that these apparatuses

may be labeled as lower-power devices. It should be noted that their utilization remains exempted from the authorizations stipulated under legal provisions currently in force.

iv) Resolution N° 575 (2000) modifying Resolution N° 144 (1979)

Amendments contained in Resolution N° 575 have taklen into aciount that, as a result from technological advance observed in national and international market levels, there exist some short-ranged telecommunication devices or units whose radiated energy is relatively small. These apparatuses must be consequently classified as "low-power devices" under Resolution N° 144 definition.

4 RECOMMENDATIONS

Given the previously presented background information, one might possibly conclude that, in Chile, there exists neither a single ITS development-related entity nor specific legislation being developed enough in relate to the topic of ITS. Although this statement has not prevented MOP, UOCT, and many public-owned and private-owned corporations from developing ITS systems, this situation has resulted in the development of systems that do not interoperate or not being integrated in a complementary fashion, for instance, by means of data exchange. These failures result in a significant loss of the benefits that ITS may furnish, if adequately developed. Electronic toll collection systems, as well as the development of their technical specifications, have become an exception to this rule. This exception will permit the utilization of a single TAG to move along Metropolitan Region highways

Internationally speaking, the US example has demonstrated that ITS systems can be adequately developed that deal with this question, namely the legal frameworks and the spread of benefits created by integrated traffic control systems.

Hence, a number of actions are required to give ITS appropriate leveraging in Chile. Below, you will find some examples of these actions that will be upgraded and complemented as part of Task 9 hereof.

- Creating an entity coordinating the development and application of ITS technologies in Chile. Said entity being in agreement with enforceable legislation must belong to the Ministerio de Transportes y Telecomunicaciones (Ministry of Transportation and Telecommunications) since this Minister has the authority which will allow it to provide the laws, orders or regulations (rules, manuals, etc) required dealing with street and road traffic control.
- Defining the Normative and Standards regulating ITS. The Ministerio de Obras Públicas (Ministry of Public Works) should be legally liable for generating ITS systems-based technical specifications within its jurisdictional scope, in accordance with the general normative created, like now. Besides, the Subsecretaría de Telecomunicaciones (Department of Telecommunications) must be another party to this joined task. The Ministerio de Transportes y Telecomunicaciones (Ministry of Transportation and Telecommunications) must deal with general rules.
- With regards to standards, it is reasonable to utilize international experience like, for instance, the National Transportation Communications for ITS Protocol (NTCIP), in the United States, as well as any other similar protocols made in other countries being more suitable to Chilean reality. As regards the Normative, it is essential to make National ITS

Architecture (the product of this study) utilization obligatory and to regulate ITS devices features and the messages delivered to users.

- Spreading ITS benefits. For achieving so, it has been required to coordinate the tasks to be performed by a set on institutions being directly, or indirectly, related to this question. Among these institutions, the following should be highlighted:
    - Ministries participating in ITS projects
    - ITS Chile
    - Technological Innovation Executive Secretary
    - Chilean Technological Research Corporation (INTEC)
    - Ministry of Economy by means of a Programa Prospectivo Tecnológico (PPT) (Technological Prospective Program)
    - "Fundación País Digital" Foundation
- Generating funding funds applicable to ITS. Taking into consideration the benefits produced by ITS implementation, it is reasonable to consider the possibility of having budgets addressed to finance certain projects or studies leading the authorities to find out which are the best ITS-related investment alternatives. There exist several institutions that might finance studies about ITS. For instance, the universities might get funds through the Comisión Nacional de Investigación Científica y Tecnológica (CONICYT) (National Scientific and Technological Research Commission), or the Fondo de Fomento al Desarrollo Científico y Tecnológico (FONDEF) (Fund Encouraging Scientific and Technological Development) depending on above CONICYT. In the public scope, the Ministerio de Planificación y Cooperación (MIDEPLAN) (Ministry of Planning and Cooperation), through SECTRA, has already financed some research studies about ITS (See Task 1).

5 SUMMARY

This Task has reviewed currently enforceable ITS implementation-related institutional and organizational structure in Chile.

Given the background review, one may conclude that there does not exist a single ITS development-related entity in Chile. However, on the contrary, there exists a significant number of public and private institutions or firms dealing with ITS to a certain extent.

An ITS architecture will become a dynamic system being affected by planning decisions, standards, political and funding aspects. Data collected in this study will help to define the relations and interfaces among the several organizations and systems.

Because of the lack of a single entity coordinating ITS implementation and taking into account that ITS have not been considered in the laws regulating the activities of public institutions, ITS adequate development conditions do not really exist. Indeed, thus far, ITS have been developed by following the technical specifications arising from respective building or bidding process agreements. However, these specifications (with the notable exception of electronic toll collection system applicable in urban highways) do not have a framework similar to that supplied by ITS Architecture.

Hence, developing a series of actions as follows will be required to achieve ITS adequate development:

- Creating a single entity coordinating the development and application of ITS technologies.
- Defining the Rules and Standards (A National ITS Architecture, particularly) regulating ITS.
- Spreading ITS benefits in both public and private sectors.
- Creating funding sources addressed to projects or studies about ITS.

Feasibility Study for the National Intelligent Transportation Systems (ITS) Architecture Project - Chile

Task 3: Technical Analysis

Prepared for

United States Trade and Development Agency

Ministerio de Obras Públicas de Chile

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1. INTRODUCTION

1.1. About This Report

This Task 3 - Technical Analysis Report was developed to document, for the purposes of development of a National ITS Architecture for Chile, the current and possible future ITS (intelligent transportation systems) of Chile, and documents an Operational Concept for the use of these systems to provide transportation services to motorists and travelers of Chile. The operational concept is based upon meetings and stakeholder workshops held in Chile, and from information (e.g., inventory of ITS systems, customized market packages) developed for the initial draft National ITS Architecture of Chile. The initial draft National ITS Architecture of Chile is available on-line at www.consystec.com, and accessible by selecting *Chile* from the *Project Links*. (This project link will be available for one-year after the completion of the project.) For the systems identified, this report explores system interfaces and interoperability issues for both current and future integration of these systems. Finally, the report outlines the existing standards being used in the systems, with focus on the electronic toll collection (ETC) standards in place, and interoperability implications of the current standards environment.

This document gathers information from the initial draft architecture, developed during 3 days of workshops held November 11, 13, and 15 of 2002, much of which is in the Spanish language. Thus, names of public agencies, description of ITS systems, and system interfaces (also called architecture flows) are all in Spanish.

Comments on this report should be received by the close of the follow-on workshop scheduled for late March/early April 2003.

1.2. National ITS Architecture of Chile Background

The ***National ITS (Intelligent Transportation Systems) Architecture of Chile*** is a roadmap for transportation systems integration over the next approximately 15 years. The architecture has been developed through a cooperative effort by the country's transportation agencies, covering all modes and all roads in the country. The architecture represents a shared vision of how each agency's systems will work together in the future, sharing information and resources to provide a safer, more efficient, and more effective transportation system for travelers in the region.

The ITS architecture is an important new tool that will be used by:

- Operating Agencies to recognize and plan for transportation integration opportunities in the region.
- Planning Agencies to better reflect integration opportunities and operational needs into the transportation planning process.
- Other organizations and individuals that use the transportation system in Chile.

The ITS architecture provides an overarching framework that spans all of these organizations and individual transportation projects. Using the ITS architecture, each transportation project can be viewed as an element of the overall transportation system, providing visibility into the relationships between individual transportation projects and ways to cost-effectively build an integrated transportation system over time.

This plan describes at a high level (from an ITS architecture perspective) the current (or legacy) as well as proposed future ITS inventory and ITS projects. The description of these ITS projects in this report, while general from an ITS architecture perspective, includes the important existing and planned ITS elements and information sharing concepts.

1.3. Approach to Development of the National ITS Architecture of Chile

The overall approach to development of the National ITS Architecture of Chile is to use the US National ITS Architecture as a starting framework, and then adapting the US architecture to meet the special requirements of Chile. This approach will enable Chile to economically benefit from the work already done elsewhere in North America, as this is a similar strategy followed recently by Canada in developing their National ITS Architecture.

1.4. Document Overview

This document is organized into 6 main sections as follows.

- Section 1 Introduction - provides introductory information.
- Section 2 Stakeholders - identifies the stakeholders – private and public agency ITS system owners, operators, managers, and transportation service providers identified in the National ITS Architecture of Chile.
- Section 3 ITS Systems - provides an inventory of ITS Systems owned and/or operated by the stakeholders.
- Section 4 Transportation Services and Operational Concept - provides a discussion of the transportation services provided by stakeholders, a general discussion of how these system are operated and interact with each other to provided transportation services, and candidate National ITS Architecture market packages identified.
- Section 5 System Interfaces and Information Exchanges - provides a high-level discussion of system interfaces and interconnections.
- Section 6 Interoperability and ITS Standards - provides a discussion of ITS system interoperability issues, key standards used in Chile, and candidate standards for future deployments (candidate standards are based on U.S. ITS standards activities).

2. STAKEHOLDERS

Stakeholder coordination and involvement is one of the key elements of the development of a National ITS Architecture of Chile. Because ITS often transcends traditional transportation infrastructure, it is important to consider a range of stakeholders beyond the traditional traffic, transit, and maintenance areas. In addition, it is important to consider stakeholders in another adjoining country.

The National ITS Architecture of Chile includes a wide range of stakeholders. Table 1 identifies the stakeholders and provides a description of the agency, department, or organization represented by the stakeholder.

Table 1: Stakeholders

Stakeholder	Description
Administracion Regional	
Administrador del Espacio Publico	
Aerovías S.A.	Aerovías S.A.
Autopista Aerovías S.A.	
Autopista Central S.A.	Concesionario Autopista Central S.A.
Autopista Costanera Norte S.A.	
Autopista del Sol S.A.	Autopista del Sol S.A.
Autopista Vespucio Norte S.A.	
Autopistas	
Autopistas Metropolitanas S.A.	Concesionario Autopistas Metropolitanas S.A.
Bomberos	Bomberos
Carabineros	Carabineros
Comision de Seguridad de Transito	
Concesionarios de Autopistas	Concesionarios de Autopistas
Concesionarios de Estacionamientos Publicos	
Costanera Norte S.A.	Concesionario Costanera Norte S.A.
DG	Direccion General incluyendo Aeronautica Civil y Putertos
Institucion Financiera	
Metro S.A.	Metro S.A.; operadores de Metrobus
Ministerio de Transportes y Telecomunicaciones	Ministerio de Transportes y Telecomunicaciones
MOP CGC	MOP Coordinacion General de Concesiones
MOP Dirección de Vialidad	Ministerio de Obras Publicas Dirección de Vialidad
MOP Subsecretaria	
MTT	Ministerio de Transportes y Telecomunicaciones
Municipalidad	
Onemi	Onemi
Operadores de Ambulancias	Operadores de Ambulancias
Operadores de Metro Ligero	
Operadores de Sistemas de Transporte Publico Regionales	Operadores de Sistemas de Transporte Publico Regionales
Operadores de Vehiculos Privados	Operadores de Vehiculos Privados
Operadores Privados de Emergencia Medica	
Operadores Privados de Gruas	
Operadores Privados de Sistemas de Transporte Publico	Operadores Privados de Sistemas de Transporte Publico

Stakeholder	Description
Operadores Privados de Sistemas de Transporte Publico Regionales	
Operadores Privados de VC	Operadores Privados de Vehiculos Comerciales
Promotor de Eventos Deportivos, Culturales y Sociales	Promotor de Eventos Deportivos, Culturales y Sociales
Promotor de Eventos Deportivos, Culturales, y Sociales	
Promotores de Eventos Deportivos, Culturales, y Sociales	Promotores de Eventos Deportivos, Culturales, y Sociales
Puertos	
Red de Sistemas de Concesionarios	Red de Sistemas de Concesionarios
Red de Sistemas de Gestion de Incidentes y Respuests	Red de Sistemas de Gestion de Incidentes y Respuests
Rutas del Pacífico S.A.	Rutas del Pacífico S.A.
SAMU	Servicio Ambulancia Medico Urgencia
SECTRA	SECTRA
Servicio Agricola Ganadera	
Servicio General de Aduana	
Servicio Impuesto Interno	
SESMA	Servicio de Salud del Medio Ambiente
Sociedad Concesionaria Autopista Vespucio Norte S.A.	Sociedad Concesionaria Autopista Vespucio Norte S.A.
Terminales de Carga	
Terminales Multimodales	
UOCT	Unidad Operativa de Control de Tránsito
Viajeros	Viajeros
VLT	Valparaíso Logistic Trade
ZEAL	Zona Extraportuaria de Actividad Logística

The stakeholders listed in Table 1 represent a mix of specific agencies or organizations and generic names used to represent a variety of stakeholders.

3. ITS SYSTEMS

Each stakeholder agency, company, or group owns, operates, maintains or plans ITS systems in the state. An ITS architecture inventory is a list of "elements" that represent all existing and planned ITS systems in the state as well as non-ITS systems that provide information to or get information from the ITS systems. The focus of the inventory is on those systems that support, or may support, interfaces that cross stakeholder boundaries (e.g., inter-agency interfaces, public/private interfaces).

Table 2 sorts the Chile ITS inventory by stakeholder so that each stakeholder can easily identify all the relevant elements that are allocated to them in the ITS architecture. For each element in the inventory the table provides an element description and an indication of whether the element exists or is planned.

Table 2: ITS Systems sorted by Stakeholder

Stakeholder	Element Name	Element Description	Element Status
Administrador del Espacio Publico	Administrador del Espacio Publico	Administrador de eventos publicos incluyendo eventos deportivos, culturales y sociales	Existing
Autopista Aerovías S.A.	Autopista Aerovias Almacenamiento de Datos	Sistema de Almacenamiento de Datos de telepeaje y transito.	Planned
	Autopista Aerovias Equipo de Vias	Equipo de vias, e.g., CCTV, Antenas adicionales no en plazas, VMS, etc.	Planned
	Autopista Aerovias Equipo deTelepeaje	Sistema canalizado; 1000 TAG; 915 Mhz, CalTrans Titulo 21.	Existing
	Autopista Aerovias Sistema Central de Control	Sistema canalizado; 2000 TAG; Incluye acceso al Aeropuerto Comodoro Arturo Merino Benítez	Existing
	Autopista Aerovias Sistema Central de Control	Sistema canalizado; 2000 TAG; Incluye acceso al Aeropuerto Comodoro Arturo Merino Benítez	Existing
	Autopista Aerovias Sistema Central de Control	Sistema canalizado; 2000 TAG; Incluye acceso al Aeropuerto Comodoro Arturo Merino Benítez	Existing
	Autopista Aerovias Sitio Web	Sitio web	Planned
Autopista Central S.A.	Autopista Central Almacenamiento de Datos	Sistema de Almacenamiento de Datos de telepeaje y transito.	Planned
	Autopista Central Equipo de Telepeaje	Equipo de Telepeaje	Planned
	Autopista Central Equipo de Vias	Sistema Norte-Sur, General Velásquez 39 VMS; 70 CCTV; 350 Contadores; Postes Auxilio; Gestión Incidentes	Planned
	Autopista Central Sistema Central de Control	Sistema Norte-Sur, General Velásquez Sistema Free-Flow; Norma europea CEN 278 ENST1; 300.000 TAG	Planned
	Autopista Central Sistema Central de Control	Sistema Norte-Sur, General Velásquez Sistema Free-Flow; Norma europea CEN 278 ENST1; 300.000 TAG	Planned
	Autopista Central Sistema Central de Control	Sistema Norte-Sur, General Velásquez Sistema Free-Flow; Norma europea CEN 278 ENST1; 300.000 TAG	Planned
	Autopista Central Sitio Web	Informacion de Cuentas, y servicios a clientes	Planned
Autopista Costanera Norte S.A.	Autopista Costanera Norte Almacenamiento de Datos	Sistema de Almacenamiento de Datos de telepeaje y transito.	Planned
	Autopista Costanera Norte Equipo de Telepeaje	Sistema Oriente-Poniente Costanera Norte Equipo de Telepeaje; CEN 278 ENST1; 300.000 TAGs.	Planned

Stakeholder	Element Name	Element Description	Element Status
	Autopista Costanera Norte Equipo de Tunel	Incluye CCTV, VMS, detector de conteo y gases y ventilacion.	Planned
	Autopista Costanera Norte Equipo de Vias	Sistema Oriente-Poniente Costanera Norte 32 VMS; 20 CCTV; 300 Contadores automáticos; Postes Auxilio; Detección Incidentes;	Planned
	Autopista Costanera Norte Sistema Central de Control	Sistema Oriente-Poniente Costanera Norte sSistema Free-Flow; Norma europea CEN 278 ENST1; 300.000 TAG	Planned
	Autopista Costanera Norte Sistema Central de Control	Sistema Oriente-Poniente Costanera Norte sSistema Free-Flow; Norma europea CEN 278 ENST1; 300.000 TAG	Planned
	Autopista Costanera Norte Sistema Central de Control	Sistema Oriente-Poniente Costanera Norte sSistema Free-Flow; Norma europea CEN 278 ENST1; 300.000 TAG	Planned
	Autopista Costanera Norte Sitio Web	Informacion de Cuentas, y servicios a clientes	Planned
Autopista del Sol S.A.	Autopista del Sol Almacenamiento de Datos	Sistema de Almacenamiento de Datos de telepeaje y transito.	Planned
	Autopista del Sol Equipo de Telepeaje	Sistema canalizado; 3000 TAG; CEN 278 TIS; Antenas	Existing
	Autopista del Sol Equipo de Vias	CCTV, VMS	Existing
	Autopista del Sol Sistema Central de Control	Sistema canalizado; 3000 TAG; Administracion de Telepeaje, Control de Transito, Gestion de Incidentes; Telefono de Emergencia.	Existing
	Autopista del Sol Sistema Central de Control	Sistema canalizado; 3000 TAG; Administracion de Telepeaje, Control de Transito, Gestion de Incidentes; Telefono de Emergencia.	Existing
	Autopista del Sol Sistema Central de Control	Sistema canalizado; 3000 TAG; Administracion de Telepeaje, Control de Transito, Gestion de Incidentes; Telefono de Emergencia.	Existing
	Autopista del Sol Sitio Web	Informacion de Cuentas, y servicios a clientes	Planned
Autopista Vespucio Norte S.A.	Autopista Vespucio Norte Almacenamiento de Datos	Sistema de Almacenamiento de Datos de telepeaje y transito.	Planned
	Autopista Vespucio Norte Equipo de Telepeaje	Equipo de Telepeaje	Planned
	Autopista Vespucio Norte Equipo de Vias	Autopista Américo Vespucio Nor Poniente VMS; contadores automáticos; postes auxilio; gestión incidentes	Planned
	Autopista Vespucio Norte Sistema Central de Control	Autopista Américo Vespucio Nor Poniente Sistema Free-Flow; Norma europea CEN 278 GSS A1	Planned

Stakeholder	Element Name	Element Description	Element Status
		adaptada; 300.000 TAG	
	Autopista Vespucio Norte Sistema Central de Control	Autopista Américo Vespucio Nor Poniente Sistema Free-Flow; Norma europea CEN 278 GSS A1 adaptada; 300.000 TAG	Planned
	Autopista Vespucio Norte Sistema Central de Control	Autopista Américo Vespucio Nor Poniente Sistema Free-Flow; Norma europea CEN 278 GSS A1 adaptada; 300.000 TAG	Planned
	Autopista Vespucio Norte Sitio Web	Informacion de Cuentas, y servicios a clientes	Planned
Autopistas	Autopistas Almacenamiento de Datos	Sistema de Almacenamiento de Datos de telepeaje y transito.	Planned
	Autopistas Equipo de Telepeaje	Equipo de telepeaje: antenas, sistemas de fiscalizacion	Planned
	Autopistas Equipo de Vias	Equipo de vias: CCTV, VMS, conteo automatico, etc.	Planned
	Autopistas Sistema Central de Control	Sistema de control central: gestion de telepeaje, transito, gestion de incidentes, tuneles, despacho de vehiculos de emergencia, etc.	Planned
	Autopistas Sistema Central de Control	Sistema de control central: gestion de telepeaje, transito, gestion de incidentes, tuneles, despacho de vehiculos de emergencia, etc.	Planned
	Autopistas Sistema Central de Control	Sistema de control central: gestion de telepeaje, transito, gestion de incidentes, tuneles, despacho de vehiculos de emergencia, etc.	Planned
	Autopistas Sitio Web	sitio web.	Planned
	Autopistas Vehiculos de Emergencia	Vehiculos de emergencia de autopistas	Existing
Autopistas Metropolitanas S.A.	Autopistas Metropolitanas Almacenamiento de Datos	Sistema de Almacenamiento de Datos de telepeaje y transito.	Planned
	Autopistas Metropolitanas Equipo de Telepeaje	Equipo de Telepeaje, CEN 278 ENST1	Planned
	Autopistas Metropolitanas Equipo de Vias	Autopista Américo Vespucio Sur VMS; contadores automáticos; gestión incidentes, CCTV; telefono emergencia	Planned
	Autopistas Metropolitanas Sistema Central de Control	Autopista Américo Vespucio Sur Sistema Free-Flow; Norma europea CEN 278 ENST1; 50.000 TAGs, CCTV, VMS	Planned
	Autopistas Metropolitanas Sistema Central de Control	Autopista Américo Vespucio Sur Sistema Free-Flow; Norma europea CEN 278 ENST1; 50.000 TAGs, CCTV, VMS	Planned
	Autopistas Metropolitanas Sistema Central de Control	Autopista Américo Vespucio Sur Sistema Free-Flow; Norma europea CEN 278 ENST1;	Planned

Stakeholder	Element Name	Element Description	Element Status
		50.000 TAGs, CCTV, VMS	
	Autopistas Metropolitanas Sitio Web	Informacion de Cuentas, y servicios a clientes, informacion de estado de carreteras.	Planned
Bomberos	Bomberos Sistema Central	Departamentos de Bomberos	Existing
	Bomberos Vehiculos de Emergencia	Vehiculos de emergencia de bomberos	Existing
Carabineros	Carabineros Sistema Central	Fiscalizacion y ayuda al publico	Existing
	Carabineros Sistema Central	Fiscalizacion y ayuda al publico	Existing
	Carabineros Vehiculos de Emergencia	vehiculos de emergencia de carabineros	Existing
Comision de Seguridad de Transito	Comision de Seguridad de Transito Sistema Central	Comision de seguridad de transito	Existing
Concesionarios de Estacionamientos Publicos	Concesionarios de Estacionamientos Publicos Sistemas de Estacionamiento	Operadores de estacionamientos publicos.	Planned
DG	DG Seguridad de Puertos y Aeropuertos	Seguridad y respuesta de emergencia en los puertos y aeropuertos.	Existing
	DGAC Sistema de Gestion de Estacionamientos	Cobro electronico usando 2000 TAG, etc.	Planned
Institucion Financiera	Institucion Financiera	Instituciones financieras y bancarias	Existing
Metro S.A.	Metro Boleteria y Punto de Venta de Tarjetas	Cobro de Tarifas Mediante Tarjetas sin Contacto en Metro y Metrobus; 160 puntos venta y carga de tarjetas	Planned
	Metro Informacion a Usuario en Viaje	315 lectores en Metro	Existing
	MTT Centro de Control de Buses	Centro de Control de buses	Existing
	MTT Control de Buses Sitio Web	Sitio web	Existing
MOP CGC	MOP CGC Almacenamiento de Datos de Transito Concesiones	Sistema de almacenamiento de datos de concesiones de transito.	Planned
	MOP CGC Almacenamiento de Datos de Transito Concesiones	Sistema de almacenamiento de datos de concesiones de transito.	Planned
	MOP CGC Centro de Explotacion de Concesiones	Centro de mantenimiento de vias.	Planned
MOP Dirección de Vialidad	MOP DV Contadores Automáticos de Flujos Vehiculares	70 contadores instalados en el país; tecnología basada en espiras; mas ampliación a 240 puntos de medición de flujos vehiculares en red vial interurbana.	Existing
	MOP DV Cruce Fronterizo Equipo de Vias	Equipo de vias en cruce fronterizos.	Planned
	MOP DV Cruce Fronterizo Sistema de Registro Electronico de Vehiculos	Sistema de registro electronico de vehiculos para cruces fronterizos.	Planned
	MOP DV Equipo Pesaje en Movimiento	1 estación de pesaje de vehículos en movimiento en ruta Antofagasta-Chuquicamata	Existing
	MOP DV Equipo Pesaje en Movimiento	1 estación de pesaje de vehículos en movimiento en ruta Antofagasta-Chuquicamata	Existing

Stakeholder	Element Name	Element Description	Element Status
	MOP DV Information de la Red Vial Interurbana Sitio Web	Información de la Red Vial Interurbana - Sistema que entrega información de valor de peajes, condiciones de carreteras, pasos fronterizos y emergencias viales, en cada una de las regiones del país	Existing
	MOP DV Registro y Revision de Credenciales Pesaje y Sobredimensiones	1 estación de pesaje de vehículos en movimiento en ruta Antofagasta-Chuquicamata	Planned
	MOP DV Sistema de Almacenamiento de Datos de Transito en Vias	Sistema de archivo de datos para uso en planeacion	Existing
	MOP DV Sistema de Almacenamiento de Datos de Transito en Vias	Sistema de archivo de datos para uso en planeacion	Existing
	MOP DV Sistema de Emergencia	Sistema de emergencia, asistencia a otros centros de emergencia, y respuesta a emergencias en las vias.	Planned
	MOP DV Sistema de Permiso de Carga	Sistema de permisos de carga incluyendo caraga peligrosa.	Existing
	MOP DV Subdireccion de Exlotacion Sitio Web	MOP DV Subdireccion de Exlotacion Sitio Web	Planned
	MOP DV Subdireccion de Explotacion	Gestion de mantenimiento.	Planned
	MOP DV Subdireccion de Explotacion Equipo de Vias	MOP DV Subdireccion de Explotacion Equipo de Vias, e.g. seguridad de zonas de labor	Planned
	MOP DV Subdireccion de Explotacion Vehiculos	Vehiculos de mantenimiento	Existing
MOP Subsecretaria	MOP Sistema de Informacion Geografico	Sistema de Informacion Geografico de MOP	Existing
MTT	MTT Almacenamiento de Datos de Transporte Publico	Informacion de horarios, flotas, etc.	Planned
	MTT Almacenamiento de Datos de Transporte Publico	Informacion de horarios, flotas, etc.	Planned
	MTT Ente Recaudador	Sistema de ente recaudor	Planned
	MTT Fiscalización y Control del Transporte Público	Seguimiento buses; control frecuencia y recorrido; entrega información a usuarios; recopilación información para planificación;	Planned
	MTT Informacion a Usuario Sitio Web	Sitio Web para informacion de viajeros.	Planned
	MTT Informacion en Paraderos	Letreros variables en paraderos con informacion de viajero.	Planned
	MTT Quiosco	Sistema de apoyo remoto para viajeros, compra de boletos electronicos.	Planned
Municipalidad	Sistema Municipal Almacenamiento de Datos de Transito	Almacenamiento de datos de transito para sistemas municipales de transito.	Planned
	Sistema Municipal Central de Transito	Sistema de control central	Planned
	Sistema Municipal Equipo de Vias	Incluye: Semaforos, CCTV, VMS.	Planned
	Sistema Municipal Sensores de Transito		Planned

Stakeholder	Element Name	Element Description	Element Status
	Sistema Municipal Sitio Web	Sitio web e informacion de viajeros	Planned
	Sistema Municipalid de Permiso de Carga	Sistema Municipalid de Permiso de Carga	Planned
Onemi	Onemi Gestion de Emergencia	Sistema central de emergencia y despacho de Onemi.	Existing
Operadores de Metro Ligero	Operadores de Metro Ligero Boleteria y Punto de Venta de Tarjetas	Operadores de Metro Ligero Boleteria y Punto de Venta de Tarjetas	Planned
	Operadores de Metro Ligero Centro de Control	Operadores de Metro Ligero Centro de Control	Existing
	Operadores de Metro Ligero Centro de Control	Operadores de Metro Ligero Centro de Control	Existing
	Operadores de Metro Ligero Sitio Web	Operadores de Metro Ligero Sitio Web	Existing
	Operadores de Metro Ligero Vehiculos de Transporte Publico	Operadores de Metro Ligero Vehiculos de Transporte Publico	Existing
Operadores de Sistemas de Transporte Publico Regionales	Operadores de Sistemas de Transporte Publico Regionales Tarjeta Electronico	Tarjeta electronico.	Planned
Operadores Privados de Emergencia Medica	Operadores Privados de Emergencia Medica Centro de Despacho	Operadores Privados de Emergencia Medica Centro de Despacho	Existing
	Operadores Privados de Emergencia Medica Vehiculos	Operadores Privados de Emergencia Medica Vehiculos	Planned
Operadores Privados de Gruas	Operadores Privados de Gruas Sistema de Despacho	Sistema de Despacho	Planned
Operadores Privados de Sistemas de Transporte Publico	Operadores Privados de Sistemas de Transporte Publico Centro de Control	Centro de Control de Transporte Publico	Planned
	Operadores Privados de Sistemas de Transporte Publico Vehiculos	Vehiculos de transporte publico.	Planned
	Operadores Privados de Sistemas de Transporte Publico Vehiculos	Vehiculos de transporte publico.	Planned
Operadores Privados de VC	Operadores Privados de VC Sistemas de Operadores de Vehiculos Comerciales	Sistemas de Operadores de Vehiculos Comerciales	Planned
	Operadores Privados de VC Vehiculos Comerciales	Vehiculos Comerciales incluyen transponder en el Vehiculo	Existing
	Operadores Privados de VC Vehiculos Comerciales	Vehiculos Comerciales incluyen transponder en el Vehiculo	Existing
Puertos	Puertos Equipo de Acceso de Vehiculos	Puertos Equipo de Control de Vehiculos	Planned
	Puertos Sistema de Registro Electronico de Vehiculos	Puertos Sistema de Registro Electronico de Vehiculos	Planned
	Puertos Sistema de Seguimiento de Vehiculos	Puertos Sistema de Seguimiento de Vehiculos, y control de equipo que controla acceso del puerto por vehiculos (e.g.,	Planned

Stakeholder	Element Name	Element Description	Element Status
		barreras automaticas).	
	Puertos Sitio Web	Sitio web	Planned
Red de Sistemas de Concesionarios	Red de Servicio y Reciprocidad de Concesionarios	Servicio Clientes (Customer Services): Cargo de Pago, Pago, Reciprocidad, Venta de Tags	Planned
	Red de Servicio y Reciprocidad de Concesionarios	Servicio Clientes (Customer Services): Cargo de Pago, Pago, Reciprocidad, Venta de Tags	Planned
	Red de Servicio y Reciprocidad de Concesionarios Sitio Web	Informacion de cuentas, venta de Tags	Planned
Red de Sistemas de Gestion de Incidentes y Respuests	Red Regional de Informacion de Incidentes y Respuesta	Red de Informacion de Incidentes y Respuesta.	Planned
	Red Regional de Informacion de Incidentes y Respuesta	Red de Informacion de Incidentes y Respuesta.	Planned
Rutas del Pacífico S.A.	Autopistas Rutas del Pacifico Equipo de Telepeaje	CEN 278 ENST1. 100.000 TAGs.	Planned
	Autopistas Rutas del Pacifico Equipo de Vias	Control de túneles (ventilación), información a usuarios (VMS) y gestión de incidentes (postes de auxilio), CCTV.	Existing
	Autopistas Rutas del Pacifico Sistema Central de Control de Túneles y Telepeaje	Control de túneles (ventilación), información a usuarios (VMS) y gestión de incidentes (postes de auxilio), video monitoreo, y telepeaje.	Existing
	Autopistas Rutas del Pacifico Sistema Central de Control de Túneles y Telepeaje	Control de túneles (ventilación), información a usuarios (VMS) y gestión de incidentes (postes de auxilio), video monitoreo, y telepeaje.	Existing
	Autopistas Rutas del Pacifico Sistema Central de Control de Túneles y Telepeaje	Control de túneles (ventilación), información a usuarios (VMS) y gestión de incidentes (postes de auxilio), video monitoreo, y telepeaje.	Existing
	Autopistas Rutas del Pacifico Sitio web	Rutas del Pacifico Sitio web	Planned
SAMU	SAMU Sistema Central	Sistema de despacho de vehiculos de urgencia medica	Existing
	SAMU Vehiculos de Emergencia	Vehiculos de urgencia medica	Existing
SECTRA	SECTRA Circuito Cerrado de Televisión	Incluye 6 cámaras de CCTV en SCAT-GV; y en Gran Concepcion, y Antofagasta	Existing
	SECTRA Controladores de Semáforos	79 interseciones con planes de tiempo prefijados en Gran Valparaíso;190 intersecciones en Gran Concepcion; 75 intersecciones in Antofagasta	Existing
	SECTRA Estaciones de Conteo Automático de Flujos Vehiculares	12 estaciones de conteo automático de flujos vehiculares en SCAT-GV; y en Gran Concepcion y Antofagasta	Existing
	SECTRA Letreros de Mensaje Variable	Letreros de Mensaje Variables incluyendo SCAT-GV, Gran Concepcion, y Altofagasta	Existing

Stakeholder	Element Name	Element Description	Element Status
	SECTRA Sensores de Transito		Planned
	SECTRA Sistemas Control de Semaforos	Incluye: Antofafasta - 75 intersecciones; Gran Concepcion - 190 intersecciones; Gran Valparaiso, y otras municipalidades donde esta relacionado el sistema de control de semaforos con SECTRA.	Planned
	SECTRA Sistemas Control de Semaforos Sitio Web	Incluye: sistemas de SCAT o control de semaforos para Antofagasta, Gran Concepcion, Gran Valparaiso, y otras municipalidades con sistemas relacionadas con SECTRA	Planned
	SECTRA Sistemas de Almacenamiento de Datos de Transito	Sistema de analisis de informacion	Planned
	SECTRA Sistemas de Planificacion Multimodal	SECTRA Sistemas de Planificacion Multimodal	Planned
Servicio Agricola Ganadera	Servicio Agricola Ganadera	Servicio Agricola Ganadera	Existing
Servicio General de Aduana	Servicio General de Aduana	Servicio General de Aduana	Existing
Servicio Impuesto Interno	Servicio Impuesto Interno	Servicio Impuesto Interno	Existing
SESMA	SESMA Centro de Analisis	Sistemas centrales de analisis de informacion de emisiones y ambiental.	Existing
SESMA	SESMA Estaciones de Monitoreo Ambiental	Equipo de vias de monitoreo ambiental.	Existing
Terminales de Carga	Terminales de Carga	Terminaloes de carga	Existing
Terminales Multimodales	Terminales Multimodales	Terminales Multimodales y de pasajeros	Existing
UOCT	UOCT Centro de Control de Gestión de Tránsito	Monitoreo de vias y estado de equipos de carretera y control de semáforos; en el futuro, ampliación red control dinámico; ampliación CCTV; detección automática incidentes; medición automática tiempos viaje.	Existing
	UOCT Circuito Cerrado de Televisión	37 cámaras de televisión distribuidas en la ciudad.	Existing
	UOCT Controladores de Semáforos	Incluye en Santiago: 1453 semáforos con planes de tiempo prefijados, 246 semáforos habilitados para operar con control dinámico, 30 semáforos están siendo habilitados para operar con control dinámico en el eje Av. Grecia.	Existing
	UOCT Estaciones de Conteo Automático de Flujos Vehiculares	50 estaciones de conteo automático de flujos vehiculares en Santiago; 106 estaciones automáticas: flujo, velocidad, clasificación, ocupación, índice congestión.	Existing
	UOCT Letreros de Mensaje Variable	8 letreros de mensaje variable.	Existing
	UOCT Sensores Ambientales	Sensores ambientales, tiempo, y condiciones peligrosas en las vias (e.g. hielo).	Planned
	UOCT Sensores de Transito		Planned
	UOCT Sistema de Almacenamiento de Datos de	Almacen de datos historicos incluyendo incidentes flujos	Existing

Stakeholder	Element Name	Element Description	Element Status
	Transito	vehiculares, peatonales, etc.	
	UOCT Sitio Web	Informacion para viajeros, etc.	Existing
Viajeros	Viajeros Equipo Personal de Viajeros	Viajeros Equipo Personal de Viajeros	Planned
	Viajeros Vehiculos Privados	Vehiculos Privados	Planned
VLT	VLT Equipo de Acceso de Vehiculos	Control de apertura de puertas y temperatura cámaras frigoríficas, tag antena.	Existing
	VLT Sistema de Registro Electronico de Vehiculos	Registro electrónico de ingreso y salida de vehículos y carga	Existing
	VLT Sistema de Seguimiento de Vehiculos	Seguimiento de vehículos y carga mediante GPS. Control de equipo que controla acceso del puerto por vehiculos (e.g., barreras automaticas).	Existing
	VLT Sitio Web	Sitio web	Existing
ZEAL	ZEAL Equipo de Acceso de Vehiculos	Control de apertura de puertas y temperatura cámaras frigoríficas	Planned
	ZEAL Sistema de Registro Electronico de Vehiculos	Registro electrónico de ingreso y salida de vehículos y carga	Planned
	ZEAL Sistema de Seguimiento de Vehiculos	Seguimiento de vehículos y carga mediante GPS. Control de equipo que controla acceso del puerto por vehiculos (e.g., barreras automaticas).	Planned
	ZEAL Sitio Web	Sitio web	Planned

4. TRANSPORTATION SERVICES AND OPERATIONAL CONCEPT

4.1. ITS Transportation Services

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

- Traffic Signal Control: The development of signaling systems that react to changing traffic conditions and provide coordinated intersection timing over a corridor, an area, or multiple jurisdictions.
- Freeway Control: The development of systems to monitor freeway (or tollway) traffic flow and roadway conditions, and provide strategies such as ramp metering or lane access control to improve the flow of traffic on the freeway. Includes systems to provide information to travelers on the roadway.
- Public Transportation Management: The development of systems to more efficiently manage fleets of transit vehicles or transit rail. Includes systems to provide transit traveler information both pre-trip and during the trip.
- Commercial Vehicle Operations: The development of systems to more efficiently manage commercial fleets, monitor freight movements, hazardous materials movement, safety inspections, and electronic clearance (both domestic and international).
- Traveler Information: The development of systems to provide static and real time transportation information to travelers.
- Incident Management: The development of systems to provide rapid and effective response to incidents. Includes systems to detect and verify incidents, along with coordinated agency response to the incidents.
- Emergency Management: The development of systems to provide emergency call taking, public safety dispatch, and emergency operations center operations.
- Maintenance and Construction Management: The development of systems to manage the maintenance of roadways in the region, including winter snow and ice clearance. Includes the managing of construction operations.
- Archive Data Management: The development of systems to collect transportation data for use in non-operational purposes (e.g. planning and research).

Table 4 shows the roles and responsibilities of the key stakeholders across these transportation areas.

4.2. Market Packages

In addition to general roles and responsibilities, an operational concept can include a list of services provided by each stakeholder. In the US National ITS Architecture the concept of market packages was created to provide a service oriented perspective to the description of ITS architectures.

Market Packages are tailored to fit, separately or in combination, real world transportation problems and needs. Market packages collect together one or more system elements that must work together to deliver a given transportation service and the architecture flows that connect them and other important external systems on the boundary of ITS. In other words, they identify the ITS system elements required to implement a particular transportation service. In the context of an Operational Concept, market packages provide an expansion on the role of the stakeholder. Table 3 provides a list of market packages applicable to the stakeholders of the National ITS Architecture of Chile. Table 4 maps candidate market packages for which stakeholder ITS systems might participate to provide that service. Table 3 below is a cross reference between Market Package acronyms used in Table 4 and the Market Package Name.

Table 3. Market Package Names

Advanced Traffic Management Systems Market Packages

(Covers Traffic Signal Control, Freeway Control, and Incident Management Transportation Services as described in Section 4.1)

ATMS01 - Network Surveillance
ATMS02 - Probe Surveillance
ATMS03 - Surface Street Control
ATMS04 - Freeway Control
ATMS05 - HOV Lane Management
ATMS06 - Traffic Info. Dissemination
ATMS07 - Regional Traffic Control
ATMS08 - Incident Management System
ATMS09 - Traffic Forecast and Demand Mgmt.
ATMS10 - Electronic Toll Collection
ATMS11 - Emissions Monitoring and Mgmt.
ATMS12 - Virtual TMC and Smart Probe Data
ATMS13 - Standard Railroad Grade Crossing
ATMS14 - Advanced Railroad Grade Crossing
ATMS15 - Railroad Operations Coordination
ATMS16 - Parking Facility Management
ATMS17 - Regional Parking Management
ATMS18 - Reversible Lane Management
ATMS19 - Speed Monitoring
ATMS20 - Drawbridge Management

Advanced Public Transportation Systems Market Packages

(Covers Public Transportation Management Transportation Services as described in Section 4.1)

APTS1 - Transit Vehicle Tracking

APTS2 - Transit Fixed-Route Operations
APTS3 - Demand Response Transit Operations
APTS4 - Transit Passenger and Fare Mgmt.
APTS5 - Transit Security
APTS6 - Transit Maintenance
APTS7 - Multi-modal Coordination
APTS8 - Transit Traveler Information

Commercial Vehicle Operations Market Packages

(Covers Commercial Vehicle Operations Transportation Services as described in Section 4.1)

CVO01 - Fleet Administration
CVO02 - Freight Administration
CVO03 - Electronic Clearance
CVO04 - CV Administrative Processes
CVO05 - International Border Electronic Clearance
CVO06 - Weigh-In-Motion
CVO07 - Roadside CVO Safety
CVO08 - On-board CVO Safety
CVO09 - CVO Fleet Maintenance
CVO10 - HAZMAT Management

Advanced Traveler Information System Market Packages

(Covers Traveler Information Transportation Services as described in Section 4.1)

ATIS1 - Broadcast Traveler Information
ATIS2 - Interactive Traveler Information
ATIS3 - Autonomous Route Guidance
ATIS4 - Dynamic Route Guidance
ATIS5 - ISP Based Route Guidance
ATIS6 - Integrated Transportation Mgmt/Route Guidance
ATIS7 - Yellow Pages and Reservation
ATIS8 - Dynamic Ridesharing
ATIS9 - In-Vehicle Signing

Emergency Management Market Packages

(Covers Emergency Management Transportation Services as described in Section 4.1)

EM1 - Emergency Response
EM2 - Emergency Routing
EM3 - Mayday Support
EM4 - Roadway Service Patrols

Maintenance and Construction Market Packages

(Covers Maintenance and Construction Transportation Services as described in Section 4.1)

MC01 - Maintenance and Construction Vehicle Tracking
MC02 - Maintenance and Construction Vehicle Maintenance
MC03 - Road Weather Data Collection
MC04 - Weather Information Processing and Distribution

MC05 - Roadway Automated Treatment
MC06 - Winter Maintenance
MC07 - Roadway Maintenance and Construction
MC08 - Work Zone Management
MC09 - Work Zone Safety Monitoring
MC10 - Maintenance and Construction Activity Coordination

Archived Data Management Market Packages

(Covers Archived Data Management Transportation Services as described in Section 4.1)

AD1 - ITS Data Mart
AD2 - ITS Data Warehouse
AD3 - ITS Virtual Data Warehouse

Table 4: Stakeholder Roles and Responsibilities

Transportation Service	Stakeholders	Roles/Responsibilities	Candidate Market Packages
Traffic Signal Control	State and Municipal Transportation Agencies: UOCT, SECTRA	Monitor urban traffic and arterials	ATMS01
		Operate traffic signal systems on state and municipal roads, including adaptive control.	ATMS03
		Interconnect with signal systems operated by adjacent municipalities	ATMS07
		Collect and provide vehicles emissions monitoring information	ATMS11
		Provide intersection signal preemption for public safety vehicles.	EM2
Freeway Control	Private Autopista Concessionaires	Monitor Freeways and Tollways	ATMS01
		Operate and Manage Tollways	ATMS04, ATMS06, ATMS10
		Operate and Manage Tunnels and Bridge Control Systems	ATMS01
		Incident detection, verification, tracking, and clean-up.	ATMS08
	Government Concessionaire Authority and Regulatory Agencies: MOP CGC	Manage and operate Concessionaire Reciprocity Network	ATMS10
		Collect information from Private Autopista Concessionaires for planning, regulation, and auditing purposes	AD1
Public Transportation Management	Private Transit Operators	Monitor transit vehicle routes and schedule adherence; provide fixed route service bus to municipal, regional, and multi-regional (intercity) areas.	APTS1, APTS2, APTS4
		Maintain vehicles and report maintenance information to Government Public Transportation Authorities.	APTS6
	Government Public Transportation Authority and Regulatory Agencies: MOP, MTT	Collect information from Private Transit Operators for planning, regulation, and auditing purposes.	AD1, APTS4, APTS6

Transportation Service	Stakeholders	Roles/Responsibilities	Candidate Market Packages
		Operate and Control Subways, Light Rail, and multi-modal transfer facilities	APTS2, APTS4, APTS7
		Operate traveler information systems (kiosks, point-of-sale systems, and information displays at transit stations and stops)	APTS8
Commercial Vehicle Operations	Private Commercial Vehicle Operators	Operate private fleets, track commercial vehicle location, move freight	CVO01, CVO02
	Private Commercial Vehicle Operators, MOP DV, Carabineros	HAZMAT Emergency Management	CVO10
	Private Commercial Vehicle Operators, MOP DV, Port and Airport Authorities and Regulatory Agencies: Direccion General incluyendo Aeronautica Civil y Putertos	Operate inter-modal transportation facilities. Track freight from source to destination using electronic toll collection technologies.	CVO02, ATMS10
		Operate parking at port and airport facilities, and monitor commercial vehicle location and delay	ATMS16, CVO01
		Freight inspection and tracking (including international borders)	CVO03, CVO04, CVO05
		Provide coordination between commercial vehicle operators and ports and airports, and operate automated electronic clearance and inspection systems	ATMS10
		Monitor commercial vehicle transportation corridors using electronic tag readers.	ATMS02
		Control commercial vehicle access (gates, access-ways to ships and planes, etc.)	ATMS03, ATMS04
	SECTRA, MOP DV	Receive commercial vehicle statistics. Use information for planning.	AD1
Traveler Information	Private Concessionaires / Transportation Agencies	Provide basic traffic and maintenance/ construction information to the public via website. Information is also made available to media for broadcast via radio, television, and newpapers.	ATIS01
	Private Telematics Providers	Collect traffic and incident information from transportation agencies in the region	ATIS01, ATIS02

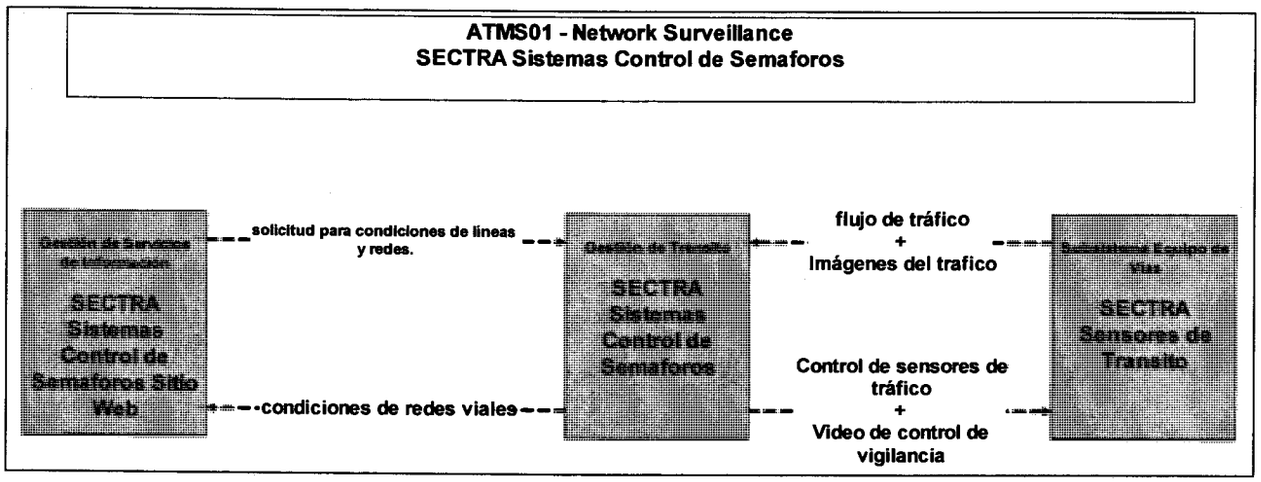
Transportation Service	Stakeholders	Roles/Responsibilities	Candidate Market Packages
Traveler Information	Private Telematics Providers	Provide road congestion and construction information to the public via mobile personal computing devices, private web sites, and rest stop computer terminals.	ATIS02
		Provide in-vehicle information for private vehicles, public transportation vehicles, commercial vehicles, fleets for routing	ATIS05
Incident Management	Public Safety Agencies / Transportation Agencies	Perform incident detection and verification for municipal or state roadways.	ATMS08
		Coordinate incident response with Public Safety Agencies	ATMS08
		Provide incident information to Public Safety and Local emergency operations	ATMS08
		Receive traffic and incident video from State and Municipal Transportation Agencies	ATMS08
		Receive emergency calls for incidents within the stakeholder jurisdiction	EM1
		Dispatch Police, and notify Fire, and EMS to incidents within jurisdiction	EM1
		Provide incident information to State and Municipal Transportation Agency	ATMS08
Emergency Management	Carabineros	Provide emergency call taking for state and municipal jurisdictions.	EM1
		Dispatch police, fire, and EMS for state and municipal jurisdiction	EM2
		Develop state and municipal emergency preparedness plan	EM1
		Provide municipal Emergency Operations Center responsible for directing emergency operations during major emergencies and disasters.	EM1
	Private Telematics Providers / Carabineros	Mayday support for vehicles	EM3
	Bomberos	Develop emergency preparedness plan Dispatch Fire and Rescue Vehicles	EM1 EM2
	SAMU	Develop emergency preparedness plan Dispatch Emergency Medical Vehicles	EM1 EM2

Transportation Service	Stakeholders	Roles/Responsibilities	Candidate Market Packages
Maintenance and Construction Management	MOP DV and Municipalities	Maintains state and municipal maintenance and construction vehicles	MC01, MC02
		Provide maintenance of State or Municipal roads including snow and ice control and pavement maintenance.	MC03, MC04, MC06
	MOP DV	Provide maintenance of state roadways including snow and ice control and pavement maintenance. Provide management of road construction projects on state highways	MC05, MC06 MC07, MC08, MC09, MC10
Archived Data Management	SECTRA	Collect and archive data generated from ITS sources in the state and coordinate archived information for use in planning, evaluation, program assessment, and research applications.	AD1, AD3

4.2.1. Customized Market Packages

The market packages of the US National ITS Architecture were customized to reflect the unique systems and connections of Chile. Each market package is shown graphically with the market package name, and the Market Package elements (shown as boxes) identified by the entity from the US National ITS Architecture that they represent and the specific instances of Chile ITS elements associated with the entity. In addition the market packages show the information flows (also known as Architecture Flows) that move between elements.

Figure 1: Example Customized Market Package



A complete set of customized market packages are accessible via the National ITS Architecture of Chile web site by clicking on the *Market Packages* button.

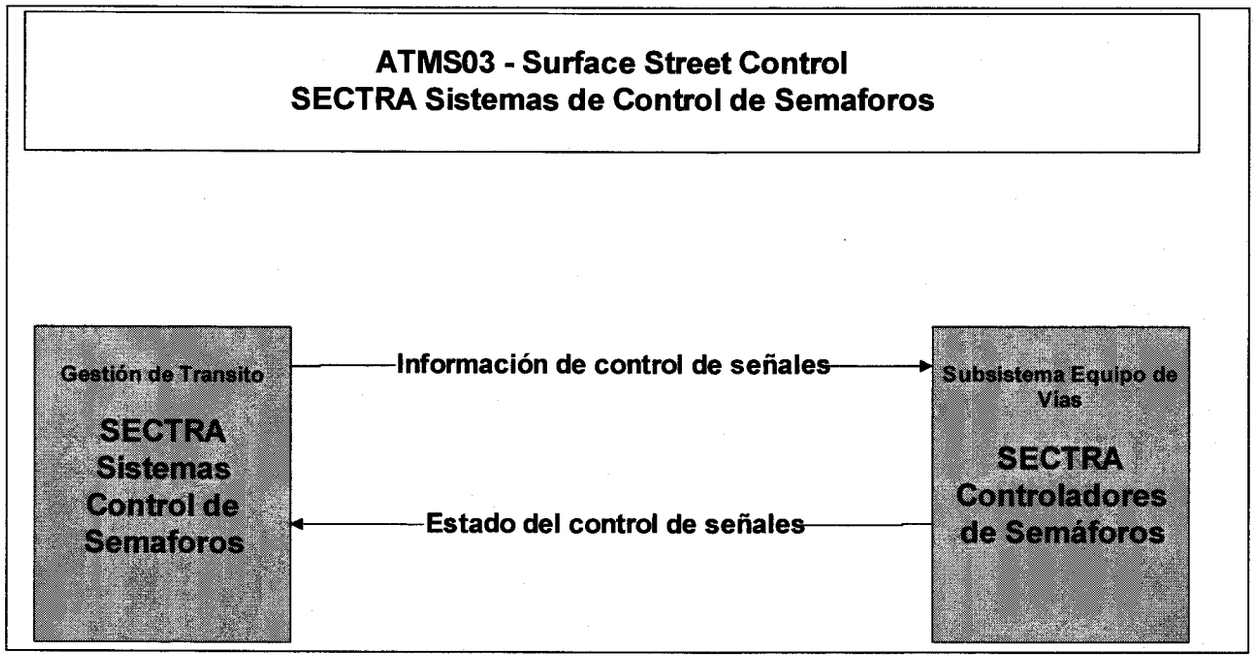
The following sections illustrate the general approach in which transportation services are implemented (both existing and future) in Chile. Each section below details the following: 1) an illustration of one or more example customized market packages which show how stakeholders use ITS system to support the providing of transportation services, 2) a short narrative to describe the primary interactions shown on the market package, and 3) a list of centers that participate in one of more customized market packages of a given type (e.g., ATMS03).

4.3. Traffic Signal Control

4.3.1. ATMS03 – Surface Street Control

Example Market Package

Figure 2: Example ATMS03 Market Package



Description

This market package provides for monitoring and control of traffic signal control roadside elements.

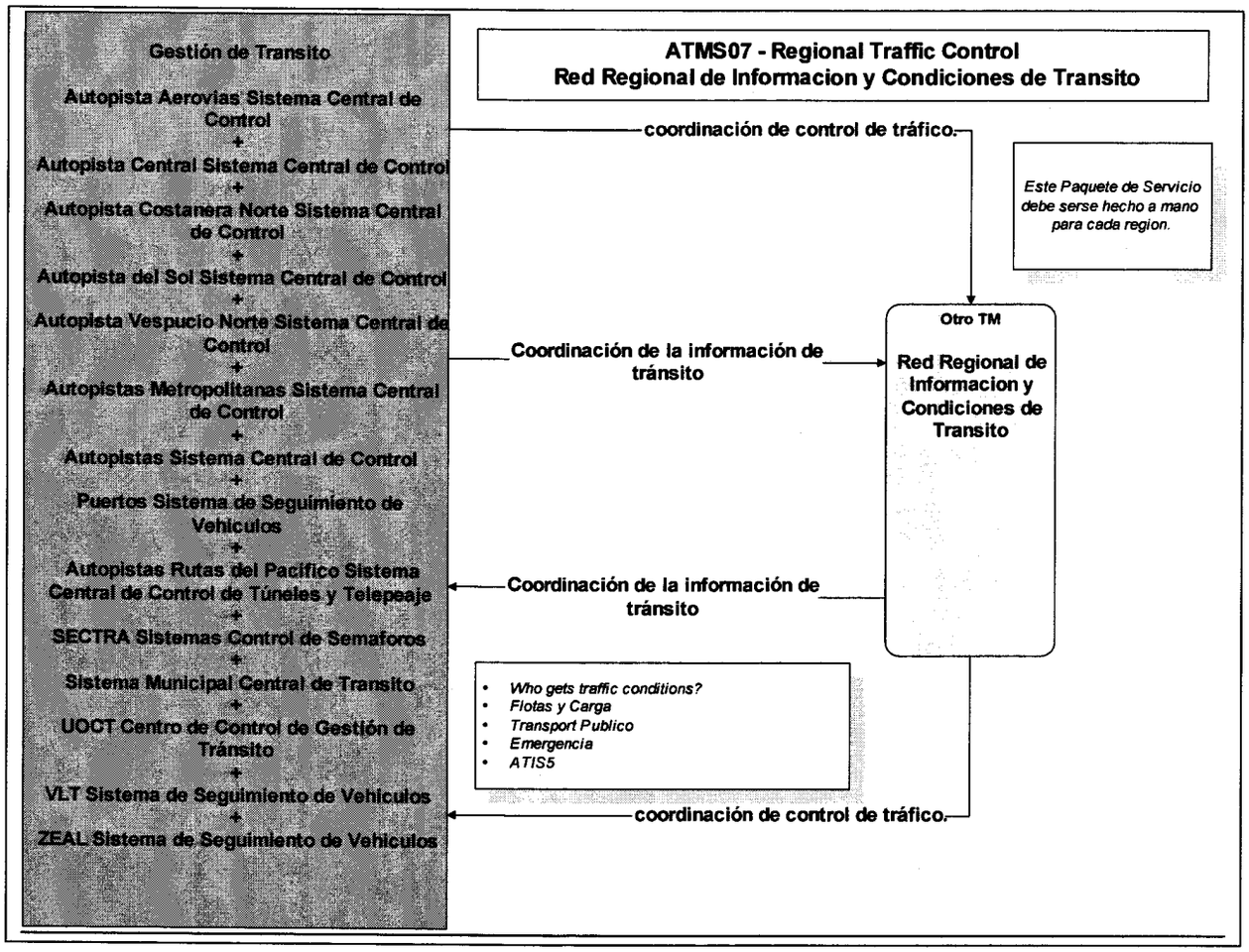
Centers Participating in Market Package

Stakeholder	Element
Municipalidad	Sistema Municipal Central de Transito
SECTRA	SECTRA Sistemas Control de Semaforos
UOCT	UOCT Centro de Control de Gestión de Tránsito

4.3.2. ATMS07 – Regional Traffic Control

Example Market Package

Figure 3: Example ATMS07 Market Package



Description

This market package provides coordination (information sharing and device control) between traffic management centers. This market package is applicable to multi-jurisdictional and regional traffic control and coordination.

Centers Participating Market Package

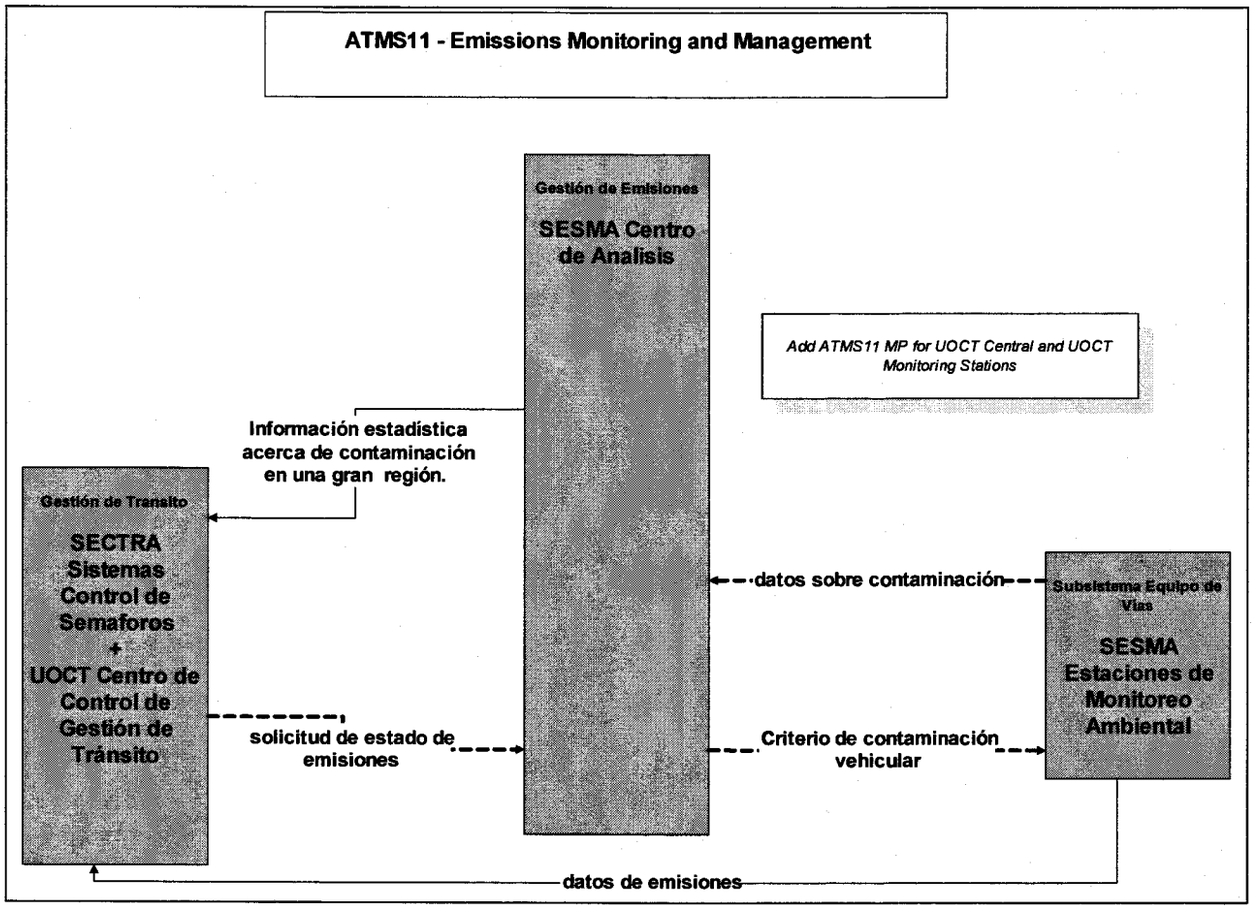
Stakeholder	Element
Autopista Aerovías S.A.	Autopista Aerovias Sistema Central de Control
Autopista Central S.A.	Autopista Central Sistema Central de Control
Autopista Costanera Norte S.A.	Autopista Costanera Norte Sistema Central de Control
Autopista del Sol S.A.	Autopista del Sol Sistema Central de Control

Stakeholder	Element
Autopista Vespucio Norte S.A.	Autopista Vespucio Norte Sistema Central de Control
Autopistas	Autopistas Sistema Central de Control
Autopistas Metropolitanas S.A.	Autopistas Metropolitanas Sistema Central de Control
Municipalidad	Sistema Municipal Central de Transito
Rutas del Pacífico S.A.	Autopistas Rutas del Pacifico Sistema Central de Control de Túneles y Telepeaje
SECTRA	SECTRA Sistemas Control de Semaforos
UOCT	UOCT Centro de Control de Gestión de Tránsito

4.3.3. ATMS11 – Emissions Monitoring

Example Market Package

Figure 4: Example ATMS11 Market Package



Description

This market package provides for emissions monitoring and communication of emissions and air quality information between roadside and center elements, and center-to-center communications between operators of traffic management systems and emissions monitoring agencies.

Centers Participating in Market Package

Stakeholder	Element
SECTRA	SECTRA Sistemas Control de Semaforos
SESMA	SESMA Centro de Analisis
UOCT	UOCT Centro de Control de Gestión de Tránsito

4.3.4. Other Traffic Signal Control Support Market Packages

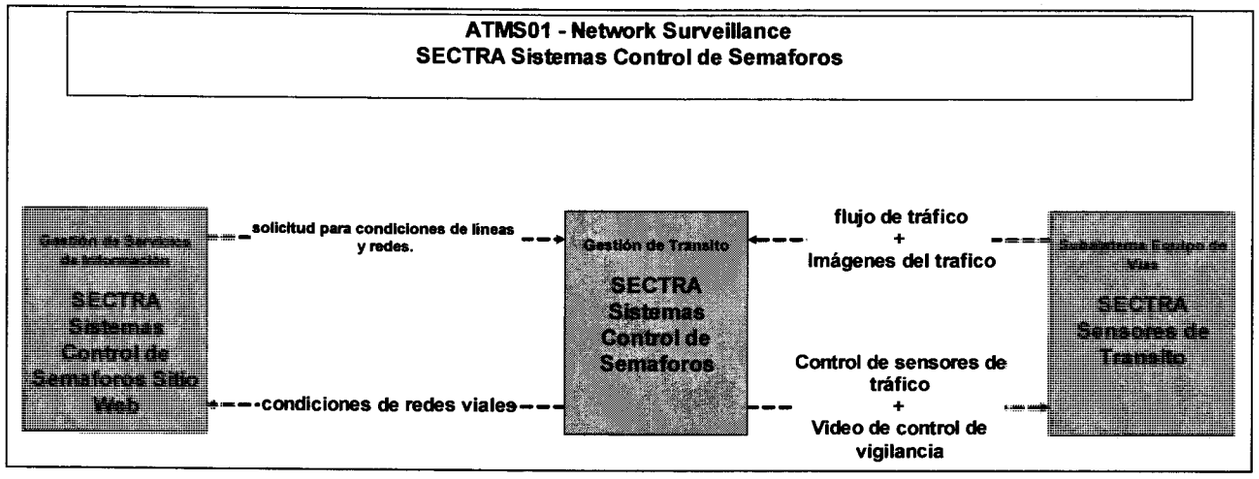
Market Package	Support Role
ATMS13 – Standard Railroad Grade Crossing	This market package provides the ability to coordinate signalized intersections with rail wayside equipment to restrict movement of vehicles into highway-rail intersections.

4.4. Freeway Control

4.4.1. ATMS01 – Network Surveillance

Example Market Package

Figure 5: Example ATMS01 Market Package



Description

The market package provides for monitoring of traffic and network conditions through sensors and closed-circuit television cameras. Traffic and network conditions may also be made available to private as well as public, agency run, traveler information systems.

Centers Participating in Market Package

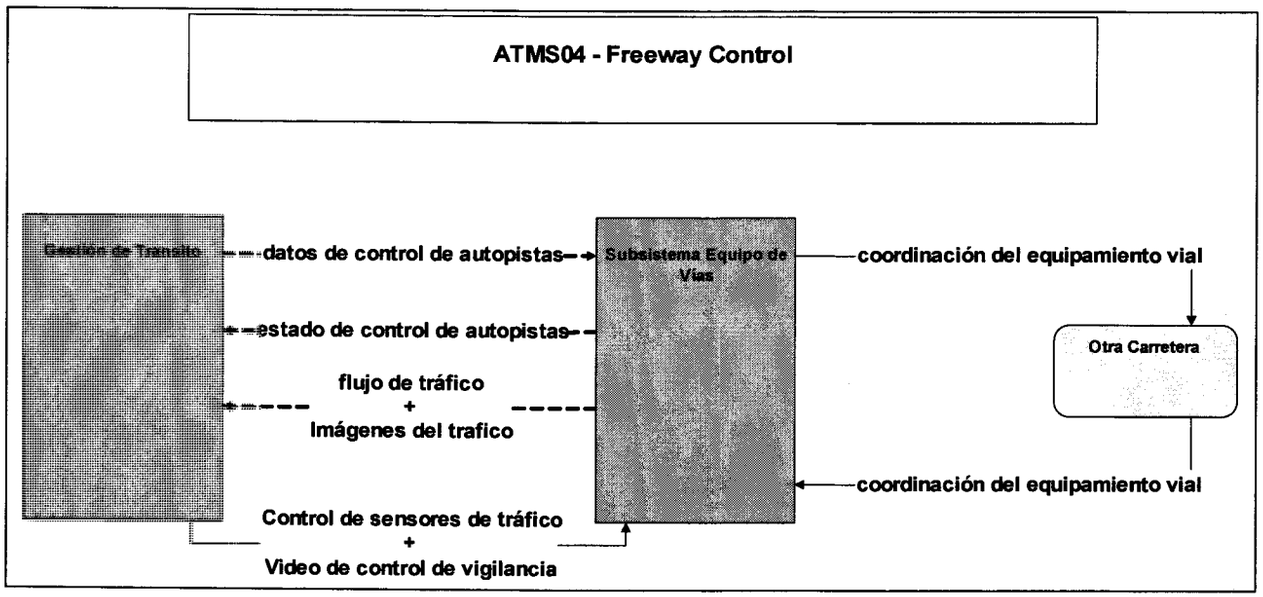
Stakeholder	Element
Autopista Aerovías S.A.	Autopista Aerovias Sistema Central de Control
Autopista Aerovías S.A.	Autopista Aerovias Sitio Web

Stakeholder	Element
Autopista Central S.A.	Autopista Central Sistema Central de Control
Autopista Central S.A.	Autopista Central Sitio Web
Autopista Costanera Norte S.A.	Autopista Costanera Norte Sistema Central de Control
Autopista Costanera Norte S.A.	Autopista Costanera Norte Sitio Web
Autopista del Sol S.A.	Autopista del Sol Sistema Central de Control
Autopista del Sol S.A.	Autopista del Sol Sitio Web
Autopista Vespucio Norte S.A.	Autopista Vespucio Norte Sistema Central de Control
Autopista Vespucio Norte S.A.	Autopista Vespucio Norte Sitio Web
Autopistas	Autopistas Sistema Central de Control
Autopistas	Autopistas Sitio Web
Autopistas Metropolitanas S.A.	Autopistas Metropolitanas Sistema Central de Control
Autopistas Metropolitanas S.A.	Autopistas Metropolitanas Sitio Web
Municipalidad	Sistema Municipal Central de Transito
Municipalidad	Sistema Municipal Sitio Web
Rutas del Pacífico S.A.	Autopistas Rutas del Pacifico Sistema Central de Control de Túneles y Telepeaje
Rutas del Pacífico S.A.	Autopistas Rutas del Pacifico Sitio web
SECTRA	SECTRA Sistemas Control de Semáforos
SECTRA	SECTRA Sistemas Control de Semaforos Sitio Web
UOCT	UOCT Centro de Control de Gestión de Tránsito
UOCT	UOCT Sitio Web

4.4.2. ATMS04 – Freeway Control

Example Market Package

Figure 6: Example ATMS04 Market Package



Description

This market package provides for traffic control on freeways and tollways through a variety of devices including ramp meters and lane control signals.

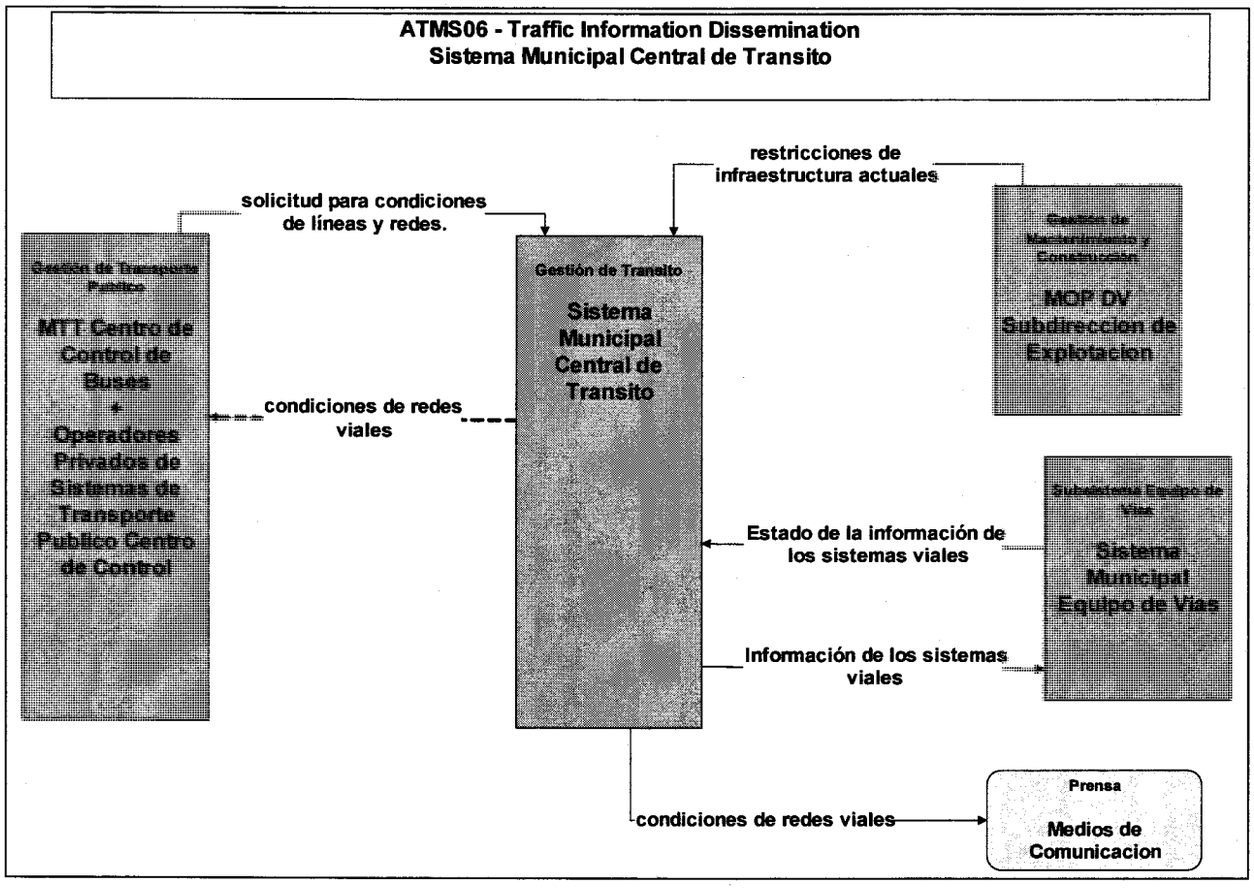
Centers Participating in Market Package

No center elements have been associated with this market package. This market package has been identified as a candidate based on an analysis of transportation services and stakeholder roles and responsibilities. This market package has been left in this report because of the possibility that stakeholders may want to introduce it into the architecture prior to the completion of the National ITS Architecture of Chile project.

4.4.3. ATMS06 – Traffic Information Dissemination

Example Market Package

Figure 7: Example ATMS06 Market Package



Description

This market package allows traffic information to be disseminated to drivers and vehicles using roadway equipment such as dynamic message signs or highway advisory radio. Additionally, this market package provides for communication with other centers for sharing of information about road network conditions and traffic impediments.

Centers Participating in Market Package

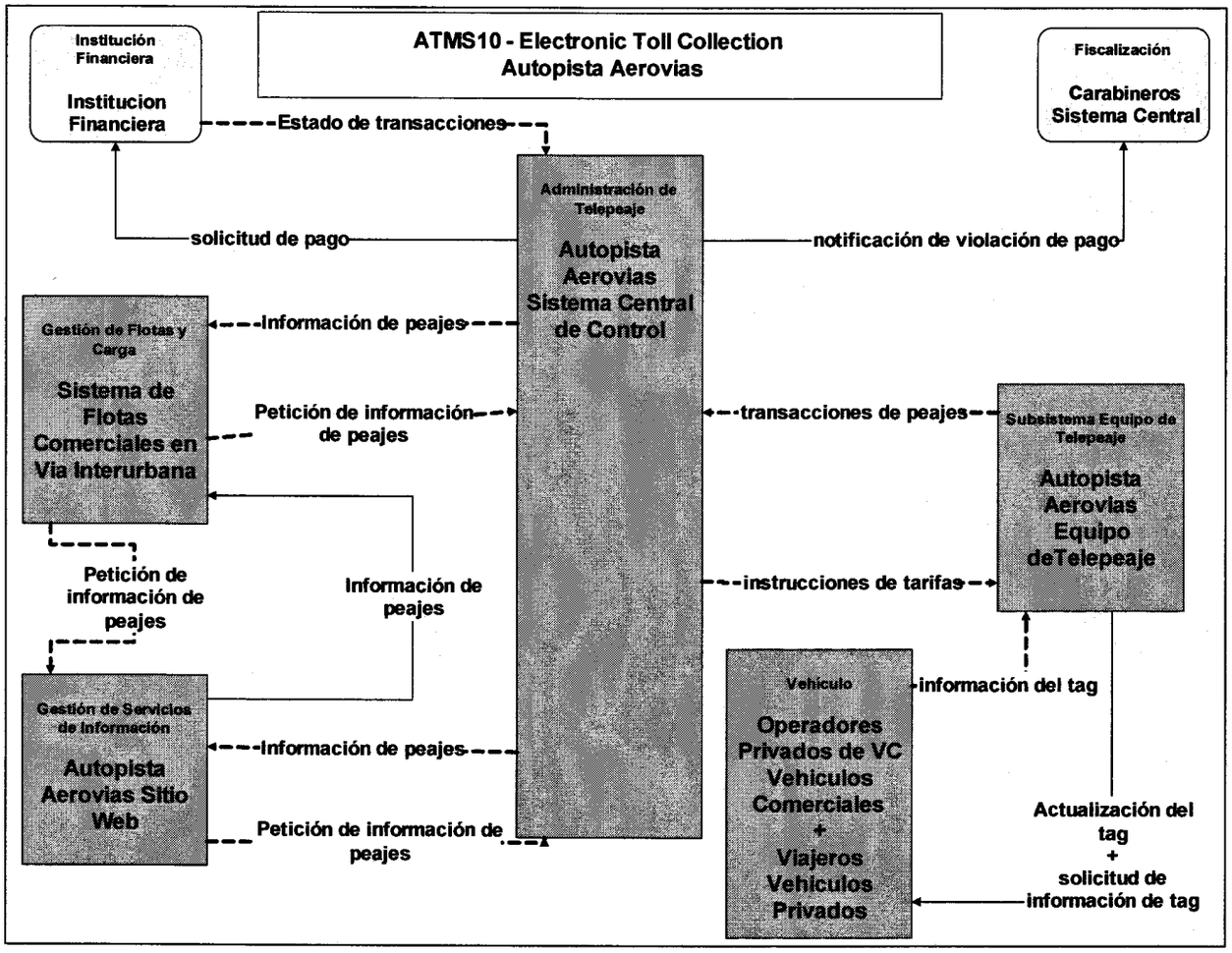
Stakeholder	Element
Autopista Aerovías S.A.	Autopista Aerovias Sistema Central de Control
Autopista Central S.A.	Autopista Central Sistema Central de Control
Autopista Costanera Norte S.A.	Autopista Costanera Norte Sistema Central de Control
Autopista del Sol S.A.	Autopista del Sol Sistema Central de Control
Autopista Vespucio Norte S.A.	Autopista Vespucio Norte Sistema Central de Control

Stakeholder	Element
Autopistas	Autopistas Sistema Central de Control
Autopistas Metropolitanas S.A.	Autopistas Metropolitanas Sistema Central de Control
Metro S.A.	MTT Centro de Control de Buses
MOP Dirección de Vialidad	MOP DV Subdireccion de Explotacion
Municipalidad	Sistema Municipal Central de Transito
Operadores Privados de Sistemas de Transporte Publico	Operadores Privados de Sistemas de Transporte Publico Centro de Control
Rutas del Pacífico S.A.	Autopistas Rutas del Pacifico Sistema Central de Control de Túneles y Telepeaje
SECTRA	SECTRA Sistemas Control de Semaforos
UOCT	UOCT Centro de Control de Gestión de Tránsito

4.4.4. ATMS10 – Electronic Toll Collection

Example Market Package

Figure 8: Example ATMS10 Market Package



Description

This market package provides the ability to collect tolls electronically and detect and process violators.

Centers Participating in Market Package

Stakeholder	Element
Autopista Aerovías S.A.	Autopista Aerovias Sistema Central de Control
Autopista Aerovías S.A.	Autopista Aerovias Sitio Web
Autopista Central S.A.	Autopista Central Sistema Central de Control
Autopista Central S.A.	Autopista Central Sitio Web
Autopista Costanera Norte S.A.	Autopista Costanera Norte Sistema Central de Control

Stakeholder	Element
Autopista Costanera Norte S.A.	Autopista Costanera Norte Sitio Web
Autopista del Sol S.A.	Autopista del Sol Sistema Central de Control
Autopista del Sol S.A.	Autopista del Sol Sitio Web
Autopista Vespucio Norte S.A.	Autopista Vespucio Norte Sistema Central de Control
Autopista Vespucio Norte S.A.	Autopista Vespucio Norte Sitio Web
Autopistas	Autopistas Sistema Central de Control
Autopistas	Autopistas Sitio Web
Autopistas Metropolitanas S.A.	Autopistas Metropolitanas Sistema Central de Control
Autopistas Metropolitanas S.A.	Autopistas Metropolitanas Sitio Web
Carabineros	Carabineros Sistema Central
Red de Sistemas de Concesionarios	Red de Servicio y Reciprocidad de Concesionarios
Rutas del Pacífico S.A.	Autopistas Rutas del Pacifico Sistema Central de Control de Túneles y Telepeaje
Rutas del Pacífico S.A.	Autopistas Rutas del Pacifico Sitio web

4.4.5. Other Freeway Control Support Market Packages

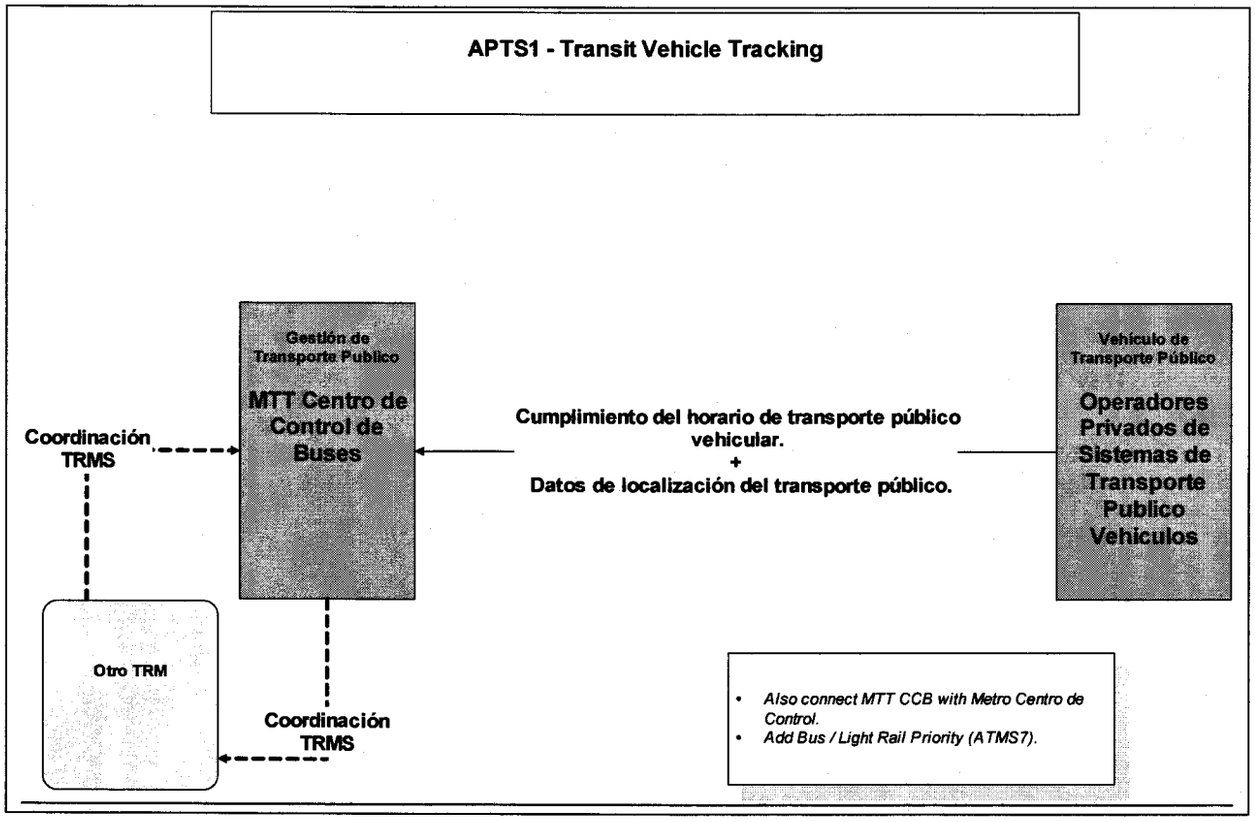
Market Package	Support Role
ATMS08 – Incident Management	Incident detection via traffic surveillance systems, and sharing of information with emergency management and public safety agencies.

4.5. Public Transportation Management

4.5.1. APTS1 – Transit Vehicle Tracking

Example Market Package

Figure 9: Example APTS1 Market Package



Description

This market package monitors current transit vehicle location using an Automated Vehicle Location System. The location data may be used to determine real time schedule adherence and update the transit system's schedule in real-time.

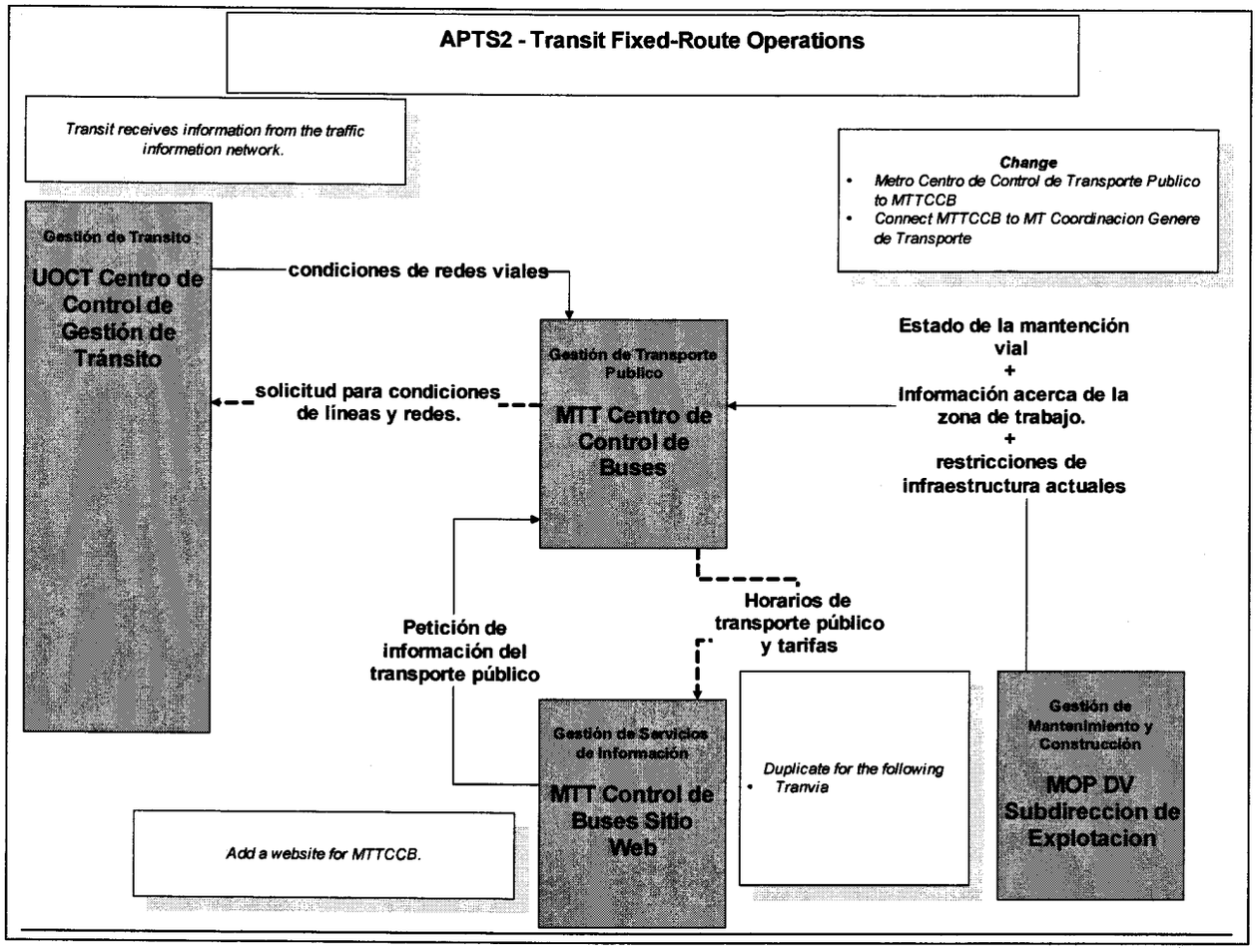
Centers Participating in Market Package

Stakeholder	Element
Metro S.A.	MTT Centro de Control de Buses
Operadores Privados de Sistemas de Transporte Publico	Operadores Privados de Sistemas de Transporte Publico Centro de Control

4.5.2. APTS2 – Transit Fixed-Route Operations

Example Market Package

Figure 10: Example APTS2 Market Package



Description

Market package provides vehicle routing and scheduling, and driver assignment and monitoring, for fixed-route Transit Services.

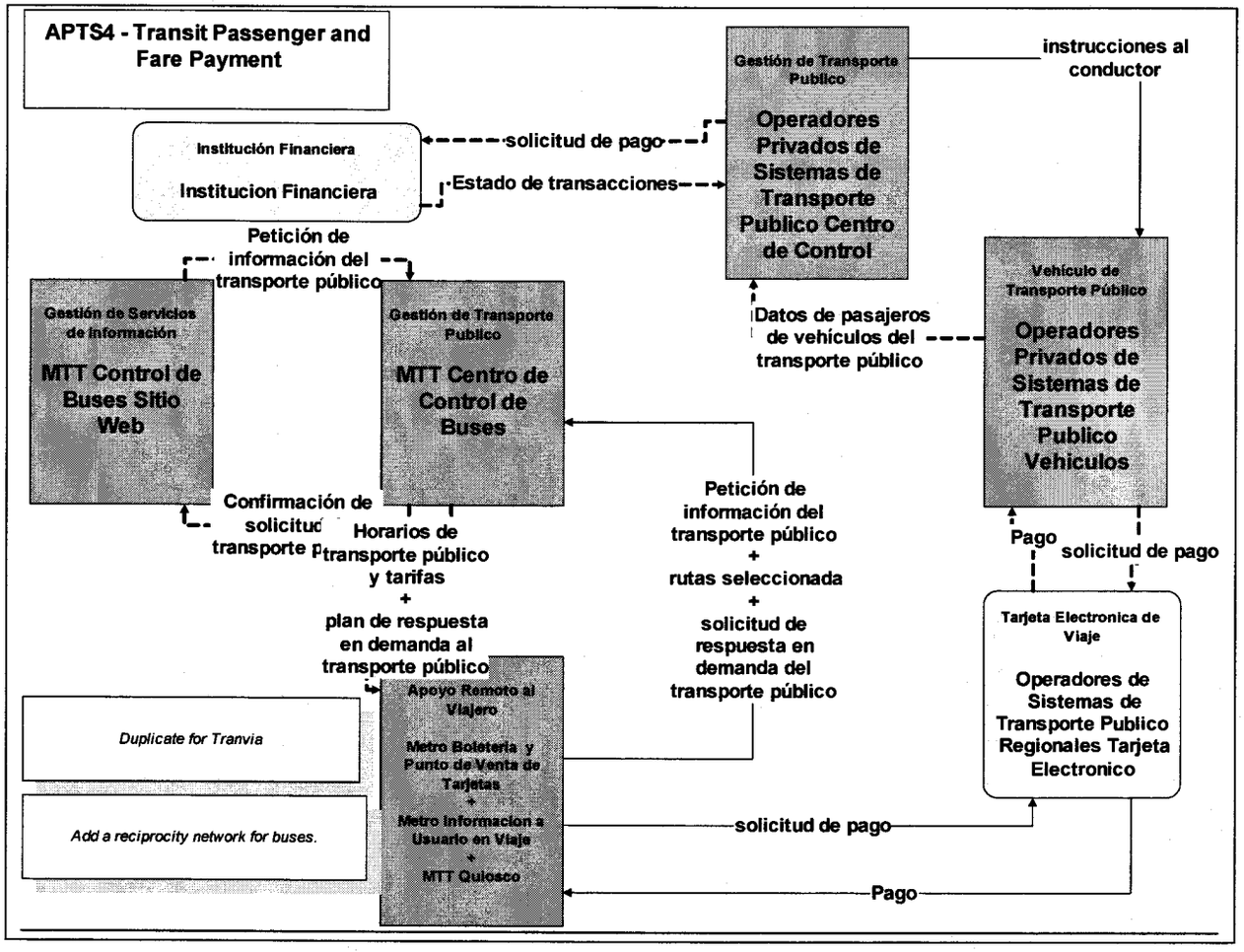
Centers Participating in Market Package

Stakeholder	Element
Metro S.A.	MTT Centro de Control de Buses
Metro S.A.	MTT Control de Buses Sitio Web
MOP Dirección de Vialidad	MOP DV Subdireccion de Explotacion
UOCT	UOCT Centro de Control de Gestión de Tránsito

4.5.3. APTS4 – Transit Passenger and Fare Management

Example Market Package

Figure 11: Example APTS4 Market Package



Description

Market package provides for the management of passenger loading and fare payments on-board vehicles using electronic means.

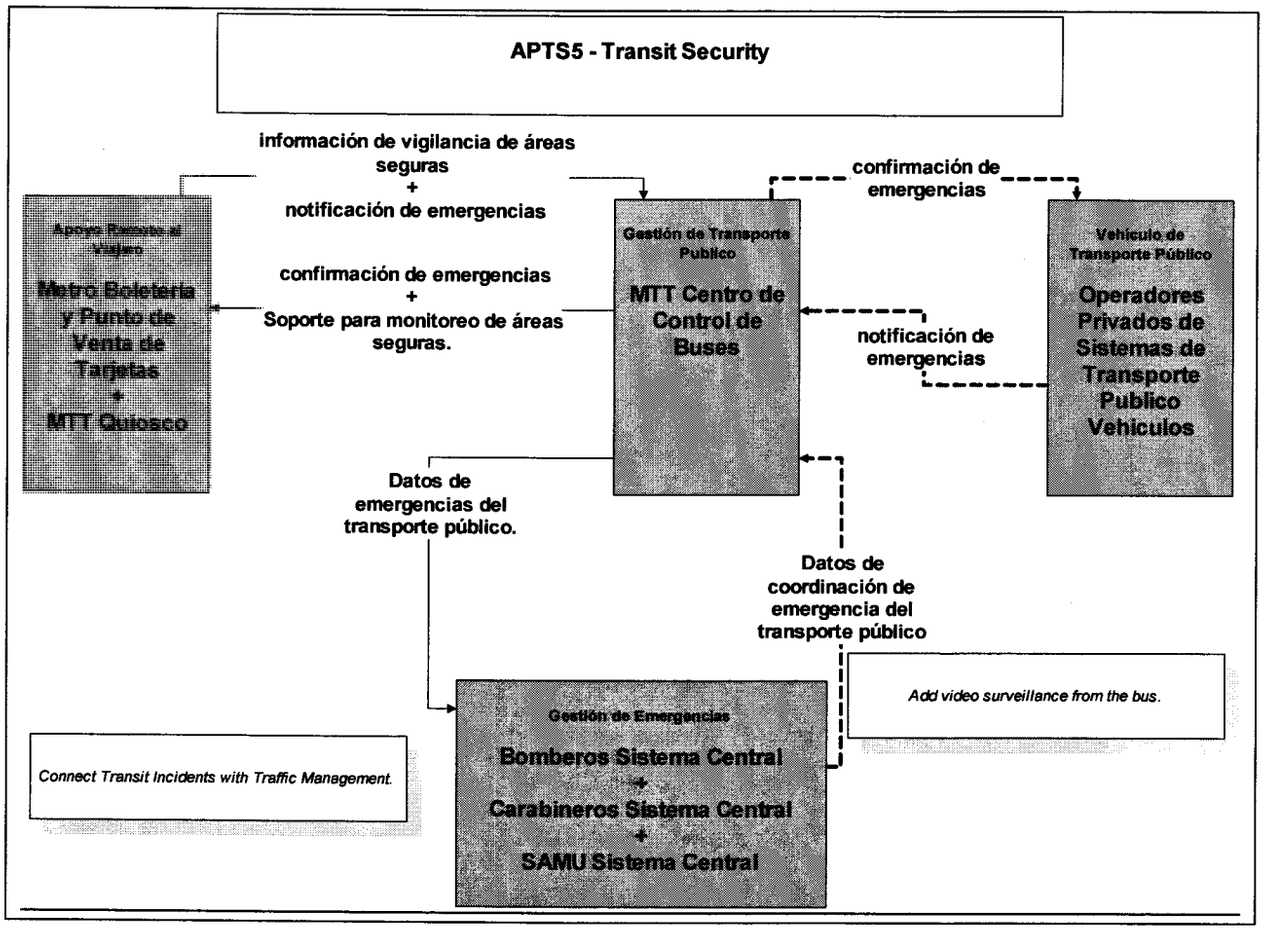
Centers Participating in Market Package

Stakeholder	Element
Metro S.A.	MTT Centro de Control de Buses
Metro S.A.	MTT Control de Buses Sitio Web
Operadores Privados de Sistemas de Transporte Publico	Operadores Privados de Sistemas de Transporte Publico Centro de Control

4.5.4. APTS5 – Transit Security

Example Market Package

Figure 12: Example APTS5 Market Package



Description

This market package provides for the physical security of transit passengers. An on-board security system is deployed to perform surveillance and warn of potentially hazardous situations. Public areas (e.g. stops, park and ride lots, stations) are also monitored.

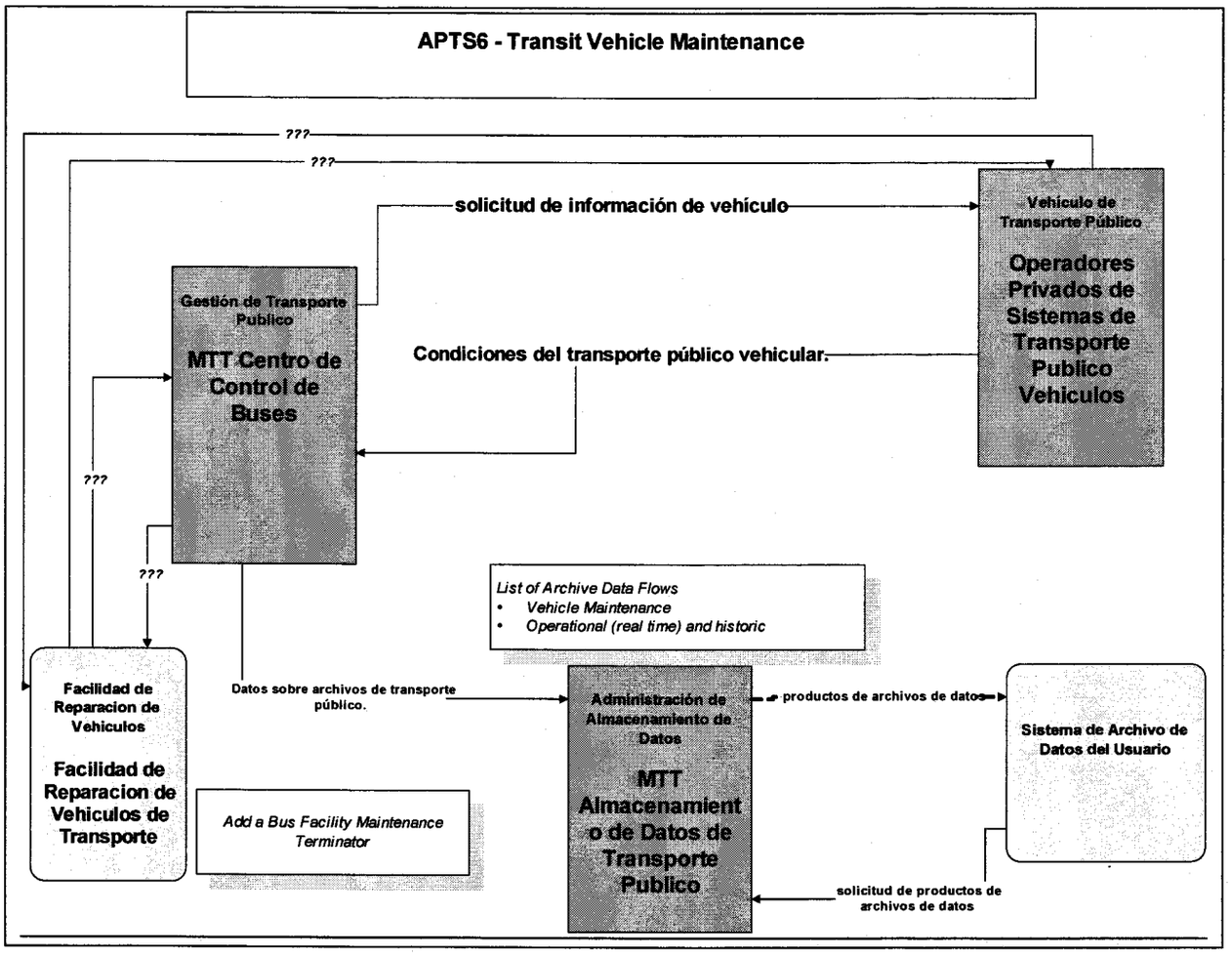
Centers Participating in Market Package

Stakeholder	Element
Metro S.A.	MTT Centro de Control de Buses
Operadores Privados de Sistemas de Transporte Publico	Operadores Privados de Sistemas de Transporte Publico Centro de Control

4.5.5. APTS6 – Transit Vehicle Maintenance

Example Market Package

Figure 13: Example APTS6 Market Package



Description

This market package supports automatic transit maintenance scheduling and monitoring. On-board condition sensors monitor system status and transmit critical status information to the Transit Management Subsystem.

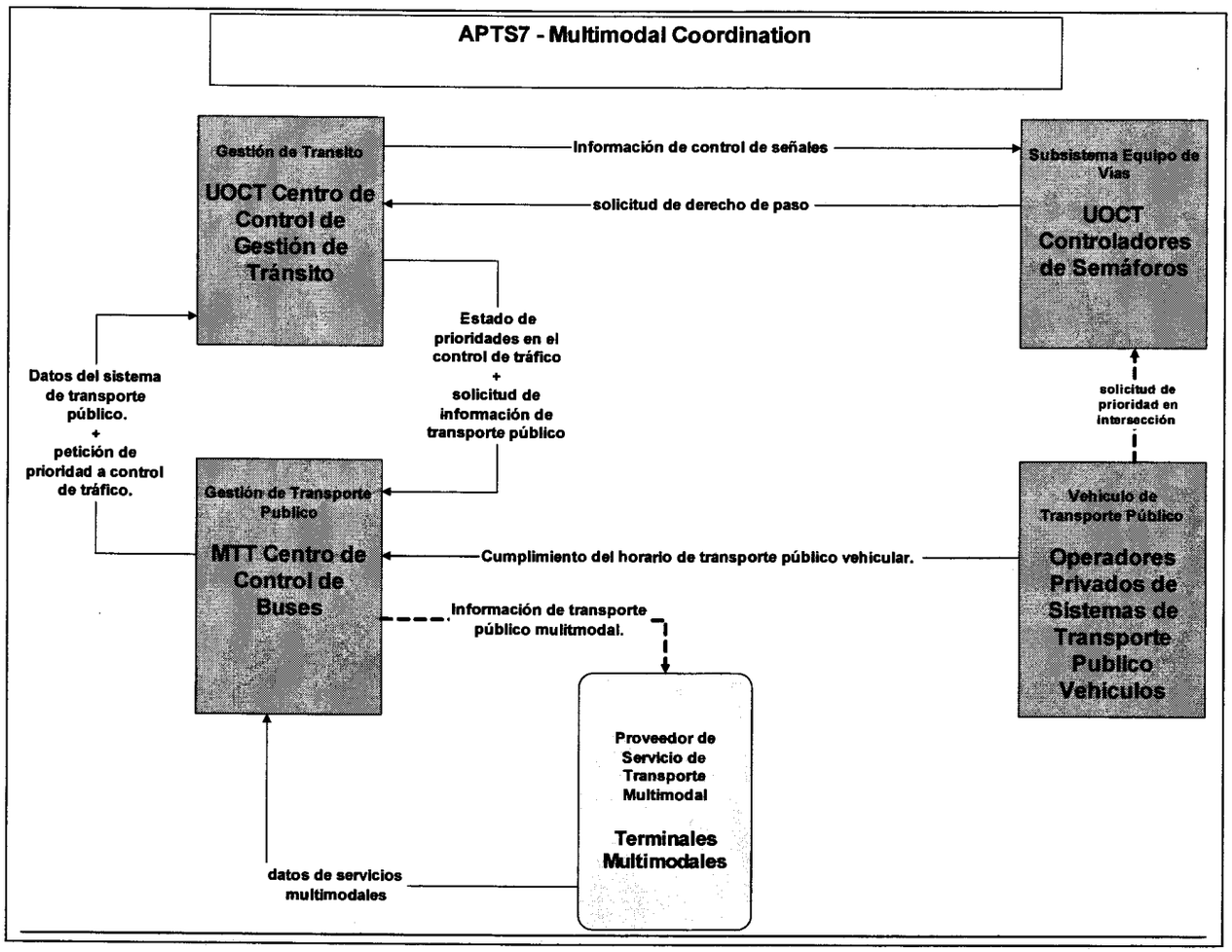
Centers Participating in Market Package

Stakeholder	Element
Metro S.A.	MTT Centro de Control de Buses
Operadores Privados de Sistemas de Transporte Publico	Operadores Privados de Sistemas de Transporte Publico Centro de Control

4.5.6. APTS7 – Multi-modal Coordination

Example Market Package

Figure 14: Example APTS7 Market Package



Description

Market package provides coordination between traffic and transit management, including coordination between the transit vehicle and individual intersections for signal priority. Also includes coordination between transit agencies.

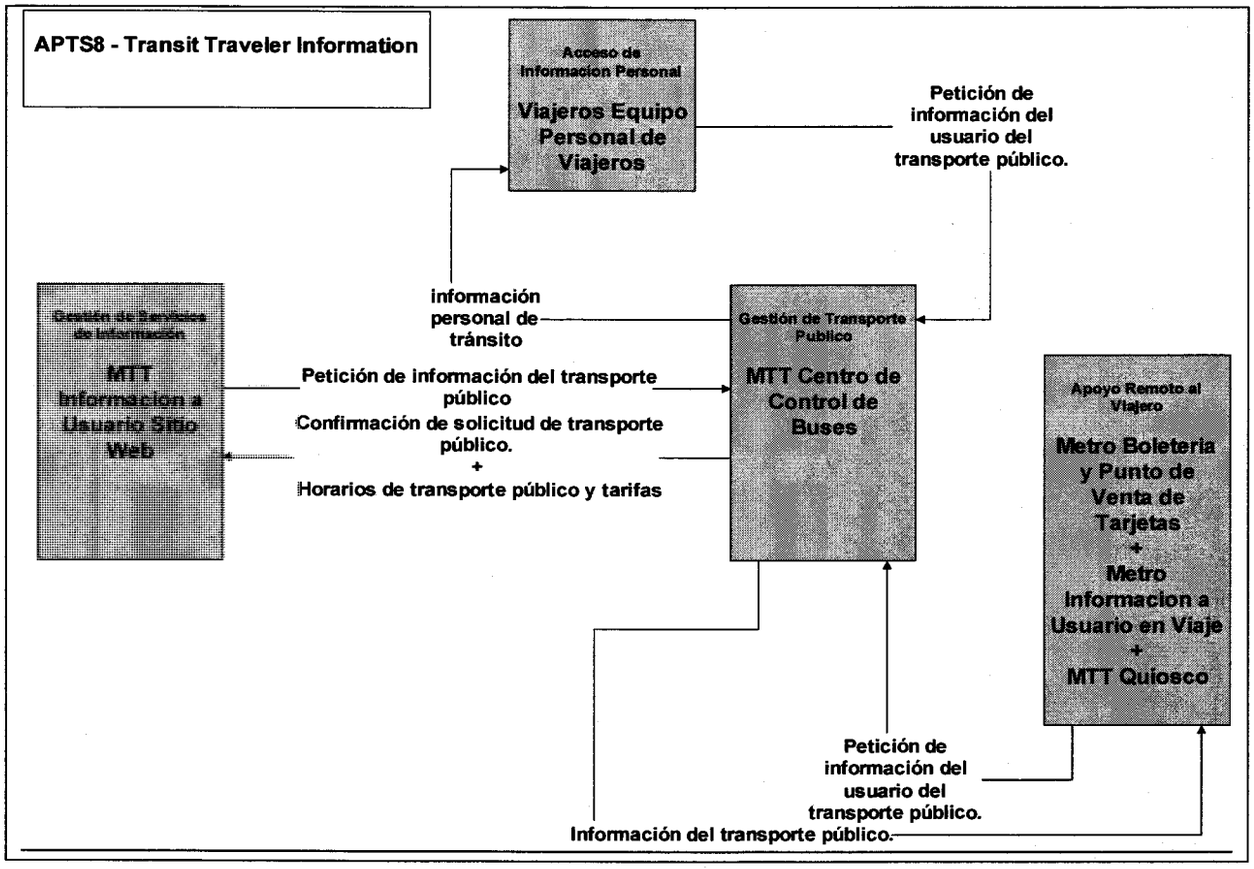
Centers Participating in Market Package

Stakeholder	Element
Metro S.A.	MTT Centro de Control de Buses
Operadores Privados de Sistemas de Transporte Publico	Operadores Privados de Sistemas de Transporte Publico Centro de Control
UOCT	UOCT Centro de Control de Gestión de Tránsito

4.5.7. APTS8 – Transit Traveler Information

Example Market Package

Figure 15: Example APTS8 Market Package



Description

Market package provides transit users at transit stops and on-board transit vehicles with ready access to transit information. The information services include transit stop annunciation, imminent arrival signs, and real-time transit schedule displays.

Centers Participating in Market Package

Stakeholder	Element
Metro S.A.	MTT Centro de Control de Buses
MTT	MTT Informacion a Usuario Sitio Web

4.5.8. Other Public Transportation Support Market Packages

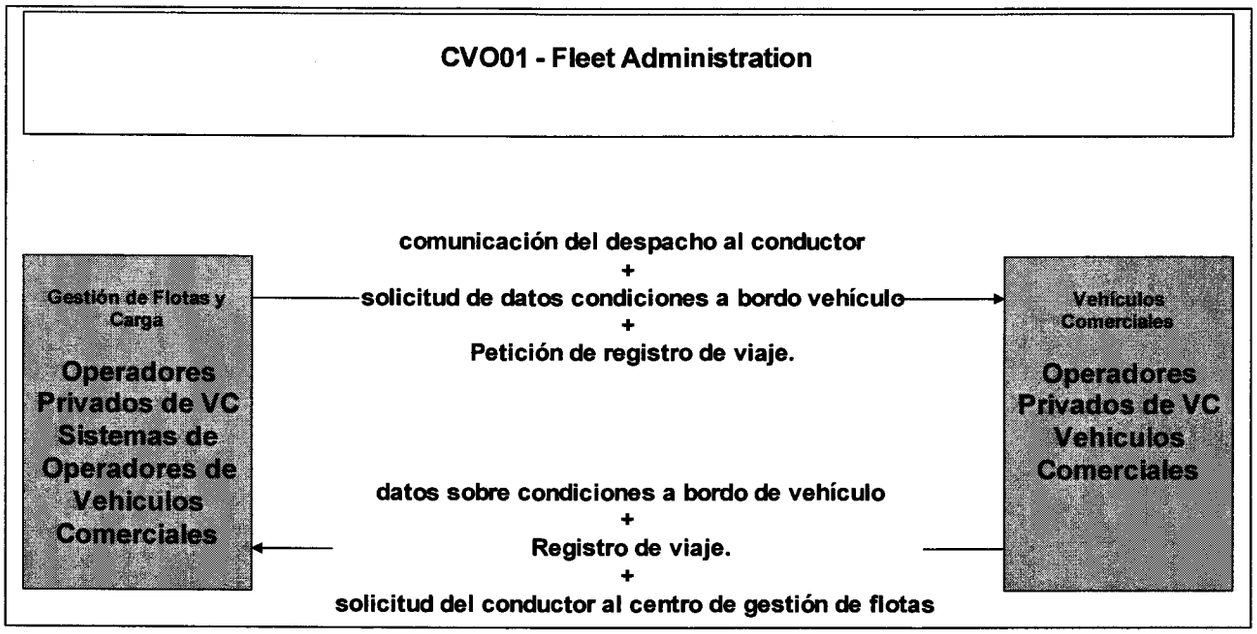
Market Package	Support Role
AD1 – ITS Data Mart	Transit ridership, route information, and regulatory information data collection and archival data management.

4.6. Commercial Vehicle Operations

4.6.1. CVO01 – Fleet Administration

Example Market Package

Figure 16: Example CVO01 Market Package



Description

This market package provides the capabilities to manage a fleet of commercial vehicles.

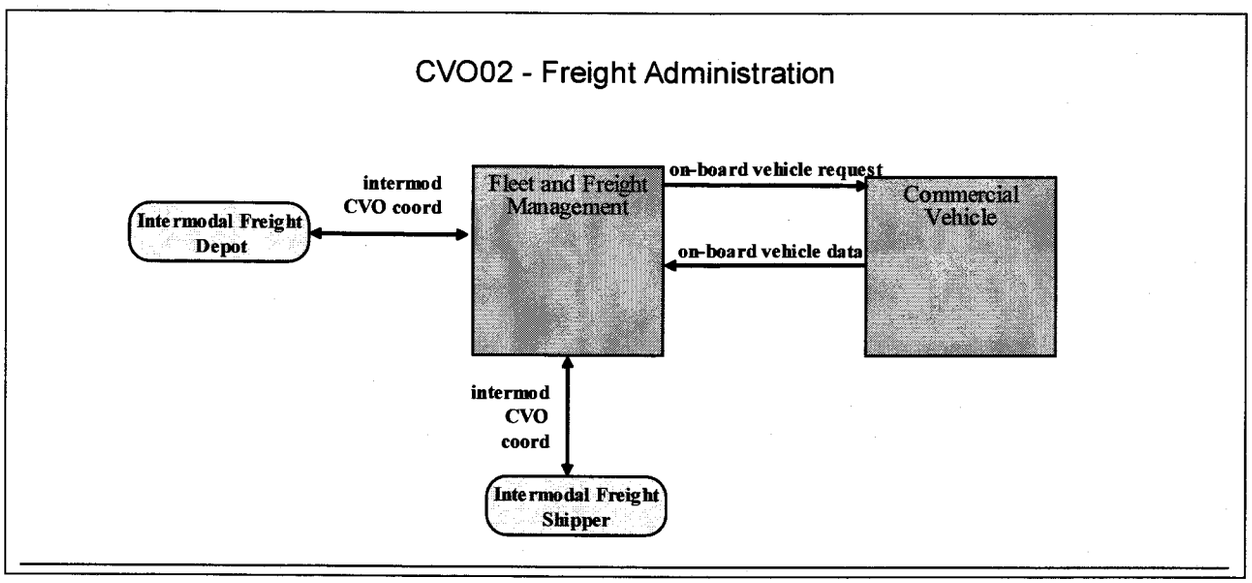
Centers Participating in Market Package

Stakeholder	Element
Operadores Privados de VC	Operadores Privados de VC Sistemas de Operadores de Vehiculos Comerciales

4.6.2. CVO02 – Freight Administration

Example Market Package

Figure 17: Example CVO02 Market Package



Description

This market package tracks the movement of cargo and monitors the cargo condition. Interconnections are provided to intermodal freight shippers and intermodal freight depots at ports and airports for tracking of cargo from source to destination.

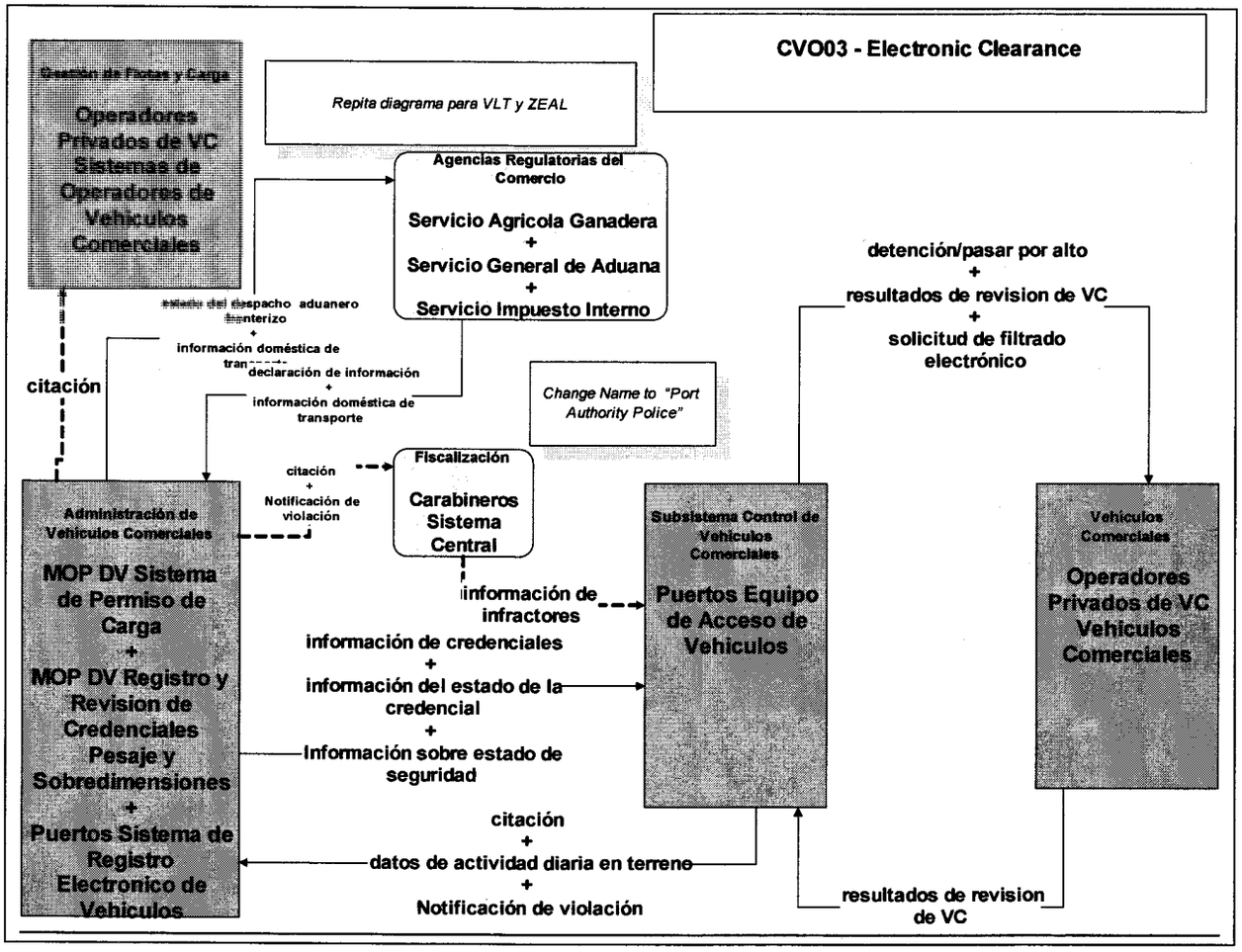
Centers Participating in Market Package

No center elements have been associated with this market package. This market package has been identified as a candidate based on an analysis of transportation services and stakeholder roles and responsibilities. This market package has been left in this report because of the possibility that stakeholders may want to introduce it into the architecture prior to the completion of the National ITS Architecture of Chile project.

4.6.3. CVO03 – Electronic Clearance

Example Market Package

Figure 18: Example CVO03 Market Package



Description

This market package provides for automated clearance at roadside check facilities. The roadside check facility communicates with the Commercial Vehicle Administration subsystem to retrieve infrastructure snapshots of critical carrier, vehicle, and driver data to be used to sort passing vehicles. This allows a good driver/vehicle/carrier to pass roadside facilities at highway speeds using transponders and dedicated short range communications to the roadside.

Centers Participating in Market Package

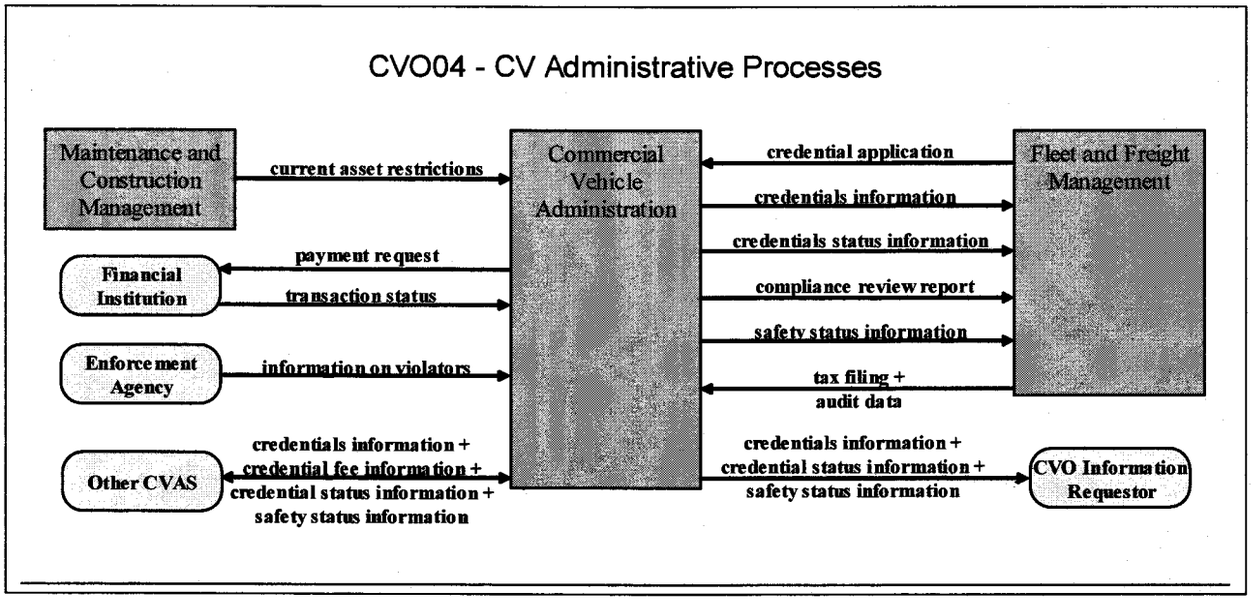
Stakeholder	Element
Carabineros	Carabineros Sistema Central
MOP Dirección de Vialidad	MOP DV Registro y Revision de Credenciales Pesaje y Sobredimensiones

Stakeholder	Element
MOP Dirección de Vialidad	MOP DV Sistema de Permiso de Carga
Operadores Privados de VC	Operadores Privados de VC Sistemas de Operadores de Vehiculos Comerciales
Puertos	Puertos Sistema de Registro Electronico de Vehiculos

4.6.4. CVO04 – Commercial Vehicle Administrative Processes

Example Market Package

Figure 19: Example CVO04 Market Package



Description

This market package provides for electronic application, processing, fee collection, issuance, and distribution of CVO credential and tax filing. Through this process, carriers, drivers, and vehicles may be enrolled in the electronic clearance program provided by a separate market package which allows commercial vehicles to be screened at mainline speeds at roadside check facilities.

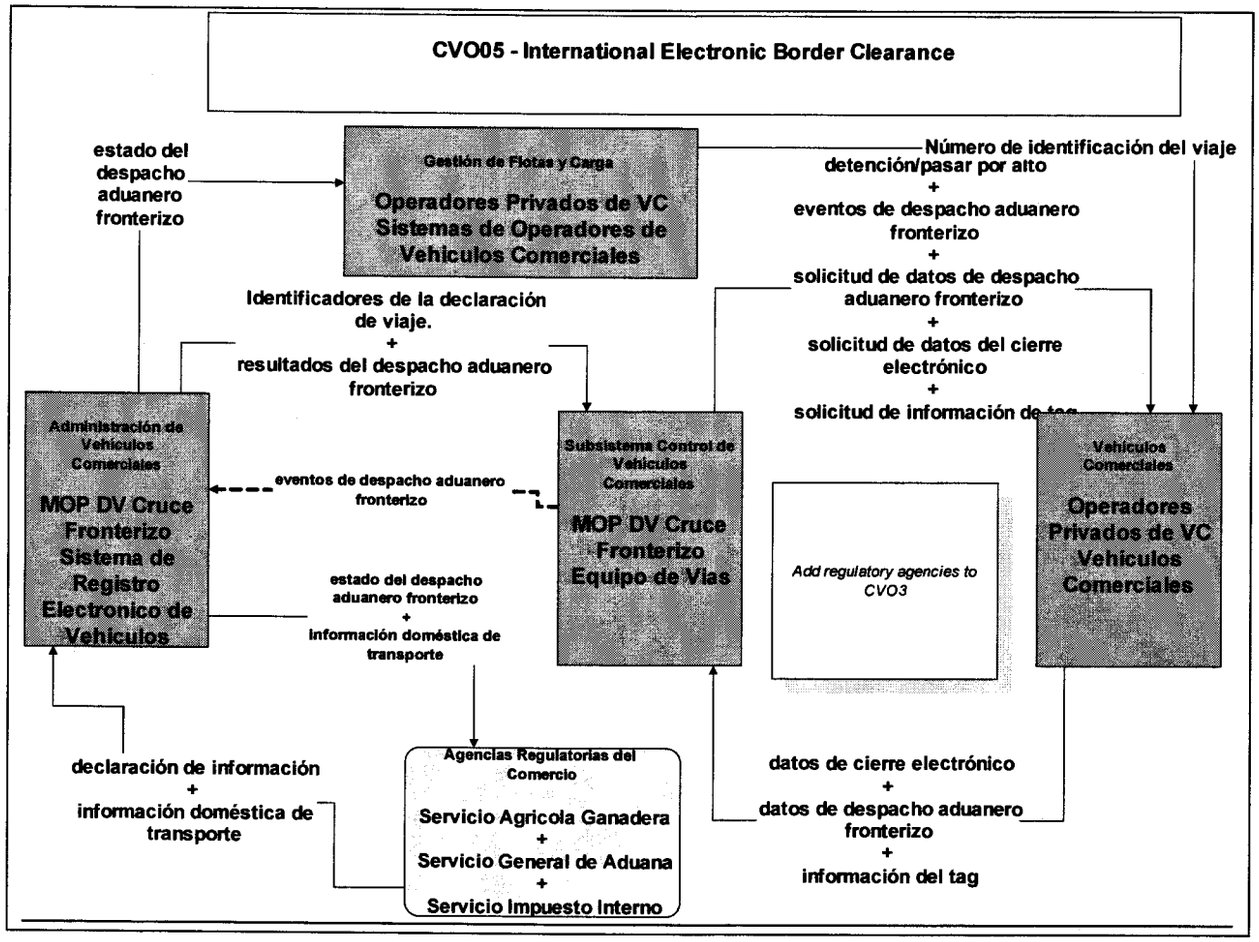
Centers Participating in Market Package

No center elements have been associated with this market package. This market package has been identified as a candidate based on an analysis of transportation services and stakeholder roles and responsibilities. This market package has been left in this report because of the possibility that stakeholders may want to introduce it into the architecture prior to the completion of the National ITS Architecture of Chile project.

4.6.5. CVO05 – International Border Electronic Clearance

Example Market Package

Figure 20: Example CVO05 Market Package



Description

This market package provides for automated clearance at international border crossings. This package augments the electronic clearance package by allowing interface with customs related functions.

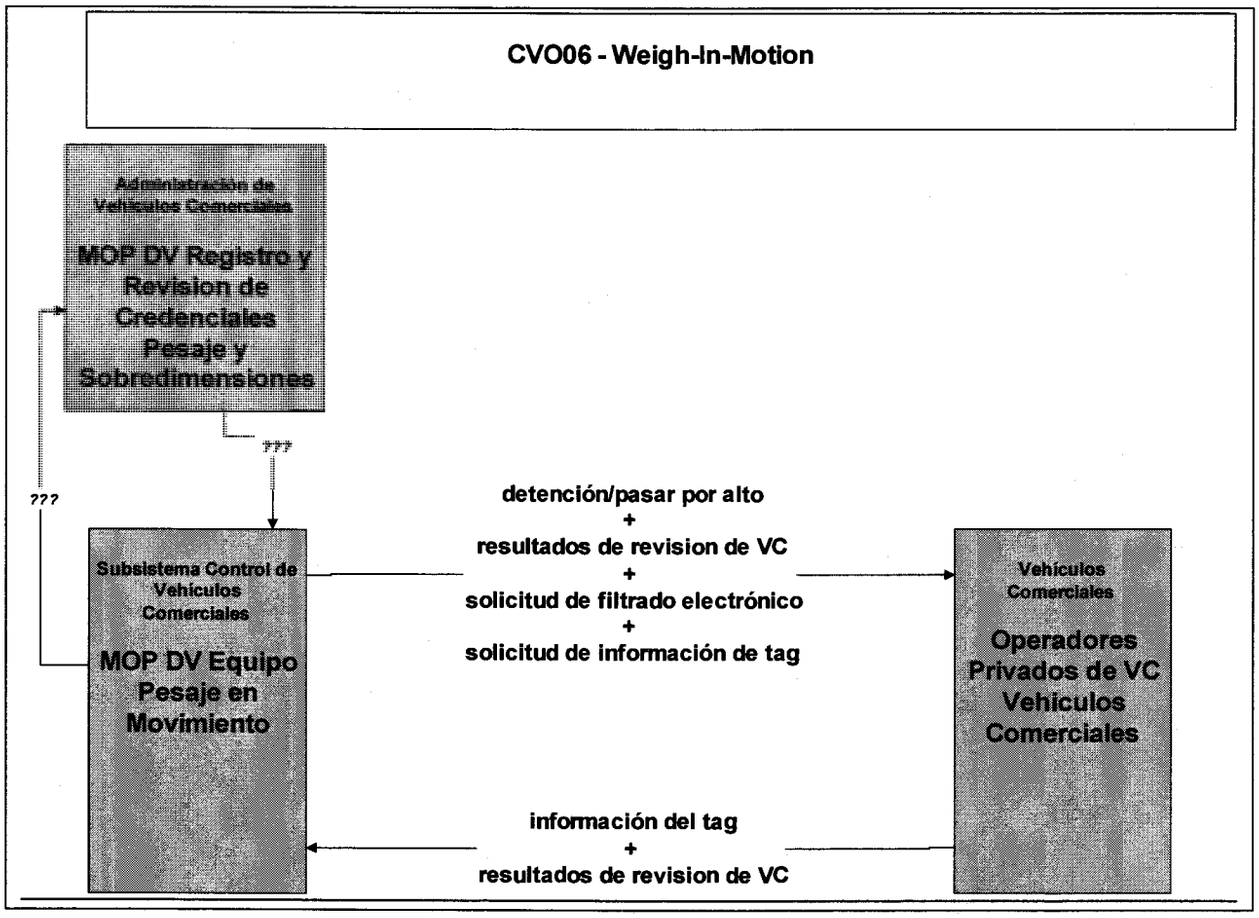
Centers Participating in Market Package

Stakeholder	Element
MOP Dirección de Vialidad	MOP DV Cruce Fronterizo Sistema de Registro Electronico de Vehiculos
Operadores Privados de VC	Operadores Privados de VC Sistemas de Operadores de Vehiculos Comerciales

4.6.6. CVO06 – Weigh-In-Motion

Example Market Package

Figure 21: Example CVO06 Market Package



Description

This market package provides for high speed weigh-in-motion with or without Automated Vehicle Identification (AVI) capabilities.

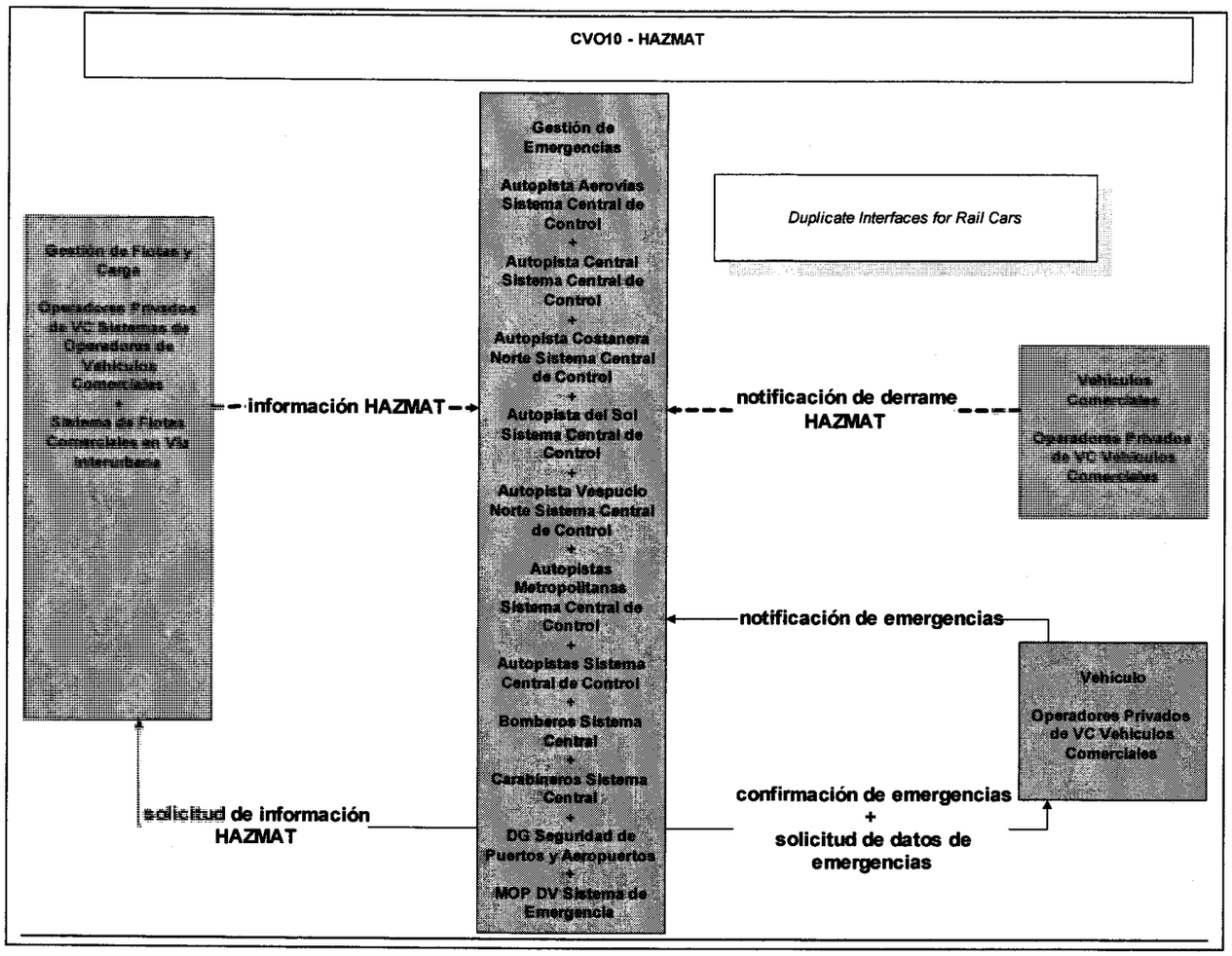
Centers Participating in Market Package

No center elements have been associated with this market package. This market package has been identified as a candidate based on an analysis of transportation services and stakeholder roles and responsibilities. This market package has been left in this report because of the possibility that stakeholders may want to introduce it into the architecture prior to the completion of the National ITS Architecture of Chile project.

4.6.7. CVO10 – HAZMAT Management

Example Market Package

Figure 22: Example CVO10 Market Package



Description

This market package integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material and incidents.

Centers Participating in Market Package

Stakeholder	Element
Autopista Aerovías S.A.	Autopista Aerovias Sistema Central de Control
Autopista Central S.A.	Autopista Central Sistema Central de Control
Autopista Costanera Norte S.A.	Autopista Costanera Norte Sistema Central de Control
Autopista del Sol S.A.	Autopista del Sol Sistema Central de Control

Stakeholder	Element
Autopista Vespucio Norte S.A.	Autopista Vespucio Norte Sistema Central de Control
Autopistas	Autopistas Sistema Central de Control
Autopistas Metropolitanas S.A.	Autopistas Metropolitanas Sistema Central de Control
Bomberos	Bomberos Sistema Central
Carabineros	Carabineros Sistema Central
DG	DG Seguridad de Puertos y Aeropuertos
MOP Dirección de Vialidad	MOP DV Sistema de Emergencia
Operadores Privados de VC	Operadores Privados de VC Sistemas de Operadores de Vehiculos Comerciales

4.6.8. Other Commercial Vehicle Operations Support Market Packages

Commercial Vehicle Traffic Control at Ports/Airports

Market Package	Support Role
ATMS01 – Network Surveillance	CCTV Monitoring of port entry-ways and exits
ATMS02 – Probe Surveillance	Monitoring tags, collect truck movement data
ATMS03 – Surface Street Control	Signal control to manage truck movements at ports
ATMS04 – Freeway Control	Lane control to manage truck queues
ATMS10 – Electronic Toll Collection	Electronic Toll Collection – electronic payment at ports for port usage, electronic
ATMS16 – Parking Management	Parking information systems for commercial vehicles at port facilities

Commercial Vehicle Statistics and Planning Information

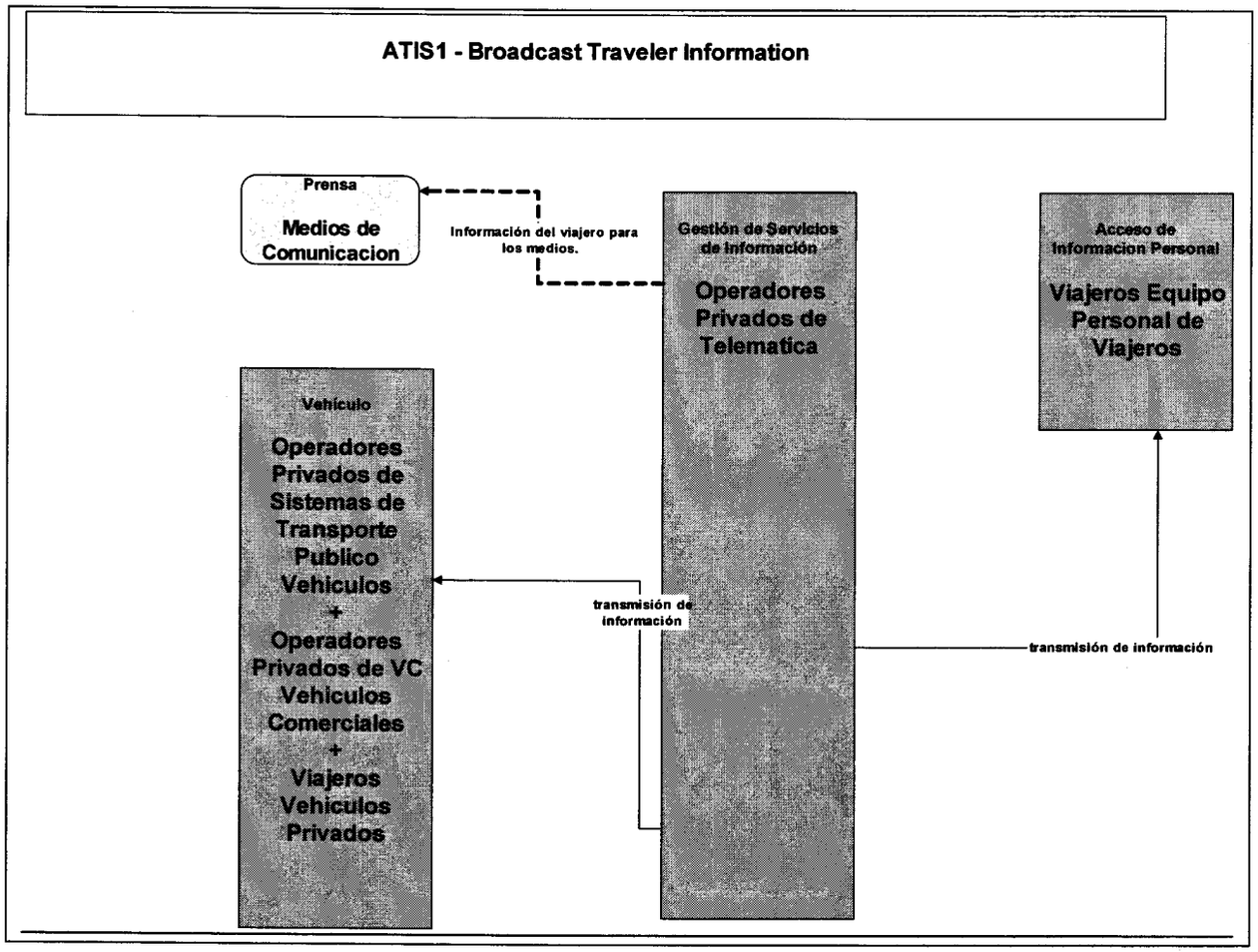
Market Package	Description
AD1	CVO data collection and archival data management

4.7. Traveler Information

4.7.1. ATIS1 – Broadcast Traveler Information

Example Market Package

Figure 23: Example ATIS1 Market Package



Description

The market packages provides for the collection of traffic conditions, advisories, general public transportation, toll and parking information, incident information, air quality and weather information, and the near real time dissemination of this information over a wide area through existing infrastructures and/or low cost user equipment (e.g., FM subcarrier, cellular data broadcast). Websites are a typical example of this type of traveler information.

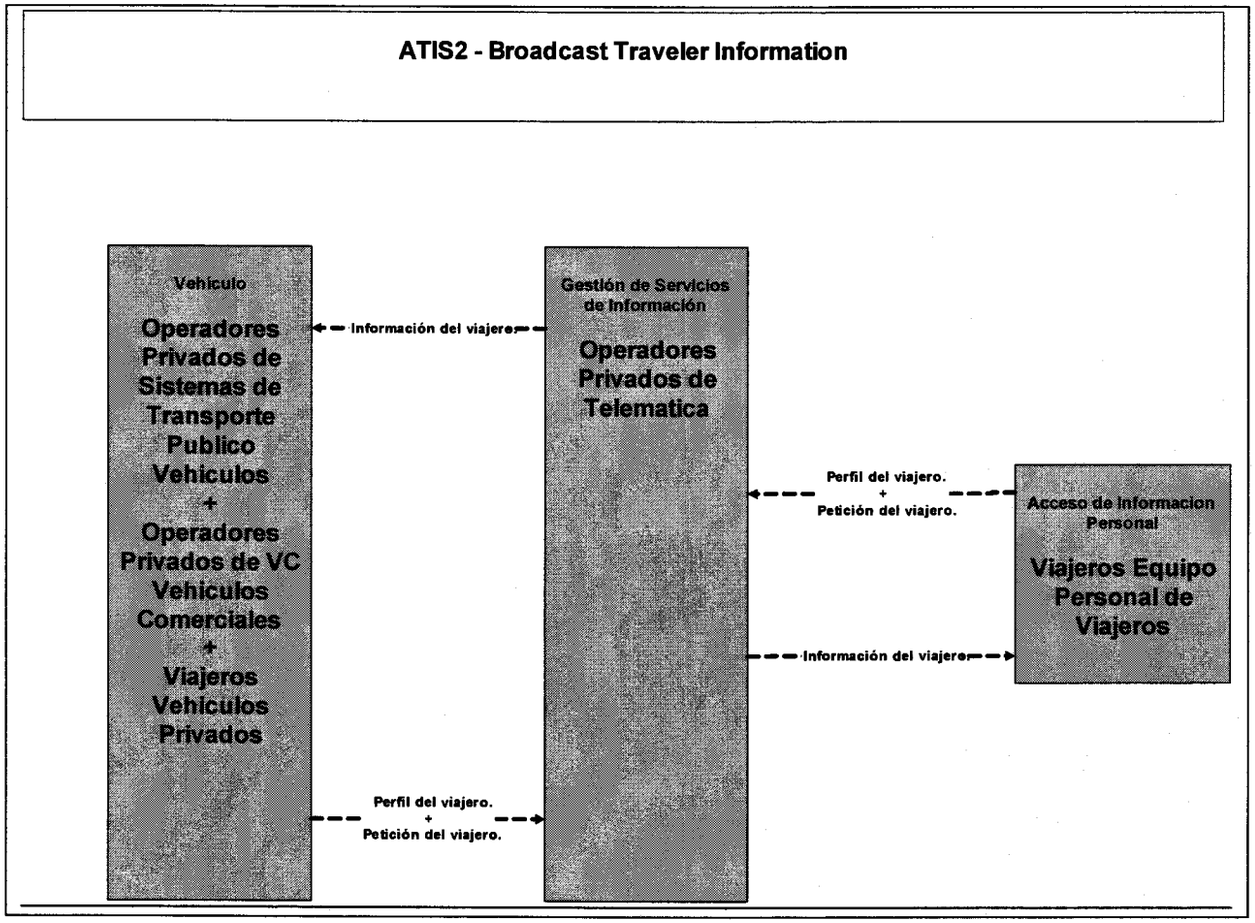
Centers Participating in Market Package

No center elements have been associated with this market package. This market package has been identified as a candidate based on an analysis of transportation services and stakeholder roles and responsibilities. This market package has been left in this report because of the possibility that stakeholders may want to introduce it into the architecture prior to the completion of the National ITS Architecture of Chile project.

4.7.2. ATIS2 – Interactive Traveler Information

Example Market Package

Figure 24: Example ATIS2 Market Package



Description

This market package provides tailored traveler information in response to a traveler request. Both real-time interactive request/response systems and information systems that "push" a tailored stream of information to the traveler based on a submitted profile are supported.

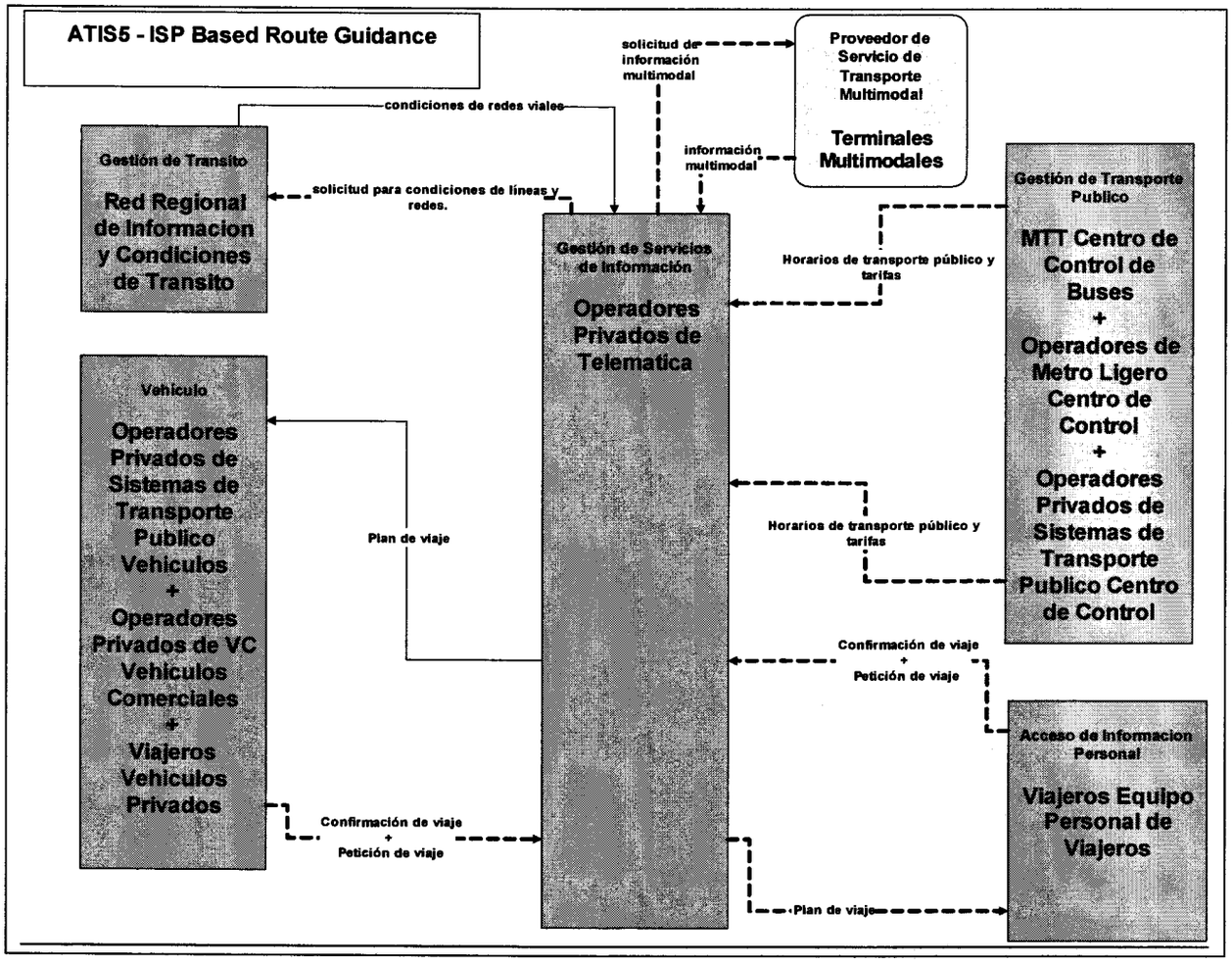
Centers Participating in Market Package

No center elements have been associated with this market package. This market package has been identified as a candidate based on an analysis of transportation services and stakeholder roles and responsibilities. This market package has been left in this report because of the possibility that stakeholders may want to introduce it into the architecture prior to the completion of the National ITS Architecture of Chile project.

4.7.3. ATIS5 – ISP Based Route Guidance

Example Market Package

Figure 25: Example ATIS5 Market Package



Description

The market package provides for route planning and guidance, whether in vehicle or pre-trip. Using either static data or real time conditions. The route planning function is at the information service provider, not in the vehicle or user system.

Centers Participating in Market Package

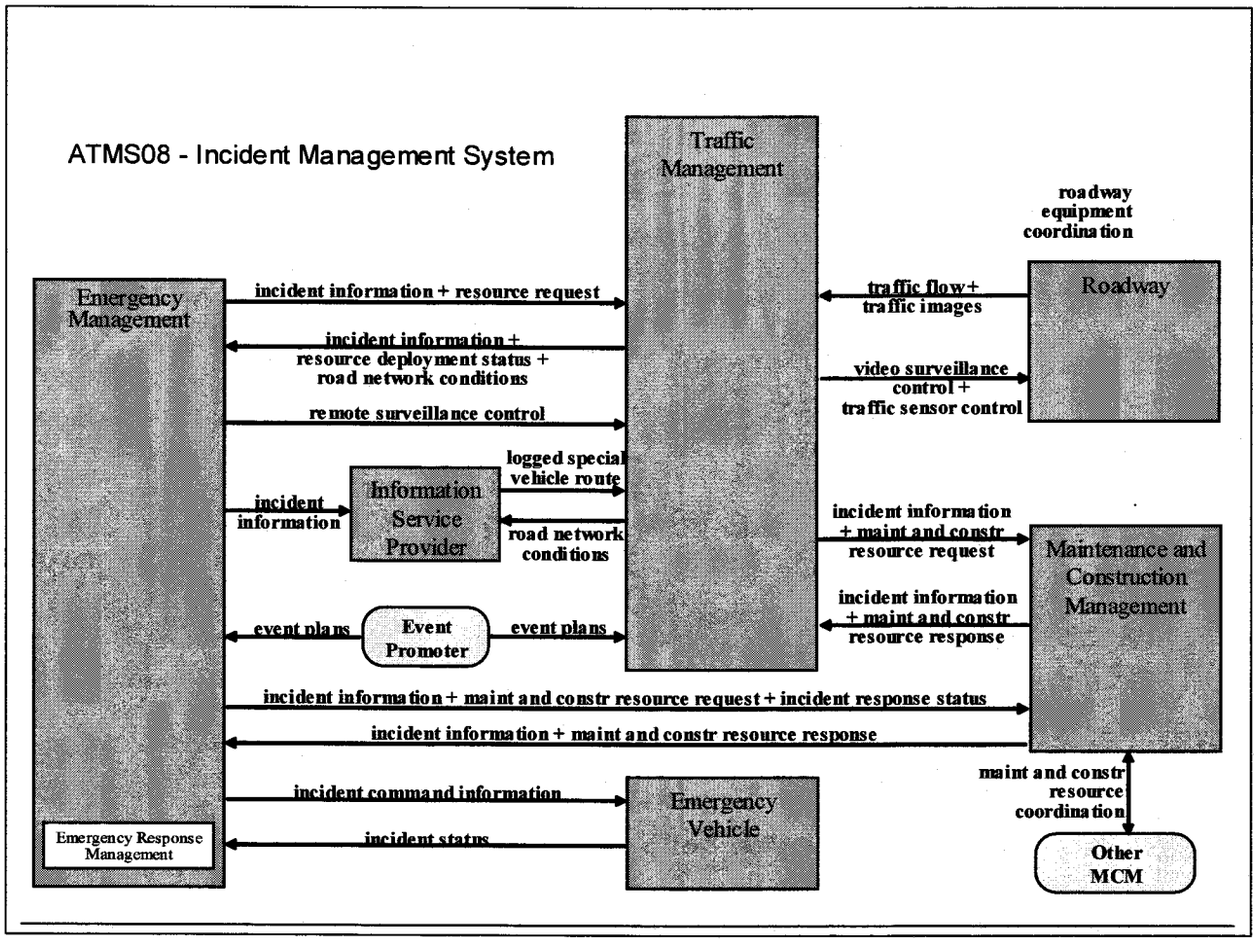
Stakeholder	Element
Metro S.A.	MTT Centro de Control de Buses
Operadores de Metro Ligero	Operadores de Metro Ligero Centro de Control
Operadores Privados de Sistemas de Transporte Publico	Operadores Privados de Sistemas de Transporte Publico Centro de Control

4.8. Incident Management

4.8.1. ATMS08 – Incident Management

Example Market Package

Figure 26: Example ATMS08 Market Package



Description

The market package provides the ability to detect and verify incidents and implement an appropriate response, including both planned events and unexpected incidents.

Centers Participating in Market Package

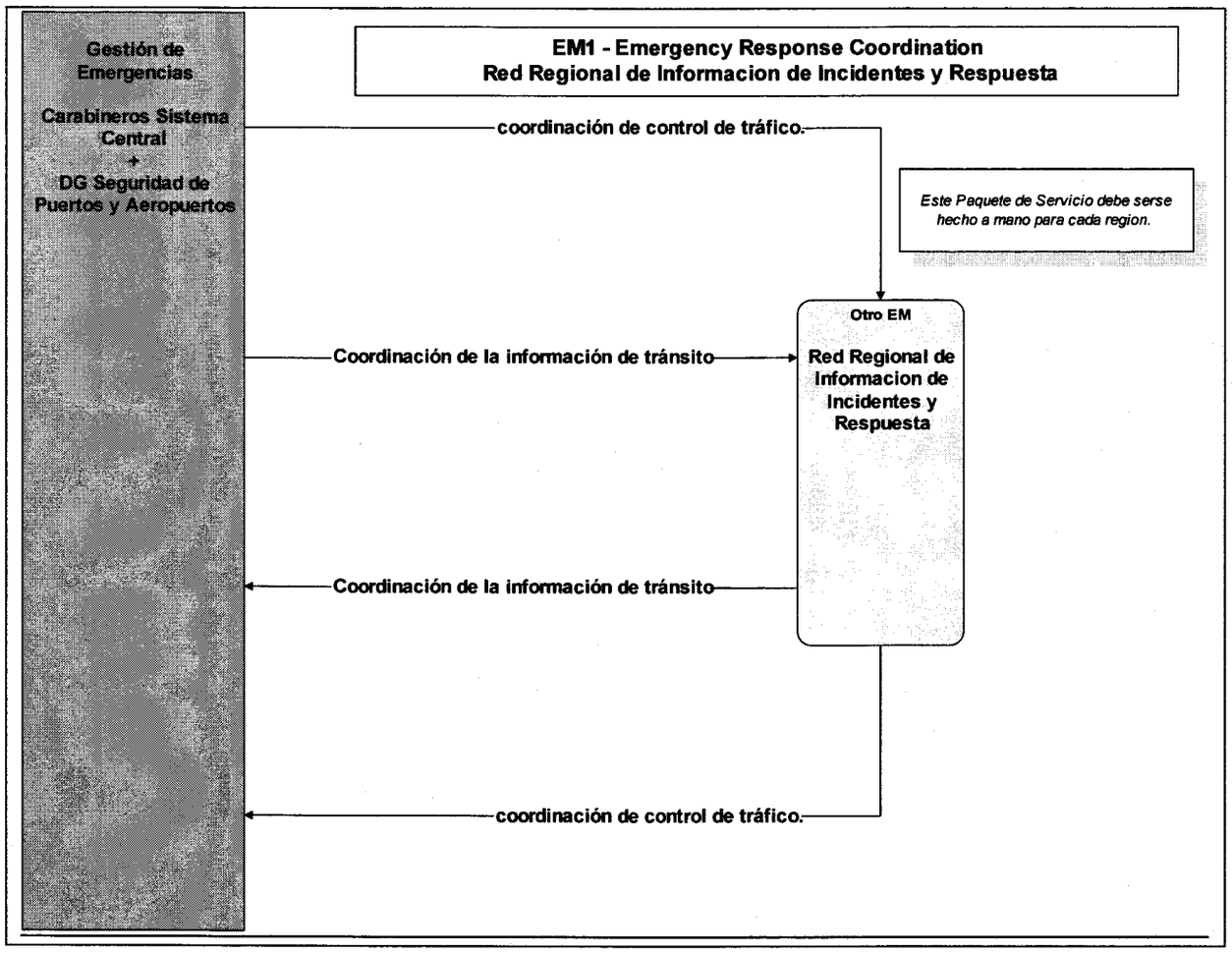
Stakeholder	Element
Autopista Aerovías S.A.	Autopista Aerovias Sistema Central de Control
Autopista Central S.A.	Autopista Central Sistema Central de Control
Autopista Costanera Norte S.A.	Autopista Costanera Norte Sistema Central de Control
Autopista del Sol S.A.	Autopista del Sol Sistema Central de Control
Autopista Vespucio Norte S.A.	Autopista Vespucio Norte Sistema Central de Control
Autopistas	Autopistas Sistema Central de Control
Autopistas Metropolitanas S.A.	Autopistas Metropolitanas Sistema Central de Control
Bomberos	Bomberos Sistema Central
Carabineros	Carabineros Sistema Central
DG	DG Seguridad de Puertos y Aeropuertos
MOP Dirección de Vialidad	MOP DV Sistema de Emergencia
MOP Dirección de Vialidad	MOP DV Subdireccion de Explotacion
Municipalidad	Sistema Municipal Central de Transito
Onemi	Onemi Gestion de Emergencia
Operadores Privados de Emergencia Medica	Operadores Privados de Emergencia Medica Centro de Despacho
Operadores Privados de Gruas	Operadores Privados de Gruas Sistema de Despacho
Rutas del Pacífico S.A.	Autopistas Rutas del Pacifico Sistema Central de Control de Túneles y Telepeaje
SAMU	SAMU Sistema Central
SECTRA	SECTRA Sistemas Control de Semaforos
UOCT	UOCT Centro de Control de Gestión de Tránsito

4.9. Emergency Management

4.9.1. EM1 – Emergency Response

Example Market Package

Figure 27: Example EM1 Market Package



Description

Provide the computer-aided dispatch systems, emergency vehicle equipment, and wireless communications that enable safe and rapid deployment of appropriate resources to an emergency.

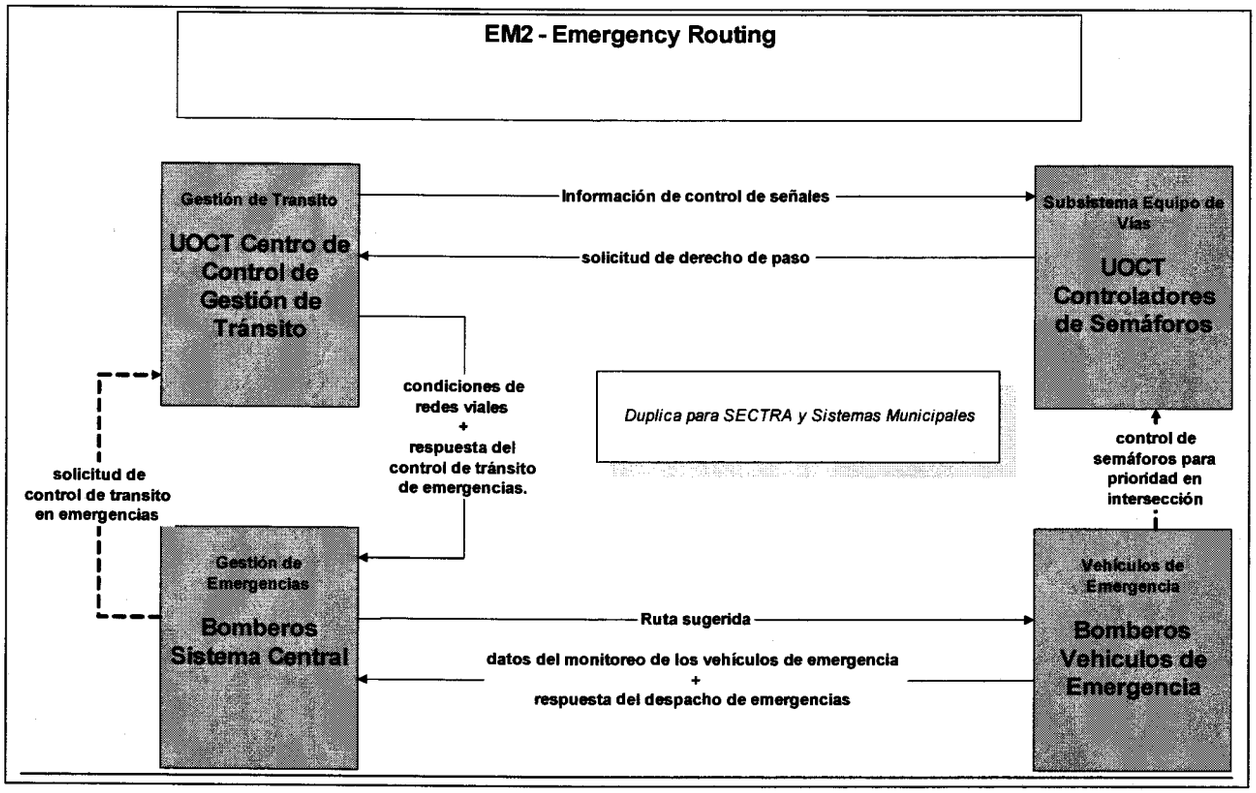
Centers Participating in Market Package

Stakeholder	Element
Carabineros	Carabineros Sistema Central
DG	DG Seguridad de Puertos y Aeropuertos
Red de Sistemas de Gestion de Incidentes y Respuests	Red Regional de Informacion de Incidentes y Respuesta

4.9.2. EM2 – Emergency Vehicle Routing

Example Market Package

Figure 28: Example EM2 Market Package



Description

Market package provides for dynamic routing of emergency vehicles and coordination with the Traffic Management Subsystem for special priority on the selected route(s), including AVL systems for emergency vehicles.

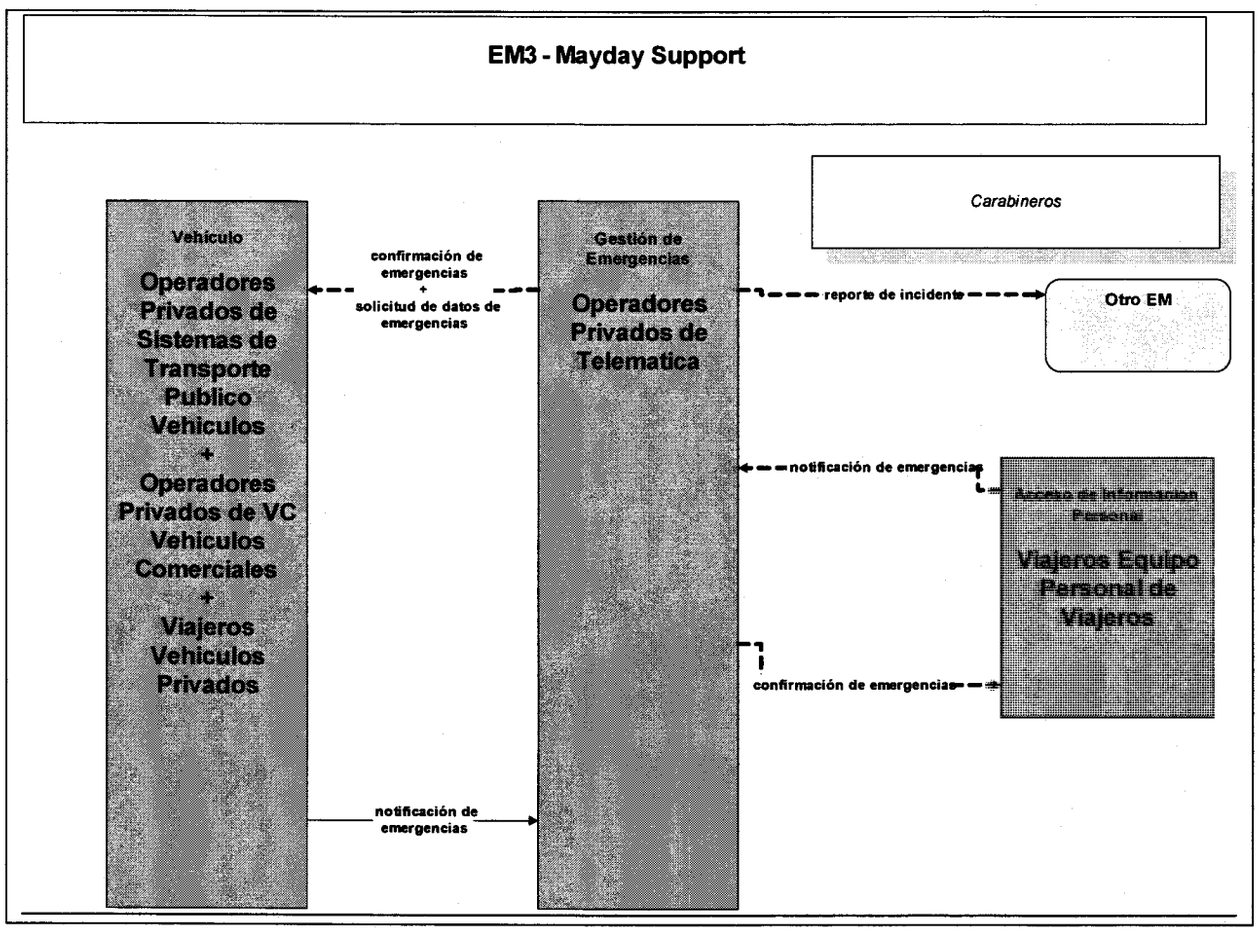
Centers Participating in Market Package

Stakeholder	Element
Bomberos	Bomberos Sistema Central
Carabineros	Carabineros Sistema Central
SAMU	SAMU Sistema Central
UOCT	UOCT Centro de Control de Gestión de Tránsito

4.9.3. EM3 – Mayday Support

Example Market Package

Figure 29: Example EM3 Market Package



Description

This market packages provides users (driver or non-driver) the ability to initiate a request for emergency assistance and enables the Emergency Management Subsystem to locate the user and determine the appropriate response.

Centers Participating in Market Package

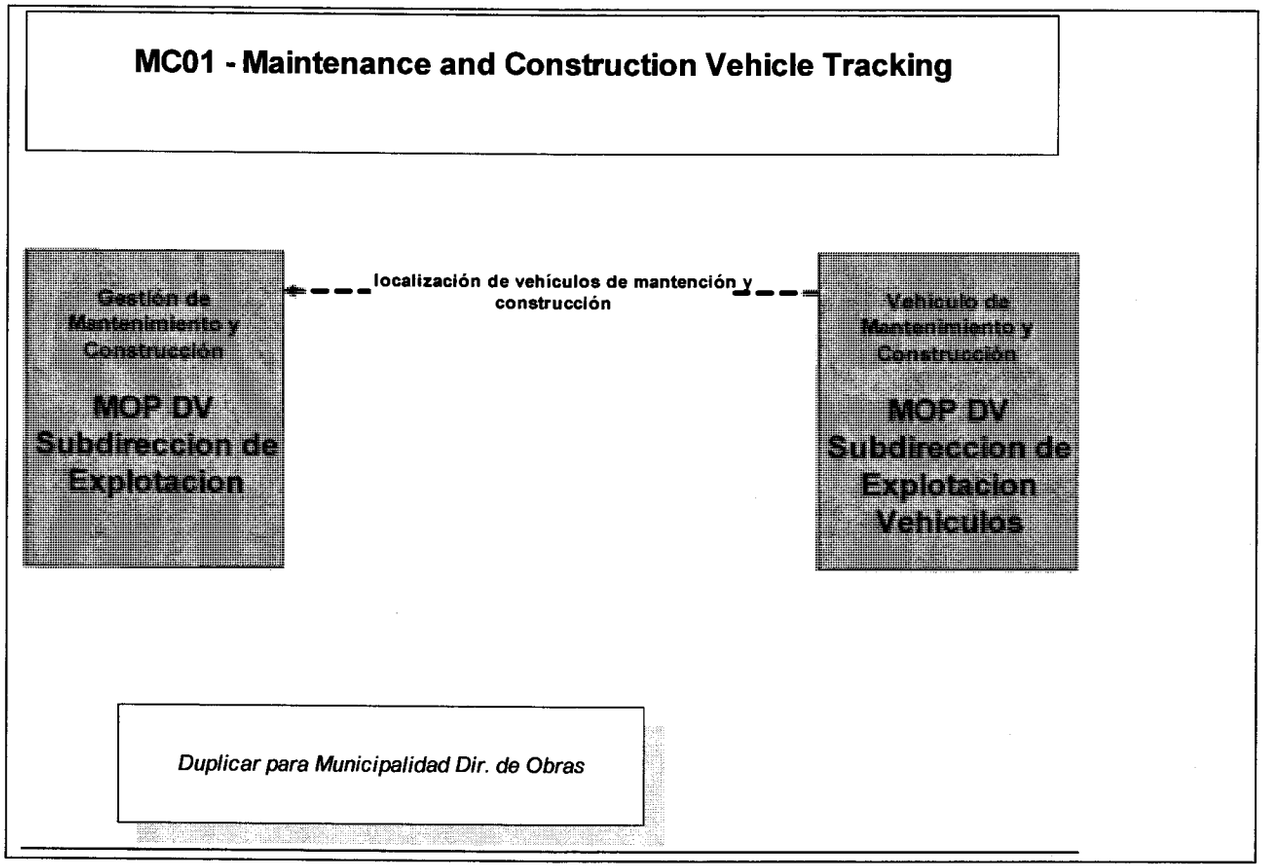
No center elements have been associated with this market package. This market package has been identified as a candidate based on an analysis of transportation services and stakeholder roles and responsibilities. This market package has been left in this report because of the possibility that stakeholders may want to introduce it into the architecture prior to the completion of the National ITS Architecture of Chile project.

4.10. Maintenance and Construction Management

4.10.1. MC01 – Maintenance and Construction Vehicle Tracking

Example Market Package

Figure 30: Example MC01 Market Package



Description

This market package will track the location of maintenance and construction vehicles and other equipment to ascertain the progress of their activities.

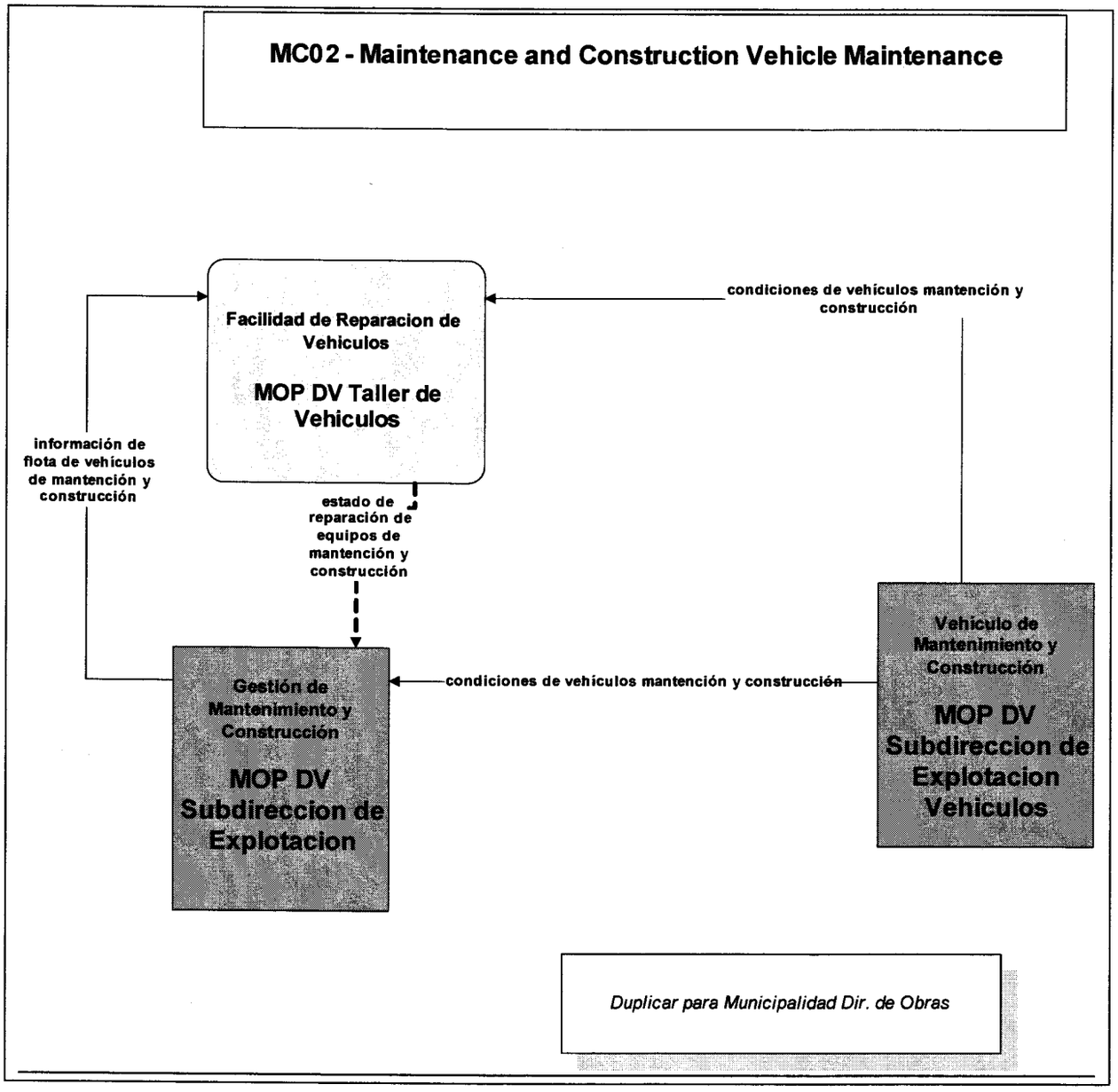
Centers Participating in Market Package

Stakeholder	Element
MOP Dirección de Vialidad	MOP DV Subdireccion de Explotacion

4.10.2. MC02 – Maintenance and Construction Vehicle Maintenance

Example Market Package

Figure 31: Example MC02 Market Package



Description

This market package performs vehicle maintenance scheduling and manages both routine and corrective maintenance activities on vehicles and other maintenance and construction equipment.

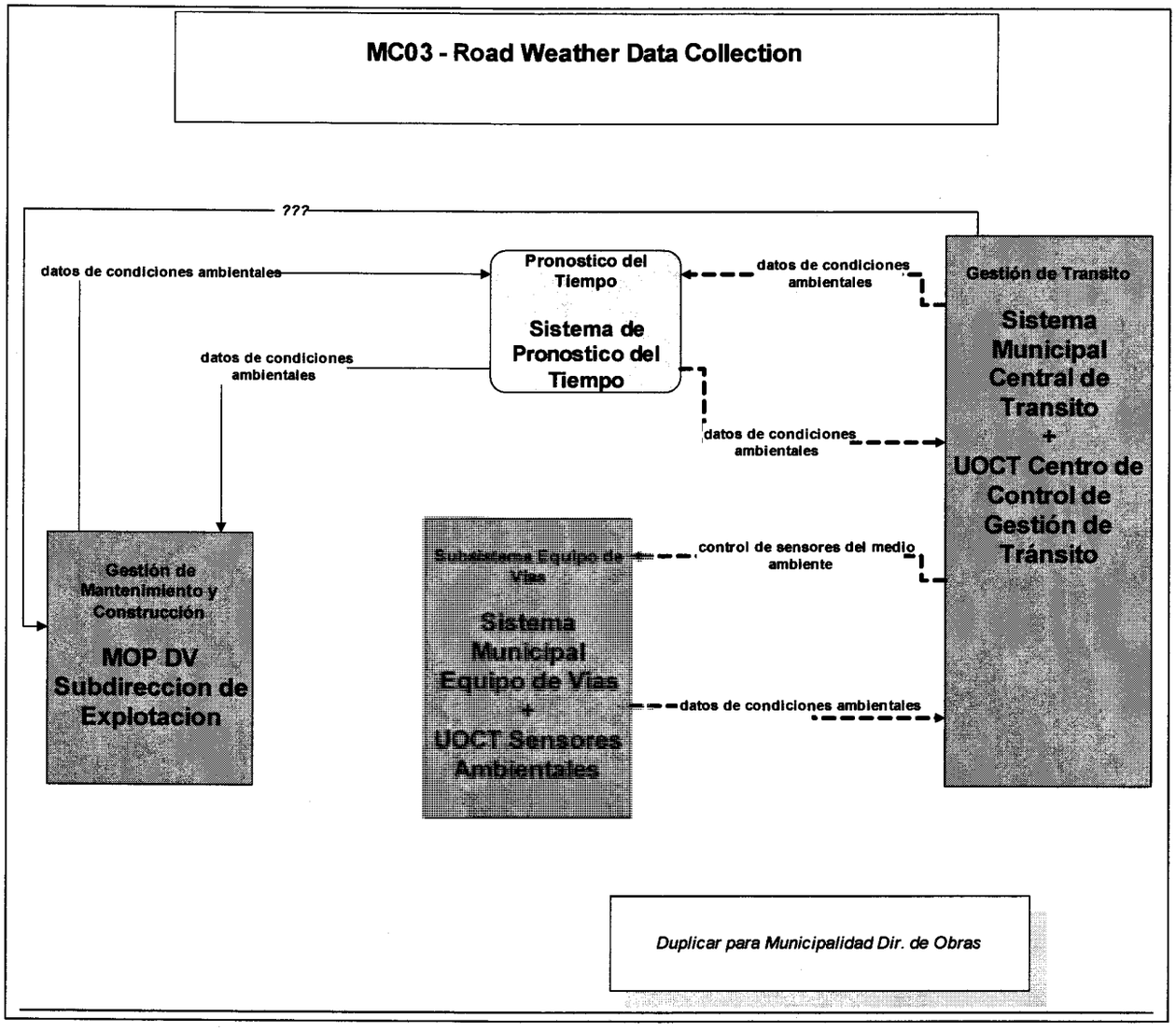
Centers Participating in Market Package

Stakeholder	Element
MOP Dirección de Vialidad	MOP DV Subdireccion de Explotacion

4.10.3. MC03 – Road Weather Data Collection

Example Market Package

Figure 32: Example MC03 Market Package



Description

This market package collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway (or guideway in the case of transit related rail systems).

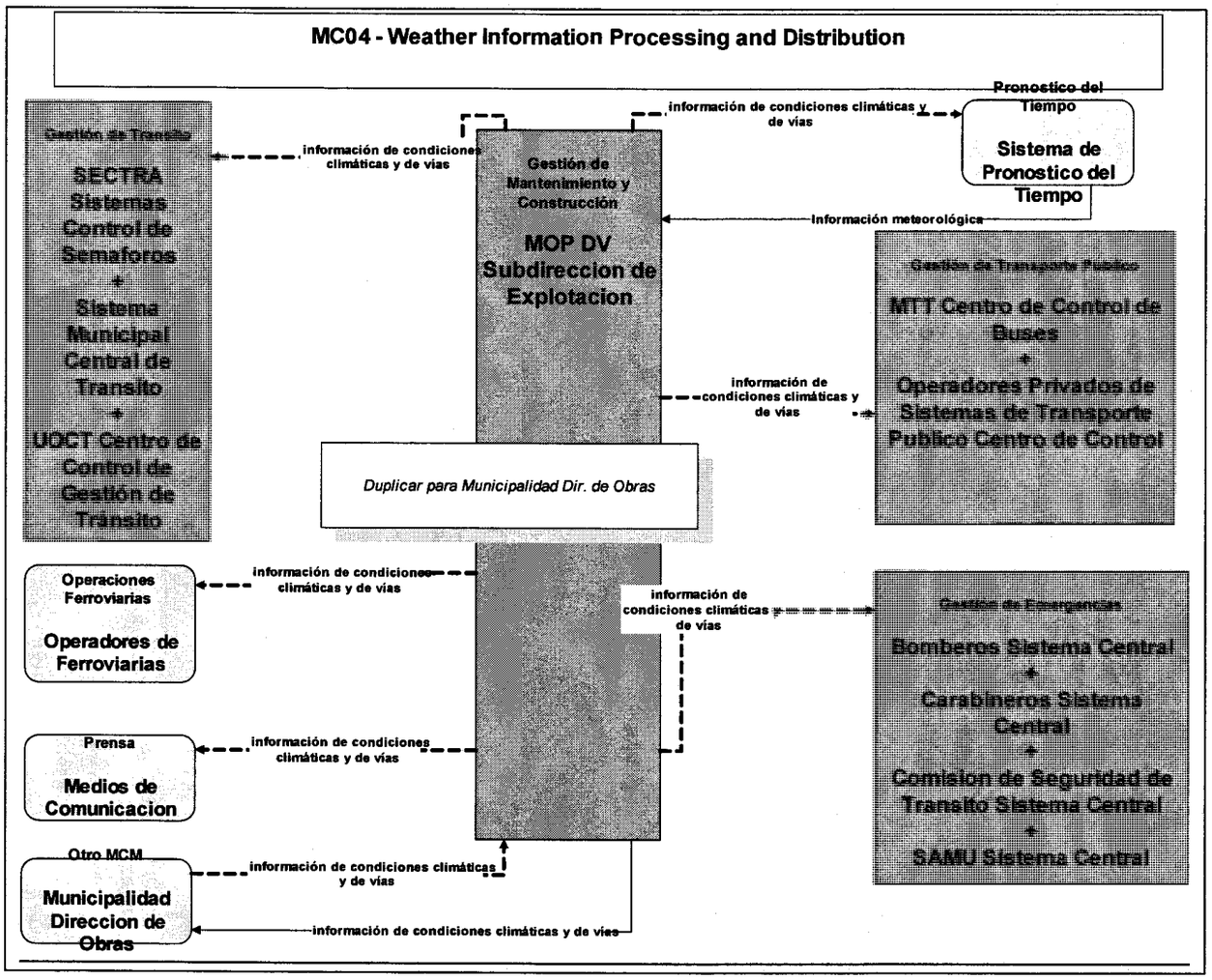
Centers Participating in Market Package

Stakeholder	Element
MOP Dirección de Vialidad	MOP DV Subdireccion de Explotacion
Municipalidad	Sistema Municipal Central de Transito
UOCT	UOCT Centro de Control de Gestión de Tránsito

4.10.4. MC04 – Weather Information Processing and Distribution

Example Market Package

Figure 33: Example MC04 Market Package



Description

This market package processes and distributes the environmental information collected from the Road Weather Data Collection market package. This market package uses the environmental

data to detect environmental hazards such as icy road conditions, high winds, dense fog, etc. so system operators and decision support systems can make decision on corrective actions to take.

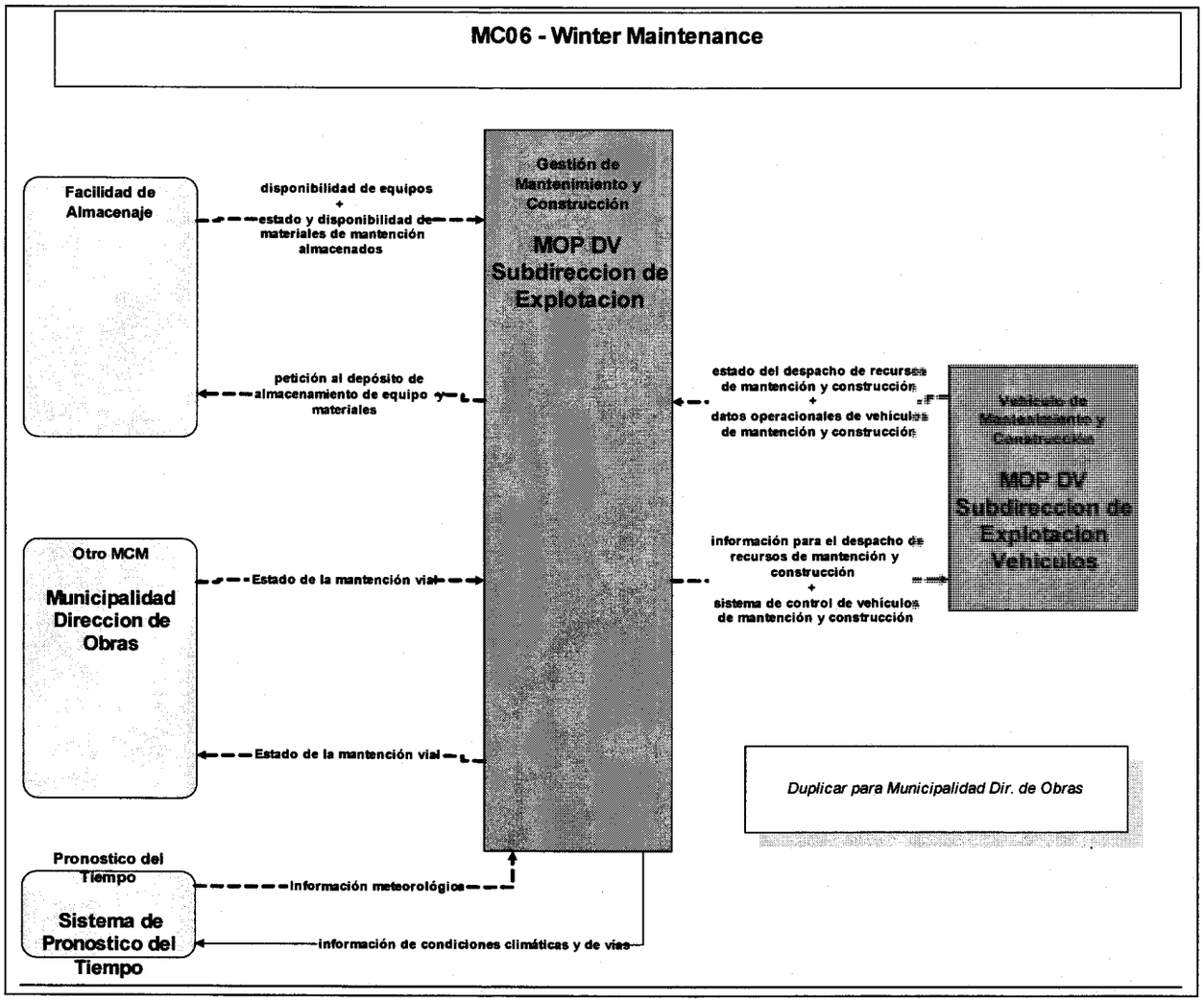
Centers Participating in Market Package

Stakeholder	Element
Bomberos	Bomberos Sistema Central
Carabineros	Carabineros Sistema Central
Comision de Seguridad de Transito	Comision de Seguridad de Transito Sistema Central
Metro S.A.	MTT Centro de Control de Buses
MOP Dirección de Vialidad	MOP DV Subdireccion de Explotacion
Municipalidad	Sistema Municipal Central de Transito
Operadores Privados de Sistemas de Transporte Publico	Operadores Privados de Sistemas de Transporte Publico Centro de Control
SAMU	SAMU Sistema Central
SECTRA	SECTRA Sistemas Control de Semaforos
UOCT	UOCT Centro de Control de Gestión de Tránsito

4.10.5. MC06 – Winter Maintenance

Example Market Package

Figure 34: Example MC06 Market Package



Description

This market package supports winter road maintenance including snow plow operations, roadway treatments (e.g., salt spraying and other anti-icing material applications), and other snow and ice control activities. This package monitors environmental conditions and weather forecasts.

Centers Participating in Market Package

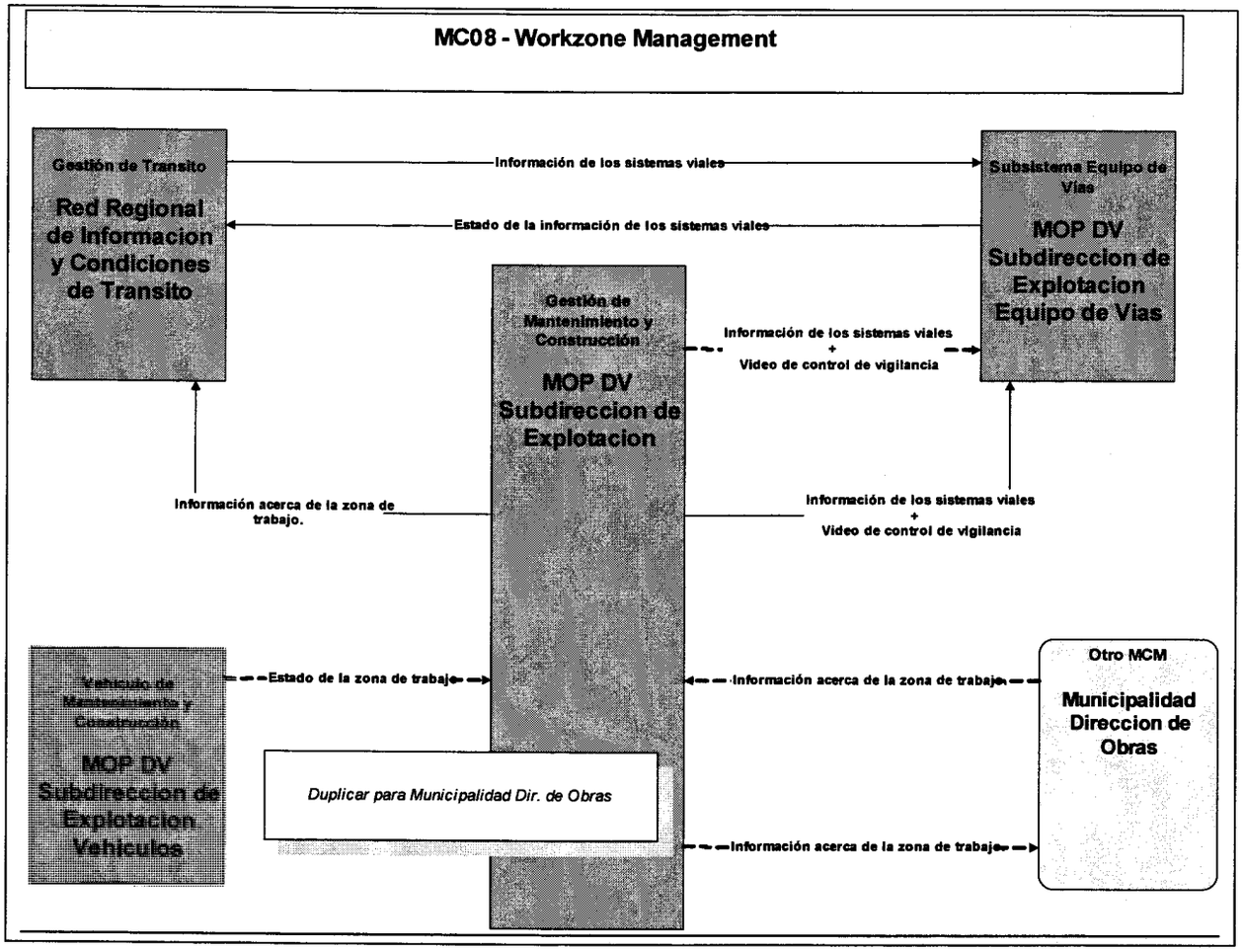
Stakeholder	Element
Bomberos	Bomberos Sistema Central

Stakeholder	Element
Carabineros	Carabineros Sistema Central
Comision de Seguridad de Transito	Comision de Seguridad de Transito Sistema Central
Metro S.A.	MTT Centro de Control de Buses
MOP Dirección de Vialidad	MOP DV Subdireccion de Explotacion
Municipalidad	Sistema Municipal Central de Transito
SAMU	SAMU Sistema Central
SECTRA	SECTRA Sistemas Control de Semaforos
UOCT	UOCT Centro de Control de Gestión de Tránsito

4.10.6. MC08 – Work Zone Management

Example Market Package

Figure 35: Example MC08 Market Package



Description

This market package directs activity in work zones, controlling traffic through portable dynamic message signs (DMS) and informing other groups of activity (e.g., ISP, TM, other maintenance and construction centers) for better coordination management.

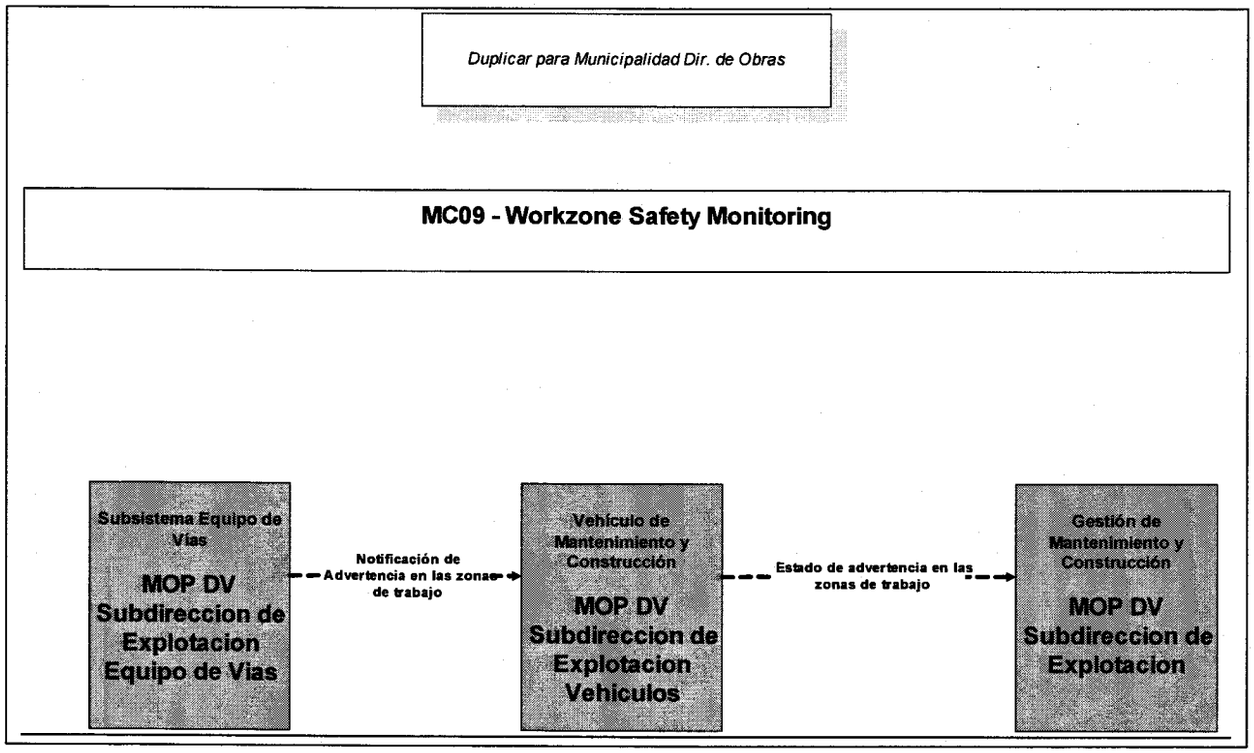
Centers Participating in Market Package

Stakeholder	Element
MOP Dirección de Vialidad	MOP DV Subdireccion de Exlotacion Sitio Web
MOP Dirección de Vialidad	MOP DV Subdireccion de Explotacion

4.10.7. MC09 – Work Zone Safety Monitoring

Example Market Package

Figure 36: Example MC09 Market Package



Description

This market package includes systems that improve work crew safety and reduce collisions between the motoring public and maintenance and construction vehicles.

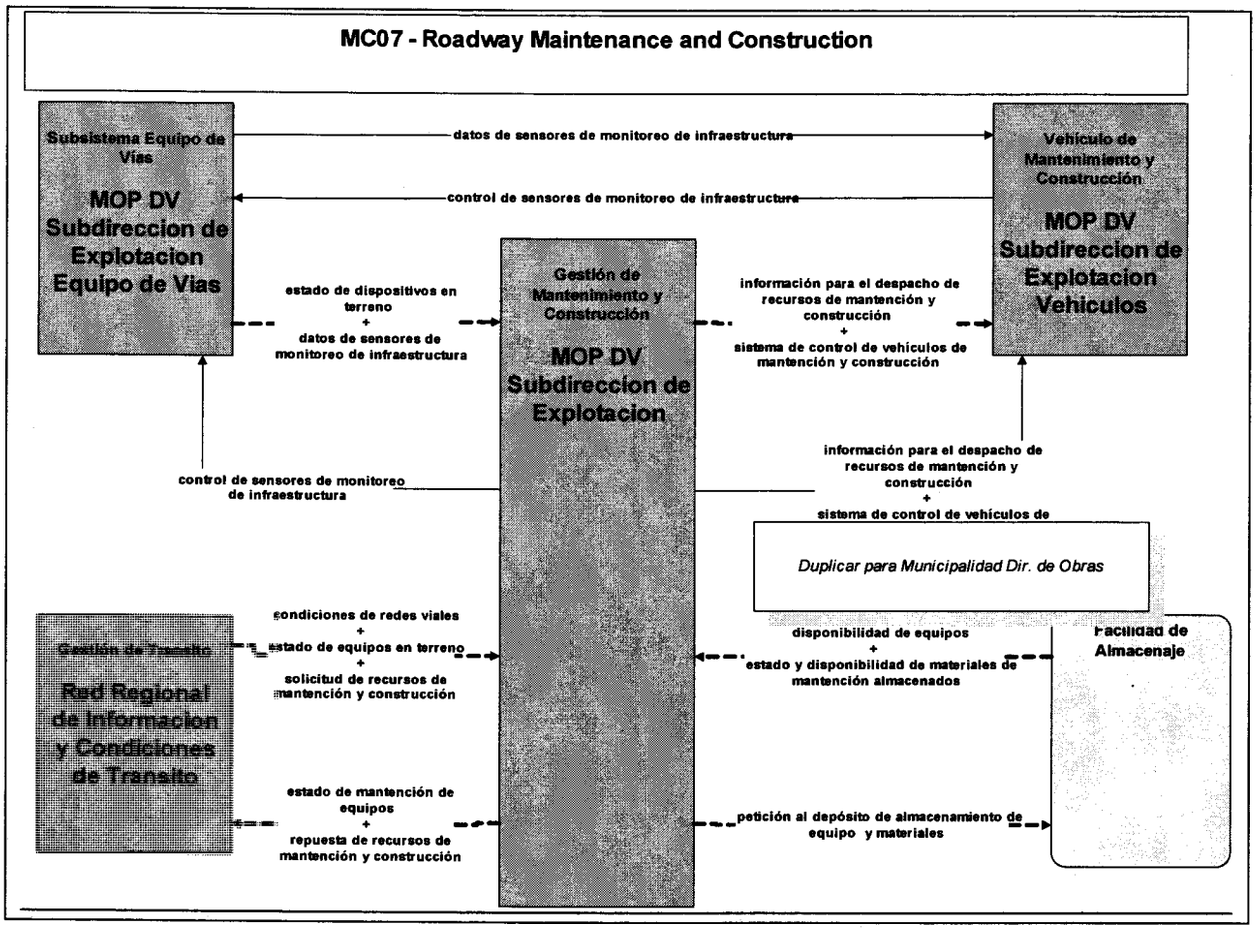
Centers Participating in Market Package

Stakeholder	Element
MOP Dirección de Vialidad	MOP DV Subdireccion de Explotacion

4.10.8. MC07 – Roadway Maintenance and Construction

Example Market Package

Figure 37: Example MC07 Market Package



Description

This market package supports numerous services for scheduled and unscheduled maintenance and construction on a roadway system or right-of-way.

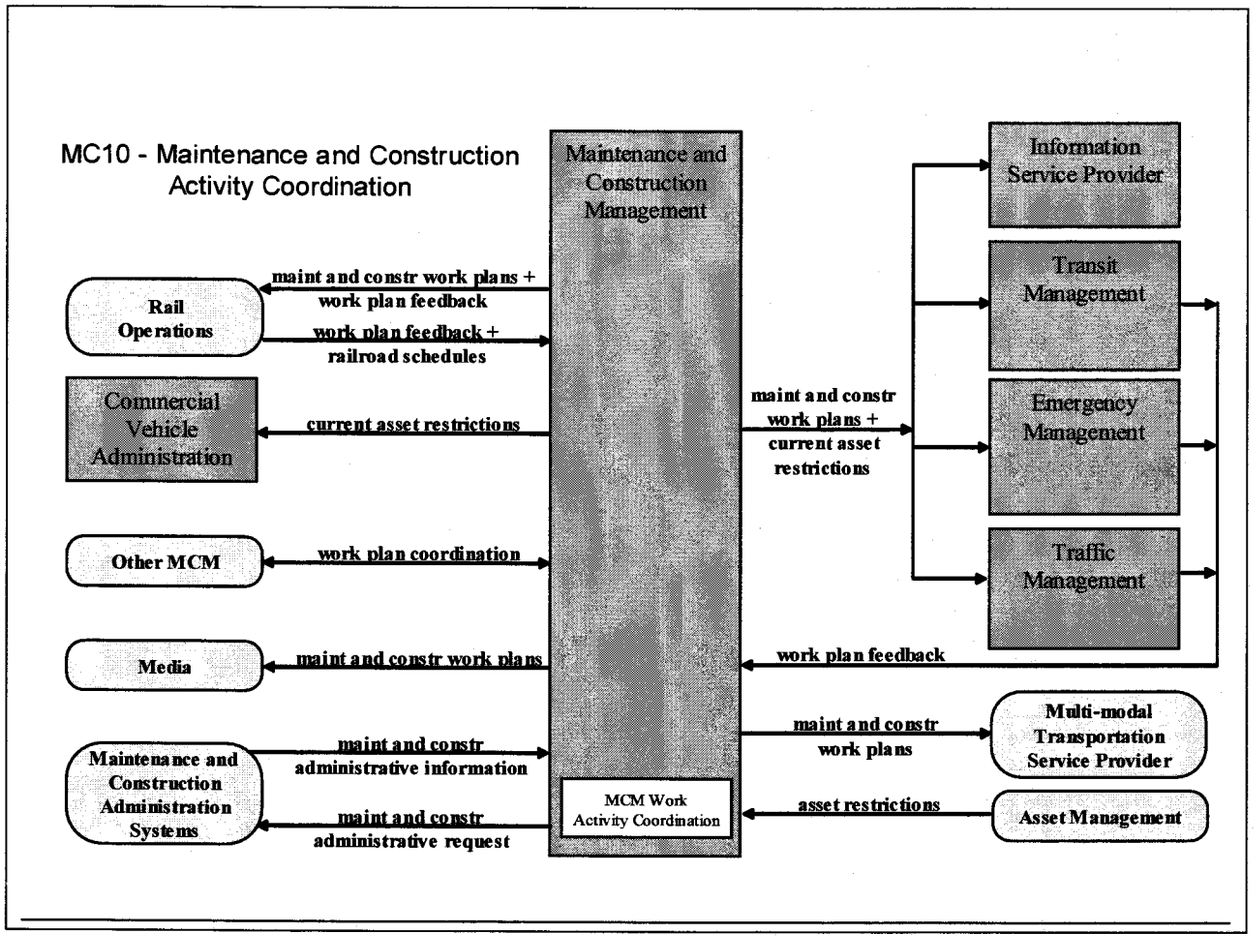
Centers Participating in Market Package

Stakeholder	Element
MOP Dirección de Vialidad	MOP DV Subdireccion de Explotacion

4.10.9. MC10 – Maintenance and Construction Activity Coordination

Example Market Package

Figure 38: Example MC10 Market Package



Description

This market package supports the dissemination of maintenance and construction activity to centers which can utilize it as part of their operations, or to the Information Service Providers who can provide the information to travelers.

Centers Participating in Market Package

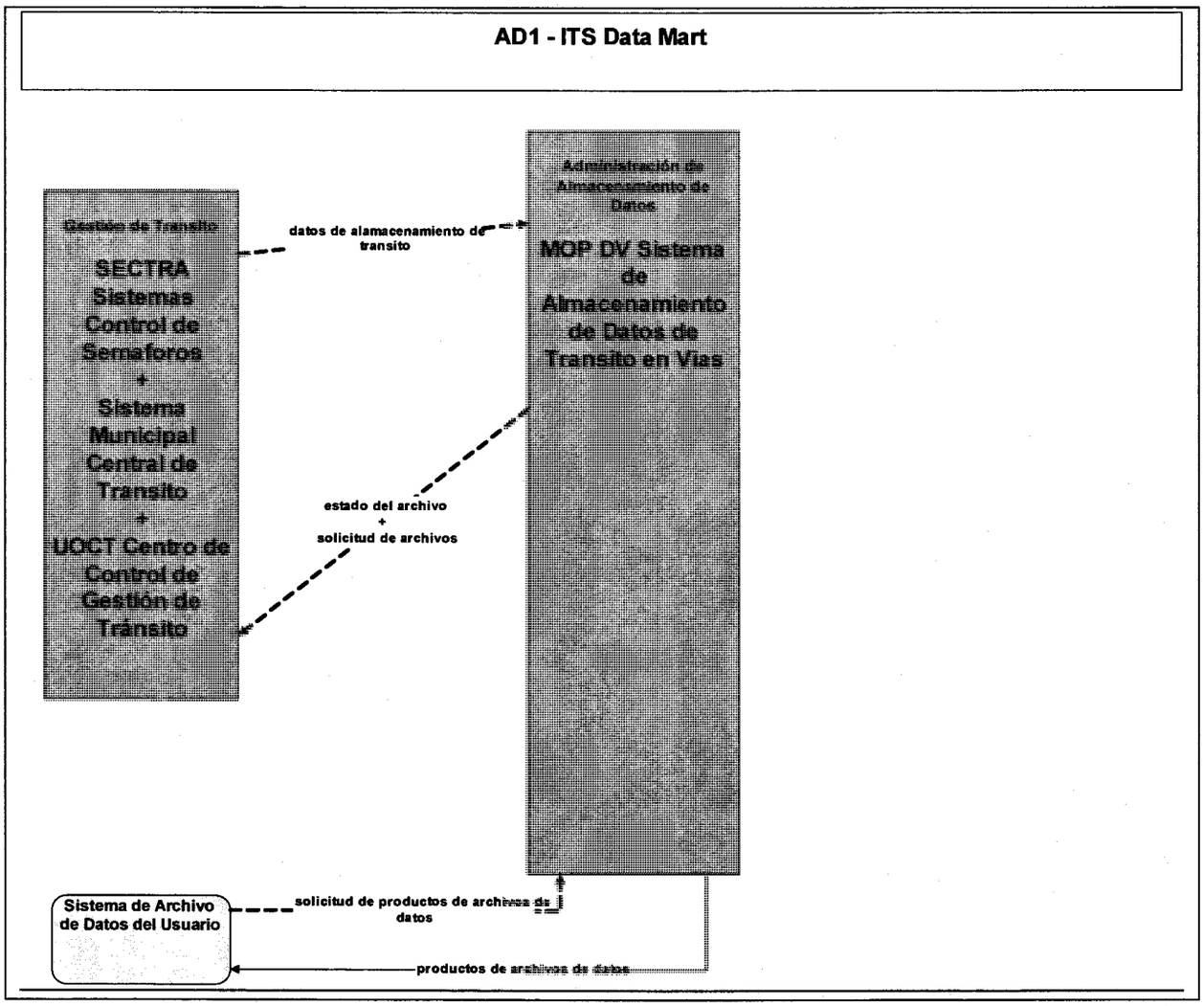
Stakeholder	Element
Bomberos	Bomberos Sistema Central
Carabineros	Carabineros Sistema Central
Comision de Seguridad de Transito	Comision de Seguridad de Transito Sistema Central
Metro S.A.	MTT Centro de Control de Buses
MOP Dirección de Vialidad	MOP DV Sistema de Emergencia
MOP Dirección de Vialidad	MOP DV Subdireccion de Exlotacion Sitio Web
MOP Dirección de Vialidad	MOP DV Subdireccion de Explotacion
Operadores Privados de Sistemas de Transporte Publico	Operadores Privados de Sistemas de Transporte Publico Centro de Control
SAMU	SAMU Sistema Central

4.11. Archive Data Management

4.11.1. AD1 – ITS Data Mart

Example Market Package

Figure 39: Example AD1 Market Package



Description

This market package provides a focused archive that houses data collected and owned by a single agency, district, private sector provider, research institution, or other organization.

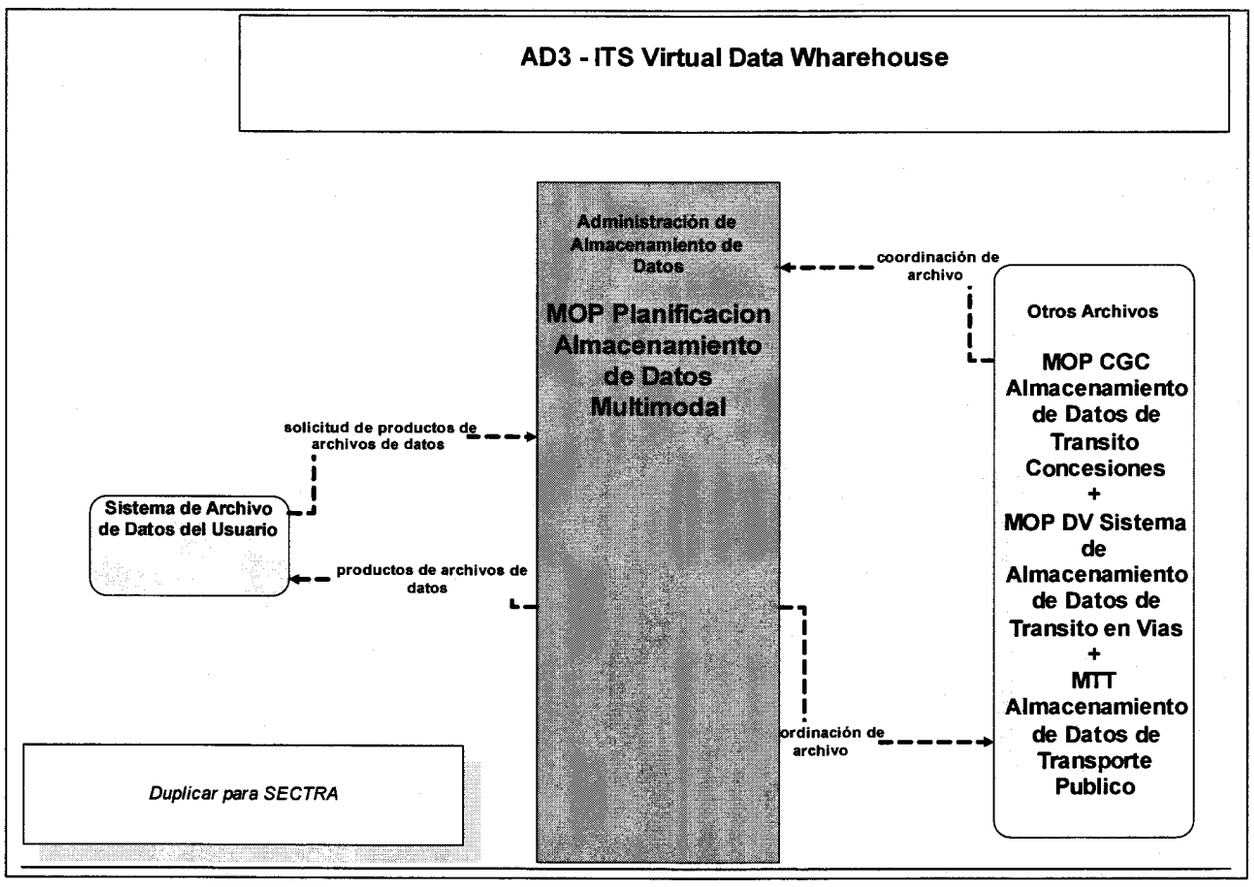
Centers Participating in Market Package

Stakeholder	Element
Autopista Aerovías S.A.	Autopista Aerovias Sistema Central de Control
Autopista Central S.A.	Autopista Central Sistema Central de Control
Autopista Costanera Norte S.A.	Autopista Costanera Norte Sistema Central de Control
Autopista del Sol S.A.	Autopista del Sol Sistema Central de Control
Autopista Vespucio Norte S.A.	Autopista Vespucio Norte Sistema Central de Control
Autopistas	Autopistas Sistema Central de Control
Autopistas Metropolitanas S.A.	Autopistas Metropolitanas Sistema Central de Control
Metro S.A.	MTT Centro de Control de Buses
MOP CGC	MOP CGC Almacenamiento de Datos de Transito Concesiones
MOP Dirección de Vialidad	MOP DV Sistema de Almacenamiento de Datos de Transito en Vias
MTT	MTT Almacenamiento de Datos de Transporte Publico
Municipalidad	Sistema Municipal Central de Transito
Operadores Privados de Sistemas de Transporte Publico	Operadores Privados de Sistemas de Transporte Publico Centro de Control
Red de Sistemas de Concesionarios	Red de Servicio y Reciprocidad de Concesionarios
Rutas del Pacífico S.A.	Autopistas Rutas del Pacifico Sistema Central de Control de Túneles y Telepeaje
SECTRA	SECTRA Sistemas Control de Semaforos
UOCT	UOCT Centro de Control de Gestión de Tránsito

4.11.2. AD3 – ITS Virtual Data Warehouse

Example Market Package

Figure 40: Example AD3 Market Package



Description

This market package provides broad access to multimodal, multidimensional data from varied data sources, and provides this access using interoperability between physically distributed ITS archives that are each locally managed.

Centers Participating in Market Package

Stakeholder	Element
MOP CGC	MOP CGC Almacenamiento de Datos de Transito Concesiones
MOP Dirección de Vialidad	MOP DV Sistema de Almacenamiento de Datos de Transito en Vias
MTT	MTT Almacenamiento de Datos de Transporte Publico

4.12. Summary Market Packages and ITS Systems

Table 5 shows the relationship between Market Packages and ITS systems, and for each market package the status (is it currently provided or planned) and the primary elements associated with the market package.

Table 5: Market Packages and ITS Systems

Market Package	Market Package Name	ITS System	Stakeholder	Status
AD1	ITS Data Mart	Autopista Aerovias Sistema Central de Control	Autopista Aerovías S.A.	Existing
		Autopista Central Sistema Central de Control	Autopista Central S.A.	Planned
		Autopista Costanera Norte Sistema Central de Control	Autopista Costanera Norte S.A.	Planned
		Autopista del Sol Sistema Central de Control	Autopista del Sol S.A.	Existing
		Autopista Vespucio Norte Sistema Central de Control	Autopista Vespucio Norte S.A.	Planned
		Autopistas Sistema Central de Control	Autopistas	Planned
		Autopistas Metropolitanas Sistema Central de Control	Autopistas Metropolitanas S.A.	Planned
		MTT Centro de Control de Buses	Metro S.A.	Existing
		MOP CGC Almacenamiento de Datos de Transito Concesiones	MOP CGC	Planned
		MOP DV Sistema de Almacenamiento de Datos de Transito en Vias	MOP Dirección de Vialidad	Existing
		MTT Almacenamiento de Datos de Transporte Publico	MTT	Planned
		Sistema Municipal Central de Transito	Municipalidad	Planned
		Operadores Privados de Sistemas de Transporte Publico Centro de Control	Operadores Privados de Sistemas de Transporte Publico	Planned
		Red de Servicio y Reciprocidad de Concesionarios	Red de Sistemas de Concesionarios	Planned
		Autopistas Rutas del Pacifico Sistema Central de Control de Túneles y Telepeaje	Rutas del Pacífico S.A.	Existing
		SECTRA Sistemas Control de Semaforos	SECTRA	Planned
		UOCT Centro de Control de Gestión de Tránsito	UOCT	Existing
AD3	ITS Virtual Data Warehouse	MOP CGC Almacenamiento de Datos de Transito Concesiones	MOP CGC	Planned
		MOP DV Sistema de Almacenamiento de Datos de Transito en Vias	MOP Dirección de Vialidad	Existing

Market Package	Market Package Name	ITS System	Stakeholder	Status
AD3	ITS Virtual Data Warehouse	MTT Almacenamiento de Datos de Transporte Publico	MTT	Planned
APTS1	Transit Vehicle Tracking	MTT Centro de Control de Buses	Metro S.A.	Existing
		Operadores Privados de Sistemas de Transporte Publico Vehiculos	Operadores Privados de Sistemas de Transporte Publico	Planned
APTS2	Transit Fixed-Route Operations	MTT Control de Buses Sitio Web	Metro S.A.	Existing
		MTT Centro de Control de Buses	Metro S.A.	Existing
		MOP DV Subdireccion de Explotacion	MOP Dirección de Vialidad	Planned
		UOCT Centro de Control de Gestión de Tránsito	UOCT	Existing
APTS4	Transit Passenger and Fare Management	Institucion Financiera	Institucion Financiera	Existing
		Metro Informacion a Usuario en Viaje	Metro S.A.	Existing
		MTT Centro de Control de Buses	Metro S.A.	Existing
		Metro Boleteria y Punto de Venta de Tarjetas	Metro S.A.	Planned
		MTT Control de Buses Sitio Web	Metro S.A.	Existing
		MTT Quiosco	MTT	Planned
		Operadores de Sistemas de Transporte Publico Regionales Tarjeta Electronico	Operadores de Sistemas de Transporte Publico Regionales	Planned
		Operadores Privados de Sistemas de Transporte Publico Centro de Control	Operadores Privados de Sistemas de Transporte Publico	Planned
		Operadores Privados de Sistemas de Transporte Publico Vehiculos	Operadores Privados de Sistemas de Transporte Publico	Planned
APTS5	Transit Security	Bomberos Sistema Central	Bomberos	Existing
		Carabineros Sistema Central	Carabineros	Existing
		MTT Centro de Control de Buses	Metro S.A.	Existing
		Metro Boleteria y Punto de Venta de Tarjetas	Metro S.A.	Planned
		MTT Quiosco	MTT	Planned

Market Package	Market Package Name	ITS System	Stakeholder	Status
APTS5	Transit Security	Operadores Privados de Sistemas de Transporte Publico Vehiculos	Operadores Privados de Sistemas de Transporte Publico	Planned
		SAMU Sistema Central	SAMU	Existing
APTS6	Transit Maintenance	MTT Centro de Control de Buses	Metro S.A.	Existing
		Operadores Privados de Sistemas de Transporte Publico Vehiculos	Operadores Privados de Sistemas de Transporte Publico	Planned
APTS7	Multi-modal Coordination	MTT Centro de Control de Buses	Metro S.A.	Existing
		Operadores Privados de Sistemas de Transporte Publico Vehiculos	Operadores Privados de Sistemas de Transporte Publico	Planned
		Terminales Multimodales	Terminales Multimodales	Existing
		UOCT Controladores de Semáforos	UOCT	Existing
		UOCT Centro de Control de Gestión de Tránsito	UOCT	Existing
APTS8	Transit Traveler Information	Metro Boleteria y Punto de Venta de Tarjetas	Metro S.A.	Planned
		Metro Informacion a Usuario en Viaje	Metro S.A.	Existing
		MTT Centro de Control de Buses	Metro S.A.	Existing
		MTT Informacion a Usuario Sitio Web	MTT	Planned
		MTT Quiosco	MTT	Planned
		Viajeros Equipo Personal de Viajeros	Viajeros	Planned
ATIS1	Broadcast Traveler Information	Operadores Privados de Sistemas de Transporte Publico Vehiculos	Operadores Privados de Sistemas de Transporte Publico	Planned
		Operadores Privados de VC Vehiculos Comerciales	Operadores Privados de VC	Existing
		Viajeros Vehiculos Privados	Viajeros	Planned
		Viajeros Equipo Personal de Viajeros	Viajeros	Planned
ATIS2	Interactive Traveler Information	Operadores Privados de Sistemas de Transporte Publico Vehiculos	Operadores Privados de Sistemas de Transporte Publico	Planned

Market Package	Market Package Name	ITS System	Stakeholder	Status
ATIS2	Interactive Traveler Information	Operadores Privados de VC Vehiculos Comerciales	Operadores Privados de VC	Existing
		Viajeros Equipo Personal de Viajeros	Viajeros	Planned
		Viajeros Vehiculos Privados	Viajeros	Planned
ATIS5	ISP Based Route Guidance	MTT Centro de Control de Buses	Metro S.A.	Existing
		Operadores de Metro Ligero Centro de Control	Operadores de Metro Ligero	Existing
		Operadores Privados de Sistemas de Transporte Publico Vehiculos	Operadores Privados de Sistemas de Transporte Publico	Planned
		Operadores Privados de Sistemas de Transporte Publico Centro de Control	Operadores Privados de Sistemas de Transporte Publico	Planned
		Operadores Privados de VC Vehiculos Comerciales	Operadores Privados de VC	Existing
		Terminales Multimodales	Terminales Multimodales	Existing
		Viajeros Equipo Personal de Viajeros	Viajeros	Planned
		Viajeros Vehiculos Privados	Viajeros	Planned
ATMS01	Network Surveillance	Autopista Aerovias Sitio Web	Autopista Aerovías S.A.	Planned
		Autopista Aerovias Sistema Central de Control	Autopista Aerovías S.A.	Existing
		Autopista Aerovias Equipo de Vias	Autopista Aerovías S.A.	Planned
		Autopista Central Sistema Central de Control	Autopista Central S.A.	Planned
		Autopista Central Equipo de Vias	Autopista Central S.A.	Planned
		Autopista Central Sitio Web	Autopista Central S.A.	Planned
		Autopista Costanera Norte Equipo de Tunel	Autopista Costanera Norte S.A.	Planned
		Autopista Costanera Norte Sistema Central de Control	Autopista Costanera Norte S.A.	Planned
		Autopista Costanera Norte Sitio Web	Autopista Costanera Norte S.A.	Planned

Market Package	Market Package Name	ITS System	Stakeholder	Status
		Autopista Costanera Norte Equipo de Vias	Autopista Costanera Norte S.A.	Planned
ATMS01	Network Surveillance	Autopista del Sol Equipo de Vias	Autopista del Sol S.A.	Existing
		Autopista del Sol Sistema Central de Control	Autopista del Sol S.A.	Existing
		Autopista del Sol Sitio Web	Autopista del Sol S.A.	Planned
		Autopista Vespucio Norte Sitio Web	Autopista Vespucio Norte S.A.	Planned
		Autopista Vespucio Norte Sistema Central de Control	Autopista Vespucio Norte S.A.	Planned
		Autopista Vespucio Norte Equipo de Vias	Autopista Vespucio Norte S.A.	Planned
		Autopistas Sistema Central de Control	Autopistas	Planned
		Autopistas Equipo de Vias	Autopistas	Planned
		Autopistas Sitio Web	Autopistas	Planned
		Autopistas Metropolitanas Sistema Central de Control	Autopistas Metropolitanas S.A.	Planned
		Autopistas Metropolitanas Sitio Web	Autopistas Metropolitanas S.A.	Planned
		Autopistas Metropolitanas Equipo de Vias	Autopistas Metropolitanas S.A.	Planned
		Sistema Municipal Central de Transito	Municipalidad	Planned
		Sistema Municipal Sitio Web	Municipalidad	Planned
		Sistema Municipal Equipo de Vias	Municipalidad	Planned
		Autopistas Rutas del Pacifico Equipo de Vias	Rutas del Pacífico S.A.	Existing
		Autopistas Rutas del Pacifico Sitio web	Rutas del Pacífico S.A.	Planned
		Autopistas Rutas del Pacifico Sistema Central de Control de Túneles y Telepeaje	Rutas del Pacífico S.A.	Existing
		SECTRA Sistemas Control de Semaforos Sitio Web	SECTRA	Planned
		SECTRA Sensores de Transito	SECTRA	Planned
		SECTRA Sistemas Control de Semaforos	SECTRA	Planned

Market Package	Market Package Name	ITS System	Stakeholder	Status
ATMS01	Network Surveillance	UOCT Sensores de Transito	UOCT	Planned
		UOCT Centro de Control de Gestión de Tránsito	UOCT	Existing
		UOCT Sitio Web	UOCT	Existing
		UOCT Circuito Cerrado de Televisión	UOCT	Existing
ATMS02	Probe Surveillance	Autopista Aerovias Sistema Central de Control	Autopista Aerovías S.A.	Existing
		Autopista Aerovias Sitio Web	Autopista Aerovías S.A.	Planned
		Autopista Aerovias Equipo de Vias	Autopista Aerovías S.A.	Planned
		Autopista Central Sitio Web	Autopista Central S.A.	Planned
		Autopista Central Sistema Central de Control	Autopista Central S.A.	Planned
		Autopista Costanera Norte Equipo de Vias	Autopista Costanera Norte S.A.	Planned
		Autopista Costanera Norte Sitio Web	Autopista Costanera Norte S.A.	Planned
		Autopista Costanera Norte Sistema Central de Control	Autopista Costanera Norte S.A.	Planned
		Autopista del Sol Sitio Web	Autopista del Sol S.A.	Planned
		Autopista del Sol Equipo de Vias	Autopista del Sol S.A.	Existing
		Autopista del Sol Sistema Central de Control	Autopista del Sol S.A.	Existing
		Autopista Vespucio Norte Sistema Central de Control	Autopista Vespucio Norte S.A.	Planned
		Autopista Vespucio Norte Sitio Web	Autopista Vespucio Norte S.A.	Planned
		Autopista Vespucio Norte Equipo de Vias	Autopista Vespucio Norte S.A.	Planned
		Autopistas Equipo de Vias	Autopistas	Planned
		Autopistas Sitio Web	Autopistas	Planned
		Autopistas Sistema Central de Control	Autopistas	Planned
		Autopistas Metropolitanas Sistema Central de Control	Autopistas Metropolitanas S.A.	Planned

Market Package	Market Package Name	ITS System	Stakeholder	Status
ATMS02	Probe Surveillance	Autopistas Metropolitanas Sitio Web	Autopistas Metropolitanas S.A.	Planned
		Autopistas Metropolitanas Equipo de Vias	Autopistas Metropolitanas S.A.	Planned
		Operadores Privados de VC Vehiculos Comerciales	Operadores Privados de VC	Existing
		SECTRA Sistemas Control de Semaforos	SECTRA	Planned
		SECTRA Sensores de Transito	SECTRA	Planned
		UOCT Sensores de Transito	UOCT	Planned
		UOCT Centro de Control de Gestión de Tránsito	UOCT	Existing
		Viajeros Vehiculos Privados	Viajeros	Planned
ATMS03	Surface Street Control	Sistema Municipal Equipo de Vias	Municipalidad	Planned
		Sistema Municipal Central de Transito	Municipalidad	Planned
		SECTRA Sistemas Control de Semaforos	SECTRA	Planned
		SECTRA Controladores de Semáforos	SECTRA	Existing
		UOCT Controladores de Semáforos	UOCT	Existing
		UOCT Centro de Control de Gestión de Tránsito	UOCT	Existing
ATMS06	Traffic Information Dissemination	Autopista Aerovias Equipo de Vias	Autopista Aerovías S.A.	Planned
		Autopista Aerovias Sistema Central de Control	Autopista Aerovías S.A.	Existing
		Autopista Central Equipo de Vias	Autopista Central S.A.	Planned
		Autopista Central Sistema Central de Control	Autopista Central S.A.	Planned
		Autopista Costanera Norte Equipo de Tunel	Autopista Costanera Norte S.A.	Planned
		Autopista Costanera Norte Sistema Central de Control	Autopista Costanera Norte S.A.	Planned
		Autopista del Sol Equipo de Vias	Autopista del Sol S.A.	Existing
		Autopista del Sol Sistema Central de Control	Autopista del Sol S.A.	Existing
		Autopista Vespucio Norte Equipo de Vias	Autopista Vespucio Norte S.A.	Planned

Market Package	Market Package Name	ITS System	Stakeholder	Status
ATMS06	Traffic Information Dissemination	Autopista Vespucio Norte Sistema Central de Control	Autopista Vespucio Norte S.A.	Planned
		Autopistas Sistema Central de Control	Autopistas	Planned
		Autopistas Equipo de Vias	Autopistas	Planned
		Autopistas Metropolitanas Equipo de Vias	Autopistas Metropolitanas S.A.	Planned
		Autopistas Metropolitanas Sistema Central de Control	Autopistas Metropolitanas S.A.	Planned
		MTT Centro de Control de Buses	Metro S.A.	Existing
		MOP DV Subdireccion de Explotacion	MOP Dirección de Vialidad	Planned
		Sistema Municipal Central de Transito	Municipalidad	Planned
		Sistema Municipal Equipo de Vias	Municipalidad	Planned
		Operadores Privados de Sistemas de Transporte Publico Centro de Control	Operadores Privados de Sistemas de Transporte Publico	Planned
		Autopistas Rutas del Pacifico Sistema Central de Control de Túneles y Telepeaje	Rutas del Pacífico S.A.	Existing
		Autopistas Rutas del Pacifico Equipo de Vias	Rutas del Pacífico S.A.	Existing
		SECTRA Sistemas Control de Semaforos	SECTRA	Planned
		SECTRA Letreros de Mensaje Variable	SECTRA	Existing
		UOCT Centro de Control de Gestión de Tránsito	UOCT	Existing
		UOCT Letreros de Mensaje Variable	UOCT	Existing
ATMS07	Regional Traffic Control	Autopista Aerovias Sistema Central de Control	Autopista Aerovías S.A.	Existing
		Autopista Central Sistema Central de Control	Autopista Central S.A.	Planned
		Autopista Costanera Norte Sistema Central de Control	Autopista Costanera Norte S.A.	Planned
		Autopista del Sol Sistema Central de Control	Autopista del Sol S.A.	Existing
		Autopista Vespucio Norte Sistema Central de Control	Autopista Vespucio Norte S.A.	Planned
		Autopistas Sistema Central de Control	Autopistas	Planned

Market Package	Market Package Name	ITS System	Stakeholder	Status
ATMS07	Regional Traffic Control	Autopistas Metropolitanas Sistema Central de Control	Autopistas Metropolitanas S.A.	Planned
		Sistema Municipal Central de Transito	Municipalidad	Planned
		Autopistas Rutas del Pacifico Sistema Central de Control de Túneles y Telepeaje	Rutas del Pacífico S.A.	Existing
		Autopistas Rutas del Pacifico Sistema Central de Control de Túneles y Telepeaje	Rutas del Pacífico S.A.	Existing
		SECTRA Sistemas Control de Semaforos	SECTRA	Planned
		UOCT Centro de Control de Gestión de Tránsito	UOCT	Existing
ATMS08	Incident Management System	Administrador del Espacio Publico	Administrador del Espacio Publico	Existing
		Autopista Aerovias Sistema Central de Control	Autopista Aerovías S.A.	Existing
		Autopista Aerovias Sistema Central de Control	Autopista Aerovías S.A.	Existing
		Autopista Central Sistema Central de Control	Autopista Central S.A.	Planned
		Autopista Central Sistema Central de Control	Autopista Central S.A.	Planned
		Autopista Costanera Norte Sistema Central de Control	Autopista Costanera Norte S.A.	Planned
		Autopista Costanera Norte Sistema Central de Control	Autopista Costanera Norte S.A.	Planned
		Autopista del Sol Sistema Central de Control	Autopista del Sol S.A.	Existing
		Autopista del Sol Sistema Central de Control	Autopista del Sol S.A.	Existing
		Autopista Vespucio Norte Sistema Central de Control	Autopista Vespucio Norte S.A.	Planned
		Autopista Vespucio Norte Sistema Central de Control	Autopista Vespucio Norte S.A.	Planned
		Autopistas Vehiculos de Emergencia	Autopistas	Existing
		Autopistas Sistema Central de Control	Autopistas	Planned
		Autopistas Sistema Central de Control	Autopistas	Planned
		Autopistas Metropolitanas Sistema Central de Control	Autopistas Metropolitanas S.A.	Planned

Market Package	Market Package Name	ITS System	Stakeholder	Status
ATMS08	Incident Management System	Autopistas Metropolitanas Sistema Central de Control	Autopistas Metropolitanas S.A.	Planned
		Bomberos Vehiculos de Emergencia	Bomberos	Existing
		Bomberos Sistema Central	Bomberos	Existing
		Carabineros Vehiculos de Emergencia	Carabineros	Existing
		Carabineros Sistema Central	Carabineros	Existing
		DG Seguridad de Puertos y Aeropuertos	DG	Existing
		MOP DV Subdireccion de Explotacion	MOP Dirección de Vialidad	Planned
		MOP DV Sistema de Emergencia	MOP Dirección de Vialidad	Planned
		Sistema Municipal Central de Transito	Municipalidad	Planned
		Onemi Gestion de Emergencia	Onemi	Existing
		Operadores Privados de Emergencia Medica Vehiculos	Operadores Privados de Emergencia Medica	Planned
		Operadores Privados de Emergencia Medica Centro de Despacho	Operadores Privados de Emergencia Medica	Existing
		Operadores Privados de Gruas Sistema de Despacho	Operadores Privados de Gruas	Planned
		Autopistas Rutas del Pacifico Sistema Central de Control de Túneles y Telepeaje	Rutas del Pacífico S.A.	Existing
		SAMU Sistema Central	SAMU	Existing
		SAMU Vehiculos de Emergencia	SAMU	Existing
		SECTRA Sistemas Control de Semaforos	SECTRA	Planned
		UOCT Centro de Control de Gestión de Tránsito	UOCT	Existing
ATMS10	Electronic Toll Collection	Autopista Aerovias Sitio Web	Autopista Aerovías S.A.	Planned
		Autopista Aerovias Equipo deTelepeaje	Autopista Aerovías S.A.	Existing
		Autopista Aerovias Sistema Central de Control	Autopista Aerovías S.A.	Existing
		Autopista Central Sistema Central de Control	Autopista Central S.A.	Planned
		Autopista Central Equipo de Telepeaje	Autopista Central S.A.	Planned
		Autopista Central Sitio Web	Autopista Central S.A.	Planned

Market Package	Market Package Name	ITS System	Stakeholder	Status
ATMS10	Electronic Toll Collection	Autopista Costanera Norte Sistema Central de Control	Autopista Costanera Norte S.A.	Planned
		Autopista Costanera Norte Sitio Web	Autopista Costanera Norte S.A.	Planned
		Autopista Costanera Norte Equipo de Telepeaje	Autopista Costanera Norte S.A.	Planned
		Autopista del Sol Sistema Central de Control	Autopista del Sol S.A.	Existing
		Autopista del Sol Equipo de Telepeaje	Autopista del Sol S.A.	Existing
		Autopista del Sol Sitio Web	Autopista del Sol S.A.	Planned
		Autopista Vespucio Norte Sistema Central de Control	Autopista Vespucio Norte S.A.	Planned
		Autopista Vespucio Norte Equipo de Telepeaje	Autopista Vespucio Norte S.A.	Planned
		Autopista Vespucio Norte Sitio Web	Autopista Vespucio Norte S.A.	Planned
		Autopistas Equipo de Telepeaje	Autopistas	Planned
		Autopistas Sitio Web	Autopistas	Planned
		Autopistas Sistema Central de Control	Autopistas	Planned
		Autopistas Metropolitanas Sistema Central de Control	Autopistas Metropolitanas S.A.	Planned
		Autopistas Metropolitanas Sitio Web	Autopistas Metropolitanas S.A.	Planned
		Autopistas Metropolitanas Equipo de Telepeaje	Autopistas Metropolitanas S.A.	Planned
		Carabineros Sistema Central	Carabineros	Existing
		Institucion Financiera	Institucion Financiera	Existing
		Operadores Privados de VC Vehiculos Comerciales	Operadores Privados de VC	Existing
		Red de Servicio y Reciprocidad de Concesionarios	Red de Sistemas de Concesionarios	Planned
		Autopistas Rutas del Pacifico Sistema Central de Control de Túneles y Telepeaje	Rutas del Pacífico S.A.	Existing

Market Package	Market Package Name	ITS System	Stakeholder	Status
		Autopistas Rutas del Pacifico Equipo de Telepeaje	Rutas del Pacífico S.A.	Planned
		Autopistas Rutas del Pacifico Sitio web	Rutas del Pacífico S.A.	Planned
		Viajeros Vehiculos Privados	Viajeros	Planned
ATMS11	Emissions Monitoring and Management	SECTRA Sistemas Control de Semaforos	SECTRA	Planned
		SESMA Centro de Analisis	SESMA	Existing
		SESMA Estaciones de Monitoreo Ambiental	SESMA	Existing
		UOCT Centro de Control de Gestión de Tránsito	UOCT	Existing
ATMS13	Standard Railroad Grade Crossing	Sistema Municipal Equipo de Vias	Municipalidad	Planned
		Sistema Municipal Central de Transito	Municipalidad	Planned
		Operadores de Metro Ligero Centro de Control	Operadores de Metro Ligero	Existing
		SECTRA Controladores de Semáforos	SECTRA	Existing
		SECTRA Sistemas Control de Semaforos	SECTRA	Planned
		UOCT Controladores de Semáforos	UOCT	Existing
		UOCT Centro de Control de Gestión de Tránsito	UOCT	Existing
ATMS16	Parking Facility Management	Concesionarios de Estacionamientos Publicos Sistemas de Estacionamiento	Concesionarios de Estacionamientos Publicos	Planned
		DGAC Sistema de Gestion de Estacionamientos	DG	Planned
		Institucion Financiera	Institucion Financiera	Existing
		Viajeros Vehiculos Privados	Viajeros	Planned
ATMS18	Reversible Lane Management	Sistema Municipal Central de Transito	Municipalidad	Planned
		Sistema Municipal Equipo de Vias	Municipalidad	Planned
		SECTRA Sistemas Control de Semaforos	SECTRA	Planned
		SECTRA Controladores de Semáforos	SECTRA	Existing
		UOCT Centro de Control de Gestión de Tránsito	UOCT	Existing
		UOCT Controladores de Semáforos	UOCT	Existing
CVO01	Fleet Administration	Operadores Privados de VC Vehiculos Comerciales	Operadores Privados de VC	Existing

Market Package	Market Package Name	ITS System	Stakeholder	Status
		Operadores Privados de VC Sistemas de Operadores de Vehiculos Comerciales	Operadores Privados de VC	Planned
CVO03	Electronic Clearance	Carabineros Sistema Central	Carabineros	Existing
		MOP DV Registro y Revision de Credenciales Pesaje y Sobredimensiones	MOP Dirección de Vialidad	Planned
		MOP DV Sistema de Permiso de Carga	MOP Dirección de Vialidad	Existing
		Operadores Privados de VC Vehiculos Comerciales	Operadores Privados de VC	Existing
		Operadores Privados de VC Sistemas de Operadores de Vehiculos Comerciales	Operadores Privados de VC	Planned
		Puertos Sistema de Registro Electronico de Vehiculos	Puertos	Planned
		Puertos Equipo de Acceso de Vehiculos	Puertos	Planned
CVO05	International Border Electronic Clearance	MOP DV Cruce Fronterizo Equipo de Vias	MOP Dirección de Vialidad	Planned
		MOP DV Cruce Fronterizo Sistema de Registro Electronico de Vehiculos	MOP Dirección de Vialidad	Planned
		Operadores Privados de VC Vehiculos Comerciales	Operadores Privados de VC	Existing
		Operadores Privados de VC Sistemas de Operadores de Vehiculos Comerciales	Operadores Privados de VC	Planned
		Servicio Agricola Ganadera	Servicio Agricola Ganadera	Existing
		Servicio General de Aduana	Servicio General de Aduana	Existing
		Servicio Impuesto Interno	Servicio Impuesto Interno	Existing
CVO06	Weigh-In-Motion	MOP DV Equipo Pesaje en Movimiento	MOP Dirección de Vialidad	Existing
		Operadores Privados de VC Vehiculos Comerciales	Operadores Privados de VC	Existing
CVO10	HAZMAT Management	Autopista Aerovias Sistema Central de Control	Autopista Aerovías S.A.	Existing
		Autopista Central Sistema Central de Control	Autopista Central S.A.	Planned
		Autopista Costanera Norte Sistema Central de Control	Autopista Costanera Norte S.A.	Planned
		Autopista del Sol Sistema Central de Control	Autopista del Sol S.A.	Existing

Market Package	Market Package Name	ITS System	Stakeholder	Status
		Autopista Vespucio Norte Sistema Central de Control	Autopista Vespucio Norte S.A.	Planned
		Autopistas Sistema Central de Control	Autopistas	Planned
		Autopistas Metropolitanas Sistema Central de Control	Autopistas Metropolitanas S.A.	Planned
		Bomberos Sistema Central	Bomberos	Existing
		Carabineros Sistema Central	Carabineros	Existing
		DG Seguridad de Puertos y Aeropuertos	DG	Existing
		MOP DV Sistema de Emergencia	MOP Dirección de Vialidad	Planned
		Operadores Privados de VC Sistemas de Operadores de Vehiculos Comerciales	Operadores Privados de VC	Planned
		Operadores Privados de VC Vehiculos Comerciales	Operadores Privados de VC	Existing
		Operadores Privados de VC Vehiculos Comerciales	Operadores Privados de VC	Existing
EM1	Emergency Response	Carabineros Sistema Central	Carabineros	Existing
		DG Seguridad de Puertos y Aeropuertos	DG	Existing
		Red Regional de Informacion de Incidentes y Respuesta	Red de Sistemas de Gestion de Incidentes y Respuests	Planned
EM2	Emergency Routing	Bomberos Vehiculos de Emergencia	Bomberos	Existing
		Bomberos Sistema Central	Bomberos	Existing
		Carabineros Sistema Central	Carabineros	Existing
		Carabineros Vehiculos de Emergencia	Carabineros	Existing
		SAMU Sistema Central	SAMU	Existing
		SAMU Vehiculos de Emergencia	SAMU	Existing
		UOCT Controladores de Semáforos	UOCT	Existing
		UOCT Centro de Control de Gestión de Tránsito	UOCT	Existing

Market Package	Market Package Name	ITS System	Stakeholder	Status
EM3	Mayday Support	Operadores Privados de Sistemas de Transporte Publico Vehiculos	Operadores Privados de Sistemas de Transporte Publico	Planned
		Operadores Privados de VC Vehiculos Comerciales	Operadores Privados de VC	Existing
		Viajeros Equipo Personal de Viajeros	Viajeros	Planned
		Viajeros Vehiculos Privados	Viajeros	Planned
MC01	Maintenance and Construction Vehicle Tracking	MOP DV Subdireccion de Explotacion Vehiculos	MOP Dirección de Vialidad	Existing
		MOP DV Subdireccion de Explotacion	MOP Dirección de Vialidad	Planned
MC02	Maintenance and Construction Vehicle Maintenance	MOP DV Subdireccion de Explotacion Vehiculos	MOP Dirección de Vialidad	Existing
		MOP DV Subdireccion de Explotacion	MOP Dirección de Vialidad	Planned
MC03	Road Weather Data Collection	MOP DV Subdireccion de Explotacion	MOP Dirección de Vialidad	Planned
		Sistema Municipal Equipo de Vias	Municipalidad	Planned
		Sistema Municipal Central de Transito	Municipalidad	Planned
		UOCT Sensores Ambientales	UOCT	Planned
		UOCT Centro de Control de Gestión de Tránsito	UOCT	Existing
MC04	Weather Information Processing and Distribution	Bomberos Sistema Central	Bomberos	Existing
		Carabineros Sistema Central	Carabineros	Existing
		Comision de Seguridad de Transito Sistema Central	Comision de Seguridad de Transito	Existing
		MTT Centro de Control de Buses	Metro S.A.	Existing
		MOP DV Subdireccion de Explotacion	MOP Dirección de Vialidad	Planned
		Sistema Municipal Central de Transito	Municipalidad	Planned
		Operadores Privados de Sistemas de Transporte Publico Centro de Control	Operadores Privados de Sistemas de Transporte Publico	Planned
		SAMU Sistema Central	SAMU	Existing

Market Package	Market Package Name	ITS System	Stakeholder	Status
		SECTRA Sistemas Control de Semaforos	SECTRA	Planned
		UOCT Centro de Control de Gestión de Tránsito	UOCT	Existing
MC06	Winter Maintenance	Bomberos Sistema Central	Bomberos	Existing
		Carabineros Sistema Central	Carabineros	Existing
		Comision de Seguridad de Transito Sistema Central	Comision de Seguridad de Transito	Existing
		MTT Centro de Control de Buses	Metro S.A.	Existing
		MOP DV Subdireccion de Explotacion Vehiculos	MOP Dirección de Vialidad	Existing
		MOP DV Subdireccion de Explotacion	MOP Dirección de Vialidad	Planned
		Sistema Municipal Central de Transito	Municipalidad	Planned
		SAMU Sistema Central	SAMU	Existing
MC06	Winter Maintenance	SECTRA Sistemas Control de Semaforos	SECTRA	Planned
		UOCT Centro de Control de Gestión de Tránsito	UOCT	Existing
MC07	Roadway Maintenance and Construction	MOP DV Subdireccion de Explotacion Vehiculos	MOP Dirección de Vialidad	Existing
		MOP DV Subdireccion de Explotacion	MOP Dirección de Vialidad	Planned
		MOP DV Subdireccion de Explotacion Equipo de Vias	MOP Dirección de Vialidad	Planned
MC08	Work Zone Management	MOP DV Subdireccion de Exlotacion Sitio Web	MOP Dirección de Vialidad	Planned
		MOP DV Subdireccion de Explotacion Equipo de Vias	MOP Dirección de Vialidad	Planned
		MOP DV Subdireccion de Explotacion Vehiculos	MOP Dirección de Vialidad	Existing
		MOP DV Subdireccion de Explotacion	MOP Dirección de Vialidad	Planned
MC09	Work Zone Safety Monitoring	MOP DV Subdireccion de Explotacion	MOP Dirección de Vialidad	Planned
		MOP DV Subdireccion de Explotacion Vehiculos	MOP Dirección de Vialidad	Existing
		MOP DV Subdireccion de Explotacion Equipo de Vias	MOP Dirección de Vialidad	Planned
MC10	Maintenance and Construction Activity Coordination	Bomberos Sistema Central	Bomberos	Existing
		Carabineros Sistema Central	Carabineros	Existing

Market Package	Market Package Name	ITS System	Stakeholder	Status
		Comision de Seguridad de Transito Sistema Central	Comision de Seguridad de Transito	Existing
		MTT Centro de Control de Buses	Metro S.A.	Existing
		MOP DV Sistema de Emergencia	MOP Dirección de Vialidad	Planned
		MOP DV Subdireccion de Explotacion	MOP Dirección de Vialidad	Planned
		MOP DV Subdireccion de Exlotacion Sitio Web	MOP Dirección de Vialidad	Planned
		Operadores Privados de Sistemas de Transporte Publico Centro de Control	Operadores Privados de Sistemas de Transporte Publico	Planned
		SAMU Sistema Central	SAMU	Existing
		Terminales Multimodales	Terminales Multimodales	Existing

5. SYSTEM INTERFACES AND INFORMATION EXCHANGES

5.1. Top Level Regional System Interconnect Diagram

A system interconnect diagram, or sausage diagram, shows the systems and primary types of interconnections in the region. The National ITS Architecture of Chile interconnect diagram has been customized based on the information gathered from the stakeholders and the system inventory. Figure 41 on the following page summarizes the existing and planned ITS elements for the region in the context of physical interconnects. ITS elements identified for Chile ITS deployments (and their primary associated architecture entity) are called out in the boxes surrounding the central interconnect diagram. In the center of the figure the rectangles represent the subsystems of the National ITS Architecture of Chile.

The National ITS Architecture of Chile has elements that map to all 21 subsystems defined. In addition, the regional ITS architecture has elements that map to 15 terminators of the National ITS Architecture. These terminators are represented by the rightmost column of boxes on the diagram and include entities such as Prensa (Media) which maps to the Medios de *Comunicación element).*

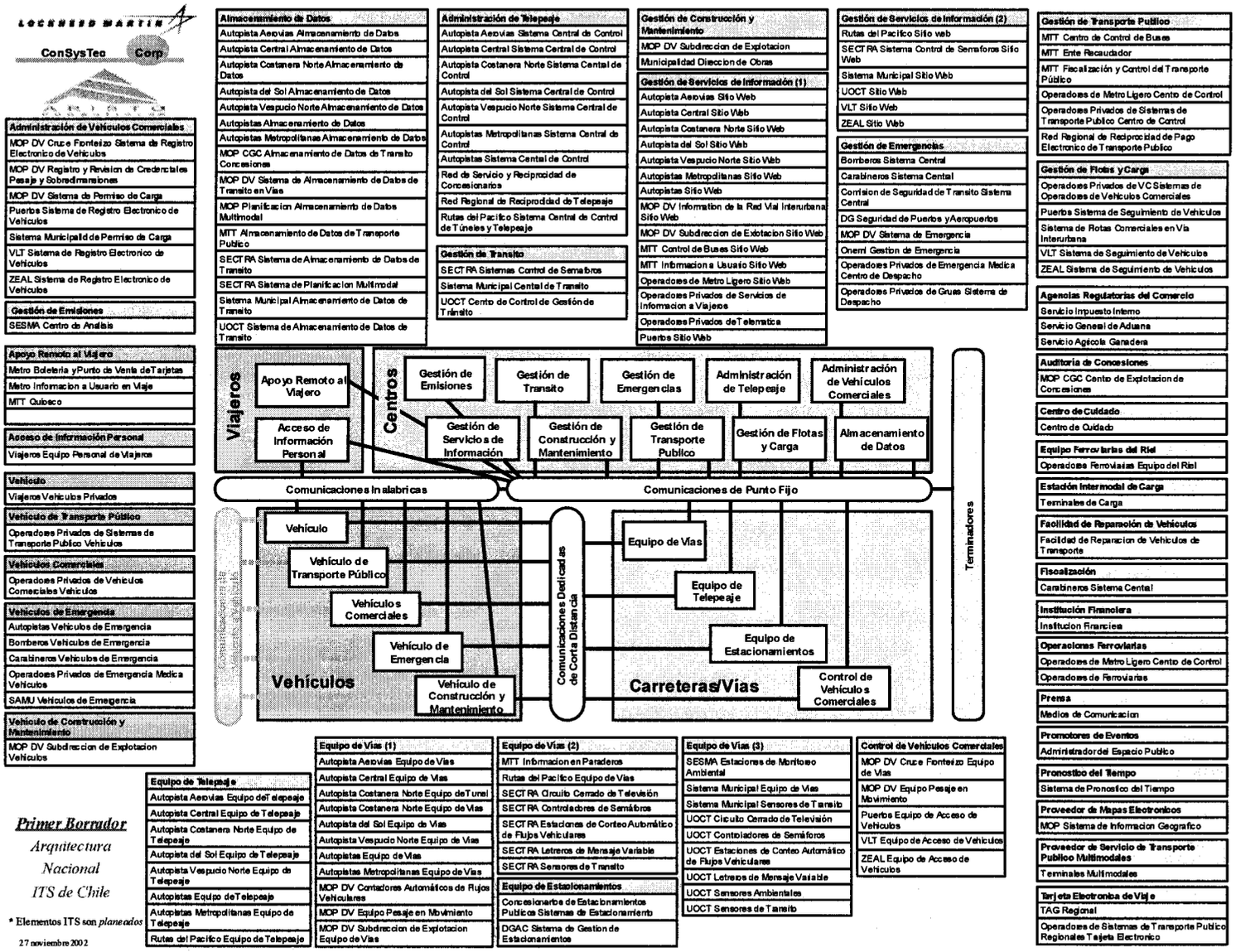
The diagram also identifies the three basic types of communications used to interconnect the elements of the ITS architecture. These communications types are defined as:

- Wireline Communications:
  A communications link serving stationary sources. It may be implemented using a variety of public or private communications networks that may physically include wireless (e.g., microwave) as well as wireline infrastructure. Both dedicated and shared communications resources may be used.

- Wide Area Wireless Communications:
  A communications link that provides communications via a wireless device between a user and an infrastructure-based system. Both broadcast (one-way) and interactive (two-way) communications services are grouped into wide-area wireless communications. These links support a range of services including real-time traveler information and various forms of fleet communications.

- Dedicated Short Range Communications:
  A wireless communications channel used for close-proximity communications between vehicles and the immediate infrastructure. It supports location-specific communications for ITS capabilities such as toll collection, transit vehicle management, driver information, and automated commercial vehicle operations.

Figure 41: Architecture System Interconnect Diagram



5.2. Regional Architecture Information Flows

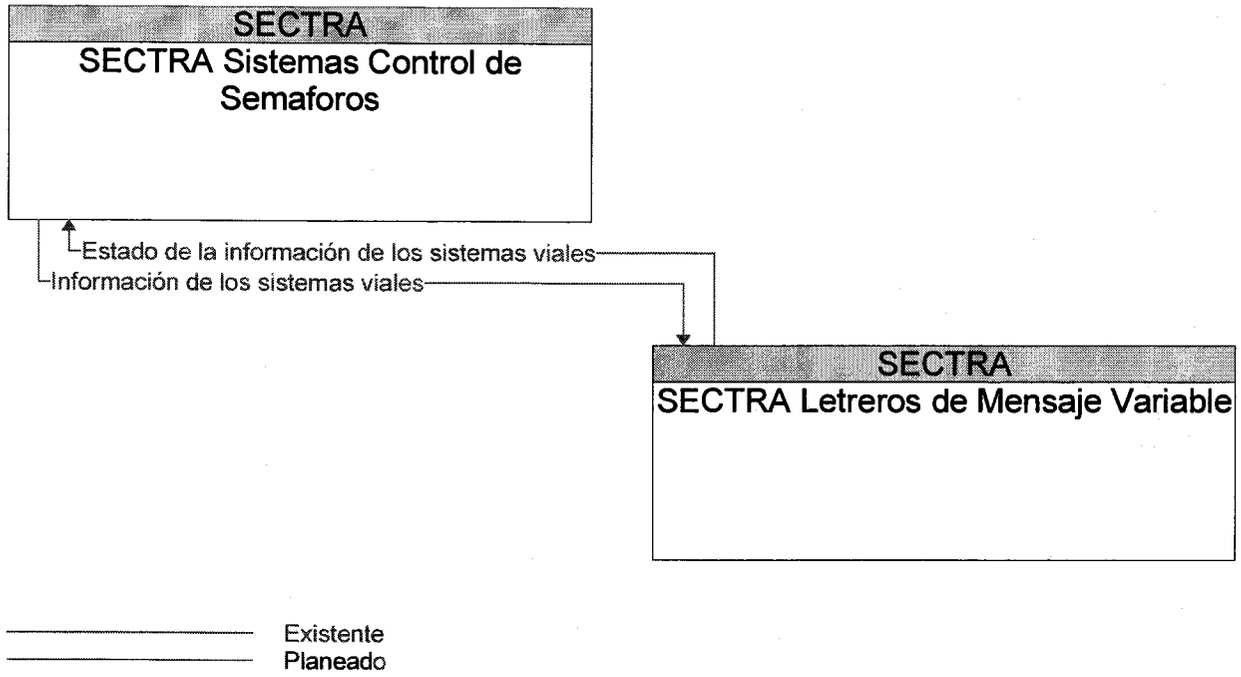
While it is important to identify the various systems and stakeholders as part of a regional ITS architecture, a primary purpose of the ITS architecture is to identify the *connectivity* between transportation systems in the region. The interconnect diagram shown previously in Figure 41 showed the high level relationships of the elements in the region. The customized market packages represent services that can be deployed as an integrated capability, and the market package diagrams show the information flows between the subsystems and terminators that are most important to the operation of the market packages. How these systems interface with each other is an integral part of the overall architecture. There are 156 elements identified as part of the National ITS Architecture of Chile. These elements were listed previously organized by stakeholder and entity in Section 3.

Architecture flows between the elements define specific information that is exchanged by the elements. Each architecture flow has a direction, name and definition. Most of the architecture flows match ones from the National ITS Architecture (the mapping of elements to National ITS Architecture entities allowed the developers to match the architecture flows to the appropriate interfaces.) In some cases new user defined flows have been created for interfaces or connectivities that are not expressed in the National ITS Architecture. These architecture flows define the interface requirements between the various elements in the regional ITS architecture.

A complete set of elements and their interfaces is accessible via the National ITS Architecture of Chile web page by clicking on the *Interfaces* button. On the web page elements are listed alphabetically in the column on the left, and each entry in the Interfacing Element column on the right is a link to more detailed information about the particular interface.

An example architecture flow diagram showing the architecture flows between two specific elements, similar to the diagram shown in Figure 42. Each architecture flow may be associated with ITS standards (discussed in the following section).

Figure 42: Example of Architecture Flows Between Elements.



6. INTEROPERABILITY AND ITS STANDARDS

6.1. Interoperability Issues

This discussion of interoperability issues is divided into two sections: Center-to-Center Interoperability and Center-to-Field Interoperability. In general, center-to-center interoperability refers to interoperability between systems inside of centers, and primarily covers information exchanges (information formats, information exchange sequences) between systems, and command and control. Center-to-field interoperability involves interoperability not only of information exchanges, and command and control between center and field systems, but also interoperability between different manufacturers' equipment, including electrical and mechanical specifications.

6.1.1. Center-to-Center Communications Interoperability

Interoperability between center systems allows them to share the following kinds of information:

- Incident information (type, location, severity, type of vehicles involved), incident response and status
- Traffic and road network conditions, road weather information, road closure (type, location, number of lanes).
- Location (of incidents, vehicles, ITS devices)

- Traffic images and video surveillance control
- Shared device control, and device control requests (sign messages, traffic patterns, highway advisory radio)
- Maintenance resource requests (equipment for incident removal, weather emergencies, roadway disasters)

The impact of not having interoperable center-to-center communication formats and protocols is that unique interfaces will need to be developed for each center-to-center pair.

6.1.2. Center-to-Field Communications Interoperability

Interoperability between center and field-based systems, and between equipment manufacturers equipment, may include the following:

- Passenger fare cards and readers
- Toll tags and readers
- Motorist Information Systems (highway advisory radio, dynamic message signs)
- Transit Customer Information Systems (information displays at stations and stops, kiosk systems, electronic passenger point-of-sale systems)
- Surveillance equipment (CCTV, vehicle sensors, traffic image formats, camera control)
- Environmental Sensors (weather and air quality sensors, flood warning devices)
- Traffic Control (traffic signal controllers, ramp meters, lane controllers)

The primary impact of not having interoperability between manufacturers equipment is that it limits system expansion opportunities to a limited number (or perhaps a single) manufacturer or vendor.

6.2. Discussion of Key Standards and Interoperability in the Region

ITS standards establish a common way in which devices connect and communicate with one another. This allows transportation agencies to implement systems that cost-effectively exchange pertinent data and accommodate equipment replacement, system upgrades, and system expansion. Standards benefit the traveling public by providing products that will function consistently and reliably throughout the region. ITS standards contribute to a safer and more efficient transportation system, facilitate regional interoperability, and promote an innovative and competitive market for transportation products and services. Use of ITS standards will be very important to project development in Chile. Table 6 below identifies Electronic Toll Collection standards used by the Autopistas in Chile.

Table 6: Standards Used by Autopistas Identified in the National ITS Architecture of Chile

Autopista	Description	Standard
Autopista Aerovias	Sistema canalizado; 1000 TAG; 915 Mhz, CalTrans Titulo 21.	915 Mhz, CalTrans Titulo 21.
Autopista Central	Sistema Norte-Sur, General Velásquez Sistema Free-Flow; Norma europea CEN 278 ENST1; 300.000 TAG	CEN 278 ENST1
Autopista Costanera Norte	Sistema Oriente-Poniente Costanera Norte sSistema Free-Flow; Norma europea CEN 278 ENST1; 300.000 TAG	CEN 278 ENST1
Autopista del Sol	Sistema canalizado; 3000 TAG; CEN 278 TIS; Antenas	CEN 278 TIS
Autopista Vespucio Norte	Autopista Américo Vespucio Nor Poniente Sistema Free-Flow; Norma europea CEN 278 GSS A1 adaptada; 300.000 TAG	CEN 278 GSS A1 (modified)
Autopistas Metropolitanas	Autopista Américo Vespucio Sur Sistema Free-Flow; Norma europea CEN 278 ENST1; 50.000 TAGs, CCTV, VMS	CEN 278 ENST1
Autopistas Rutas del Pacifico	CEN 278 ENST1. 100.000 TAGs.	CEN 278 ENST1

Interoperability Impacts of Existing Systems and Outlook for Standards

Center-to-Center Communications. Center-based standards are applicable to the current environment in Chile, especially given the fact that government agencies desire the ability to collect information directly from private concessionaire's systems for audit, regulation, and planning purposes. The introduction of standards-based (or retrofitting of existing systems) of private concessionaires systems would significantly reduce the cost of implementing public agency systems to monitor concessionaire systems due to the fact that only a single interface need be designed, developed, and implemented, instead of one custom interface being developed for each concessionaire. Additionally, in the future, should a reciprocity network be developed to allow, for example, a single tag or fare card to be used across various concessionaire systems – including toll, transit, or parking – only a single interface need be designed and implemented, versus custom interfaces between the reciprocity system and each concessionaire's systems.

Toll Tags and Readers. As discussed in section 6.1.2, one of the categories of interoperability is Toll Tags and Readers. Incompatible Autopista tags and reader equipment presents the problem of users needing to have more than one tag to travel on multiple autopistas. Due to the investment in Toll Equipment and Tags, introduction of new standards would require the replacement of equipment and tags.

Traffic Control Equipment. In the case of traffic control equipment (e.g., dynamic message signs, camera control, traffic signal controllers, traffic counters, etc.) introduction of new

standards may be applicable and feasible due to the reduced cost in equipment replacement and/or the ability to purchase entirely new systems based on standards-based specifications.

Tables 7 and 8 below identify US ITS standards that are potentially applicable in Chile. The tables list the Standards Development Organization (SDO) in the first column followed by a description of the standard and document title. Table 7 identifies applicable Communication Protocol Standards, while Table 8 shows applicable Message Set and Data Dictionary Standards.

The SDOs listed include:

- American Association of State Highway and Transportation Officials (AASHTO)
- American National Standards Institute (ANSI)
- American Society for Testing and Materials (ASTM)
- Electronic Industries Alliance/Consumer Electronic Association (EIA/CEA)
- Institute of Electrical and Electronics Engineers (IEEE)
- Institute of Transportation Engineers (ITE)
- Society of Automotive Engineers (SAE)

Table 7: Applicable ITS Communications Protocol Standards

SDO	Standard Title	Document Title
ASTM	Standard Specification for 5.9 GHz Physical Layer	ASTM 5 GHz Phys
ASTM	Standard Specification for 5.9 GHz Data Link Layer	ASTM 5 GHz Data Link
ASTM	Specification for Dedicated Short Range Communication (DSRC) Physical Layer using Microwave in the 902-928 MHz	ASTM PS 111-98
ASTM	Specification for Dedicated Short Range Communication (DSRC) Data Link Layer: Medium Access and Logical Link Control	ASTM PS 105-99
EIA/CEA	Data Radio Channel (DARC) System	CEA/EIA-794
EIA/CEA	Subcarrier Traffic Information Channel (STIC) System	CEA/EIA-795
AASHTO/ITE /NEMA	Application Profile for Common Object Request Broker Architecture (CORBA)	NTCIP 2305
AASHTO/ITE /NEMA	Application Profile for Data Exchange ASN.1 (DATEX)	NTCIP 2304
AASHTO/ITE /NEMA	Application Profile for File Transfer Protocol (FTP)	NTCIP 2303

SDO	Standard Title	Document Title
AASHTO/ITE /NEMA	Base Standard: Octet Encoding Rules (OER)	NTCIP 1102
AASHTO/ITE /NEMA	Information Profile for CORBA	NTCIP 2502
AASHTO/ITE /NEMA	Information Profile for DATEX	NTCIP 2501
AASHTO/ITE /NEMA	Internet (TCP/IP and UDP/IP) Transport Profile	NTCIP 2202
AASHTO/ITE /NEMA	Subnet Profile for Ethernet	NTCIP 2104
AASHTO/ITE /NEMA	Application Profile for File Transfer Protocol (FTP)	NTCIP 2303
AASHTO/ITE /NEMA	Application Profile for Simple Transportation Management Framework (STMF)	NTCIP 2301
AASHTO/ITE /NEMA	Application Profile for Trivial File Transfer Protocol	NTCIP 2302
AASHTO/ITE /NEMA	Base Standard: Octet Encoding Rules (OER)	NTCIP 1102
AASHTO/ITE /NEMA	Class B Profile	NTCIP 2001
AASHTO/ITE /NEMA	Internet (TCP/IP and UDP/IP) Transport Profile	NTCIP 2202
AASHTO/ITE /NEMA	Point to Multi-Point Protocol Using RS-232 Subnetwork Profile	NTCIP 2101
AASHTO/ITE /NEMA	Simple Transportation Management Framework (STMF)	NTCIP 1101
AASHTO/ITE /NEMA	Simple Transportation Management Protocol (STMP)	NTCIP 1103
AASHTO/ITE /NEMA	Subnet Profile for Ethernet	NTCIP 2104
AASHTO/ITE /NEMA	Subnet Profile for PMPP Over FSK modems	NTCIP 2102
AASHTO/ITE /NEMA	Subnet Profile for Point-to-Point Protocol using RS 232	NTCIP 2103
AASHTO/ITE /NEMA	Transportation Transport Profile	NTCIP 2201
SAE	ITS Data Bus Data Security Services Recommended Practice	SAE J1760
SAE	ITS Data Bus Protocol - Link Layer Recommended Practice	SAE J2366-2
SAE	ITS Data Bus Protocol - Physical Layer Recommended Practice	SAE J2366-1
SAE	ITS Data Bus Protocol - Thin Transport	SAE J2366-4

SDO	Standard Title	Document Title
	Layer Recommended Practice	
SAE	ITS Data Bus Protocol - Application Layer Recommended Practice	SAE J2366-7
SAE	ITS Data Bus Gateway Recommended Practice	SAE J2367
SAE	Standard for ATIS Message Sets Delivered Over Bandwidth Restricted Media	SAE J2369

Table 8: Applicable ITS Message Set and Data Dictionary Standards

SDO	Std Title	Document Title	Msg Set	Data Dic
AASHTO/ITE /NEMA	Data Collection & Monitoring Devices	NTCIP 1206	M	D
AASHTO/ITE /NEMA	Data Dictionary for Closed Circuit Television (CCTV)	NTCIP 1205	M	D
AASHTO/ITE /NEMA	Global Object Definitions	NTCIP 1201	M	D
AASHTO/ITE /NEMA	Message Set for Weather Reports	NTCIP 1301	M	
AASHTO/ITE /NEMA	Object Definitions for Actuated Traffic Signal Controller Units	NTCIP 1202	M	D
AASHTO/ITE /NEMA	Object Definitions for Dynamic Message Signs	NTCIP 1203	M	D
AASHTO/ITE /NEMA	Object Definitions for Environmental Sensor Stations & Roadside Weather Information System	NTCIP 1204	M	D
AASHTO/ITE /NEMA	Object Definitions for Video Switches	NTCIP 1208	M	D
AASHTO/ITE /NEMA	Objects for Signal Control Priority	NTCIP 1211	M	D
AASHTO/ITE /NEMA	Objects for Signal Systems Master	NTCIP 1210	M	D
AASHTO/ITE /NEMA	Ramp Meter Controller Objects	NTCIP 1207	M	D
AASHTO/ITE /NEMA	TCIP - Common Public Transportation (CPT) Business Area Standard	NTCIP 1401	M	D
AASHTO/ITE /NEMA	TCIP - Control Center (CC) Business Area Standard	NTCIP 1407	M	D
AASHTO/ITE /NEMA	TCIP - Fare Collection (FC) Business Area Standard	NTCIP 1408	M	D
AASHTO/ITE	TCIP - Incident Management (IM) Business Area	NTCIP 1402	M	D

SDO	Std Title	Document Title	Msg Set	Data Dic
/NEMA	Standard			
AASHTO/ITE /NEMA	TCIP - Onboard (OB) Business Area Standard	NTCIP 1406	M	D
AASHTO/ITE /NEMA	TCIP - Passenger Information (PI) Business Area Standard	NTCIP 1403	M	D
AASHTO/ITE /NEMA	TCIP - Scheduling/Runcutting (SCH) Business Area Standard	NTCIP 1404	M	D
AASHTO/ITE /NEMA	TCIP - Spatial Representation (SP) Business Area Standard	NTCIP 1405	M	D
AASHTO/ITE /NEMA	Transportation System Sensor Objects	NTCIP 1209	M	D
ANSI	Commercial Vehicle Credentials	ANSI TS286	M	D
ANSI	Commercial Vehicle Safety and Credentials Information Exchange	ANSI TS285	M	D
ANSI	Commercial Vehicle Safety Reports	ANSI TS284	M	D
ASTM	ADMS Data Dictionary Specifications	ASTM DD 17.54.00.2		D
IEEE	Standard for Common Incident Management Message Sets (IMMS) for use by EMCs	IEEE P1512-2000	M	D
IEEE	Standard for Emergency Management Data Dictionary	IEEE P1512.a		D
IEEE	Standard for Hazardous Material IMMS for use by EMCs	IEEE P1512.3	M	D
IEEE	Standard for Interface Between the Rail Subsystem and the Highway Subsystem at a Highway Rail Intersection	IEEE P1570	M	D
IEEE	Standard for Message Sets for Vehicle/Roadside Communications	IEEE Std 1455-1999	M	D
IEEE	Standard for Public Safety IMMS for use by EMCs	IEEE P1512.2	M	D
IEEE	Standard for Traffic Incident Management Message Sets for Use by EMCs	IEEE P1512.1	M	D
ITE	Message Sets for External TMC Communication (MS/ETMCC)	ITE TM 2.01	M	
ITE	Standard for Functional Level Traffic Management Data Dictionary (TMDD)	ITE TM 1.03		D
ITE	TCIP - Traffic Management (TM) Business Area Standard	ITE TS 3.TM	M	D
SAE	Data Dictionary for Advanced Traveler Information System (ATIS)	SAE J2353		D
SAE	ISP-Vehicle Location Referencing Standard	SAE J1746		D
SAE	ITS Data Bus Data Security Services	SAE J1760	M	D

SDO	Std Title	Document Title	Msg Set	Data Dic
	Recommended Practice			
SAE	ITS Data Bus Gateway Recommended Practice	SAE J2367	M	D
SAE	ITS Data Bus Protocol - Application Layer Recommended Practice	SAE J2366-7	M	D
SAE	Message Set for Advanced Traveler Information System (ATIS)	SAE J2354	M	
SAE	Messages for Handling Strings and Look-Up Tables in ATIS Standards	SAE J2540	M	
SAE	On-Board Land Vehicle Mayday Reporting Interface	SAE J2313	M	D
SAE	Rules for Standardizing Street Names and Route IDs	SAE J2529	M	
SAE	Standard for ATIS Message Sets Delivered Over Bandwidth Restricted Media	SAE J2369	M	D

Feasibility Study for the National Intelligent Transportation Systems (ITS) Architecture Project - Chile

Task 4: Economic and Financial Analysis

Prepared for

United States Trade and Development Agency

Ministerio de Obras Públicas de Chile

Prepared by

Lockheed Martin Corporation

Consensus Systems Technologies Corp.

Aristo Consultores

August 15, 2003

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The U.S. Trade and Development Agency

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USTDA's strategic use of foreign assistance funds to support sound investment policy and decision-making in host countries creates an enabling environment for trade, investment and sustainable economic development. Operating at the nexus of foreign policy and commerce, USTDA is uniquely positioned to work with U.S. firms and host countries in achieving the agency's trade and development goals. In carrying out its mission, USTDA gives emphasis to economic sectors that may benefit from U.S. exports of goods and services.

INTRODUCTION

Lockheed Martin Finance Corporation (LMFC), in conjunction with Lockheed Martin Transportation Systems (LMTS), is available to assist the Government of Chile in securing beneficial financing. There are different methods to consider for financing infrastructure improvements, each should be evaluated against the project goals and expectations.

Following are descriptions of several available methods of financing. Some are straightforward, while others are complicated. The ultimate decision needs to consider long-term goals and short-term needs and capabilities. It is worth reviewing these key elements so that the correct method of raising capital can be arranged.

EXIM BANK

The Export-Import bank of the US Government (Exim Bank) provides loan guarantees for US exports of goods and services. These guarantees enable international customers to access an extremely low rate of interest. The guarantees can be used for project financing and direct commercial loans, including construction funding.

Exim Bank provides a guarantee for 85% of the contract value. If a loan is guaranteed by Exim Bank, and the customer defaults, Exim Bank will repay the lender for the guaranteed amount. The customer can borrow the remaining 15% from the lender of the 85%, which is often the case, but the interest rate on the 15% will be based on the customer's credit.

Exim Bank recommends a rate of interest for the guaranteed portion of the loan, based on their analysis of current market conditions. LMFC is qualified to access Exim guarantees for loans originated by LMFC, but often finds lower rates of interest from commercial banks. Unless instructed otherwise, LMFC will set up a competition among commercial banks interested in the loan. Current Exim Bank guaranteed loans typically float with London Interbank Offered Rate (LIBOR) rates. (LIBOR is an average of rate quotes from five major banks: Bank of America, Barclays, Bank of Tokyo, Deutsche Bank and Swiss Bank.)

Exim Bank charges an origination fee depending on the credit quality of the customer. For Chile, the current origination fee is 1.59% of the loan guarantee amount.

COMMERCIAL LOAN

A more flexible but potentially more expensive method of financing is a direct commercial loan. LMFC can assist in developing commercial loan structures that will meet Chile's financing needs. The variables include rate of interest, term, payment periods, construction funding, and contract terms. Commercial loans offer the most flexibility in structure: interest only, sliding scale, even payment stream, payment frequency, and tenor. An important feature of commercial loans is the lack of content restrictions.

Through LMFC's international bank contacts, we can help locate the appropriate and motivated lender, as we have for many multi-million dollar transactions. LMFC works as your advocate when selecting and negotiating with the lender. A commercial loan can be arranged for 100% financing, and can include assets from a variety of sources.

DEFERRED PAYMENT LETTERS OF CREDIT

If Chile would like to arrange for deferred payments without a direct commercial loan, a deferred payment structure can be established contingent upon the credit of the bank of your choice, whom Chile would provide the deferred payment letters of credit. In effect, the bank will create payment obligations payable at future dates. The contractor's bank will confirm the letters of credit, and will purchase the letters of credit from the contractor, at discounted amounts. In this manner, Chile will create a unique repayment schedule, as long as the discounted amounts provide the contractor with adequate funds.

While deferred payment letters of credit can be simple to arrange, the issuing bank's credit will dictate the discount rate. In all likelihood, Chile has a better credit rating than a potential issuing bank, so this alternative could be more expensive than other alternatives.

BONDS ISSUES

Chile can issue bonds to raise the required capital. Bond issues often times provide the longest term and the best rate for the issuer. Bond issues are also one of the more complex methods of raising capital, and often require the most amount of time. There are investment bankers who would gladly structure a bond to meet Chile's requirements.

Apart from the high cost, a bond issue has a problem of funding. The funding of a bond issue takes place all at once. If there is a delay in contractor payments, Chile will be exposed to negative arbitrage if the excess funds do not earn as much as the bond yield rate.

PROJECT FINANCE

As long as there is a revenue stream from the overall project, project financing can be utilized. Basically, a lender looks to the expected revenue stream for the source of repayment. The more likely the source is to provide the revenues, the more capital can be raised at a lower rate of interest. Project financing is not venture capital; there must be an owner at risk, invested in the project, and able to deliver revenues from that one distinct project.

Chile can dramatically help generate the most preferential terms and conditions by guaranteeing a minimum revenue stream. The project can generate the funds to repay the lender independently of the Chilean guarantee, but the lenders will look to the credit of the guarantor when structuring the loan.

PRIVATE FINANCE INITIATIVE

An increasingly popular method of acquiring the use of assets for the public good, without making an investment or creating a loan obligation, is to contract with a private entity for the service provided by that asset; referred to as a private finance initiative (PFI). This is a good way to avoid the complex capital authorization process; instead of purchasing an asset, Chile would enter into a service agreement.

The service agreement would need to have a long enough term for a private investor to recover the investment and to make a profit. The private investor will form an entity dedicated only to

providing the service. This entity would need to raise the capital, either through investing or borrowing, in order to construct the assets that will provide the service. This newly formed entity can raise capital in any of the above methods, selecting the appropriate method based upon the nature of the asset and the timing of the need for capital. These entities frequently utilize either project financing or bond issues.

Annually, Chile would have the service payment obligation, but would avoid a capital purchase. If the service needs to be discontinued at some point in time, Chile will be able to do so by paying a breakage fee.

There are substantial hurdles in creating a PFI. One significant hurdle is indemnification. Often, PFIs involve services that include a significant risk of serious injury. The most economic, and possibly only solution is for the government to indemnify the service provider against potential liabilities. PFIs are frequently used to provide services that previously were under governmental control, and where the government previously had all liabilities. In this case, the government is not increasing or reducing the risk exposure by indemnifying the PFI service provider.

WORLD TRADE ORGANIZATION

The World Trade Organization (WTO) is primarily focused on ensuring fair and competitive trade between nations. Primary to their efforts is the elimination of tariffs that individual nations place on goods imported from another nation. While financing can fall under their purview, the WTO does not lend in a customary finance sense.

WORLD BANK

The World Bank is a far-reaching organization, and includes such entities as the International Development Association (IDA), the International Bank for Reconstruction and Development (IBRD), the International Finance Corporation (IFC), the Multilateral Investment Guaranty Agency (MIGA) and the International Centre for Settlement of Investment Disputes (ICSID).

ICSID is an arbitrator for financial disputes between a country and international investors.

The IDA exists to provide zero interest loans to impoverished countries, often with extended grace periods, and more as financial aid than as a lender. IDA's goal is to eliminate poverty worldwide, and as such provides funds to countries such as Nigeria, Tanzania, and Bangladesh. Chile would not be able to borrow from the IDA.

The International Bank for Reconstruction and Development (IBRD) is owned by member countries, and has the stated goal to reduce poverty by promoting development through loans, guarantees, and other services. The IBRD focuses on such projects as urban development, agriculture, legal institutions, health care, and transportation. It is not clear if an ITS project would be considered, or if their focus is restricted to building roads and transportation networks such as trains.

The Multilateral Investment Guarantee Agency (MIGA) is also a World Bank organization that exists to provide loan guarantees related to projects approved at their discretion. Some of the MIGA guarantees are for political risk, and most are focused on projects in the poorest countries

of the world. MIGA guarantees cover currency inconvertibility, breach of contract, expropriation, and civil disturbance. Based on their history, the chance of guaranteeing a project in Chile, with a strong economy, is slight.

OPIC

The Overseas Private Investment Corporation (OPIC) is a self-sustaining US Governmental organization that, among other activities, strives to create jobs for US citizens by direct lending or guaranteeing loans to private US companies who are investing internationally. OPIC determines their support based on the project viability and if the project will support development in the foreign country. OPIC sometimes requires corporate guarantees. Development can include providing better services, transfer of technology, job and tax revenue creation, and economic stimulation. If LM or some other US entity is investing directly and requires project-specific debt, OPIC might help.

IFC

The International Finance Corporation (IFC) lends and invests in and to private entities that invest in developing countries. The IFC strives to support projects that do not have access to all of the needed capital, and which do not have access to other forms of borrowing. The IFC has invested in public beneficial projects in Chile such as wastewater treatment, and electricity generation. The smart highway project may or may not be for the public good, but as it appears non-essential, chances of an IFC loan or investment seem remote.

Feasibility Study for the National Intelligent Transportation Systems (ITS) Architecture Project - Chile

Task 5: Environmental Impacts

Prepared for

United States Trade and Development Agency

Ministerio de Obras Públicas de Chile

Prepared by

Lockheed Martin Corporation

Consensus Systems Technologies Corp.

Aristo Consultores

August 15, 2003

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1. INTRODUCTION

1.1. About This Report

This Task 5 – Environmental Impact Report identifies benefits for the ITS implementations considered by the Chile National ITS Architecture. This includes a characterization of benefits for each type of system (rather than for every individual system). Comments will be incorporated into the Task 10 final report.

1.2. National ITS Architecture of Chile Background

The ***National ITS (Intelligent Transportation Systems) Architecture of Chile*** is a roadmap for transportation systems integration over the next approximately 15 years. The architecture has been developed through a cooperative effort by the country's transportation agencies, covering all modes and all roads in the country. The architecture represents a shared vision of how each agency's systems will work together in the future, sharing information and resources to provide a safer, more efficient, and more effective transportation system for travelers in the region.

The ITS architecture is an important new tool that will be used by:

- Operating Agencies to recognize and plan for transportation integration opportunities in the region.
- Planning Agencies to better reflect integration opportunities and operational needs into the transportation planning process.
- Other organizations and individuals that use the transportation system in Chile.

The ITS architecture provides an overarching framework that spans all of these organizations and individual transportation projects. Using the ITS architecture, each transportation project can be viewed as an element of the overall transportation system, providing visibility into the relationships between individual transportation projects and ways to cost-effectively build an integrated transportation system over time.

1.3. Document Overview

The primary source of information for this report is derived from the U.S. National ITS Benefits Database (U.S. DOT Joint ITS Program Office). The database, updated quarterly, is available to the public at www.benefitcost.its.dot.gov and contains the most recent data collected.

This document is organized into 3 main sections as follows.

- Section 1 Introduction - provides introductory information.
- Section 2 ITS Benefits Measures and Functional Area Definitions – provides definitional information regarding benefits measures and functional areas assessed in the U.S. National ITS Benefits Program.
- Section 3 Summary of ITS Benefits - This section includes a tabular summary found in the U.S. National ITS Benefits Database.

2. ITS BENEFITS MEASURES AND FUNCTIONAL AREA DEFINITIONS

2.1. ITS Benefits Measures

The ITS benefits measures have been developed to enable project managers and engineers to gauge the effects and impacts of ITS. Summarized from the **Intelligent Transportation Systems Benefits:** ***2001 Update*** report, the following definitions for benefits measures are shown below:

Safety. An explicit objective of the transportation system is to provide a safe environment for travel while continuing to strive to improve the performance of the system. Although undesirable, crashes and fatalities are inevitable occurrences. This goal area focuses on reducing the number of crashes, and lessening the probability of a fatality should a crash occur. Typical measures of effectiveness used to quantify safety performance include the overall crash rate, fatality crash rate, and injury crash rate. Crash rates are typically calculated in terms of crashes per year or crashes per million vehicle miles of travel.

Delay. Delay can be measured in many different ways, depending on the type of transportation system being analyzed. Delay of a system is typically measured in seconds or minutes of delay per vehicle. Also, delay for users of the system may be measured in person-hours. Delay for freight shipments could be measured in time past scheduled arrival time of the shipment. Delay can also be measured by observing the number of stops experienced by drivers before and after a project is deployed or implemented.

Travel time variability indicates the variability in overall travel time from an origin to a destination in the system, including any modal transfers or en-route stops. This measure of effectiveness can readily be applied to intermodal freight (goods) movement as well as personal travel. Reducing the variability of travel time improves the reliability of arrival time estimates that travelers or companies use to make planning and scheduling decisions.

Throughput. Throughput is defined as the number of persons, goods, or vehicles traversing a roadway section or network per unit time. Increases in throughput are sometimes realizations of increases in effective capacity. Under certain conditions, it may reflect the maximum number of travelers that can be accommodated by a transportation system.

Customer Satisfaction. Given that many ITS projects and programs were specifically developed to serve the public, it is important to ensure that user (i.e., customer) expectations are being met or surpassed. Customer satisfaction measures and characterizes the distance between users' expectations and experiences in relation to a service or product. Although satisfaction is difficult to measure directly, measures related to satisfaction can be observed including amount of travel in various modes, mode choices, and the quality of service as well as the volume of complaints and/or compliments received by the service provider.

Cost. ITS implementation frequently reduces operating costs and allows productivity improvements. In addition, ITS alternatives may have lower acquisition costs and life cycle costs compared to traditional transportation improvement techniques. The measure of effectiveness for this goal area is cost savings as a result of implementing ITS. Another way to view the cost savings is to quantify the cost savings between traditional and ITS solutions to addressing problems.

Environmental. The air quality and energy impacts of ITS services are very important considerations, particularly for non-attainment areas. In most cases, environmental benefits can only be estimated by the use of analysis and simulation. The problems related to regional measurement include the small impact of individual projects and large numbers of exogenous variables including weather, contributions from non-mobile sources or other regions, and the time-evolving nature of ozone pollution. Smallscale studies generally show positive impacts on the environment. These impacts result from smoother and more efficient flows in the transportation system. However, environmental impacts of travelers reacting to large-scale deployment in the long term are not well understood.

Decreases in emission levels and energy consumption have been identified as measures of effectiveness for this goal area. Specific measures of effectiveness for emission levels and fuel use include:

- Emission levels (CO, NOx and HC) (kg or tons of pollutant)
- Fuel use (liters or gallons)
- Fuel economy (km/L or miles/gal)

The tables in section 3 of this report include specific details regarding environmental benefits drawn from experience in the U.S. The National ITS Architecture of Chile identifies a number of Chilean traffic management systems. In general, the systems that show the greatest potential for favorable environmental impact are those categorized as "Autopistas" (see Freeway Management benefits in the tables), and traffic signal control systems (see Arterial Management benefits in the tables).

2.2. Functional Area Definitions

The following summarizes the functional areas across ITS analyzed in the U.S. National ITS Benefits Database.

Arterial Management. Arterial management systems are used to manage traffic by employing various detection and control devices along arterial roadways. Included in this program area are arterial traffic management systems that provide surveillance and traffic signal control, and some systems that provide travelers with audio or visual information on arterial roadway travel conditions.

Freeway Management. There are three major ITS functions that make up freeway management systems. Two of these are the monitoring and control of freeway operations. Monitoring and surveillance can be used to implement control and management strategies such as ramp metering rates and variable speed limits based on observed freeway conditions. The third function consists of displaying or providing information to the motorist in several ways, including Dynamic Message Signs (DMS) and Highway Advisory Radio (HAR).

Advanced Public Transportation Systems. Advanced Public Transportation Systems (APTS) include a number of ITS applications that can help transit agencies increase the safety and operational efficiency of the nation's transit systems. Remote monitoring of transit vehicle status and passenger activity helps to provide additional safety and security to passengers. Transit ITS services also assist operators in maintaining vehicle fleets. Vehicle self-diagnostics can alert mechanics of unexpected mechanical problems as well as routine maintenance needs. Automated vehicle location (AVL) and computer aided dispatch (CAD) can improve scheduling activities and schedule adherence.

Incident Management. Incident management systems can reduce these effects by decreasing the time to detect incidents, reducing the time for responding vehicles to arrive, and by decreasing the time required to return the facility to normal conditions. Freeway service patrols, which began prior to the emergence of ITS technologies, but are being incorporated into traffic management centers, significantly reduce the time to clear incidents, especially minor incidents.

Emergency Management. Benefits of emergency management include those derived from improved notification, dispatch, and guidance of emergency or other response equipment when an incident occurs. Applications of ITS in emergency management typically consist of automatic vehicle location, computer aided dispatch, fleet management, and vehicle guidance systems.

Electronic Payment. Electronic Toll Collection (ETC) is one of the ITS program areas where benefits information is readily available. Benefits due to impacts on the cost of toll administration, management, and collection have been demonstrated. Vehicle delay reduction and throughput at toll plazas have been proven to be very high. Electronic fare payment is another area where benefits information justifies implementation. Electronic fare payment tests, which address customer convenience and security, are ongoing in both bus and rail systems.

Traveler Information. Traveler information services allow users to make informed decisions for trip departures, routes, and mode of travel. They have been shown to increase transit usage, and may help to reduce congestion when travelers choose to defer or postpone trips, or to select alternate routes. Evaluation of implemented traveler information systems reveals that the systems are well received by those who make use of them, though the number of travelers using the information systems generally represents a small portion of the total travelers in a region. Consequently, the evaluated systems have little, if any, impact on travel times across the regional transportation network.

Crash Prevention and Safety. Benefits from crash prevention relate to the reduction in numbers of crashes. ITS implementation include the deployment of equipment at highway-rail intersections, speed warning indicators, and inclement weather warning systems.

Operations and Maintenance. Applications in ITS related to Operations and Maintenance include effective construction and work zone management and distribution of active work zone and construction information among agencies in a region, and work zone warning systems. Safety improvements through ITS include work zone warning systems which provide vehicle intrusion alerts to workers.

Road Weather Management. This functional area derives benefits from ITS through improved safety during inclement weather conditions, and cost savings through more efficient winter weather (for example, snow removal) operations.

3. TABULAR SUMMARY OF ITS BENEFITS

This section includes a tabular summary found in the U.S. National ITS Benefits Database. It includes a sample of benefits for each of the functional areas and benefits measures.

Table 1. ITS Benefits by Functional Area

Program Area / Benefits		Summary
Arterial Management Systems	Safety Improvements	Automated enforcement of traffic signals has reduced red-light violations 20-75%.
	Delay Savings	Field studies in several cities have shown that adaptive signal control systems can reduce peak period travel time 5-11%.
	Throughput	No information for this measure within this functional area was identified.
	Customer Satisfaction	In Michigan, 72% of drivers surveyed felt "better off" after signal control improvements.
	Cost Savings	Transit signal priority on a Toronto transit line allowed same level-of-service with less rolling stock.
	Environmental	Model estimates showed advanced traffic signal control systems can reduce fuel consumption 2-13%.
Freeway Management Systems	Safety Improvements	Traffic management centers using ramp meters reported freeway management systems can reduce accidents 15-50%.
	Delay Savings	Advanced Traffic Management Systems (ATMS) in the Astrodome area reduced street congestion delay by 46%.
	Throughput	After ramp meters were experimentally turned off in the Twin Cities, MN, freeway volume declined 9% and peak period throughput decreased 14%.
	Customer Satisfaction	After the Twin Cities ramp meter shutdown test, support for a complete shutdown fell from 21% to 14%.
	Cost Savings	Variable speed limits with lane controls on the German Autobahn reduced injury accidents 20-29% saving approximately $4 million/year.
	Environmental	In Denver, CO, dynamic message signs (DMS) that posted real-time vehicle emission levels motivated most motorists surveyed to consider repairs.

Table 1. ITS Benefits by Functional Area (continued)

Program Area / Benefits		Summary
Transit Management Systems	Safety Improvements	In Denver, the provision of a silent alarm feature with the AVL system has helped improve the safety of the transit system. Passenger assaults per 100,000 passengers decreased by 33% between 1992 and 1997.
	Delay Savings	Computer Aided Dispatch (CAD) and Automatic Vehicle Location (AVL) technologies improved on-time bus performance 9-23%.
	Throughput	In Portland, OR, models of transit data showed AVL/CAD may allow same level-of-service to more travelers using the same rolling stock.
	Customer Satisfaction	In Denver, installation of CAD/AVL contributed to improved schedule adherence. Customer complaints decreased 26% per 100,000 boardings.
	Cost Savings	In San Jose, CA, a paratransit scheduling and routing system increased shared rides 45% and reduced operating costs $500K the first year.
	Environmental	
Incident Management Systems	Safety Improvements	In Pennsylvania, Traffic and Incident Management Systems (TIMS) decreased highway incidents 40% between 1993 and 1997.
	Delay Savings	The I-95 Traffic and Incident Management System (TIMS) in Pennsylvania decreased highway incidents 40%, and cut closure time 55%.
	Throughput	No specific information for this measure within this functional area was identified.
	Customer Satisfaction	The Virginia DOT has received hundreds of "thank you" letters from customers satisfied with service patrols.
	Cost Savings	In Minnesota, a $600K/yr Highway Helper Program reduced the average duration of stall incidents by 8 minutes, saving $1.4 million/yr in delay costs.
	Environmental	Based on calculations of incident delay reduction, models of the Maryland CHART system showed a fuel savings of 4.1 million gallons/year in 2000.

Table 1. ITS Benefits by Functional Area (continued)

Program Area / Benefits		Summary
Emergency Management Systems	Safety Improvements	In Erie, NY, dispatch center notification time was about 1 min. for vehicles equipped with automated collision notification, and 3 to 46 minutes without.
	Delay Savings	Integrated use of incident management, DMS and arterial traffic control can achieve an annual benefit of a 5.9% reduction in delay, a 2.0% decrease in crashes, and a 1.4% decrease in fuel consumption for travelers in the corridor.
	Throughput	No specific information for this measure within this functional area was identified.
	Customer Satisfaction	In Puget Sound, WA, 95% of drivers equipped with Mayday voice communications felt more secure, and 70% with text messaging felt more secure.
	Cost Savings	In New Mexico, a private ambulance company used CAD/AVL to guide ambulances to exact locations. The company increased efficiency 10-15%.
	Environmental	No specific information for this measure within this functional area was identified.
Electronic Payment	Safety Improvements	In Florida, driver uncertainty about toll plaza configuration and traffic speeds contributed to a 48% increase in accidents at E-PASS toll stations.*
	Delay Savings	The New Jersey Turnpike Authority (NJTA) E-Zpass system reduced vehicle delay 85%.
	Throughput	Tappan Zee Bridge, New York, NY: Manual lane 400-450 vehicles/hour (vph), ETC lane 1000 vph.
	Customer Satisfaction	20% of surveyed travelers on two bridges in Lee County, FL adjusted their departure times as a result of value pricing at electronic tolls.
	Cost Savings	Smart cards in Ventura, CA saved an estimated annual $9.5 mil. in fare evasion, $5 mil. in data collection, and $0.9 mil. by eliminating transfer slips.
	Environmental	NJTA models indicate E-Zpass saves: 1.2 mil gallons of fuel/year, 0.35 tons of VOC/day, and 0.056 tons NOx/day.

Table 1. ITS Benefits by Functional Area (continued)

Program Area / Benefits		Summary
Traveler Information	Safety Improvements	IDAS models of ARTIMIS in Cincinnati and Northern Kentucky indicated traveler information may have reduced fatalities 3.2%.
	Delay Savings	In the DC metro area, a simulation model showed that commuters who used traveler information may improve their on-time reliability 5-16%.
	Throughput	A simulated traffic network in Seattle showed that supplementing freeway ATIS with arterial ATIS may not significantly improve throughput.*
	Customer Satisfaction	In Philadelphia, 66% of surveyed commuters changed their departure time, and 86% changed their route as a result of real-time traveler information.
	Cost Savings	No specific information for this measure within this functional area was identified.
	Environmental	Models of vehicle emissions in Boston showed users of Smart Traveler generated 1.5% less NOx, and 25% less VOCs.
Crash Prevention & Safety	Safety Improvements	In Colorado, a downhill speed warning system on interstate I-70 decreased truck accidents 13% and reduced runaway ramp usage 24% in 4 years.
	Delay Savings	Simulations of increased traffic volume at a San Antonio railroad crossing indicated dynamic signs with delay info may decrease system delay by 6.7%.
	Throughput	No specific information for this measure within this functional area was identified.
	Customer Satisfaction	70% of truck drivers and 85% of car drivers surveyed in California felt curve speed warning systems were useful.
	Cost Savings	No specific information for this measure within this functional area was identified.
	Environmental	An automated horn warning system in Ames, Iowa, reduced noise impact areas 97% in areas adjacent to a highway rail intersection.

Table 1. ITS Benefits by Functional Area (continued)

Program Area / Benefits		Summary
Operations and Maintenance	Safety Improvement	Texas police officers said remote speed enforcement at work zones may improve officer safety, especially on narrow bridges.
	Delay Savings	Work zone surveillance and incident response at the "Big-I" interchange in Albuquerque, NM, reduced average clearance time 44% the first year.
	Throughput	No specific information for this measure within this functional area was identified.
	Customer Satisfaction	Most people surveyed about the Minnesota Guidestar program said Smart Work Zone warning signs were accurate and useful.
	Cost Savings	No specific information for this measure within this functional area was identified.
	Environmental	No specific information for this measure within this functional area was identified.
Road Weather Management	Safety Improvements	In Idaho, weather-related warnings on freeway dynamic message signs decreased vehicle speeds 35% compared to a 9% decrease without the signs.
	Delay Savings	No specific information for this measure within this functional area was identified.
	Throughput	No specific information for this measure within this functional area was identified.
	Customer Satisfaction	In Finland, 90% of surveyed drivers felt weather controlled dynamic message signs were useful.
	Cost Savings	In WI, a snow forecasting model (with ice detection) improved DOT work schedules and reduced labor costs 4 hrs/person during significant storms.
	Environmental	No specific information for this measure within this functional area was identified.

Source: U.S. National ITS Benefits Database http://www.benefitcost.its.dot.gov

* Database also include negative impacts of ITS.

Feasibility Study for the National Intelligent Transportation Systems (ITS) Architecture Project - Chile

Task 6: Development of System Requirements and Capabilities

Prepared for

United States Trade and Development Agency
Ministerio de Obras Públicas de Chile

Prepared by

Lockheed Martin Corporation
Consensus Systems Technologies Corp.
Aristo Consultores

August 15, 2003

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USTDA's strategic use of foreign assistance funds to support sound investment policy and decision-making in host countries creates an enabling environment for trade, investment and sustainable economic development. Operating at the nexus of foreign policy and commerce, USTDA is uniquely positioned to work with U.S. firms and host countries in achieving the agency's trade and development goals. In carrying out its mission, USTDA gives emphasis to economic sectors that may benefit from U.S. exports of goods and services.

1 INTRODUCTION

This report describes the process used to develop the National ITS Architecture of Chile. The primary goal was to develop in Chile a national ITS architecture and to identify the standards required for the interconnections between the ITS elements. The standards adopted support the ITS goal to attain the exchange of information and the interoperability between the ITS elements in order to lower the cost of development of ITS projects.

The National ITS Architecture of Chile was developed by a team of consultants: Lockheed Martin and Consensus Systems Technologies Corporation (ConSysTec) of the United States, and Aristo Consultores of Santiago, Chile.

Why Chile Needs An ITS Architecture?

A safe and effective transportation infrastructure is crucial to attain both the individual and national goals of the citizens throughout Chile. Until recently, the progress of the transportation implied not only the new civil and mechanical building of highways, bridges and tunnels, or their enlargement but also the engagement of the companies that supply the vehicles (including carriers and personal vehicles and the safe transportation of people and vehicles). Nowadays, the information technology and the telecommunications applied to ground transportation cast a new light as far as additionally safety and optimal benefits is concerned. For example, while ITS (Intelligent Transportation Systems) cannot reduce travel time in heavy traffic areas and corridors, ITS can improve the ability of carriers and travelers to determine accurate travel time estimates. Improving travel time estimates can mean a significant increase in the use of the infrastructure, above all within the framework of the new economies where manufacturing cost and time (including transportation cost and time) are crucial for its success. This is important in Chile where highways are used for a majority of cargo transportation and for passenger transportation by interstate buses.

One definition of intelligent transportation systems (ITS) is: information technology and telecommunications applied to ground transportation. The distribution of ground transportation, both geographically and institutionally, requires a careful planning for the equipment and the information between the different ITS elements to be effective and interchangeable. Like any other distribution system, the ITS planning can be even more profitable by a systematic process for the development of the requirements that bring the various elements together. The aim is to establish conventions (that is to say a common language) in order to show how ITS functions are divided between the transportation elements and how the functions will interchange information. This is the function of ITS architecture!

Today, the acronym ITS means *intelligent* transportation systems – but another meaning which emphasizes one of the major benefits of ITS is that of *integrated* transportation systems.

The technical approach is to use the United States National ITS Architecture as a basis for the structure for the development of the Chile National ITS Architecture. This approach will allow Chile to take advantage of the work already done in North America, which will facilitate integrated ITS deployment in Chile. This has been the strategy recently followed by Canada when developing its national ITS architecture.

2 GOALS FOR THE CHILEAN NATIONAL ITS ARCHITECTURE

The primary goal is to develop in Chile a national ITS architecture and to identify the standards required for the interconnections between the ITS elements. The standards adopted support the ITS goal to attain the exchange of information and the interoperability between the ITS elements in order to lower the cost of deployment of ITS projects. The purpose of an ITS architecture is to guide the implementation of external interconnections of the elements that are identified in the architecture (e.g., interconnections between specific centers, ITS equipments, vehicles, and travelers). The Chilean national ITS architecture will identify the stakeholders (ITS agencies), the existing and future ITS elements where stakeholders indicate a need, and the information to be exchanged between these elements.

Thus, the focus of the ITS architecture will be in the interfaces between ITS elements (that is, the interconnections between the ITS elements, not the technology inside the ITS elements). This approach to the external interfaces is necessary because the most difficult step, that is the greatest obstacle in the development of interoperable ITS elements in a country, is to reach an agreement between the ITS stakeholders in order to exchange specific information between specific ITS elements.

The Chilean ITS architecture will identify the specific information exchanges between ITS systems early enough in the process to implement the interchange requirements of ITS projects.

The US National ITS Architecture was used as a basis and was expanded to include services and high level functional requirements to meet Chile and its regions' particular needs (but not included in the US National ITS Architecture). The result is Chile National ITS Architecture.

3 PROCESS USED

The consultant team first systematically identified the existing and future inventory of ITS elements, of ITS stakeholders at the subsystem level based on current ITS projects, existing and / or planned ITS architectural documentation and the articulation of ITS stakeholders in workshops. As defined in the national ITS architecture, a subsystem is the highest level element of the physical architecture. There are 21 subsystems identified in the National ITS Architecture classified as follows: centers, roadside (including ITS equipment), vehicles and travelers. Next, the consultant team identified the ITS services (represented by the national ITS architecture

market packages) where stakeholders indicated a need. The market packages were then customized to reflect specific applications (both existing and future) identified by the stakeholders. The customized market packages (that exist at a more detailed level than that of the subsystems) show how parts of the subsystems can be applied to supply one or more ITS services. This customization of the market packages reflects the information exchanges, showing inflow and outflow information between specific ITS systems. Finally, the customized market packages were reviewed with the ITS stakeholders at a workshop and modifications made. The result was a consensus architecture for the regions of Chile and the national ITS services.

While high level requirements were identified, an objective is to avoid specific technologies identified with elements of ITS architecture. The result provides Chile with an ITS architecture with a long shelf-life, avoiding technologies that could easily make the architecture obsolete.

3.1 ITS Architecture Training

ConSysTec has developed a two-day course (winner of the highest prize given by ITS America) called "Using the National ITS Architecture for the Development of ITS Projects". This course was designed to train ITS stakeholders on ITS standards and architecture, and to prepare them to participate in the development of ITS architecture. This course was adapted to be used in Chile's workshops. The course materials were translated into Spanish, and the course given after the First Chilean Congress on Intelligent Transportation Systems held in September 2002.

3.2 Workshop Format, Objectives and Process

This section describes the three-day workshops that have been offered in Santiago de Chile and their objectives. The objectives of the first workshop was to develop the first draft ITS architecture. Between the first and second workshop, the second and third drafts of the ITS architecture were elaborated taking into accounts comments sent by e-mail and telephone conferences. The objective of the second workshop was to review the third draft of ITS architecture. Following the second workshop a fourth and final version of the ITS architecture was developed.

The first workshop was conducted in Santiago de Chile on November 11, 13 and 15, 2002. The second workshop was conducted in Santiago de Chile on April 28, 29 and 30, 2003. The final ITS architecture was completed approximately mid August of 2003.

3.3 Documentation Model

The documentation of the National ITS Architecture of Chile was developed using software developed by ConSysTec for Chile to produce information reports and web pages based on the Turbo Architecture database. This information is available in Internet and on CD-ROM. The final web site location will be determined by the MOP's Program Manager in Chile. During the

period of the development of the architecture, the web site will be hosted by ConSysTec at www.consystec.com.

The home page provides links to the main documents of the site: list of ITS stakeholders, the architecture interconnect diagram (a.k.a. the Sausage Diagram), the market packages adapted to Chilean requirements, the inventory of ITS elements, and finally an option to have access to Turbo Architecture database. The inventory of ITS elements is organized by entities so that all similar entities can be easily found. The inventory is organized by stakeholders so that a stakeholder can easily see each of their assets in the architecture.

Feasibility Study for the National Intelligent Transportation Systems (ITS) Architecture Project - Chile

Task 7: Development of an ITS Architecture

Prepared for

United States Trade and Development Agency

Ministerio de Obras Públicas de Chile

Prepared by

Lockheed Martin Corporation

Consensus Systems Technologies Corp.

Aristo Consultores

August 15, 2003

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INTRODUCTION

This report describes the contents of the National ITS Architecture of Chile. The report contents mirror the information contained on the National ITS Archietcture web site and includes the following sections (each section contained in an Appendix of this report) as follows:

- ITS Stakeholders – Appendix A
- Inventory of ITS Elements – Appendix B
- Inventory by Stakeholder – Appendix C
- Inventory by Entity – Appendix D
- Architecture Interconnect Diagram – Appendix E
- Market Packages
    - Market Package Definitions – Appendix F
    - Market Packages by Stakeholder – Appendix G

      Appendix G contains a cross-reference for each ITS stakeholder, and the page within which (H, I J, K, L, M, and N) the market package diagram can be found.
    - Archived Data (AD) – Appendix H
    - Advanced Public Transportation Systems (APTS) – Appendix I
    - Advanced Traveler Information Systems (ATIS) – Appendix J
    - Advanced Traffic Management Systems (ATMS) – Appendix K
    - Commercial Vehicle Operations (CVO) – Appendix L
    - Emergency Management (EM) – Appendix M
    - Maintenance and Construction (MC) – Appendix N
- Architecture Flow Descriptions – Appendix O
- Equipment Package Descriptions – Appendix P
- Equipment Packages by ITS Element – Appendix Q

HOME PAGE CONTENT

The National ITS Architecture of Chile is a plan for ITS system integration over the next approximately 15 to 20 years. The National ITS Architecture of Chile represents the information and visio of ITS stakeholders (representatives from both the public and private sectors) developed during workshops conducted in Santiago, Chile on November 11, 13, and 15 of 2002, and a second workshop held during April 28, 29, and 30 of 2003. The result was a consensus architecture of the stakeholder participants.

The primary objective of the National ITS Architecture is to identify standards required for the information and control exchanges between ITS systems in Chile. The primary objective in the identification of ITS standardsE is the interoperability of ITS elements with the goal of reducing the development cost of ITS projects. The architecture, therefore, presents a framework to guide the implementation of system interconnects identified in the ITS architecture. The National ITS Architecture of Chile identifies the stakeholders, ITS systems (existing, planned, and future), plus information exchanges between systems.

ITS STAKEHOLDERS

The National ITS Architecture of Chile represents a consensus vision of the ITS stakeholders in Chile from diverse functional areas: traffic managements, public transportation, emergency and safety management, comercial vehicle administration, commercial fleet management, traveler information management, toll administration, from the public and private sectors.

The ITS Stakeholders web page contains the following information:

- Stakeholder
- Stakeholder Description

INVENTORY OF ITS ELEMENTS

This web page contains the name and description of each ITS element contained in the ITS architecture.

INVENTORY BY STAKEHOLDER

This page lists each ITS stakeholder and their ITS elements. Each stakeholder may be responsable for multiple ITS elements.

The web page contains a table of the following information:

- Stakeholder
- ITS Element

INVENTORY BY ENTITY

This web page contains the following information:

- Entity (subsystem or terminator)
- ITS Element

INTERCONNECTS

This web page contains a diagram that shows the inventory of ITS elements and the mapping of the element to the subsystems and terminators identified in the National ITS Architecture.

MARKET PACKAGES

One of the more significant steps in development of the ITS architecture was to identify and document the transportation services in the study region, in this case the country of Chile. During the workshops, market packages were selectedbased on the needs and requirements of the transportation system.

The market packages are accessible (viewable) by clicking on the graphic beside each of the ITS functional areas listed.

This web page contains the following information:

- ITS Functional Area
- Short Hand Reference (AD, ATMS, APTS, etc.)
- Market Packages
- Applicability

In addition, this web page contains hyperlinks to a PDF file which contains the market package diagrams for a particular functional area of ITS.

ARCHITECTURE FLOWS

The architecture flows represent the information or control exchanges between ITS elements.

EQUIPMENT PACKAGES

Equipment packages represent the high level functional requirements of ITS elements. The combination of all the equipment packages used by an ITS element, represents the complete seto f high level requirements for that system.

Task 7, Appendix A - ITS Stakeholders

ITS Stakeholder	Description
Administrador de TAG de Vehículos Comerciales	Administrador de TAG de Vehículos Comerciales
Administrador de TAG Regional	Administrador o administradores del TAG Regional multimodal.
Administrador del Archivo de Datos Operacionales de VC	Administrador del Archivo de Datos Operacionales de Vehículos Comerciales
Administrador del Archivo Regional de Planes de Contingencia	Administrador del archivo regional de planes de contingencia de incidentes y emergencias
Administrador del Espacio Público	Administrador de eventos públicos incluyendo eventos deportivos, culturales y sociales
Aeropuerto Aerosur	Concesionaria Aerosur S.A.
Aeropuerto Austral	Concesiones Austral S.A.
Aeropuerto Chucumata	Concesionaria Chucumata S.A.
Aeropuerto Cintra Chile	Concesionaria Cintra Chile S.A.
Aeropuerto Gestión e Ing. IDC	Concesionaria Gestión e Ing. IDC S.A.
Aeropuerto SCL Terminal Aéreo de Santiago	Concesionaria SCL Terminal Aéreo de Santiago S.A.
Antepuertos	Antepuertos
Autopista Aeropuerto AMB	Acceso Vial Aeropuerto AMB
Autopista Camino de la Madera	Concesionaria Camino de la Madera S.A.
Autopista Camino Nogales - Puchuncaví	Concesionaria Camino Nogales-Puchuncaví S.A.
Autopista Costanera Norte	Concesionaria Autopista Costanera Norte S.A.
Autopista de los Lagos	Concesionaria de los Lagos S.A.
Autopista del Aconcagua	Concesionaria Autopista del Aconcagua
Autopista del Bosque	Concesionaria Autopista del Bosque S.A.
Autopista del Elqui	Concesionaria Concesiones del Elqui S.A.
Autopista del Maipo	Concesionaria Autopista del Maipo S.A.
Autopista del Sol	Concesionaria Autopista del Sol S.A.
Autopista Litoral Central	Consorcio Acciona-Sacyr Chile S.A.
Autopista Los Libertadores	Concesionaria Autopista Los Libertadores S.A.
Autopista Norte - Sur	Concesionaria Autopista - Norte Sur S.A.
Autopista Ruta 5 Collipulli - Temuco	Concesionaria Ruta de la Araucanía Sociedad Concesionaria S.A.
Autopista Ruta de los Ríos	Concesionaria Ruta de los Ríos Sociedad Concesionaria S.A.
Autopista Talca - Chillán	Concesionaria Talca - Chillán S.A.
Autopista Tribasa Bío Bío	Concesionaria Tribasa Bío Bío S.A.
Autopista Túnel El Melón	Concesionaria Túnel El Melón S.A.
Autopista Variante Melipilla	Concesionaria Melipilla S.A.
Autopista Vespucio Norte	Concesionaria Autopista Vespucio Norte S.A.
Autopistas	Actor genérico representante de operadores de otras autopistas
Autopistas Metropolitanas	Concesionaria Autopistas Metropolitanas S.A.
Autopistas Rutas del Pacífico	Concesionaria Rutas del Pacífico S.A.
Bomberos	Bomberos
Broker de Carga	Broker de Carga
Carabineros	Carabineros
CONAMA	Comisión Nacional del Medio Ambiente
CONASET	Comisión Nacional de Seguridad de Tránsito
Concesionarias de Autopistas	Concesionarias de Autopistas

ITS Stakeholder	*Description*
Concesionarios de Estacionamientos Públicos	Concesionarios de Estacionamientos Públicos
DG	Dirección General incluyendo Aeronáutica Civil y Puertos
Institución Financiera	Institución financieras y bancarias que procesan transacciones usadas para el pago de varios servicios de ITS
Juzgado Policía Local	Juzgado Policía Local
Marina	Marina
METRO	Empresa de Transporte de Pasajeros Metro S.A.; operadores de Metrobus
MOP CGC	MOP Coordinación General de Concesiones
MOP Dirección de Vialidad	Ministerio de Obras Públicas Dirección de Vialidad
MOP Subsecretaría	Subsecretaría Ministerio de Obras Públicas
MTT	Ministerio de Transportes y Telecomunicaciones
Municipalidad	Administradores de municipalidades
Onemi	Oficina Nacional de Emergencia
Operadores de Centros de Cuidado	Operadores públicos y privados de centros de cuidado
Operadores de Ferrocarril	Operadores de Ferrocarril
Operadores de Sistemas de Pronóstico del Tiempo	Operadores de Sistemas de Pronóstico del Tiempo
Operadores de Sistemas de Transporte Público Regionales	Operadores de Sistemas de Transporte Público Regionales
Operadores Privados de Emergencia Médica	Operadores privados de ambulancias, vehículos, y sistemas de emergencia médica
Operadores Privados de Grúas	Operadores privados de vehículos y equipo de grúas
Operadores Privados de Sistemas de Transporte Público	Operadores Privados de Sistemas de Transporte Público
Operadores Privados de Telemática	Operadores Privados de Telemática
Operadores Privados de VC	Operadores Privados de Vehículos Comerciales
Promotores de Eventos Deportivos, Culturales, y Sociales	Promotores de Eventos Deportivos, Culturales, y Sociales
Proveedor de Información Sobre Materiales Peligrosos	Proveedor de Información Sobre Materiales Peligrosos
Proveedores de Medios de Comunicaciones	Proveedores públicos y privados de medios de comunicación
Puerto de Mejillones	Puerto de Mejillones
Puerto de San Antonio	Puerto de San Antonio
Puerto de Valparaíso	Puerto de Valparaíso
Puertos	Actor genérico representante de los puertos
Red de Sistemas de Concesionarias	Red de Sistemas de Concesionarias
Red de Sistemas de Gestión de Incidentes y Respuestas	Red de Sistemas de Gestión de Incidentes y Respuestas
Red de Sistemas de Información y Condiciones de Tránsito	Red de Sistemas de Información y Condiciones de Tránsito
SAMU	Servicio de Atención Médica de Urgencia
SECTRA	Secretaría Interministral de Planificación de Transporte
Servicio Agrícola Ganadero	Servicio Agrícola Ganadero
Servicio de Impuestos Internos	Servicio de Impuestos Internos
Servicio de Salud	Servicio de Salud
Servicio General de Aduana	Servicio Nacional de Aduanas
SESMA	Servicio de Salud Metropolitano del Medio Ambiente
Terminales de Carga	Terminales de carga
Terminales Multimodales	Terminales multimodales y de pasajeros
UOCT	Unidad Operativa de Control de Tránsito

ITS Stakeholder	Description
Usuarios de Sistemas de Almacenamiento de Datos	Usuarios de sistemas de almacenamiento de datos
Viajeros	Viajeros
VLT	Valparaíso Logistic Trade

Task 7, Appendix B - Inventory of ITS Elements

ITS Element	Description
Administrador del Espacio Público	Administrador de eventos públicos incluyendo eventos deportivos,
Aeropuerto Aerosur	Sistemas central de control y monitoreo del aeropuerto.
Aeropuerto Aerosur Equipo de Vías	Equipo en las vías en el espacio del aeropuerto incluyendo sensor
Aeropuerto Aerosur Sitio Web	Sitio web del aeropuerto.
Aeropuerto Austral	Sistemas central de control y monitoreo del aeropuerto.
Aeropuerto Austral Equipo de Vías	Equipo en las vías en el espacio del aeropuerto incluyendo sensor
Aeropuerto Austral Sitio Web	Sitio web del aeropuerto.
Aeropuerto Chucumata	Sistemas central de control y monitoreo del aeropuerto.
Aeropuerto Chucumata Equipo de Vías	Equipo en las vías en el espacio del aeropuerto incluyendo sensor
Aeropuerto Chucumata Sitio Web	Sitio web del aeropuerto.
Aeropuerto Cintra Chile	Sistemas central de control y monitoreo del aeropuerto.
Aeropuerto Cintra Chile Equipo de Vías	Equipo en las vías en el espacio del aeropuerto incluyendo sensor
Aeropuerto Cintra Chile Sitio Web	Sitio web del aeropuerto.
Aeropuerto Gestión e Ing. IDC	Sistemas central de control y monitoreo del aeropuerto.
Aeropuerto Gestión e Ing. IDC Equipo de Vías	Equipo en las vías en el espacio del aeropuerto incluyendo sensor
Aeropuerto Gestión e Ing. IDC Sitio Web	Sitio web del aeropuerto.
Aeropuerto SCL Terminal Aéreo de Santiago	Sistemas central de control y monitoreo del aeropuerto.
Aeropuerto SCL Terminal Aéreo de Santiago Equipo de Vías	Equipo en las vías en el espacio del aeropuerto incluyendo sensor
Aeropuerto SCL Terminal Aéreo de Santiago Sitio Web	Sitio web del aeropuerto.
Antepuertos Equipo de Acceso y Monitoreo de Vehículos	Equipo de control de acceso y monitoreo de vehículos.
Antepuertos Letreros Electrónicos	Letreros de mensaje variable.
Antepuertos Sistema Central de Control de Tráfico	Equipo de control de trafico de vehículos.
Antepuertos Sistema de Registro Electrónico de Vehículos	Sistemas de registros electrónicos de vehículos en los antepuertos
Antepuertos Sitio Web	Sitio web del antepuerto.
Archivo de Planes de Contingencia	Archivo de planes de contingencia para incidentes y emergencias.
Autopista Aeropuerto AMB Equipo de Telepeaje	Sistema canalizado; 2000 TAG; 915 Mhz.
Autopista Aeropuerto AMB Equipo de Vías	CCTV, antenas adicionales no en plazas, VMS.
Autopista Aeropuerto AMB Sistema Central de Control	Sistema central de control de la Autopista. Incluye acceso al Aero
Autopista Aeropuerto AMB Sitio Web	Sitio web de la autopista. Información puede incluir: cuentas, serv
Autopista Camino de la Madera Equipo de Telepeaje	Equipo de telepeaje: antenas, sistemas de fiscalización.
Autopista Camino de la Madera Equipo de Vías	Equipo en la autopista: letreros de mensaje variable, gestión de in
Autopista Camino de la Madera Sistema Central de Control	Sistema central de control de la Autopista.
Autopista Camino de la Madera Sitio Web	Sitio web de la autopista. Información puede incluir: cuentas, serv
Autopista Camino Nogales Puchuncaví Equipo de Telepeaje	Equipo de telepeaje: antenas, sistemas de fiscalización.
Autopista Camino Nogales Puchuncaví Equipo de Vías	Equipo en la autopista: letreros de mensaje variable, gestión de in
Autopista Camino Nogales Puchuncaví Sistema Central de Control	Sistema central de control de la Autopista.
Autopista Camino Nogales Puchuncaví Sitio Web	Sitio web de la autopista. Información puede incluir: cuentas, serv
Autopista Costanera Norte Equipo de Telepeaje	Sistema Oriente-Poniente Costanera Norte. 300.000 TAGs.
Autopista Costanera Norte Equipo de Túnel	Incluye CCTV, VMS, detector de conteo y gases y ventilación.
Autopista Costanera Norte Equipo de Vías	Sistema Oriente-Poniente Costanera Norte
Autopista Costanera Norte Sistema Central de Control	Sistema Oriente-Poniente Costanera Norte
Autopista Costanera Norte Sistema Control de Túneles	Sistema central de control de túneles en la autopista.

ITS Element	Description
Autopista Costanera Norte Sitio Web	Sitio web de la autopista. Información puede incluir: cuentas, serv
Autopista de los Lagos Equipo de Telepeaje	Equipo de telepeaje: antenas, sistemas de fiscalización.
Autopista de los Lagos Equipo de Vías	Equipo en la autopista: letreros de mensaje variable, gestión de in
Autopista de los Lagos Sistema Central de Control	Sistema central de control de la Autopista.
Autopista de los Lagos Sitio Web	Sitio web de la autopista. Información puede incluir: cuentas, serv
Autopista del Aconcagua Equipo de Telepeaje	Equipo de telepeaje: antenas, sistemas de fiscalización.
Autopista del Aconcagua Equipo de Túnel	Equipo en los túneles: ventilación, información al conductor, letrer
Autopista del Aconcagua Equipo de Vías	Equipo en la autopista: letreros de mensaje variable, gestión de in
Autopista del Aconcagua Sistema Central de Control	Sistema central de control de la Autopista. Control de equipos no
Autopista del Aconcagua Sistema Control de Túneles	Sistema central de control de túneles en la autopista.
Autopista del Aconcagua Sitio Web	Sitio web de la autopista. Información puede incluir: cuentas, serv
Autopista del Bosque Equipo de Telepeaje	Equipo de telepeaje: antenas, sistemas de fiscalización
Autopista del Bosque Equipo de Vías	Equipo en la autopista: letreros de mensaje variable, gestión de in
Autopista del Bosque Sistema Central de Control	Sistema central de control de la Autopista.
Autopista del Bosque Sitio Web	Sitio web de la autopista. Información puede incluir: cuentas, serv
Autopista del Elqui Equipo de Telepeaje	Equipo de telepeaje: antenas, sistemas de fiscalización.
Autopista del Elqui Equipo de Vías	Equipo en la autopista: letreros de mensaje variable, gestión de in
Autopista del Elqui Sistema Central de Control	Sistema central de control de la Autopista.
Autopista del Elqui Sitio Web	Sitio web de la autopista. Información puede incluir: cuentas, serv
Autopista del Maipo Equipo de Telepeaje	Equipo de telepeaje: antenas, sistemas de fiscalización.
Autopista del Maipo Equipo de Túnel	Equipo en los túneles: ventilación, información al conductor, letrer
Autopista del Maipo Equipo de Vías	Equipo en la autopista: letreros de mensaje variable, gestión de in
Autopista del Maipo Sistema Central de Control	Sistema central de control de la Autopista. Control de equipos no
Autopista del Maipo Sistema Control de Túneles	Sistema central de control de túneles en la autopista.
Autopista del Maipo Sitio Web	Sitio web de la autopista. Información puede incluir: cuentas, serv
Autopista del Sol Equipo de Telepeaje	Sistema canalizado; 3000 TAG; Antenas.
Autopista del Sol Equipo de Vías	Incluye CCTV, VMS.
Autopista del Sol Sistema Central de Control	Sistema canalizado; 3000 TAG; Administración de Telepeaje, Cont
Autopista del Sol Sitio Web	Sitio web de la autopista. Información puede incluir: cuentas, serv
Autopista Litoral Central Equipo de Telepeaje	Equipo de telepeaje: antenas, sistemas de fiscalización.
Autopista Litoral Central Equipo de Vías	Sistema Norte-Sur, General Velásquez.
Autopista Litoral Central Sistema Central de Control	Sistema central de la Autopista.
Autopista Litoral Central Sitio Web	Sitio web de la autopista. Información puede incluir: cuentas, serv
Autopista Los Libertadores Equipo de Telepeaje	Equipo de telepeaje: antenas, sistemas de fiscalización.
Autopista Los Libertadores Equipo de Túnel	Equipo en los túneles: ventilación, información al conductor, letrer
Autopista Los Libertadores Equipo de Vías	Equipo en la autopista: letreros de mensaje variable, gestión de in
Autopista Los Libertadores Sistema Central de Control	Sistema central de control de la Autopista. Control de equipos no
Autopista Los Libertadores Sistema Control de Túneles	Sistema central de control de túneles en la autopista.
Autopista Los Libertadores Sitio Web	Sitio web de la autopista. Información puede incluir: cuentas, serv
Autopista Norte Sur Equipo de Telepeaje	Equipo de telepeaje: antenas, sistemas de fiscalización
Autopista Norte Sur Equipo de Vías	Equipo en la autopista: letreros de mensaje variable, gestión de in
Autopista Norte Sur Sistema Central de Control	Sistema central de control de la Autopista.
Autopista Norte Sur Sitio Web	Sitio web de la autopista. Información puede incluir: cuentas, serv
Autopista Ruta 5 Collipulli - Temuco Equipo de Telepeaje	Equipo de telepeaje: antenas, sistemas de fiscalización.

ITS Element	Description
Autopista Ruta 5 Collipulli - Temuco Equipo de Vías	Equipo en la autopista: letreros de mensaje variable, gestión de in
Autopista Ruta 5 Collipulli - Temuco Sistema Central de Control	Sistema central de control de la Autopista.
Autopista Ruta 5 Collipulli - Temuco Sitio Web	Sitio web de la autopista. Información puede incluir: cuentas, serv
Autopista Ruta de los Ríos Equipo de Telepeaje	Equipo de telepeaje: antenas, sistemas de fiscalización.
Autopista Ruta de los Ríos Equipo de Vías	Equipo en la autopista: letreros de mensaje variable, gestión de in
Autopista Ruta de los Ríos Sistema Central de Control	Sistema central de control de la Autopista.
Autopista Ruta de los Ríos Sitio Web	Sitio web de la autopista. Información puede incluir: cuentas, serv
Autopista Talca - Chillán Equipo de Telepeaje	Equipo de telepeaje: antenas, sistemas de fiscalización.
Autopista Talca - Chillán Equipo de Vías	Equipo en la autopista: letreros de mensaje variable, gestión de in
Autopista Talca - Chillán Sistema Central de Control	Sistema central de control de la Autopista.
Autopista Talca - Chillán Sitio Web	Sitio web de la autopista. Información puede incluir: cuentas, serv
Autopista Tribasa Bío Bío Equipo de Telepeaje	Equipo de telepeaje: antenas, sistemas de fiscalización
Autopista Tribasa Bío Bío Equipo de Vías	Equipo en la autopista: letreros de mensaje variable, gestión de in
Autopista Tribasa Bío Bío Sistema Central de Control	Sistema central de control de la Autopista.
Autopista Tribasa Bío Bío Sitio Web	Sitio web de la autopista. Información puede incluir: cuentas, serv
Autopista Túnel El Melón Equipo de Telepeaje	Equipo de telepeaje: antenas, sistemas de fiscalización.
Autopista Túnel El Melón Equipo de Túnel	Equipo en los túneles: ventilación, información al conductor, letrer
Autopista Túnel El Melón Equipo de Vías	Equipo en la autopista: letreros de mensaje variable, gestión de in
Autopista Túnel El Melón Sistema Central de Control	Sistema central de control de la Autopista. Control de equipos no
Autopista Túnel El Melón Sistema Control de Túneles	Sistema central de control de túneles en la autopista.
Autopista Túnel El Melón Sitio Web	Sitio web de la autopista. Información puede incluir: cuentas, serv
Autopista Variante Melipilla Equipo de Telepeaje	Equipo de telepeaje: antenas, sistemas de fiscalización
Autopista Variante Melipilla Equipo de Vías	Equipo en la autopista: letreros de mensaje variable, gestión de in
Autopista Variante Melipilla Sistema Central de Control	Sistema central de control de la Autopista.
Autopista Variante Melipilla Sitio Web	Sitio web de la autopista. Información puede incluir: cuentas, serv
Autopista Vespucio Norte Equipo de Telepeaje	Equipo de telepeaje: antenas, sistemas de fiscalización.
Autopista Vespucio Norte Equipo de Vías	Autopista Américo Vespucio Norte Poniente.
Autopista Vespucio Norte Sistema Central de Control	Autopista Américo Vespucio Norte Poniente.
Autopista Vespucio Norte Sitio Web	Sitio web de la autopista. Información puede incluir: cuentas, serv
Autopistas Centros de Atención al Cliente	Sistemas de atención al cliente de autopistas.
Autopistas Metropolitanas Equipo de Telepeaje	Equipo de Telepeaje.
Autopistas Metropolitanas Equipo de Vías	Autopista Américo Vespucio Sur.
Autopistas Metropolitanas Sistema Central de Control	Autopista Américo Vespucio Sur.
Autopistas Metropolitanas Sitio Web	Sitio web de la autopista. Información puede incluir: cuentas, serv
Autopistas Otras Equipo de Telepeaje	Equipo de telepeaje: antenas, sistemas de fiscalización.
Autopistas Otras Equipo de Vías	Equipo de vías: CCTV, VMS, conteo automático, etc.
Autopistas Otras Sistema Central de Control	Sistema de control central: gestión de telepeaje, transito, gestión d
Autopistas Otras Sitio Web	Sitio Web.
Autopistas Punto de Venta	Punto de venta para pase diario de peaje.
Autopistas Rutas del Pacífico Equipo de Telepeaje	Equipo de telepeaje: antenas, sistemas de fiscalización. 100.000
Autopistas Rutas del Pacífico Equipo de Túnel	Equipo en los túneles: ventilación, información al conductor, letrer
Autopistas Rutas del Pacífico Equipo de Vías	Equipo en la autopista: letreros de mensaje variable, gestión de in
Autopistas Rutas del Pacífico Sistema Central de Control	Sistema central de control de la Autopista. Control de equipos no
Autopistas Rutas del Pacífico Sistema Control de Túneles	Sistema central de control de túneles en la autopista.

ITS Element	Description
Autopistas Rutas del Pacífico Sitio Web	Sitio web de la autopista. Información puede incluir: cuentas, serv
Autopistas Vehículos de Emergencia	Vehículos de emergencia de autopistas.
Bomberos Sistema Central	Departamentos de Bomberos.
Bomberos Vehículos de Emergencia	Vehículos de emergencia de bomberos.
Broker de Carga	Broker de carga.
Carabineros	Fiscalización y ayuda al publico.
Carabineros Registro de Accidentes	Archivo de información sobre accidentes.
Carabineros Vehículos de Emergencia	Vehículos de emergencia de los carabineros.
Centro de Cuidado	Centro de cuidado, hospitales, etc.
Comisión de Seguridad de Transito Sistema Central	Comisión de seguridad de transito.
CONAMA Sistema de Permiso de Carga (HAZMAT)	Comisión responsable por permisos para el transporte de material
Concesionarios de Estacionamientos Públicos Sistemas de Estacionamiento	Operadores de estacionamientos públicos.
Concesionarios de Estacionamientos Sitio Web	Sitios Web de concesionarios de estacionamientos.
DG Archivo de Datos Operacionales de VC	Archivo de datos operacionales de vehículos comerciales.
DG Seguridad de Puertos y Aeropuertos	Seguridad y respuesta de emergencia en los puertos y aeropuertos
DGAC Sistema de Gestión de Estacionamientos	Cobro electrónico usando 2000 TAG, etc.
DGAC Sitio Web	Sitio web del DGAC.
Institución Financiera	Instituciones financieras y bancarias.
Juzgado Policía Local	Fiscalización de telepeaje.
Marina	La marina de Chile. Responsable por fiscalización en los puertos.
Medios de Comunicación	Televisión, Radio, Periódico.
Metro Centro de Control	Centro de control de Metro.
Metro Estación	Equipo de pago de tarifa electrónica en el Metro.
Metro Información a Usuario en Viaje	315 lectores en Metro.
Metro Punto de Venta	Cobro de Tarifas Mediante Tarjetas sin Contacto en Metro y Metro
Metro Sitio Web	El sitio web de Metro.
Metro Tarjeta Electrónica Multivía	Tarjeta electrónica del Metro de Santiago.
MOP CGC Almacenamiento de Datos de Tránsito Concesiones	Sistema de almacenamiento de datos de concesiones de transito.
MOP DV Contadores Automáticos de Flujos Vehiculares	70 contadores instalados en el país; tecnología basada en espiras;
MOP DV Cruce Fronterizo Equipo de Vías	Equipo de vías en cruce fronterizos.
MOP DV Cruce Fronterizo Sistema de Registro Electrónico de Vehículos	Sistema de registro electrónico de vehículos para cruces fronterizo
MOP DV Equipo Pesaje en Movimiento y Control de Seguridad	1 estación de pesaje de vehículos en movimiento en ruta Antofaga
MOP DV Información de la Red Vial Interurbana Sitio Web	Información de la Red Vial Interurbana - Sistema que entrega infor
MOP DV Sistema de Almacenamiento de Datos de Tránsito en Vías	Sistema de archivo de datos para uso en planeación.
MOP DV Sistema de Emergencia	Sistema de emergencia, asistencia a otros centros de emergencia,
MOP DV Sistema de Monitoreo de Vehículos Comerciales	Sistema de información sobre flotas de vehículos comerciales.
MOP DV Sistema de Registro y Revisión de Credenciales (Pesaje, Sobredimensiones, y Seguridad)	1 estación de pesaje de vehículos en movimiento en ruta Antofaga
MOP DV Subdirección de Explotación	Gestión de mantenimiento.
MOP DV Subdirección de Explotación Equipo de Vías	MOP DV Subdirección de Explotación Equipo de vías, Ej.. Segurid
MOP DV Subdirección de Explotación Facilidad de Almacenaje	Facilidades de almacenaje de equipo y materiales.
MOP DV Subdirección de Explotación Sitio Web	MOP DV Subdirección de Explotación Sitio Web.
MOP DV Subdirección de Explotación Vehículos	Vehículos de mantenimiento.
MOP DV Taller de Vehículos	MOP DV Facilidad de Reparación de Vehículos.

ITS Element	Description
MOP Planificación Almacenamiento de Datos Multimodal	MOP Planificación Almacenamiento de Datos Multimodal.
MOP Sistema de Información Geográfico	Sistema de Información Geográfico del MOP.
MTT Almacenamiento de Datos de Transporte Público	Información de horarios, flotas, etc.
MTT Coordinación General de Transporte	Administración general del transporte publico.
MTT Fiscalización y Control del Transporte Público (CCB)	Centro de Control de buses.
MTT Fiscalización y Control del Transporte Público Sitio Web	Sitio Web.
MTT Información a Usuario Sitio Web	Sitio Web para información de viajeros.
MTT Información en Paraderos	Letreros variables en paraderos con información de viajero.
MTT Punto de Venta	Sistema de apoyo remoto para viajeros, compra de boletos electró
MTT Tarificación Vial	Sistema de control de demanda de acceso a la zona central de la c
MTT Tarificación Vial Equipo de Vías / Estacionamientos	Sistemas de estacionamientos de MTT Tarificación Vial.
Municipalidad Dirección de Obras	Dirección de construcción y mantenimiento de carreteras municipal
Municipalidad Dirección de Obras Equipo de Vías	Equipo portátil (CCTV, VMS).
Municipalidad Dirección de Obras Facilidad de Almacenaje	Facilidades de almacenaje de equipo y materiales.
Municipalidad Dirección de Obras Sitio Web	Sitio Web.
Municipalidad Dirección de Obras Taller de Vehículos	Taller de vehículos de mantenimiento y construcción.
Municipalidad Dirección de Obras Vehículos	Vehículos de mantenimiento.
Onemi Gestión de Emergencia	Sistema central de emergencia y despacho de Onemi.
Operadores de Ferrocarril	Operadores de Ferrocarril.
Operadores de Ferrocarril Equipo del Riel	Equipo Ferroviaria del Riel incluye Metro Ligero.
Operadores de Ferrocarril Vehículos	Los trenes de los operadores de ferrocarril.
Operadores del Transporte Público Tarjeta Electrónica	Tarjeta electrónica.
Operadores Privados de Emergencia Médica Centro de Despacho	Operadores Privados de Emergencia Médica Centro de Despacho.
Operadores Privados de Emergencia Médica Vehículos	Operadores Privados de Emergencia Médica Vehículos.
Operadores Privados de Grúas Sistema de Despacho	Sistema de Despacho.
Operadores Privados de Telemática	Operadores Privados de Telemática.
Operadores Privados de VC Sistema Móvil del Conductor	Sistemas personales (Ej., teléfonos celulares) de conductores de v
Operadores Privados de Vehículos Comerciales Sistemas Central	Sistemas de Operadores de Vehículos Comerciales.
Operadores Privados de Vehículos Comerciales Vehículos	Vehículos Comerciales incluyen transponder en el vehículo.
Operadores Privados del Transporte Público Centro de Control	Centro de Control de Transporte Público.
Operadores Privados del Transporte Público Vehículos	Vehículos de transporte público.
Proveedor de Información Sobre Materiales Peligrosos	Ej., Chemtrec.
Puerto de Mejillones Equipo de Acceso y Monitoreo de Vehículos	Puertos equipo de control de vehículos.
Puerto de Mejillones Letreros Electrónicos	Letreros de mensaje variable.
Puerto de Mejillones Sistema Central de Control de Tráfico	Puertos Sistema de Seguimiento de Vehículos, y control de equipo
Puerto de Mejillones Sistema de Registro Electrónico de Vehículos	Puertos sistema de registro electrónico de vehículos.
Puerto de Mejillones Sitio Web	Sitio Web.
Puerto de San Antonio Equipo de Acceso y Monitoreo de Vehículos	Puertos equipo de control de vehículos.
Puerto de San Antonio Letreros Electrónicos	Letreros de mensaje variable.
Puerto de San Antonio Sistema Central de Control de Tráfico	Puertos Sistema de Seguimiento de Vehículos, y control de equipo
Puerto de San Antonio Sistema de Registro Electrónico de Vehículos	Puertos sistema de registro electrónico de vehículos.
Puerto de San Antonio Sitio Web	Sitio Web.
Puerto de Valparaíso Terminal de Pasajeros	Terminal de pasajeros en el Puerto de Valparaíso.
Puertos Equipo de Acceso y Monitoreo de Vehículos	Puertos equipo de control de vehículos.

ITS Element	Description
Puertos Letreros Electrónicos	Letreros de mensaje variable.
Puertos Sistema Central de Control de Tráfico	Puertos Sistema de Seguimiento de Vehículos, y control de equipo
Puertos Sistema de Registro Electrónico de Vehículos	Puertos sistema de registro electrónico de vehículos.
Puertos Sitio Web	Sitio Web.
Red de Información de Incidentes y Respuesta	Red de Información de Incidentes y Respuesta.
Red de Información y Condiciones de Tránsito	Red de Información y Condiciones de Tránsito .
Red de Reciprocidad de Pago Electrónico del Transporte Público	Red regional de reciprocidad de pago electrónico de transporte pu
Red de Servicio y Reciprocidad de Concesionarias	Servicio Clientes (Customer Services): Cargo de Pago, Pago, Reci
SAMU Sistema Central	Sistema de despacho de vehículos de urgencia médica.
SAMU Vehículos de Emergencia	Vehículos de urgencia médica.
SECTRA Controladores de Semáforos	79 intersecciones con planes de tiempo prefijados en Gran Valpara
SECTRA Letreros de Mensaje Variable	Letreros de Mensaje Variables incluyendo SCAT-GV, Gran Concep
SECTRA Sensores de Tránsito	Sensores o detectores varios de transito.
SECTRA Sistemas Central de Control de Tránsito	Incluye: Antofagasta - 75 intersecciones; Gran Concepción - 190 i
SECTRA Sistemas de Almacenamiento de Datos de Tránsito	Sistema de análisis de información.
SECTRA Sistemas de Control de Semáforos Sitio Web	Incluye: sistemas de SCAT o control de semáforos para Antofagas
SECTRA Sistemas de Planificación Multimodal	SECTRA Sistemas de Planificación Multimodal.
Servicio Agrícola Ganadero	Servicio Agrícola Ganadero.
Servicio de Impuestos Internos	Servicio de Impuestos Internos.
Servicio de Salud	Servicio de Salud.
Servicio General de Aduana	Servicio General de Aduana.
SESMA Centro de Análisis	Sistemas centrales de análisis de información de emisiones y ambi
SESMA Estaciones de Monitoreo Ambiental	Equipo de vías de monitoreo ambiental.
Sistema de Prónostico del Tiempo	Sistemas privados o de agencias publicas de prónostico del tiempo
Sistema Municipal de Permiso de Carga	Sistema Municipalidad de Permiso de Carga.
Sistema Municipal Equipo de Vías	Incluye: semáforos, CCTV, VMS.
Sistema Municipal Sistema Central de Control de Tránsito	Sistema de control central.
Sistema Municipal Sitio Web	Sitio Web e información de viajeros.
Sistemas de Usuarios de Almacenamiento de Datos	Sistemas de usuarios para acceso a sistemas de almacenamiento
TAG de Vehículo Comercial	TAGs usado en el transporte de carga.
TAG Regional	TAG (transponder) Regional.
Terminales Multimodales	Terminales multimodales y de pasajeros.
UOCT Centro de Control de Gestión de Tránsito	Monitoreo de vías y estado de equipos de carretera y control de se
UOCT Circuito Cerrado de Televisión	37 cámaras de televisión distribuidas en la ciudad.
UOCT Controladores de Semáforos	Incluye en Santiago: 1453 semáforos con planes de tiempo prefija
UOCT Equipo Control de Tráfico Autopistas	Equipo de vías para control de trafico en las autopistas -- Ej.., seña
UOCT Estaciones de Monitoreo Ambiental	Sensores (estaciones) de monitoreo de polución ambiental (aire).
UOCT Letreros de Mensaje Variable	8 letreros de mensaje variable.
UOCT Sensores Ambientales	Sensores ambientales, tiempo, y condiciones peligrosas en las vía
UOCT Sensores de Tránsito	Sensores o detectores varios de transito.
UOCT Sitio Web	Información y sitio Web para viajeros.
Viajeros Equipo Personal de Viajeros	Equipo personal de viajeros.
Viajeros Vehículos Privados	Vehículos privados.
VLT Equipo de Acceso y Monitoreo de Vehículos	Control de apertura de puertas y temperatura cámaras frigoríficas,

ITS Element	Description
VLT Letreros Electrónicos	Letreros de mensaje variable.
LT Sistema Central de Control de Tráfico	Seguimiento de vehículos y carga mediante GPS. Control de equip
VLT Sistema de Registro Electrónico de Vehículos	Registro electrónico de ingreso y salida de vehículos y carga.
VLT Sitio Web	Sitio Web de VLT.

Task 7, Appendix C - Inventory by Stakeholder

Stakeholder	ITS System	Status
Administrador de TAG de Vehículos Comerciales		
	TAG de Vehículo Comercial	Planned
Administrador de TAG Regional		
	TAG Regional	Planned
Administrador del Archivo de Datos Operacionales de VC		
	DG Archivo de Datos Operacionales de VC	Planned
Administrador del Archivo Regional de Planes de Contingencia		
	Archivo de Planes de Contingencia	Planned
Administrador del Espacio Público		
	Administrador del Espacio Público	Existing
Aeropuerto Aerosur		
	Aeropuerto Aerosur	Existing
	Aeropuerto Aerosur Equipo de Vías	Existing
	Aeropuerto Aerosur Sitio Web	Planned
Aeropuerto Austral		
	Aeropuerto Austral	Existing
	Aeropuerto Austral Equipo de Vías	Existing
	Aeropuerto Austral Sitio Web	Planned
Aeropuerto Chucumata		
	Aeropuerto Chucumata	Existing
	Aeropuerto Chucumata Equipo de Vías	Existing
	Aeropuerto Chucumata Sitio Web	Planned
Aeropuerto Cintra Chile		
	Aeropuerto Cintra Chile	Existing
	Aeropuerto Cintra Chile Equipo de Vías	Existing
	Aeropuerto Cintra Chile Sitio Web	Planned
Aeropuerto Gestión e Ing. IDC		
	Aeropuerto Gestión e Ing. IDC	Existing
	Aeropuerto Gestión e Ing. IDC Equipo de Vías	Existing
	Aeropuerto Gestión e Ing. IDC Sitio Web	Planned
Aeropuerto SCL Terminal Aéreo de Santiago		
	Aeropuerto SCL Terminal Aéreo de Santiago	Existing
	Aeropuerto SCL Terminal Aéreo de Santiago Equipo de Vías	Planned
	Aeropuerto SCL Terminal Aéreo de Santiago Sitio Web	Planned
Antepuertos		
	Antepuertos Equipo de Acceso y Monitoreo de Vehículos	Planned
	Antepuertos Letreros Electrónicos	Planned
	Antepuertos Sistema Central de Control de Tráfico	Planned
	Antepuertos Sistema de Registro Electrónico de Vehículos	Planned
	Antepuertos Sitio Web	Planned
Autopista Aeropuerto AMB		
	Autopista Aeropuerto AMB Equipo de Telepeaje	Existing
	Autopista Aeropuerto AMB Equipo de Vías	Planned
	Autopista Aeropuerto AMB Sistema Central de Control	Existing
	Autopista Aeropuerto AMB Sitio Web	Planned
Autopista Camino de la Madera		

Stakeholder	ITS System	Status
Autopista Camino de la Madera		
	Autopista Camino de la Madera Equipo de Telepeaje	Existing
	Autopista Camino de la Madera Equipo de Vías	Existing
	Autopista Camino de la Madera Sistema Central de Control	Existing
	Autopista Camino de la Madera Sitio Web	Planned
Autopista Camino Nogales - Puchuncaví		
	Autopista Camino Nogales Puchuncaví Equipo de Telepeaje	Existing
	Autopista Camino Nogales Puchuncaví Equipo de Vías	Existing
	Autopista Camino Nogales Puchuncaví Sistema Central de Control	Existing
	Autopista Camino Nogales Puchuncaví Sitio Web	Planned
Autopista Costanera Norte		
	Autopista Costanera Norte Equipo de Telepeaje	Planned
	Autopista Costanera Norte Equipo de Túnel	Planned
	Autopista Costanera Norte Equipo de Vías	Planned
	Autopista Costanera Norte Sistema Central de Control	Planned
	Autopista Costanera Norte Sistema Control de Túneles	Existing
	Autopista Costanera Norte Sitio Web	Planned
Autopista de los Lagos		
	Autopista de los Lagos Equipo de Telepeaje	Existing
	Autopista de los Lagos Equipo de Vías	Existing
	Autopista de los Lagos Sistema Central de Control	Existing
	Autopista de los Lagos Sitio Web	Planned
Autopista del Aconcagua		
	Autopista del Aconcagua Equipo de Telepeaje	Existing
	Autopista del Aconcagua Equipo de Túnel	Existing
	Autopista del Aconcagua Equipo de Vías	Existing
	Autopista del Aconcagua Sistema Central de Control	Existing
	Autopista del Aconcagua Sistema Control de Túneles	Existing
	Autopista del Aconcagua Sitio Web	Planned
Autopista del Bosque		
	Autopista del Bosque Equipo de Telepeaje	Existing
	Autopista del Bosque Equipo de Vías	Existing
	Autopista del Bosque Sistema Central de Control	Existing
	Autopista del Bosque Sitio Web	Planned
Autopista del Elqui		
	Autopista del Elqui Equipo de Telepeaje	Existing
	Autopista del Elqui Equipo de Vías	Existing
	Autopista del Elqui Sistema Central de Control	Existing
	Autopista del Elqui Sitio Web	Planned
Autopista del Maipo		
	Autopista del Maipo Equipo de Telepeaje	Existing
	Autopista del Maipo Equipo de Túnel	Existing
	Autopista del Maipo Equipo de Vías	Existing
	Autopista del Maipo Sistema Central de Control	Existing
	Autopista del Maipo Sistema Control de Túneles	Existing
	Autopista del Maipo Sitio Web	Planned
Autopista del Sol		

Stakeholder	ITS System	Status
Autopista del Sol		
	Autopista del Sol Equipo de Telepeaje	Existing
	Autopista del Sol Equipo de Vías	Existing
	Autopista del Sol Sistema Central de Control	Existing
	Autopista del Sol Sitio Web	Planned
Autopista Litoral Central		
	Autopista Litoral Central Equipo de Telepeaje	Planned
	Autopista Litoral Central Equipo de Vías	Planned
	Autopista Litoral Central Sistema Central de Control	Planned
	Autopista Litoral Central Sitio Web	Planned
Autopista Los Libertadores		
	Autopista Los Libertadores Equipo de Telepeaje	Existing
	Autopista Los Libertadores Equipo de Túnel	Existing
	Autopista Los Libertadores Equipo de Vías	Existing
	Autopista Los Libertadores Sistema Central de Control	Existing
	Autopista Los Libertadores Sistema Control de Túneles	Existing
	Autopista Los Libertadores Sitio Web	Planned
Autopista Norte - Sur		
	Autopista Norte Sur Equipo de Telepeaje	Existing
	Autopista Norte Sur Equipo de Vías	Existing
	Autopista Norte Sur Sistema Central de Control	Existing
	Autopista Norte Sur Sitio Web	Planned
Autopista Ruta 5 Collipulli - Temuco		
	Autopista Ruta 5 Collipulli - Temuco Equipo de Telepeaje	Existing
	Autopista Ruta 5 Collipulli - Temuco Equipo de Vías	Existing
	Autopista Ruta 5 Collipulli - Temuco Sistema Central de Control	Existing
	Autopista Ruta 5 Collipulli - Temuco Sitio Web	Planned
Autopista Ruta de los Ríos		
	Autopista Ruta de los Ríos Equipo de Telepeaje	Existing
	Autopista Ruta de los Ríos Equipo de Vías	Existing
	Autopista Ruta de los Ríos Sistema Central de Control	Existing
	Autopista Ruta de los Ríos Sitio Web	Planned
Autopista Talca - Chillán		
	Autopista Talca - Chillán Equipo de Telepeaje	Existing
	Autopista Talca - Chillán Equipo de Vías	Existing
	Autopista Talca - Chillán Sistema Central de Control	Existing
	Autopista Talca - Chillán Sitio Web	Planned
Autopista Tribasa Bío Bío		
	Autopista Tribasa Bío Bío Equipo de Telepeaje	Existing
	Autopista Tribasa Bío Bío Equipo de Vías	Existing
	Autopista Tribasa Bío Bío Sistema Central de Control	Existing
	Autopista Tribasa Bío Bío Sitio Web	Planned
Autopista Túnel El Melón		
	Autopista Túnel El Melón Equipo de Telepeaje	Existing
	Autopista Túnel El Melón Equipo de Túnel	Existing
	Autopista Túnel El Melón Equipo de Vías	Existing
	Autopista Túnel El Melón Sistema Central de Control	Existing

Stakeholder	ITS System	Status
Autopista Túnel El Melón		
	Autopista Túnel El Melón Sistema Control de Túneles	Existing
	Autopista Túnel El Melón Sitio Web	Planned
Autopista Variante Melipilla		
	Autopista Variante Melipilla Equipo de Telepeaje	Existing
	Autopista Variante Melipilla Equipo de Vías	Existing
	Autopista Variante Melipilla Sistema Central de Control	Existing
	Autopista Variante Melipilla Sitio Web	Planned
Autopista Vespucio Norte		
	Autopista Vespucio Norte Equipo de Telepeaje	Planned
	Autopista Vespucio Norte Equipo de Vías	Planned
	Autopista Vespucio Norte Sistema Central de Control	Planned
	Autopista Vespucio Norte Sitio Web	Planned
Autopistas		
	Autopistas Centros de Atención al Cliente	Existing
	Autopistas Otras Equipo de Telepeaje	Planned
	Autopistas Otras Equipo de Vías	Planned
	Autopistas Otras Sistema Central de Control	Planned
	Autopistas Otras Sitio Web	Planned
	Autopistas Punto de Venta	Planned
	Autopistas Vehículos de Emergencia	Existing
Autopistas Metropolitanas		
	Autopistas Metropolitanas Equipo de Telepeaje	Planned
	Autopistas Metropolitanas Equipo de Vías	Planned
	Autopistas Metropolitanas Sistema Central de Control	Planned
	Autopistas Metropolitanas Sitio Web	Planned
Autopistas Rutas del Pacífico		
	Autopistas Rutas del Pacífico Equipo de Telepeaje	Planned
	Autopistas Rutas del Pacífico Equipo de Túnel	Existing
	Autopistas Rutas del Pacífico Equipo de Vías	Existing
	Autopistas Rutas del Pacífico Sistema Central de Control	Existing
	Autopistas Rutas del Pacífico Sistema Control de Túneles	Existing
	Autopistas Rutas del Pacífico Sitio Web	Planned
Bomberos		
	Bomberos Sistema Central	Existing
	Bomberos Vehículos de Emergencia	Existing
Broker de Carga		
	Broker de Carga	Existing
Carabineros		
	Carabineros	Existing
	Carabineros Registro de Accidentes	Existing
	Carabineros Vehículos de Emergencia	Existing
CONAMA		
	CONAMA Sistema de Permiso de Carga (HAZMAT)	Planned
CONASET		
	Comisión de Seguridad de Transito Sistema Central	Existing
Concesionarios de Estacionamientos Públicos		

Stakeholder	ITS System	Status
Concesionarios de Estacionamientos Públicos		
	Concesionarios de Estacionamientos Públicos Sistemas de Estacionamiento	Planned
	Concesionarios de Estacionamientos Sitio Web	Planned
DG		
	DG Seguridad de Puertos y Aeropuertos	Existing
	DGAC Sistema de Gestión de Estacionamientos	Planned
	DGAC Sitio Web	Existing
Institución Financiera		
	Institución Financiera	Existing
Juzgado Policía Local		
	Juzgado Policía Local	Existing
Marina		
	Marina	Planned
METRO		
	Metro Centro de Control	Existing
	Metro Estación	Existing
	Metro Información a Usuario en Viaje	Existing
	Metro Punto de Venta	Existing
	Metro Sitio Web	Existing
	Metro Tarjeta Electrónica Multivía	Existing
MOP CGC		
	MOP CGC Almacenamiento de Datos de Tránsito Concesiones	Planned
MOP Dirección de Vialidad		
	MOP DV Contadores Automáticos de Flujos Vehiculares	Existing
	MOP DV Cruce Fronterizo Equipo de Vías	Planned
	MOP DV Cruce Fronterizo Sistema de Registro Electrónico de Vehículos	Planned
	MOP DV Equipo Pesaje en Movimiento y Control de Seguridad	Existing
	MOP DV Información de la Red Vial Interurbana Sitio Web	Existing
	MOP DV Sistema de Almacenamiento de Datos de Tránsito en Vías	Existing
	MOP DV Sistema de Emergencia	Planned
	MOP DV Sistema de Monitoreo de Vehículos Comerciales	Planned
	MOP DV Sistema de Registro y Revisión de Credenciales (Pesaje, Sobredimensiones, y Seguridad)	Planned
	MOP DV Subdirección de Explotación	Existing
	MOP DV Subdirección de Explotación Equipo de Vías	Planned
	MOP DV Subdirección de Explotación Facilidad de Almacenaje	Existing
	MOP DV Subdirección de Explotación Sitio Web	Planned
	MOP DV Subdirección de Explotación Vehículos	Existing
	MOP DV Taller de Vehículos	Planned
MOP Subsecretaría		
	MOP Planificación Almacenamiento de Datos Multimodal	Planned
	MOP Sistema de Información Geográfico	Existing
MTT		
	MTT Almacenamiento de Datos de Transporte Público	Planned
	MTT Coordinación General de Transporte	Existing
	MTT Fiscalización y Control del Transporte Público (CCB)	Existing
	MTT Fiscalización y Control del Transporte Público Sitio Web	Existing

Stakeholder	ITS System	Status
MTT		
	MTT Información a Usuario Sitio Web	Planned
	MTT Información en Paraderos	Planned
	MTT Punto de Venta	Existing
	MTT Tarificación Vial	Planned
	MTT Tarificación Vial Equipo de Vías / Estacionamientos	Planned
Municipalidad		
	Municipalidad Dirección de Obras	Planned
	Municipalidad Dirección de Obras Equipo de Vías	Existing
	Municipalidad Dirección de Obras Facilidad de Almacenaje	Existing
	Municipalidad Dirección de Obras Sitio Web	Existing
	Municipalidad Dirección de Obras Taller de Vehículos	Planned
	Municipalidad Dirección de Obras Vehículos	Existing
	Sistema Municipal de Permiso de Carga	Planned
	Sistema Municipal Equipo de Vías	Planned
	Sistema Municipal Sistema Central de Control de Tránsito	Existing
	Sistema Municipal Sitio Web	Planned
Onemi		
	Onemi Gestión de Emergencia	Existing
Operadores de Centros de Cuidado		
	Centro de Cuidado	Planned
Operadores de Ferrocarril		
	Operadores de Ferrocarril	Existing
	Operadores de Ferrocarril Equipo del Riel	Planned
	Operadores de Ferrocarril Vehículos	Existing
Operadores de Sistemas de Pronóstico del Tiempo		
	Sistema de Prónostico del Tiempo	Planned
Operadores de Sistemas de Transporte Público Regionales		
	Operadores del Transporte Público Tarjeta Electrónica	Planned
Operadores Privados de Emergencia Médica		
	Operadores Privados de Emergencia Médica Centro de Despacho	Existing
	Operadores Privados de Emergencia Médica Vehículos	Planned
Operadores Privados de Grúas		
	Operadores Privados de Grúas Sistema de Despacho	Planned
Operadores Privados de Sistemas de Transporte Público		
	Operadores Privados del Transporte Público Centro de Control	Planned
	Operadores Privados del Transporte Público Vehículos	Existing
Operadores Privados de Telemática		
	Operadores Privados de Telemática	Planned
Operadores Privados de VC		
	Operadores Privados de VC Sistema Móvil del Conductor	Existing
	Operadores Privados de Vehículos Comerciales Sistemas Central	Planned
	Operadores Privados de Vehículos Comerciales Vehículos	Existing
Proveedor de Información Sobre Materiales Peligrosos		
	Proveedor de Información Sobre Materiales Peligrosos	Planned
Proveedores de Medios de Comunicaciones		
	Medios de Comunicación	Existing

Stakeholder	ITS System	Status
Puerto de Mejillones		
	Puerto de Mejillones Equipo de Acceso y Monitoreo de Vehículos	Planned
	Puerto de Mejillones Letreros Electrónicos	Planned
	Puerto de Mejillones Sistema Central de Control de Tráfico	Planned
	Puerto de Mejillones Sistema de Registro Electrónico de Vehículos	Planned
	Puerto de Mejillones Sitio Web	Planned
Puerto de San Antonio		
	Puerto de San Antonio Equipo de Acceso y Monitoreo de Vehículos	Planned
	Puerto de San Antonio Letreros Electrónicos	Planned
	Puerto de San Antonio Sistema Central de Control de Tráfico	Planned
	Puerto de San Antonio Sistema de Registro Electrónico de Vehículos	Planned
	Puerto de San Antonio Sitio Web	Planned
Puerto de Valparaíso		
	Puerto de Valparaíso Terminal de Pasajeros	Existing
Puertos		
	Puertos Equipo de Acceso y Monitoreo de Vehículos	Planned
	Puertos Letreros Electrónicos	Existing
	Puertos Sistema Central de Control de Tráfico	Planned
	Puertos Sistema de Registro Electrónico de Vehículos	Planned
	Puertos Sitio Web	Planned
Red de Sistemas de Concesionarias		
	Red de Reciprocidad de Pago Electrónico del Transporte Público	Planned
	Red de Servicio y Reciprocidad de Concesionarias	Planned
Red de Sistemas de Gestión de Incidentes y Respuestas		
	Red de Información de Incidentes y Respuesta	Planned
Red de Sistemas de Información y Condiciones de Tránsito		
	Red de Información y Condiciones de Tránsito	Planned
SAMU		
	SAMU Sistema Central	Existing
	SAMU Vehículos de Emergencia	Existing
SECTRA		
	SECTRA Controladores de Semáforos	Existing
	SECTRA Letreros de Mensaje Variable	Existing
	SECTRA Sensores de Tránsito	Planned
	SECTRA Sistemas Central de Control de Tránsito	Existing
	SECTRA Sistemas de Almacenamiento de Datos de Tránsito	Existing
	SECTRA Sistemas de Control de Semáforos Sitio Web	Planned
	SECTRA Sistemas de Planificación Multimodal	Planned
Servicio Agrícola Ganadero		
	Servicio Agrícola Ganadero	Existing
Servicio de Impuestos Internos		
	Servicio de Impuestos Internos	Existing
Servicio de Salud		
	Servicio de Salud	Existing
Servicio General de Aduana		
	Servicio General de Aduana	Existing
SESMA		

Stakeholder	ITS System	Status
SESMA		
	SESMA Centro de Análisis	Existing
	SESMA Estaciones de Monitoreo Ambiental	Existing
Terminales Multimodales		
	Terminales Multimodales	Existing
UOCT		
	UOCT Centro de Control de Gestión de Tránsito	Existing
	UOCT Circuito Cerrado de Televisión	Existing
	UOCT Controladores de Semáforos	Existing
	UOCT Equipo Control de Tráfico Autopistas	Existing
	UOCT Estaciones de Monitoreo Ambiental	Existing
	UOCT Letreros de Mensaje Variable	Existing
	UOCT Sensores Ambientales	Planned
	UOCT Sensores de Tránsito	Planned
	UOCT Sitio Web	Existing
Usuarios de Sistemas de Almacenamiento de Datos		
	Sistemas de Usuarios de Almacenamiento de Datos	Existing
Viajeros		
	Viajeros Equipo Personal de Viajeros	Planned
	Viajeros Vehículos Privados	Planned
VLT		
	VLT Equipo de Acceso y Monitoreo de Vehículos	Existing
	VLT Letreros Electrónicos	Existing
	VLT Sistema Central de Control de Tráfico	Existing
	VLT Sistema de Registro Electrónico de Vehículos	Existing
	VLT Sitio Web	Existing

Task 7, Appendix D - Inventory by Entity

Entity	ITS Element	Stakeholder
Archived Data Management Subsystem		
	Carabineros Registro de Accidentes	Carabineros
	DG Archivo de Datos Operacionales de VC	Administrador del Archivo de Datos Operacionales de VC
	MOP CGC Almacenamiento de Datos de Tránsito Concesiones	MOP CGC
	MOP DV Sistema de Almacenamiento de Datos de Tránsito en Vías	MOP Dirección de Vialidad
	MOP Planificación Almacenamiento de Datos Multimodal	MOP Subsecretaría
	MTT Almacenamiento de Datos de Transporte Público	MTT
	SECTRA Sistemas de Almacenamiento de Datos de Tránsito	SECTRA
	SECTRA Sistemas de Planificación Multimodal	SECTRA
Archived Data User Systems		
	Sistemas de Usuarios de Almacenamiento de Datos	Usuarios de Sistemas de Almacenamiento de Datos
Care Facility		
	Centro de Cuidado	Operadores de Centros de Cuidado
Commercial Vehicle Administration		
	Antepuertos Sistema Central de Control de Tráfico	Antepuertos
	Antepuertos Sistema de Registro Electrónico de Vehículos	Antepuertos
	CONAMA Sistema de Permiso de Carga (HAZMAT)	CONAMA
	MOP DV Cruce Fronterizo Sistema de Registro Electrónico de Vehículos	MOP Dirección de Vialidad
	MOP DV Sistema de Registro y Revisión de Credenciales (Pesaje, Sobredimensiones, y Seguridad)	MOP Dirección de Vialidad
	Puerto de Mejillones Sistema de Registro Electrónico de Vehículos	Puerto de Mejillones
	Puerto de San Antonio Sistema de Registro Electrónico de Vehículos	Puerto de San Antonio
	Puertos Sistema de Registro Electrónico de Vehículos	Puertos
	Sistema Municipal de Permiso de Carga	Municipalidad
	VLT Sistema de Registro Electrónico de Vehículos	VLT
Commercial Vehicle Check		
	Antepuertos Equipo de Acceso y Monitoreo de Vehículos	Antepuertos
	MOP DV Cruce Fronterizo Equipo de Vías	MOP Dirección de Vialidad
	MOP DV Equipo Pesaje en Movimiento y Control de Seguridad	MOP Dirección de Vialidad
	Puerto de Mejillones Equipo de Acceso y Monitoreo de Vehículos	Puerto de Mejillones
	Puerto de San Antonio Equipo de Acceso y Monitoreo de Vehículos	Puerto de San Antonio
	Puertos Equipo de Acceso y Monitoreo de Vehículos	Puertos
	VLT Equipo de Acceso y Monitoreo de Vehículos	VLT
Commercial Vehicle Subsystem		
	Operadores de Ferrocarril Vehículos	Operadores de Ferrocarril
	Operadores Privados de Vehículos Comerciales Vehículos	Operadores Privados de VC
Emergency Management		
	Archivo de Planes de Contingencia	Administrador del Archivo Regional de Planes de Contingencia

Entity	ITS Element	Stakeholder
Emergency Management		
	Autopista Aeropuerto AMB Sistema Central de Control	Autopista Aeropuerto AMB
	Autopista Camino de la Madera Sistema Central de Control	Autopista Camino de la Madera
	Autopista Camino Nogales Puchuncaví Sistema Central de Control	Autopista Camino Nogales - Puchuncaví
	Autopista Costanera Norte Sistema Central de Control	Autopista Costanera Norte
	Autopista de los Lagos Sistema Central de Control	Autopista de los Lagos
	Autopista del Aconcagua Sistema Central de Control	Autopista del Aconcagua
	Autopista del Bosque Sistema Central de Control	Autopista del Bosque
	Autopista del Elqui Sistema Central de Control	Autopista del Elqui
	Autopista del Maipo Sistema Central de Control	Autopista del Maipo
	Autopista del Sol Sistema Central de Control	Autopista del Sol
	Autopista Litoral Central Sistema Central de Control	Autopista Litoral Central
	Autopista Los Libertadores Sistema Central de Control	Autopista Los Libertadores
	Autopista Norte Sur Sistema Central de Control	Autopista Norte - Sur
	Autopista Ruta 5 Collipulli - Temuco Sistema Central de Control	Autopista Ruta 5 Collipulli - Temuco
	Autopista Ruta de los Ríos Sistema Central de Control	Autopista Ruta de los Ríos
	Autopista Talca - Chillán Sistema Central de Control	Autopista Talca - Chillán
	Autopista Tribasa Bío Bío Sistema Central de Control	Autopista Tribasa Bío Bío
	Autopista Túnel El Melón Sistema Central de Control	Autopista Túnel El Melón
	Autopista Variante Melipilla Sistema Central de Control	Autopista Variante Melipilla
	Autopista Vespucio Norte Sistema Central de Control	Autopista Vespucio Norte
	Autopistas Metropolitanas Sistema Central de Control	Autopistas Metropolitanas
	Autopistas Otras Sistema Central de Control	Autopistas
	Autopistas Rutas del Pacífico Sistema Central de Control	Autopistas Rutas del Pacífico
	Bomberos Sistema Central	Bomberos
	Carabineros	Carabineros
	Comisión de Seguridad de Transito Sistema Central	CONASET
	DG Seguridad de Puertos y Aeropuertos	DG
	MOP DV Sistema de Emergencia	MOP Dirección de Vialidad
	Onemi Gestión de Emergencia	Onemi
	Operadores Privados de Emergencia Médica Centro de Despacho	Operadores Privados de Emergencia Médica
	Operadores Privados de Grúas Sistema de Despacho	Operadores Privados de Grúas
	Operadores Privados de Telemática	Operadores Privados de Telemática
	Red de Información de Incidentes y Respuesta	Red de Sistemas de Gestión de Incidentes y Respuestas
	SAMU Sistema Central	SAMU
Emergency Vehicle Subsystem		
	Autopistas Vehículos de Emergencia	Autopistas
	Bomberos Vehículos de Emergencia	Bomberos
	Carabineros Vehículos de Emergencia	Carabineros
	Operadores Privados de Emergencia Médica Vehículos	Operadores Privados de Emergencia Médica
	SAMU Vehículos de Emergencia	SAMU
[illegible]missions Management		

Entity	ITS Element	Stakeholder
Emissions Management		
	SESMA Centro de Análisis	SESMA
Enforcement Agency		
	Carabineros	Carabineros
	Juzgado Policía Local	Juzgado Policía Local
	Marina	Marina
Equipment Repair Facility		
	MOP DV Taller de Vehículos	MOP Dirección de Vialidad
	Municipalidad Dirección de Obras Taller de Vehículos	Municipalidad
Event Promoters		
	Administrador del Espacio Público	Administrador del Espacio Público
Financial Institution		
	Institución Financiera	Institución Financiera
Fleet and Freight Management		
	Antepuertos Sistema Central de Control de Tráfico	Antepuertos
	Broker de Carga	Broker de Carga
	MOP DV Sistema de Monitoreo de Vehículos Comerciales	MOP Dirección de Vialidad
	Operadores de Ferrocarril	Operadores de Ferrocarril
	Operadores Privados de Vehículos Comerciales Sistemas Central	Operadores Privados de VC
	Puerto de Mejillones Sistema Central de Control de Tráfico	Puerto de Mejillones
	Puerto de San Antonio Sistema Central de Control de Tráfico	Puerto de San Antonio
	Puertos Sistema Central de Control de Tráfico	Puertos
	VLT Sistema Central de Control de Tráfico	VLT
Information Service Provider		
	Aeropuerto Aerosur Sitio Web	Aeropuerto Aerosur
	Aeropuerto Austral Sitio Web	Aeropuerto Austral
	Aeropuerto Chucumata Sitio Web	Aeropuerto Chucumata
	Aeropuerto Cintra Chile Sitio Web	Aeropuerto Cintra Chile
	Aeropuerto Gestión e Ing. IDC Sitio Web	Aeropuerto Gestión e Ing. IDC
	Aeropuerto SCL Terminal Aéreo de Santiago Sitio Web	Aeropuerto SCL Terminal Aéreo de Santiago
	Antepuertos Sitio Web	Antepuertos
	Autopista Aeropuerto AMB Sitio Web	Autopista Aeropuerto AMB
	Autopista Camino de la Madera Sitio Web	Autopista Camino de la Madera
	Autopista Camino Nogales Puchuncaví Sitio Web	Autopista Camino Nogales - Puchuncaví
	Autopista Costanera Norte Sitio Web	Autopista Costanera Norte
	Autopista de los Lagos Sitio Web	Autopista de los Lagos
	Autopista del Aconcagua Sitio Web	Autopista del Aconcagua
	Autopista del Bosque Sitio Web	Autopista del Bosque
	Autopista del Elqui Sitio Web	Autopista del Elqui
	Autopista del Maipo Sitio Web	Autopista del Maipo
	Autopista del Sol Sitio Web	Autopista del Sol
	Autopista Litoral Central Sitio Web	Autopista Litoral Central
	Autopista Los Libertadores Sitio Web	Autopista Los Libertadores

Entity	ITS Element	Stakeholder
Information Service Provider		
	Autopista Norte Sur Sitio Web	Autopista Norte - Sur
	Autopista Ruta 5 Collipulli - Temuco Sitio Web	Autopista Ruta 5 Collipulli - Temuco
	Autopista Ruta de los Ríos Sitio Web	Autopista Ruta de los Ríos
	Autopista Talca - Chillán Sitio Web	Autopista Talca - Chillán
	Autopista Tribasa Bío Bío Sitio Web	Autopista Tribasa Bío Bío
	Autopista Túnel El Melón Sitio Web	Autopista Túnel El Melón
	Autopista Variante Melipilla Sitio Web	Autopista Variante Melipilla
	Autopista Vespucio Norte Sitio Web	Autopista Vespucio Norte
	Autopistas Metropolitanas Sitio Web	Autopistas Metropolitanas
	Autopistas Otras Sitio Web	Autopistas
	Autopistas Rutas del Pacífico Sitio Web	Autopistas Rutas del Pacífico
	Concesionarios de Estacionamientos Sitio Web	Concesionarios de Estacionamientos Públicos
	DGAC Sitio Web	DG
	Metro Sitio Web	METRO
	MOP DV Información de la Red Vial Interurbana Sitio Web	MOP Dirección de Vialidad
	MOP DV Subdirección de Explotación Sitio Web	MOP Dirección de Vialidad
	MTT Fiscalización y Control del Transporte Público Sitio Web	MTT
	MTT Información a Usuario Sitio Web	MTT
	Municipalidad Dirección de Obras Sitio Web	Municipalidad
	Operadores Privados de Telemática	Operadores Privados de Telemática
	Puerto de Mejillones Sitio Web	Puerto de Mejillones
	Puerto de San Antonio Sitio Web	Puerto de San Antonio
	Puertos Sitio Web	Puertos
	SECTRA Sistemas de Control de Semáforos Sitio Web	SECTRA
	Sistema Municipal Sitio Web	Municipalidad
	UOCT Sitio Web	UOCT
	VLT Sitio Web	VLT
Maintenance and Construction Management		
	MOP DV Subdirección de Explotación	MOP Dirección de Vialidad
	Municipalidad Dirección de Obras	Municipalidad
Maintenance and Construction Vehicle		
	MOP DV Subdirección de Explotación Vehículos	MOP Dirección de Vialidad
	Municipalidad Dirección de Obras Vehículos	Municipalidad
Map Update Provider		
	MOP Sistema de Información Geográfico	MOP Subsecretaría
Media		
	Medios de Comunicación	Proveedores de Medios de Comunicaciones
Multimodal Transportation Service Provider		
	Aeropuerto Aerosur	Aeropuerto Aerosur
	Aeropuerto Austral	Aeropuerto Austral
	Aeropuerto Chucumata	Aeropuerto Chucumata
	Aeropuerto Cintra Chile	Aeropuerto Cintra Chile
	Aeropuerto Gestión e Ing. IDC	Aeropuerto Gestión e Ing. IDC

Entity	ITS Element	Stakeholder
Multimodal Transportation Service Provider		
	Aeropuerto SCL Terminal Aéreo de Santiago	Aeropuerto SCL Terminal Aéreo de Santiago
	Puerto de Valparaíso Terminal de Pasajeros	Puerto de Valparaíso
	Terminales Multimodales	Terminales Multimodales
Other Archives		
	MOP CGC Almacenamiento de Datos de Tránsito Concesiones	MOP CGC
	MOP DV Sistema de Almacenamiento de Datos de Tránsito en Vías	MOP Dirección de Vialidad
	MTT Almacenamiento de Datos de Transporte Público	MTT
	SECTRA Sistemas de Almacenamiento de Datos de Tránsito	SECTRA
Other EM		
	Archivo de Planes de Contingencia	Administrador del Archivo Regional de Planes de Contingencia
	Carabineros	Carabineros
	Proveedor de Información Sobre Materiales Peligrosos	Proveedor de Información Sobre Materiales Peligrosos
	Red de Información de Incidentes y Respuesta	Red de Sistemas de Gestión de Incidentes y Respuestas
Other MCM		
	MOP DV Subdirección de Explotación	MOP Dirección de Vialidad
	Municipalidad Dirección de Obras	Municipalidad
Other TM		
	Antepuertos Sistema Central de Control de Tráfico	Antepuertos
	Archivo de Planes de Contingencia	Administrador del Archivo Regional de Planes de Contingencia
	Red de Información y Condiciones de Tránsito	Red de Sistemas de Información y Condiciones de Tránsito
	SECTRA Sistemas Central de Control de Tránsito	SECTRA
	Sistema Municipal Sistema Central de Control de Tránsito	Municipalidad
	UOCT Centro de Control de Gestión de Tránsito	UOCT
Other Toll Administration		
	Autopistas Centros de Atención al Cliente	Autopistas
	Red de Servicio y Reciprocidad de Concesionarias	Red de Sistemas de Concesionarias
Other TRM		
	Metro Centro de Control	METRO
	MTT Coordinación General de Transporte	MTT
	MTT Fiscalización y Control del Transporte Público (CCB)	MTT
	Red de Reciprocidad de Pago Electrónico del Transporte Público	Red de Sistemas de Concesionarias
Parking Management		
	Antepuertos Equipo de Acceso y Monitoreo de Vehículos	Antepuertos
	Antepuertos Sistema Central de Control de Tráfico	Antepuertos
	Concesionarios de Estacionamientos Públicos Sistemas de Estacionamiento	Concesionarios de Estacionamientos Públicos
	DGAC Sistema de Gestión de Estacionamientos	DG
	MTT Tarificación Vial Equipo de Vías / Estacionamientos	MTT
Personal Information Access		
	Operadores Privados de VC Sistema Móvil del Conductor	Operadores Privados de VC
	Viajeros Equipo Personal de Viajeros	Viajeros

Entity	ITS Element	Stakeholder
Rail Operations		
	Operadores de Ferrocarril	Operadores de Ferrocarril
Remote Traveler Support		
	Autopistas Punto de Venta	Autopistas
	Metro Información a Usuario en Viaje	METRO
	Metro Punto de Venta	METRO
	MTT Información en Paraderos	MTT
	MTT Punto de Venta	MTT
Roadway Subsystem		
	Aeropuerto Aerosur Equipo de Vías	Aeropuerto Aerosur
	Aeropuerto Austral Equipo de Vías	Aeropuerto Austral
	Aeropuerto Chucumata Equipo de Vías	Aeropuerto Chucumata
	Aeropuerto Cintra Chile Equipo de Vías	Aeropuerto Cintra Chile
	Aeropuerto Gestión e Ing. IDC Equipo de Vías	Aeropuerto Gestión e Ing. IDC
	Aeropuerto SCL Terminal Aéreo de Santiago Equipo de Vías	Aeropuerto SCL Terminal Aéreo de Santiago
	Antepuertos Equipo de Acceso y Monitoreo de Vehículos	Antepuertos
	Antepuertos Letreros Electrónicos	Antepuertos
	Autopista Aeropuerto AMB Equipo de Vías	Autopista Aeropuerto AMB
	Autopista Camino de la Madera Equipo de Vías	Autopista Camino de la Madera
	Autopista Camino Nogales Puchuncaví Equipo de Vías	Autopista Camino Nogales - Puchuncaví
	Autopista Costanera Norte Equipo de Túnel	Autopista Costanera Norte
	Autopista Costanera Norte Equipo de Vías	Autopista Costanera Norte
	Autopista de los Lagos Equipo de Vías	Autopista de los Lagos
	Autopista del Aconcagua Equipo de Túnel	Autopista del Aconcagua
	Autopista del Aconcagua Equipo de Vías	Autopista del Aconcagua
	Autopista del Bosque Equipo de Vías	Autopista del Bosque
	Autopista del Elqui Equipo de Vías	Autopista del Elqui
	Autopista del Maipo Equipo de Túnel	Autopista del Maipo
	Autopista del Maipo Equipo de Vías	Autopista del Maipo
	Autopista del Sol Equipo de Vías	Autopista del Sol
	Autopista Litoral Central Equipo de Vías	Autopista Litoral Central
	Autopista Los Libertadores Equipo de Túnel	Autopista Los Libertadores
	Autopista Los Libertadores Equipo de Vías	Autopista Los Libertadores
	Autopista Norte Sur Equipo de Vías	Autopista Norte - Sur
	Autopista Ruta 5 Collipulli - Temuco Equipo de Vías	Autopista Ruta 5 Collipulli - Temuco
	Autopista Ruta de los Ríos Equipo de Vías	Autopista Ruta de los Ríos
	Autopista Talca - Chillán Equipo de Vías	Autopista Talca - Chillán
	Autopista Tribasa Bío Bío Equipo de Vías	Autopista Tribasa Bío Bío
	Autopista Túnel El Melón Equipo de Túnel	Autopista Túnel El Melón
	Autopista Túnel El Melón Equipo de Vías	Autopista Túnel El Melón
	Autopista Variante Melipilla Equipo de Vías	Autopista Variante Melipilla
	Autopista Vespucio Norte Equipo de Vías	Autopista Vespucio Norte
	Autopistas Metropolitanas Equipo de Vías	Autopistas Metropolitanas
	Autopistas Otras Equipo de Vías	Autopistas

Entity	ITS Element	Stakeholder
Roadway Subsystem		
	Autopistas Rutas del Pacífico Equipo de Túnel	Autopistas Rutas del Pacífico
	Autopistas Rutas del Pacífico Equipo de Vías	Autopistas Rutas del Pacífico
	MOP DV Contadores Automáticos de Flujos Vehiculares	MOP Dirección de Vialidad
	MOP DV Equipo Pesaje en Movimiento y Control de Seguridad	MOP Dirección de Vialidad
	MOP DV Subdirección de Explotación Equipo de Vías	MOP Dirección de Vialidad
	MTT Tarificación Vial Equipo de Vías / Estacionamientos	MTT
	Municipalidad Dirección de Obras Equipo de Vías	Municipalidad
	Puerto de Mejillones Equipo de Acceso y Monitoreo de Vehículos	Puerto de Mejillones
	Puerto de Mejillones Letreros Electrónicos	Puerto de Mejillones
	Puerto de San Antonio Equipo de Acceso y Monitoreo de Vehículos	Puerto de San Antonio
	Puerto de San Antonio Letreros Electrónicos	Puerto de San Antonio
	Puertos Equipo de Acceso y Monitoreo de Vehículos	Puertos
	Puertos Letreros Electrónicos	Puertos
	SECTRA Controladores de Semáforos	SECTRA
	SECTRA Letreros de Mensaje Variable	SECTRA
	SECTRA Sensores de Tránsito	SECTRA
	SESMA Estaciones de Monitoreo Ambiental	SESMA
	Sistema Municipal Equipo de Vías	Municipalidad
	UOCT Circuito Cerrado de Televisión	UOCT
	UOCT Controladores de Semáforos	UOCT
	UOCT Equipo Control de Tráfico Autopistas	UOCT
	UOCT Estaciones de Monitoreo Ambiental	UOCT
	UOCT Letreros de Mensaje Variable	UOCT
	UOCT Sensores Ambientales	UOCT
	UOCT Sensores de Tránsito	UOCT
	VLT Equipo de Acceso y Monitoreo de Vehículos	VLT
	VLT Letreros Electrónicos	VLT
Storage Facility		
	MOP DV Subdirección de Explotación Facilidad de Almacenaje	MOP Dirección de Vialidad
	Municipalidad Dirección de Obras Facilidad de Almacenaje	Municipalidad
Toll Administration		
	Autopista Aeropuerto AMB Sistema Central de Control	Autopista Aeropuerto AMB
	Autopista Camino de la Madera Sistema Central de Control	Autopista Camino de la Madera
	Autopista Camino Nogales Puchuncaví Sistema Central de Control	Autopista Camino Nogales - Puchuncaví
	Autopista Costanera Norte Sistema Central de Control	Autopista Costanera Norte
	Autopista de los Lagos Sistema Central de Control	Autopista de los Lagos
	Autopista del Aconcagua Sistema Central de Control	Autopista del Aconcagua
	Autopista del Bosque Sistema Central de Control	Autopista del Bosque
	Autopista del Elqui Sistema Central de Control	Autopista del Elqui
	Autopista del Maipo Sistema Central de Control	Autopista del Maipo

Entity	ITS Element	Stakeholder
Toll Administration		
	Autopista del Sol Sistema Central de Control	Autopista del Sol
	Autopista Litoral Central Sistema Central de Control	Autopista Litoral Central
	Autopista Los Libertadores Sistema Central de Control	Autopista Los Libertadores
	Autopista Norte Sur Sistema Central de Control	Autopista Norte - Sur
	Autopista Ruta 5 Collipulli - Temuco Sistema Central de Control	Autopista Ruta 5 Collipulli - Temuco
	Autopista Ruta de los Ríos Sistema Central de Control	Autopista Ruta de los Ríos
	Autopista Talca - Chillán Sistema Central de Control	Autopista Talca - Chillán
	Autopista Tribasa Bío Bío Sistema Central de Control	Autopista Tribasa Bío Bío
	Autopista Túnel El Melón Sistema Central de Control	Autopista Túnel El Melón
	Autopista Variante Melipilla Sistema Central de Control	Autopista Variante Melipilla
	Autopista Vespucio Norte Sistema Central de Control	Autopista Vespucio Norte
	Autopistas Metropolitanas Sistema Central de Control	Autopistas Metropolitanas
	Autopistas Otras Sistema Central de Control	Autopistas
	Autopistas Rutas del Pacífico Sistema Central de Control	Autopistas Rutas del Pacífico
	MOP DV Sistema de Monitoreo de Vehículos Comerciales	MOP Dirección de Vialidad
	Red de Servicio y Reciprocidad de Concesionarias	Red de Sistemas de Concesionarias
Toll Collection		
	Autopista Aeropuerto AMB Equipo de Telepeaje	Autopista Aeropuerto AMB
	Autopista Camino de la Madera Equipo de Telepeaje	Autopista Camino de la Madera
	Autopista Camino Nogales Puchuncaví Equipo de Telepeaje	Autopista Camino Nogales - Puchuncaví
	Autopista Costanera Norte Equipo de Telepeaje	Autopista Costanera Norte
	Autopista de los Lagos Equipo de Telepeaje	Autopista de los Lagos
	Autopista del Aconcagua Equipo de Telepeaje	Autopista del Aconcagua
	Autopista del Bosque Equipo de Telepeaje	Autopista del Bosque
	Autopista del Elqui Equipo de Telepeaje	Autopista del Elqui
	Autopista del Maipo Equipo de Telepeaje	Autopista del Maipo
	Autopista del Sol Equipo de Telepeaje	Autopista del Sol
	Autopista Litoral Central Equipo de Telepeaje	Autopista Litoral Central
	Autopista Los Libertadores Equipo de Telepeaje	Autopista Los Libertadores
	Autopista Norte Sur Equipo de Telepeaje	Autopista Norte - Sur
	Autopista Ruta 5 Collipulli - Temuco Equipo de Telepeaje	Autopista Ruta 5 Collipulli - Temuco
	Autopista Ruta de los Ríos Equipo de Telepeaje	Autopista Ruta de los Ríos
	Autopista Talca - Chillán Equipo de Telepeaje	Autopista Talca - Chillán
	Autopista Tribasa Bío Bío Equipo de Telepeaje	Autopista Tribasa Bío Bío
	Autopista Túnel El Melón Equipo de Telepeaje	Autopista Túnel El Melón
	Autopista Variante Melipilla Equipo de Telepeaje	Autopista Variante Melipilla
	Autopista Vespucio Norte Equipo de Telepeaje	Autopista Vespucio Norte
	Autopistas Metropolitanas Equipo de Telepeaje	Autopistas Metropolitanas
	Autopistas Otras Equipo de Telepeaje	Autopistas
	Autopistas Rutas del Pacífico Equipo de Telepeaje	Autopistas Rutas del Pacífico
Trade Regulatory Agencies		
	Servicio Agrícola Ganadero	Servicio Agrícola Ganadero

Entity	ITS Element	Stakeholder
Trade Regulatory Agencies		
	Servicio de Impuestos Internos	Servicio de Impuestos Internos
	Servicio de Salud	Servicio de Salud
	Servicio General de Aduana	Servicio General de Aduana
Traffic Management		
	Aeropuerto Aerosur	Aeropuerto Aerosur
	Aeropuerto Austral	Aeropuerto Austral
	Aeropuerto Chucumata	Aeropuerto Chucumata
	Aeropuerto Cintra Chile	Aeropuerto Cintra Chile
	Aeropuerto Gestión e Ing. IDC	Aeropuerto Gestión e Ing. IDC
	Aeropuerto SCL Terminal Aéreo de Santiago	Aeropuerto SCL Terminal Aéreo de Santiago
	Antepuertos Sistema Central de Control de Tráfico	Antepuertos
	Archivo de Planes de Contingencia	Administrador del Archivo Regional de Planes de Contingencia
	Autopista Aeropuerto AMB Sistema Central de Control	Autopista Aeropuerto AMB
	Autopista Camino de la Madera Sistema Central de Control	Autopista Camino de la Madera
	Autopista Camino Nogales Puchuncaví Sistema Central de Control	Autopista Camino Nogales - Puchuncaví
	Autopista Costanera Norte Sistema Central de Control	Autopista Costanera Norte
	Autopista Costanera Norte Sistema Control de Túneles	Autopista Costanera Norte
	Autopista de los Lagos Sistema Central de Control	Autopista de los Lagos
	Autopista del Aconcagua Sistema Central de Control	Autopista del Aconcagua
	Autopista del Aconcagua Sistema Control de Túneles	Autopista del Aconcagua
	Autopista del Bosque Sistema Central de Control	Autopista del Bosque
	Autopista del Elqui Sistema Central de Control	Autopista del Elqui
	Autopista del Maipo Sistema Central de Control	Autopista del Maipo
	Autopista del Maipo Sistema Control de Túneles	Autopista del Maipo
	Autopista del Sol Sistema Central de Control	Autopista del Sol
	Autopista Litoral Central Sistema Central de Control	Autopista Litoral Central
	Autopista Los Libertadores Sistema Central de Control	Autopista Los Libertadores
	Autopista Los Libertadores Sistema Control de Túneles	Autopista Los Libertadores
	Autopista Norte Sur Sistema Central de Control	Autopista Norte - Sur
	Autopista Ruta 5 Collipulli - Temuco Sistema Central de Control	Autopista Ruta 5 Collipulli - Temuco
	Autopista Ruta de los Ríos Sistema Central de Control	Autopista Ruta de los Ríos
	Autopista Talca - Chillán Sistema Central de Control	Autopista Talca - Chillán
	Autopista Tribasa Bío Bío Sistema Central de Control	Autopista Tribasa Bío Bío
	Autopista Túnel El Melón Sistema Central de Control	Autopista Túnel El Melón
	Autopista Túnel El Melón Sistema Control de Túneles	Autopista Túnel El Melón
	Autopista Variante Melipilla Sistema Central de Control	Autopista Variante Melipilla
	Autopista Vespucio Norte Sistema Central de Control	Autopista Vespucio Norte
	Autopistas Metropolitanas Sistema Central de Control	Autopistas Metropolitanas
	Autopistas Otras Sistema Central de Control	Autopistas
	Autopistas Rutas del Pacífico Sistema Central de Control	Autopistas Rutas del Pacífico
	Autopistas Rutas del Pacífico Sistema Control de Túneles	Autopistas Rutas del Pacífico
	MOP DV Sistema de Monitoreo de Vehículos Comerciales	MOP Dirección de Vialidad

Entity	ITS Element	Stakeholder
Traffic Management		
	MTT Tarificación Vial	MTT
	Puerto de Mejillones Sistema Central de Control de Tráfico	Puerto de Mejillones
	Puerto de San Antonio Sistema Central de Control de Tráfico	Puerto de San Antonio
	Puertos Sistema Central de Control de Tráfico	Puertos
	Red de Información y Condiciones de Tránsito	Red de Sistemas de Información y Condiciones de Tránsito
	SECTRA Sistemas Central de Control de Tránsito	SECTRA
	Sistema Municipal Sistema Central de Control de Tránsito	Municipalidad
	UOCT Centro de Control de Gestión de Tránsito	UOCT
	VLT Sistema Central de Control de Tráfico	VLT
Transit Management		
	Metro Centro de Control	METRO
	MTT Coordinación General de Transporte	MTT
	MTT Fiscalización y Control del Transporte Público (CCB)	MTT
	Operadores Privados del Transporte Público Centro de Control	Operadores Privados de Sistemas de Transporte Público
	Red de Reciprocidad de Pago Electrónico del Transporte Público	Red de Sistemas de Concesionarias
Transit Vehicle Subsystem		
	Metro Estación	METRO
	Operadores Privados del Transporte Público Vehículos	Operadores Privados de Sistemas de Transporte Público
Traveler Card		
	Metro Tarjeta Electrónica Multivía	METRO
	Operadores del Transporte Público Tarjeta Electrónica	Operadores de Sistemas de Transporte Público Regionales
	TAG de Vehículo Comercial	Administrador de TAG de Vehículos Comerciales
	TAG Regional	Administrador de TAG Regional
Vehicle		
	Operadores de Ferrocarril Vehículos	Operadores de Ferrocarril
	Operadores Privados de Vehículos Comerciales Vehículos	Operadores Privados de VC
	Operadores Privados del Transporte Público Vehículos	Operadores Privados de Sistemas de Transporte Público
	Viajeros Vehículos Privados	Viajeros
Wayside Equipment		
	Operadores de Ferrocarril Equipo del Riel	Operadores de Ferrocarril
Weather Service		
	Sistema de Prónostico del Tiempo	Operadores de Sistemas de Pronóstico del Tiempo

Lockheed Martin Corporation
Consensus Systems Technologies
Aristo Consultores

Task 7, Appendix E - Sausage Diagram

Commercial Vehicle Administration
- Antepuertos Sistema de Registro Electrónico de Vehículos
- CONAMA Sistema de Permiso de Carga (HAZMAT)
- MOP DV Cruce Fronterizo Sistema de Registro Electrónico de Vehículos
- MOP DV Sistema de Registro y Revisión de Credenciales (Pesaje, Sobredimensiones, y Seguridad)
- Puerto de Mejillones Sistema de Registro Electrónico de Vehículos
- Puerto de San Antonio Sistema de Registro Electrónico de Vehículos
- Puertos Sistema de Registro Electrónico
- Sistema Municipal de Permiso de Carga
- VLT Sistema de Registro Electrónico

Remote Traveler Support
- Autopistas Punto de Venta
- Metro Información a Usuario en Viaje
- Metro Punto de Venta
- MTT Información en Paraderos
- MTT Punto de Venta

Personal Information Access
- Operadores Privados de VC Sistema Móvil del Conductor
- Viajeros Equipo Personal de Viajeros

Vehicle
- Viajeros Vehículos Privados

Commercial Vehicle
- Operadores de Ferrocarril Vehículos
- Operadores Privados de Vehículos Comerciales Vehículos

Emergency Vehicle
- Autopistas Vehículos de Emergencia
- Bomberos Vehículos de Emergencia
- Carabineros Vehículos de Emergencia
- Operadores Privados de Emergencia Medica Vehículos
- SAMU Vehículos de Emergencia

Transit Vehicle
- Metro Estación
- Operadores Privados del Transporte Público Vehículos

Maintenance and Construction Vehicle
- MOP DV Subdirección de Explotación Vehículos
- Municipalidad Dirección de Obras Vehículos

Archived Data Management
- Carabineros Registro de Accidentes
- DG Archivo de Datos Operacionales de VC
- MOP CGC Almacenamiento de Datos de Tránsito Concesiones
- MOP DV Sistema de Almacenamiento de Datos de Tránsito en Vías
- MOP Planificación Almacenamiento de Datos Multimodal
- MTT Almacenamiento de Datos de Transporte Público
- SECTRA Sistemas de Almacenamiento de Datos de Tránsito
- SECTRA Sistemas de Planificación Multimodal

Transit Management
- Metro Centro de Control
- MTT Coordinación General de Transporte
- MTT Fiscalización y Control del Transporte Público (CCB)
- Operadores Privados del Transporte Público Centro de Control
- Red de Reciprocidad de Pago Electrónico del Transporte Público

Toll Administration (1)
- Autopista Aeropuerto AMB Sistema Central
- Autopista Camino de la Madera Sistema Central
- Autopista Camino Nogales Puchuncaví Sistema Central
- Autopista Costanera Norte Sistema Central
- Autopista de los Lagos Sistema Central
- Autopista del Aconcagua Sistema Central
- Autopista del Bosque Sistema Central
- Autopista del Elqui Sistema Central
- Autopista del Maipo Sistema Central
- Autopista del Sol Sistema Central
- Autopista Litoral Central Sistema Central
- Autopista Los Libertadores Sistema Central

Maintenance and Construction Management
- MOP DV Subdirección de Explotación
- Municipalidad Dirección de Obras

Toll Administration (2)
- Autopista Norte Sur Sistema Central
- Autopista Ruta 5 Collipulli - Temuco Sistema Central
- Autopista Ruta de los Ríos Sistema Central
- Autopista Talca - Chillán Sistema Central
- Autopista Tribasa Bío Bío Sistema Central
- Autopista Túnel El Melón Sistema Central
- Autopista Variante Melipilla Sistema Central
- Autopista Vespucio Norte Sistema Central
- Autopistas Metropolitanas Sistema Central
- Autopistas Otras Sistema Central
- Autopistas Rutas del Pacífico Sistema Central
- MOP DV Sistema de Monitoreo de Vehículos Comerciales
- Red de Servicio y Reciprocidad de Concesionarias

Emissions Management
- SESMA Centro de Análisis

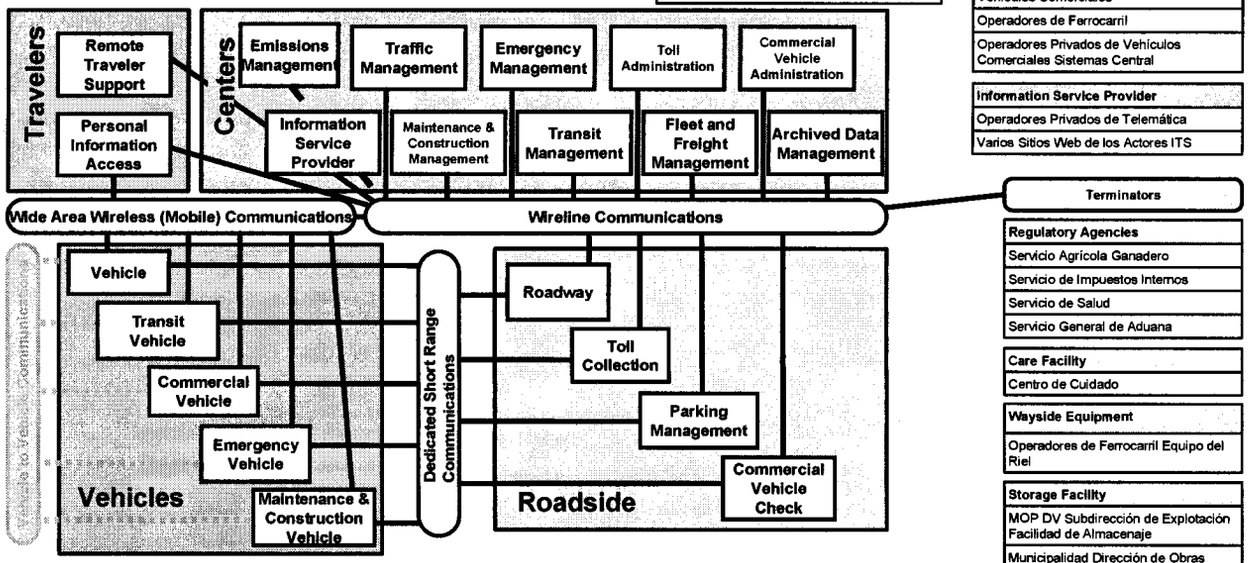
Traffic Management
- Aeropuertos Aerosur, Austral, Chucumata, Cintra Chile, Gestión e Ing. IDC, SCL Terminal Aereo de Santiago
- Archivo de Planes de Contingencia
- Autopistas Equipo de Control de Túneles
- MOP DV Sistema de Monitoreo de Vehículos Comerciales
- MTT Tarificación Vial
- Red de Información y Condiciones de Tránsito
- SECTRA Sistemas Central de Control de Tránsito
- Sistema Municipal Sistema Central de Control de Tránsito
- UOCT Centro de Control de Gestión de Tránsito

Fleet and Freight Management (1)
- Antepuertos Sistema Central de Control de Tráfico
- Broker de Carga
- MOP DV Sistema de Monitoreo de Vehículos Comerciales
- Operadores de Ferrocarril
- Operadores Privados de Vehículos Comerciales Sistemas Central

Information Service Provider
- Operadores Privados de Telemática
- Varios Sitios Web de los Actores ITS

Fleet and Freight Management (2)
- Operadores Privados de Vehículos Comerciales Sistemas Central
- Puerto de Mejillones Sistema Central de Control de Tráfico
- Puerto de San Antonio Sistema Central de Control de Tráfico
- Puertos Sistema Central de Control de Tráfico
- VLT Sistema Central de Control de Tráfico

Emergency Management
- Archivo de Planes de Contingencia
- Bomberos Sistema Central
- Carabineros
- Comisión de Seguridad de Transito Sistema Central
- DG Seguridad de Puertos y Aeropuertos
- MOP DV Sistema de Emergencia
- Onemi Gestión de Emergencia
- Operadores Privados de Emergencia Médica Centro de Despacho
- Operadores Privados de Grúas Sistema de Despacho
- Red de Información de Incidentes y Respuesta
- SAMU Sistema Central



Terminators

Regulatory Agencies
- Servicio Agrícola Ganadero
- Servicio de Impuestos Internos
- Servicio de Salud
- Servicio General de Aduana

Care Facility
- Centro de Cuidado

Wayside Equipment
- Operadores de Ferrocarril Equipo del Riel

Storage Facility
- MOP DV Subdirección de Explotación Facilidad de Almacenaje
- Municipalidad Dirección de Obras Facilidad de Almacenaje

Equipment Repair Facility
- MOP DV Taller de Vehículos
- Municipalidad Dirección de Obras Taller de Vehículos

Enforcement
- Carabineros
- Juzgado Policía Local
- Marina

Financial Institution
- Institución Financiera

Rail Operations
- Operadores de Ferrocarril

Other Toll Administration
- Autopistas Centros de Atención al Cliente

Media
- Medios de Comunicación

Event Promoter
- Administrador del Espacio Público

Weather Service Provider
- Sistema de Pronóstico del Tiempo

Map Update Provider
- MOP Sistema de Información Geográfico

Multimodal Transportation Service Provider
- Aeropuerto Aerosur
- Aeropuerto Austral
- Aeropuerto Chucumata
- Aeropuerto Cintra Chile
- Aeropuerto Gestión e Ing. IDC
- Aeropuerto SCL Terminal Aéreo de Santiago
- Puerto de Valparaíso Terminal de Pasajeros
- Terminales Multimodales

Archived Data User Systems
- Sistemas de Usuarios de Almacenamiento de Datos

Traveler Card
- Metro Tarjeta Electrónica Multivía
- Operadores del Transporte Público Tarjeta Electrónica
- TAG de Vehículo Comercial
- TAG Regional

Toll Collection
- Autopistas Equipo de Telepeaje

Roadway Subsystem (1)
- Aeropuerto Aerosur Equipo de Vías
- Aeropuerto Austral Equipo de Vías
- Aeropuerto Chucumata Equipo de Vías
- Aeropuerto Cintra Chile Equipo de Vías
- Aeropuerto Gestión e Ing. IDC Equipo de Vías
- Aeropuerto SCL Terminal Aéreo de Santiago Equipo de Vías
- Antepuertos Equipo de Acceso y Monitoreo de Vehículos
- Antepuertos Letreros Electrónicos
- Autopistas Equipo de Vías

Roadway Subsystem (2)
- MOP DV Contadores Automáticos
- MOP DV Equipo Pesaje en Movimiento y Control de Seguridad
- MOP DV Subdirección de Explotación Equipo de Vías
- MTT Tarificación Vial Equipo de Vías / Estacionamientos
- Municipalidad Dirección de Obras Equipo de Vías
- Puertos Equipo de Acceso y Monitoreo de Vehículos – VLT, San Antonio, y Mejillones
- Puertos Letreros Electrónicos
- SECTRA Controladores de Semáforos
- SECTRA Letreros de Mensaje Variable
- SECTRA Sensores de Tránsito

Roadway Subsystem (3)
- SESMA Estaciones de Monitoreo Ambiental
- Sistema Municipal Equipo de Vías
- UOCT Circuito Cerrado de Televisión
- UOCT Controladores de Semáforos
- UOCT Equipo Control de Tráfico Autopistas
- UOCT Estaciones de Monitoreo Ambiental
- UOCT Letreros de Mensaje Variable
- UOCT Sensores Ambientales
- UOCT Sensores de Tránsito

Parking Management
- Antepuertos Equipo de Acceso y Monitoreo de Vehículos
- Antepuertos Sistema Central de Control de Tráfico
- Concesionarios de Estacionamientos Públicos Sistemas de Estacionamiento
- DGAC Sistema de Gestión de Estacionamientos
- MTT Tarificación Vial Equipo de Vías / Estacionamientos

Commercial Vehicle Check
- Antepuertos y Puertos Equipo de Acceso y Monitoreo de Vehículos
- MOP DV Cruce Fronterizo Equipo de Vías
- MOP DV Equipo Pesaje en Movimiento y Control de Seguridad

Task 7, Appendix F - Market Package Descriptions

Market Package		Description
AD1	ITS Data Mart	This market package provides a focused archive that houses data collected and owned by a single agency, district, private sector provider, research institution, or other organization. This focused archive typically includes data covering a single transportation mode and one jurisdiction that is collected from an operational data store and archived for future use. It provides the basic data quality, data privacy, and meta data management common to all ITS archives and provides general query and report access to archive data users.
AD3	ITS Virtual Data Warehouse	This market package provides the same broad access to multimodal, multidimensional data from varied data sources as in the ITS Data Warehouse Market Package, but provides this access using enhanced interoperability between physically distributed ITS archives that are each locally managed. Requests for data that are satisfied by access to a single repository in the ITS Data Warehouse Market Package are parsed by the local archive and dynamically translated to requests to remote archives which relay the data necessary to satisfy the request.
APTS1	Transit Vehicle Tracking	This market package monitors current transit vehicle location using an Automated Vehicle Location System. The location data may be used to determine real time schedule adherence and update the transit system's schedule in real-time. Vehicle position may be determined either by the vehicle (e.g., through GPS) and relayed to the infrastructure or may be determined directly by the communications infrastructure. A two-way wireless communication link with the Transit Management Subsystem is used for relaying vehicle position and control measures. Fixed route transit systems may also employ beacons along the route to enable position determination and facilitate communications with each vehicle at fixed intervals. The Transit Management Subsystem processes this information, updates the transit schedule and makes real-time schedule information available to the Information Service Provider.
APTS2	Transit Fixed-Route Operations	This market package performs vehicle routing and scheduling, as well as automatic driver assignment and system monitoring for fixed-route transit services. This service determines current schedule performance using AVL data and provides information displays at the Transit Management Subsystem, . Static and real time transit data is exchanged with Information Service Providers where it is integrated with that from other transportation modes (e.g. rail, ferry, air) to provide the public with integrated and personalized dynamic schedules.
APTS4	Transit Passenger and Fare Management	This market package manages passenger loading and fare payments on-board vehicles using electronic means. It allows transit users to use a traveler card or other electronic payment device. Sensors mounted on the vehicle permit the driver and central operations to determine vehicle loads, and readers located either in the infrastructure or on-board the transit vehicle allow electronic fare payment. Data is processed, stored, and displayed on the transit vehicle and communicated as needed to the Transit Management Subsystem.
APTS5	Transit Security	This market package provides for the physical security of transit passengers. An on-board security system is deployed to perform surveillance and warn of potentially hazardous situations. Public areas (e.g. stops, park and ride lots, stations) are also monitored. Information is communicated to the Transit Management Subsystem using the existing or emerging wireless (vehicle to center) or wireline (area to center) infrastructure. Security related information is also transmitted to the Emergency Management Subsystem when an emergency is identified that requires an external response. Incident information is communicated to the Information Service Provider.
APTS6	Transit Maintenance	This market package supports automatic transit maintenance scheduling and monitoring. On-board condition sensors monitor system status and transmit critical status information to the Transit Management Subsystem. Hardware and software in the Transit Management Subsystem processes this data and schedules preventative and corrective maintenance.

Market Package		Description
APTS7	Multi-modal Coordination	This market package establishes two way communications between multiple transit and traffic agencies to improve service coordination. Multimodal coordination between transit agencies can increase traveler convenience at transfer points and also improve operating efficiency. Coordination between traffic and transit management is intended to improve on-time performance of the transit system to the extent that this can be accommodated without degrading overall performance of the traffic network. More limited local coordination between the transit vehicle and the individual intersection for signal priority is also supported by this package.
APTS8	Transit Traveler Information	This market package provides transit users at transit stops and on-board transit vehicles with ready access to transit information. The information services include transit stop annunciation, imminent arrival signs, and real-time transit schedule displays that are of general interest to transit users. Systems that provide custom transit trip itineraries and other tailored transit information services are also represented by this market package.
ATIS1	Broadcast Traveler Information	This market package collects traffic conditions, advisories, general public transportation, toll and parking information, incident information, air quality and weather information, and broadly disseminates this information through existing infrastructures and low cost user equipment (e.g., FM subcarrier, cellular data broadcast). The information may be provided directly to travelers or provided to merchants and other traveler service providers so that they can better inform their customers of travel conditions. Different from the market package ATMS6 - Traffic Information Dissemination, which provides localized HAR and DMS information capabilities, ATIS1 provides a wide area digital broadcast service. Successful deployment of this market package relies on availability of real-time traveler information from roadway instrumentation, probe vehicles or other sources.
ATIS2	Interactive Traveler Information	This market package provides tailored information in response to a traveler request. Both real-time interactive request/response systems and information systems that "push" a tailored stream of information to the traveler based on a submitted profile are supported. The traveler can obtain current information regarding traffic conditions, transit services, ride share/ride match, parking management, and pricing information. A range of two-way wide-area wireless and wireline communications systems may be used to support the required data communications between the traveler and Information Service Provider. A variety of interactive devices may be used by the traveler to access information prior to a trip or en route including phone, kiosk, Personal Digital Assistant, personal computer, and a variety of in-vehicle devices. This market package also allows merchants to receive traffic information to their personal devices or remote traveler systems to better inform customers of road travel conditions. Successful deployment of this market package relies on availability of real-time transportation data from roadway instrumentation, probe vehicles or other means. A traveler may also input personal preferences and identification information via a "traveler card" that can convey information to the system about the traveler as well as receive updates from the system so the card can be updated over time.
ATIS5	ISP Based Route Guidance	This market package offers the user pre-trip route planning and turn-by-turn route guidance services. Routes may be based on static information or reflect real time network conditions. Unlike ATIS3 and ATIS4, where the user equipment determines the route, the route determination functions are performed in the Information Service Provider Subsystem in this market package. This approach simplifies the user equipment requirements and can provide the infrastructure better information on which to predict future traffic. The package includes two way data communications and optionally also equips the vehicle with the databases, location determination capability, and display technology to support turn by turn route guidance.
ATMS01	Network Surveillance	This market package includes traffic detectors, other surveillance equipment, the supporting field equipment, and wireline communications to transmit the collected data back to the Traffic Management Subsystem. The derived data can be used locally such as when traffic detectors are connected directly to a signal control system or remotely (e.g., when a CCTV system sends data back to the Traffic Management Subsystem). The data generated by this market package enables traffic managers to monitor traffic and road conditions, identify and verify incidents, detect faults in indicator operations, and collect census data for traffic strategy development and long range planning. The collected data can also be analyzed and made available to users and the Information Service Provider Subsystem.

Market Package		Description
ATMS02	Probe Surveillance	This market package provides an alternative approach for surveillance of the roadway network. Two general implementation paths are supported by this market package: 1) wide-area wireless communications between the vehicle and Information Service Provider is used to communicate current vehicle location and status, and 2) dedicated short range communications between the vehicle and roadside is used to provide equivalent information directly to the Traffic Management Subsystem. The first approach leverages wide area communications equipment that may already be in the vehicle to support personal safety and advanced traveler information services. The second approach utilizes vehicle equipment that supports toll collection, in-vehicle signing, and other short range communications applications identified within the architecture. The market package enables traffic managers to monitor road conditions, identify incidents, analyze and reduce the collected data, and make it available to users and private information providers. It requires one of the communications options identified above, roadside beacons and wireline communications for the short range communications option, data reduction software, and utilizes wireline links between the Traffic Management Subsystem and Information Service Provider Subsystem to share the collected information. Both "Opt out" and "Opt in" strategies are available to ensure the user has the ability to turn off the probe functions to ensure individual privacy. Due to the large volume of data collected by probes, data reduction techniques are required, such as the ability to identify and filter out-of-bounds or extreme data reports.
ATMS03	Surface Street Control	This market package provides the central control and monitoring equipment, communication links, and the signal control equipment that support local surface street control and/or arterial traffic management. A range of traffic signal control systems are represented by this market package ranging from static pre-timed control systems to fully traffic responsive systems that dynamically adjust control plans and strategies based on current traffic conditions and priority requests. Additionally, general advisory and traffic control information can be provided to the driver while en route. This market package is generally an intra-jurisdictional package that does not rely on real-time communications between separate control systems to achieve area-wide traffic signal coordination. Systems that achieve coordination across jurisdictions by using a common time base or other strategies that do not require real time coordination would be represented by this package. This market package is consistent with typical urban traffic signal control systems.
ATMS04	Freeway Control	This market package provides the communications and roadside equipment to support ramp control, lane controls, and interchange control for freeways. Coordination and integration of ramp meters are included as part of this market package. This package is consistent with typical urban traffic freeway control systems. This package incorporates the instrumentation included in the Network Surveillance Market Package to support freeway monitoring and adaptive strategies as an option. This market package also includes the capability to utilize surveillance information for detection of incidents. Typically, the processing would be performed at a traffic management center; however, developments might allow for point detection with roadway equipment. For example, a CCTV might include the capability to detect an incident based upon image changes. Additionally, this market package allows general advisory and traffic control information to be provided to the driver while en route.
ATMS06	Traffic Information Dissemination	This market package allows traffic information to be disseminated to drivers and vehicles using roadway equipment such as dynamic message signs or highway advisory radio. This package provides a tool that can be used to notify drivers of incidents; careful placement of the roadway equipment provides the information at points in the network where the drivers have recourse and can tailor their routes to account for the new information. This package also covers the equipment and interfaces that provide traffic information from a traffic management center to the media (for instance via a direct tie-in between a traffic management center and radio or television station computer systems), Transit Management, Emergency Management, and Information Service Providers. A link to the Maintenance and Construction Management subsystem allows real time information on road/bridge closures due to maintenance and construction activities to be disseminated.

Market Package		Description
ATMS07	Regional Traffic Control	This market package provides for the sharing of traffic information and control among traffic management centers to support a regional control strategy. This market package advances the Surface Street Control and Freeway Control Market Packages by adding the communications links and integrated control strategies that enable integrated Interjurisdictional traffic control. The nature of optimization and extent of information and control sharing is determined through working arrangements between jurisdictions. This package relies principally on roadside instrumentation supported by the Surface Street Control and Freeway Control Market Packages and adds hardware, software, and wireline communications capabilities to implement traffic management strategies that are coordinated between allied traffic management centers. Several levels of coordination are supported from sharing of information through sharing of control between traffic management centers.
ATMS08	Incident Management System	This market package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The market package includes incident detection capabilities through roadside surveillance devices (e.g. CCTV) and through regional coordination with other traffic management, maintenance and construction management and emergency management centers as well as weather service entities and event promoters. Information from these diverse sources are collected and correlated by this market package to detect and verify incidents and implement an appropriate response. This market package supports traffic operations personnel in developing an appropriate response in coordination with emergency management, maintenance and construction management, and other incident response personnel to confirmed incidents. The response may include traffic control strategy modifications or resource coordination between center subsystems. Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination market package and dissemination of incident information to travelers through the Broadcast Traveler Information or Interactive Traveler Information market packages. The roadside equipment used to detect and verify incidents also allows the operator to monitor incident status as the response unfolds. The coordination with emergency management might be through a CAD system or through other communication with emergency field personnel. The coordination can also extend to tow trucks and other allied response agencies and field service personnel.
ATMS09	Traffic Forecast and Demand Management	This market package includes advanced algorithms, processing, and mass storage capabilities that support historical evaluation, real-time assessment, and forecast of the roadway network performance. This includes the prediction of travel demand patterns to support better link travel time forecasts. The source data would come from the Traffic Management Subsystem itself as well as other traffic management centers and forecasted traffic loads derived from route plans supplied by the Information Service Provider Subsystem. This market package provides data that supports the implementation of TDM programs, and policies managing both traffic and the environment. The package collects information on vehicle pollution levels, parking availability, usage levels, and vehicle occupancy to support these functions. Demand management requests can also be made to Toll Administration, Transit Management, and Parking Management Subsystems.
ATMS10	Electronic Toll Collection	This market package provides toll operators with the ability to collect tolls electronically and detect and process violations. The fees that are collected may be adjusted to implement demand management strategies. Dedicated short range communication between the roadway equipment and the vehicle is required as well as wireline interfaces between the toll collection equipment and transportation authorities and the financial infrastructure that supports fee collection. Vehicle tags of toll violators are read and electronically posted to vehicle owners. Standards, inter-agency coordination, and financial clearinghouse capabilities enable regional, and ultimately national interoperability for these services. The toll tags and roadside readers that these systems utilize can also be used to collect road use statistics for highway authorities. This data can be collected as a natural by-product of the toll collection process or collected by separate readers that are dedicated to probe data collection.

Market Package		Description
ATMS11	Emissions Monitoring and Management	This market package monitors individual vehicle emissions and provides general air quality monitoring using distributed sensors to collect the data. The collected information is transmitted to the emissions management subsystem for processing. Both area wide air quality monitoring and point emissions monitoring are supported by this market package. For area wide monitoring, this market package measures air quality, identifies sectors that are non-compliant with air quality standards, and collects, stores and reports supporting statistical data. For point emissions monitoring, this market package measures tail pipe emissions and identifies vehicles that exceed emissions standards. The gathered information can be used to implement environmentally sensitive TDM programs, policies, and regulations.
ATMS13	Standard Railroad Grade Crossing	This market package manages highway traffic at highway-rail intersections (HRIs) where operational requirements do not dictate more advanced features (e.g., where rail operational speeds are less than 80 miles per hour). Both passive (e.g., the crossbuck sign) and active warning systems (e.g., flashing lights and gates) are supported. (Note that passive systems exercise only the single interface between the roadway subsystem and the driver in the architecture definition.) These traditional HRI warning systems may also be augmented with other standard traffic management devices. The warning systems are activated on notification by interfaced wayside equipment of an approaching train. The equipment at the HRI may also be interconnected with adjacent signalized intersections so that local control can be adapted to highway-rail intersection activities. Health monitoring of the HRI equipment and interfaces is performed; detected abnormalities are reported to both highway and railroad officials through wayside interfaces and interfaces to the traffic management subsystem.
ATMS16	Parking Facility Management	This market package provides enhanced monitoring and management of parking facilities. It assists in the management of parking operations, coordinates with transportation authorities, and supports electronic collection of parking fees. This market package collects current parking status, shares this data with Information Service Providers and Traffic Management, and collects parking fees using the same in-vehicle equipment utilized for electronic toll collection or contact or proximity traveler cards used for electronic payment.
ATMS18	Reversible Lane Management	This market package provides for the management of reversible lane facilities. In addition to standard surveillance capabilities, this market package includes sensory functions that detect wrong-way vehicles and other special surveillance capabilities that mitigate safety hazards associated with reversible lanes. The package includes the field equipment, physical lane access controls, and associated control electronics that manage and control these special lanes. This market package also includes the equipment used to electronically reconfigure intersections and manage right-of-way to address dynamic demand changes and special events.
CVO01	Fleet Administration	This market package provides the capabilities to manage a fleet of commercial vehicles. The Fleet and Freight Management subsystem would provide the route for a commercial vehicle by either utilizing an in-house routing software package or an Information Service Provider. A route would be electronically sent to the commercial vehicle with any appropriate dispatch instructions. The location of the commercial vehicle can be monitored by the Fleet and Freight Management subsystem and routing changes can be made depending on current road network conditions. The Fleet and Freight Management subsystem can process and respond to requests for assistance and general information from the commercial vehicle. The market package also provides the Fleet and Freight Management subsystem with the capability of monitoring on-board vehicle data.
CVO02	Freight Administration	This market package tracks the movement of cargo and monitors the cargo condition. Interconnections are provided to intermodal freight shippers and intermodal freight depots for tracking of cargo from source to destination.

Market Package		Description
CVO03	Electronic Clearance	This market package provides for automated clearance at roadside check facilities. The roadside check facility communicates with the Commercial Vehicle Administration subsystem to retrieve infrastructure snapshots of critical carrier, vehicle, and driver data to be used to sort passing vehicles. This allows a good driver/vehicle/carrier to pass roadside facilities at highway speeds using transponders and dedicated short range communications to the roadside. Results of roadside clearance activities will be passed on to the Commercial Vehicle Administration. The roadside check facility may be equipped with Automated Vehicle Identification (AVI), weighing sensors, transponder read/write devices and computer workstations.
CVO04	CV Administrative Processes	This market package provides for electronic application, processing, fee collection, issuance, and distribution of CVO credential and tax filing. Through this process, carriers, drivers, and vehicles may be enrolled in the electronic clearance program provided by a separate market package which allows commercial vehicles to be screened at mainline speeds at roadside check facilities. Through this enrollment process, current profile databases are maintained in the Commercial Vehicle Administration subsystem and snapshots of this database are made available to the roadside check facilities at the roadside to support the electronic clearance process.
CVO05	International Border Electronic Clearance	This market package provides for automated clearance at international border crossings. This package augments the electronic clearance package by allowing interface with customs related functions.
CVO06	Weigh-In-Motion	This market package provides for high speed weigh-in-motion with or without Automated Vehicle Identification (AVI) capabilities. This market package provides the roadside equipment that could be used as a stand-alone system or to augment the Electronic Clearance (CVO03) market package.
CVO07	Roadside CVO Safety	This market package provides for automated roadside safety monitoring and reporting. It automates commercial vehicle safety inspections at the roadside check facilities. The capabilities for performing the safety inspection are shared between this market package and the On-Board CVO Safety (CVO08) Market Package which enables a variety of implementation options. The basic option, directly supported by this market package, facilitates safety inspection of vehicles that have been pulled in, perhaps as a result of the automated screening process provided by the Electronic Clearance (CVO03) Market Package. In this scenario, only basic identification data and status information is read from the electronic tag on the commercial vehicle. The identification data from the tag enables access to additional safety data maintained in the infrastructure which is used to support the safety inspection, and may also inform the pull-in decision if system timing requirements can be met. More advanced implementations, supported by the On-Board CVO Safety (CVO08) market package, utilize additional on-board vehicle safety monitoring and reporting capabilities in the commercial vehicle to augment the roadside safety check.
CVO08	On-board CVO Safety	This market package provides for on-board commercial vehicle safety monitoring and reporting. It is an enhancement of the Roadside CVO Safety (CVO08) Market Package and includes roadside support for reading on-board safety data via tags. Safety warnings are provided to the driver as a priority with secondary requirements to notify the Commercial Vehicle Check roadside elements. This market package allows for the Fleet and Freight Management subsystem to have access to the on-board safety data.
CVO09	CVO Fleet Maintenance	This market package supports maintenance of CVO fleet vehicles with on-board monitoring equipment and Automated Vehicle Location (AVL) capabilities with in the Fleet and Freight Management Subsystem. Records of vehicle mileage, repairs, and safety violations are maintained to assure safe vehicles on the highway.
CVO10	HAZMAT Management	This market package integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material and incidents. HAZMAT tracking is performed by the Fleet and Freight Management Subsystem. The Emergency Management subsystem is notified by the Commercial Vehicle if an incident occurs and coordinates the response. The response is tailored based on information that is provided as part of the original incident notification or derived from supplemental information provided by the Fleet and Freight Management Subsystem. The latter information can be provided prior to the beginning of the trip or gathered following the incident depending on the selected policy and implementation.

Market Package		Description
EM1	Emergency Response	This market package includes emergency vehicle equipment, equipment used to receive and route emergency calls, and wireless communications that enable safe and rapid deployment of appropriate resources to an emergency. Coordination between Emergency Management Subsystems supports emergency notification and coordinated response between agencies. Existing wide area wireless communications would be utilized between the Emergency Management Subsystem and an Emergency Vehicle to enable an incident command system to be established and supported at the emergency location. Public safety, traffic management, and many other allied agencies may each participate in the coordinated response managed by this package.
EM2	Emergency Routing	This market package supports automated vehicle location and dynamic routing of emergency vehicles. The service also supports coordination with the Traffic Management Subsystem, collecting detailed road network conditions and requesting special priority or other specific emergency traffic control strategies on the selected route(s). The Emergency Management Subsystem provides the routing for the emergency fleet based on real-time traffic conditions. The Emergency Vehicle may also be equipped with dedicated short range communications for local signal preemption. The service provides for information exchange between care facilities and both the Emergency Management Subsystem and emergency vehicles.
EM3	Mayday Support	This market package allows the user (driver or non-driver) to initiate a request for emergency assistance and enables the Emergency Management Subsystem to locate the user and determine the appropriate response. This market package also includes general surveillance capabilities that enable the Emergency Management Subsystem to remotely monitor public areas (e.g., rest stops, parking lots) to improve security in these areas. The Emergency Management Subsystem may be operated by the public sector or by a private sector provider. The request from the traveler needing assistance may be manually initiated or automated and linked to vehicle sensors. The surveillance data and any requests for assistance are sent to the Emergency Management subsystem using both data and voice communications.
MC01	Maintenance and Construction Vehicle Tracking	This market package will track the location of maintenance and construction vehicles and other equipment to ascertain the progress of their activities. These activities can include ensuring the correct roads are being plowed and work activity is being performed at the correct locations.
MC02	Maintenance and Construction Vehicle Maintenance	This market package performs vehicle maintenance scheduling and manages both routine and corrective maintenance activities on vehicles and other maintenance and construction equipment. It includes on-board sensors capable of automatically performing diagnostics for maintenance and construction vehicles, and the systems that collect this diagnostic information and use it to schedule and manage vehicle maintenance.
MC03	Road Weather Data Collection	This market package collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway (or guideway in the case of transit related rail systems). In addition to fixed sensor stations at the roadside, sensing of the roadway environment can also occur from sensor systems located on Maintenance and Construction Vehicles and on-board sensors provided by auto manufacturers. The collected environmental data is used by the Weather Information Processing and Distribution Market Package to process the information and make decisions on operations.
MC04	Weather Information Processing and Distribution	This market package processes and distributes the environmental information collected from the Road Weather Data Collection market package. This market package uses the environmental data to detect environmental hazards such as icy road conditions, high winds, dense fog, etc. so system operators and decision support systems can make decision on corrective actions to take. The continuing updates of road condition information and current temperatures can be used by system operators to more effectively deploy road maintenance resources, issue general traveler advisories, issue location specific warnings to drivers using the Traffic Information Dissemination market package, and aid operators in scheduling work activity.

Market Package		Description
MC06	Winter Maintenance	This market package supports winter road maintenance including snow plow operations, roadway treatments (e.g., salt spraying and other anti-icing material applications), and other snow and ice control activities. This package monitors environmental conditions and weather forecasts and uses the information to schedule winter maintenance activities, determine the appropriate snow and ice control response, and track and manage response operations.
MC07	Roadway Maintenance and Construction	This market package supports numerous services for scheduled and unscheduled maintenance and construction on a roadway system or right-of-way. Maintenance services would include landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment on the roadway (e.g., signs, traffic controllers, traffic detectors, dynamic message signs, traffic signals, CCTV, etc.). Environmental conditions information is also received from various weather sources to aid in scheduling maintenance and construction activities.
MC08	Work Zone Management	This market package directs activity in work zones, controlling traffic through portable dynamic message signs (DMS) and informing other groups of activity (e.g., ISP, TM, other maintenance and construction centers) for better coordination management. Work zone speeds and delays are provided to the motorist prior to the work zones.
MC09	Work Zone Safety Monitoring	This market package includes systems that improve work crew safety and reduce collisions between the motoring public and maintenance and construction vehicles. This market package detects vehicle intrusions in work zones and wams crew workers and drivers of imminent encroachment or other potential safety hazards. Crew movements are also monitored so that the crew can be wamed of movement beyond the designated safe zone. The market package supports both stationary and mobile work zones. The intrusion detection and alarm systems may be collocated or distributed, allowing systems that detect safety issues far upstream from a work zone (e.g., detection of over-dimension vehicles before they enter the work zone).
MC10	Maintenance and Construction Activity Coordination	This market package supports the dissemination of maintenance and construction activity to centers which can utilize it as part of their operations, or to the Information Service Providers who can provide the information to travelers.

Task 7, Appendix G - Cross Reference of Market Packages to Stakeholder

Stakeholder	Market Package	Market Package Documents Page
Administrador de TAG de Vehículos Comerciales		
	Parking Facility Management	ATMS16-2
Administrador de TAG Regional		
	Parking Facility Management	ATMS16-1
Administrador del Archivo de Datos Operacionales de VC		
	ITS Data Mart	AD1-6
Administrador del Archivo Regional de Planes de Contingencia		
	Regional Traffic Control	ATMS07-6
	Regional Traffic Control	ATMS07-9
Administrador del Espacio Público		
	Incident Management System	ATMS08-01
Aeropuerto Aerosur		
	ITS Data Mart	AD1-4
	ISP Based Route Guidance	ATIS5-2
	Network Surveillance	ATMS01-33
	Traffic Information Dissemination	ATMS06-32
	Regional Traffic Control	ATMS07-3
	Incident Management System	ATMS08-06
Aeropuerto Austral		
	ITS Data Mart	AD1-4
	ISP Based Route Guidance	ATIS5-2
	Network Surveillance	ATMS01-34
	Traffic Information Dissemination	ATMS06-33
	Regional Traffic Control	ATMS07-3
	Incident Management System	ATMS08-06
Aeropuerto Chucumata		
	ITS Data Mart	AD1-4
	ISP Based Route Guidance	ATIS5-2
	Network Surveillance	ATMS01-35
	Traffic Information Dissemination	ATMS06-34
	Regional Traffic Control	ATMS07-3
	Incident Management System	ATMS08-06
Aeropuerto Cintra Chile		
	ITS Data Mart	AD1-4
	ISP Based Route Guidance	ATIS5-2
	Network Surveillance	ATMS01-36
	Traffic Information Dissemination	ATMS06-35
	Regional Traffic Control	ATMS07-3
	Incident Management System	ATMS08-06
Aeropuerto Gestión e Ing. IDC		
	ITS Data Mart	AD1-4
	ISP Based Route Guidance	ATIS5-2
	Network Surveillance	ATMS01-37

Stakeholder	Market Package	Market Package Documents Page
Aeropuerto Gestión e Ing. IDC		
	Traffic Information Dissemination	ATMS06-36
	Regional Traffic Control	ATMS07-3
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	Traffic Information Dissemination	ATMS06-04
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	Incident Management System	ATMS08-02
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	Electronic Toll Collection	ATMS10-01
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Autopista Camino de la Madera		
	Probe Surveillance	ATMS02-18
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	Electronic Toll Collection	ATMS10-01
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Autopista Camino Nogales - Puchuncaví		
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	Traffic Information Dissemination	ATMS06-12
	Regional Traffic Control	ATMS07-1
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	Electronic Toll Collection	ATMS10-01
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	Electronic Toll Collection	ATMS10-02
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	Electronic Toll Collection	ATMS10-08
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Red de Sistemas de Gestión de Incidentes y Respuestas		
	Emergency Response	EM1-1
Red de Sistemas de Información y Condiciones de Tránsito		
	Transit Fixed-Route Operations	APTS2-1
	ISP Based Route Guidance	ATIS5-1
	Regional Traffic Control	ATMS07-1
	Regional Traffic Control	ATMS07-5
	Roadway Maintenance and Construction	MC07-1
	Work Zone Management	MC08-1
	Maintenance and Construction Activity Coordination	MC10-2
SAMU		
	Transit Security	APTS5-1
	Regional Traffic Control	ATMS07-5
	Incident Management System	ATMS08-01
	Incident Management System	ATMS08-13
	Emergency Routing	EM2-3
	Weather Information Processing and Distribution	MC04-1
	Winter Maintenance	MC06-2
	Maintenance and Construction Activity Coordination	MC10-2
SECTRA		
	ITS Data Mart	AD1-2
	ITS Virtual Data Warehouse	AD3-1
	ITS Virtual Data Warehouse	AD3-2
	Transit Security	APTS5-1
	Multi-modal Coordination	APTS7-2
	Network Surveillance	ATMS01-03
	Probe Surveillance	ATMS02-02
	Surface Street Control	ATMS03-2

Stakeholder	Market Package	Market Package Documents Page
SECTRA		
	Traffic Information Dissemination	ATMS06-03
	Regional Traffic Control	ATMS07-1
	Incident Management System	ATMS08-01
	Traffic Forecast and Demand Management	ATMS09-1
	Emissions Monitoring and Management	ATMS11-1
	Standard Railroad Grade Crossing	ATMS13-2
	Reversible Lane Management	ATMS18-2
	Emergency Routing	EM2-4
	Weather Information Processing and Distribution	MC04-1
	Winter Maintenance	MC06-2
Servicio Agrícola Ganadero		
	Electronic Clearance	CVO03-02
	International Border Electronic Clearance	CVO05-1
Servicio de Impuestos Internos		
	Electronic Clearance	CVO03-02
	International Border Electronic Clearance	CVO05-1
Servicio de Salud		
	Electronic Clearance	CVO03-02
	International Border Electronic Clearance	CVO05-1
Servicio General de Aduana		
	Electronic Clearance	CVO03-02
	International Border Electronic Clearance	CVO05-1
SESMA		
	Emissions Monitoring and Management	ATMS11-1
Terminales Multimodales		
	Multi-modal Coordination	APTS7-1
	ISP Based Route Guidance	ATIS5-2
	Maintenance and Construction Activity Coordination	MC10-3
UOCT		
	ITS Data Mart	AD1-2
	Transit Security	APTS5-1
	Multi-modal Coordination	APTS7-1
	Network Surveillance	ATMS01-01
	Probe Surveillance	ATMS02-01
	Surface Street Control	ATMS03-1
	Freeway Control	ATMS04-01
	Traffic Information Dissemination	ATMS06-01
	Regional Traffic Control	ATMS07-1
	Incident Management System	ATMS08-01
	Traffic Forecast and Demand Management	ATMS09-1
	Emissions Monitoring and Management	ATMS11-1
	Emissions Monitoring and Management	ATMS11-2
	Standard Railroad Grade Crossing	ATMS13-1

Stakeholder	Market Package	Market Package Documents Page
UOCT		
	Reversible Lane Management	ATMS18-1
	Emergency Routing	EM2-1
	Road Weather Data Collection	MC03-1
	Weather Information Processing and Distribution	MC04-1
	Winter Maintenance	MC06-2
Usuarios de Sistemas de Almacenamiento de Datos		
	ITS Data Mart	AD1-1
	ITS Virtual Data Warehouse	AD3-1
	Transit Maintenance	APTS6-1
Viajeros		
	Transit Traveler Information	APTS8-1
	Broadcast Traveler Information	ATIS1-1
	Interactive Traveler Information	ATIS2-1
	ISP Based Route Guidance	ATIS5-1
	Probe Surveillance	ATMS02-01
	Electronic Toll Collection	ATMS10-07
	Parking Facility Management	ATMS16-1
	Parking Facility Management	ATMS16-3
	Mayday Support	EM3-1
VLT		
	ITS Data Mart	AD1-6
	Network Surveillance	ATMS01-31
	Probe Surveillance	ATMS02-28
	Surface Street Control	ATMS03-7
	Freeway Control	ATMS04-28
	Traffic Information Dissemination	ATMS06-30
	Regional Traffic Control	ATMS07-3
	Incident Management System	ATMS08-05
	Parking Facility Management	ATMS16-3
	Reversible Lane Management	ATMS18-7
	Electronic Clearance	CVO03-07
	CV Administrative Processes	CVO04-1
	Weigh-In-Motion	CVO06-5
	Roadside CVO Safety	CVO07-1
	On-board CVO Safety	CVO08-1

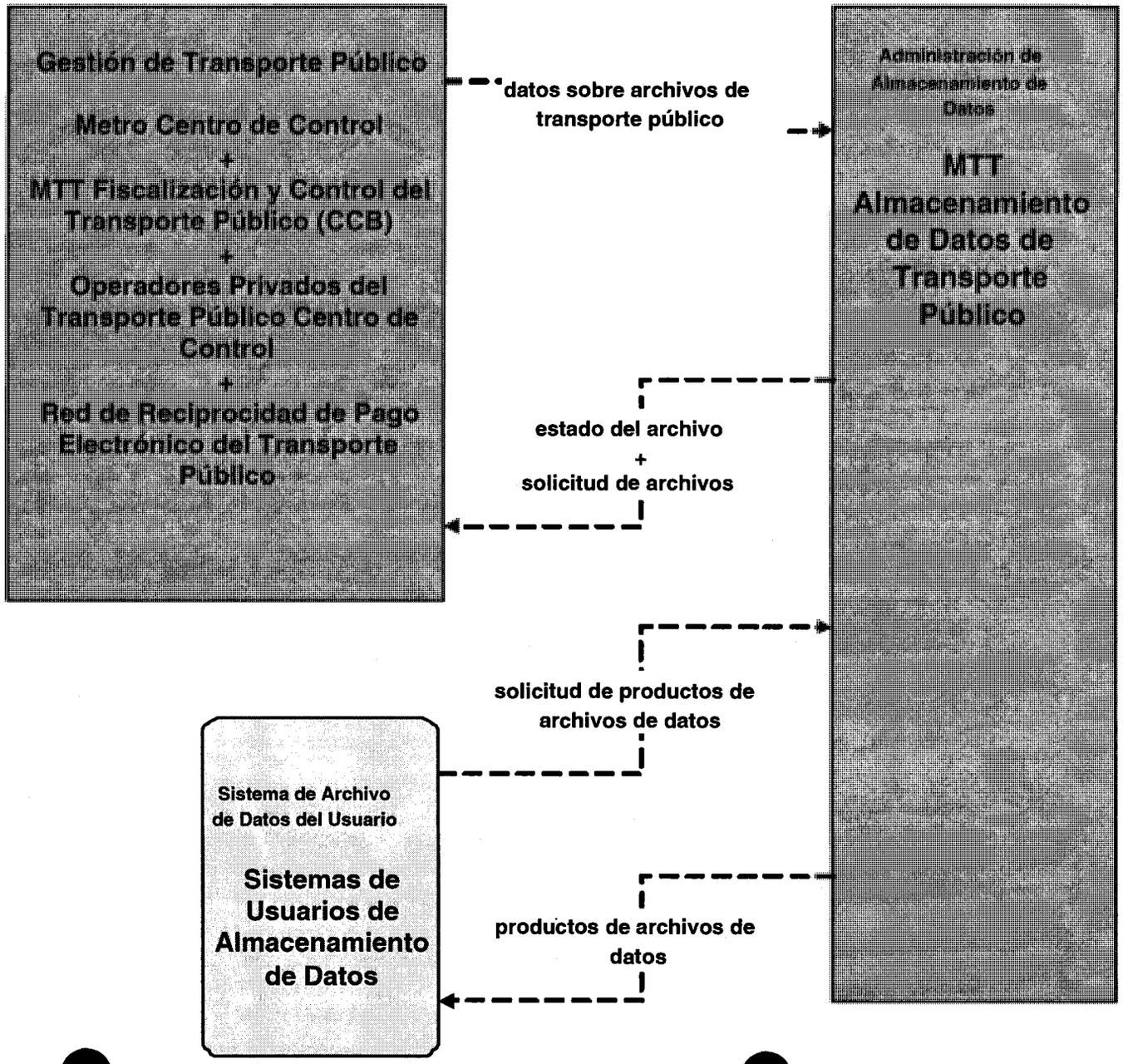
Task 7, Appendix H - Arquitectura Nacional ITS de Chile

Paquetes de Servicios ITS

Administración de Almacenamiento de Datos

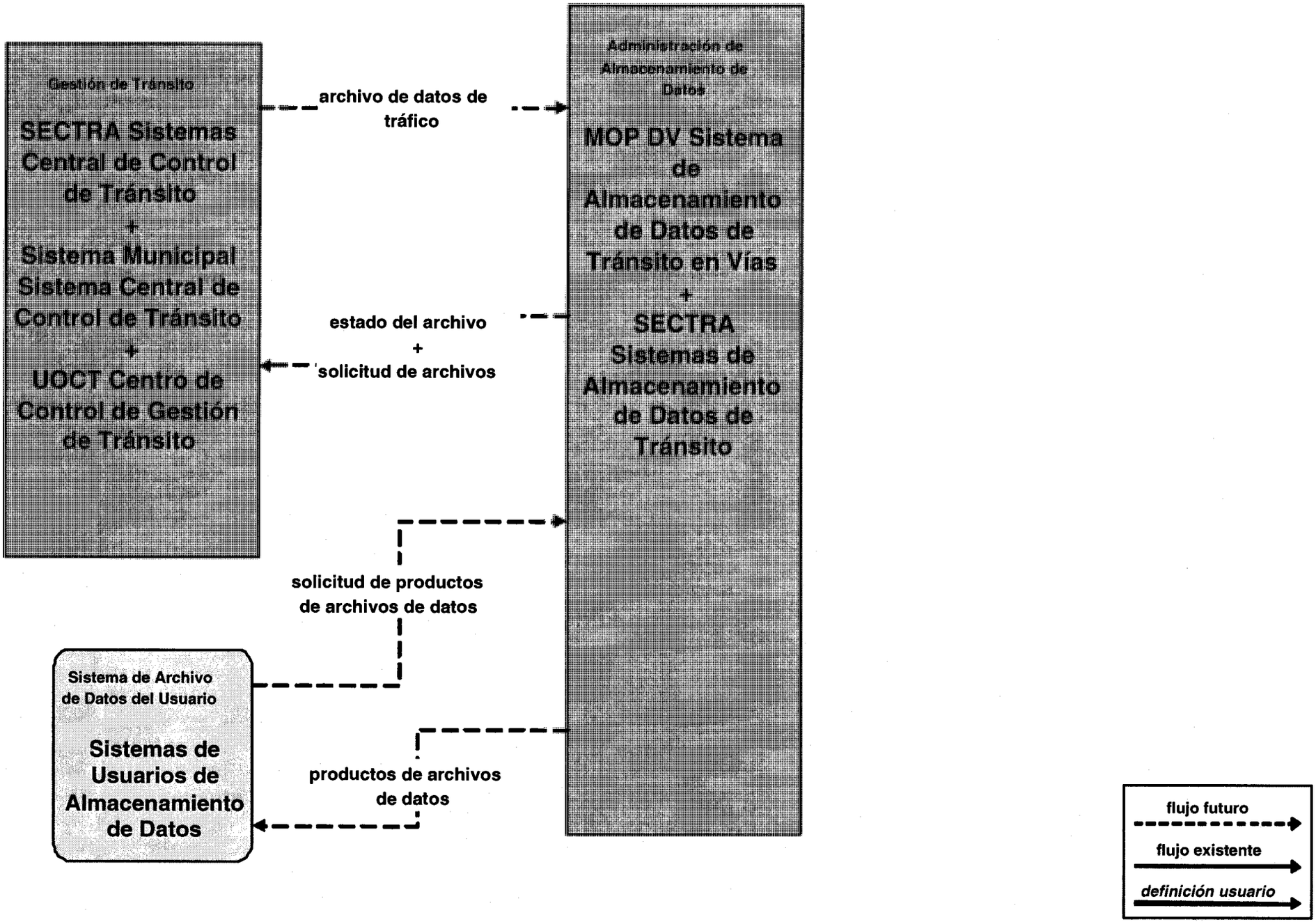
AD1 - Almacenamiento de Datos Básico

MTT

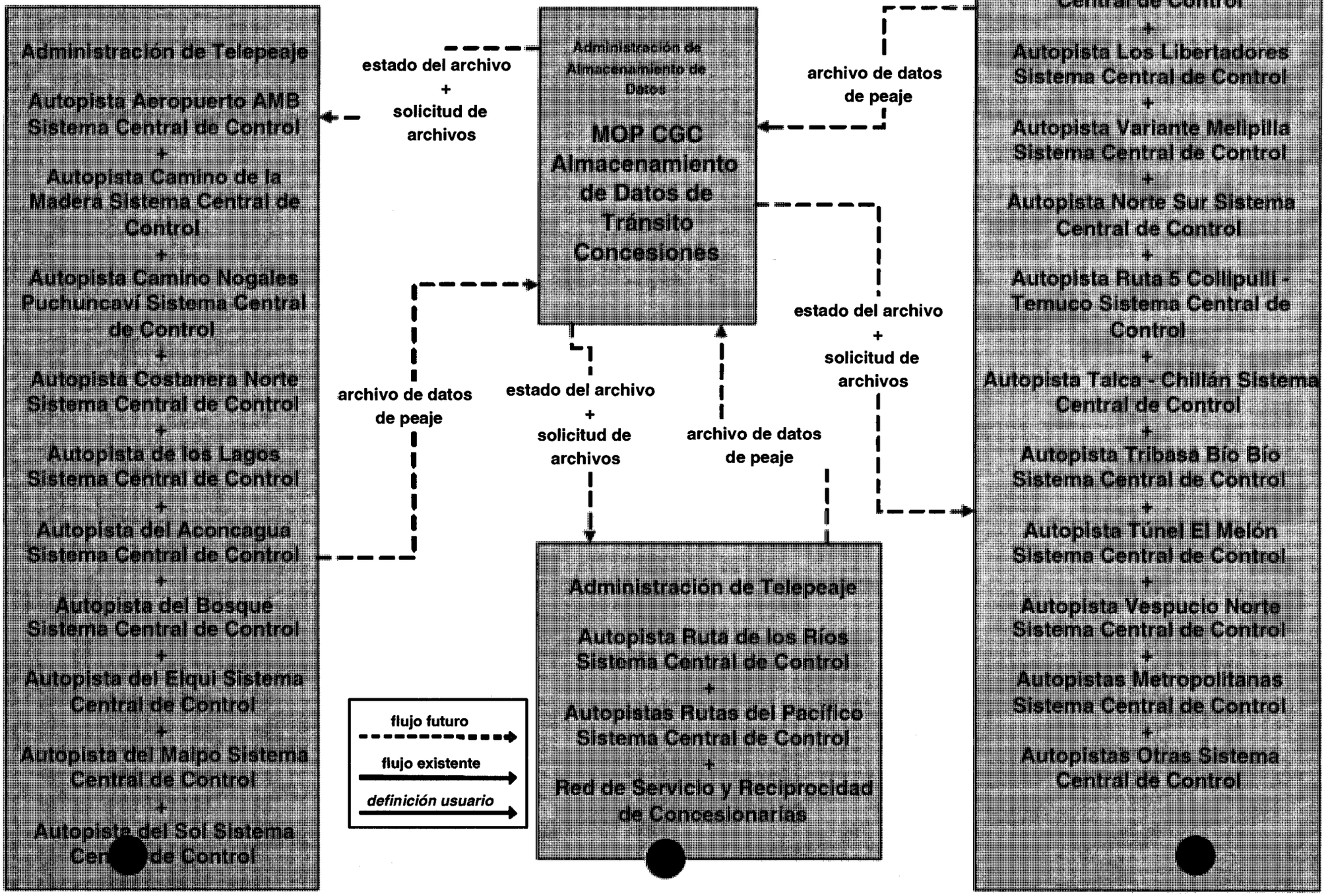


Flujo 'datos sobre archivos de transporte publico' incluye incidentes

AD1 - Almacenamiento de Datos Básico
MOP DV y SECTRA



AD1 - Almacenamiento de Datos Básico
MOP CGC



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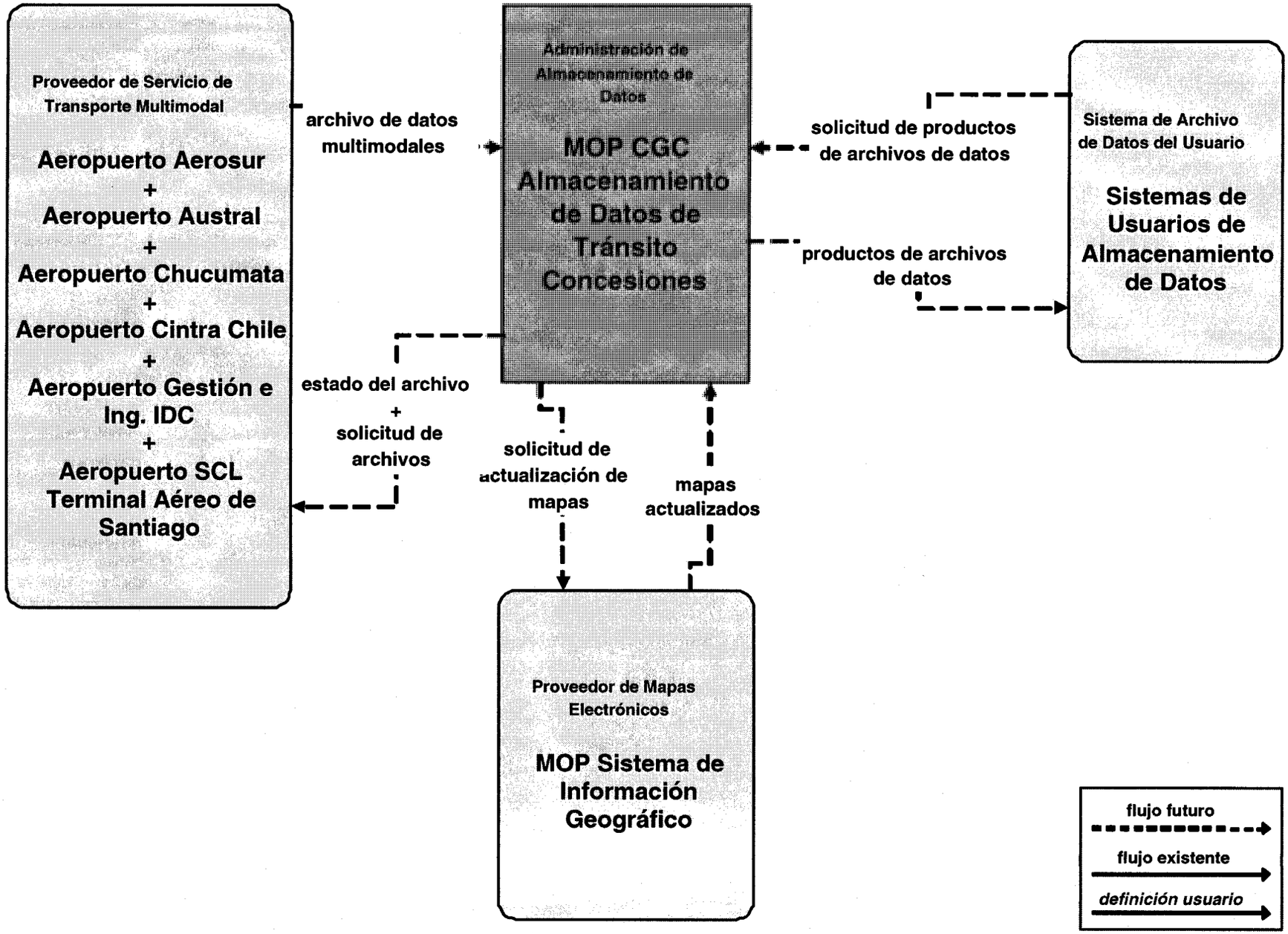
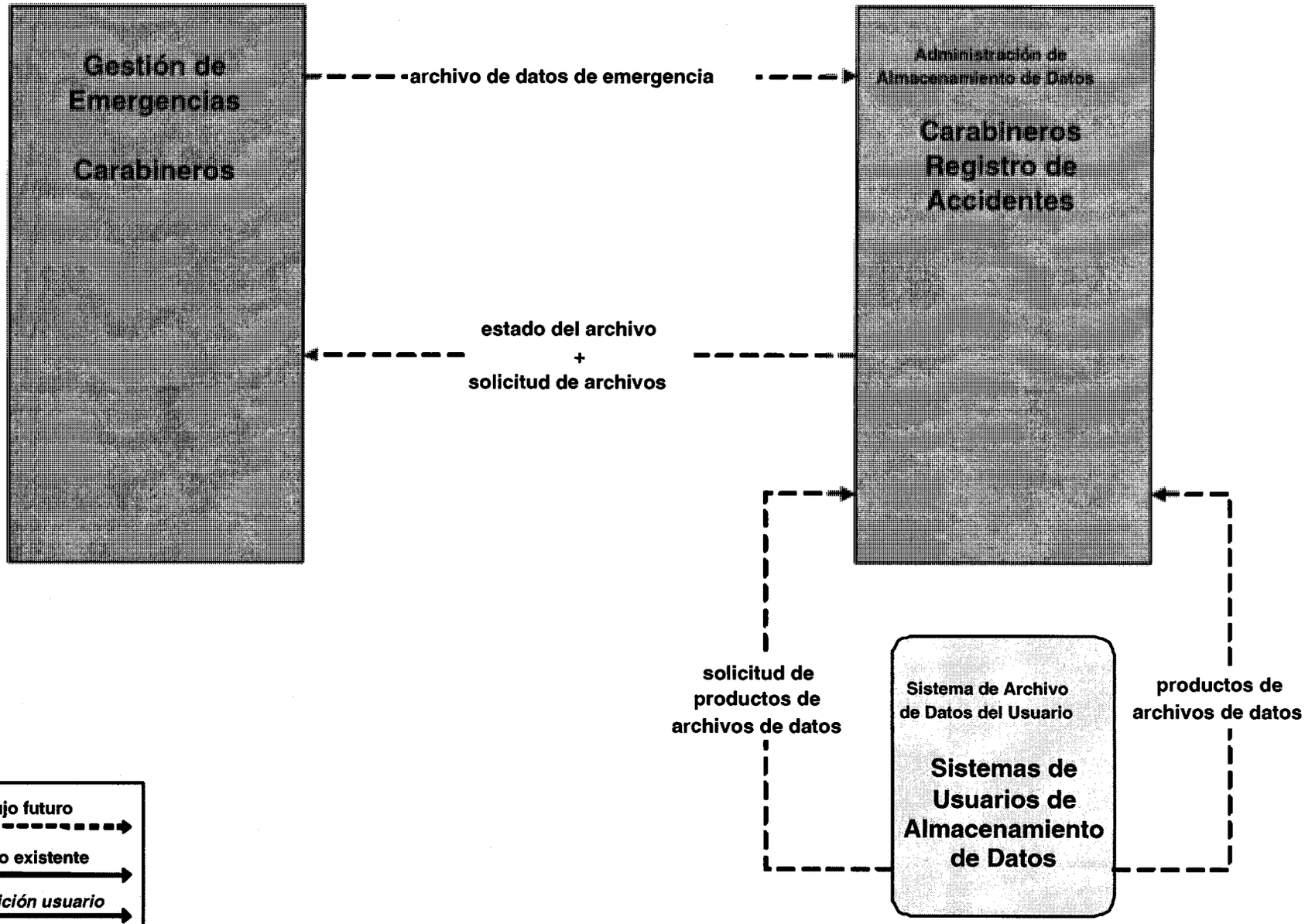
MOP CGC

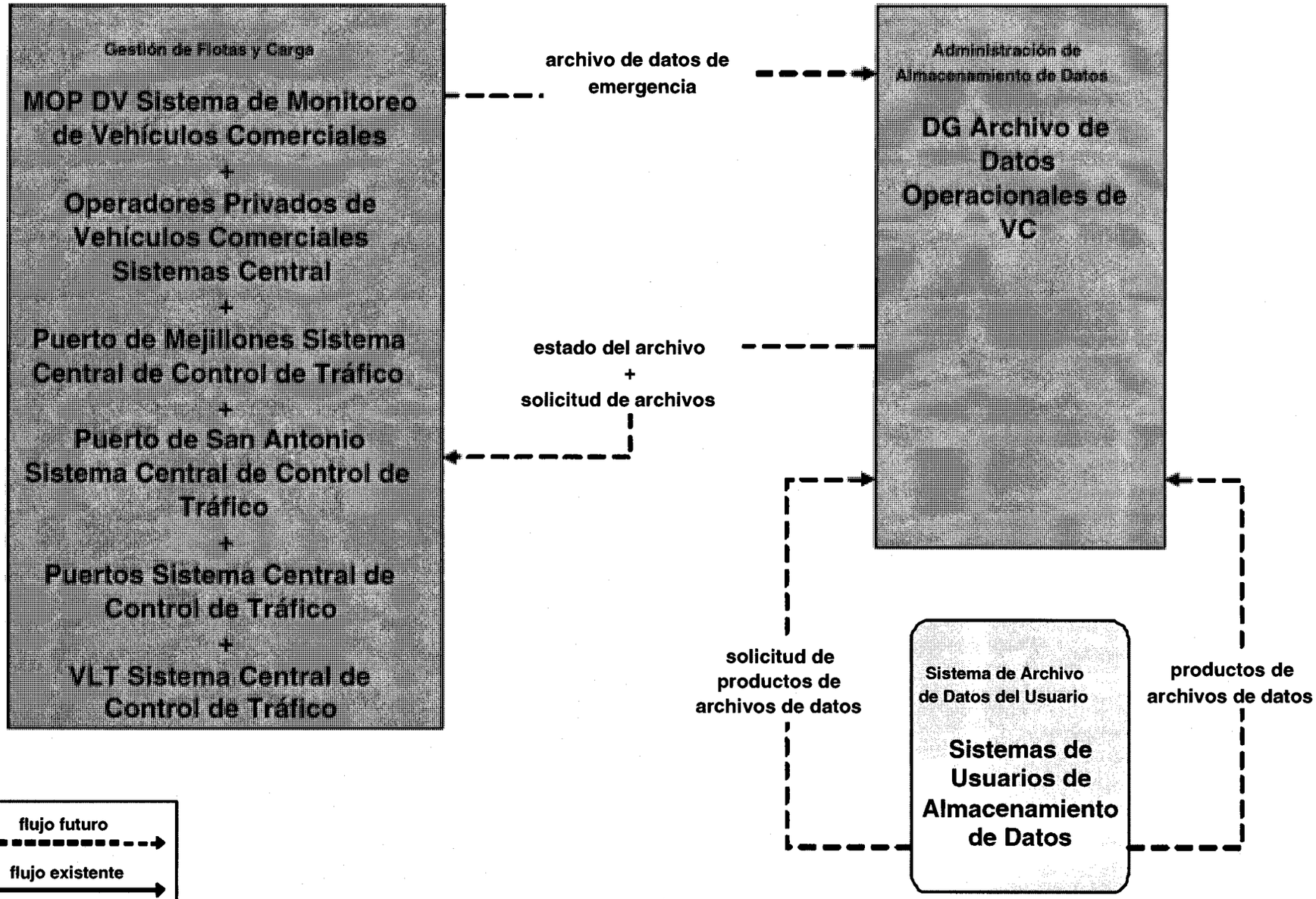


AD1 - Almacenamiento de Datos Básico
Carabineros Registro de Accidentes



AD1 - Almacenamiento de Datos Básico

DG



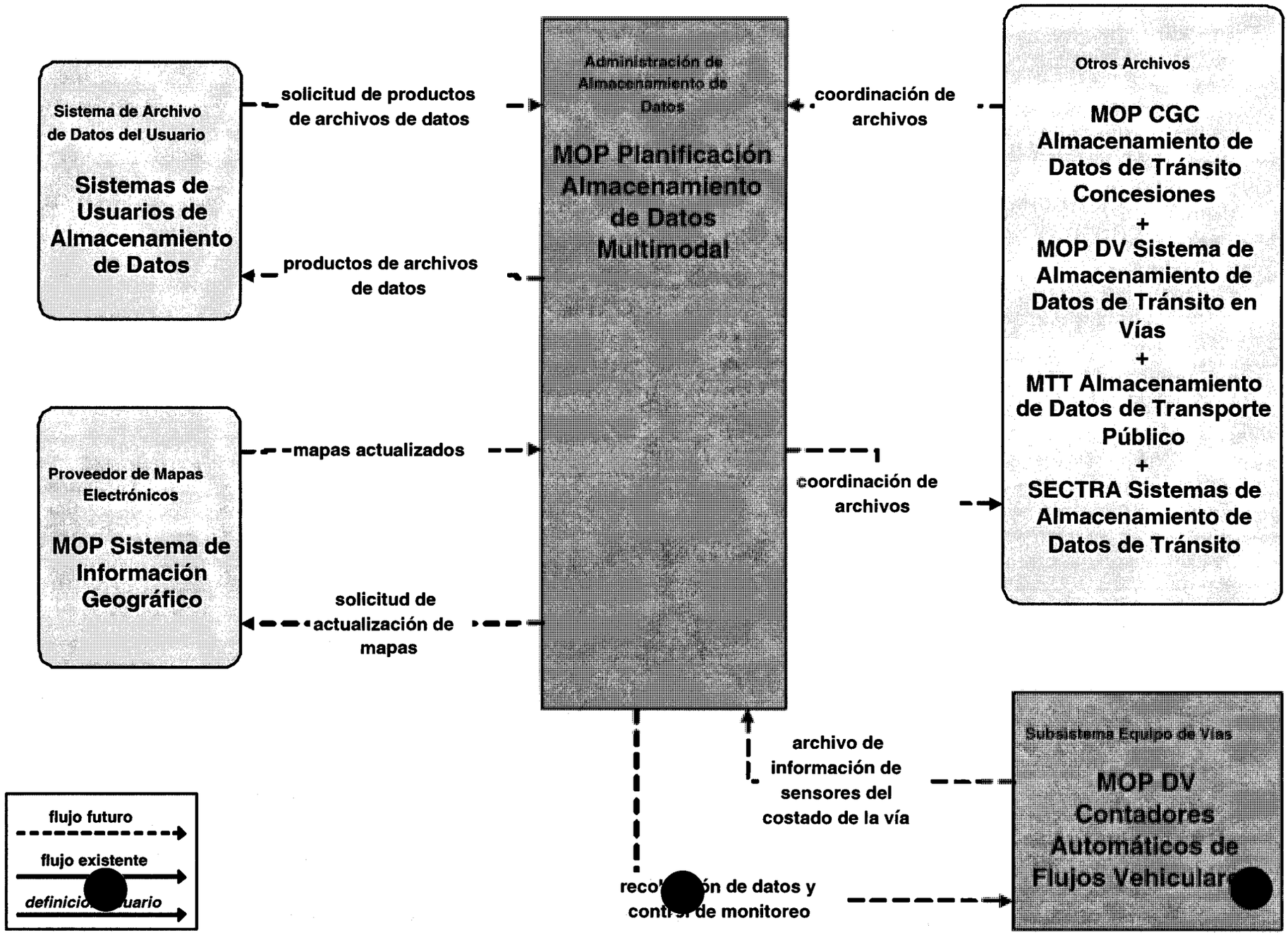
flujo futuro

flujo existente

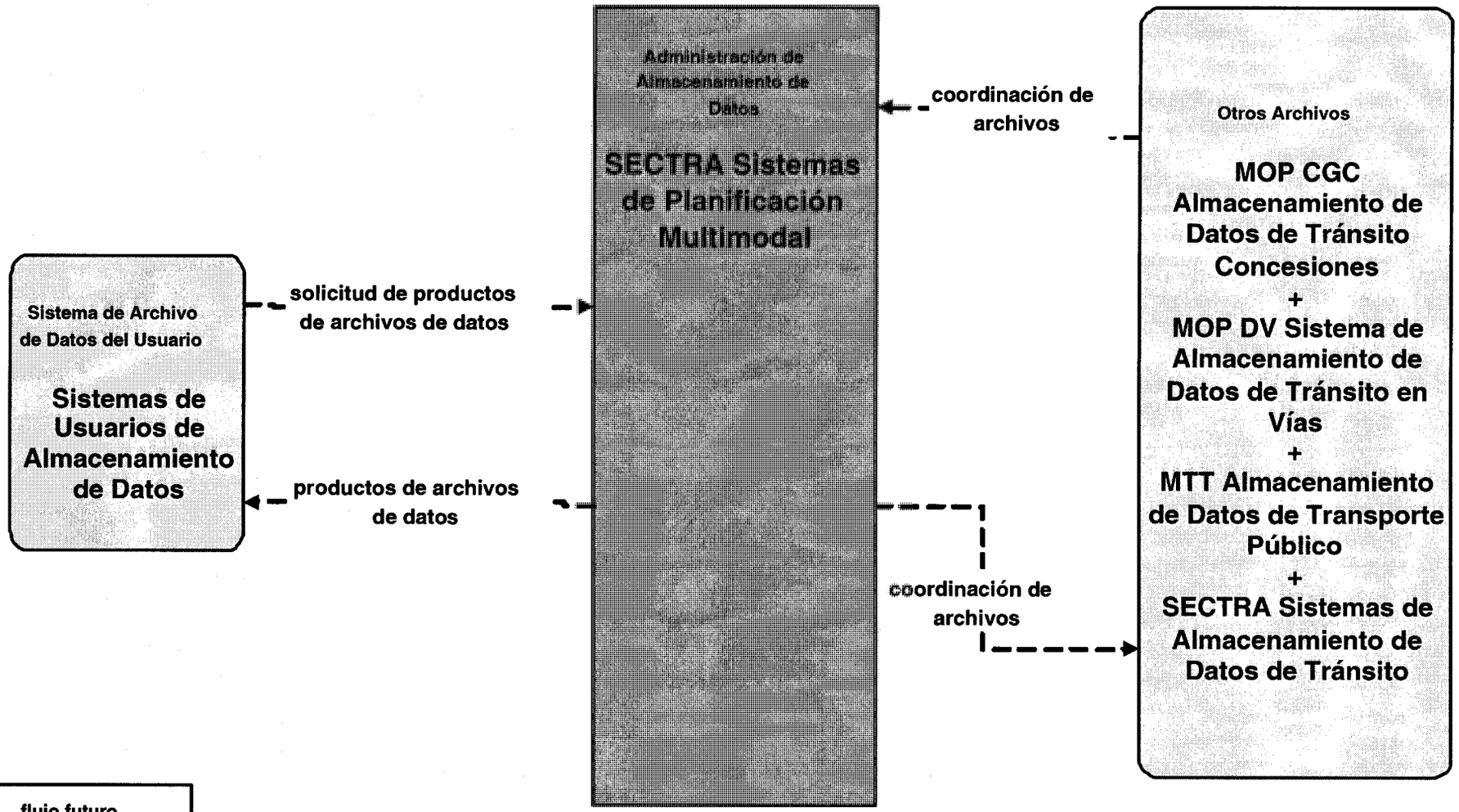
definición usuario

AD3 - Almacén de Datos Virtual ITS

MOP Planificación



AD3 - Almacén de Datos Virtual ITS
SECTRA



flujo futuro

flujo existente

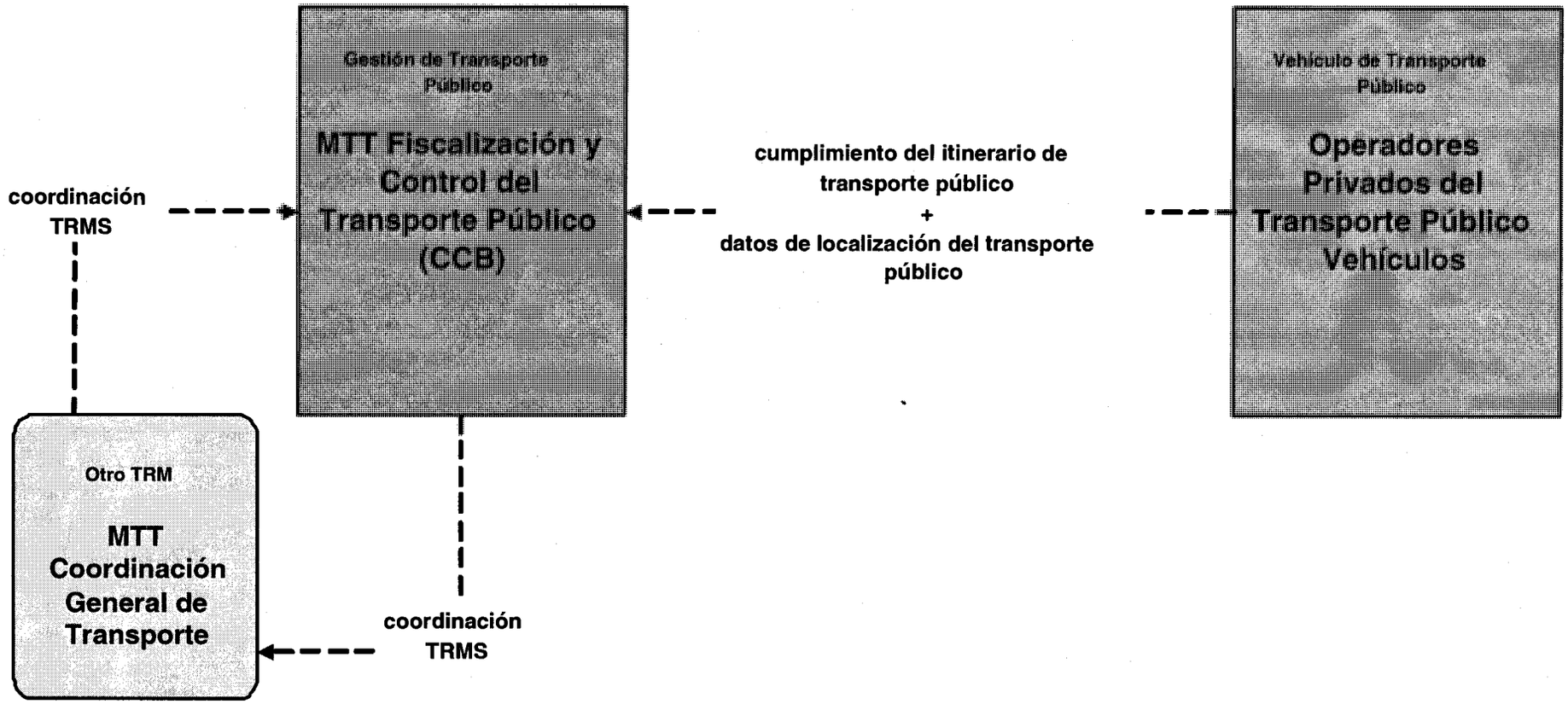
definición usuario

Task 7, Appendix I - Arquitectura Nacional ITS de Chile

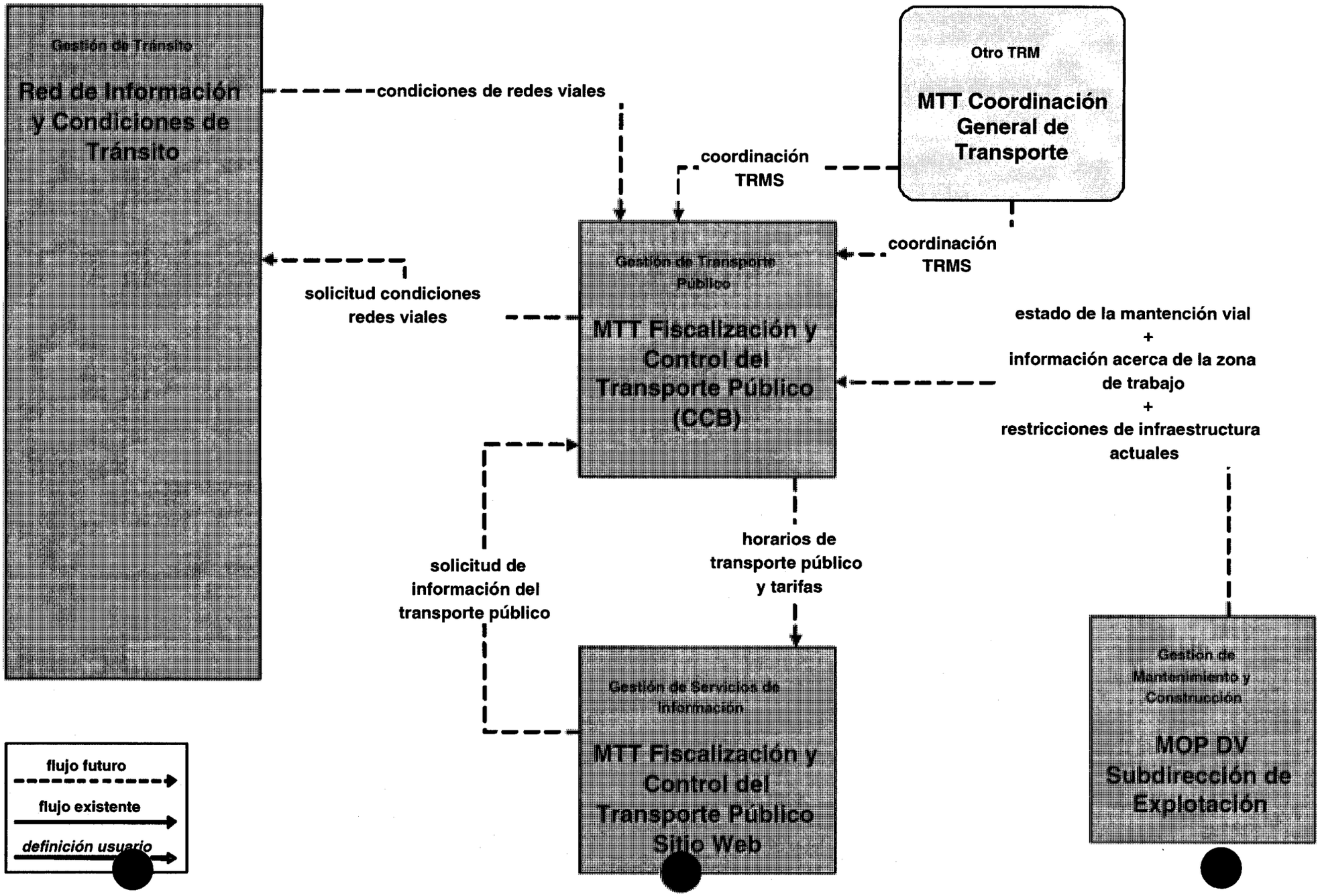
Paquetes de Servicios ITS

Gestión de Transporte Público

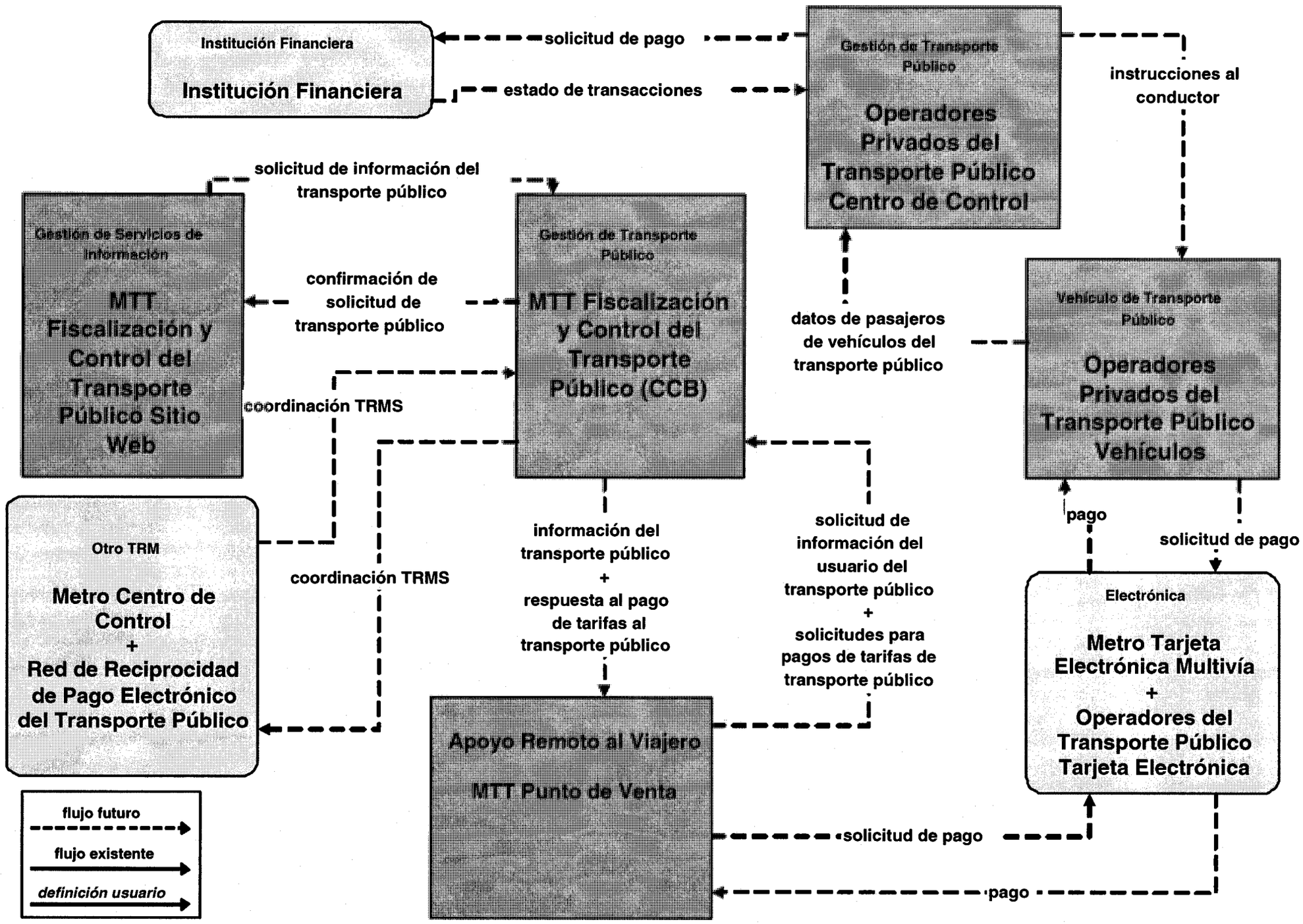
APTS1 - Sistema de Seguimiento de Vehículos de Transporte Público MTT



APTS2 - Operaciones de Rutas Fijas de Transporte Público
MTT CCB

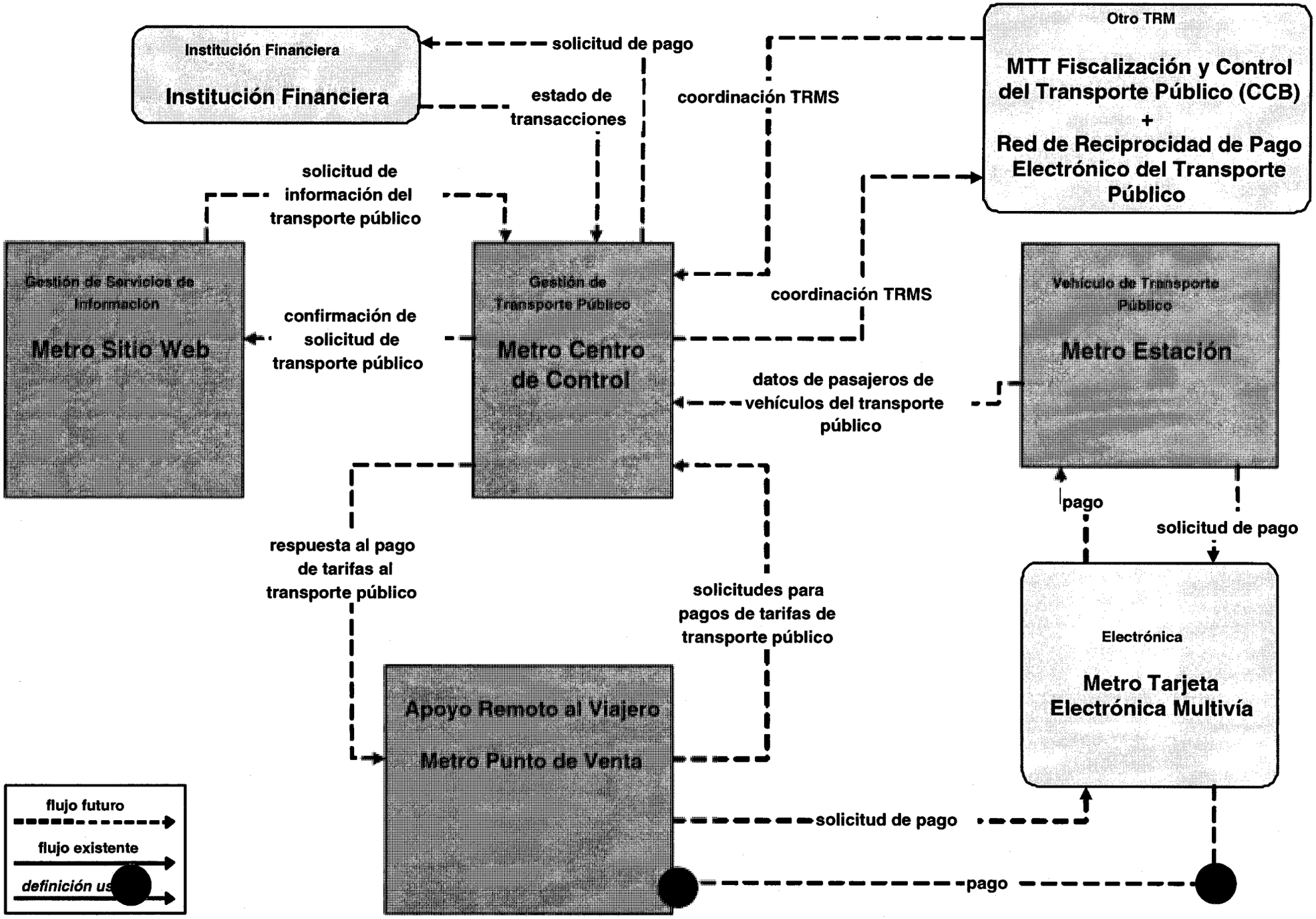


APTS4 - Gestión de Tarifas y Pasajeros del Transporte Público
MTT CCB



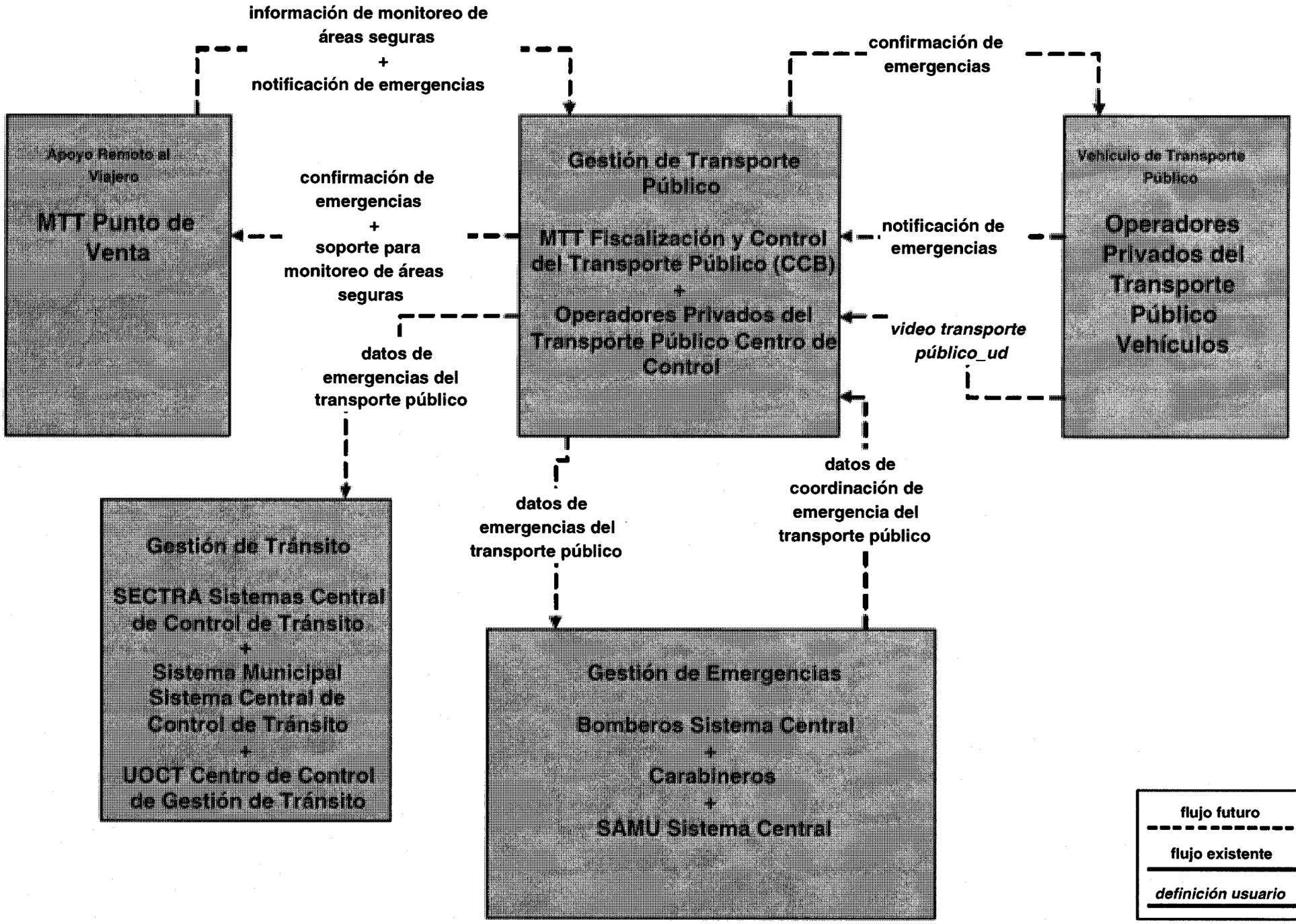
APTS4 - Gestión de Tarifas y Pasajeros del Transporte Público

Metro



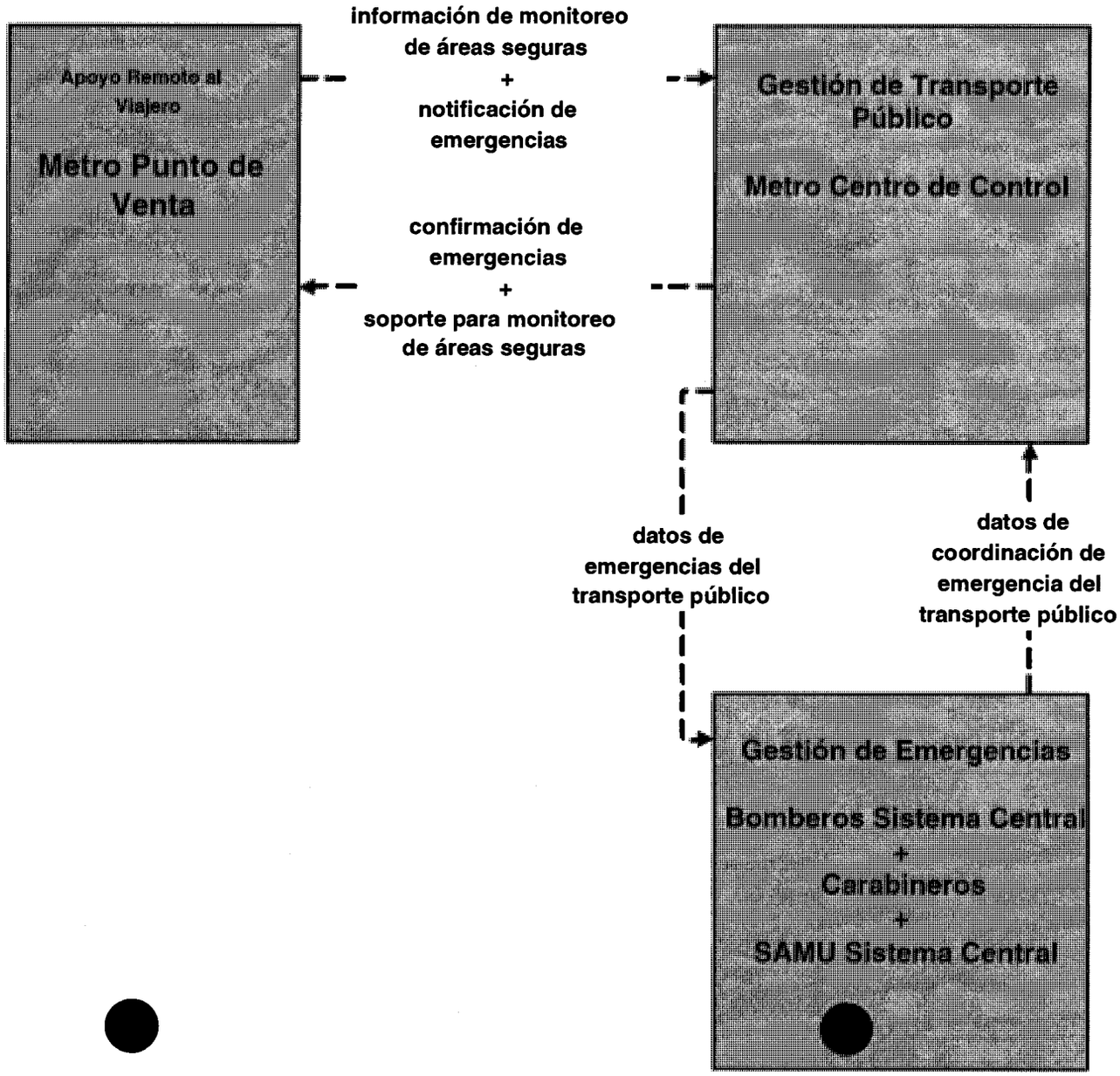
APTS5 - Servicios de Seguri para el Transporte Público

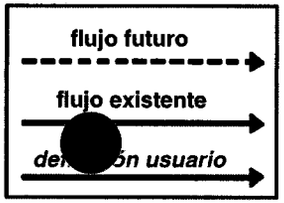
MTT



APTS5 - Servicios de Seguridad para el Transporte Público

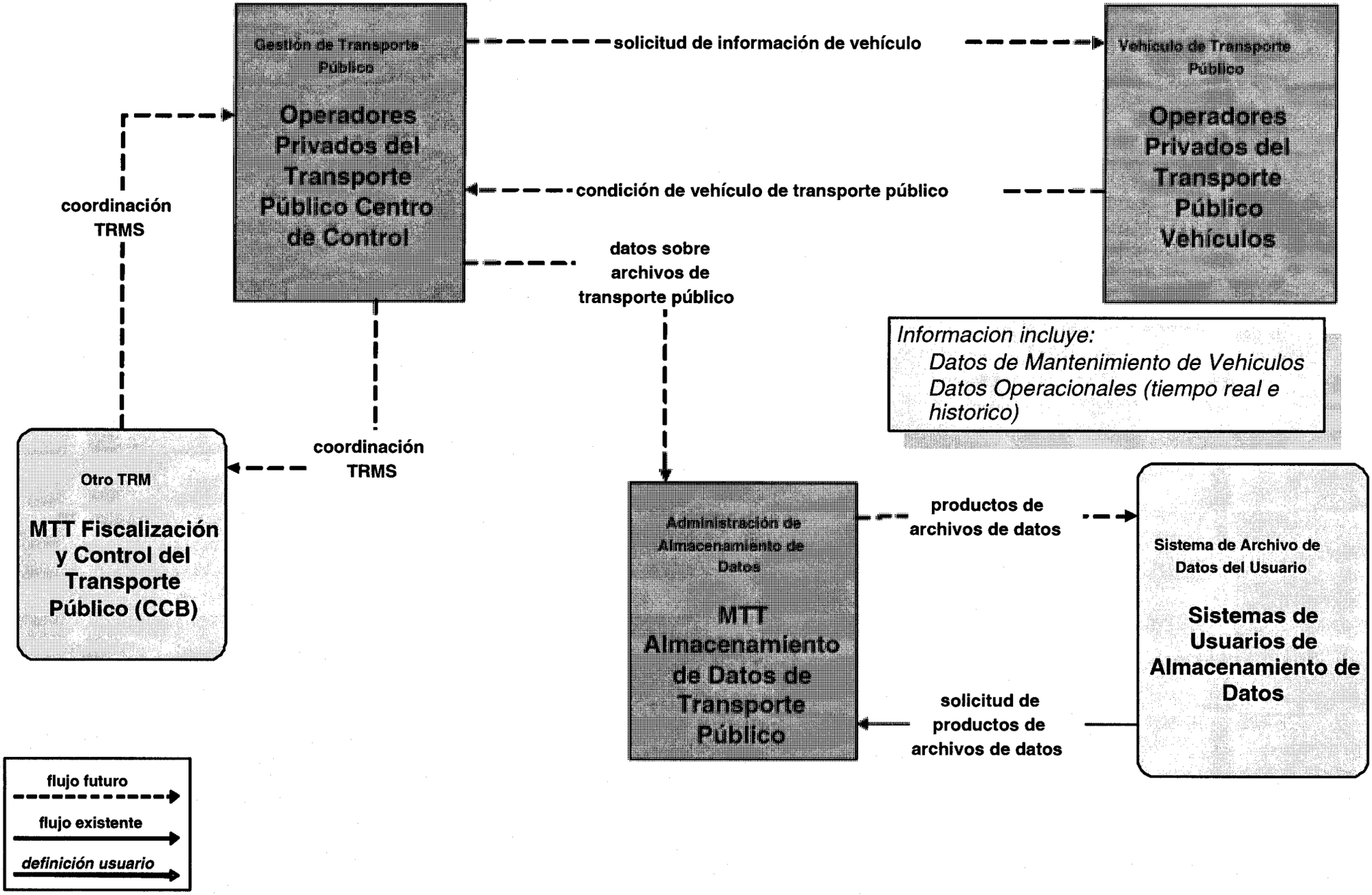
Metro





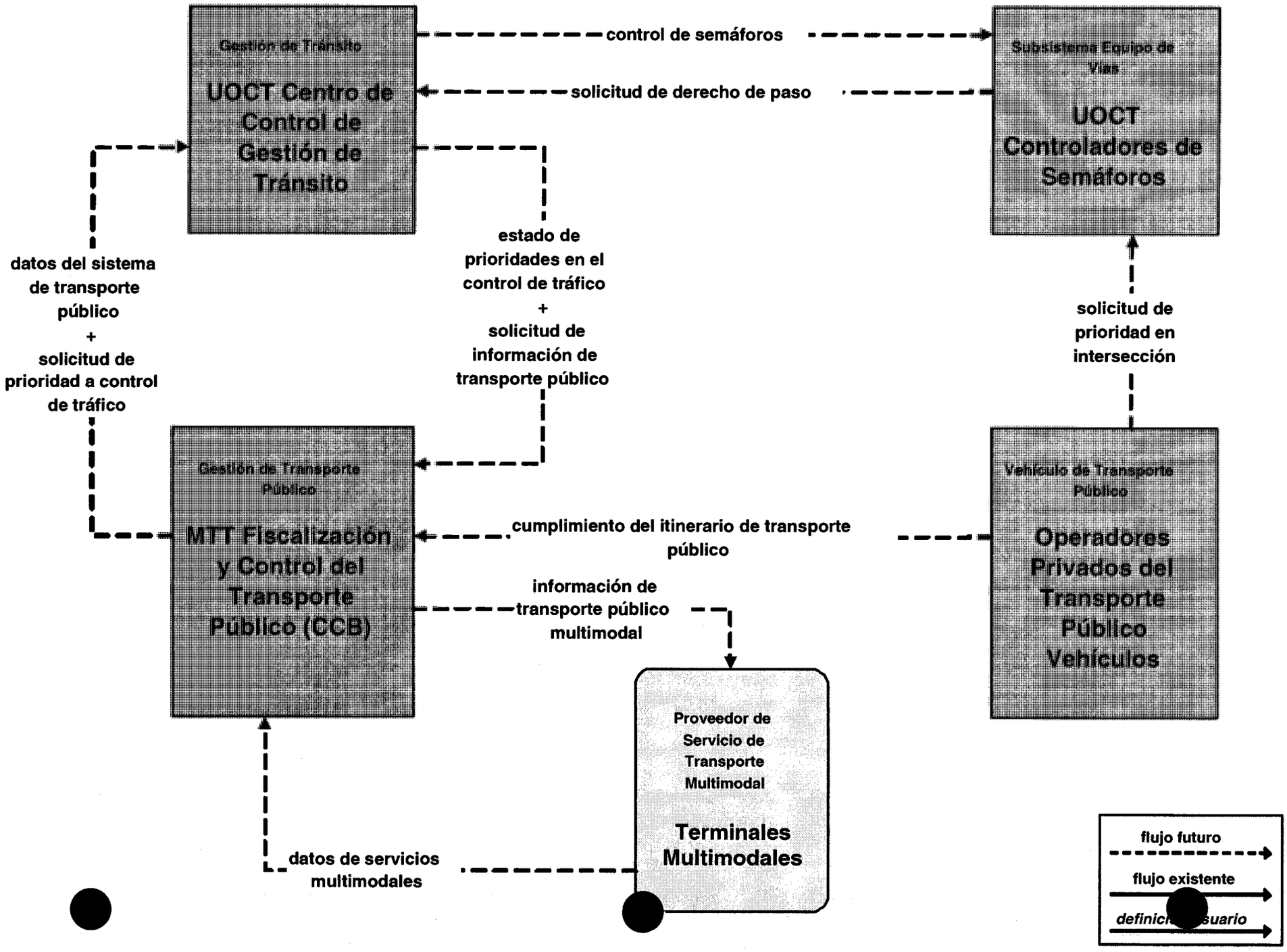
APTS6 - Servicio de Mantenci para el Transporte Público

MTT CCB



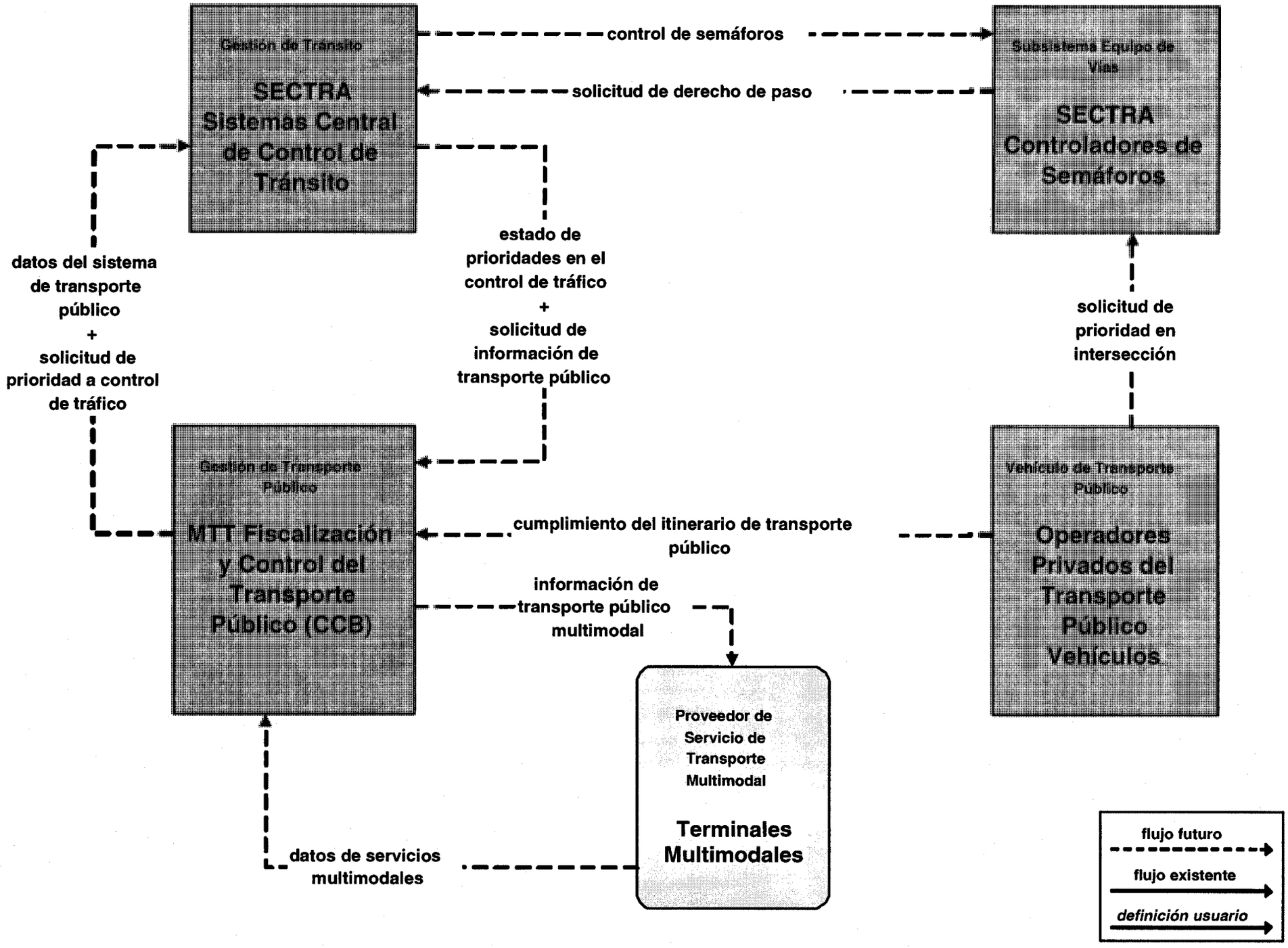
APTS7 - Coordinación Multi-modal

UOCT



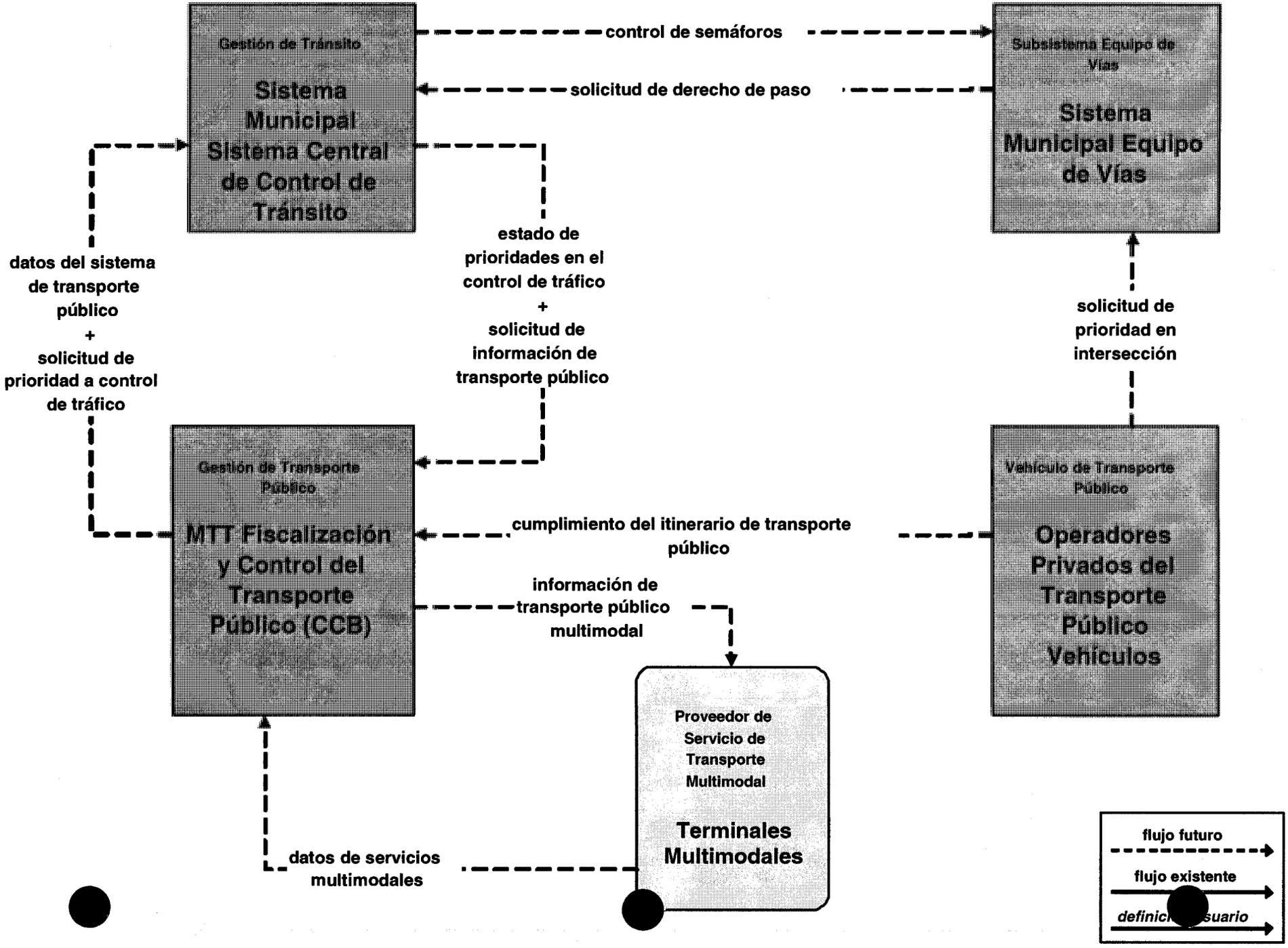
APTS7 - Coordinación Multi-modal

SECTRA



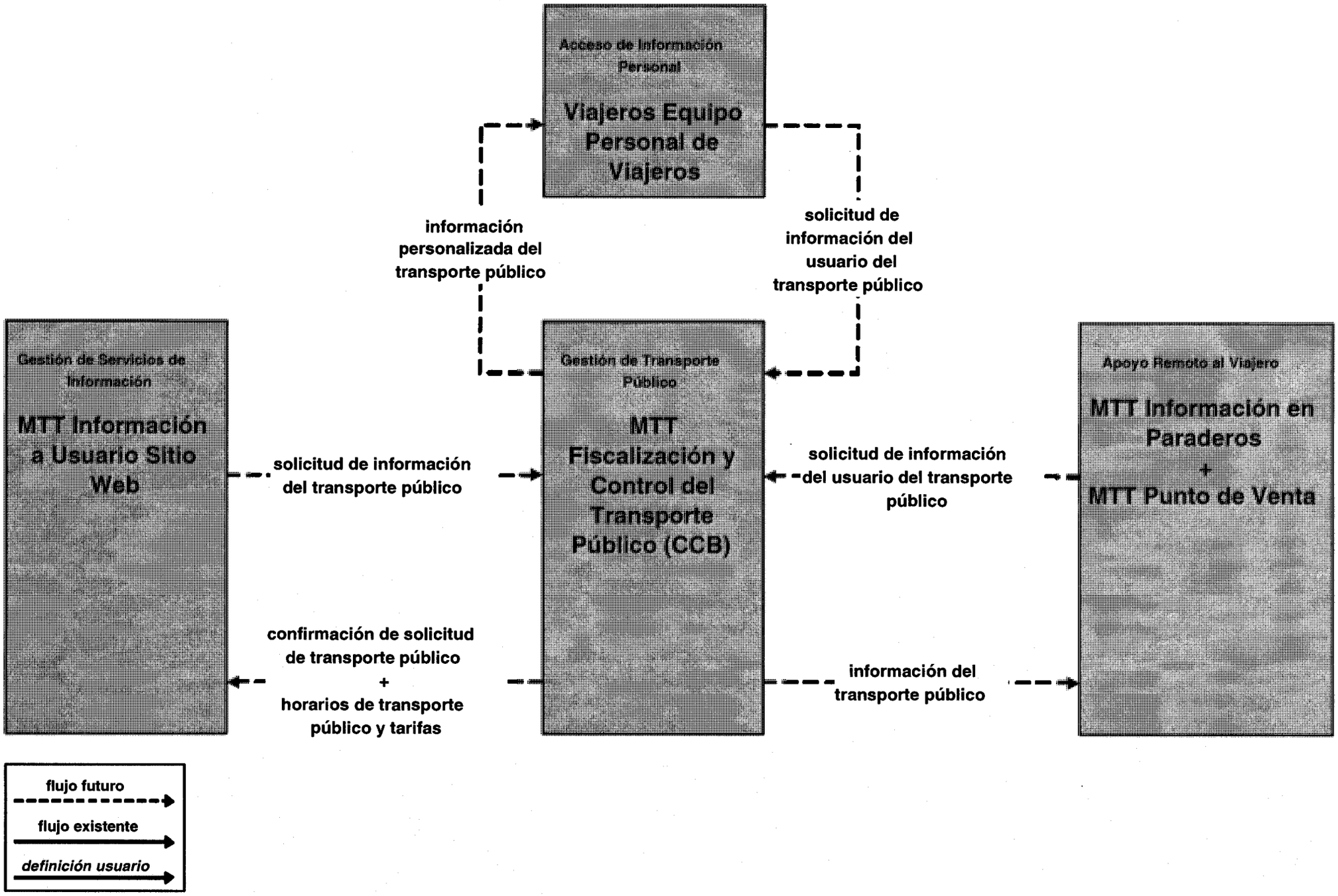
APTS7 - Coordinación Multi-modal

Sistema Municipal



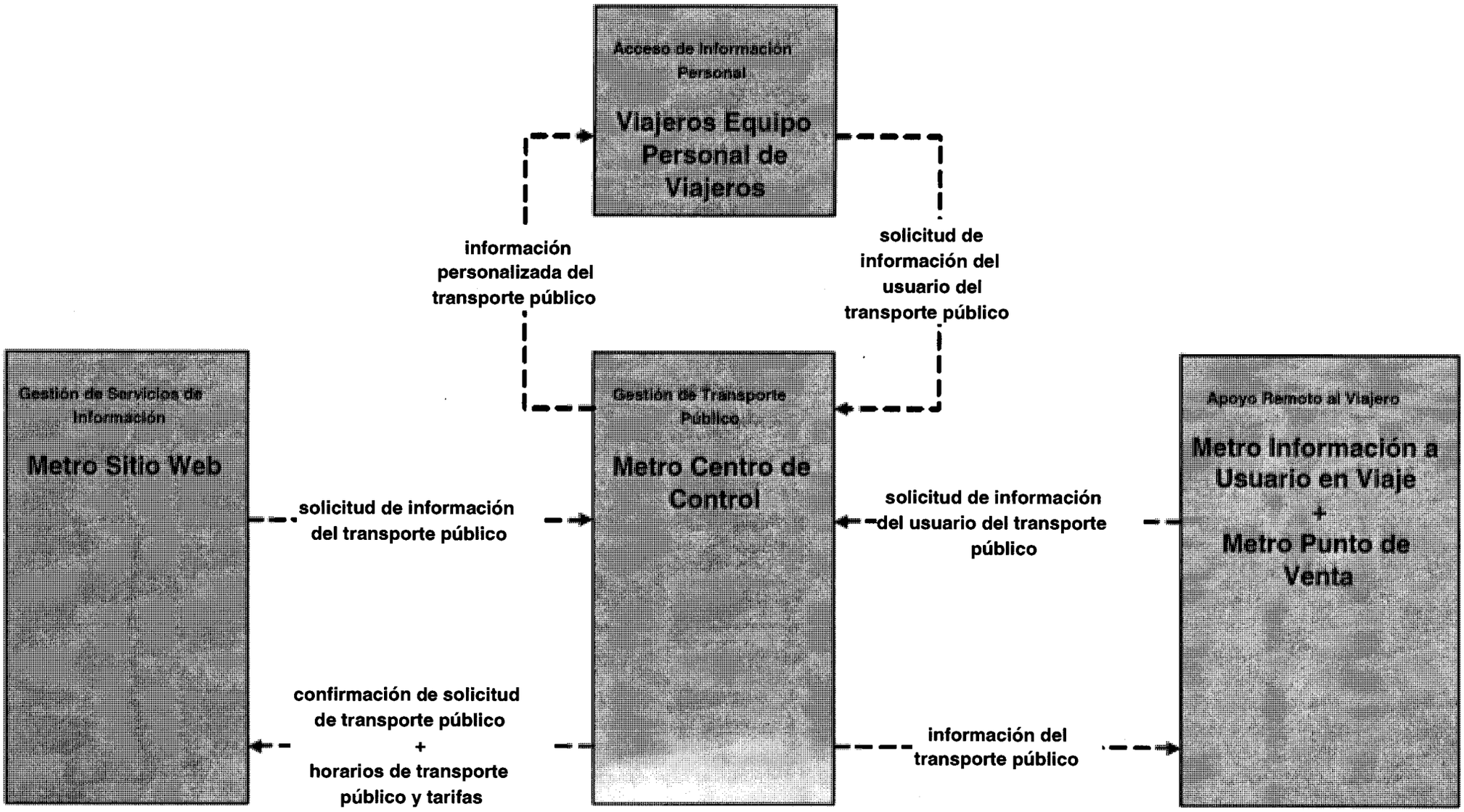
APTS8 - Información al Usuario de Transporte Público

MTT



APTS8 - Información al Usuario de Transporte Público

Metro



flujo futuro

flujo existente

definición us

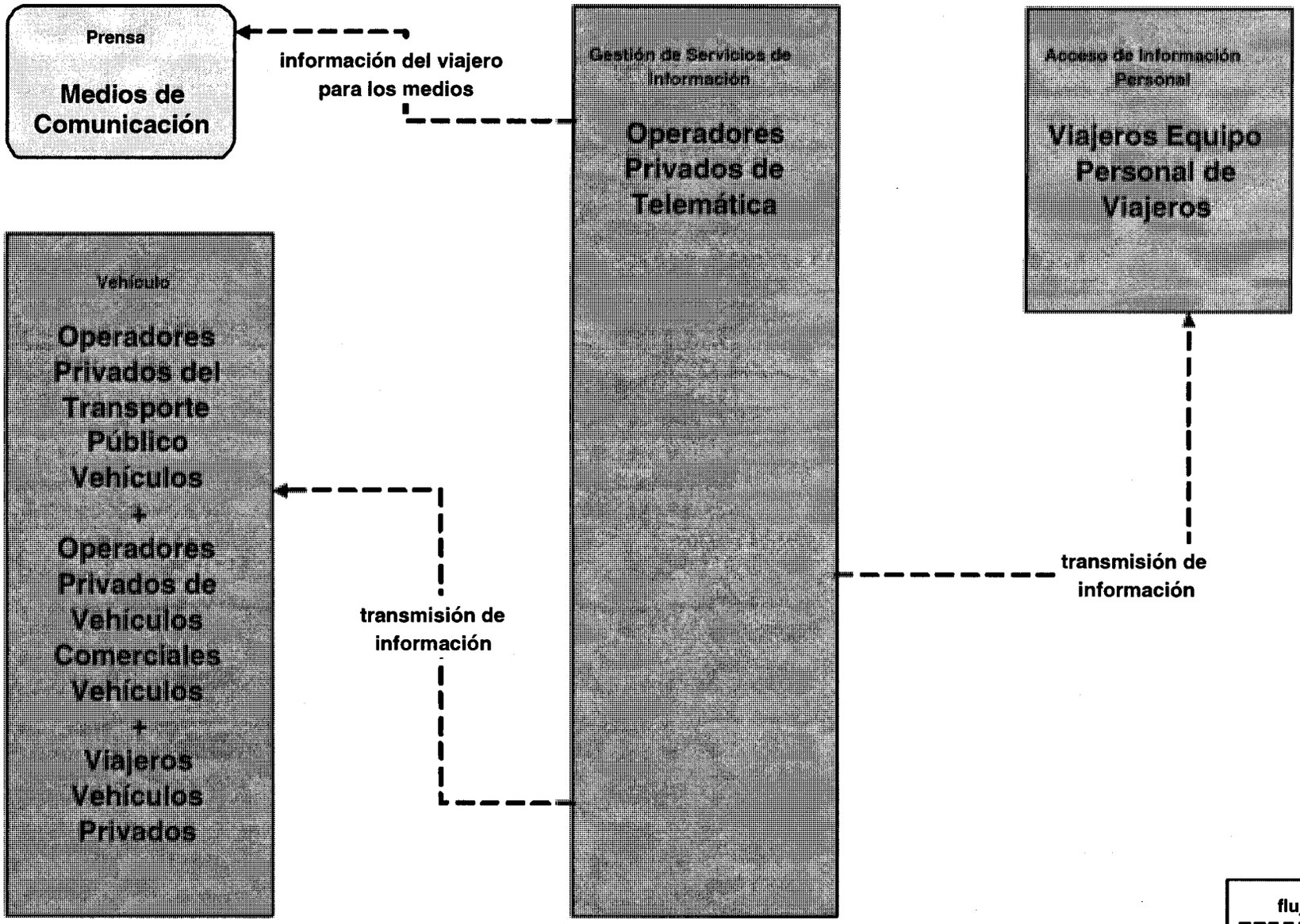
Task 7, Appendix K - Arquitectura Nacional ITS de Chile

Paquetes de Servicios ITS

Gestión de Servicios de Información

ATIS1 - Difusión de Información al Viajero

Operadores Privados de Telemática

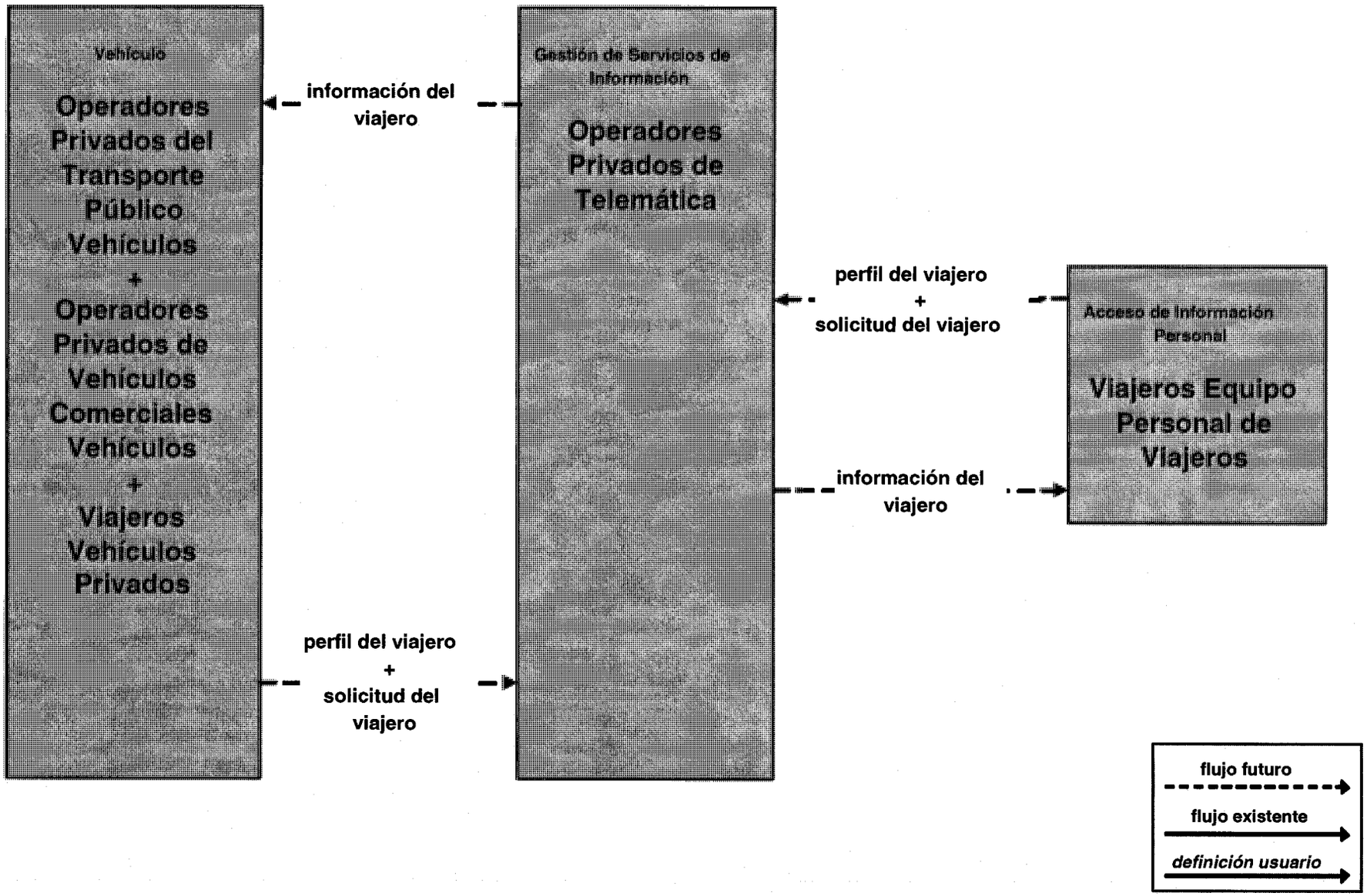


flujo futuro

flujo existente

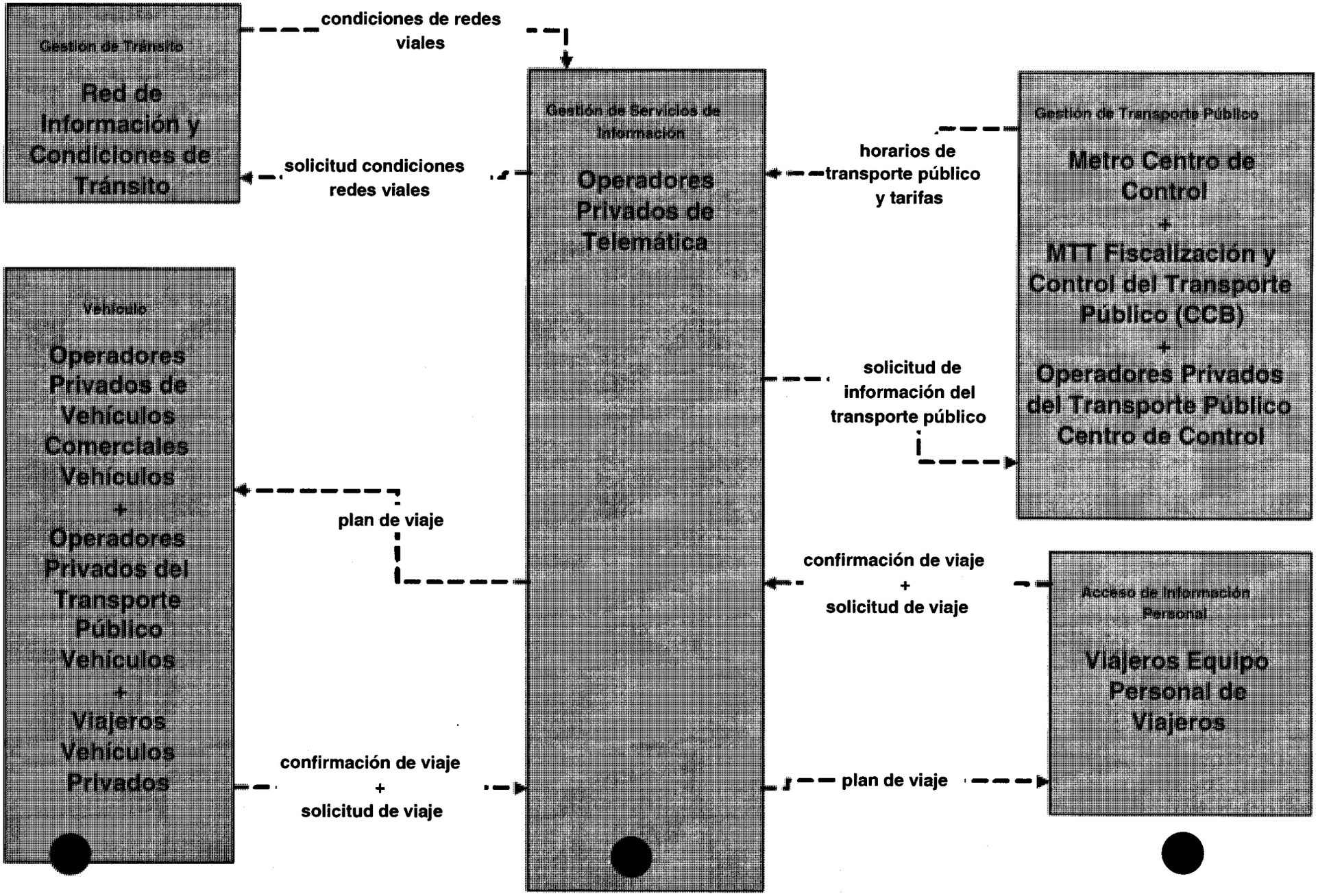
del[illegible]ón usuario

ATIS2 - Información Interactiva al Viajero
Operadores Privados de Telemática



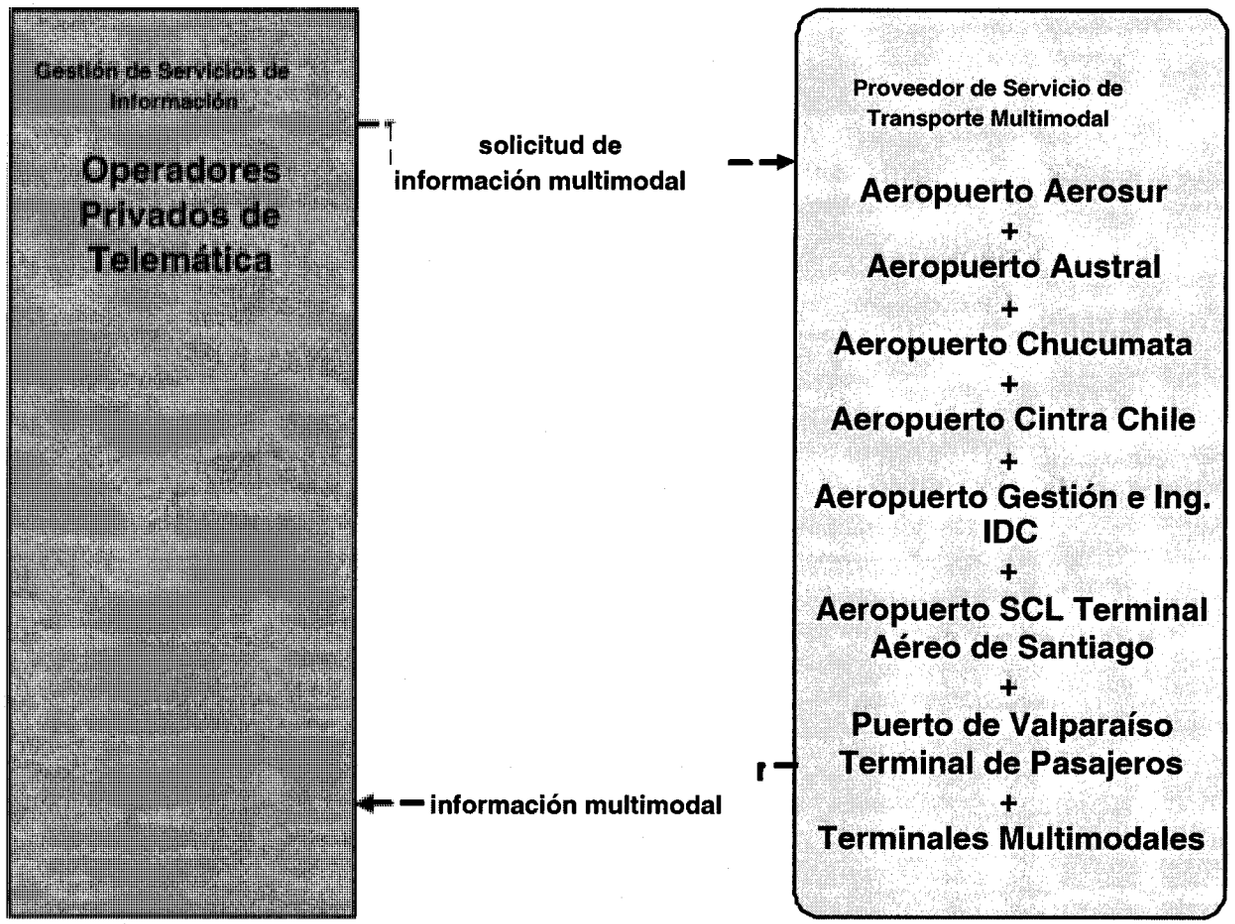
ATIS5 - Guía de Ruta a Través de ISP

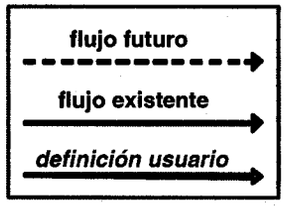
Operadores Privados de Telemática



ATIS5 - Guía de P[illegible] a Través de ISP

Operadores Privados de Telemática



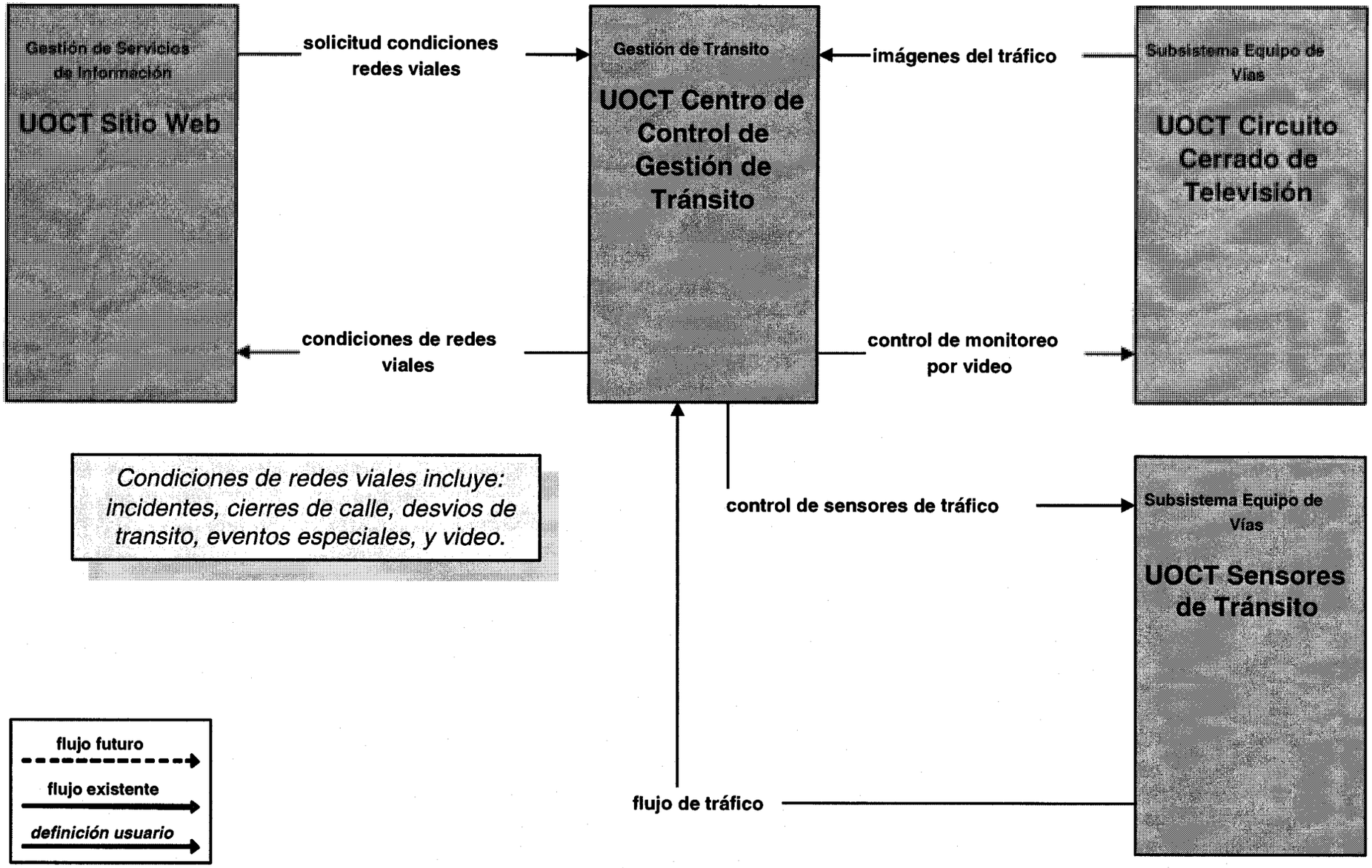


Task 7, Appendix K - Arquitectura Nacional ITS de Chile

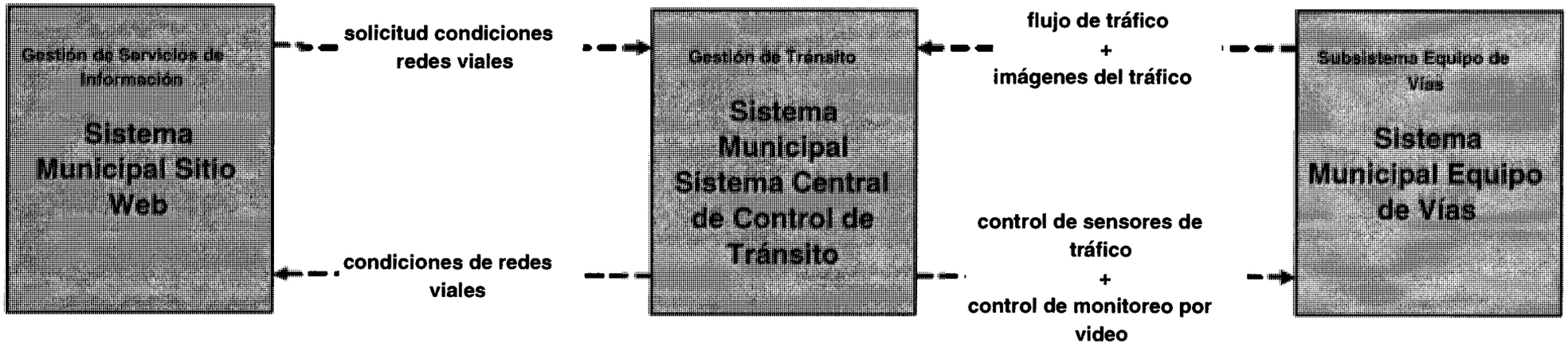
Paquetes de Servicios ITS

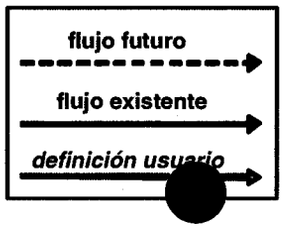
Gestión de Tránsito

ATMS01 - Monitoreo de la Red
UOCT Centro del Control de Gestion de Tránsito

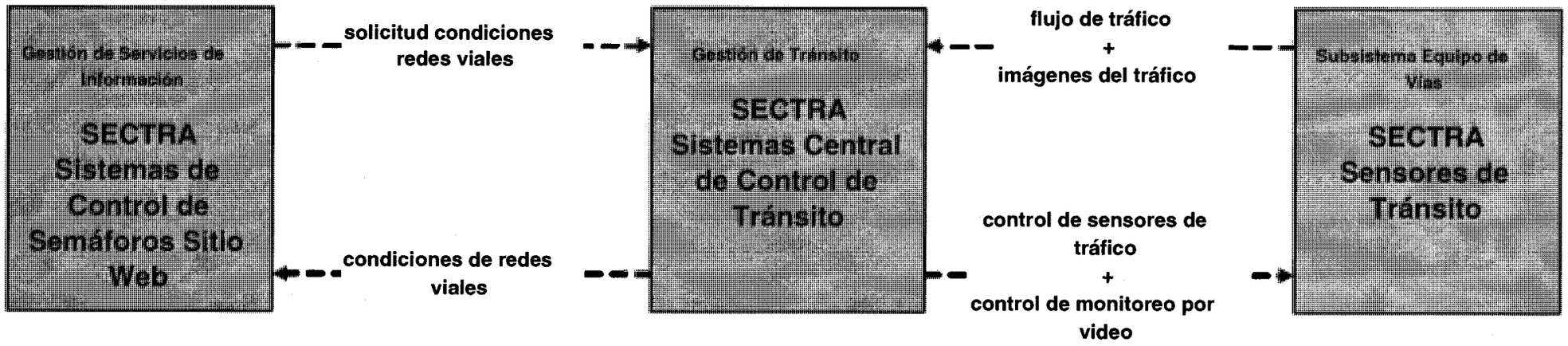


ATMS01 - Monitoreo de la Red
Sistema Municipal Central de Tránsito

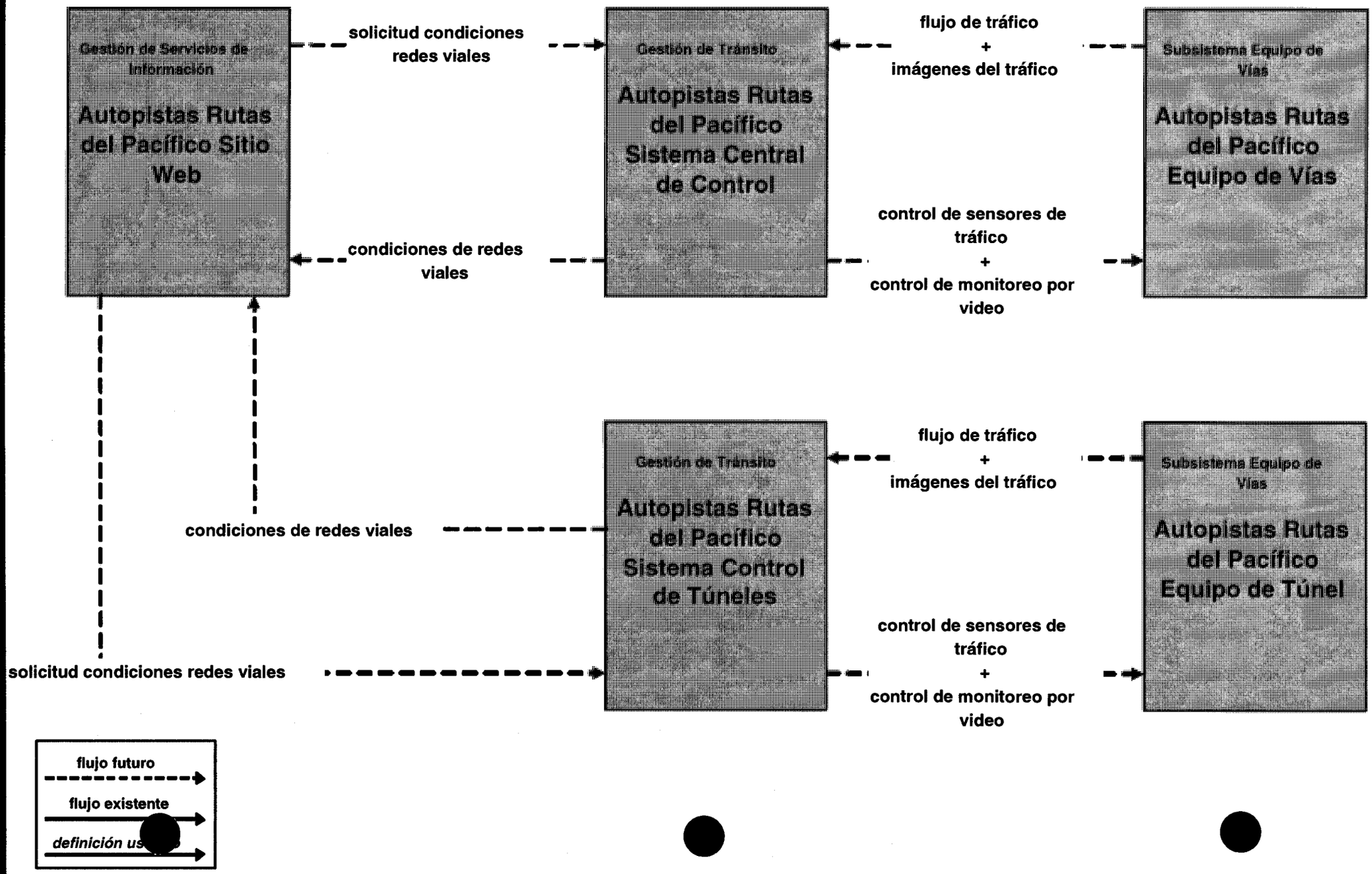




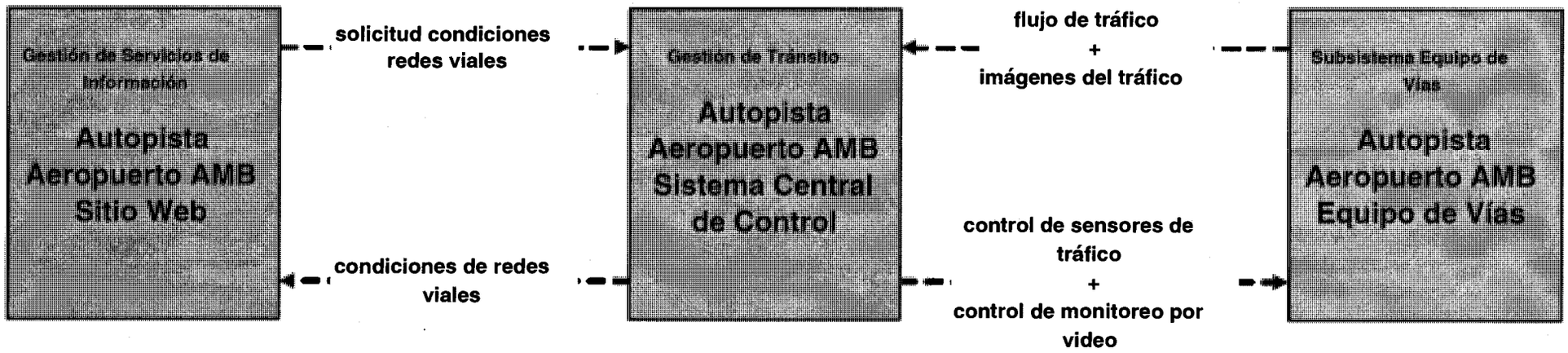
ATMS01 - Monitoreo de la Red
SECTRA Sistemas Control de Semáforos

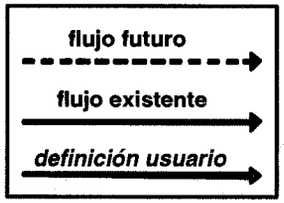


ATMS01 - Monitoreo de la Red
Rutas del Pacifico Sistema Central de Control

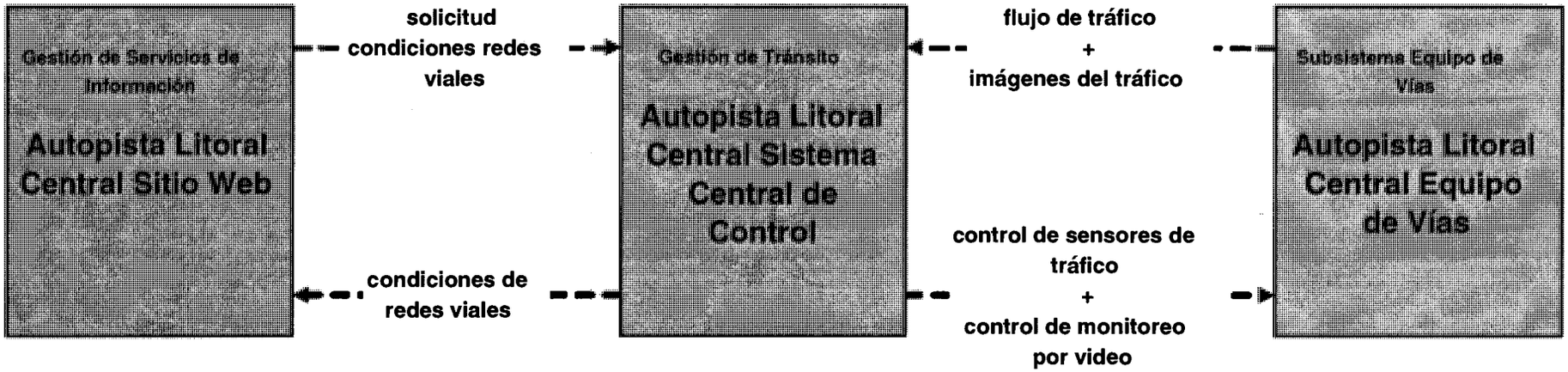


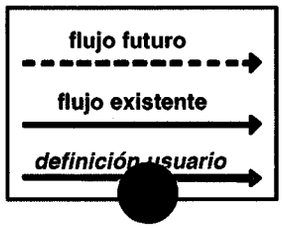
ATMS01 - Monitoreo de la Red
Autopista Aeropuerto AMB Sistema Central de Control



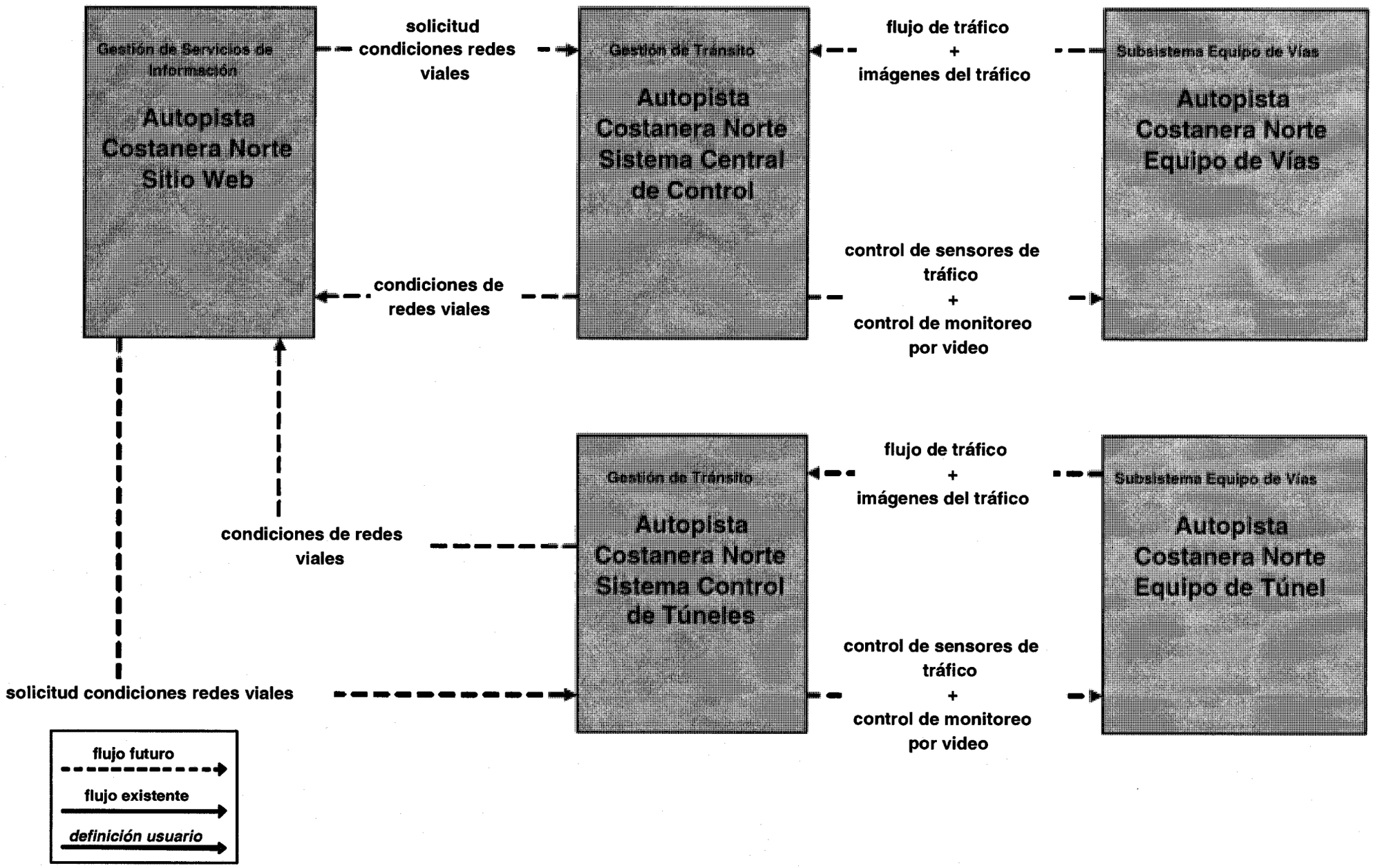


ATMS01 - Monitoreo de la Red
Autopista Litoral Central Sistema Central de Control

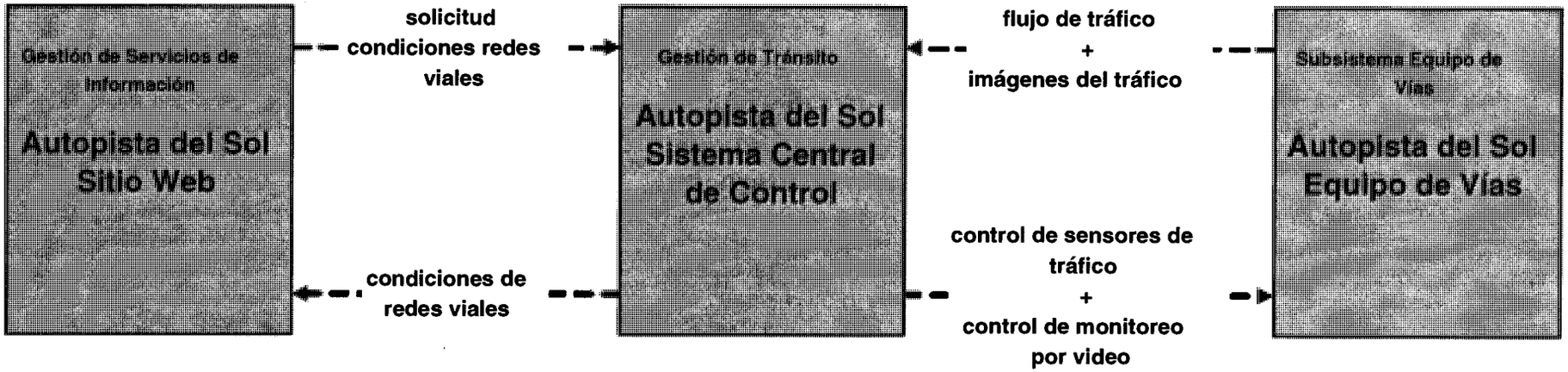


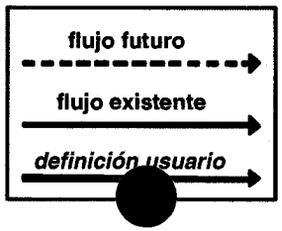


ATMS01 - Monitoreo de la Red
Autopista Costanera Norte Sistema Central de Control

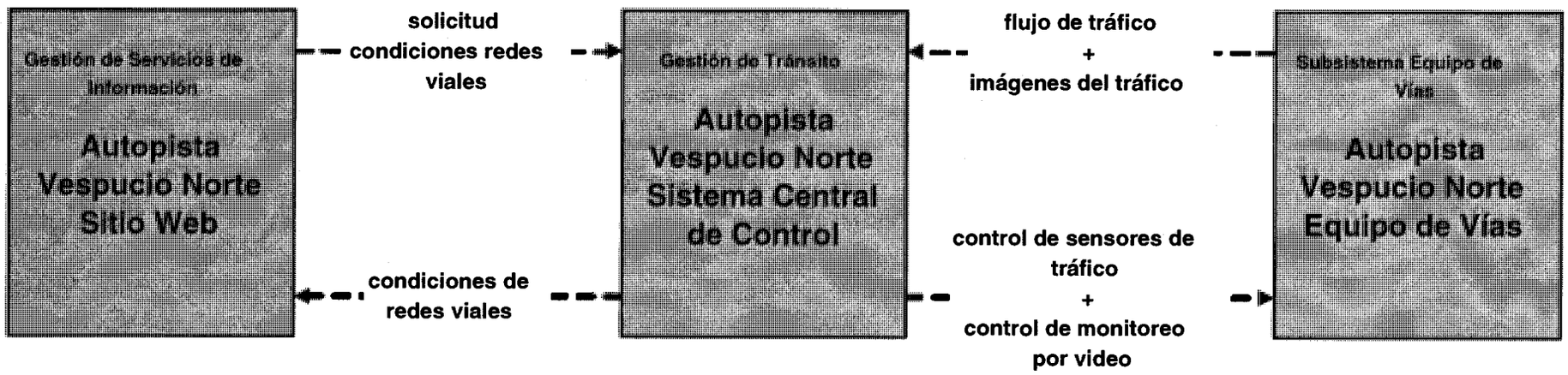


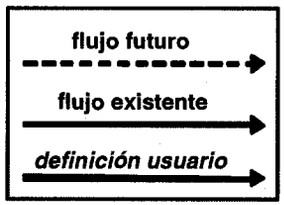
ATMS01 - Monitoreo de la Red
Autopista del Sol Sistema Central de Control



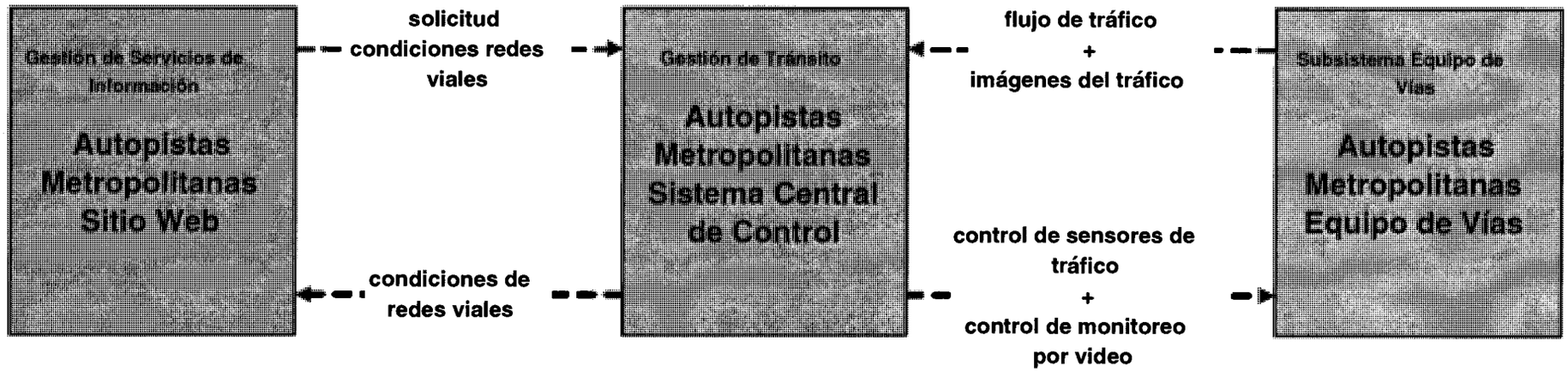


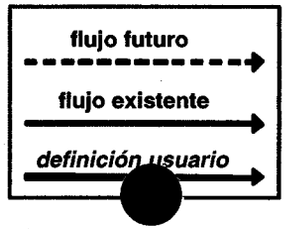
ATMS01 - Monitoreo de la Red
Autopista Vespucio Norte Sistema Central de Control



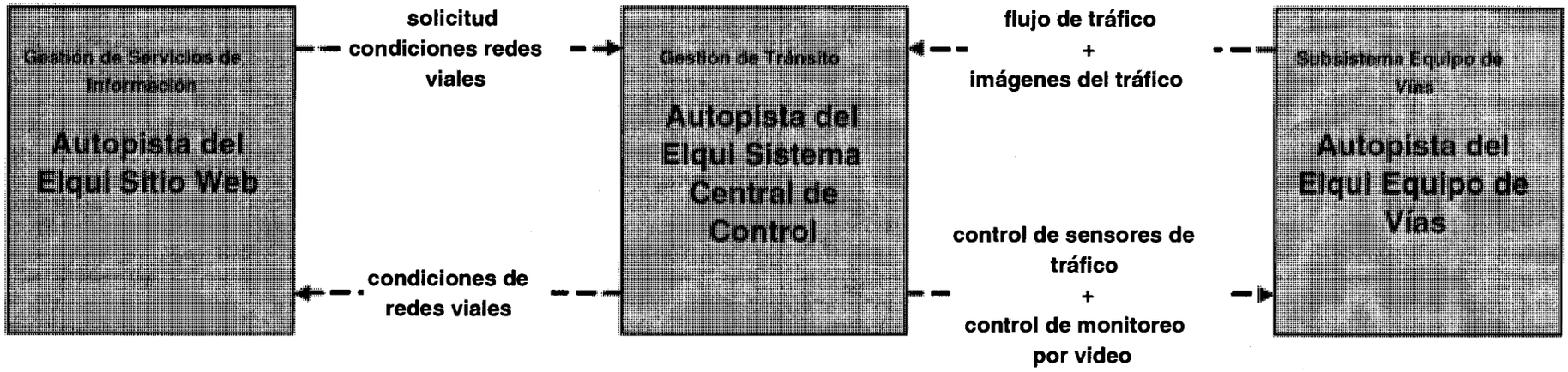


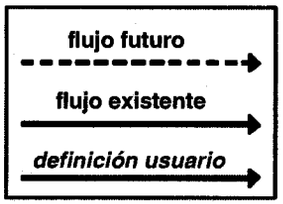
ATMS01 - Monitoreo de la Red
Autopista Metropolitanas Sistema Central de Control



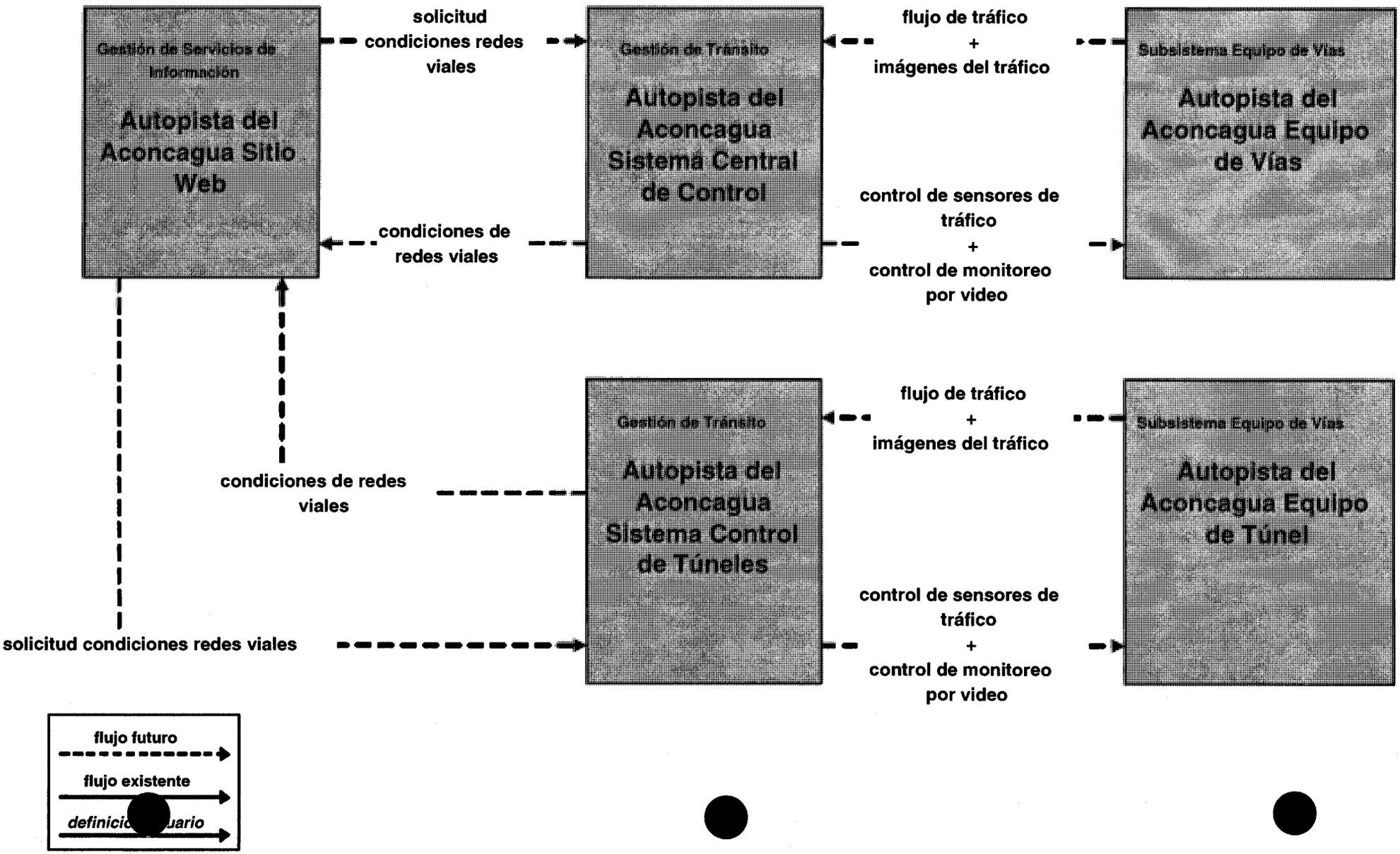


ATMS01 - Monitoreo de la Red
Autopista del Elqui Sistema Central de Control





ATMS01 - Monitoreo de la Red
Autopista del Aconcagua Sistema Central de Control



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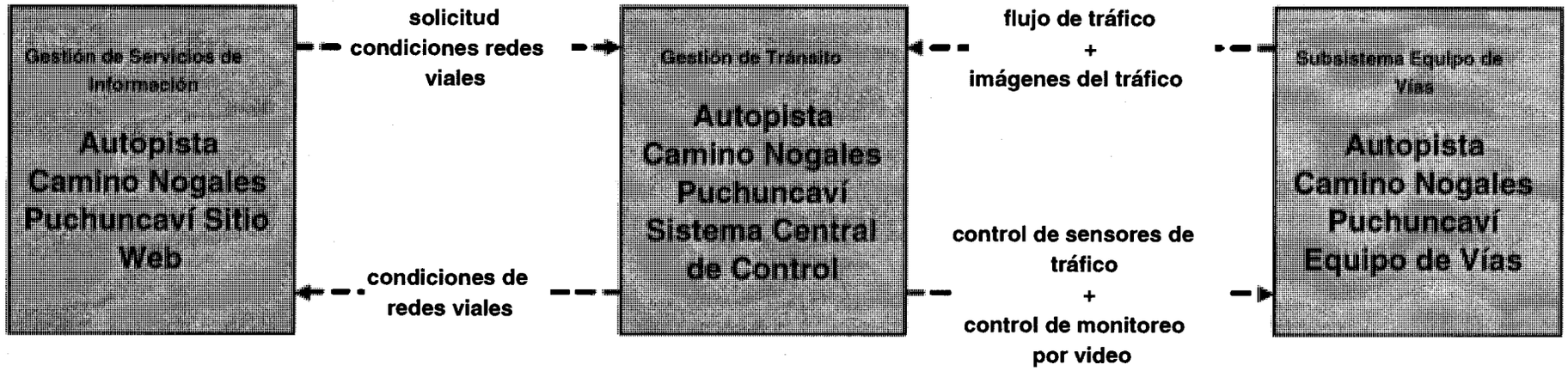
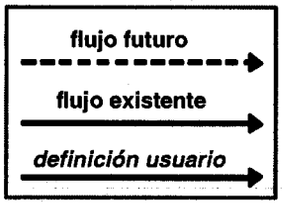
Autopista Camino Nogales Puchuncaví Sistema Central de Control





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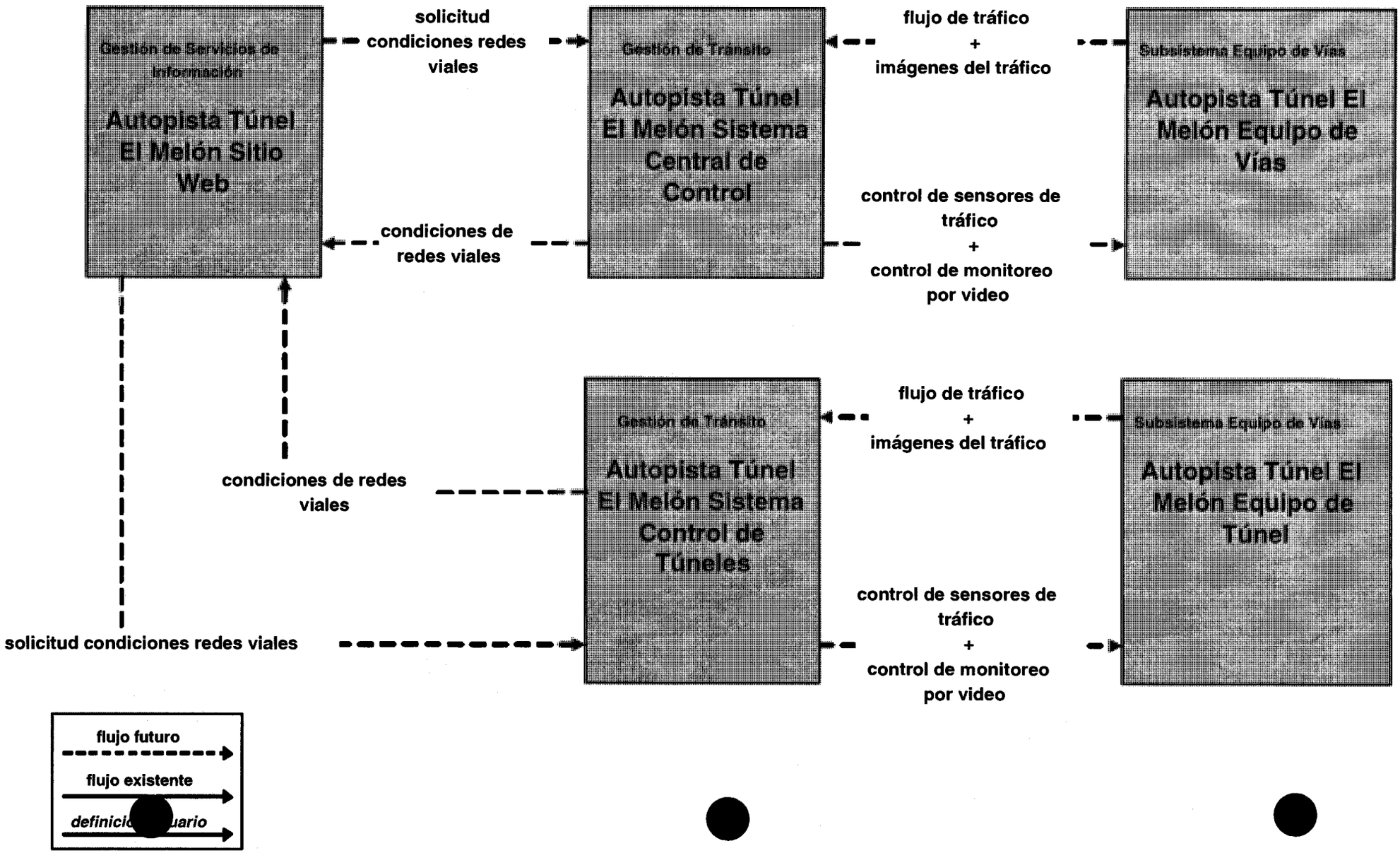
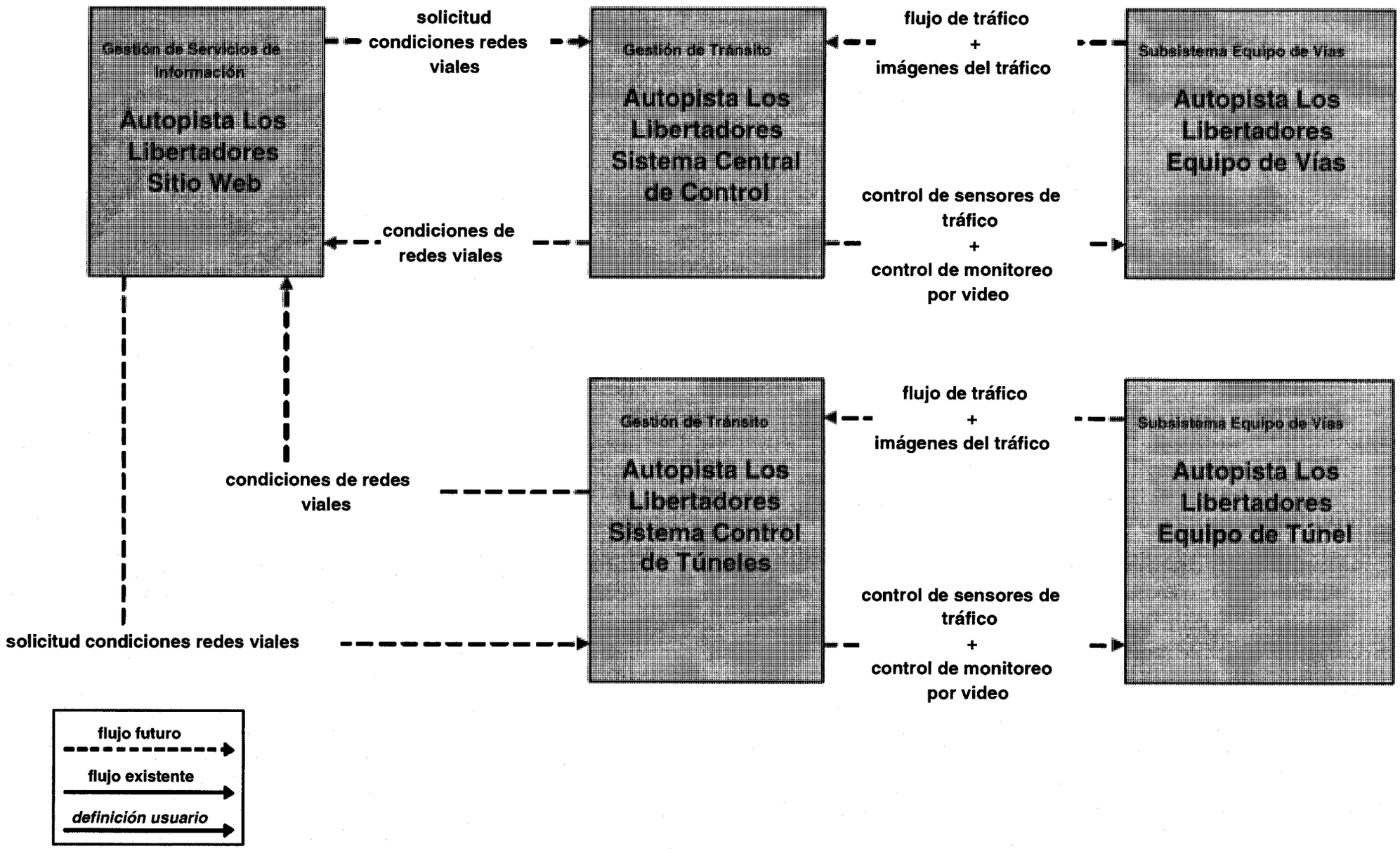


ATMS01 - Monitoreo de la Red
Autopista Los Libertadores Sistema Central de Control



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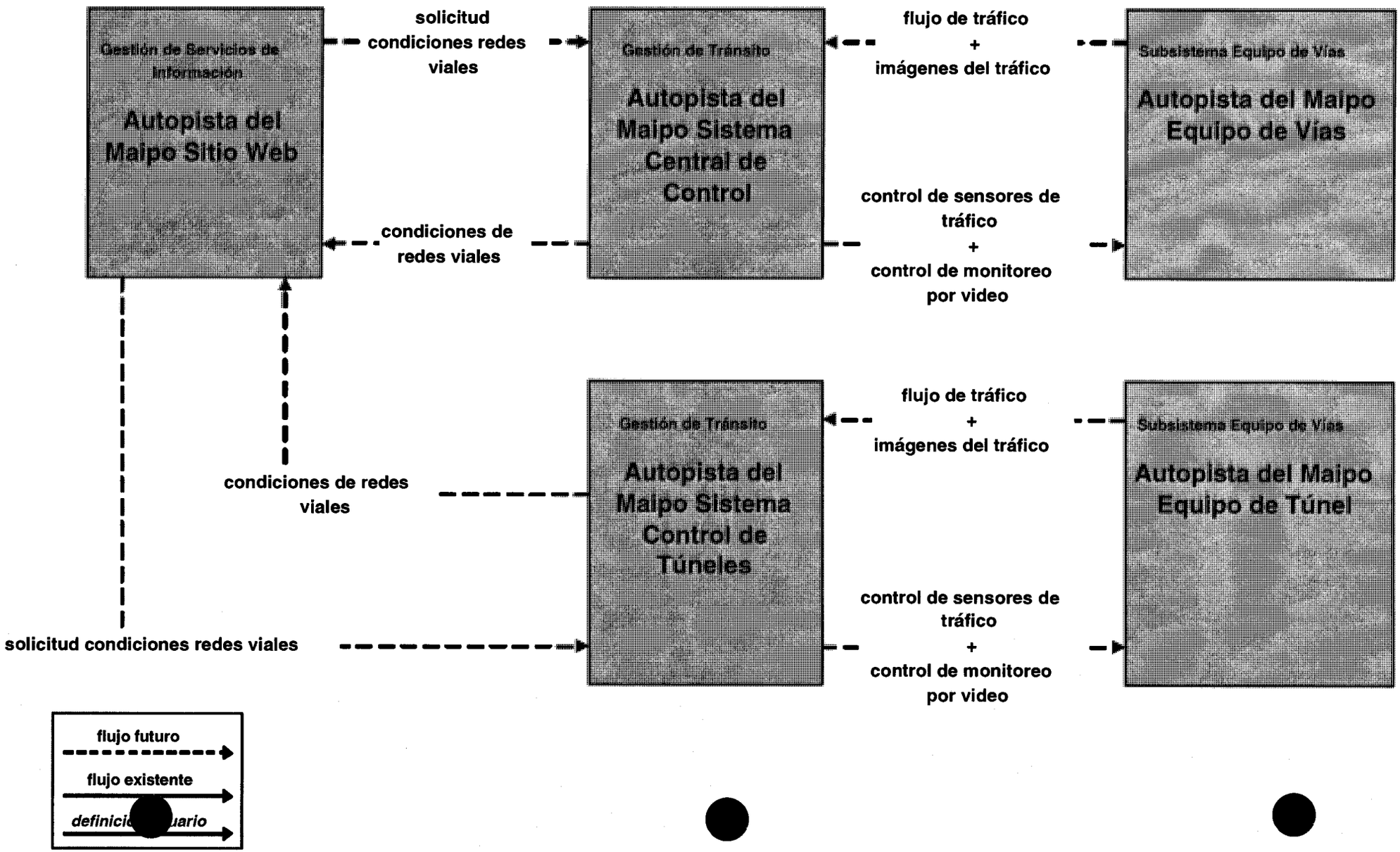
Autopista del Maipo Sistema Central de Control



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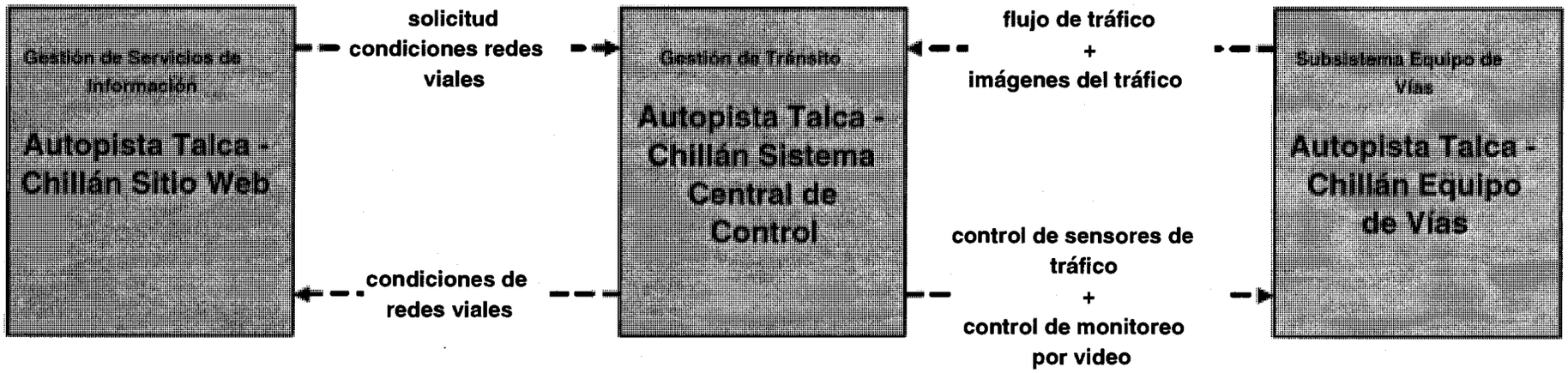

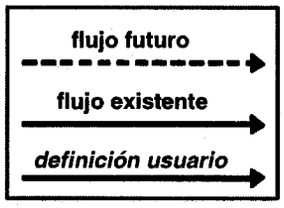

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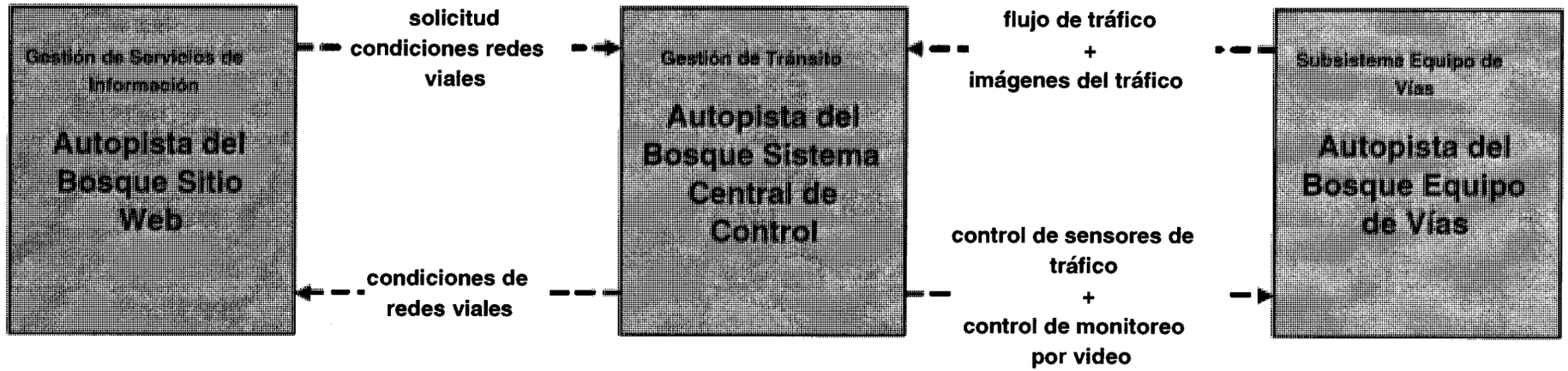

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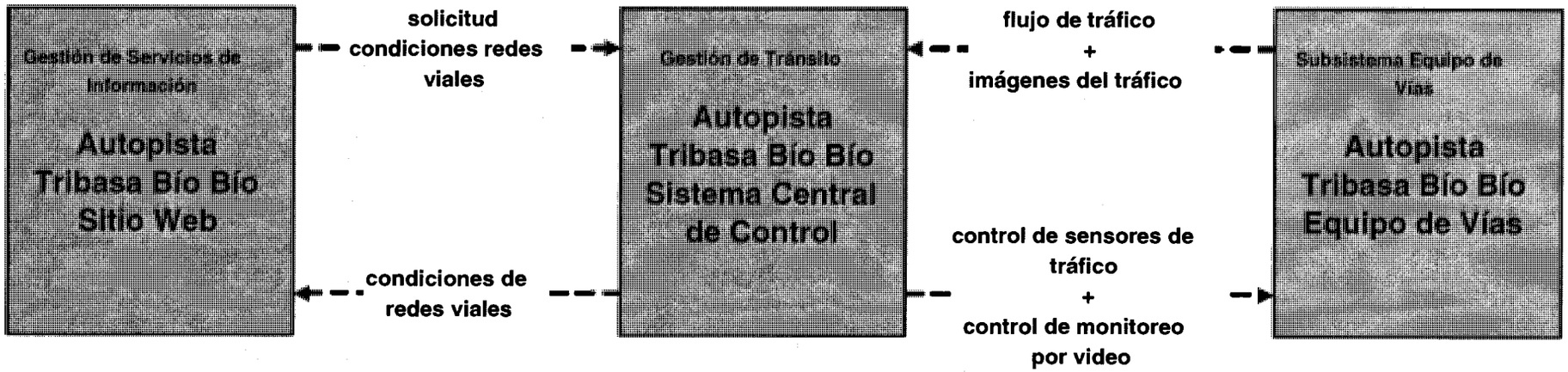
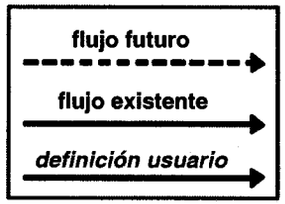
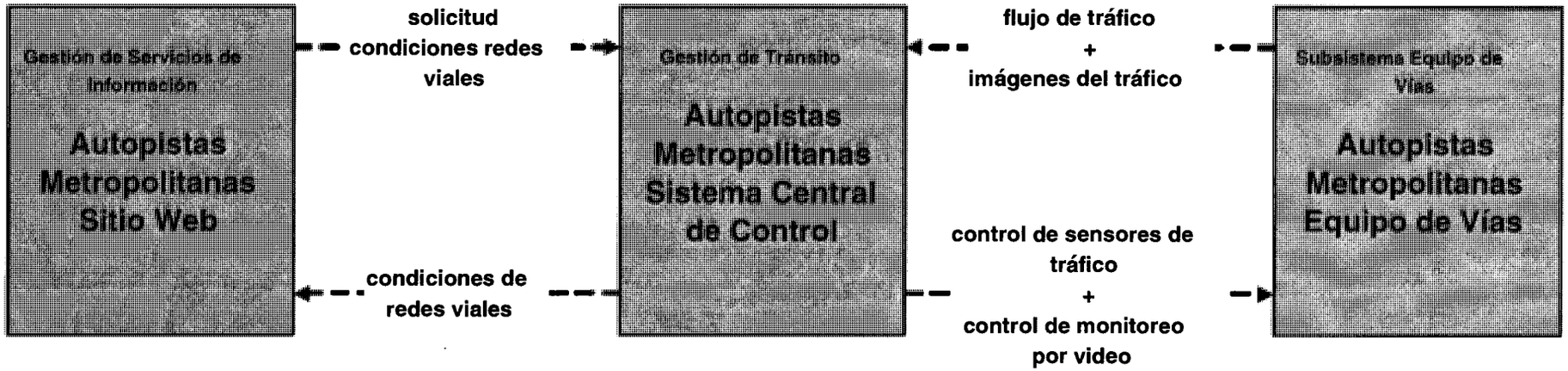




ATMS01 - Monitoreo de la Red
Autopista Metropolitanas Sistema Central de Control



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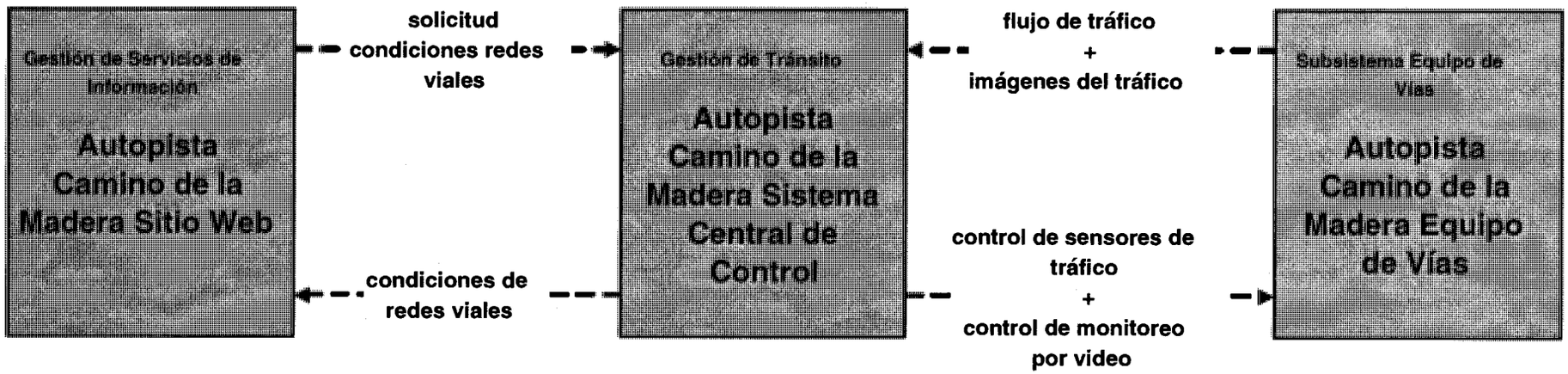

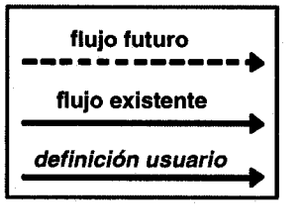

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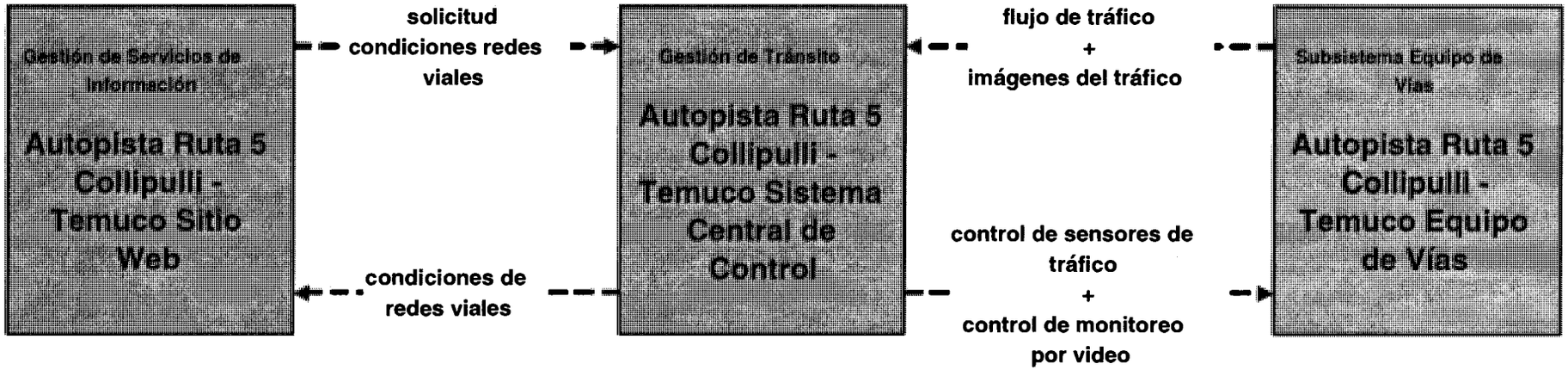

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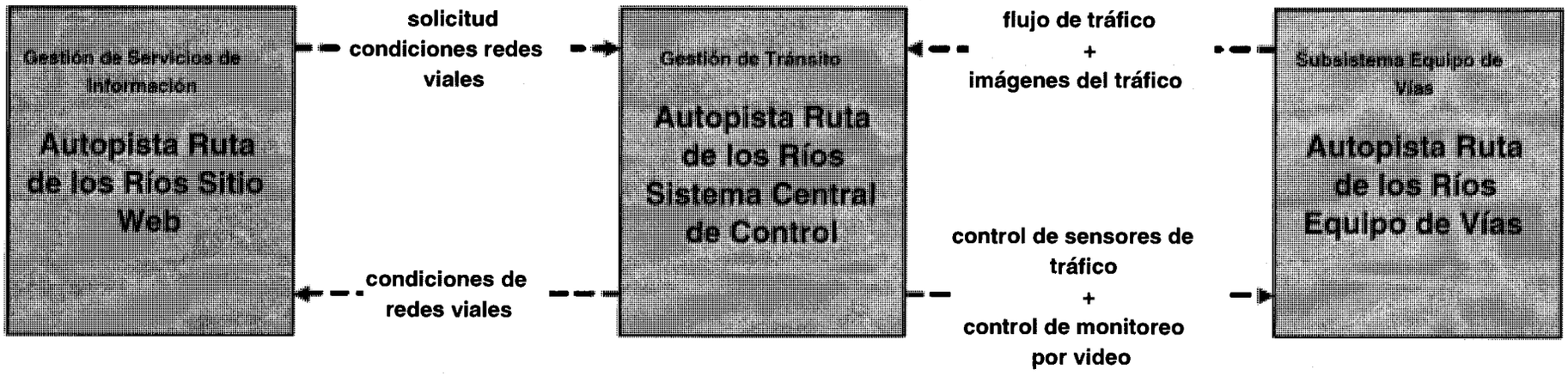

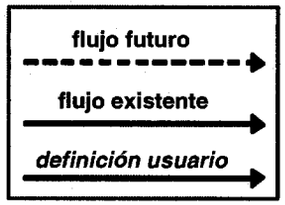

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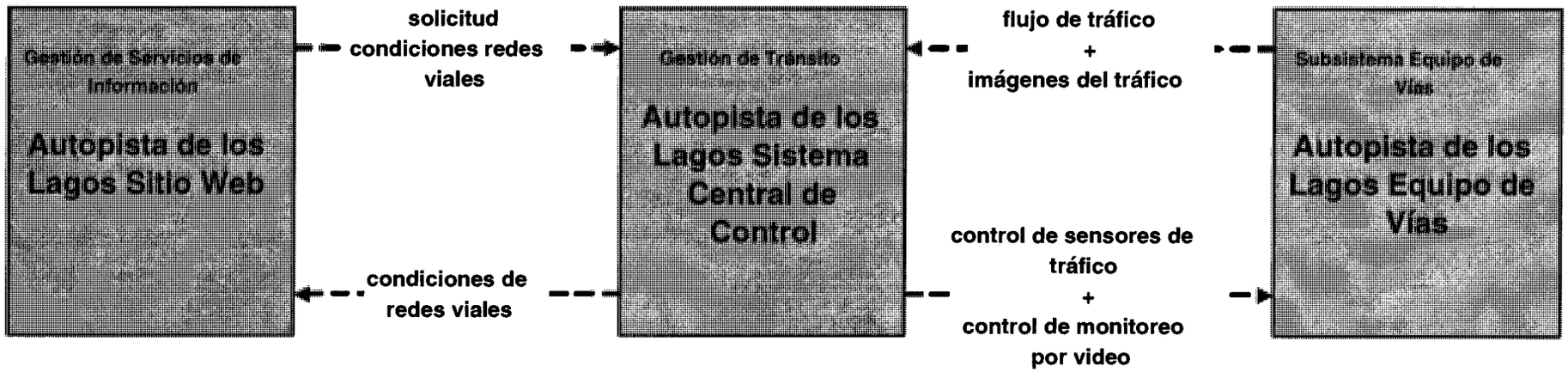

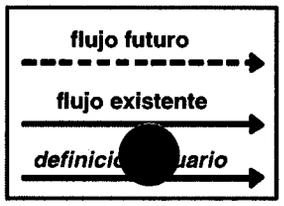

ATMS01 - Monitoreo de la Red
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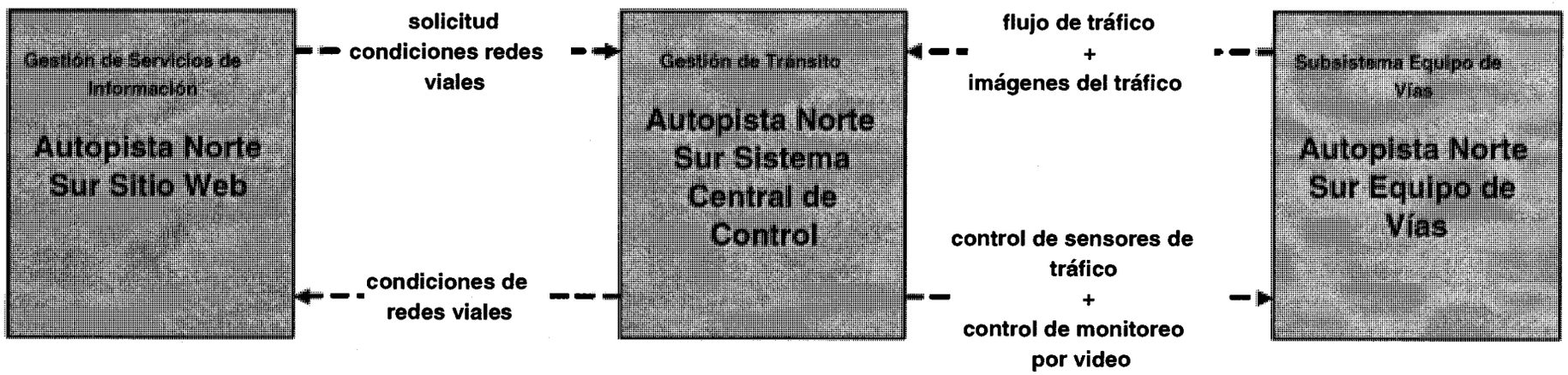

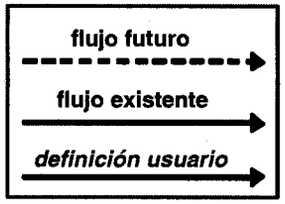

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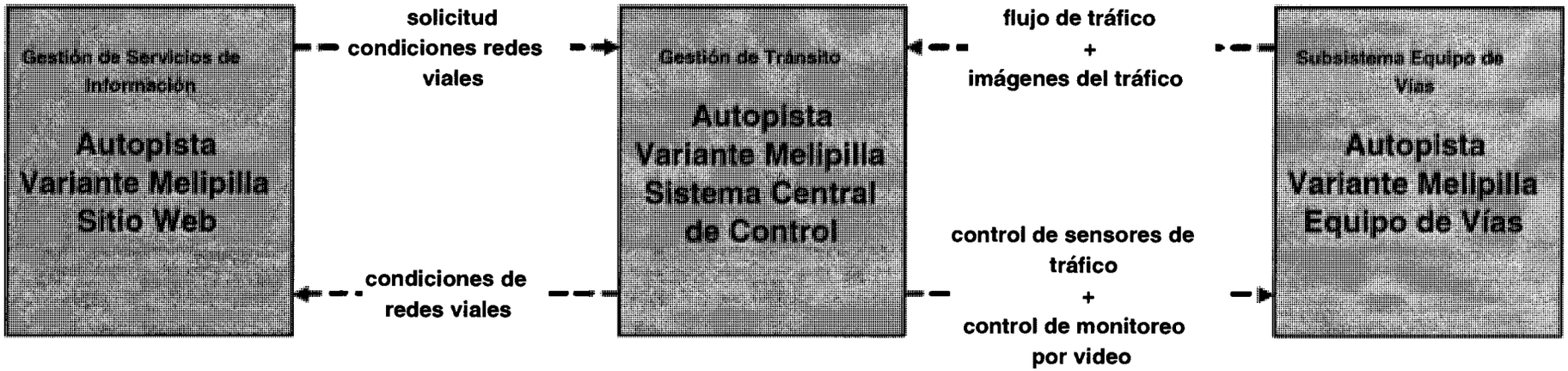
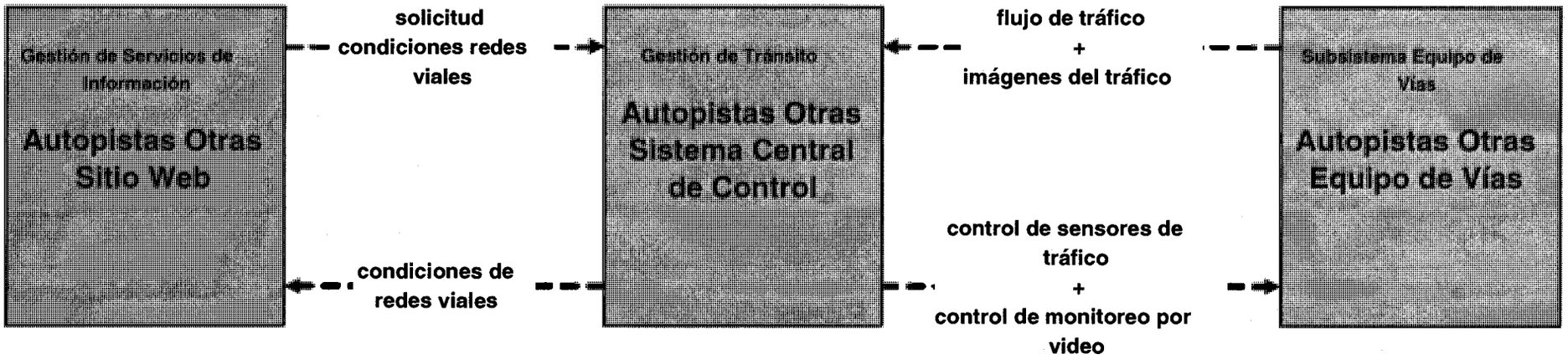
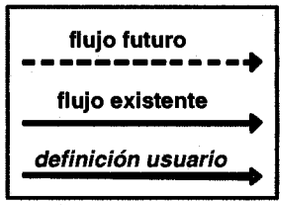
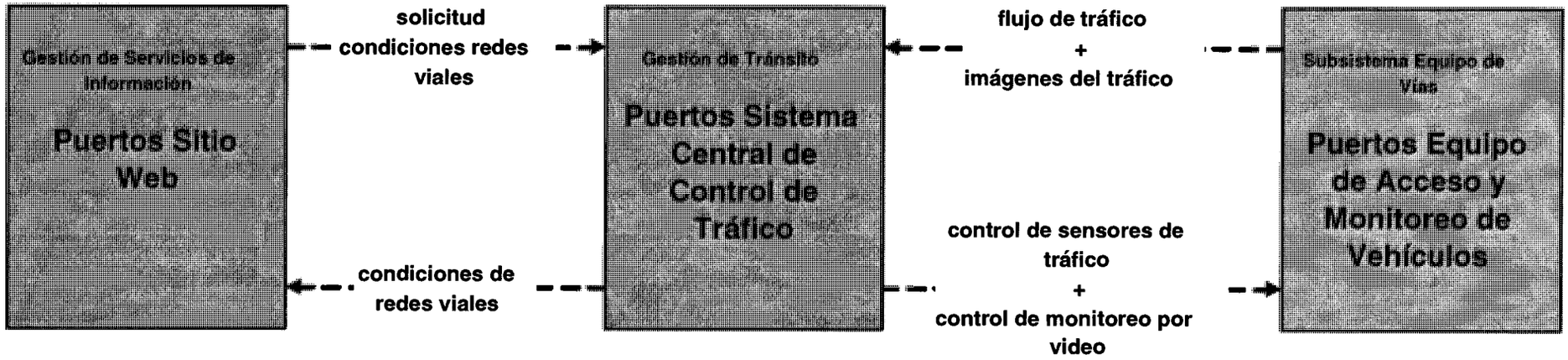


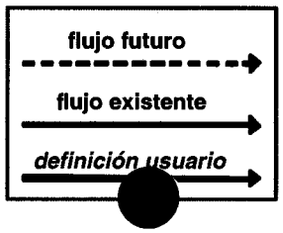
ATMS01 - Monitoreo de la Red
Autopistas Genericas Sistema Central de Control





ATMS01 - Monitoreo de la Red
Puertos





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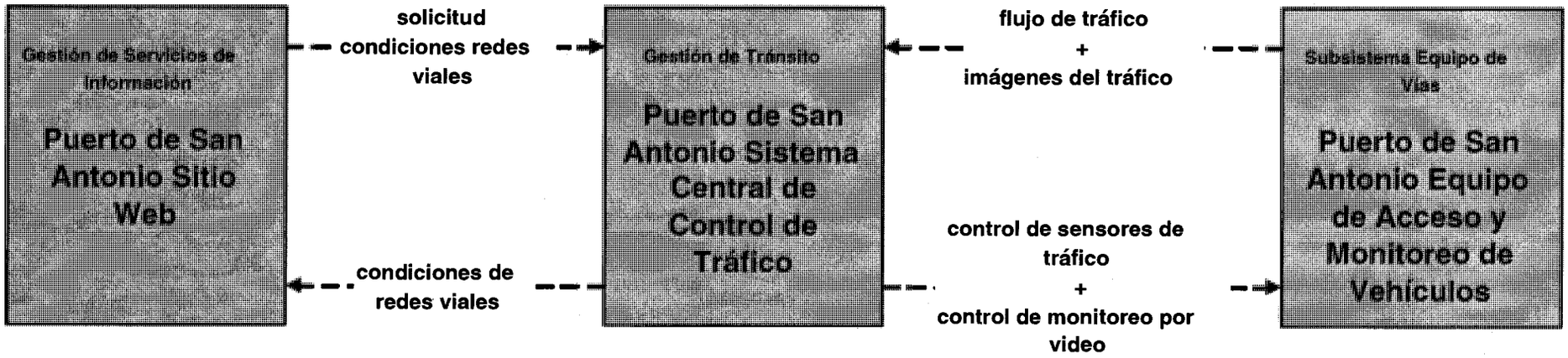

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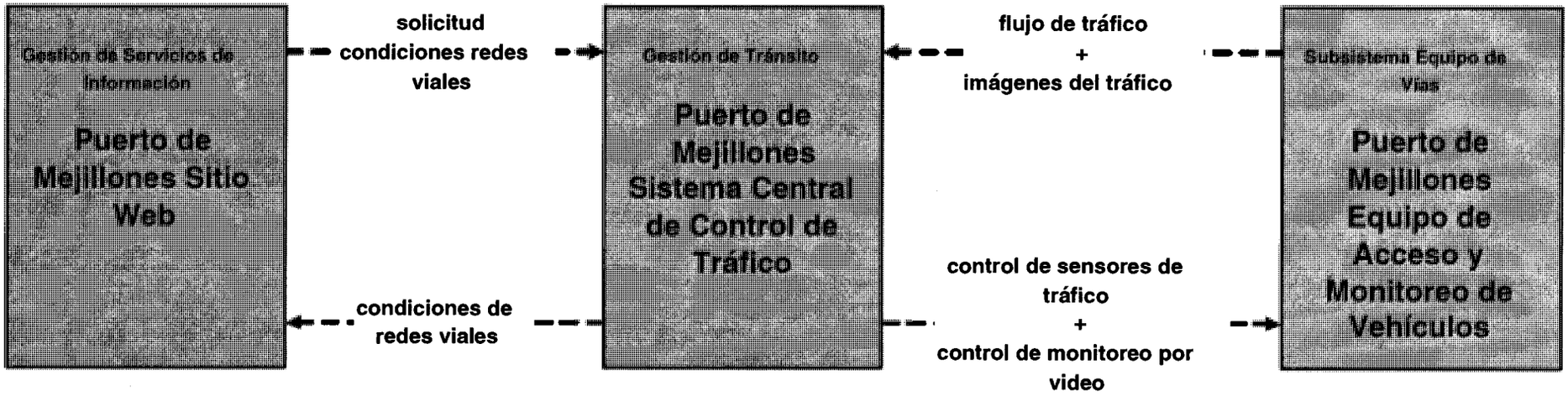

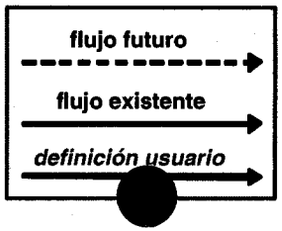

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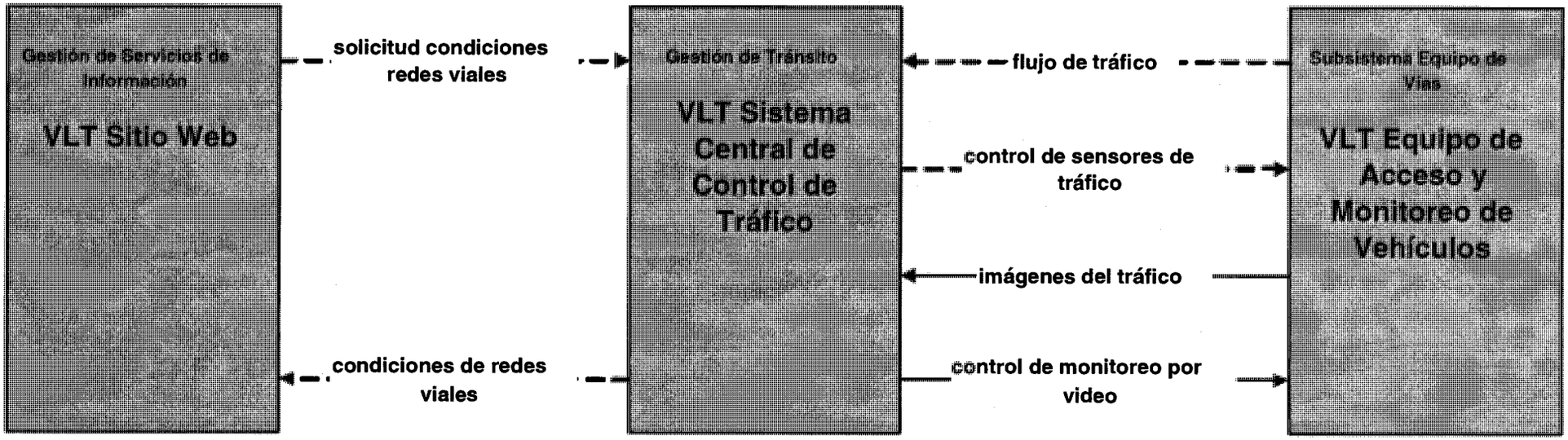

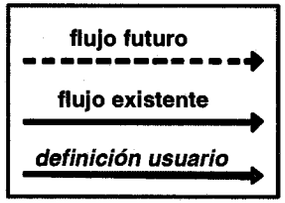

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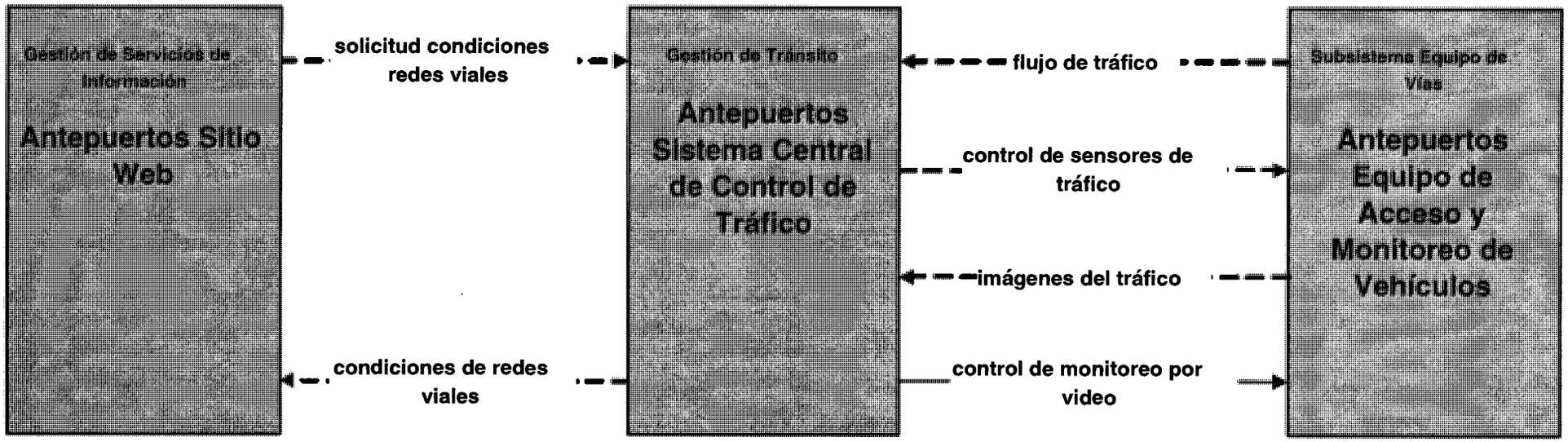

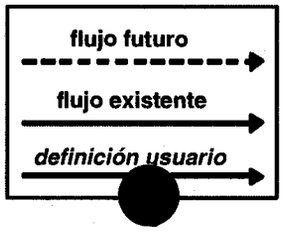

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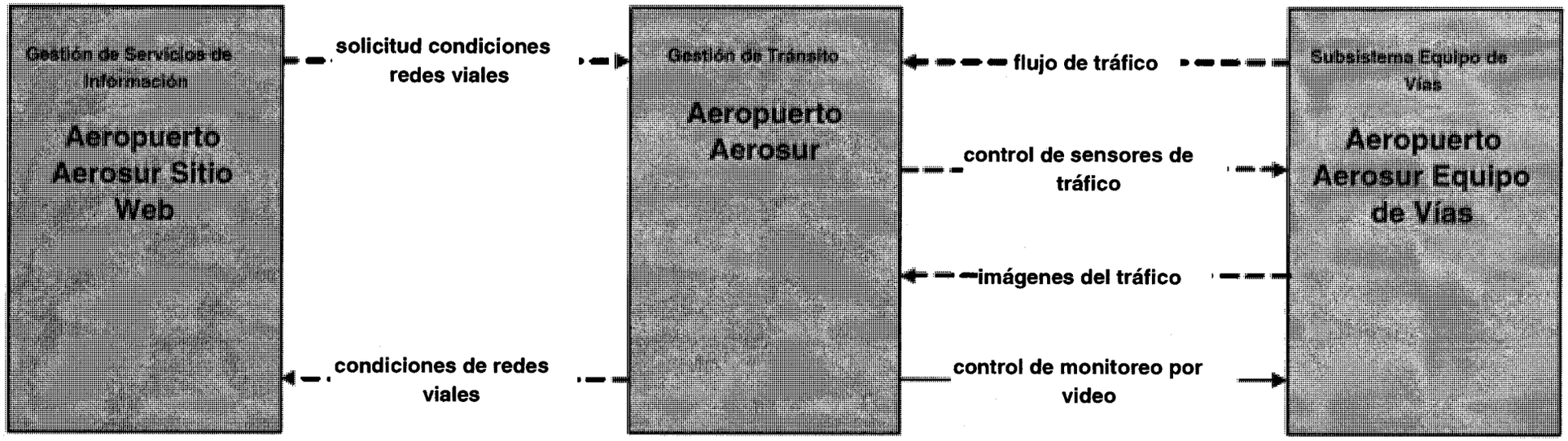

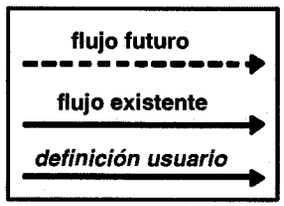

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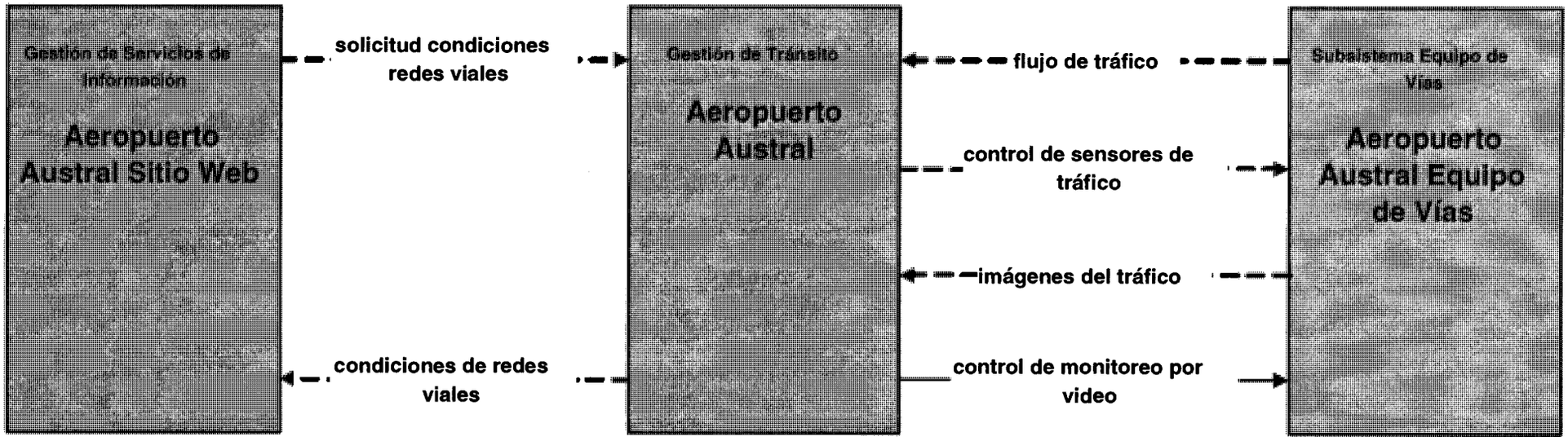

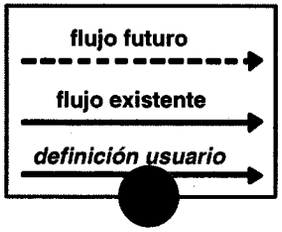

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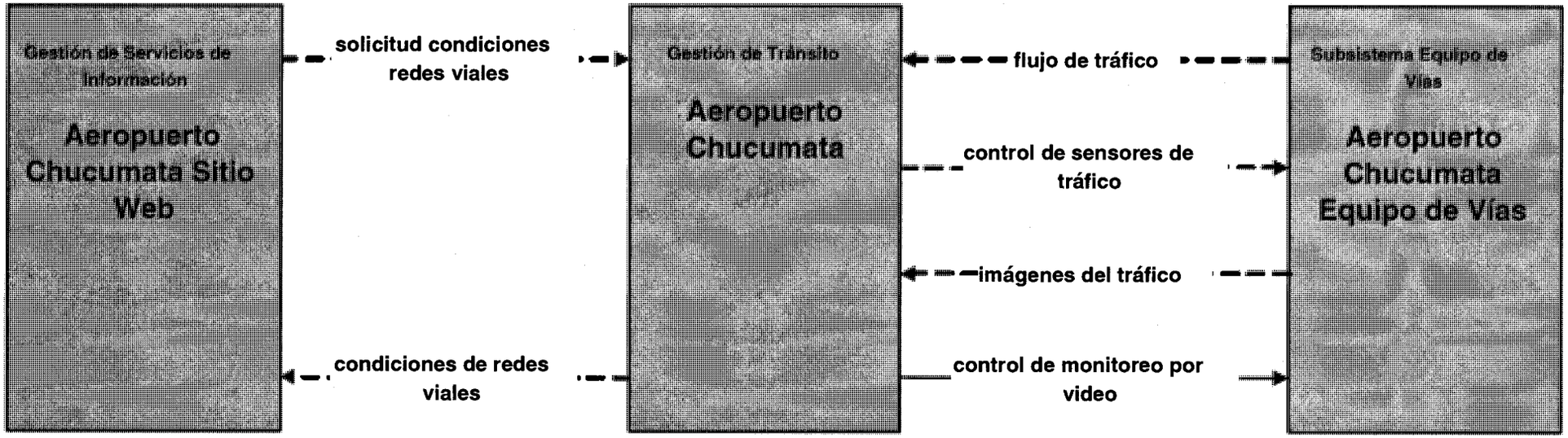

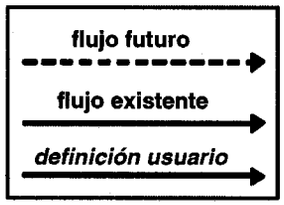

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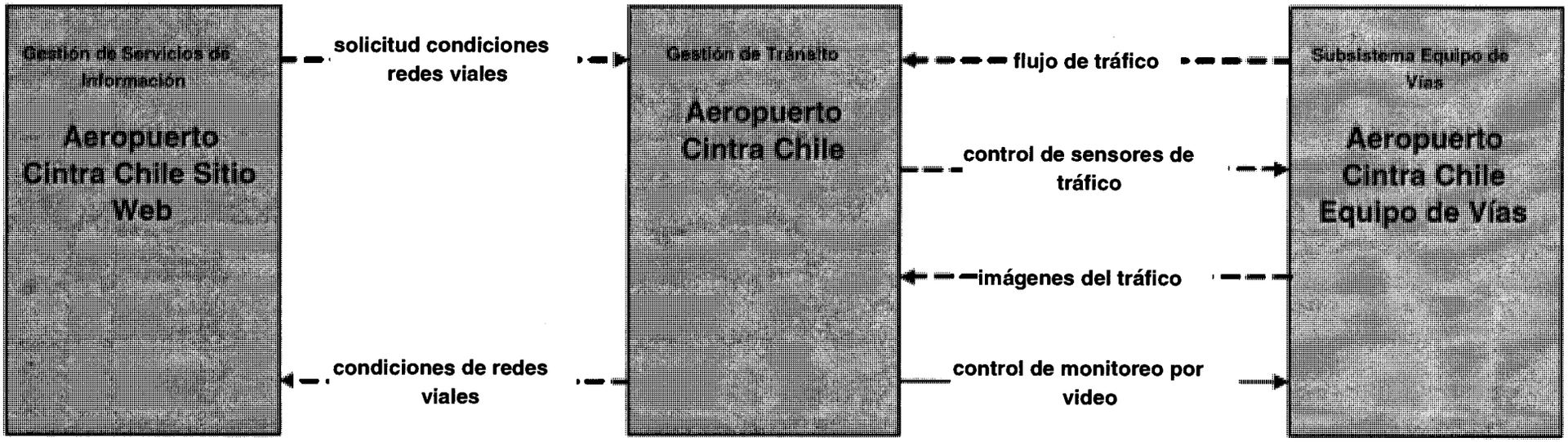
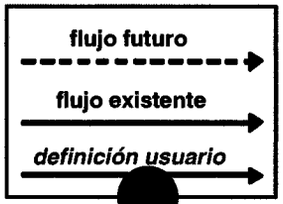
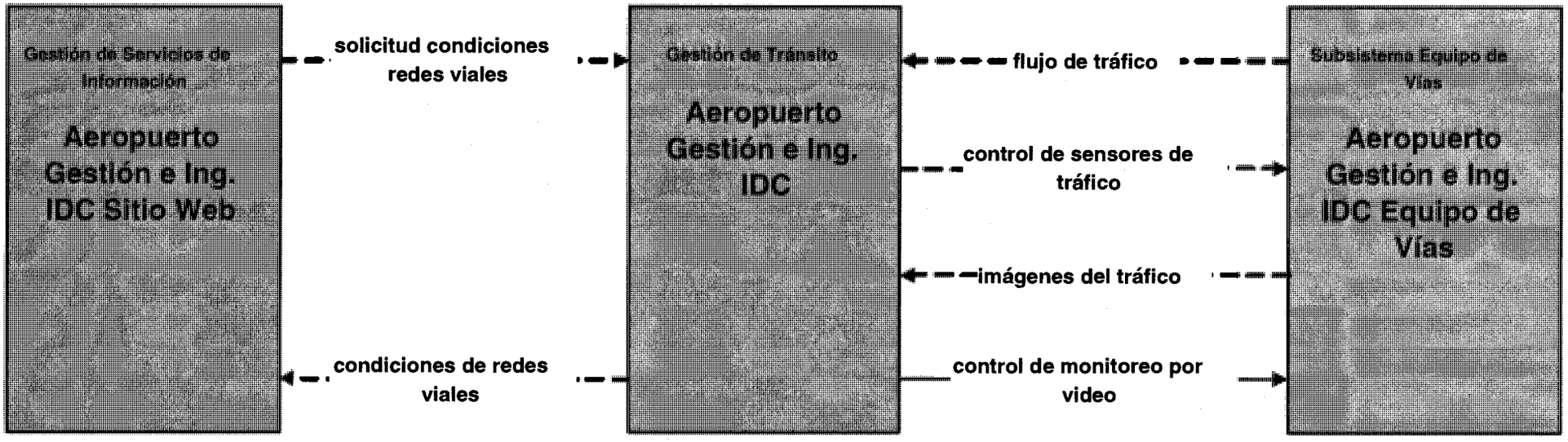
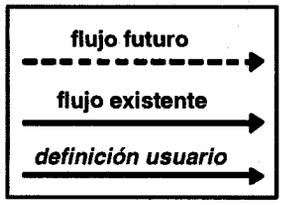




ATMS01 - Monitoreo de la Red
Aeropuerto Gestión e Ing. IDC





ATMS01 - Monitoreo de la Red
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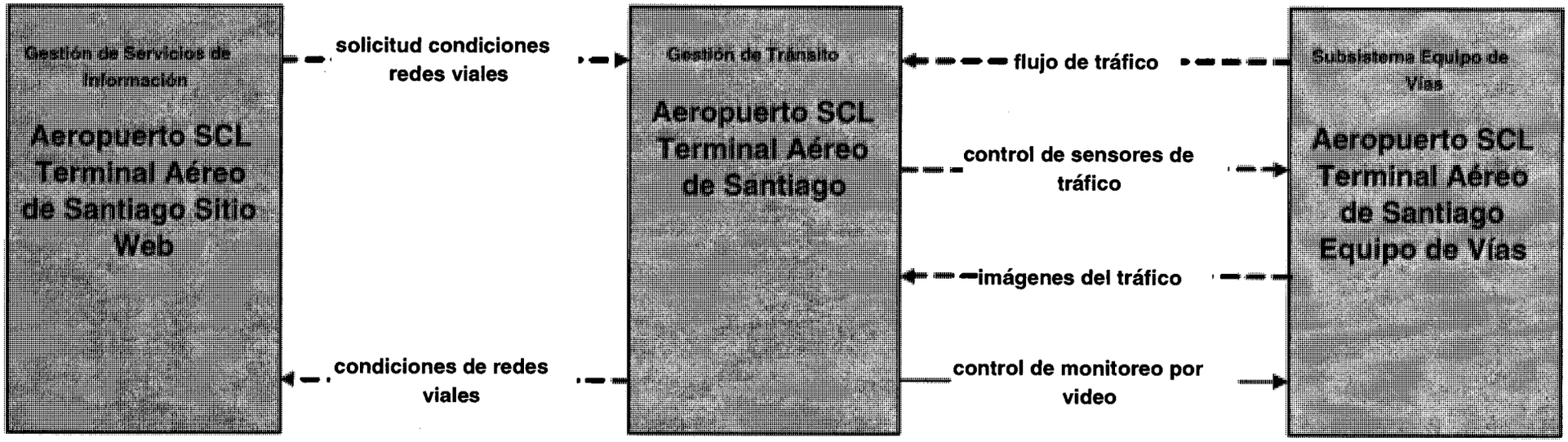
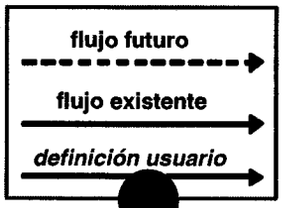
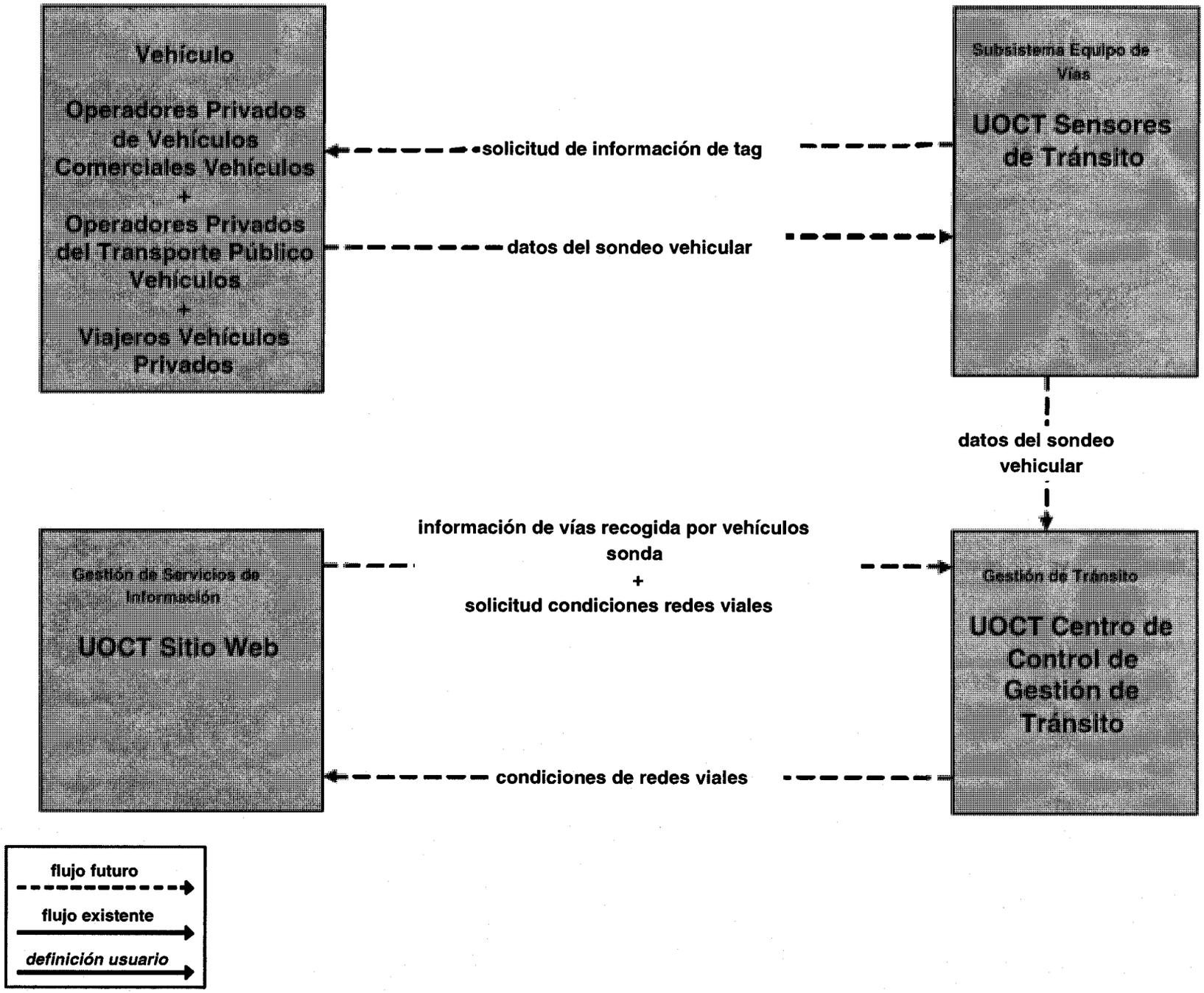




ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda

UOCT

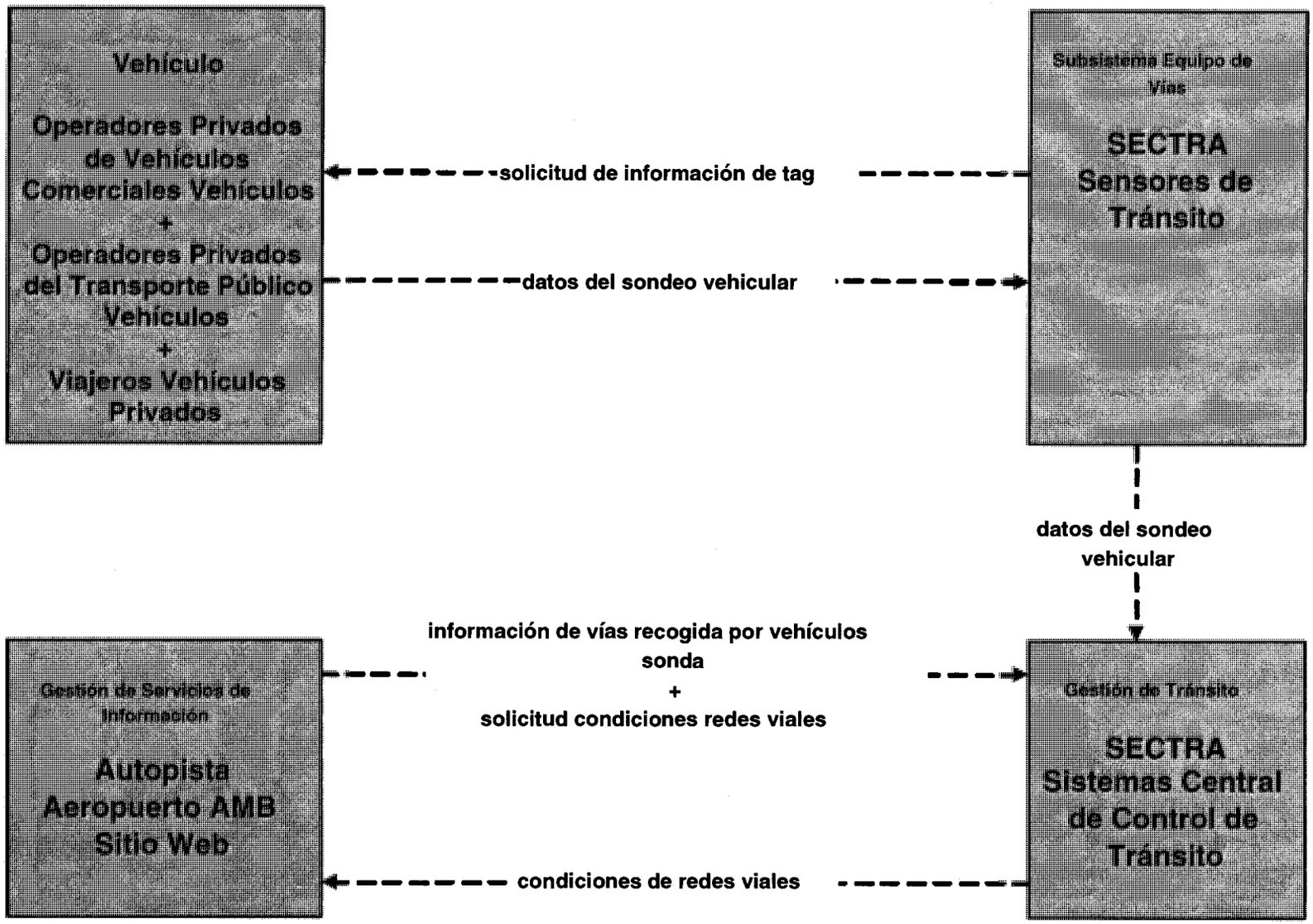


flujo futuro

flujo existente

definición usuario

ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
SECTRA



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ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
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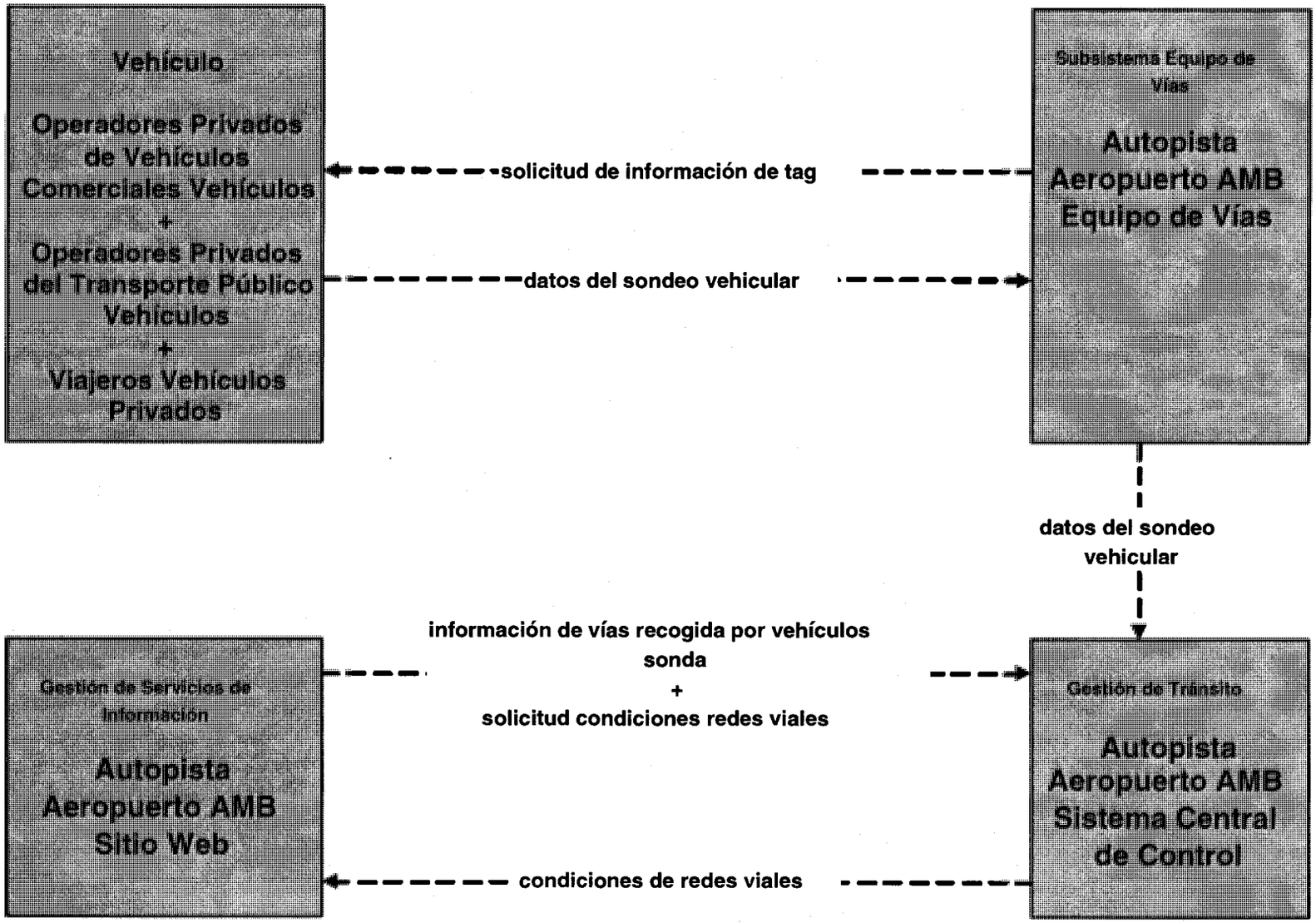

flujo futuro

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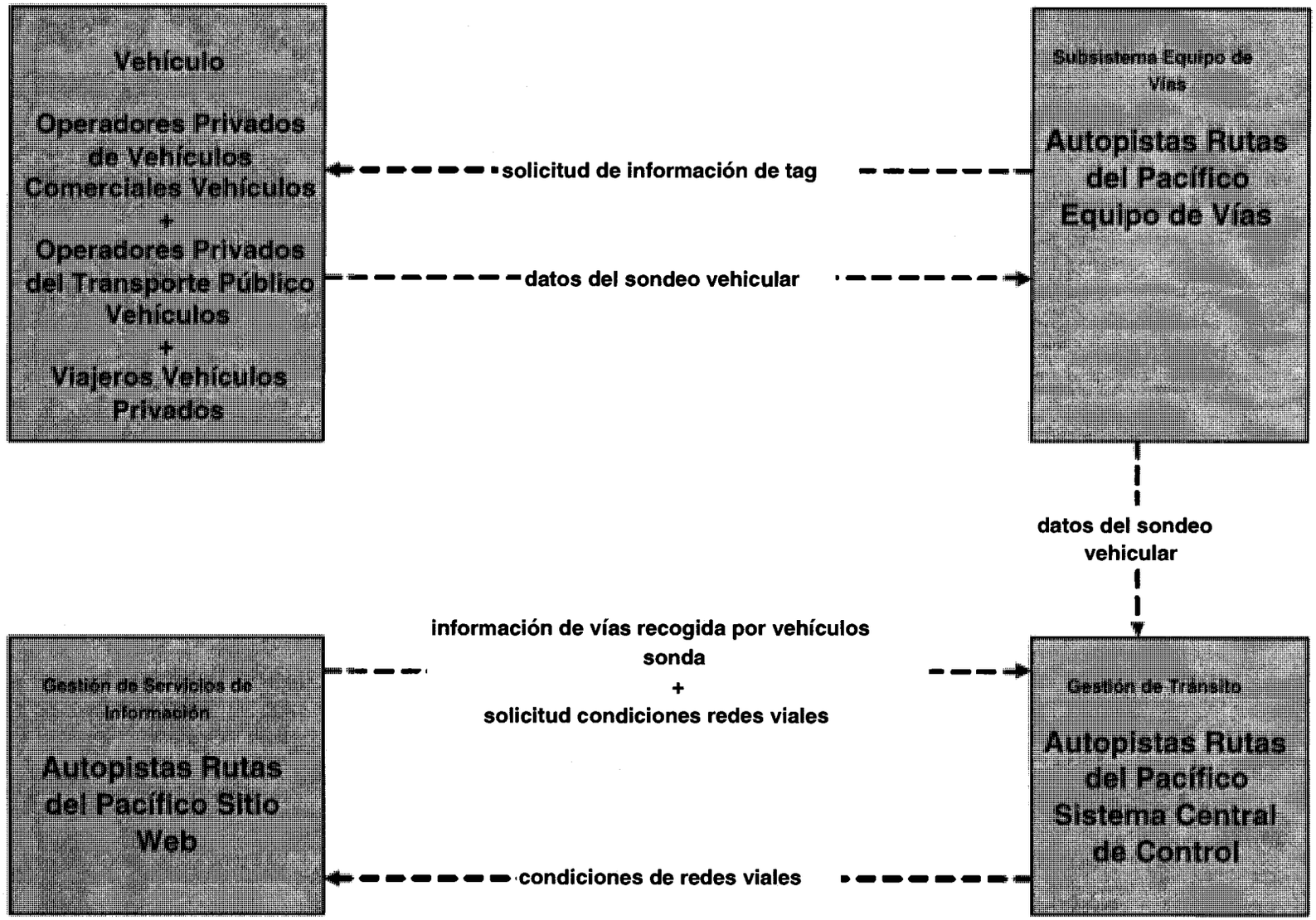
definición usuario

ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
Autopista Rutas del Pacifico



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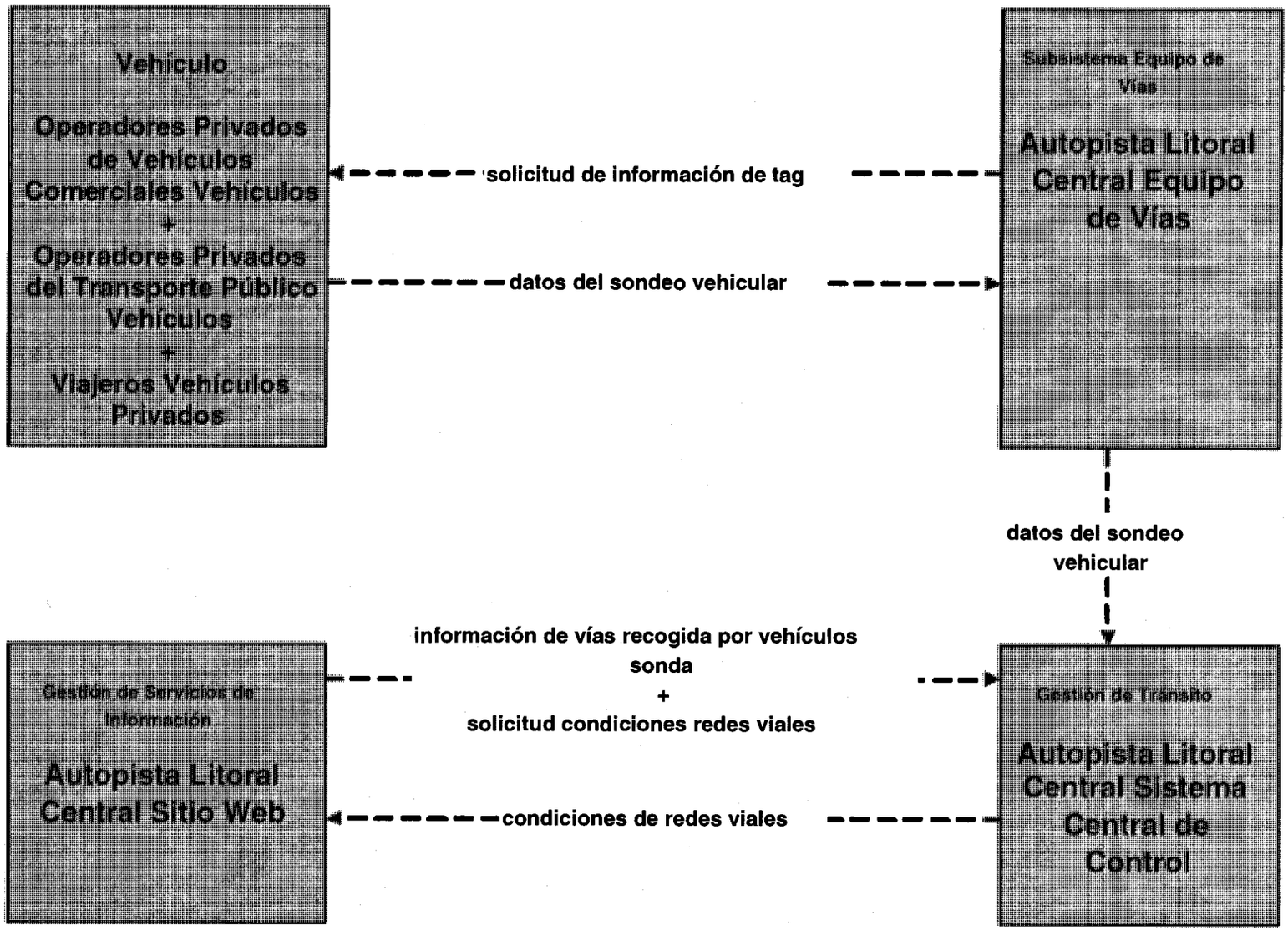

flujo futuro

flujo existente

definición usuario

ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
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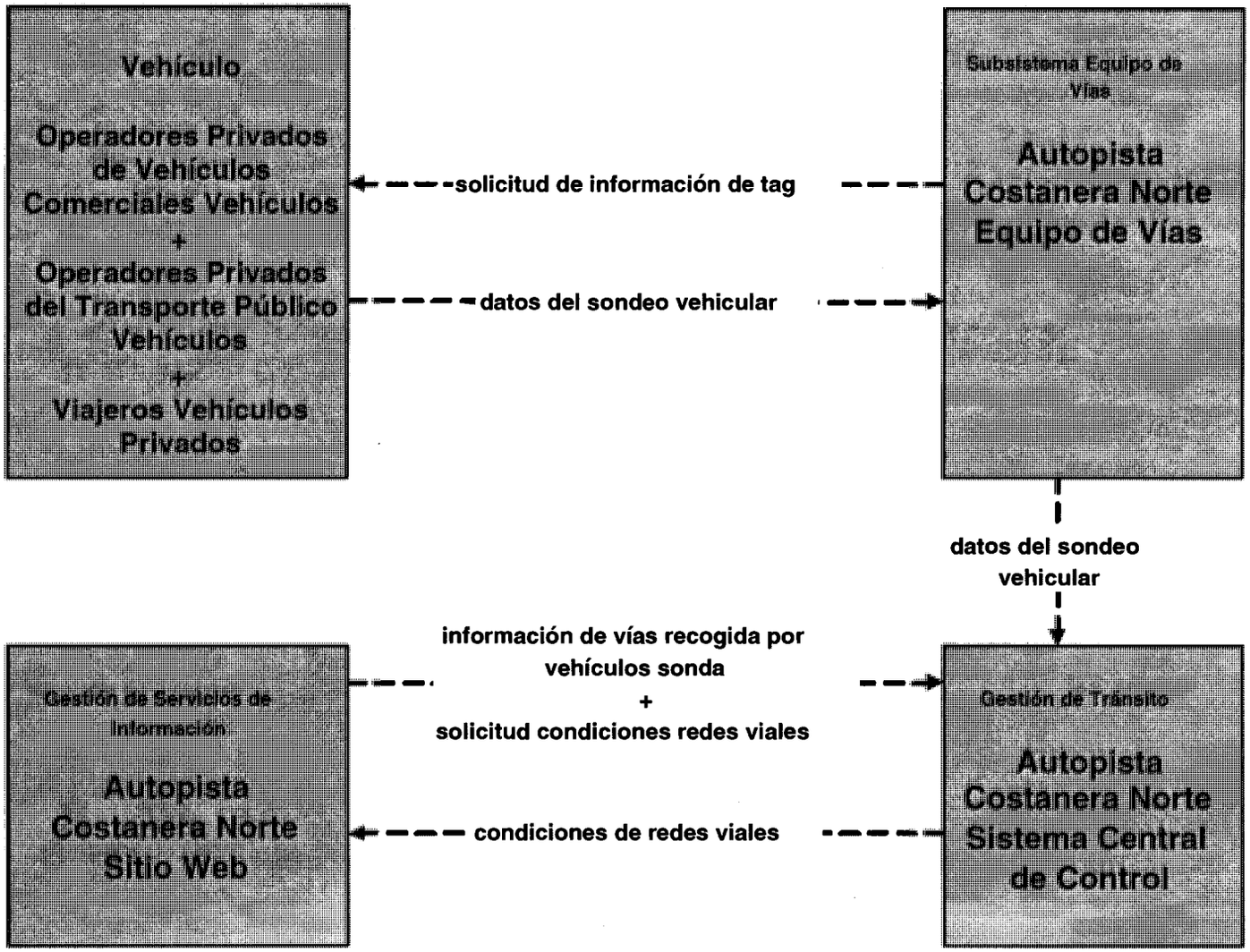
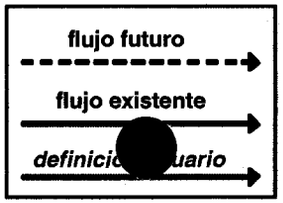
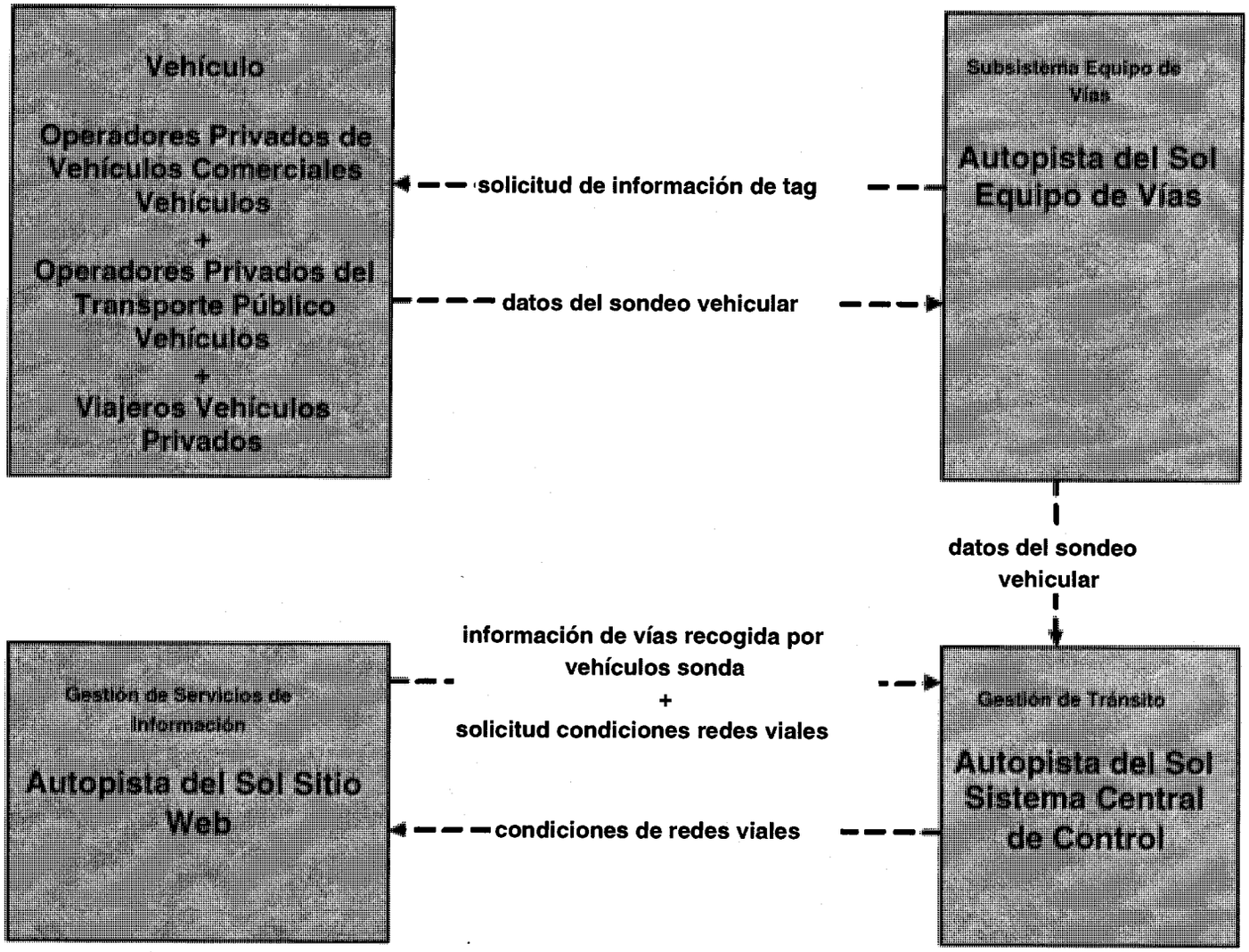




ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
Autopista del Sol



flujo futuro

flujo existente

definición usuario

ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
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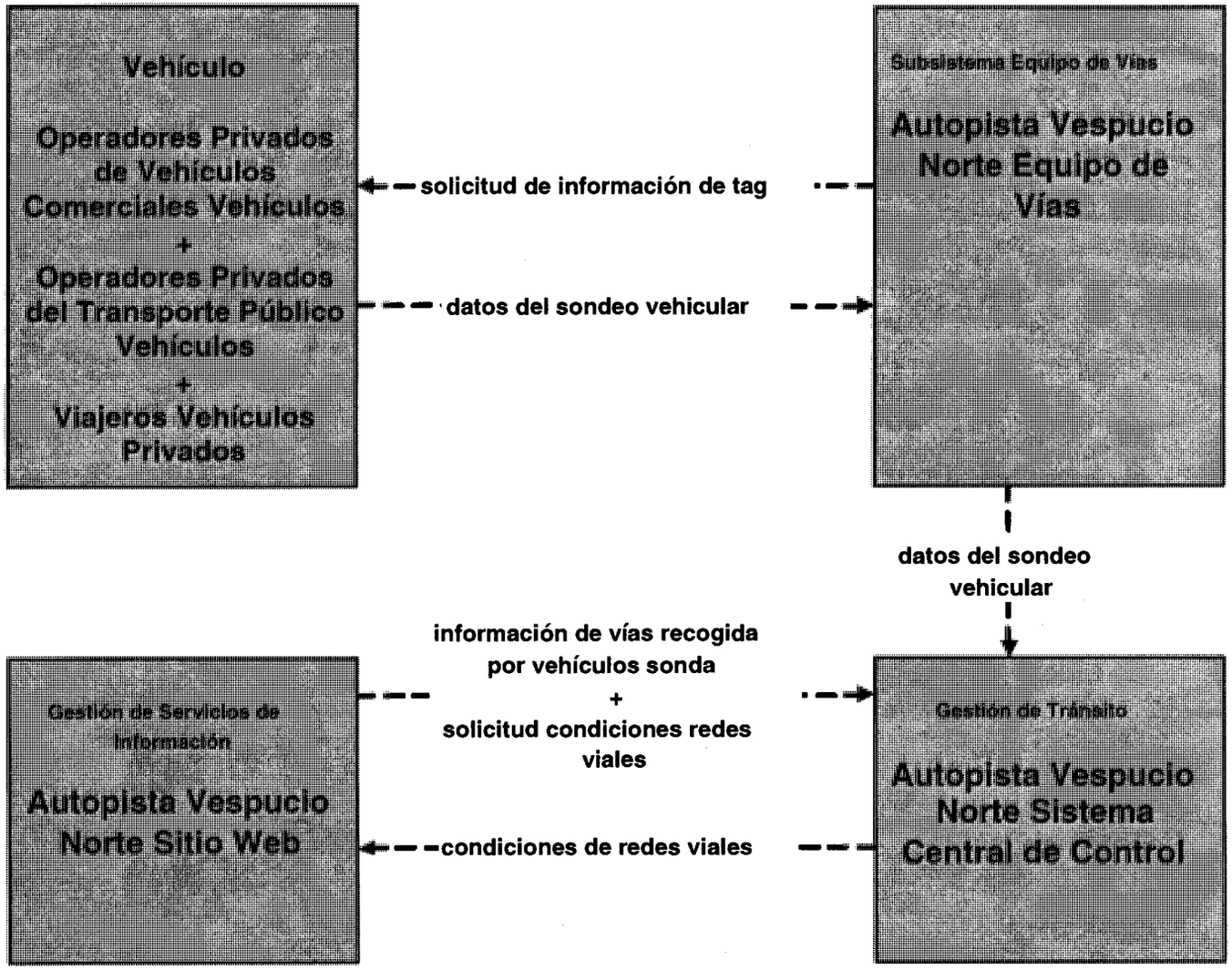
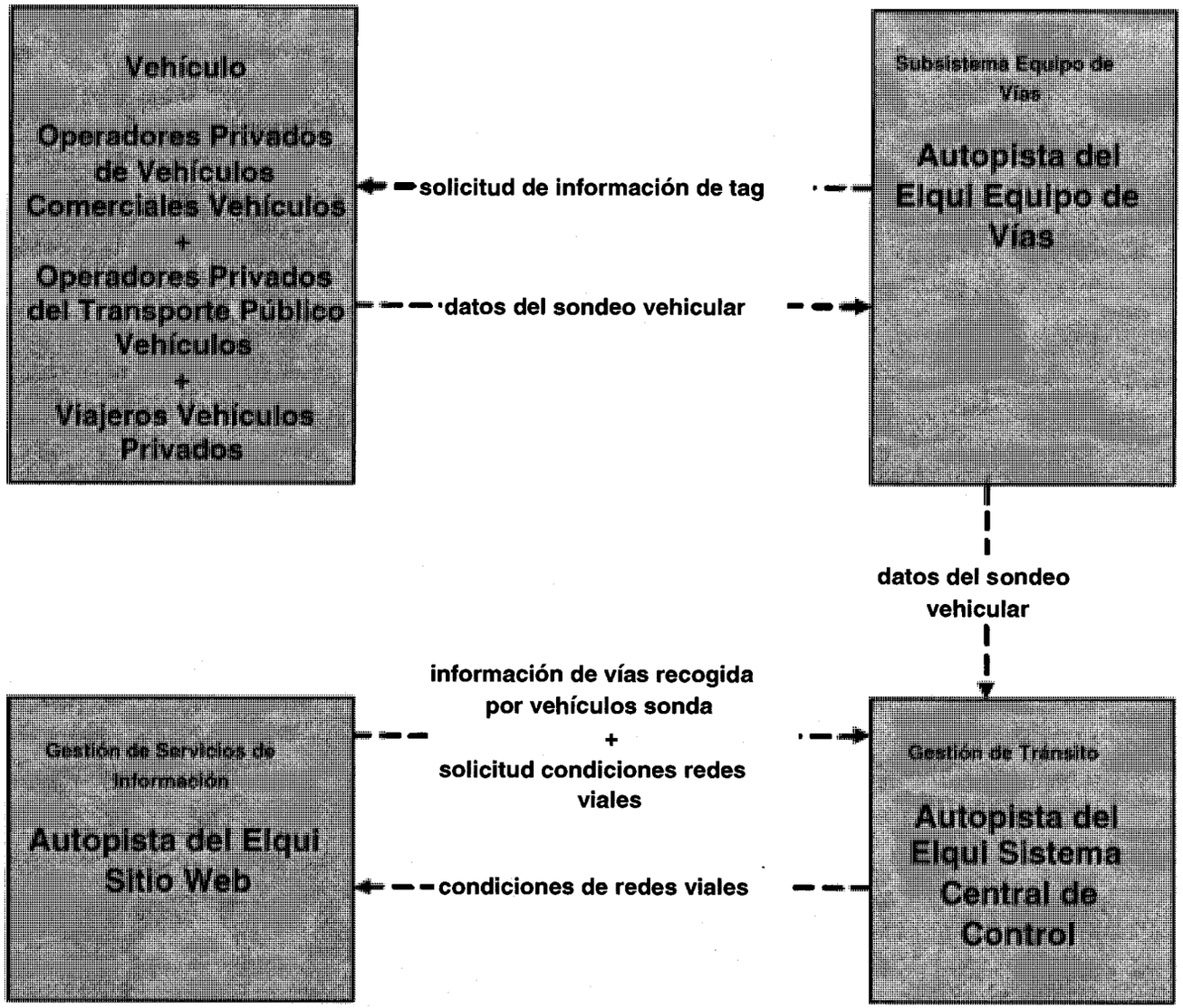


ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
Autopista del Elqui

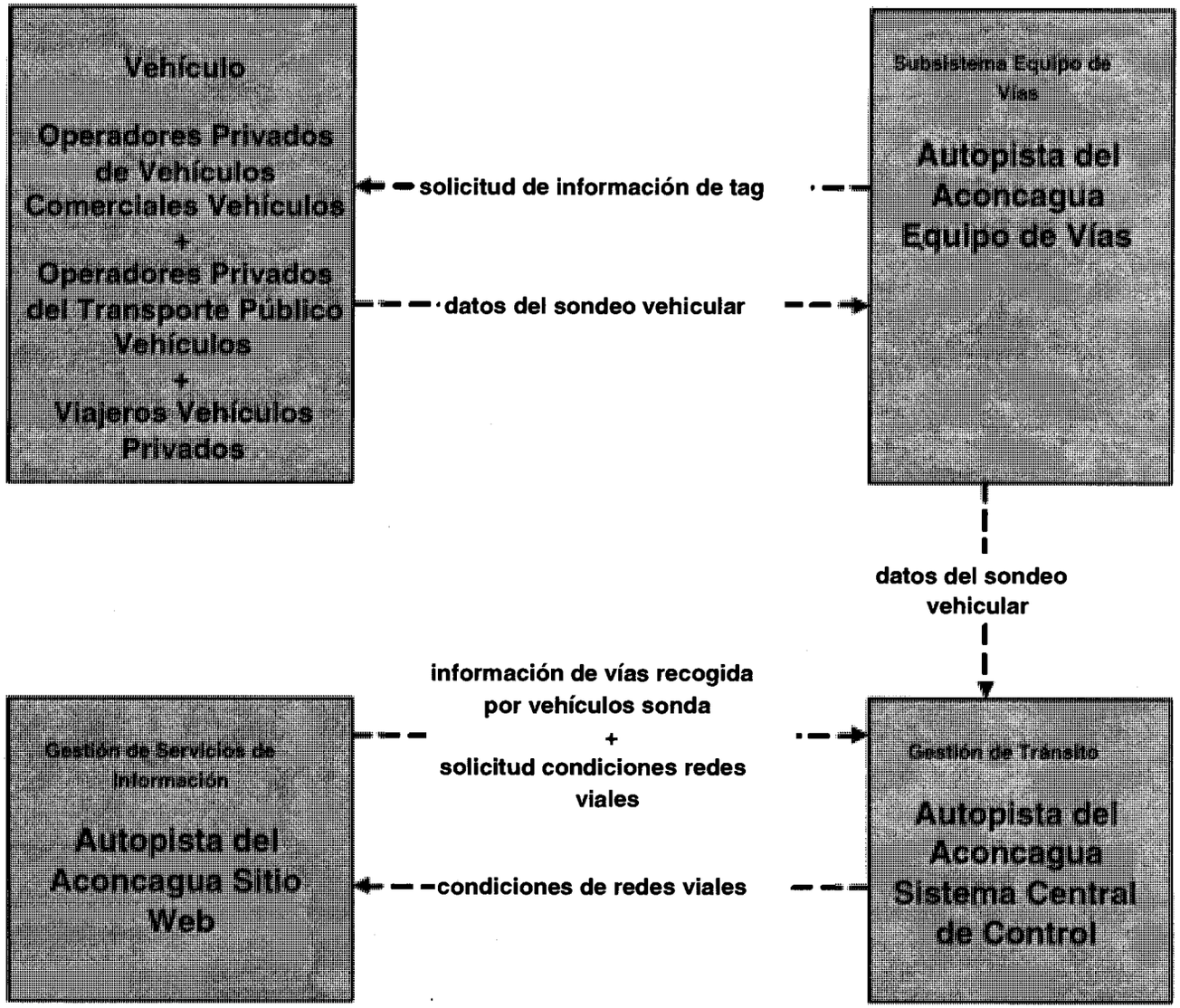


flujo futuro

flujo existente

definición usuario

ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
Autopista del Aconcagua

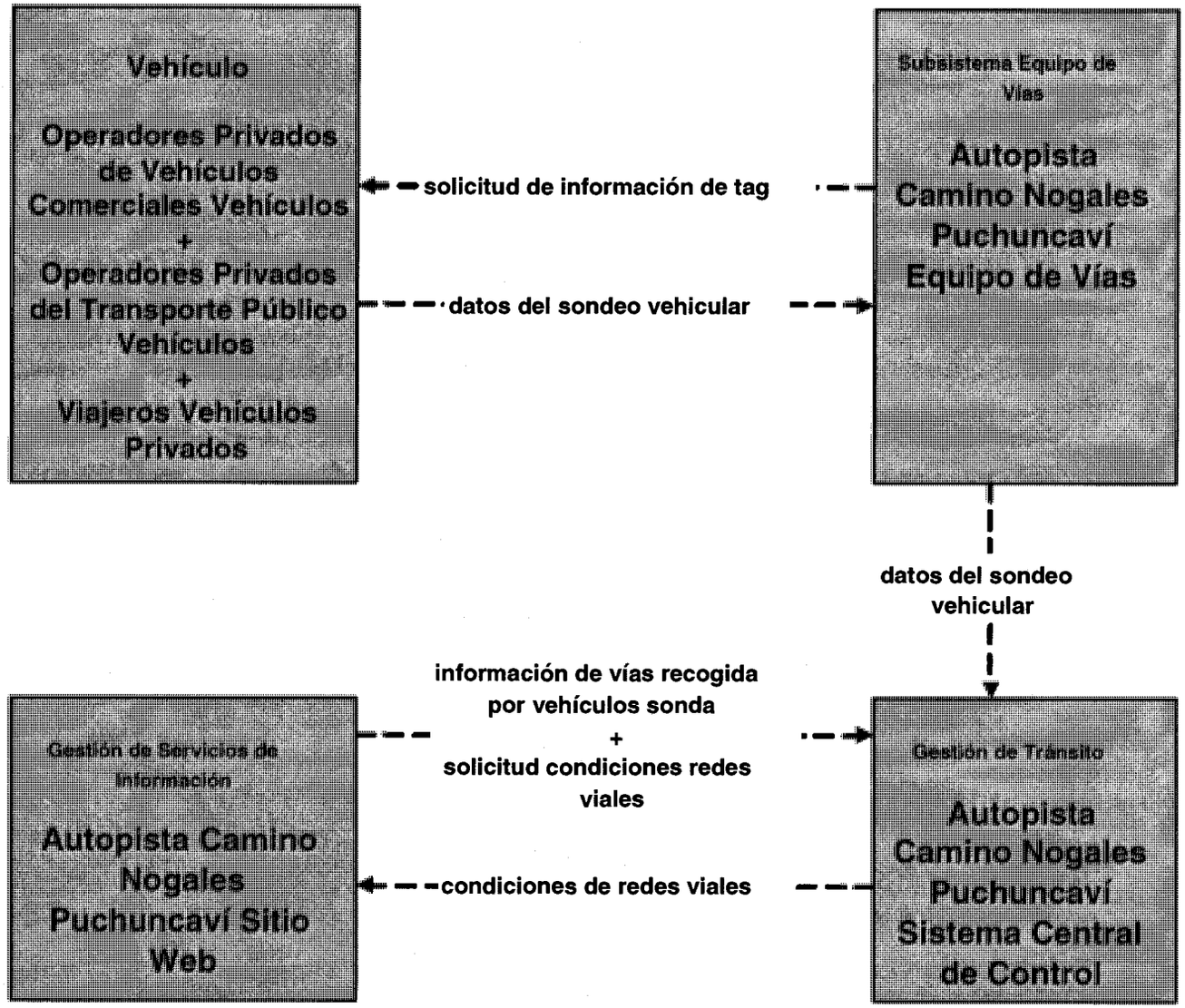


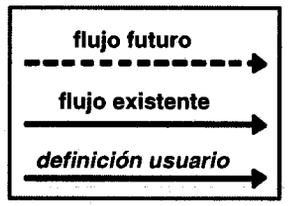
flujo futuro

flujo existente

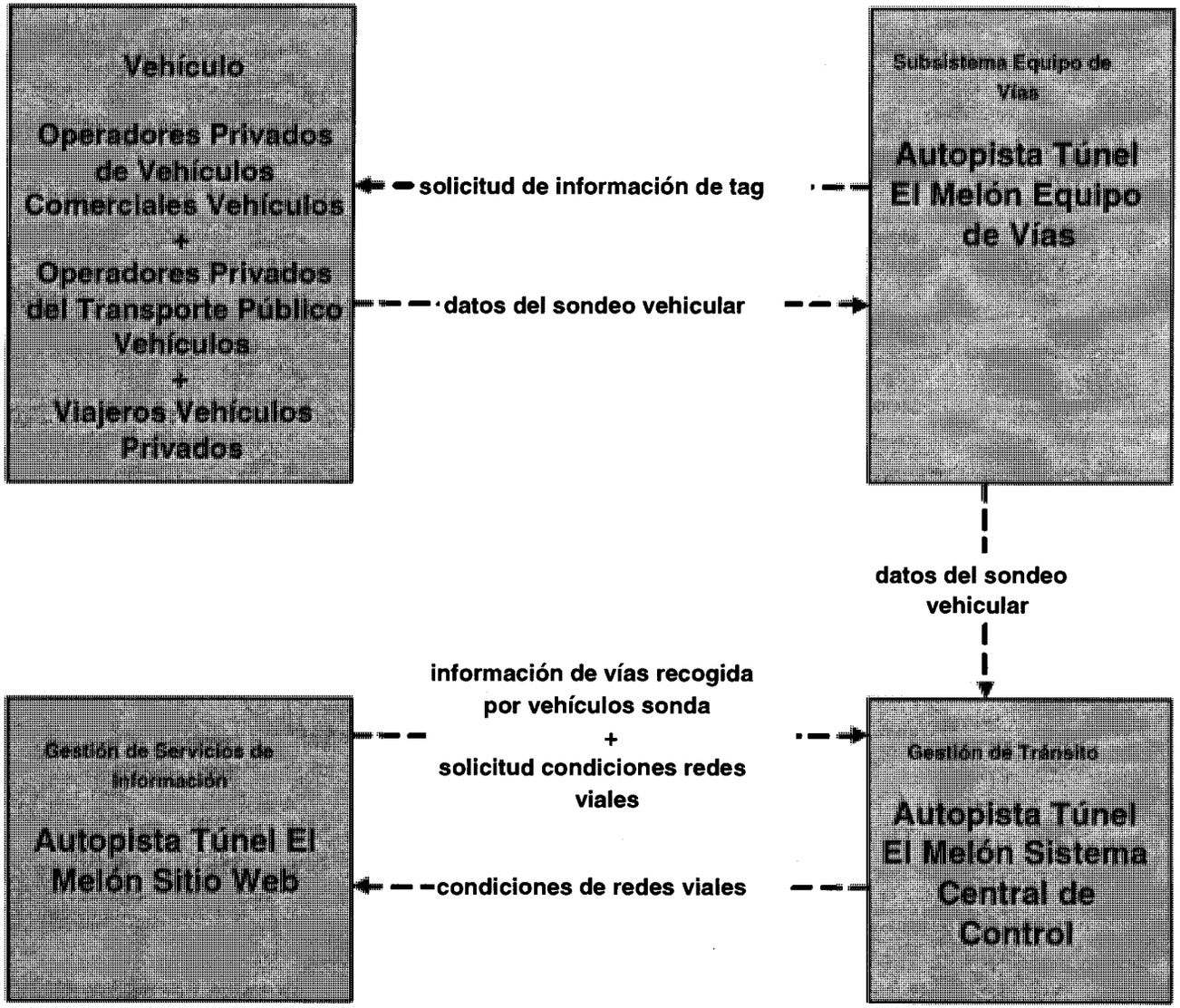
definici[illegible]uario

ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
Autopista Camino Nogales Puchuncaví





ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
Autopista Túnel El Melón



flujo futuro

flujo existente

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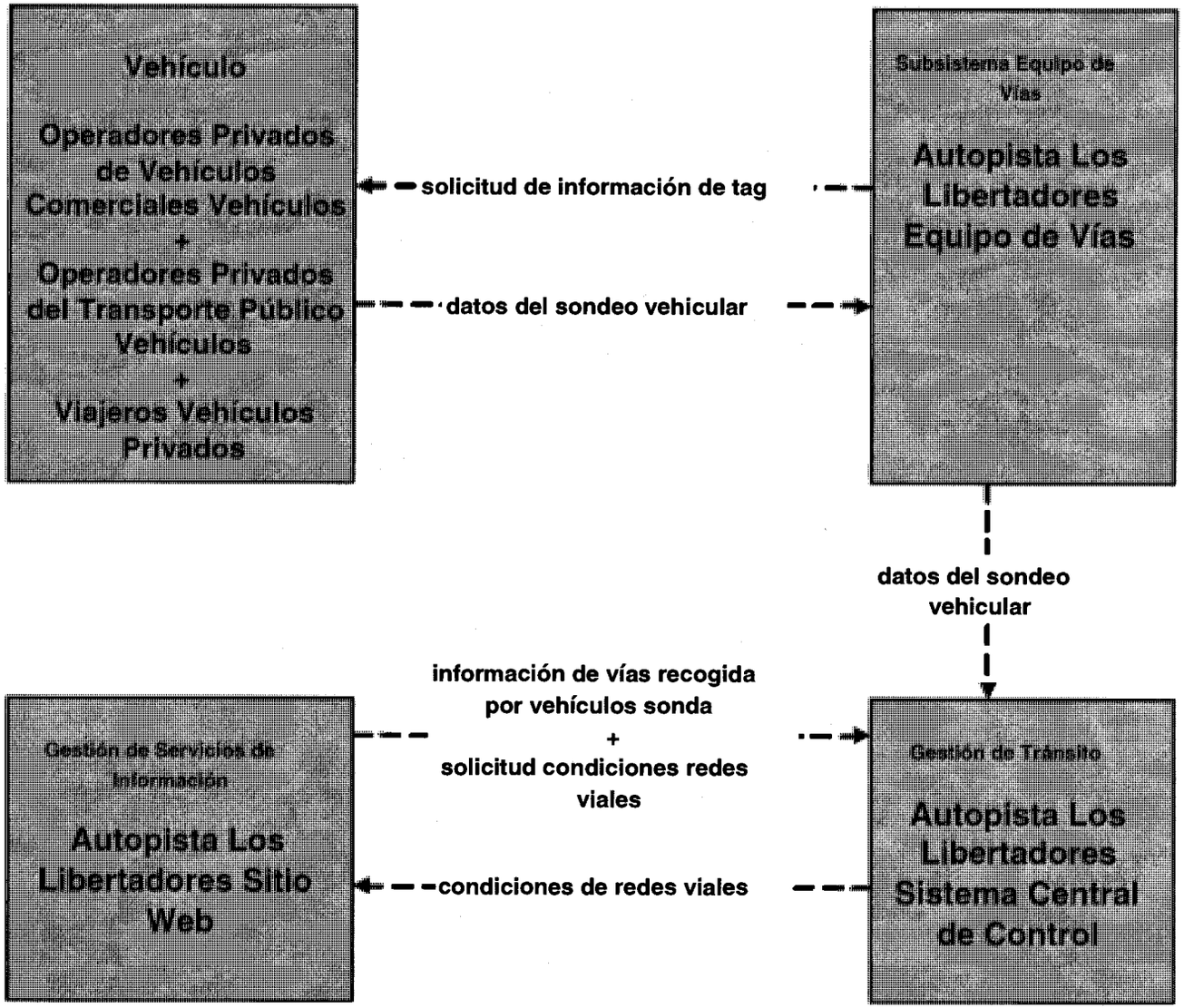
ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
Autopista Los Libertadores

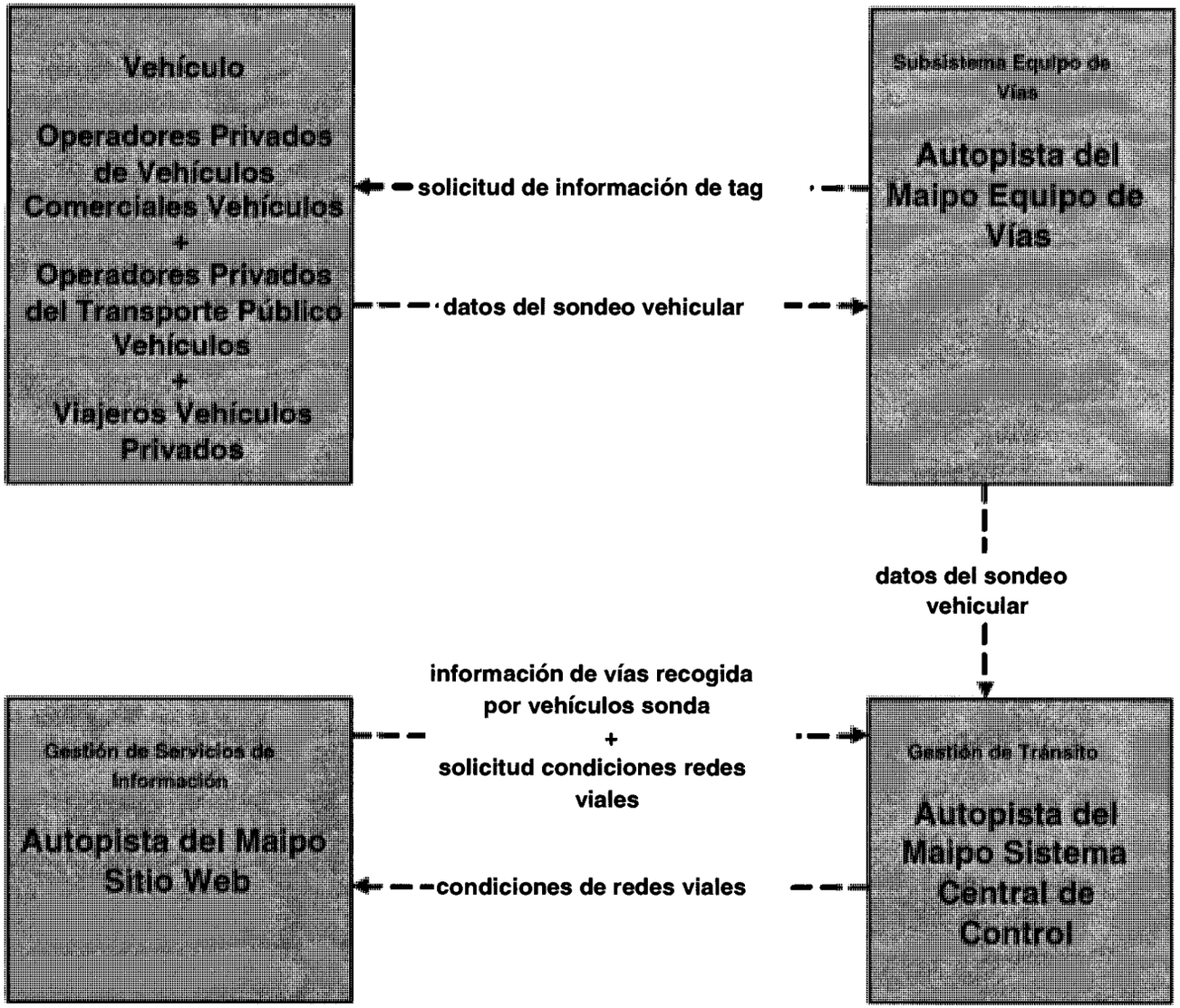


flujo futuro

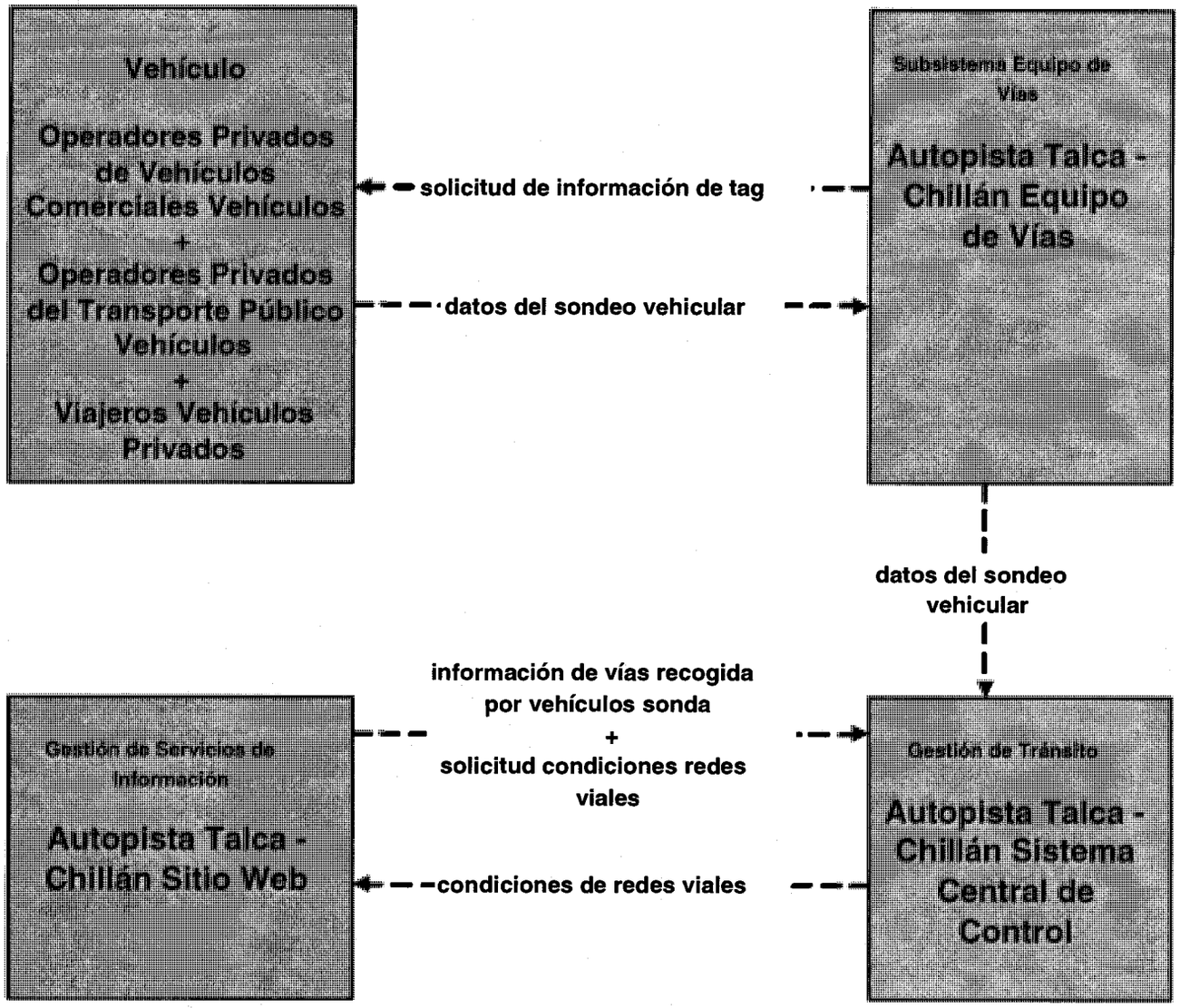
flujo existente

definición usuario

ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
Autopista del Maipo



ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
Autopista Talca - Chillán

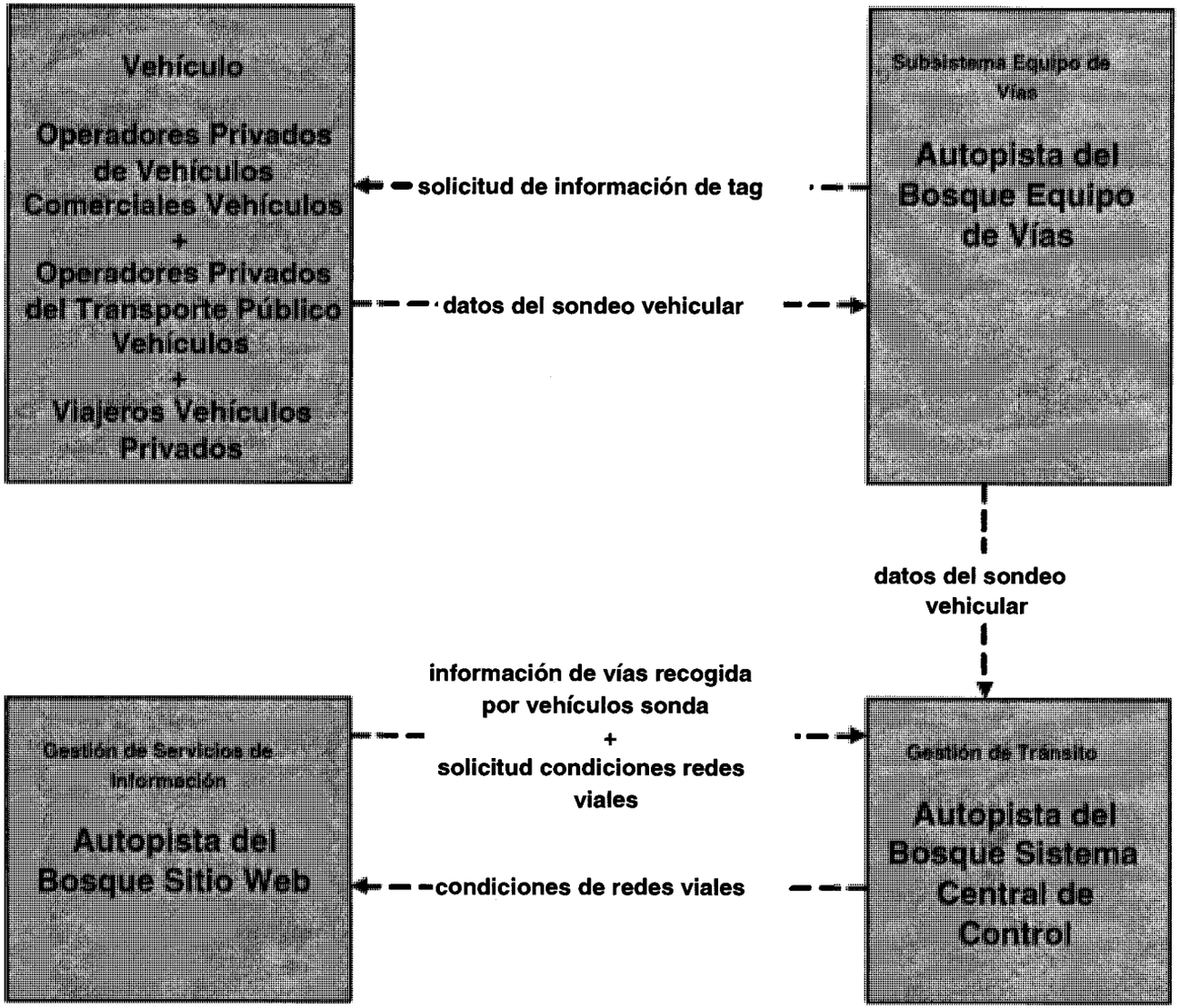


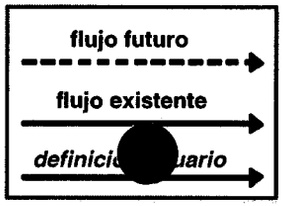
flujo futuro

flujo existente

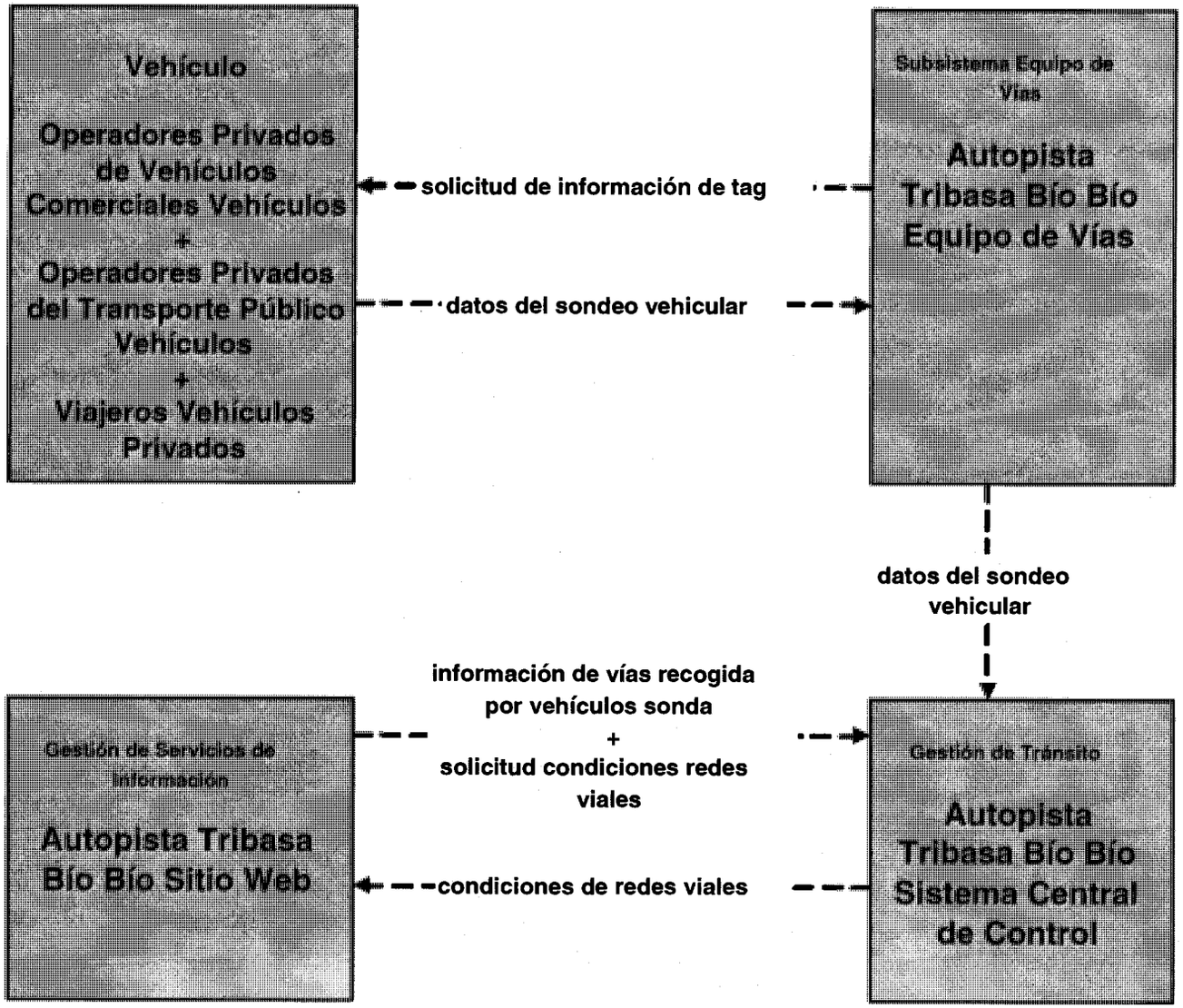
definición usuario

ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
Autopista del Bosque





ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
Autopista Tribasa Bío Bío

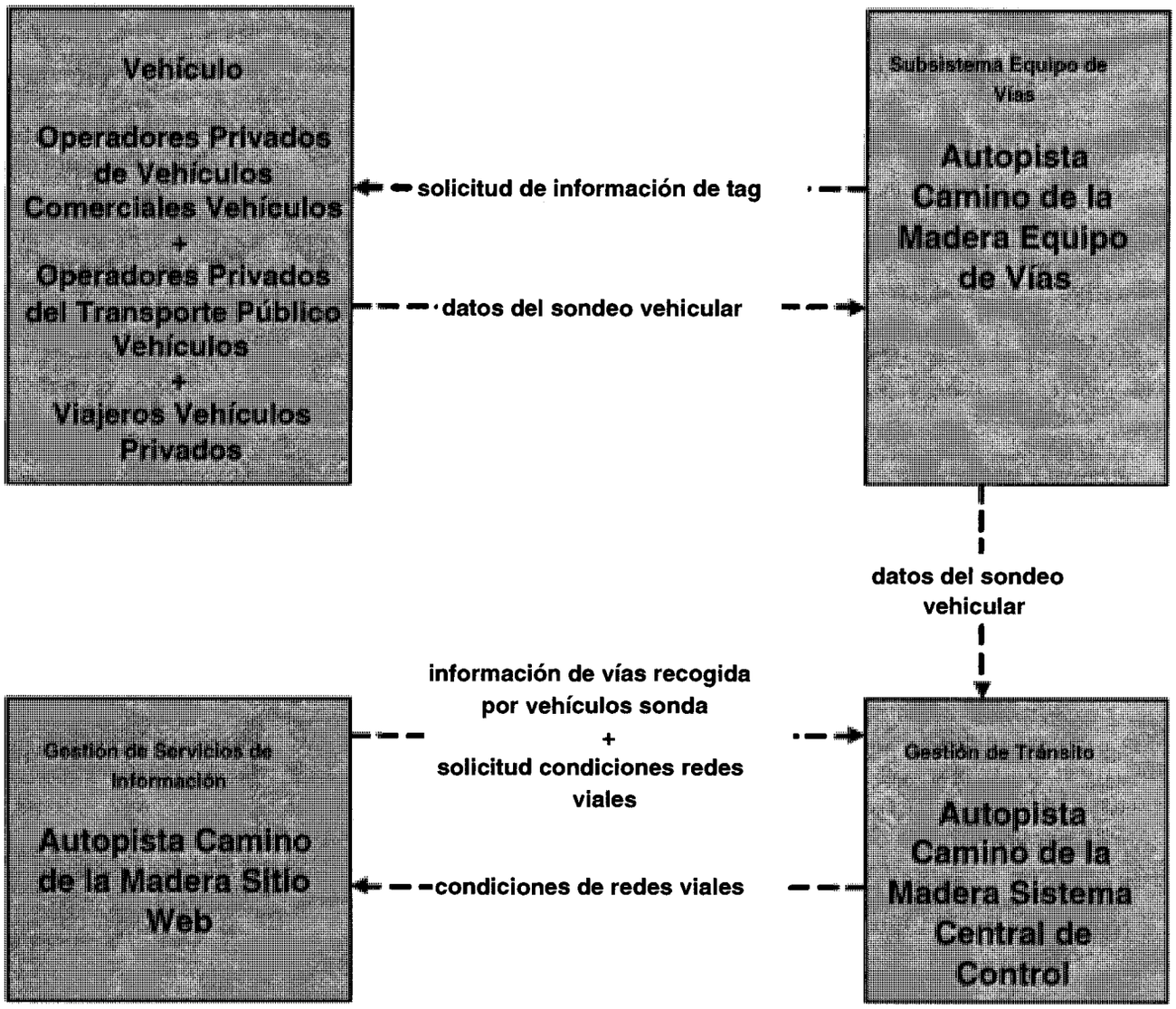


flujo futuro

flujo existente

definición usuario

ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
Autopista Camino de la Madera

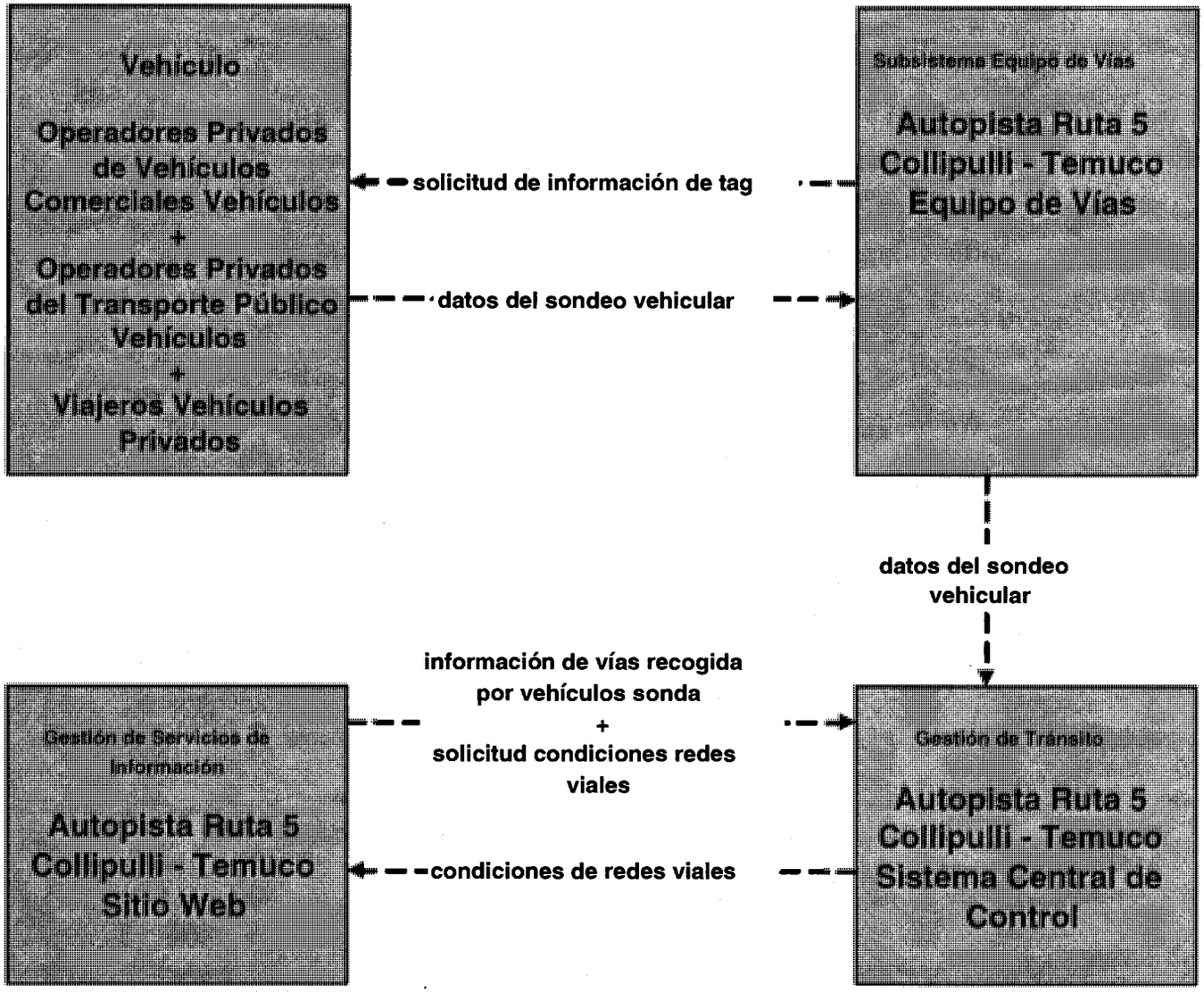


flujo futuro

flujo existente

definici[illegible]uario

ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
Autopista Ruta 5 Collipulli - Temuco

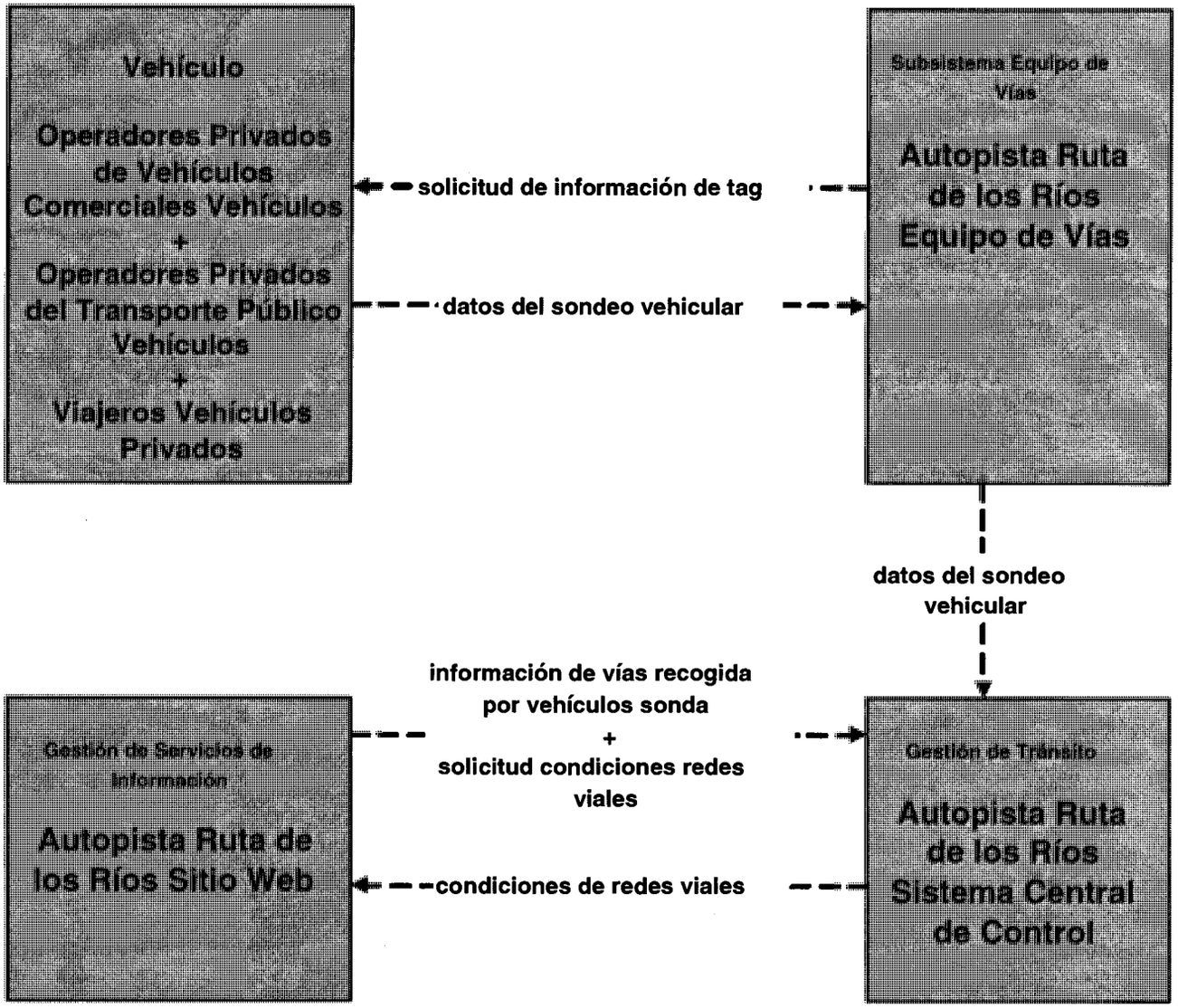


flujo futuro

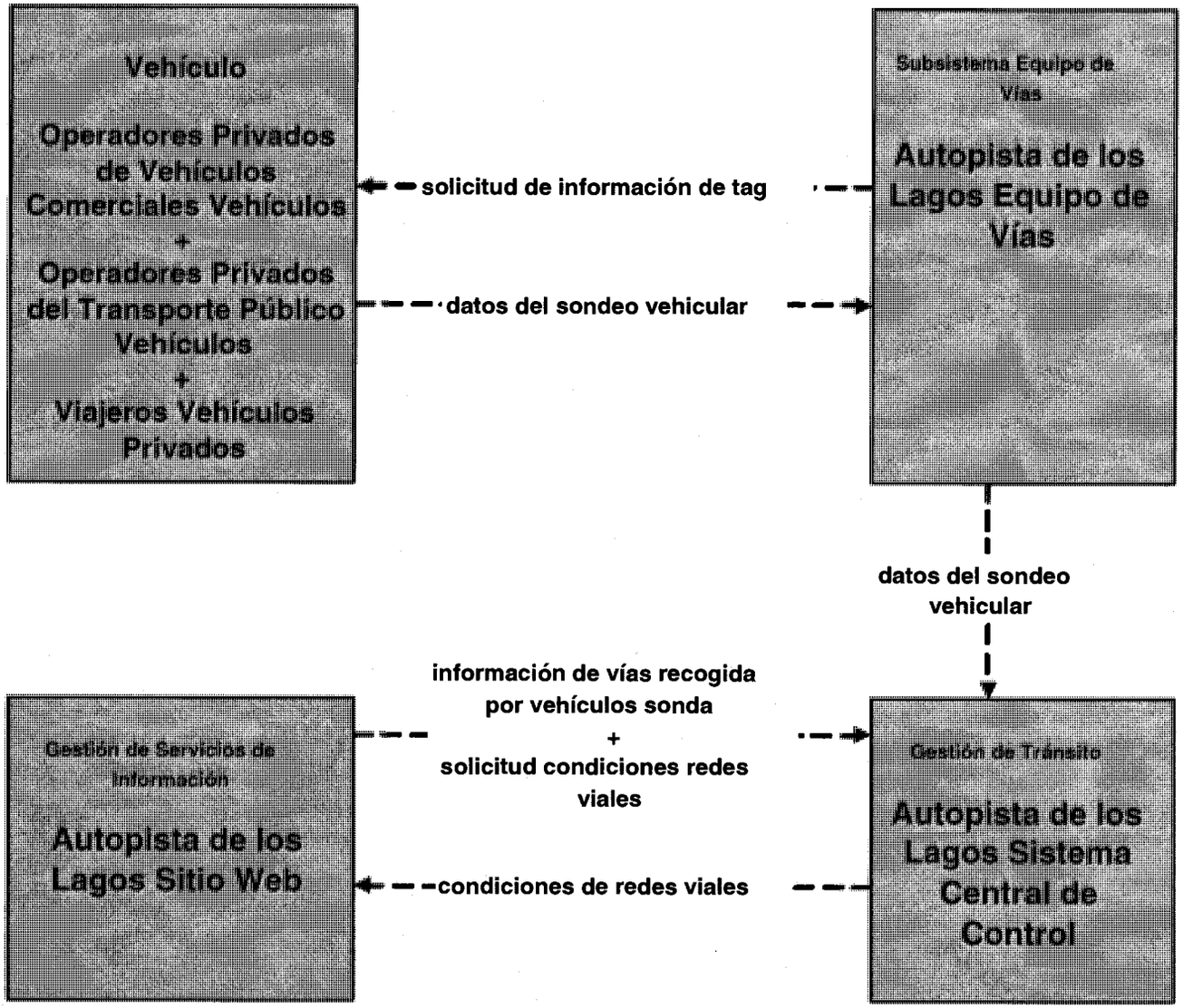
flujo existente

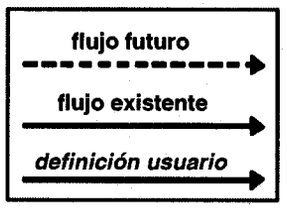
definición usuario

ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
Autopista Ruta de los Ríos

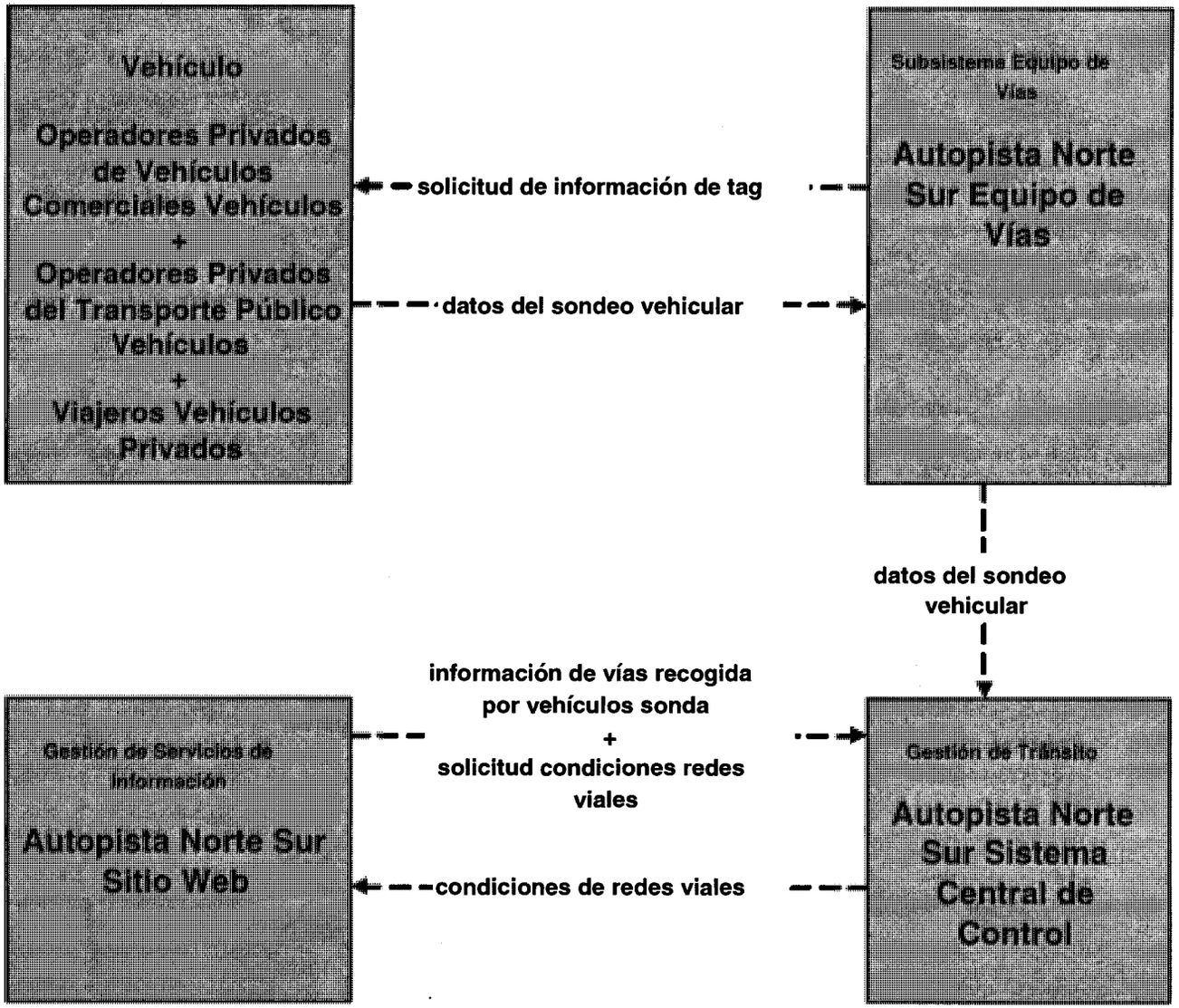


ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
Autopista de los Lagos





ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
Autopistas Norte Sur

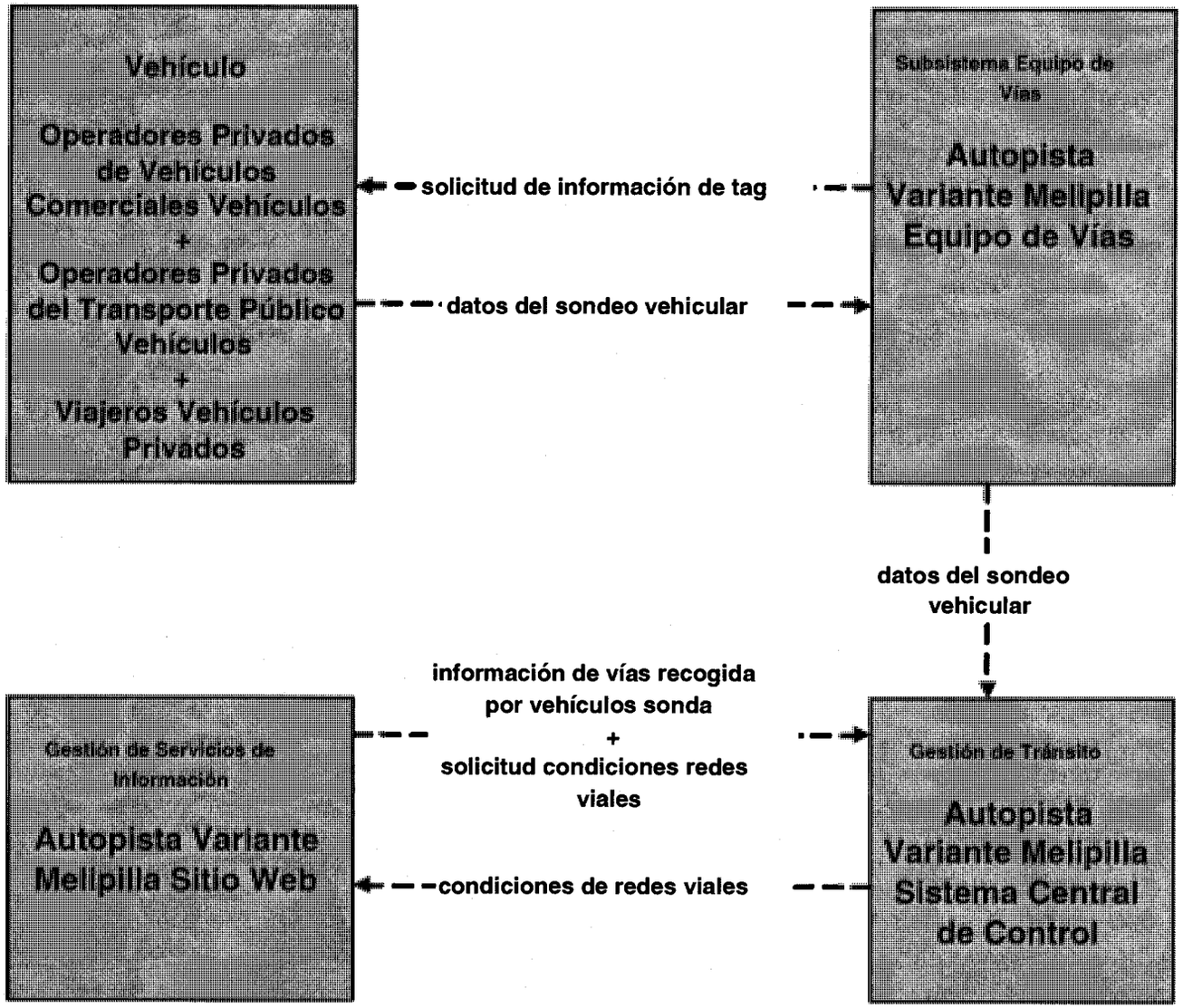


flujo futuro

flujo existente

definici[illegible]uario

ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
Autopista Variante Melipilla

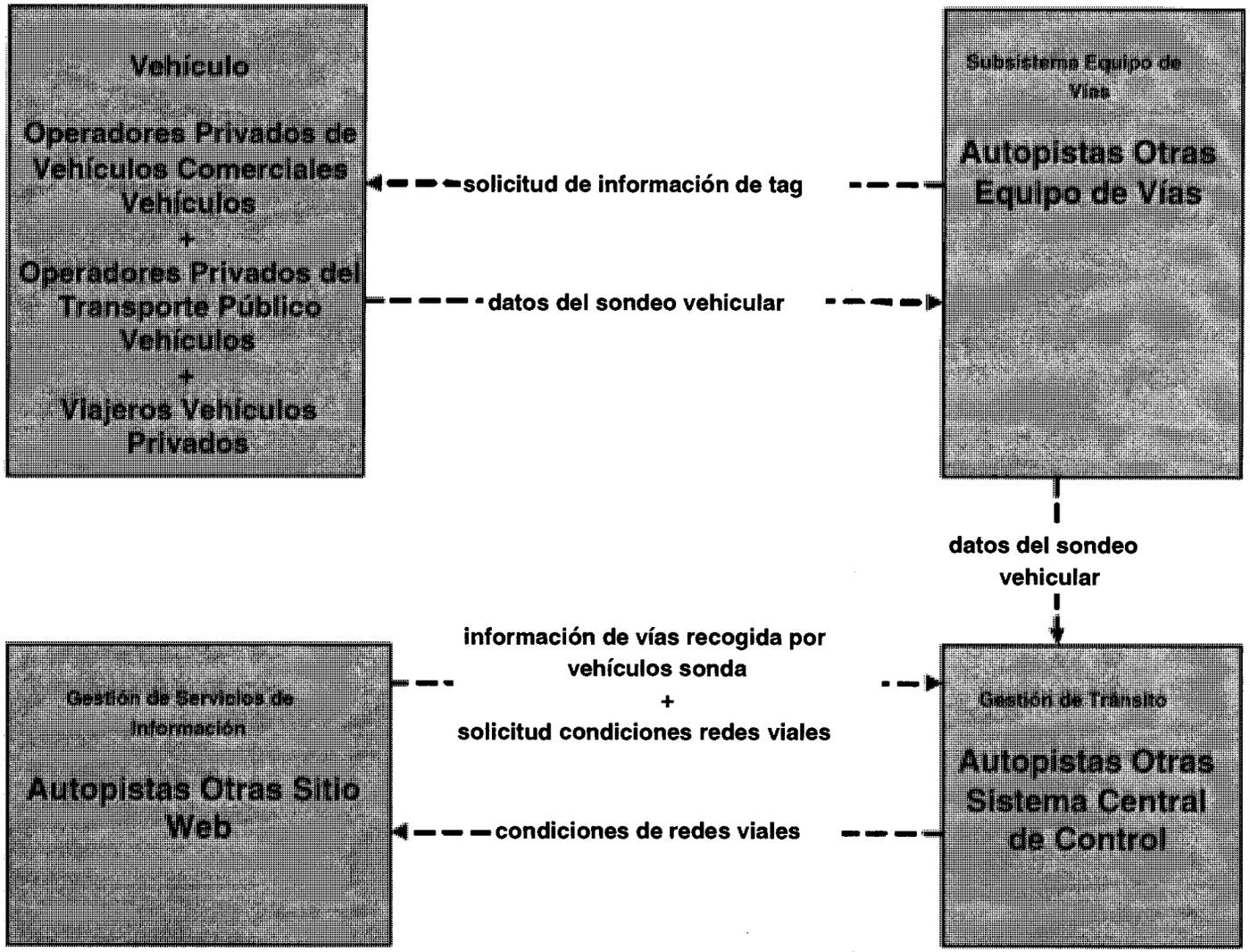


flujo futuro

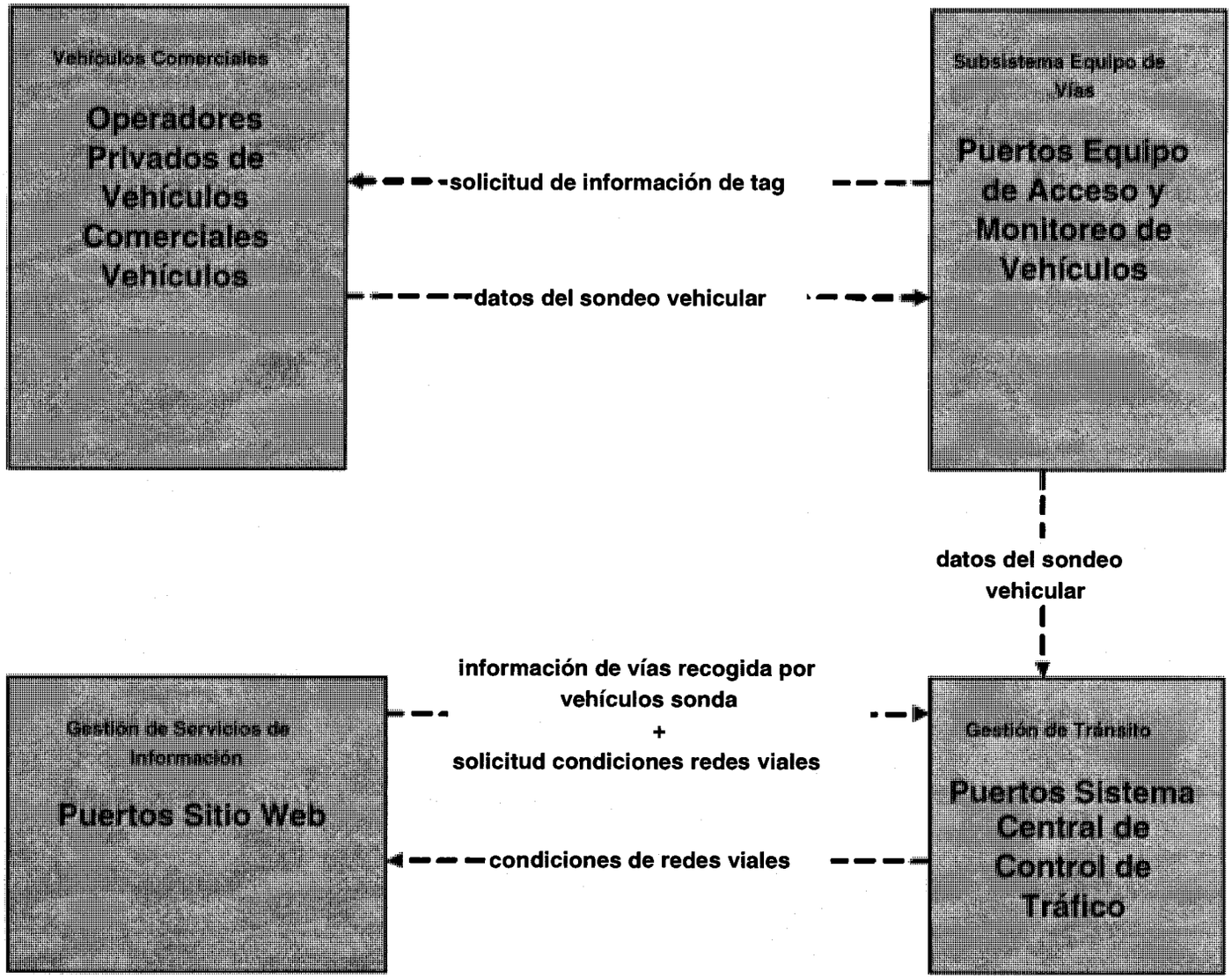
flujo existente

definición usuario

ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
Autopistas Otras



ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda Puertos

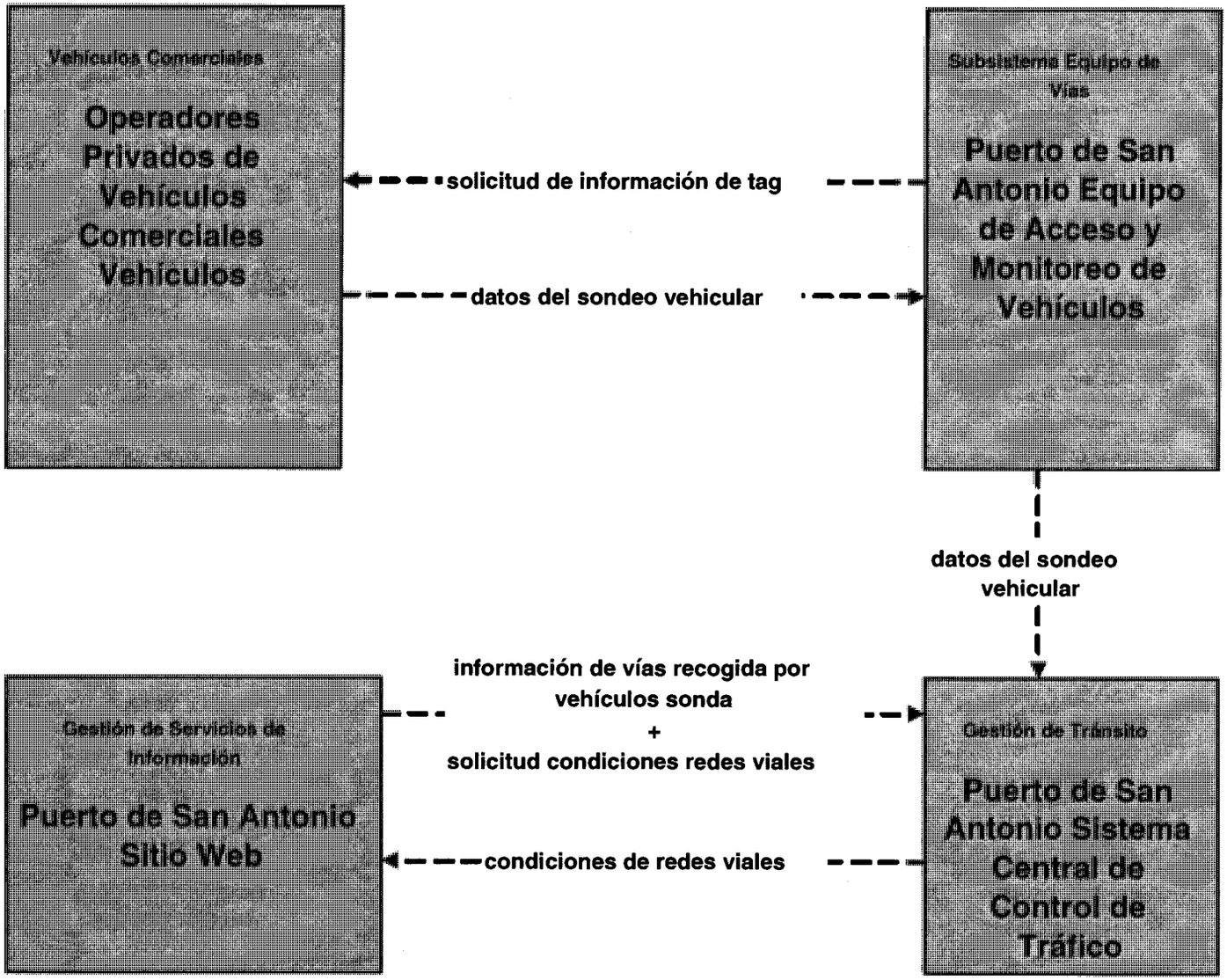


flujo futuro

flujo existente

definición usuario

ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
Puerto de San Antonio

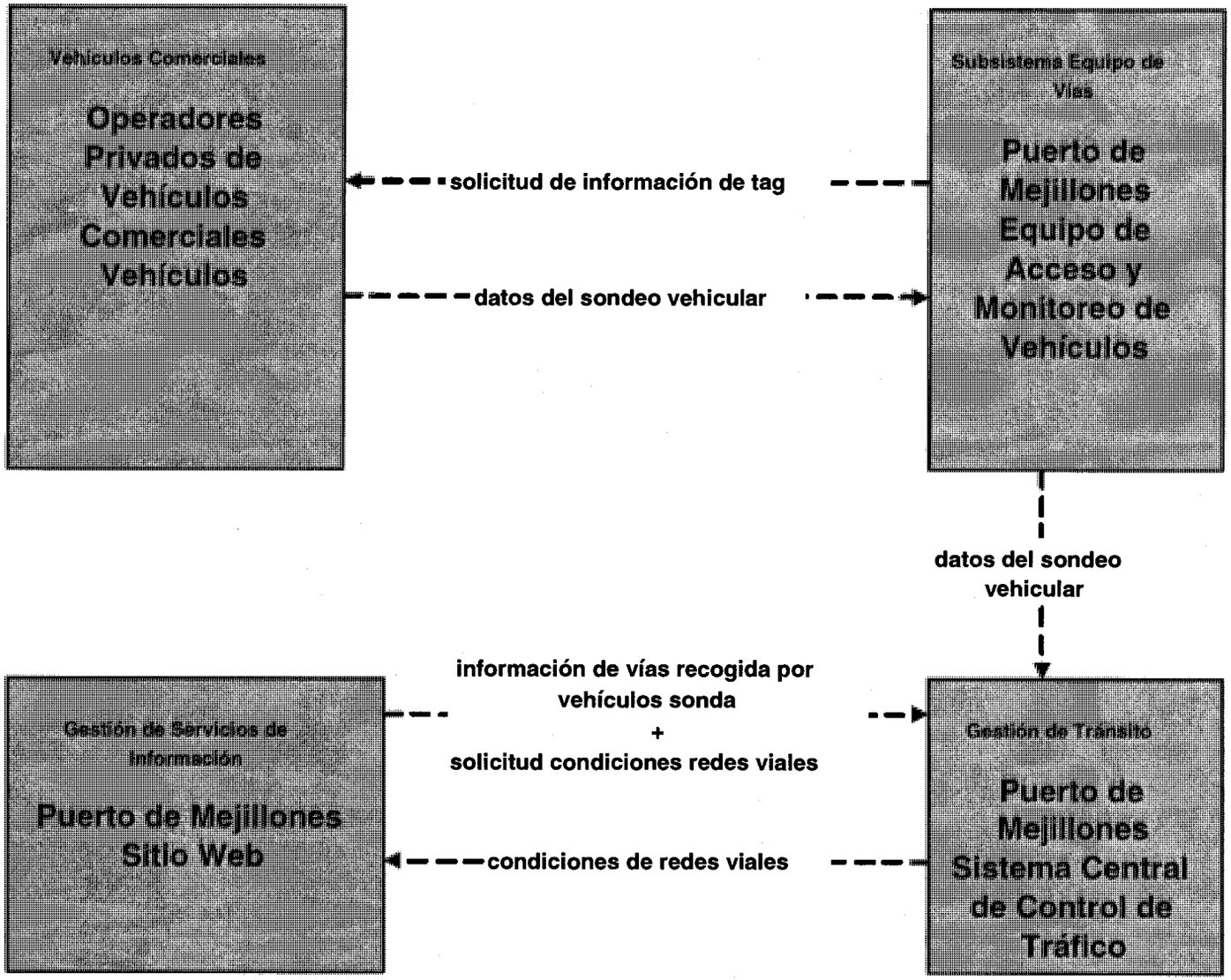


flujo futuro

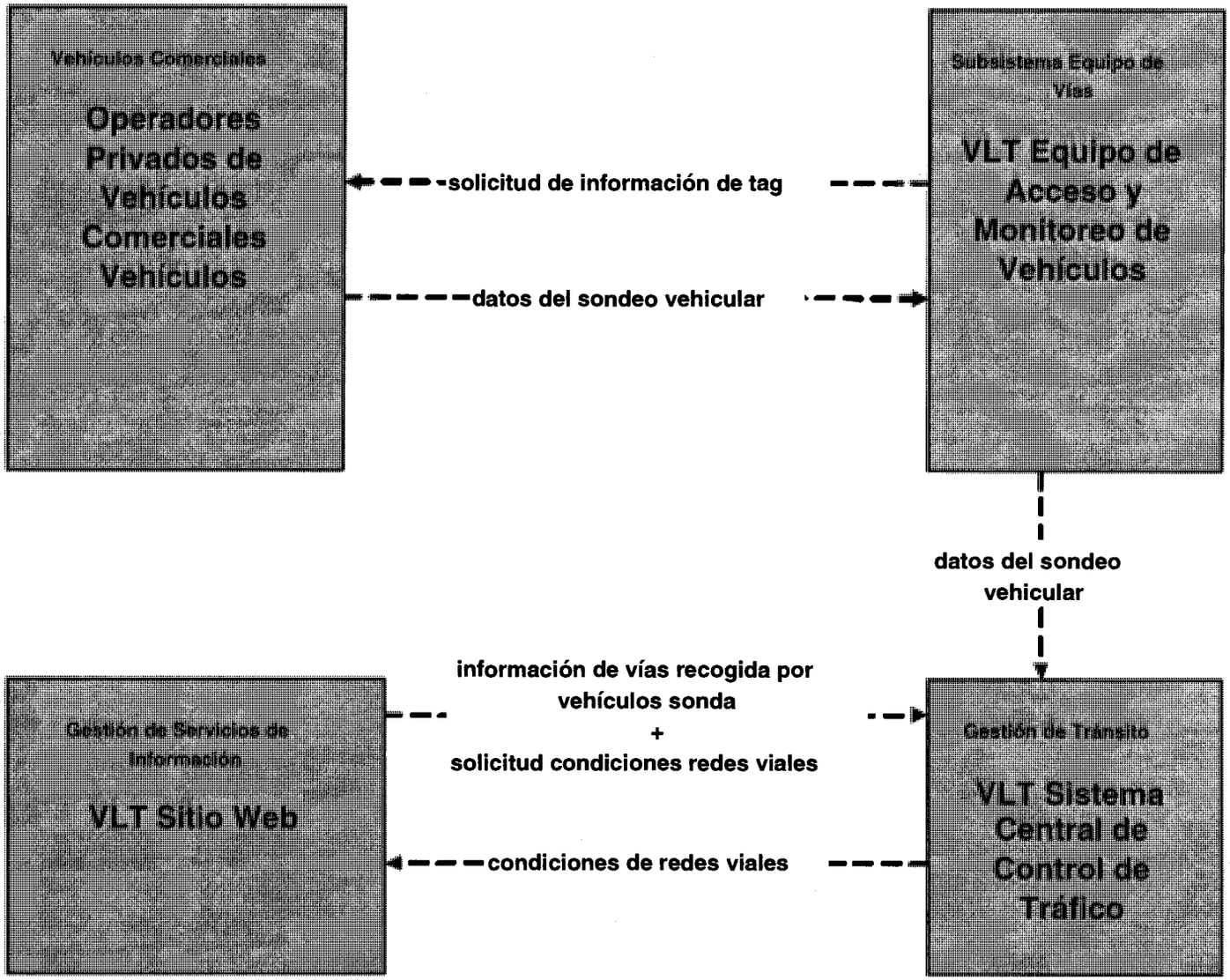
flujo existente

definici[illegible]uario

ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda
Puerto de Mejillones



ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda VLT

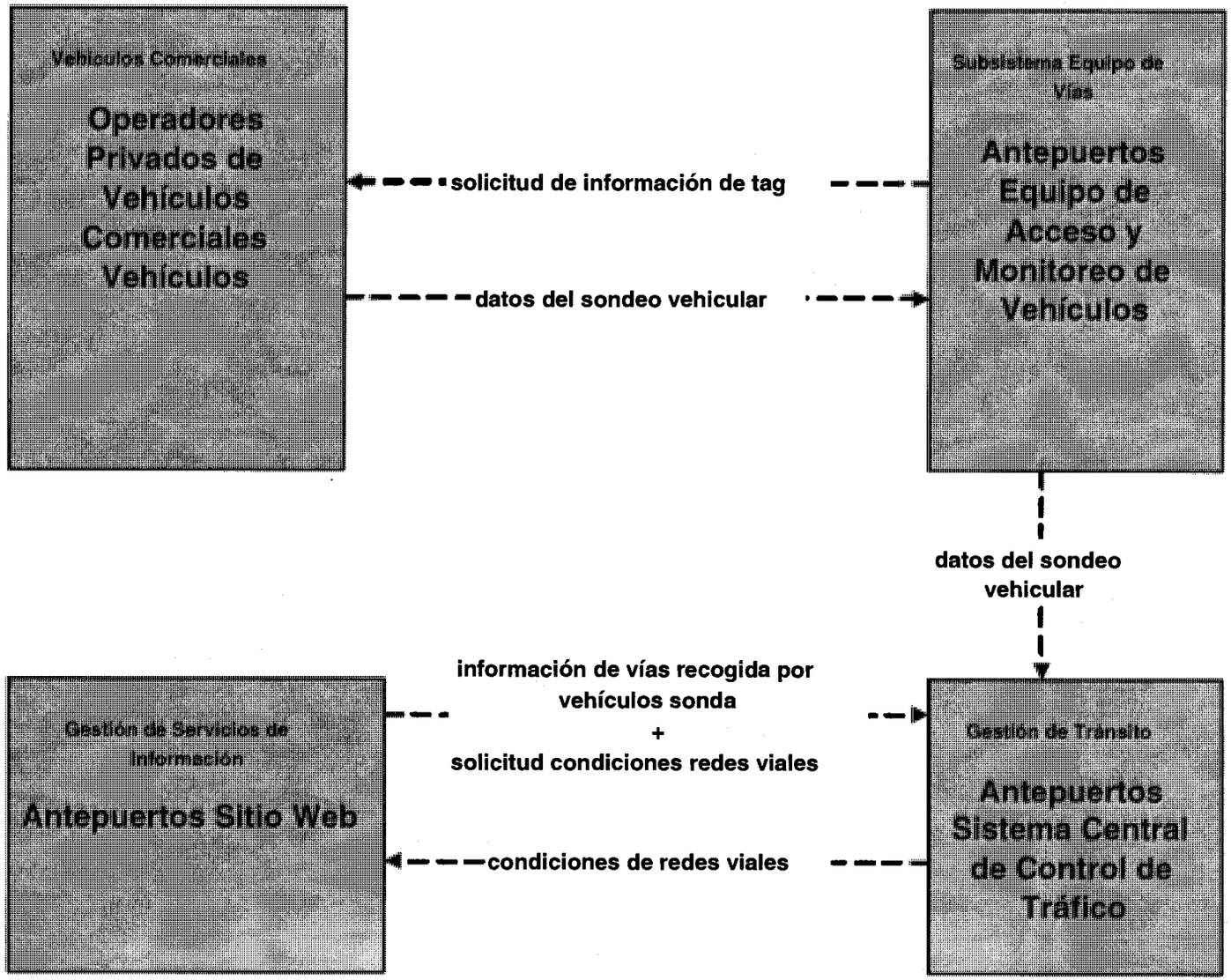


flujo futuro

flujo existente

definici[illegible]uario

ATMS 02 - Monitoreo de la Red Utilizando Vehículos Sonda Antepuertos

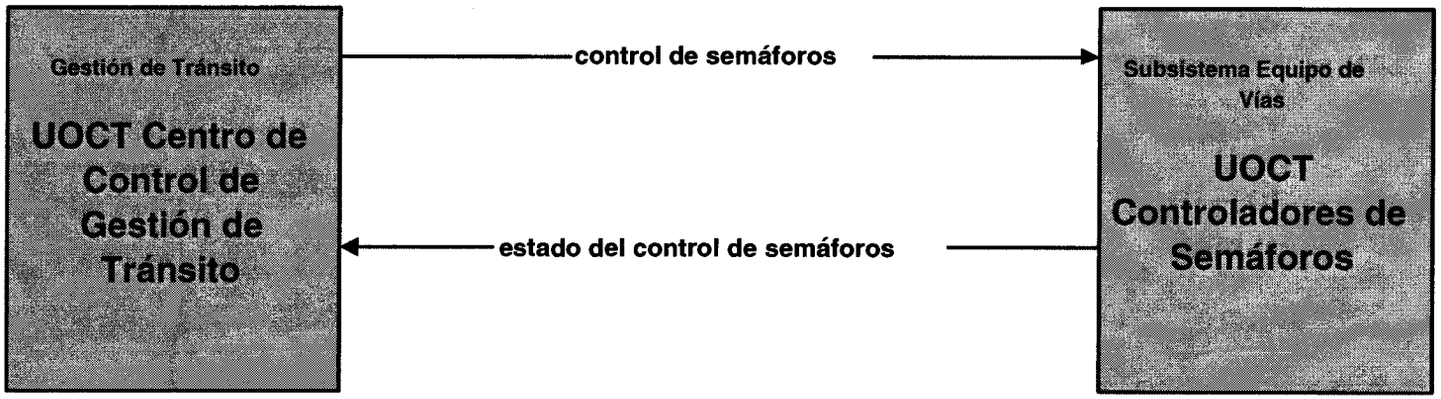


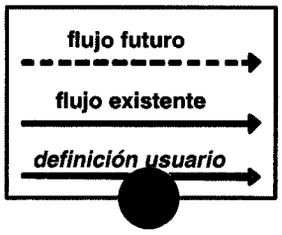
flujo futuro

flujo existente

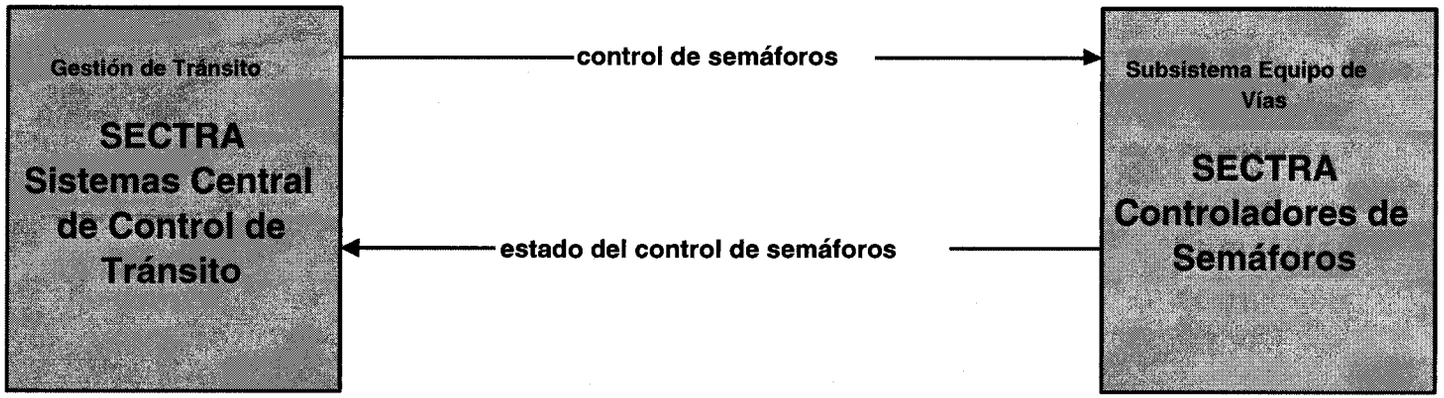
definición usuario

ATMS 03 - Sistemas de Control de Tránsito
UOCT

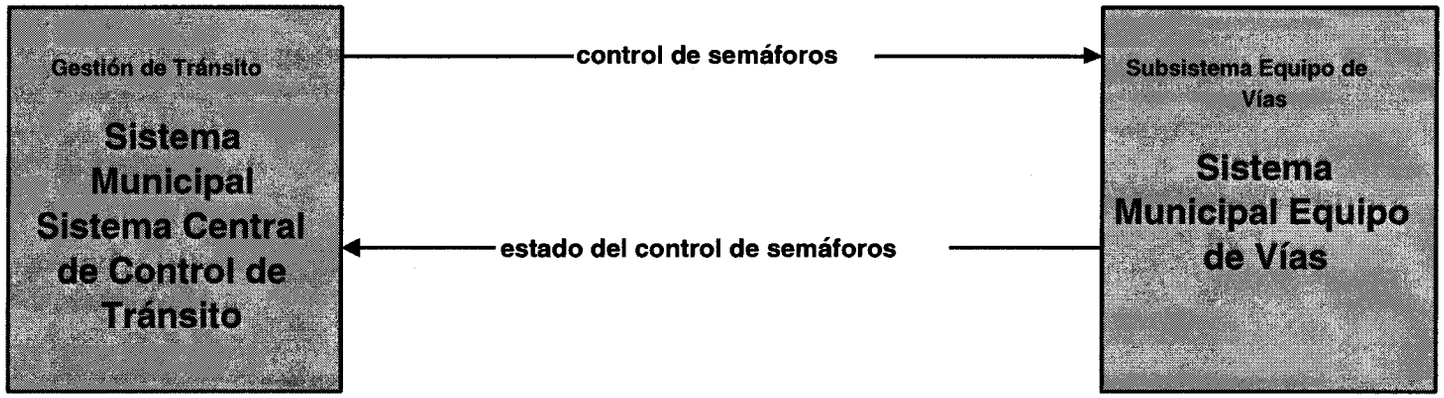


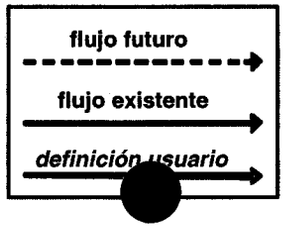


ATMS 03 - Sistemas de Control de Tránsito
SECTRA Sistemas de Control de Semáforos

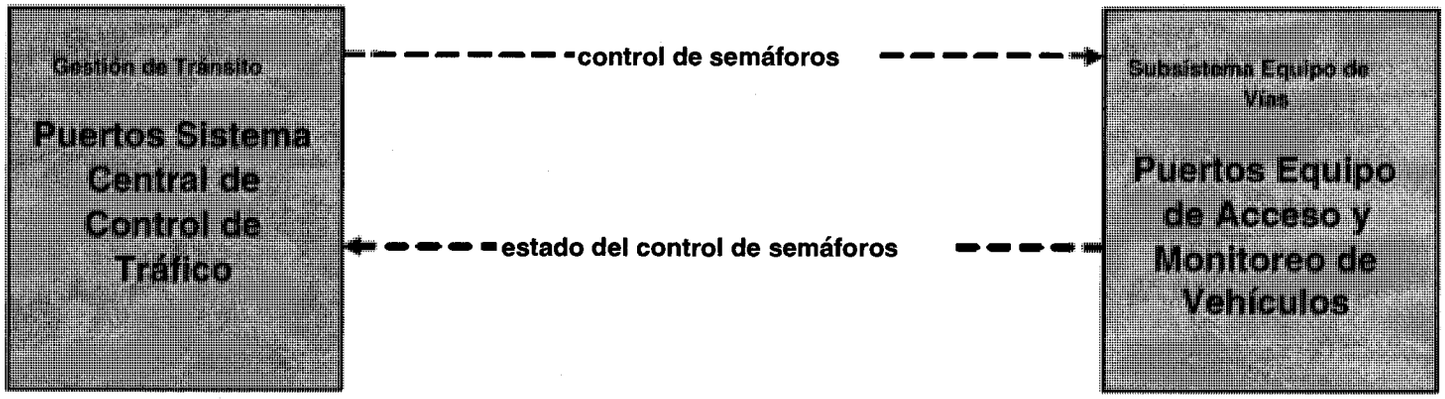


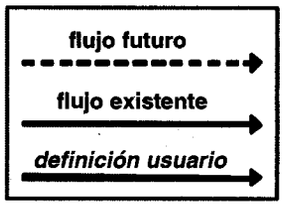
ATMS 03 - Sistemas de Control de Tránsito
Sistema Municipal de Control de Semáforos



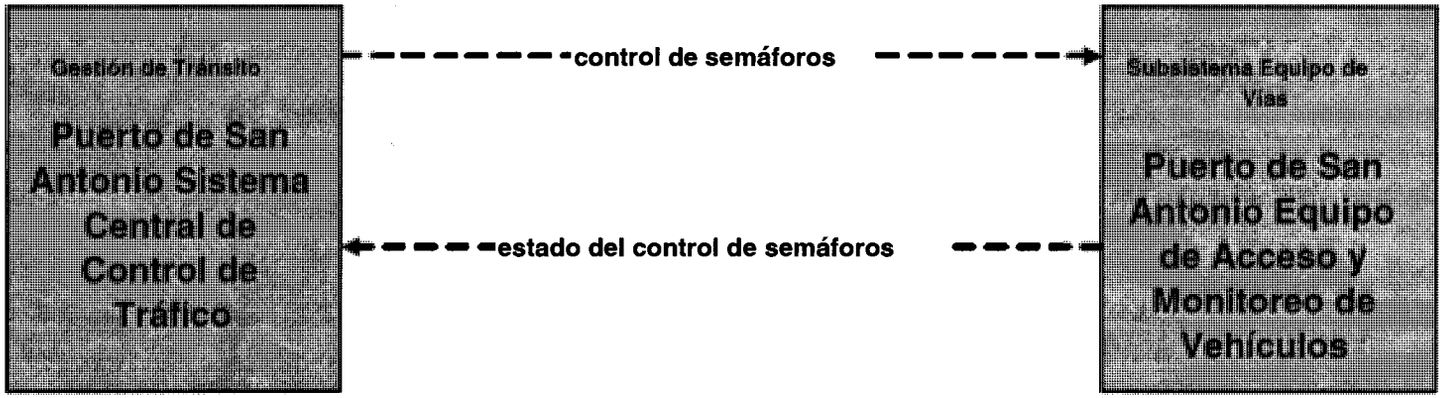


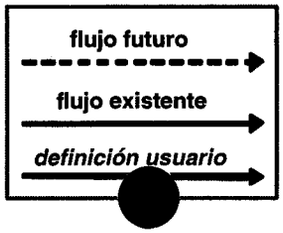
ATMS 03 - Sistemas de Control de Tránsito
Puertos



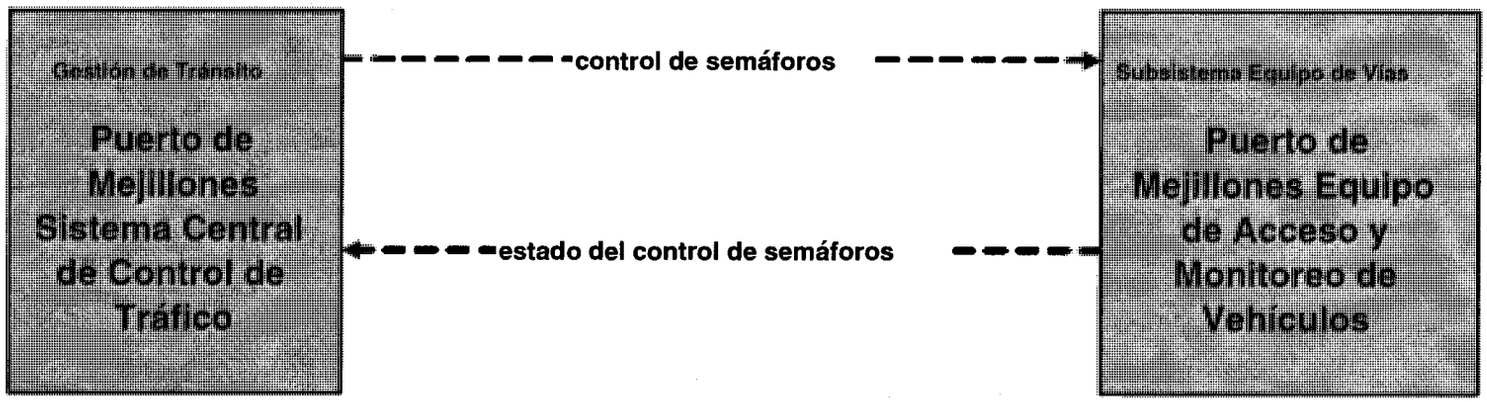


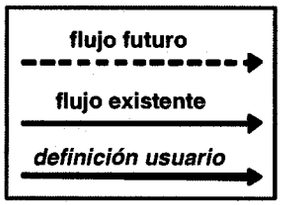
ATMS 03 - Sistemas de Control de Tránsito
Puerto de San Antonio



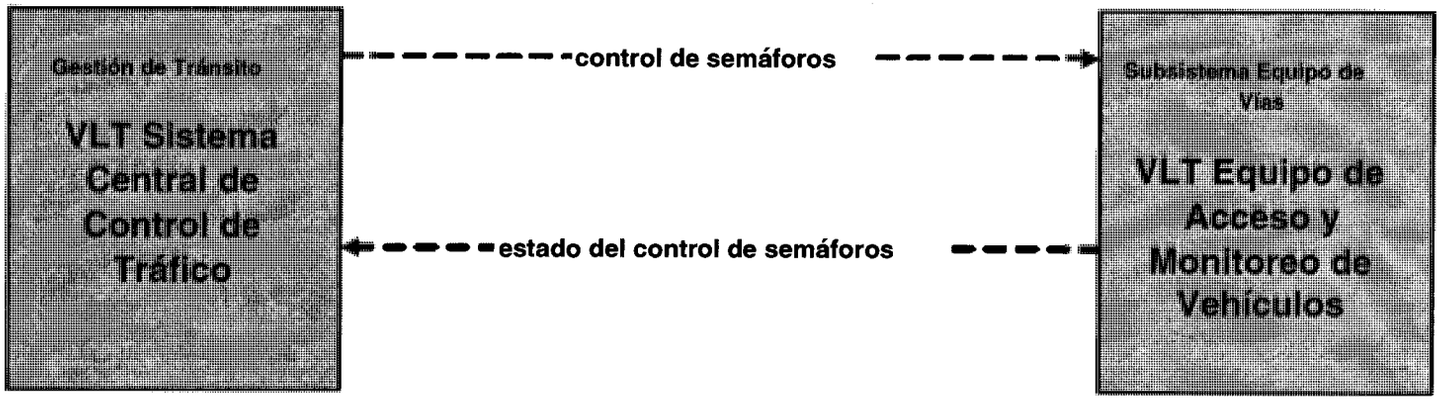


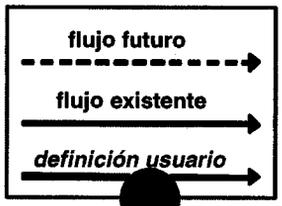
ATMS 03 - Sistemas de Control de Tránsito
Puerto de Mejillones



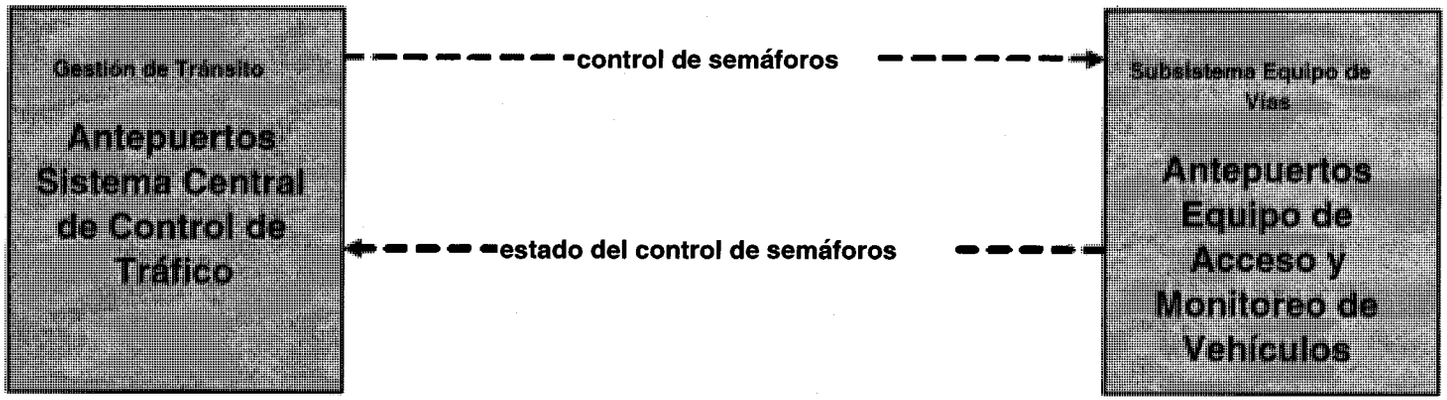


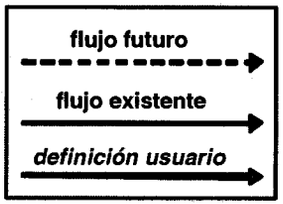
ATMS 03 - Sistemas de Control de Tránsito
VLT



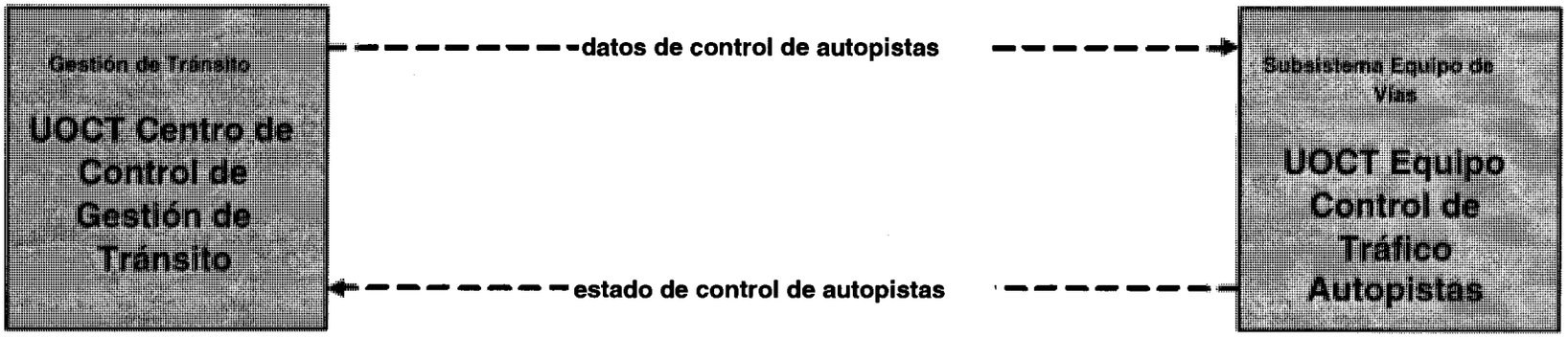


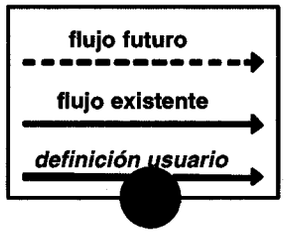
ATMS 03 - Sistemas de Control de Tránsito
Antepuertos



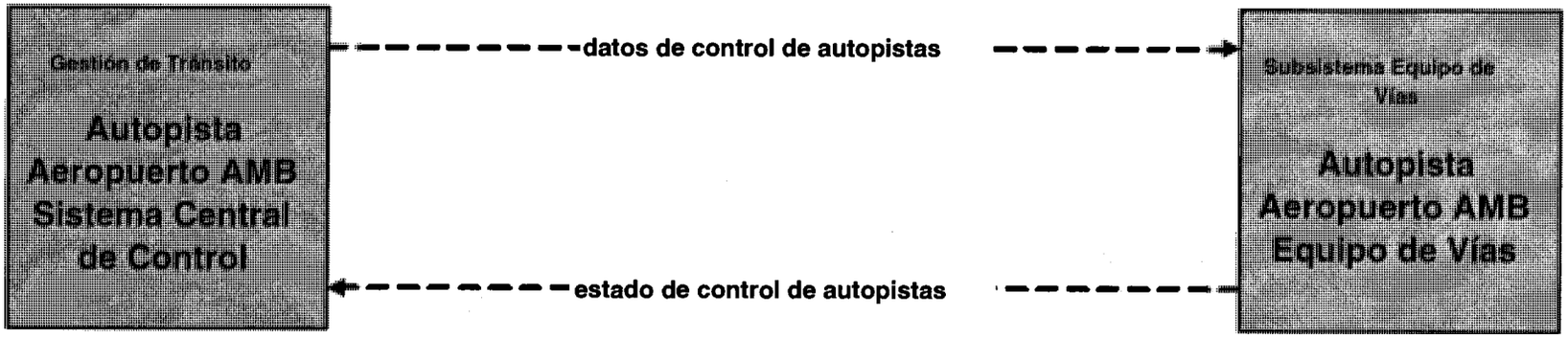


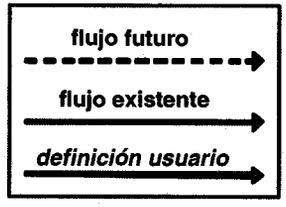
ATMS 04 - Sistemas de Control de Autopistas
UOCT



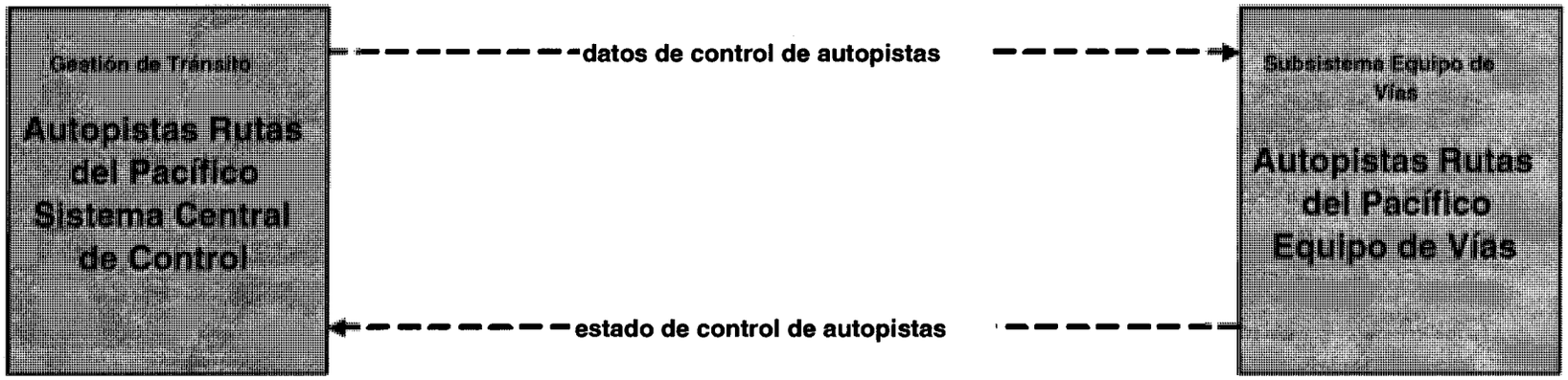


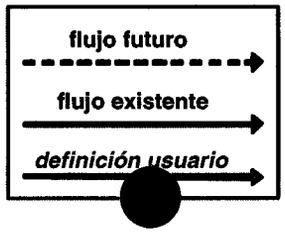
ATMS04 - Sistemas de Control de Autopistas
Autopista Aeropuerto AMB



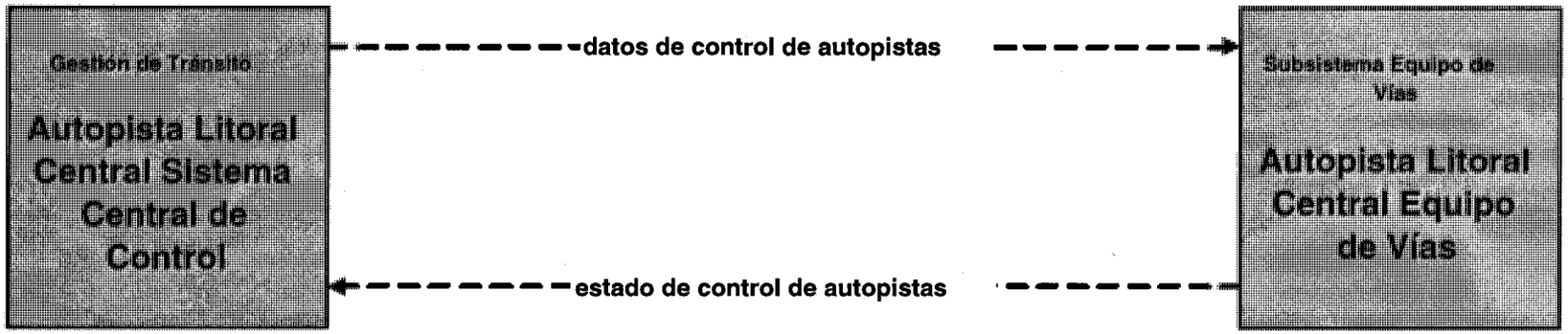


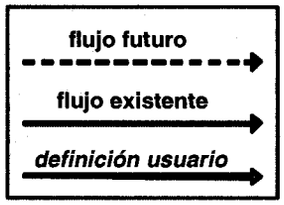
ATMS 04 - Sistemas de Control de Autopistas
Autopistas Rutas del Pacifico



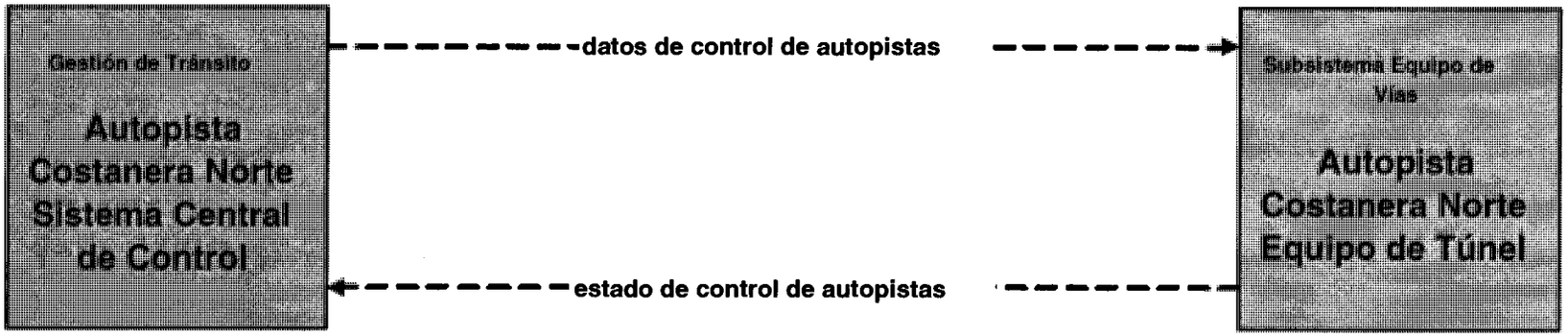


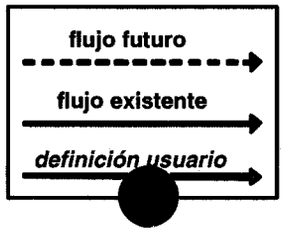
ATMS 04 - Sistemas de Control de Autopistas
Autopista Litoral Central



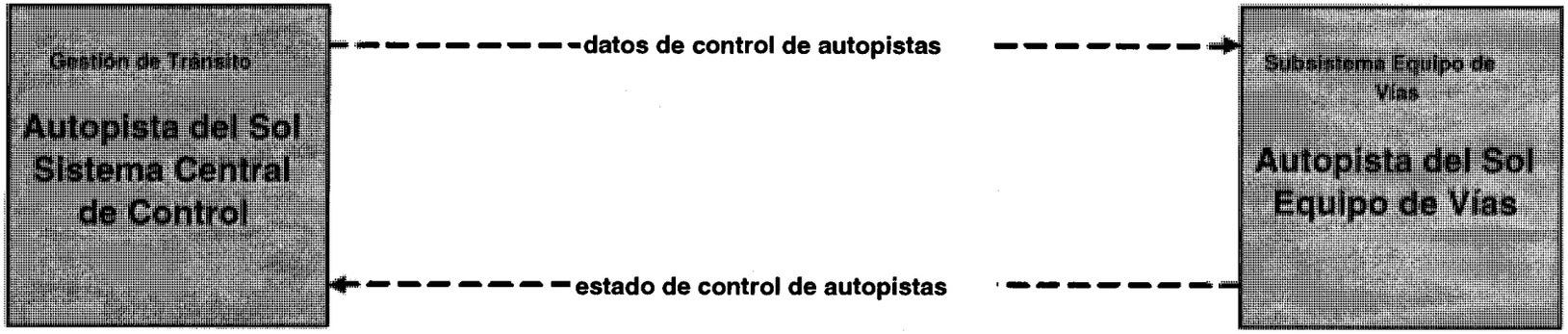


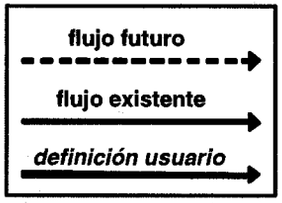
ATMS 04 - Sistemas de Control de Autopistas
Autopista Costanera Norte



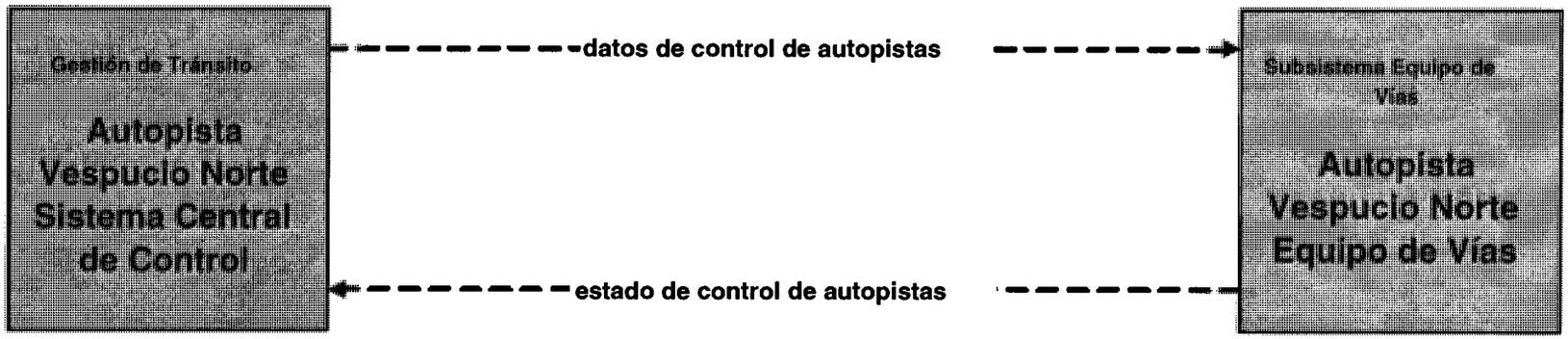


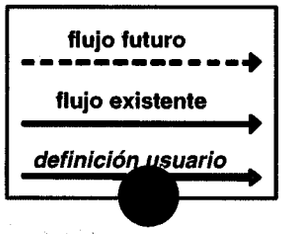
ATMS 04 - Sistemas de Control de Autopistas
Autopista del Sol



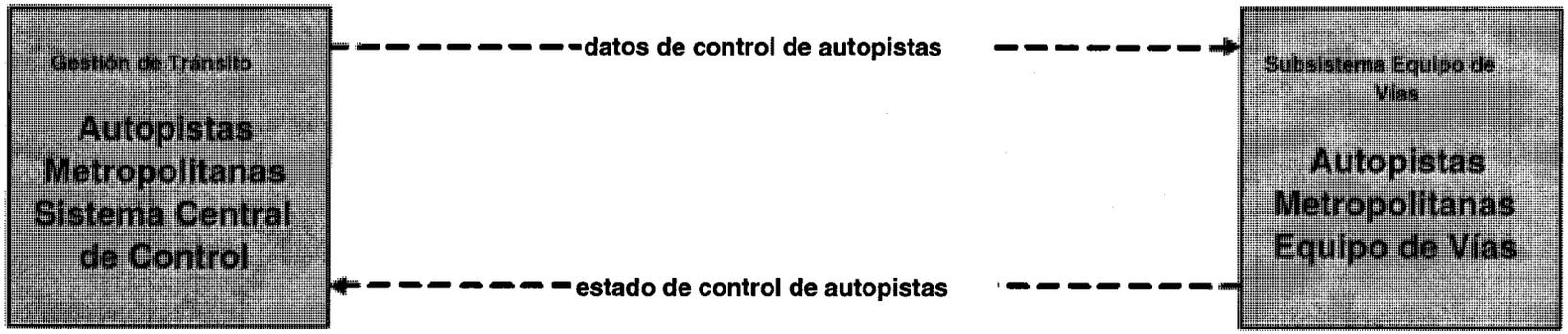


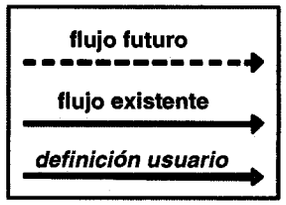
ATMS 04 - Sistemas de Control de Autopistas
Autopista Vespucio Norte



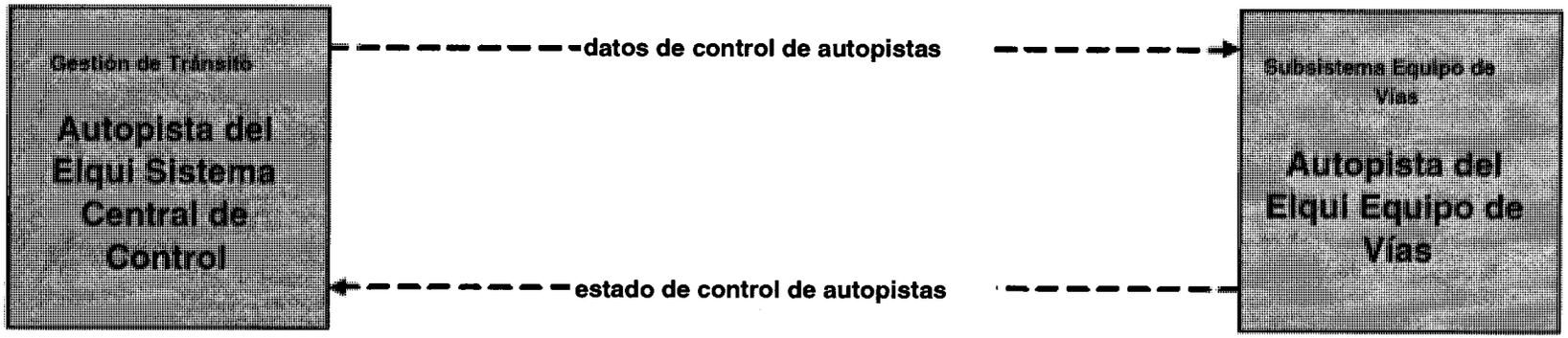


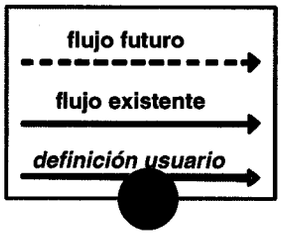
ATMS 04 - Sistemas de Control de Autopistas
Autopistas Metropolitanas





ATMS 04 - Sistemas de Control de Autopistas
Autopistas del Elqui





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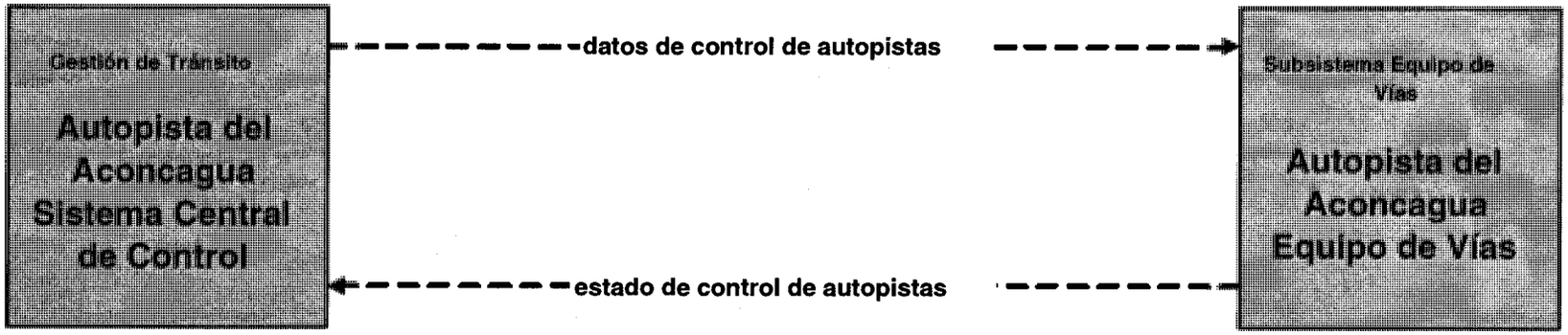

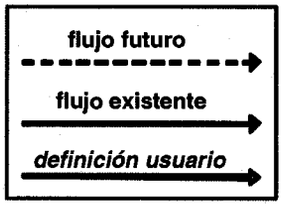

ATMS 04 - Sistemas de Control de Autopistas
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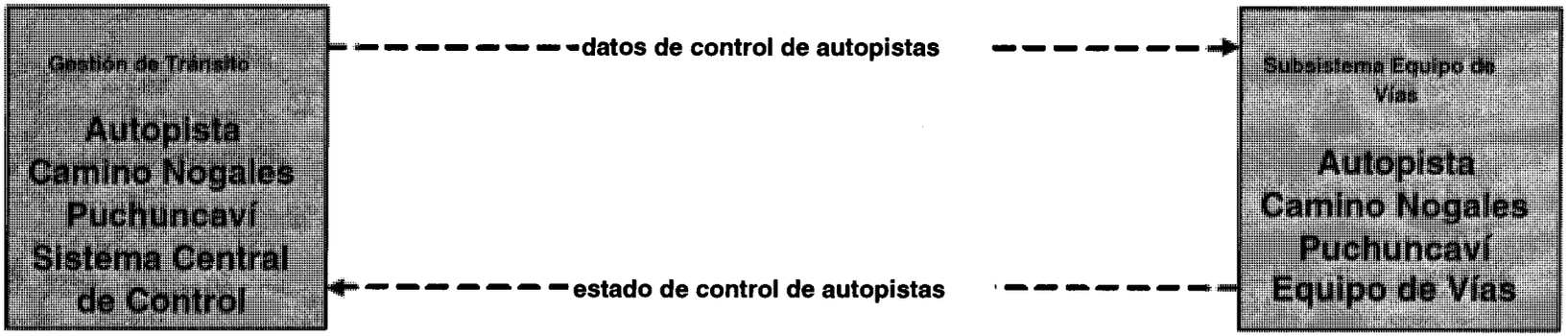

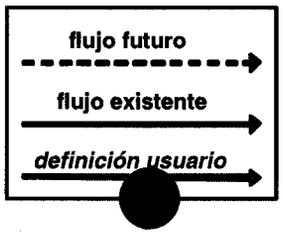

ATMS 04 - Sistemas de Control de Autopistas
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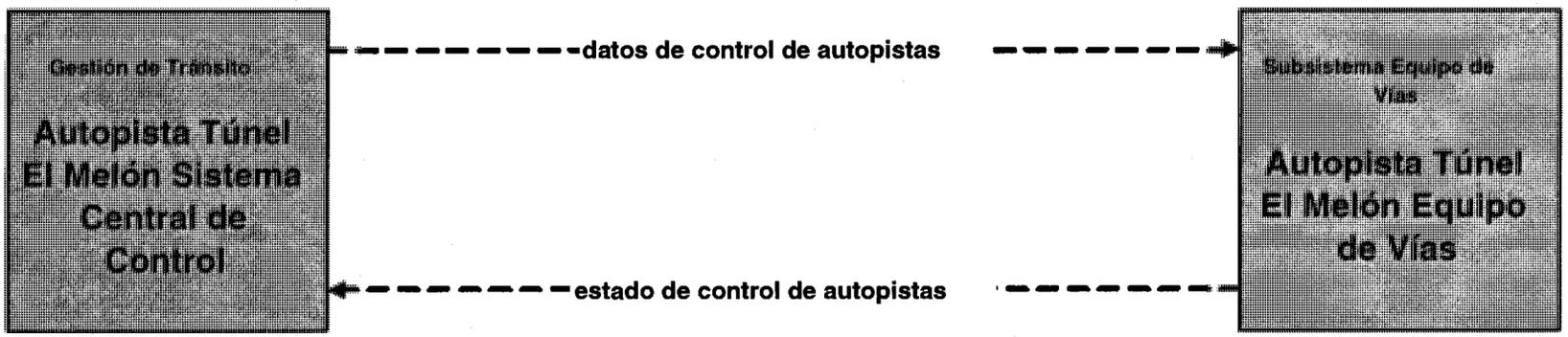

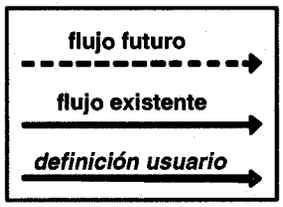

ATMS 04 - Sistemas de Control de Autopistas
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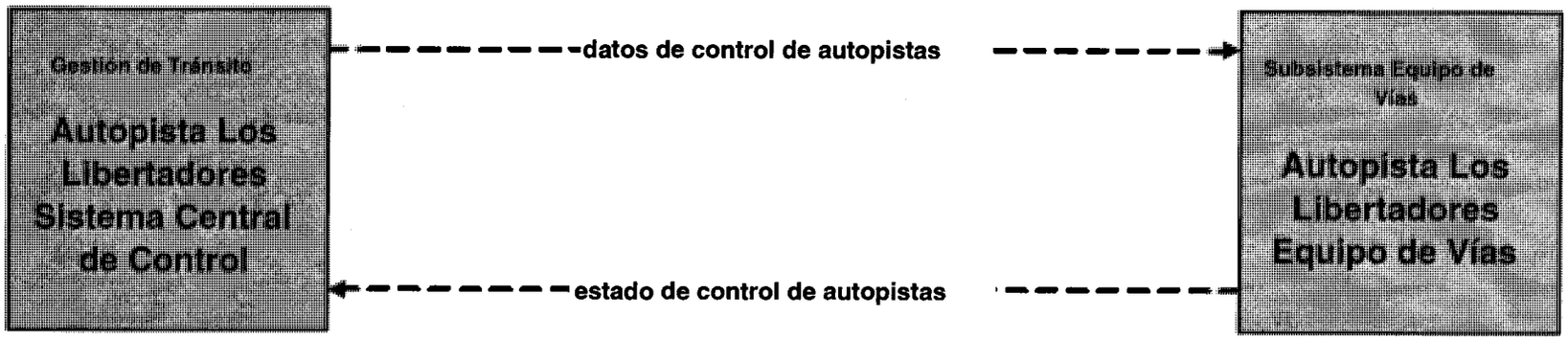

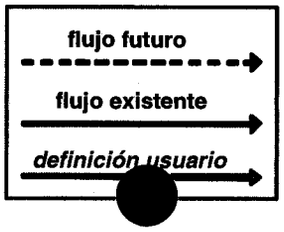

ATMS 04 - Sistemas de Control de Autopistas
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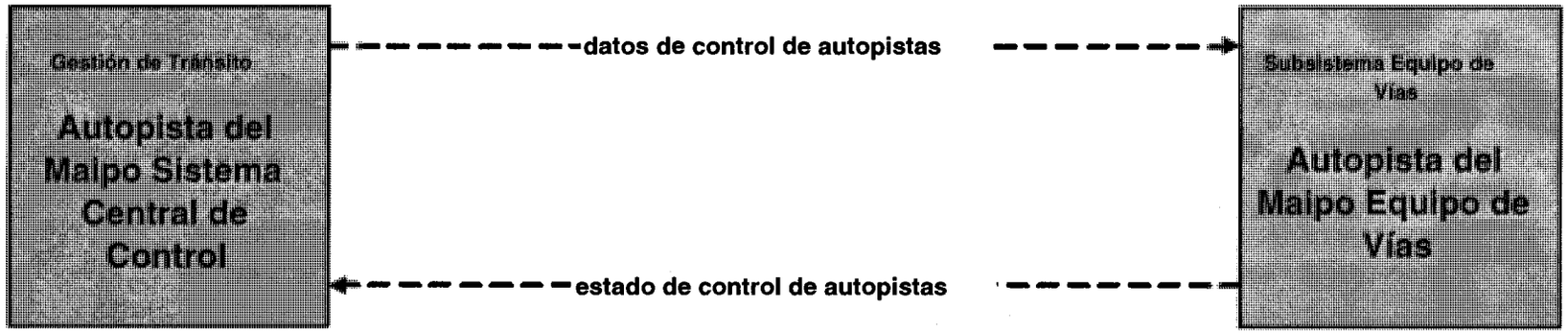

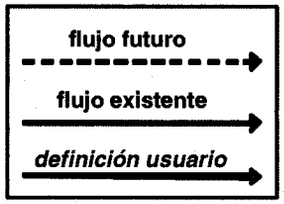

ATMS 04 - Sistemas de Control de Autopistas
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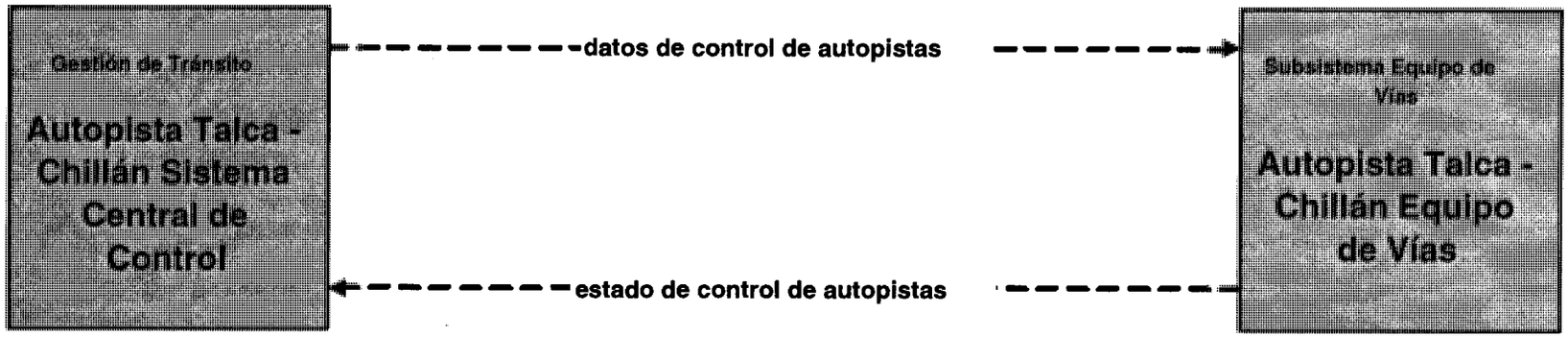
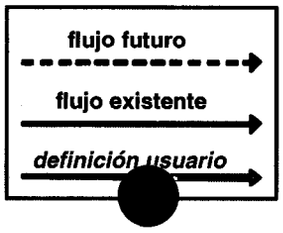
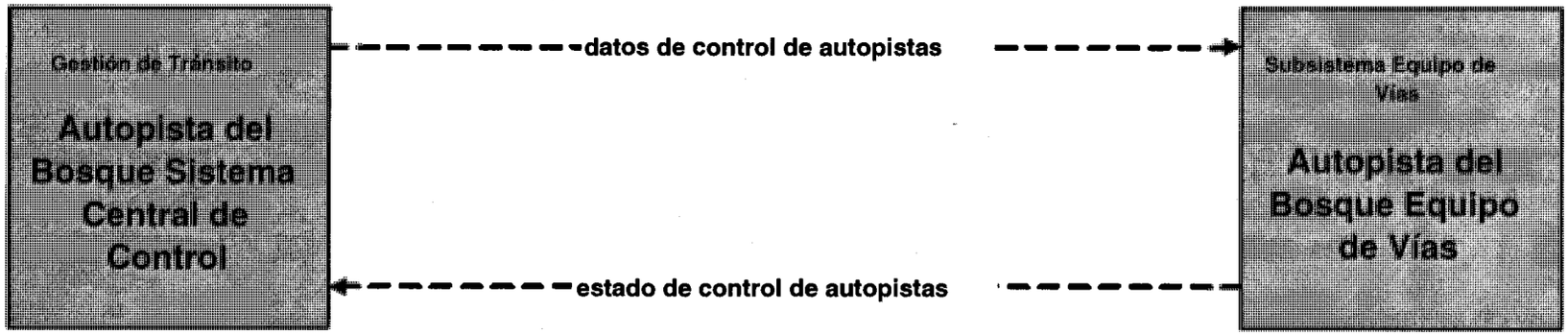
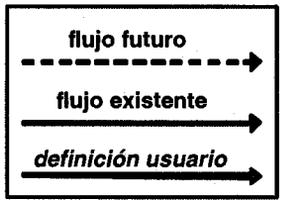




ATMS 04 - Sistemas de Control de Autopistas
Autopista del Bosque





ATMS 04 - Sistemas de Control de Autopistas
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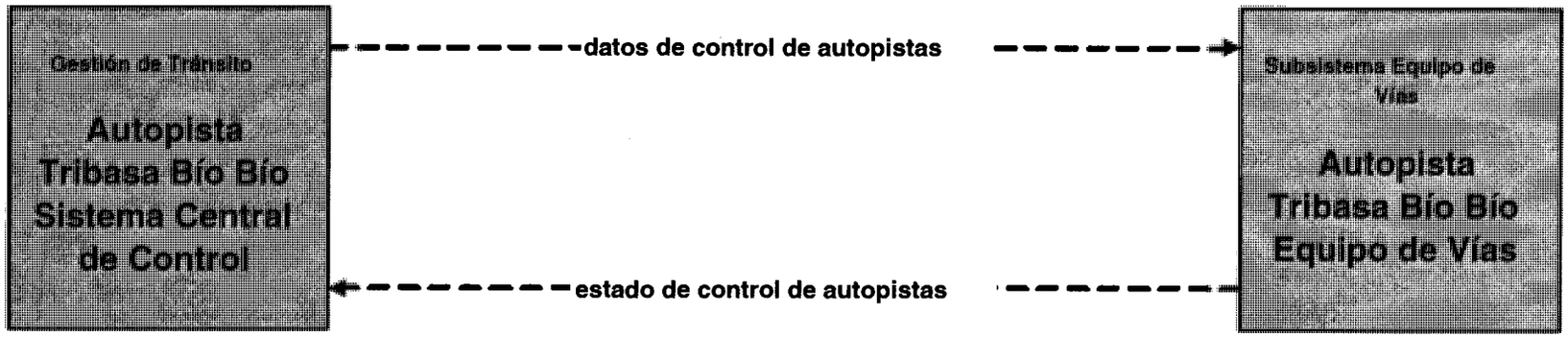

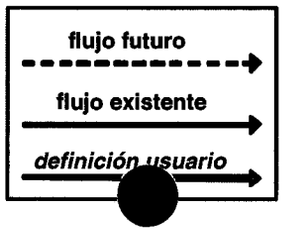

ATMS 04 - Sistemas de Control de Autopistas
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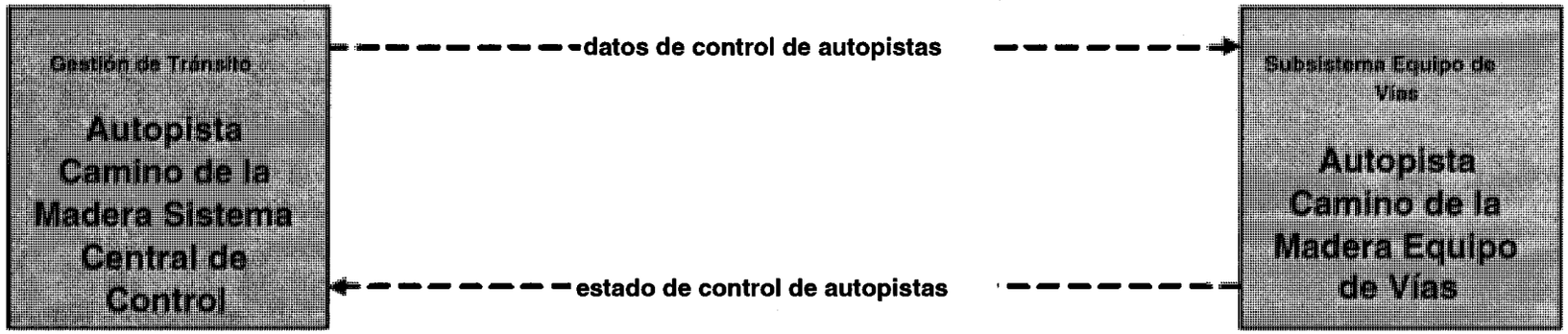

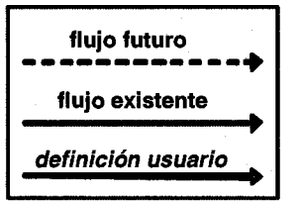

ATMS 04 - Sistemas de Control de Autopistas
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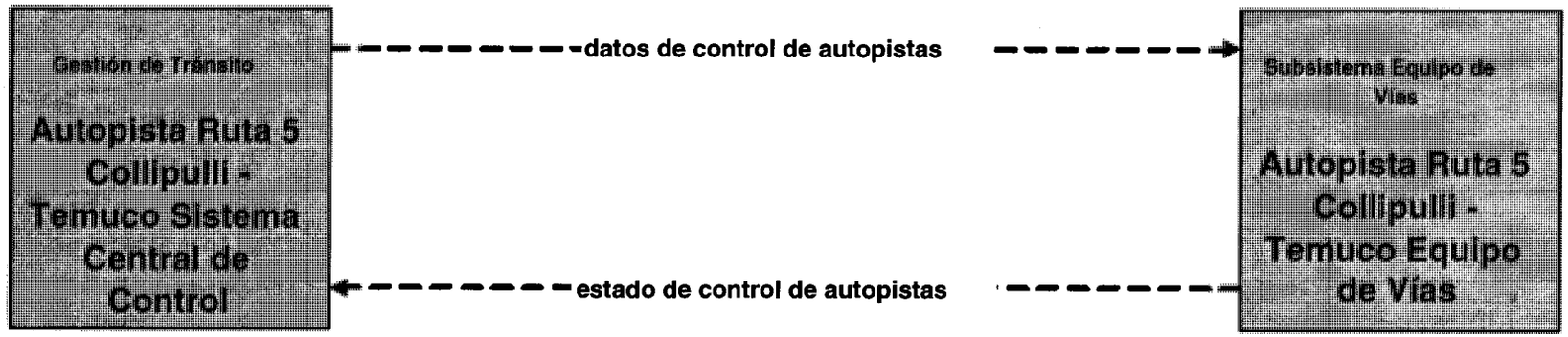

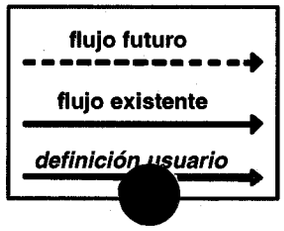

ATMS04 - Sistemas de Control de Autopistas
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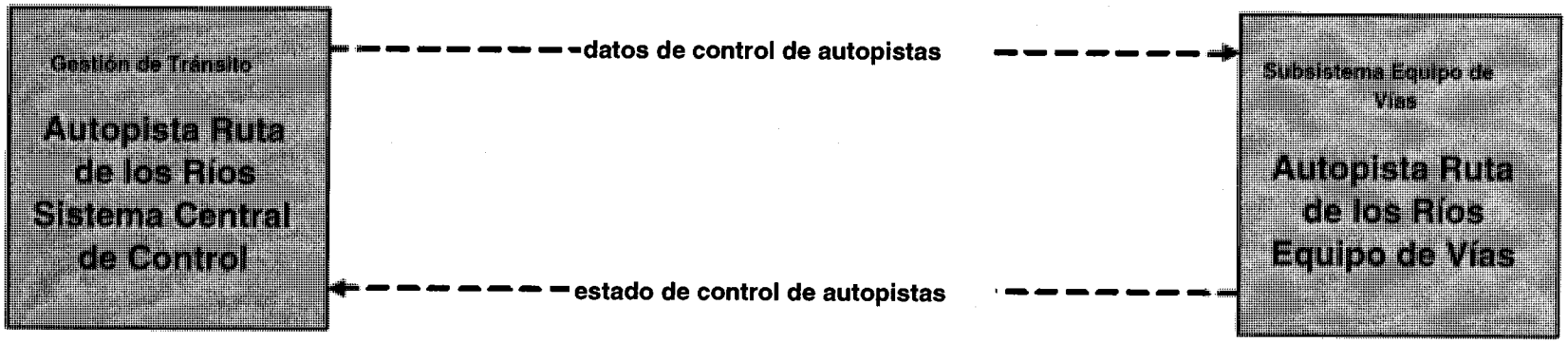

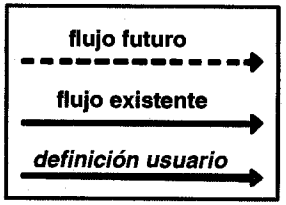

ATMS 04 - Sistemas de Control de Autopistas
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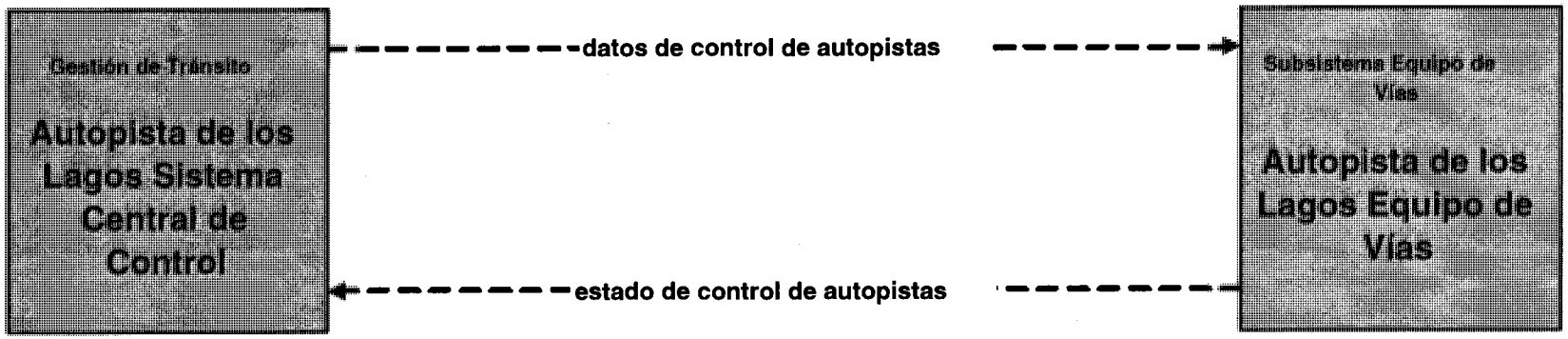
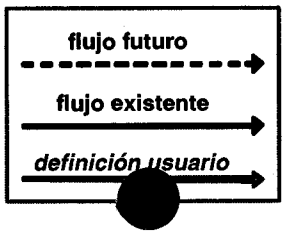
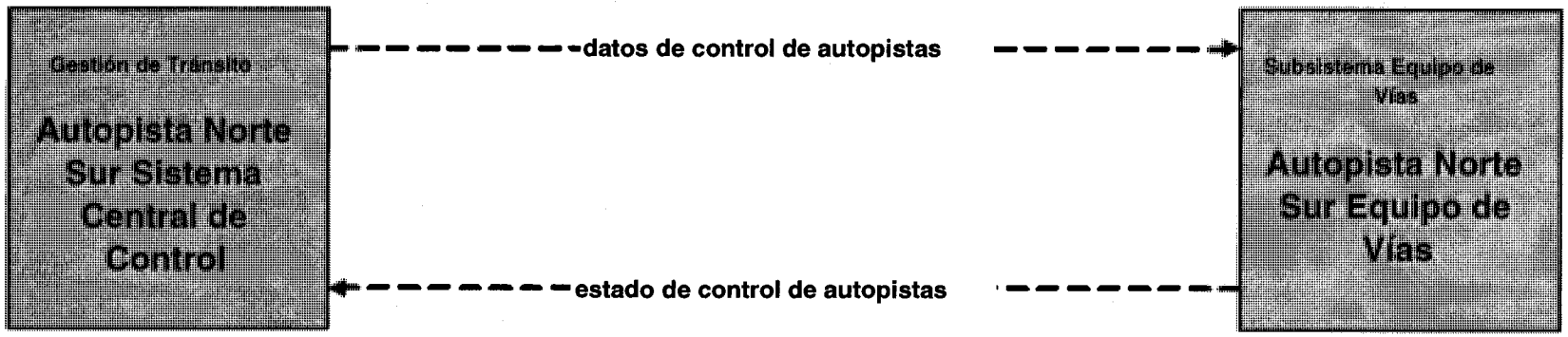
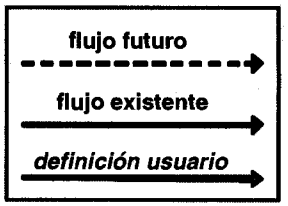


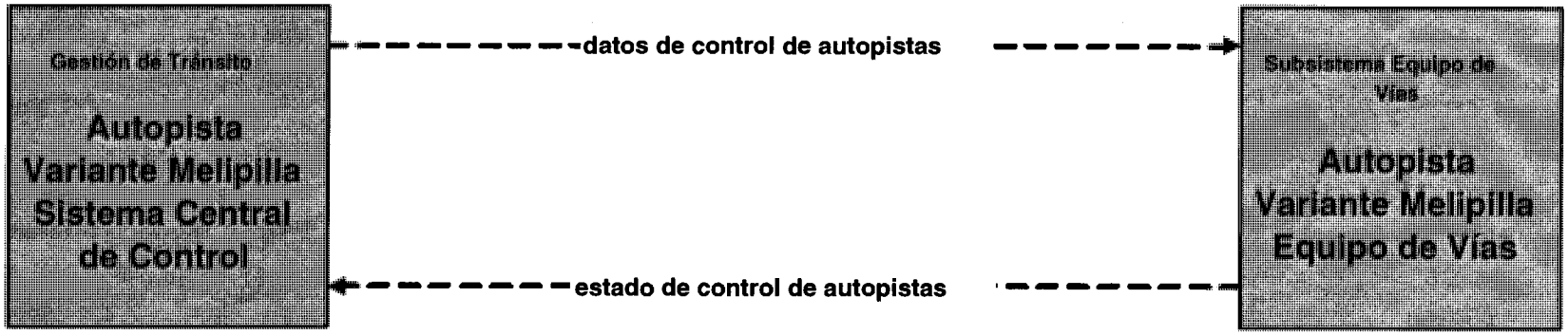


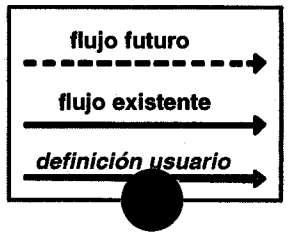
ATMS 04 - Sistemas de Control de Autopistas
Autopista Norte Sur



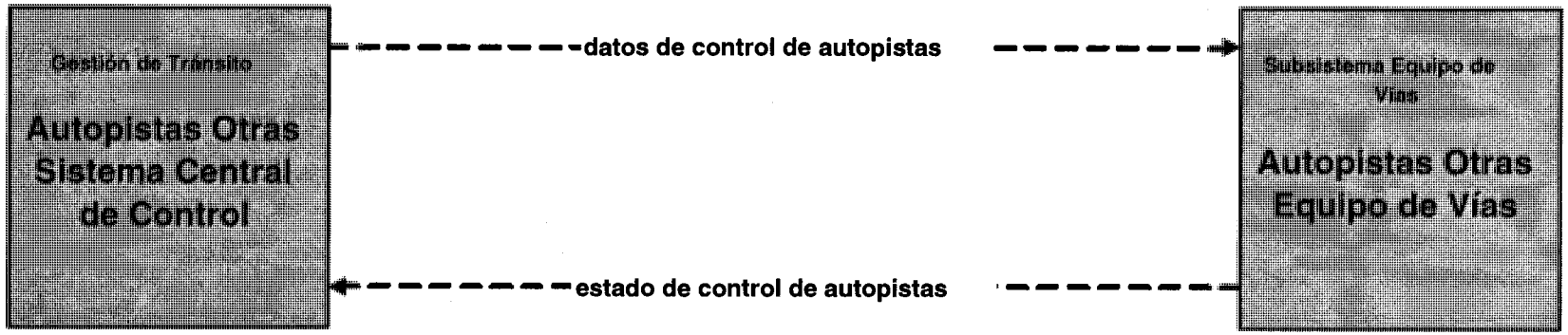


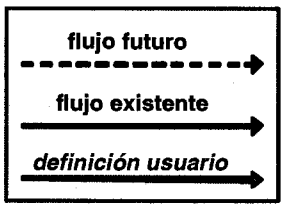
ATMS 04 - Sistemas de Control de Autopistas
Autopista Variante Melipilla



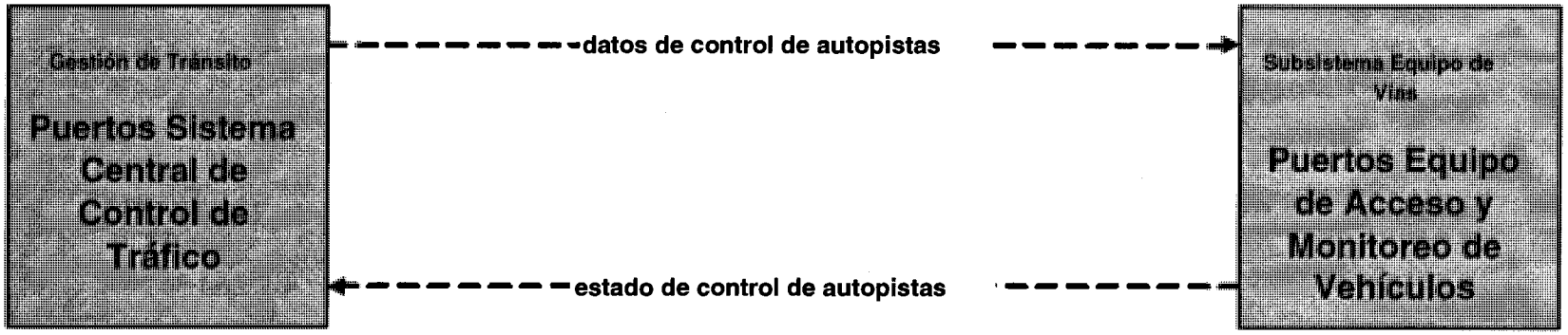


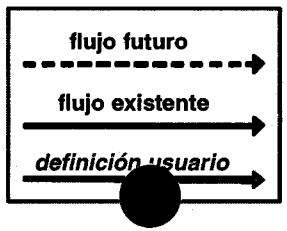
ATMS 04 - Sistemas de Control de Autopistas
Autopista Otras



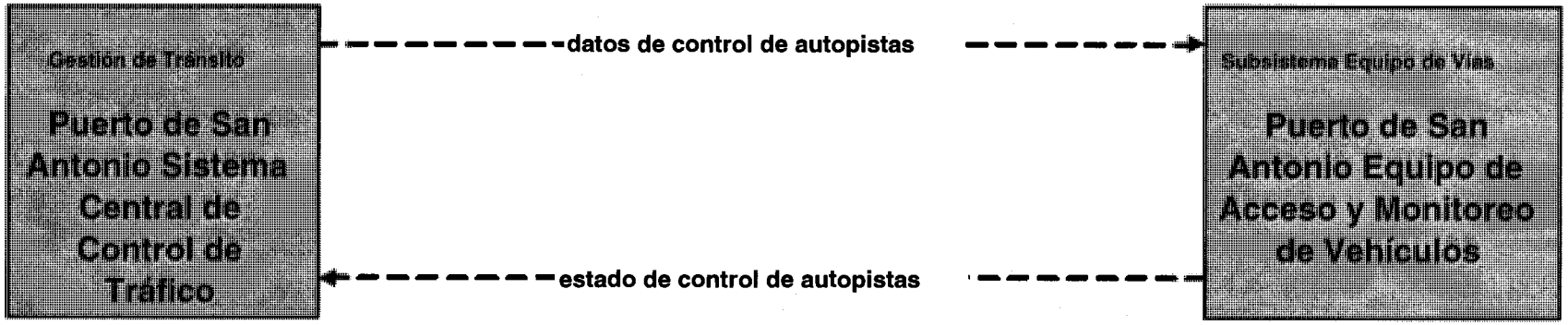


ATMS 04 - Sistemas de Control de Autopistas
Puertos

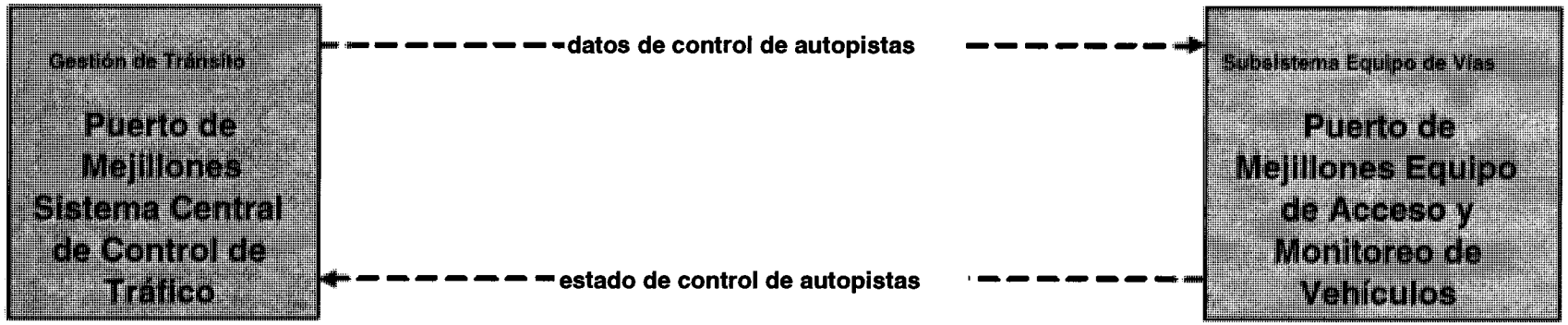


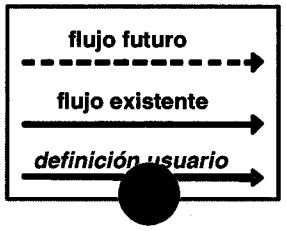


ATMS 04 - Sistemas de Control de Autopistas
Puerto de San Antonio

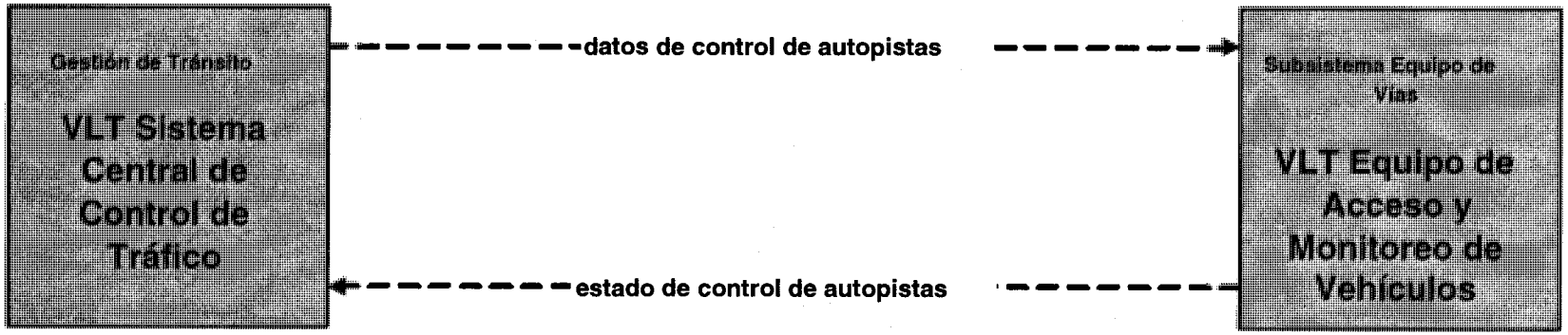


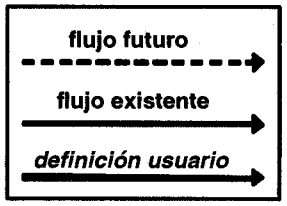
ATMS 04 - Sistemas de Control de Autopistas
Puerto de Mejillones



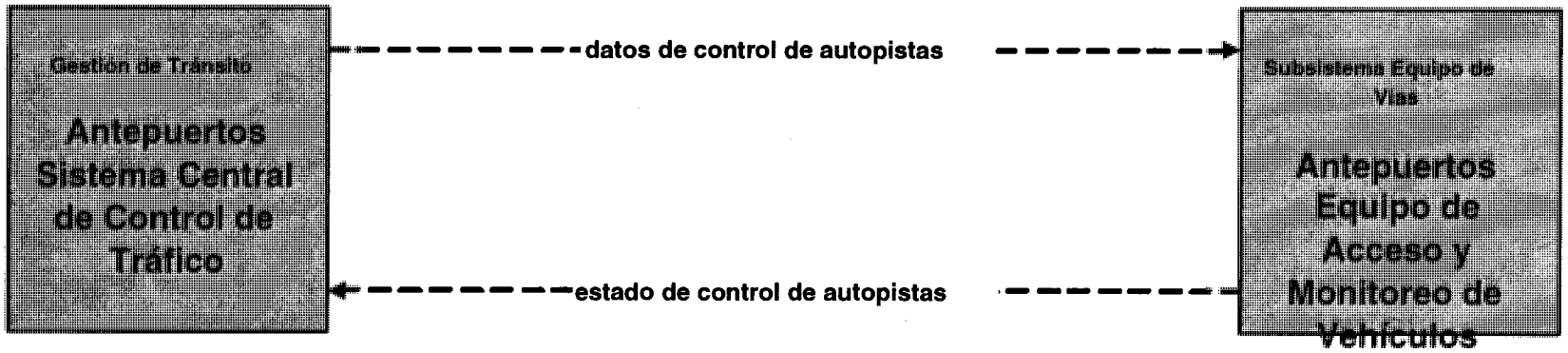


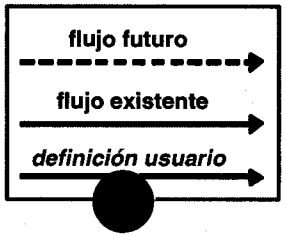
ATMS 04 - Sistemas de Control de Autopistas
VLT





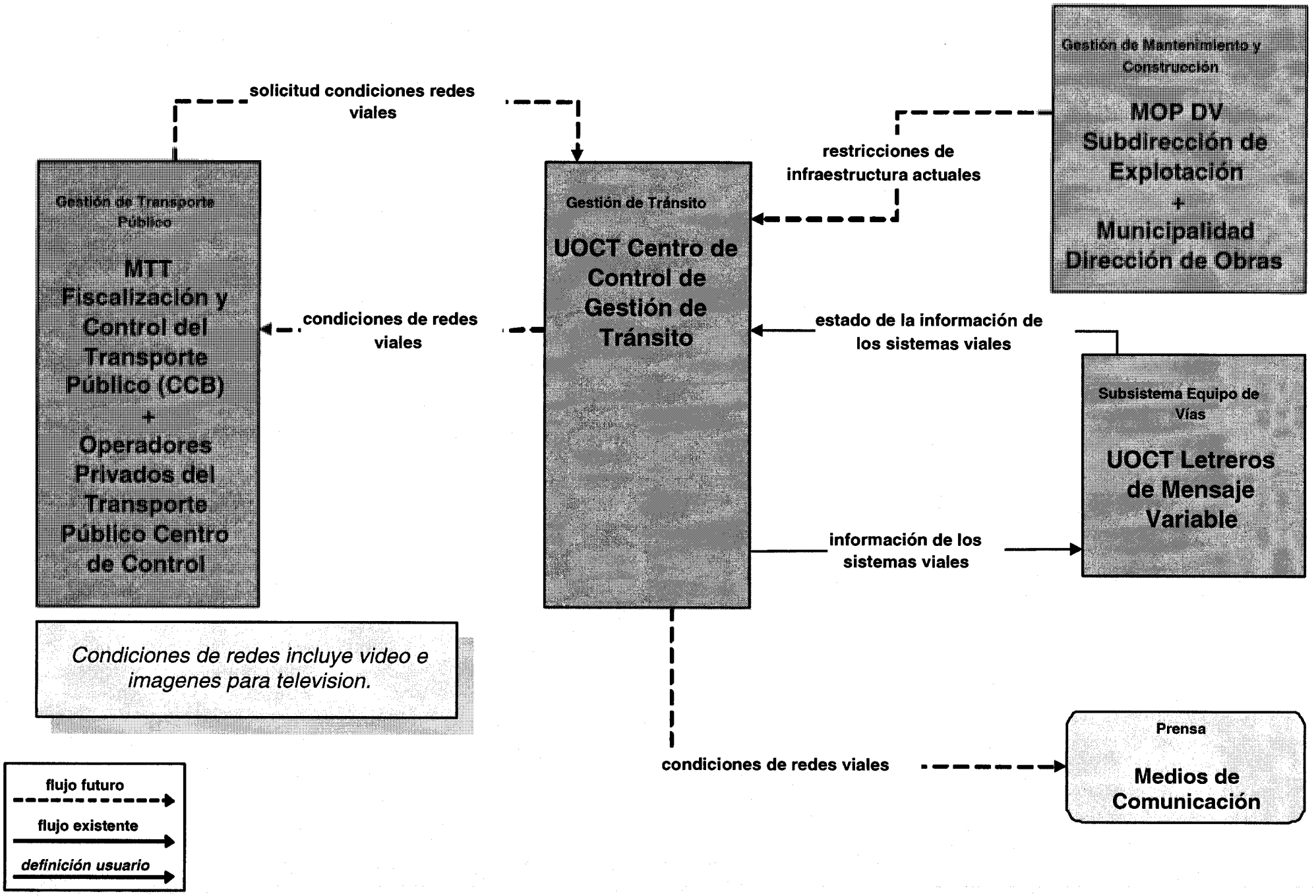
ATMS 04 - Sistemas de Control de Autopistas
Antepuertos



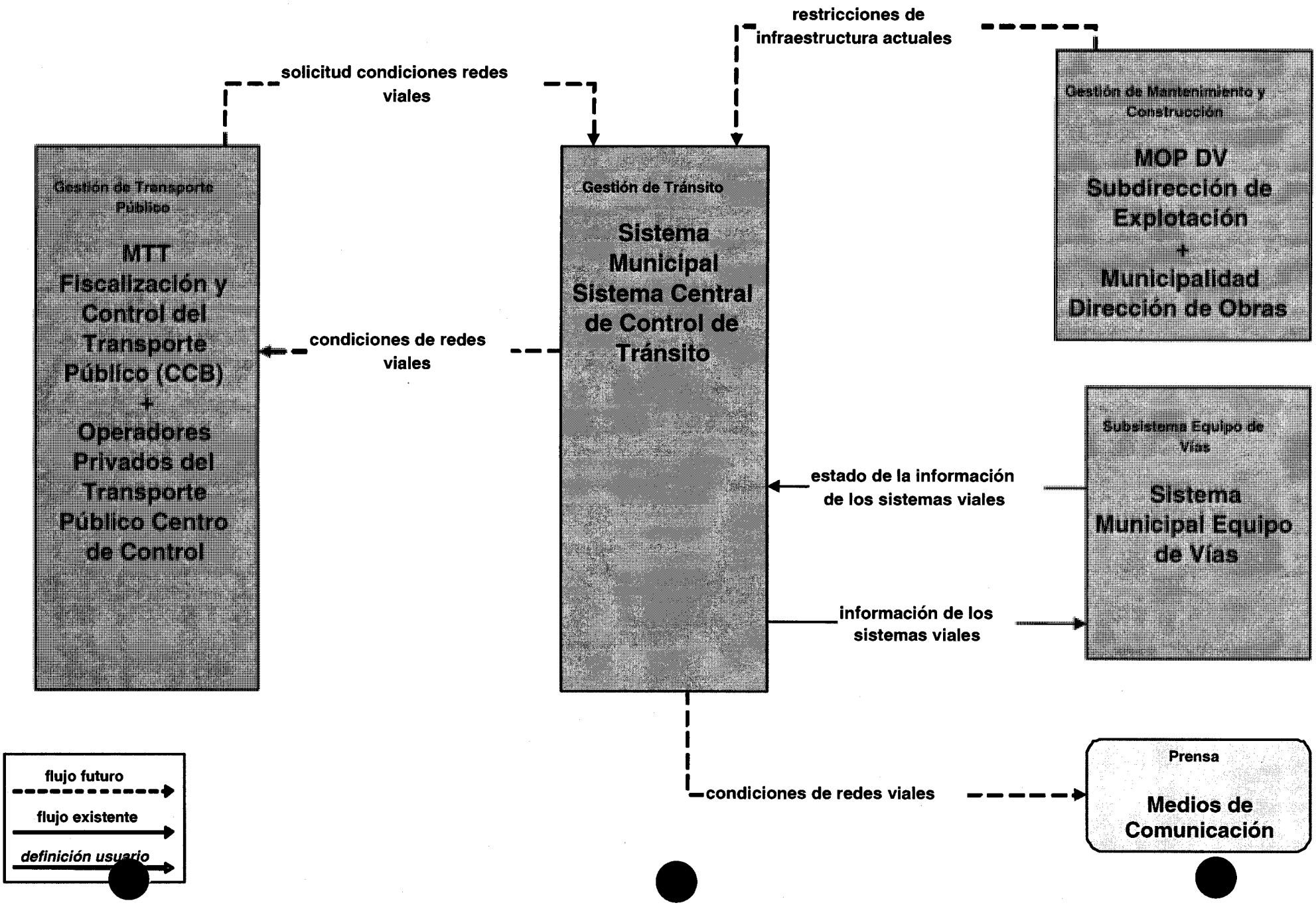


ATMS06 - Difusión de Información de Tránsito

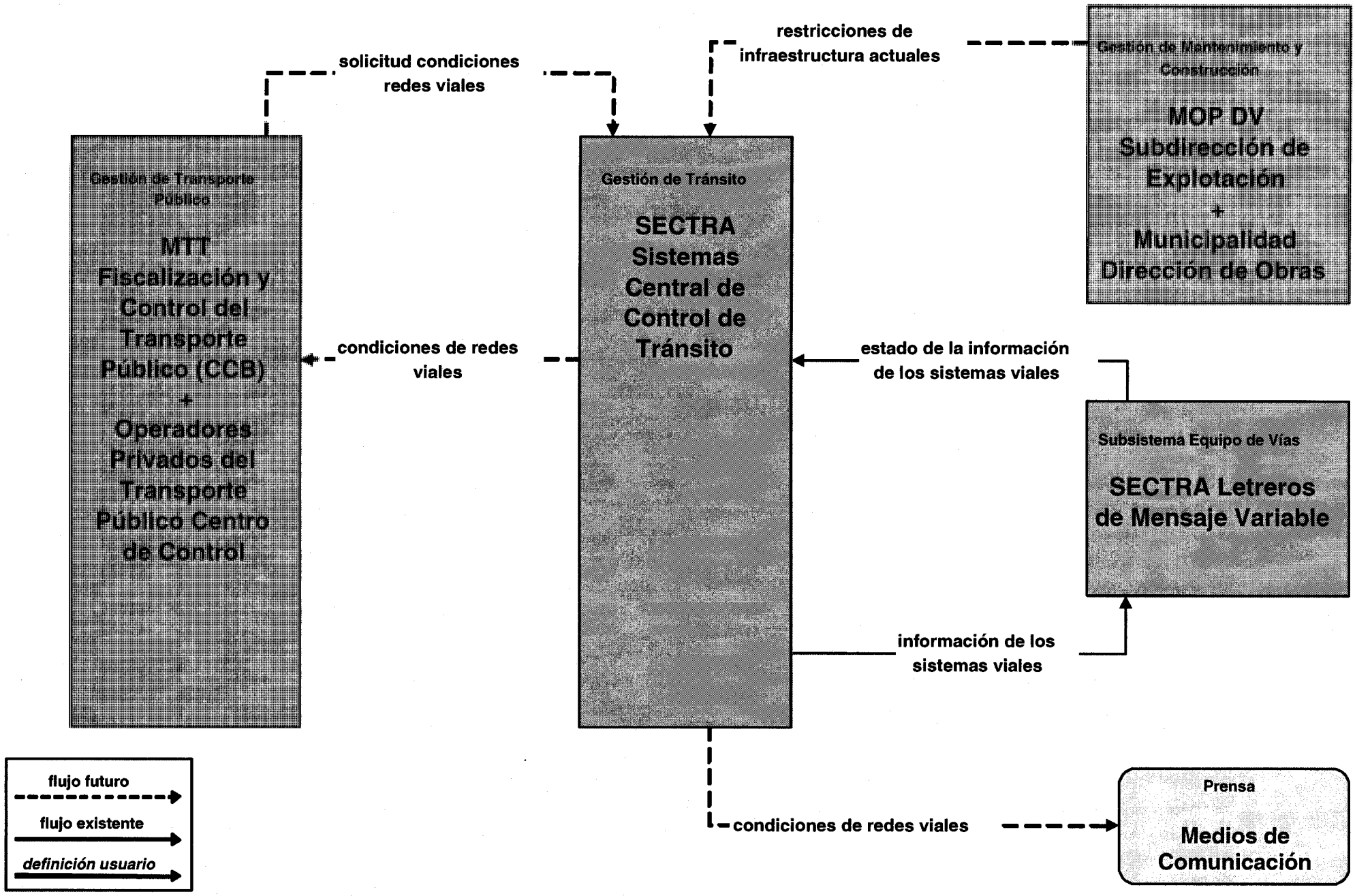
UOCT Centro de Control de Gestion de Tránsito



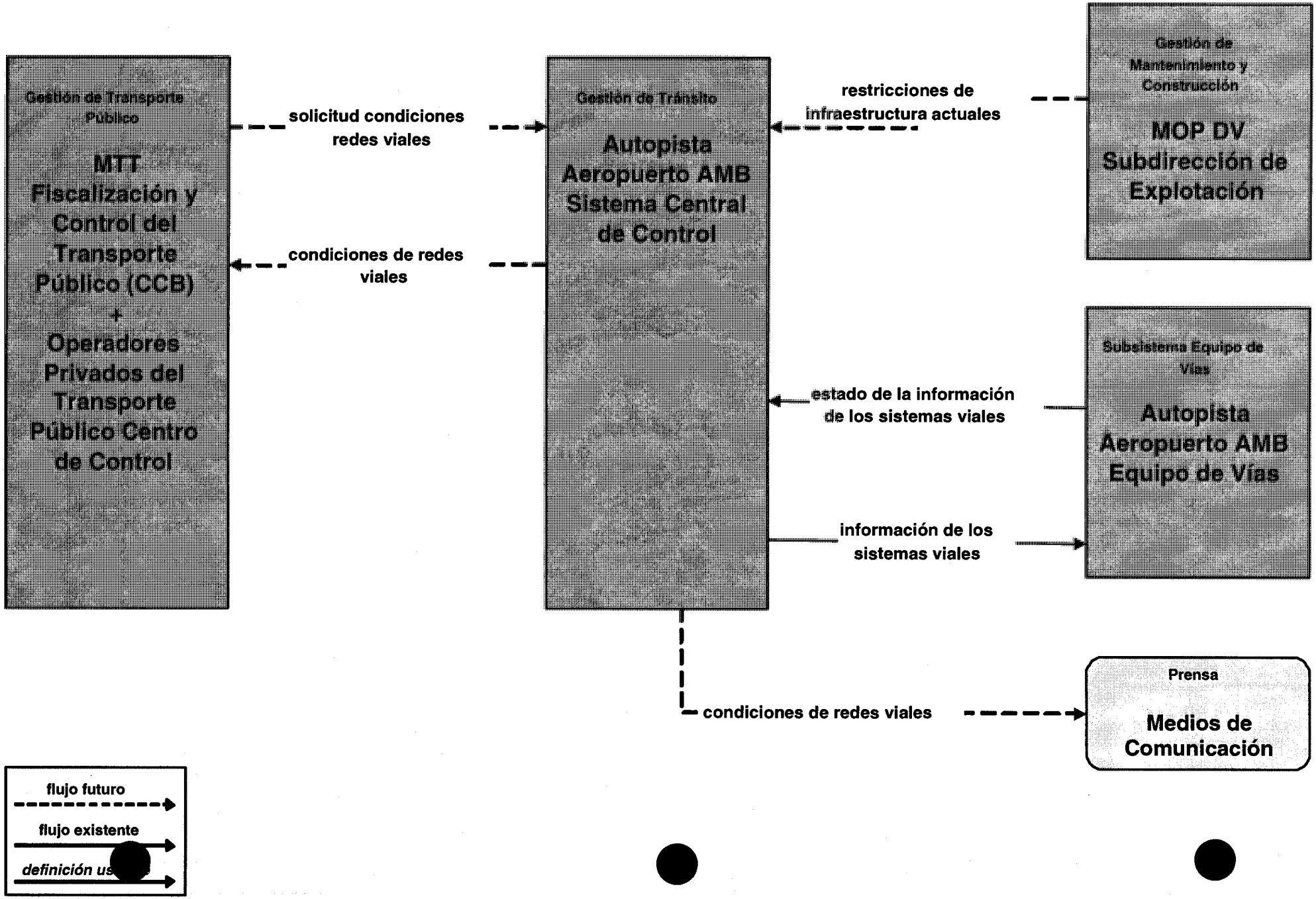
ATMS06 - Difusión de Información de Tránsito
Sistema Municipal Central de Tránsito



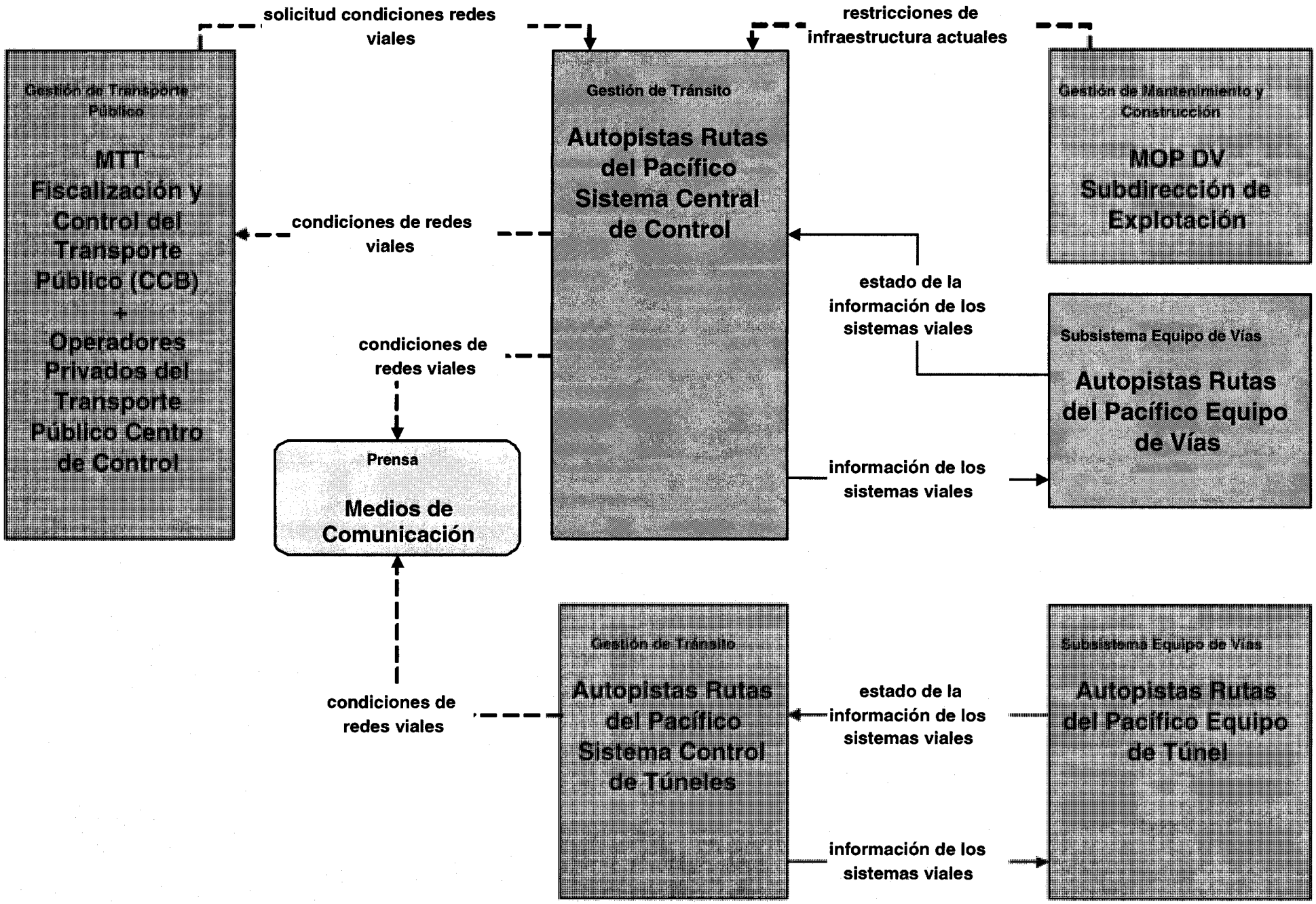
ATMS06 - Difusión de Información de Tránsito
SECTRA Central de Tránsito



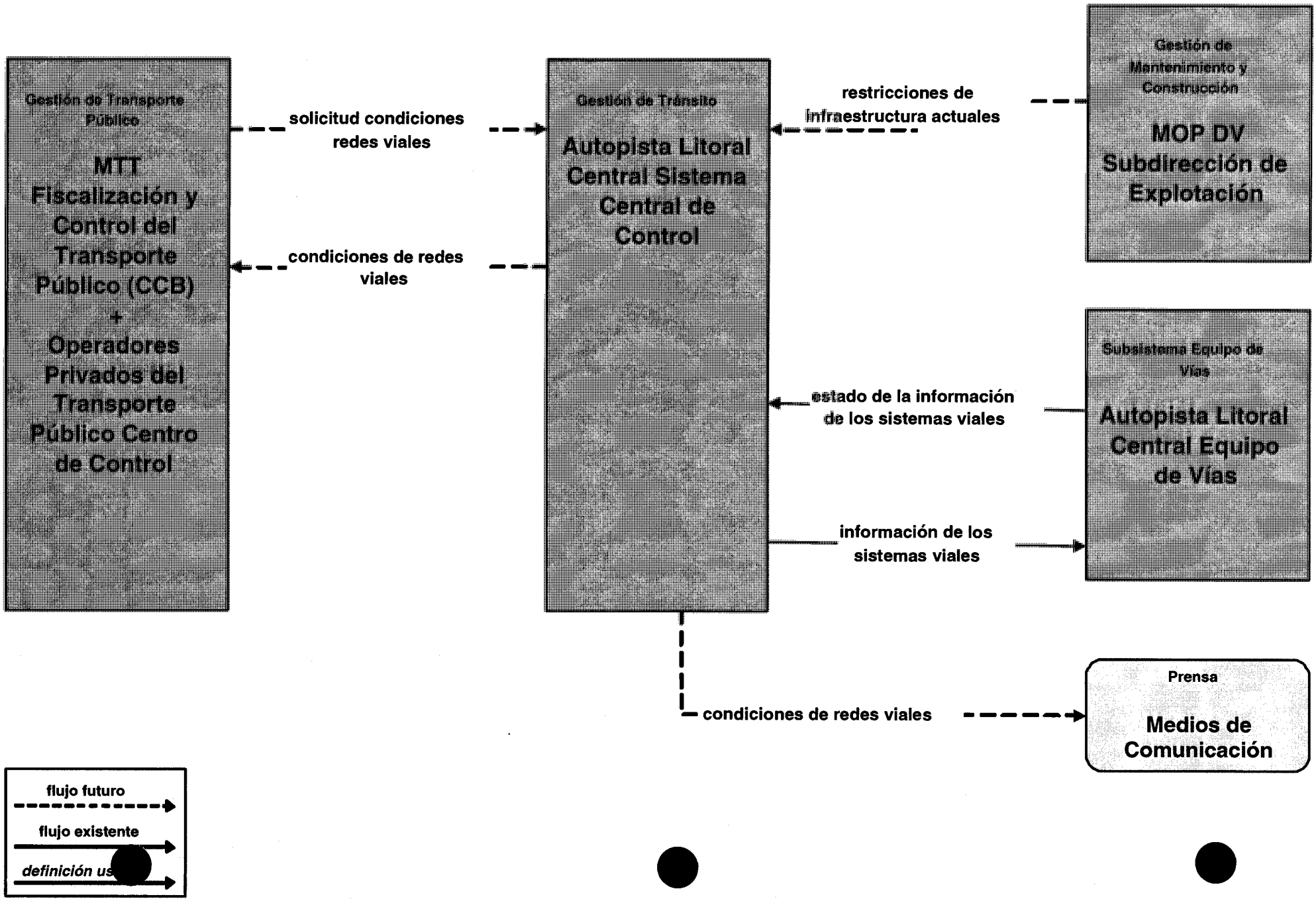
ATMS06 - Difusión de Información de Tránsito
Autopista Aeropuerto AMB



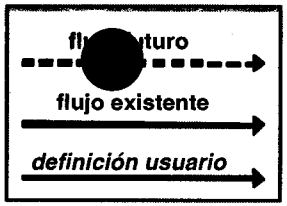
ATMS06 - Difusión de Información de Tránsito
Autopista Rutas del Pacifico Sistema Central



ATMS06 - Difusión de Información de Tránsito
Autopista Litoral Central Sistema Central



ATMS06 - Difusión de Información de Tránsito
Autopista Costanera Norte



solicitud condiciones redes viales

restricciones de infraestructura actuales

Gestión de Transporte Público

MTT Fiscalización y Control del Transporte Público (CCB) + Operadores Privados del Transporte Público Centro de Control

condiciones de redes viales

Gestión de Tránsito

Autopista Costanera Norte Sistema Central de Control

Gestión de Mantenimiento y Construcción

MOP DV Subdirección de Explotación

estado de la información de los sistemas viales

condiciones de redes viales

Subsistema Equipo de Vías

Autopista Costanera Norte Equipo de Vías

Prensa

Medios de Comunicación

información de los sistemas viales

condiciones de redes viales

Gestión de Tránsito

Autopista Costanera Norte Sistema Control de Túneles

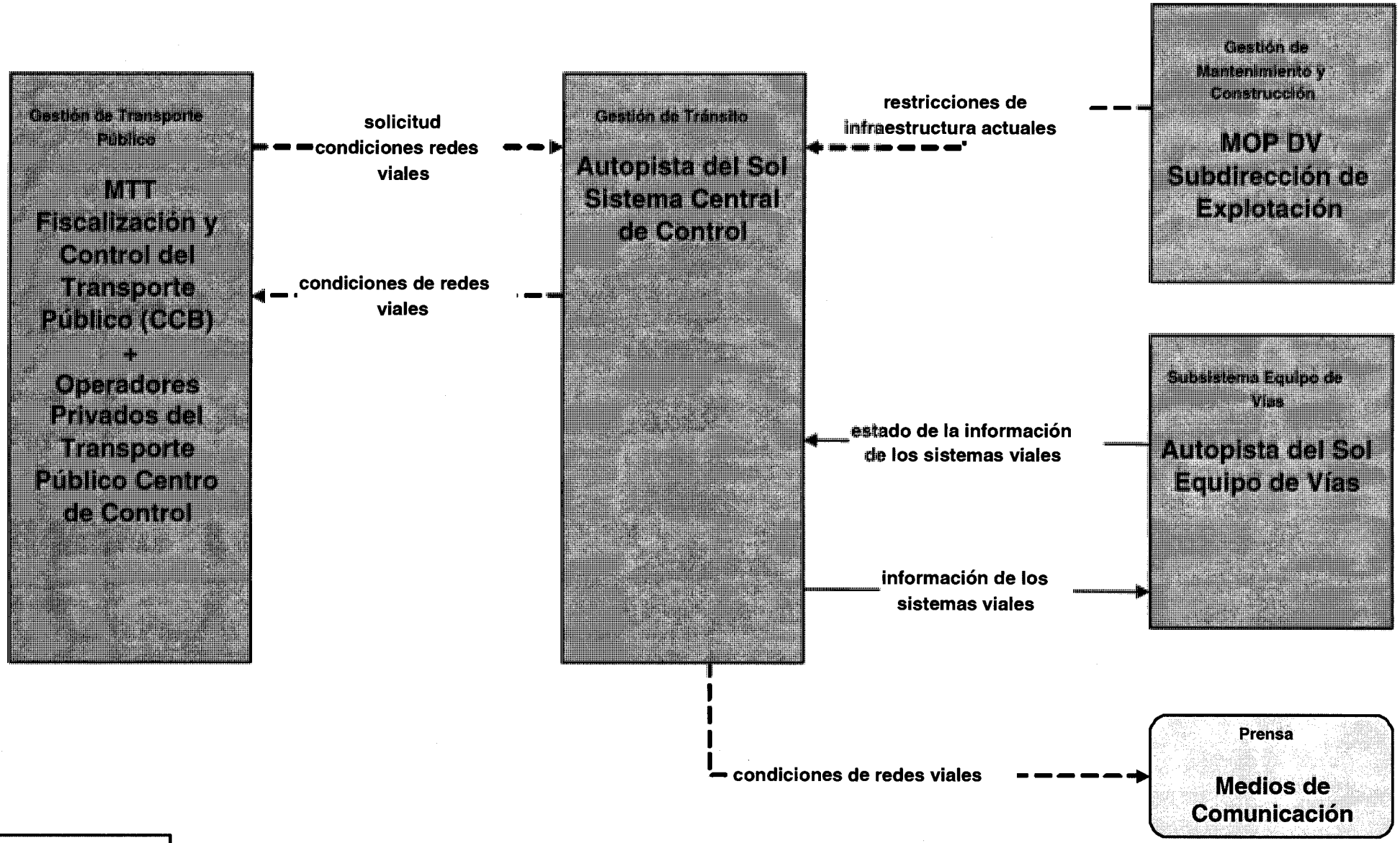
estado de la información de los sistemas viales

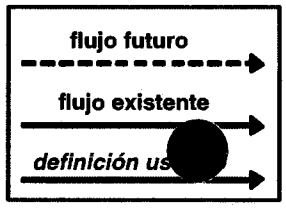
Subsistema Equipo de Vías

Autopista Costanera Norte Equipo de Túnel

información de los sistemas viales

ATMS06 - Difusión de Información de Tránsito
Autopista del Sol Sistema Central





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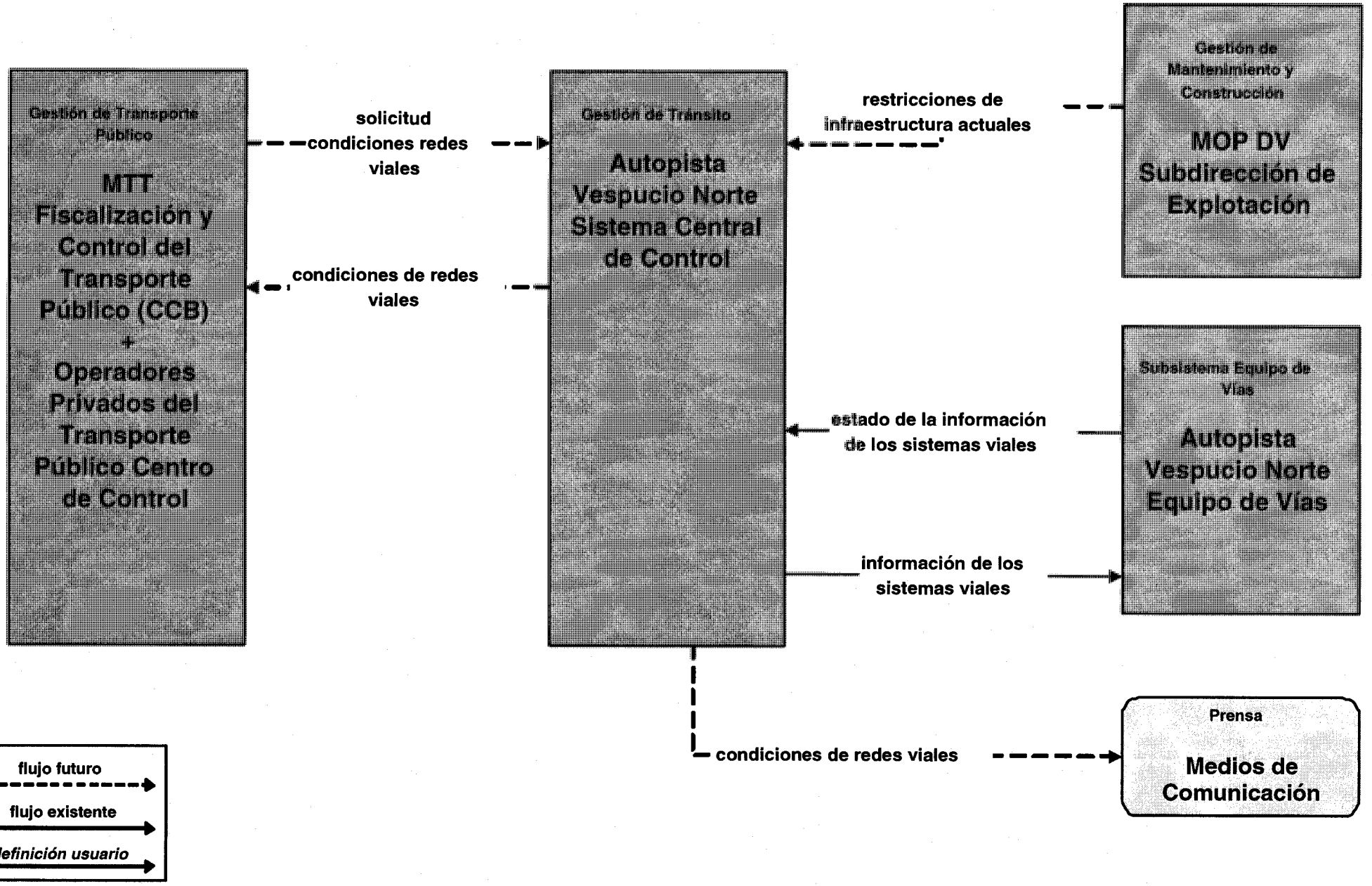
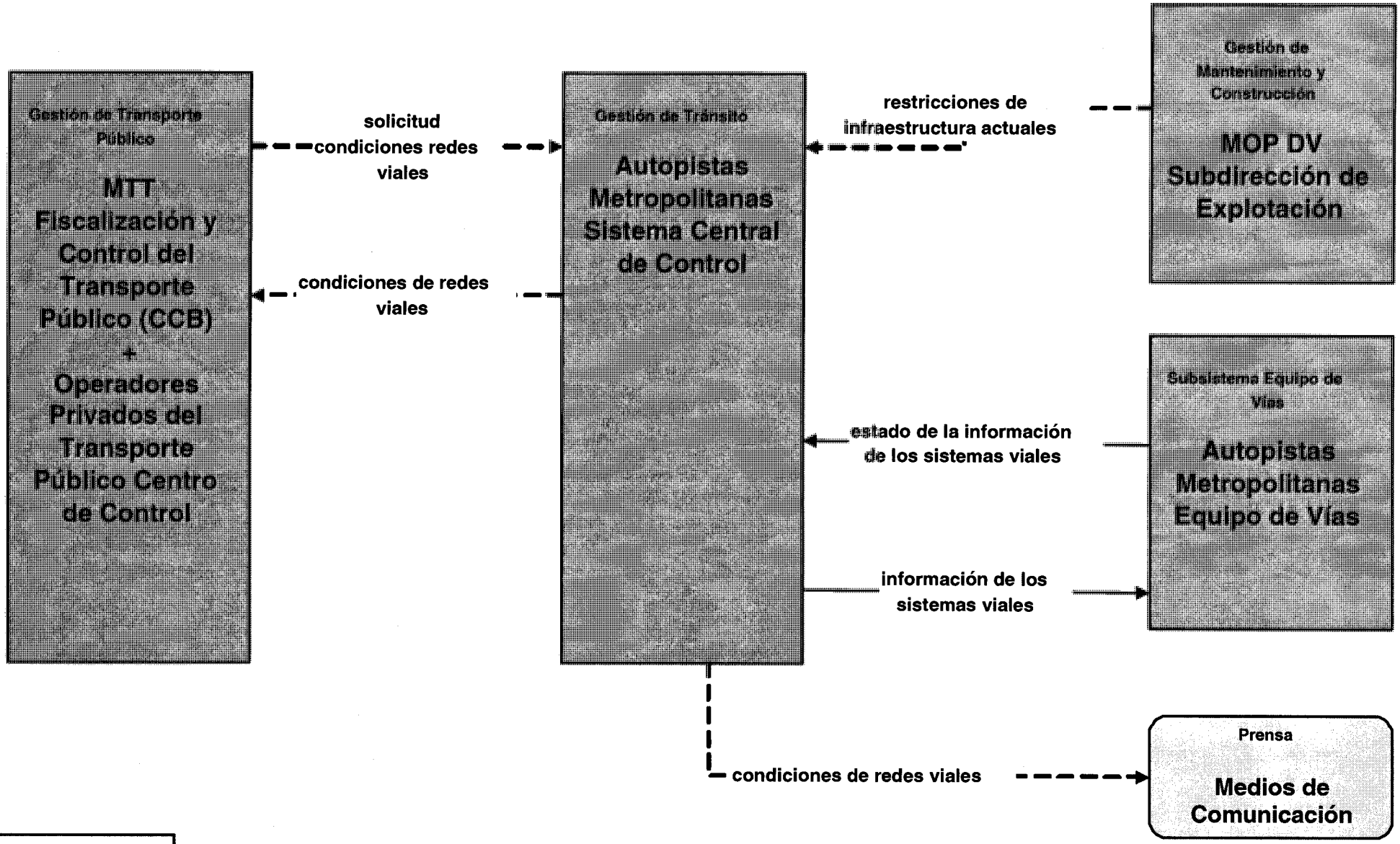
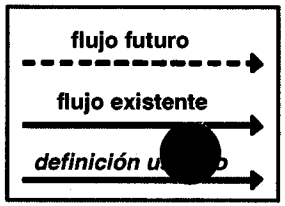
Autopista Vespucio Norte Sistema Central

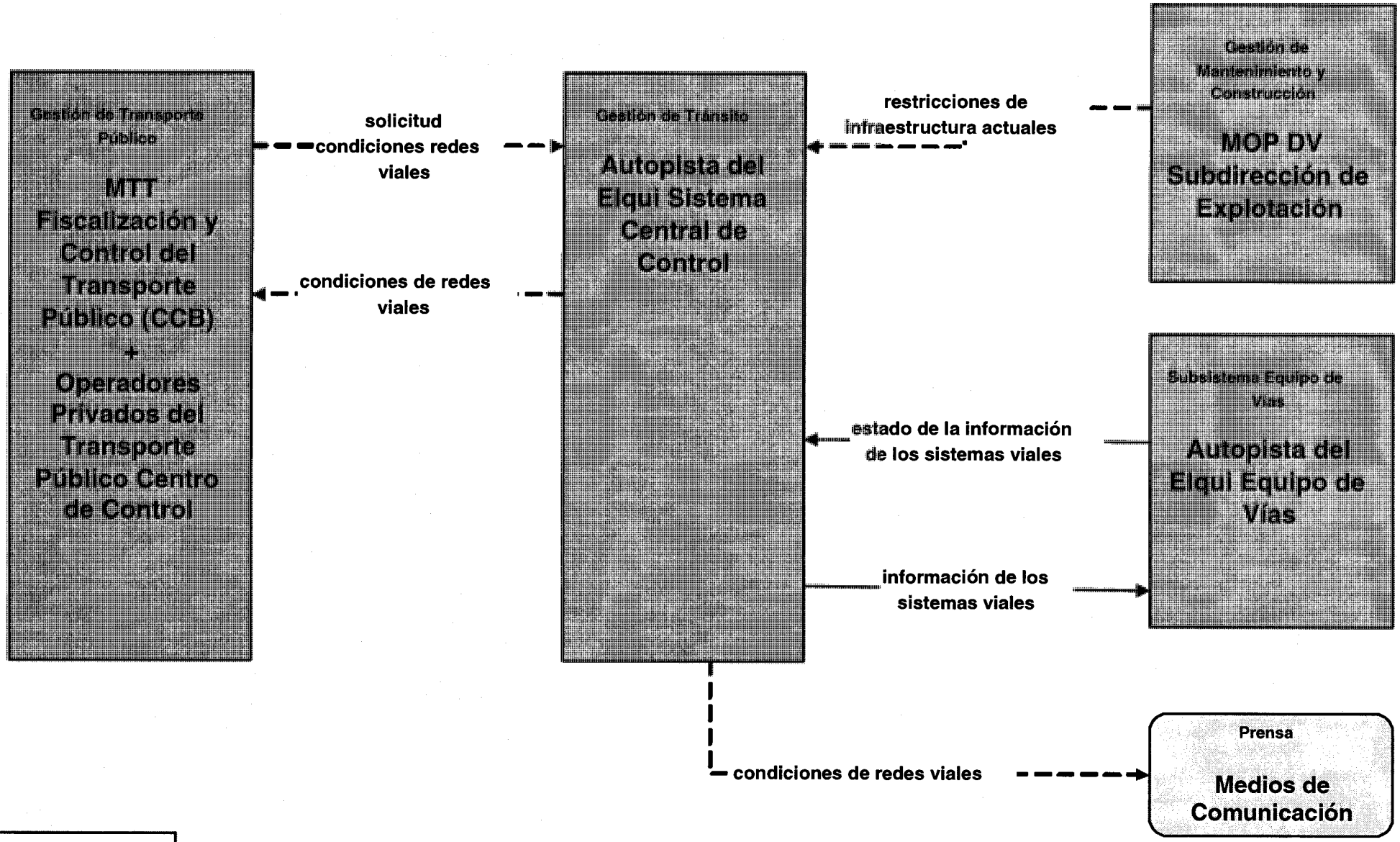


ATMS06 - Difusión de Información de Tránsito
Autopistas Metropolitanas Sistema Central





ATMS06 - Difusión de Información de Tránsito
Autopistas del Elqui

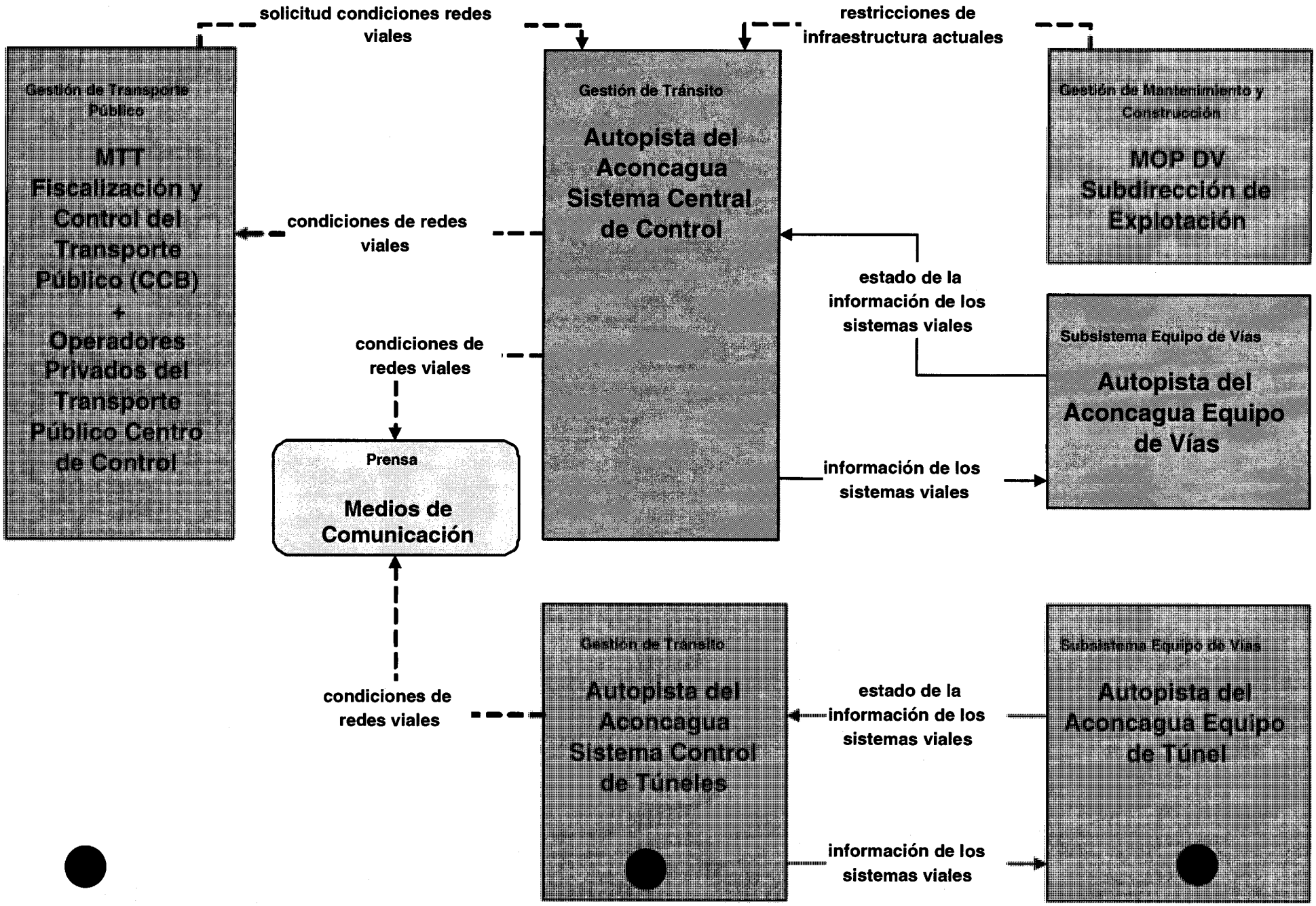


flujo futuro

flujo existente

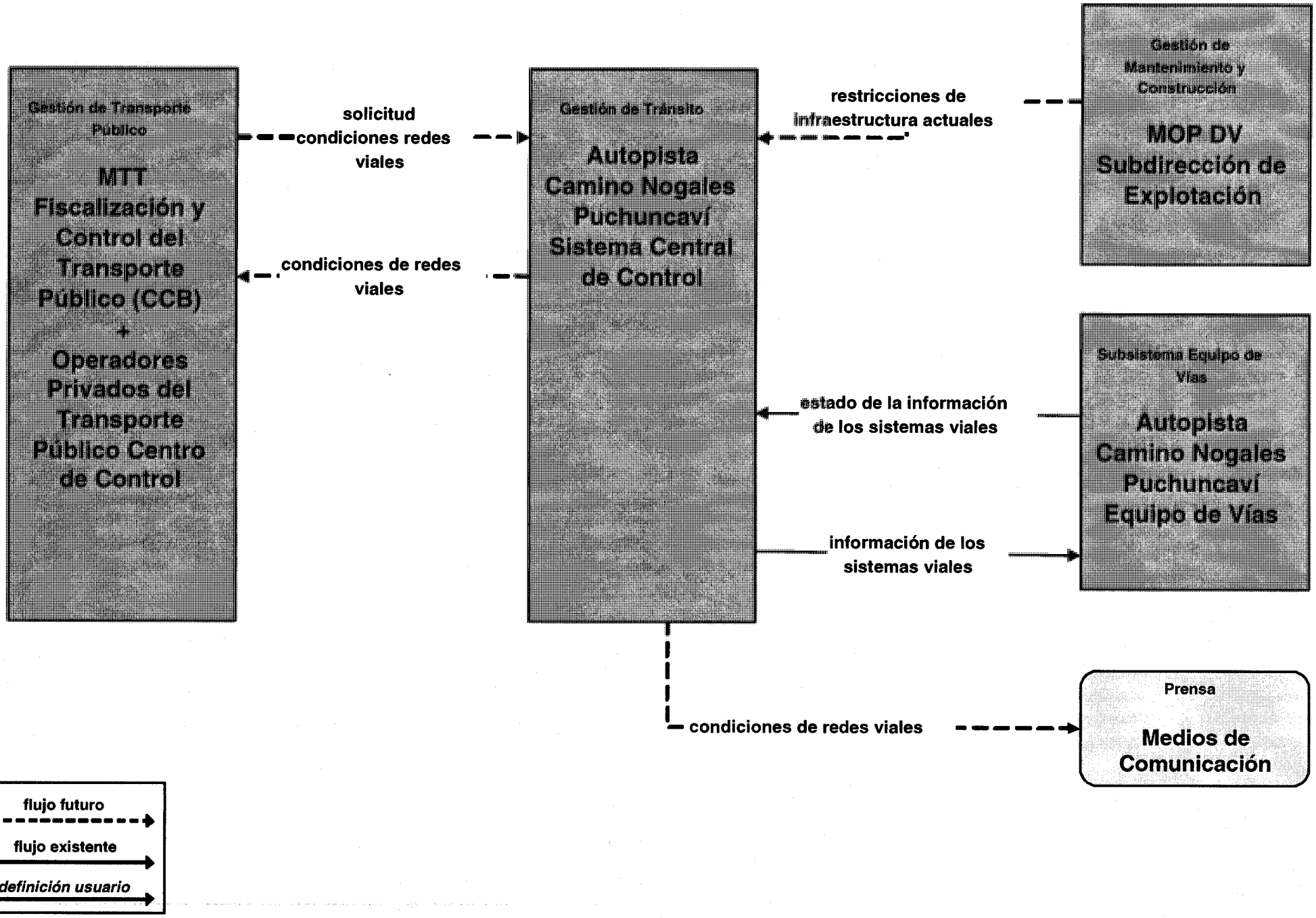
definición usuario

ATMS06 - Difusión de Información de Tránsito
Autopista Aconcagua



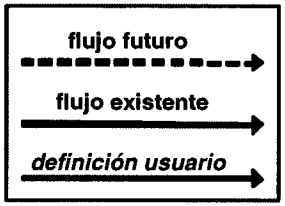
ATMS06 - Difusión de Información de Tránsito

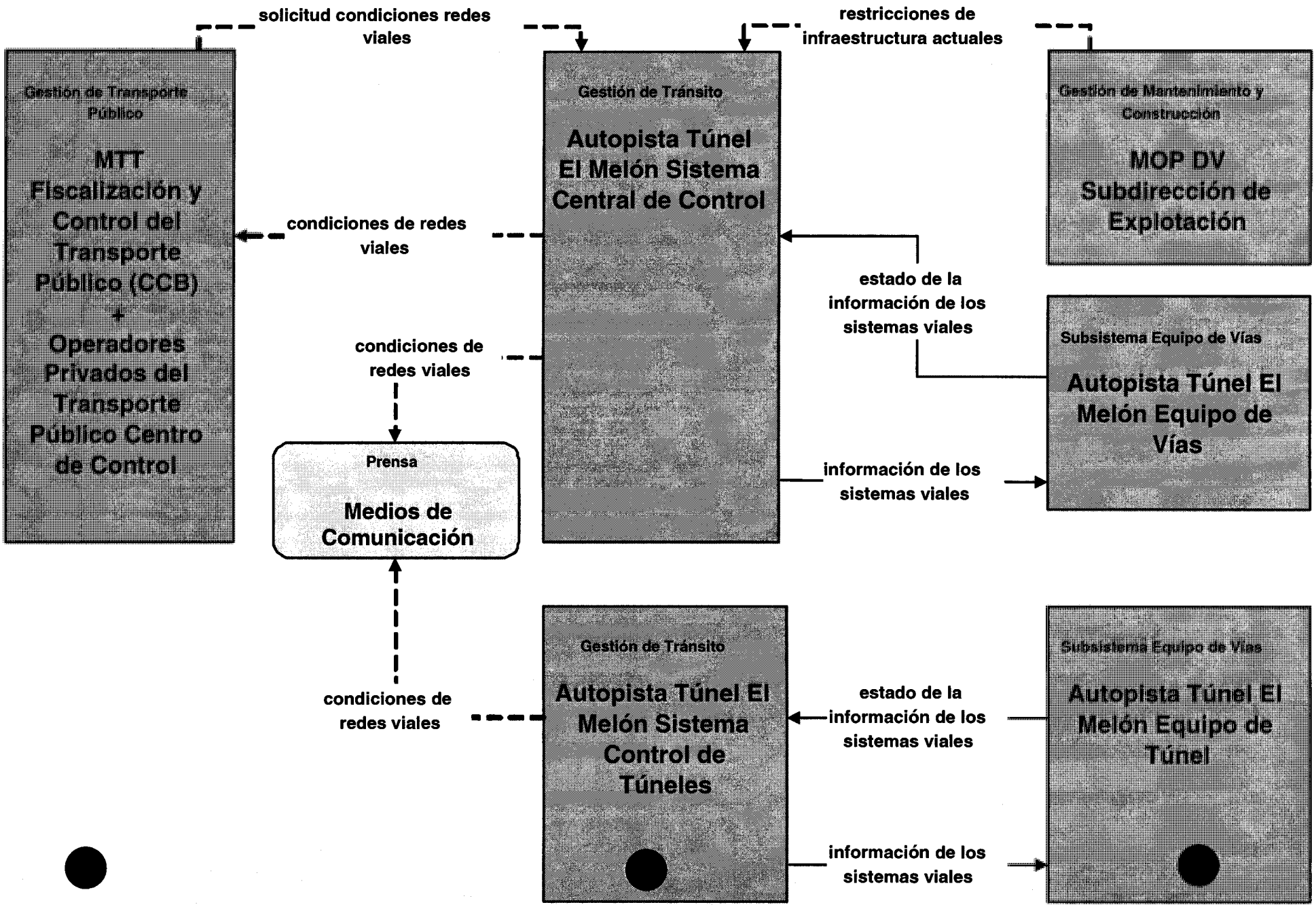
Autopista Camino Nogales Puchuncaví



ATMS06 - Difusión de Información de Tránsito

Autopista Túnel El Melón





ATMS06 - Difusión de Información de Tránsito
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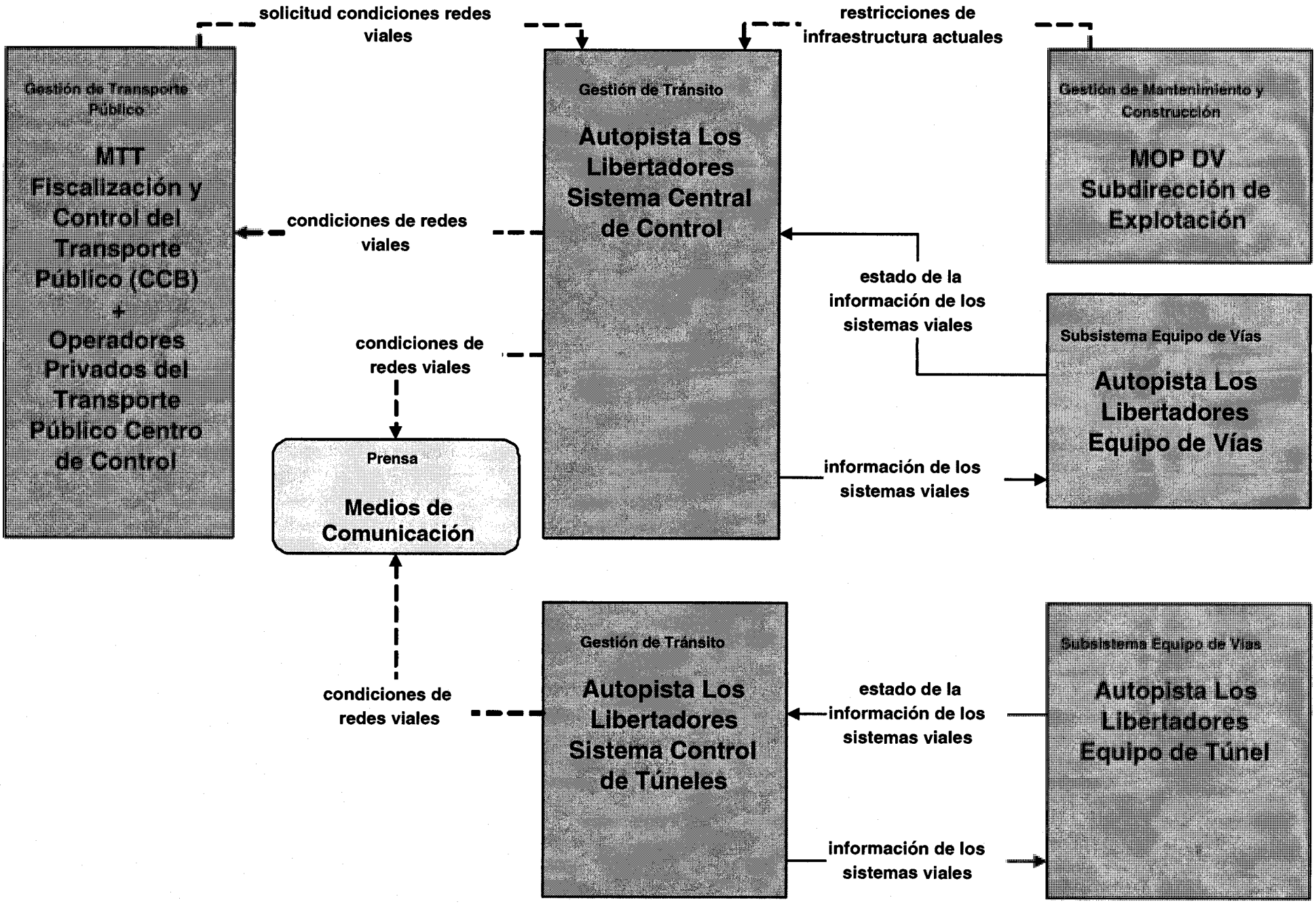

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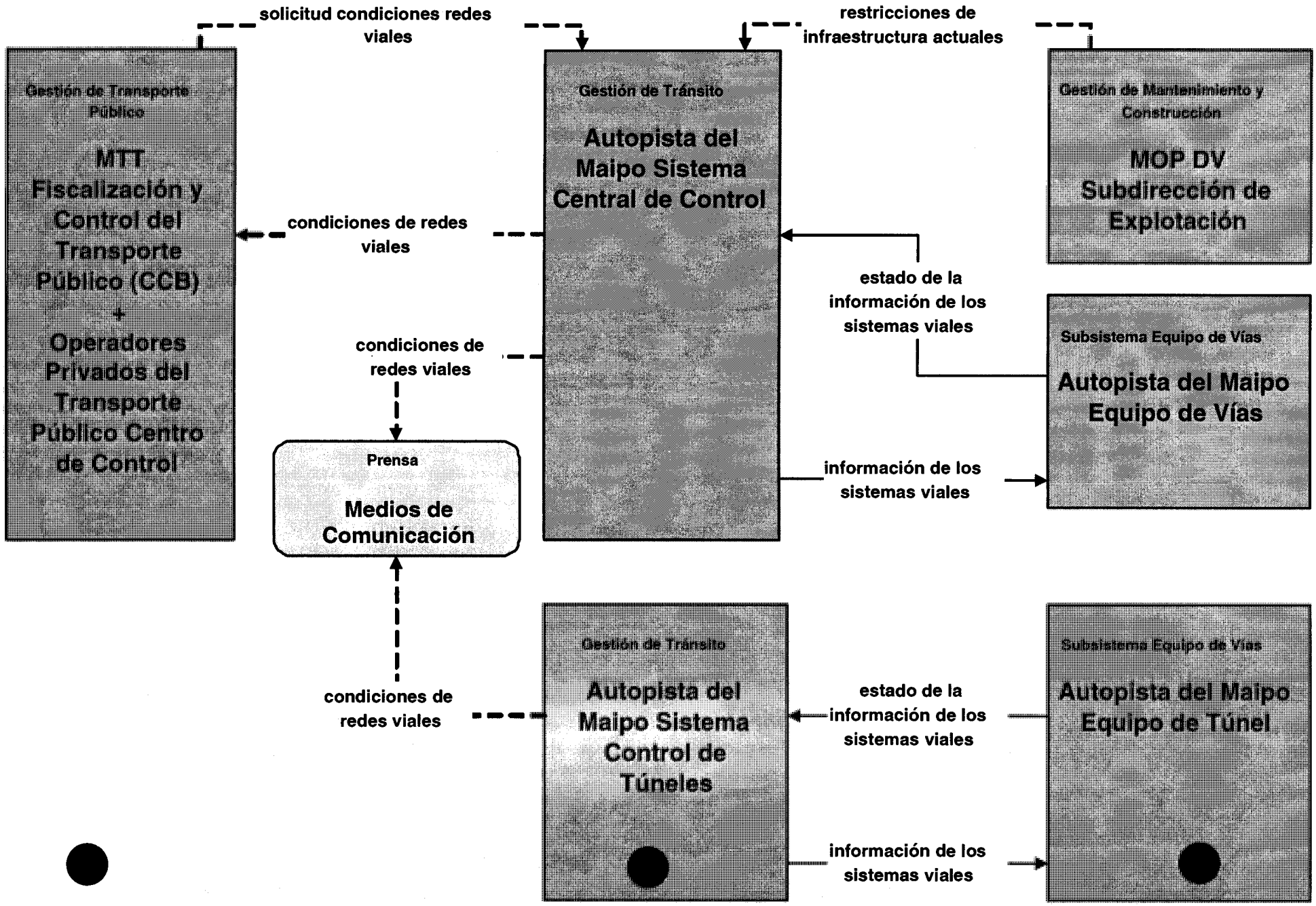
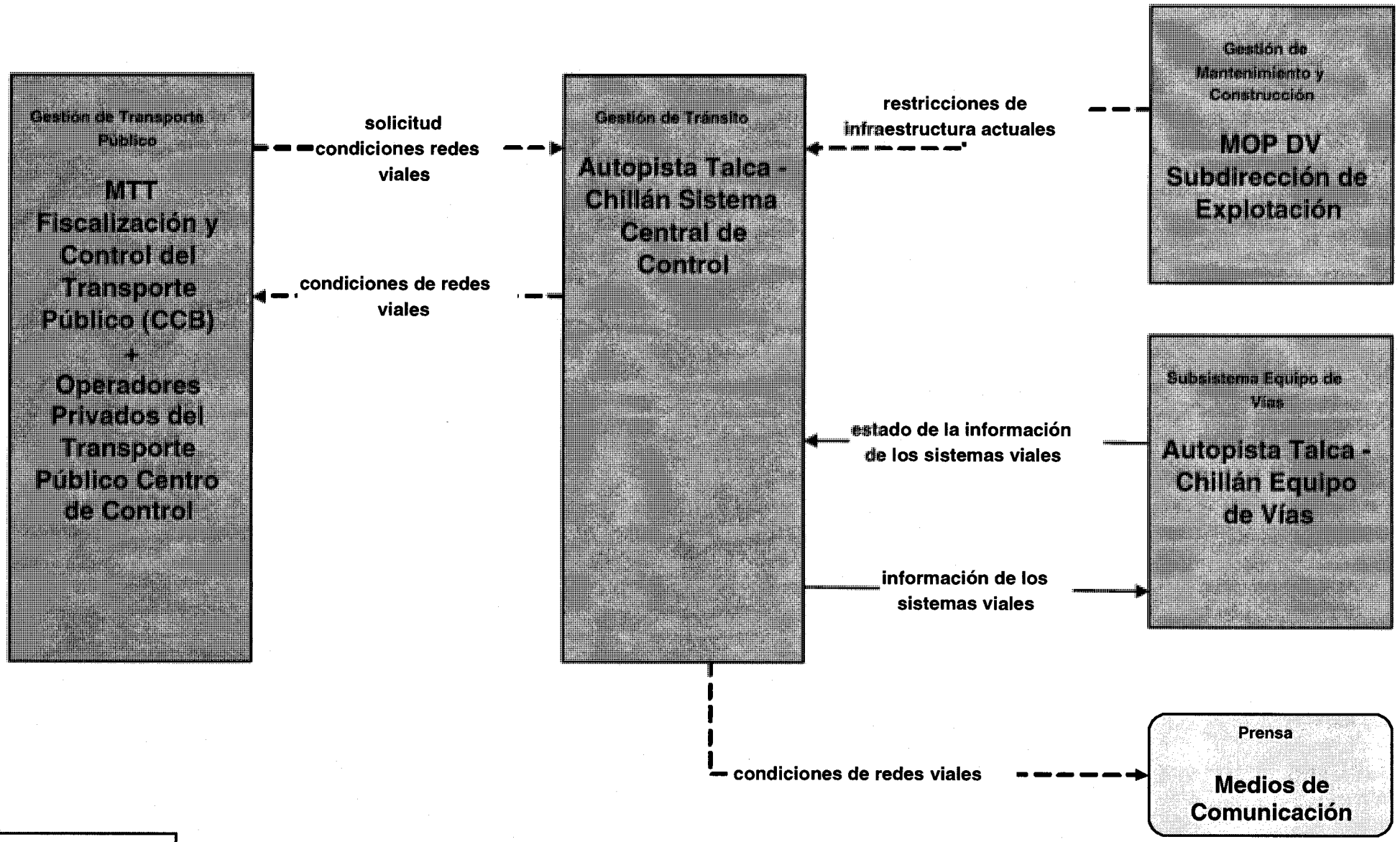


ATMS06 - Difusión de Información de Tránsito

Autopista Talca - Chillán

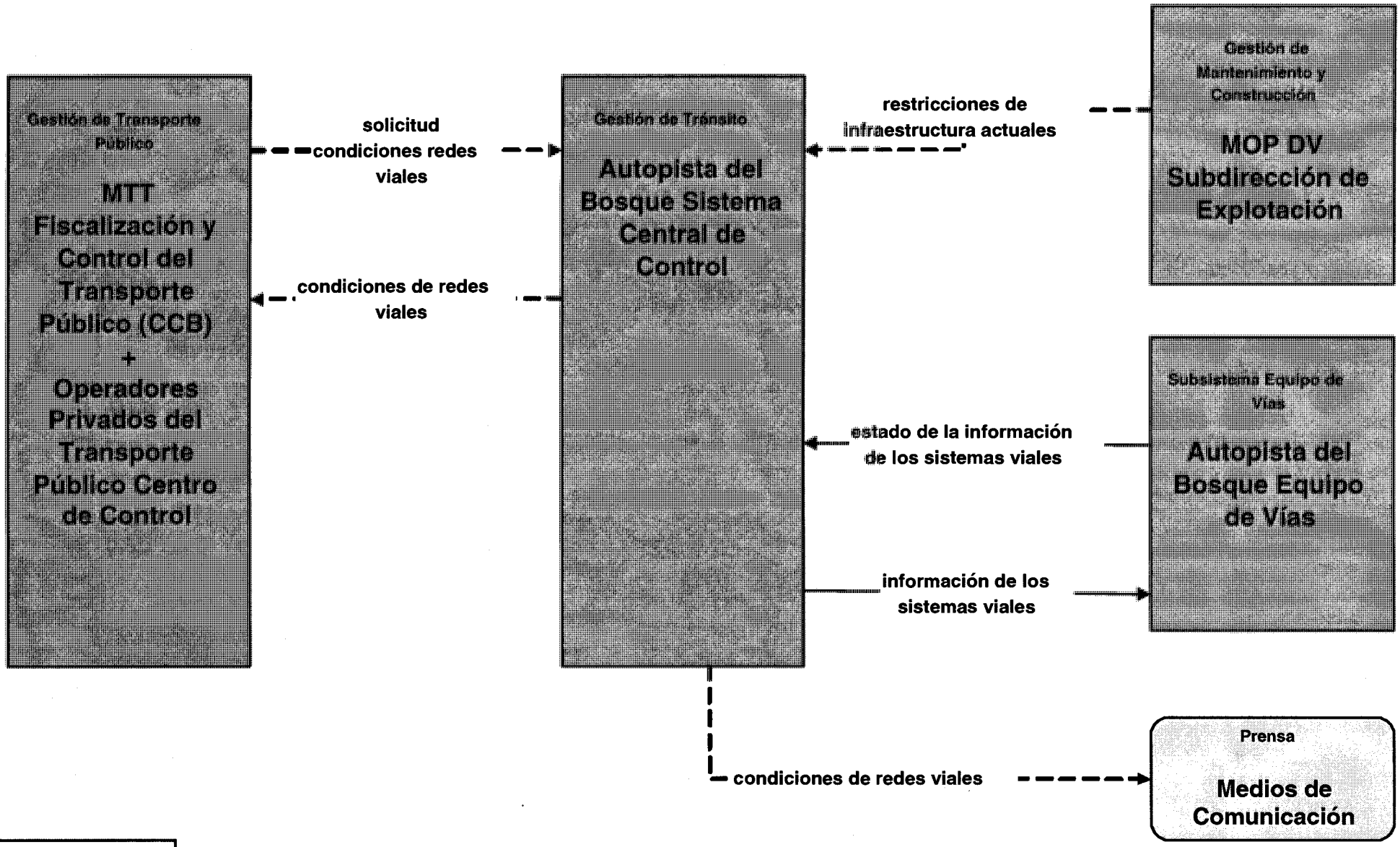


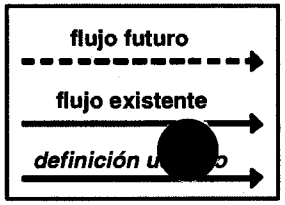
flujo futuro

flujo existente

definición usuario

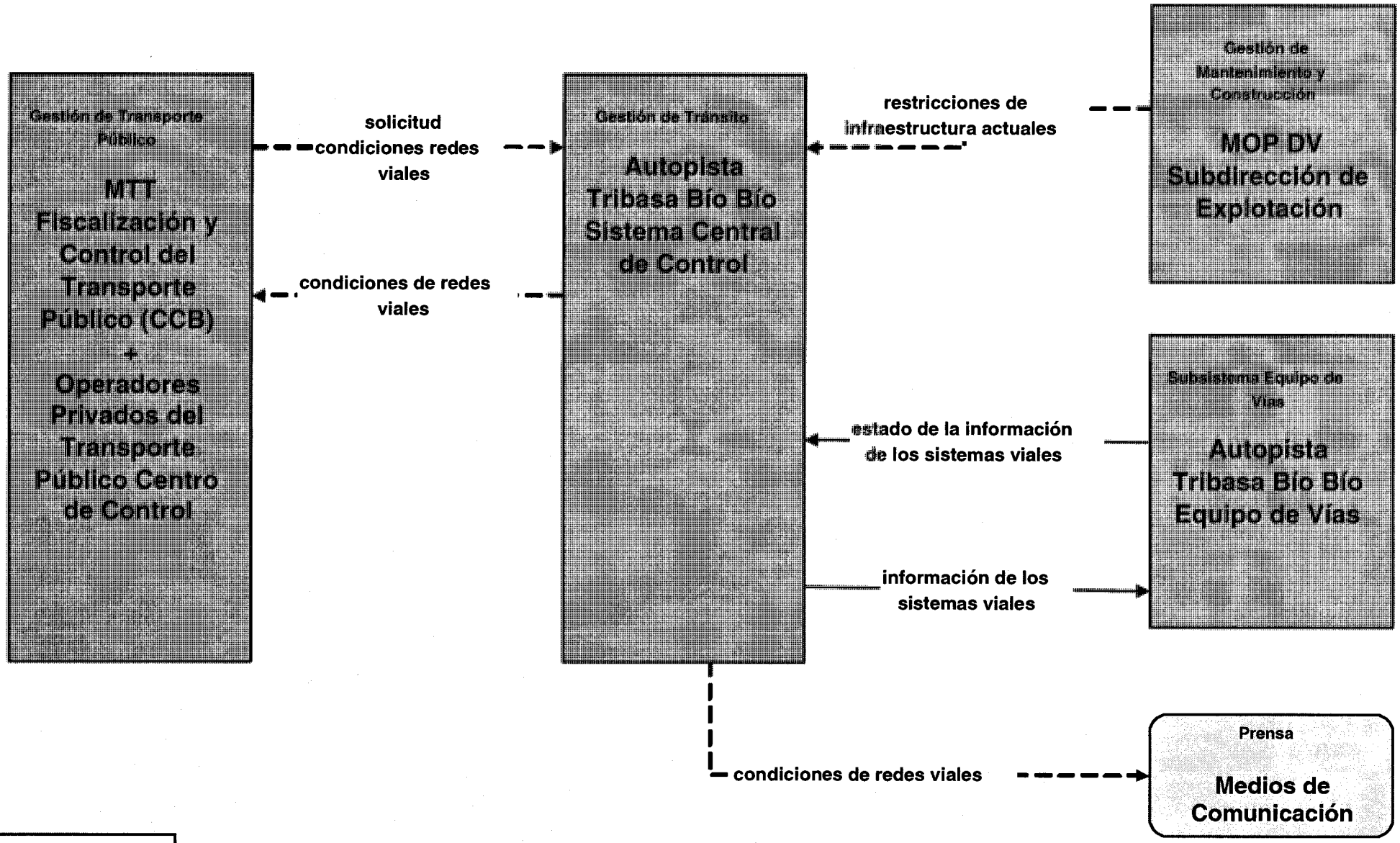
ATMS06 - Difusión de Información de Tránsito
Autopista del Bosque





ATMS06 - Difusión de Información de Tránsito

Autopista Tribasa Bío Bío



flujo futuro

flujo existente

definición usuario

ATMS06 - Difusión de Información de Tránsito
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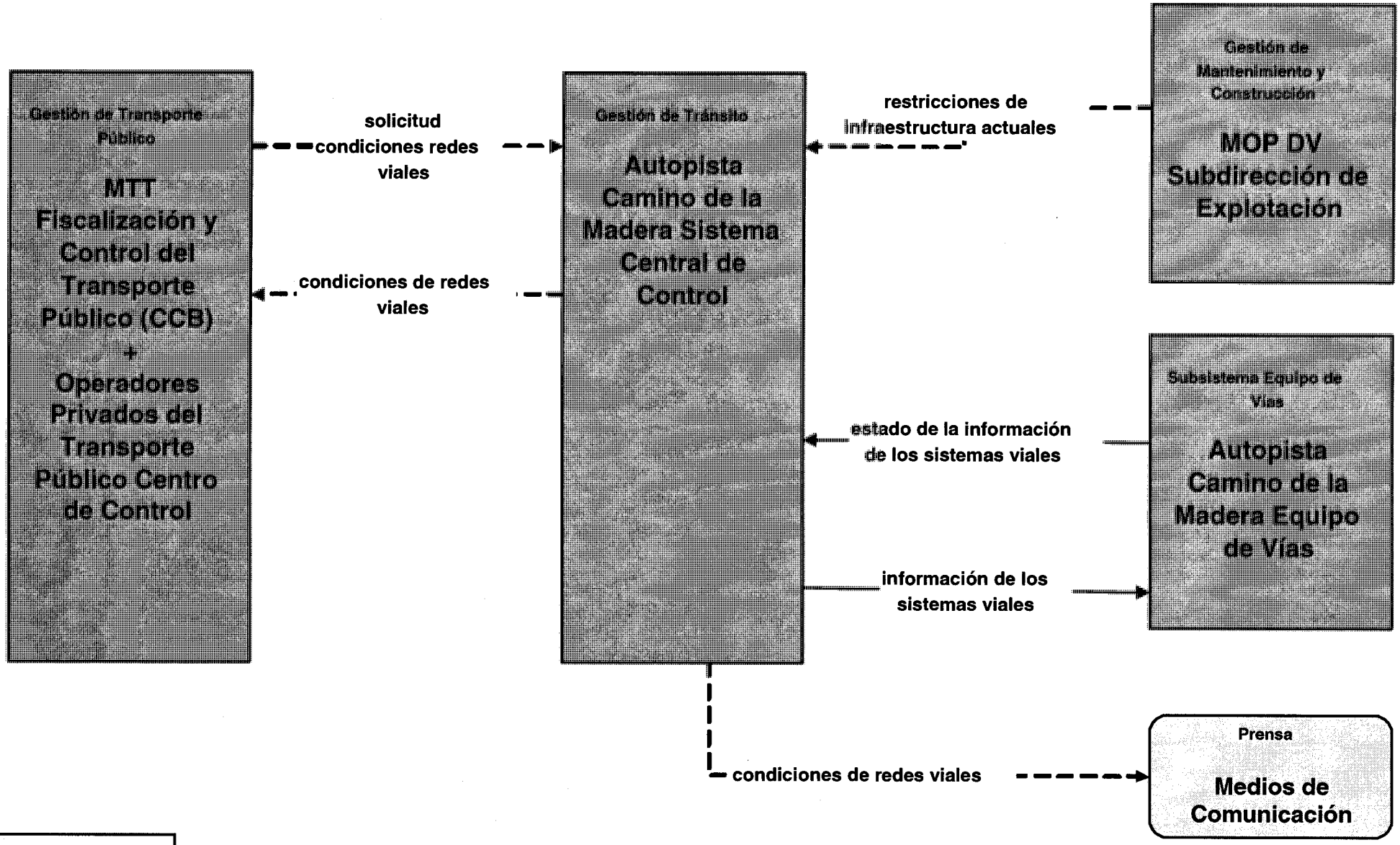
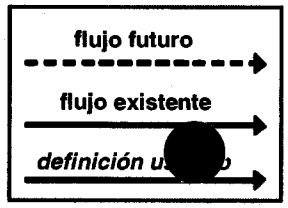
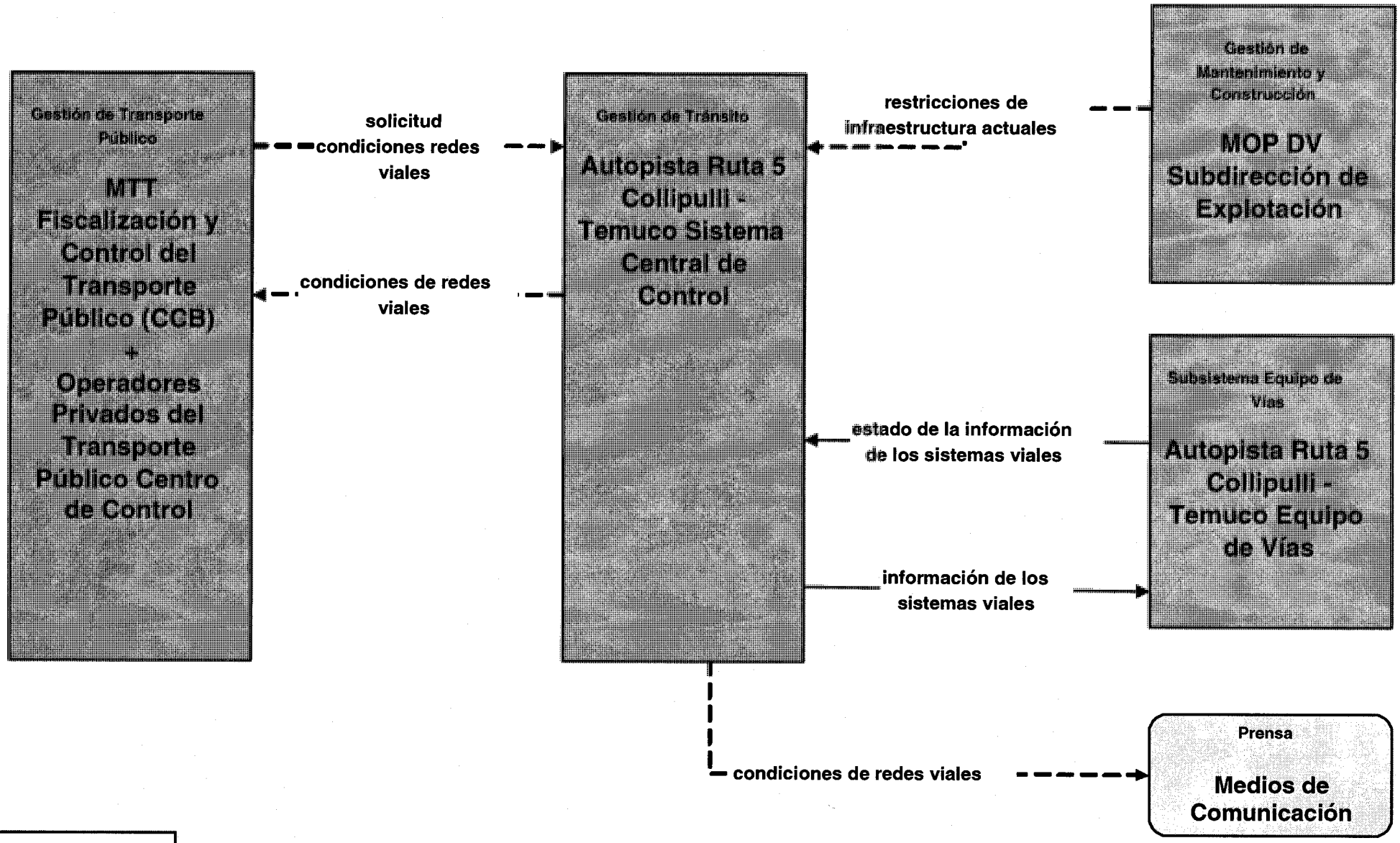




ATMS06 - Difusión de Información de Tránsito

Autopista Ruta 5 Collipulli - Temuco



flujo futuro

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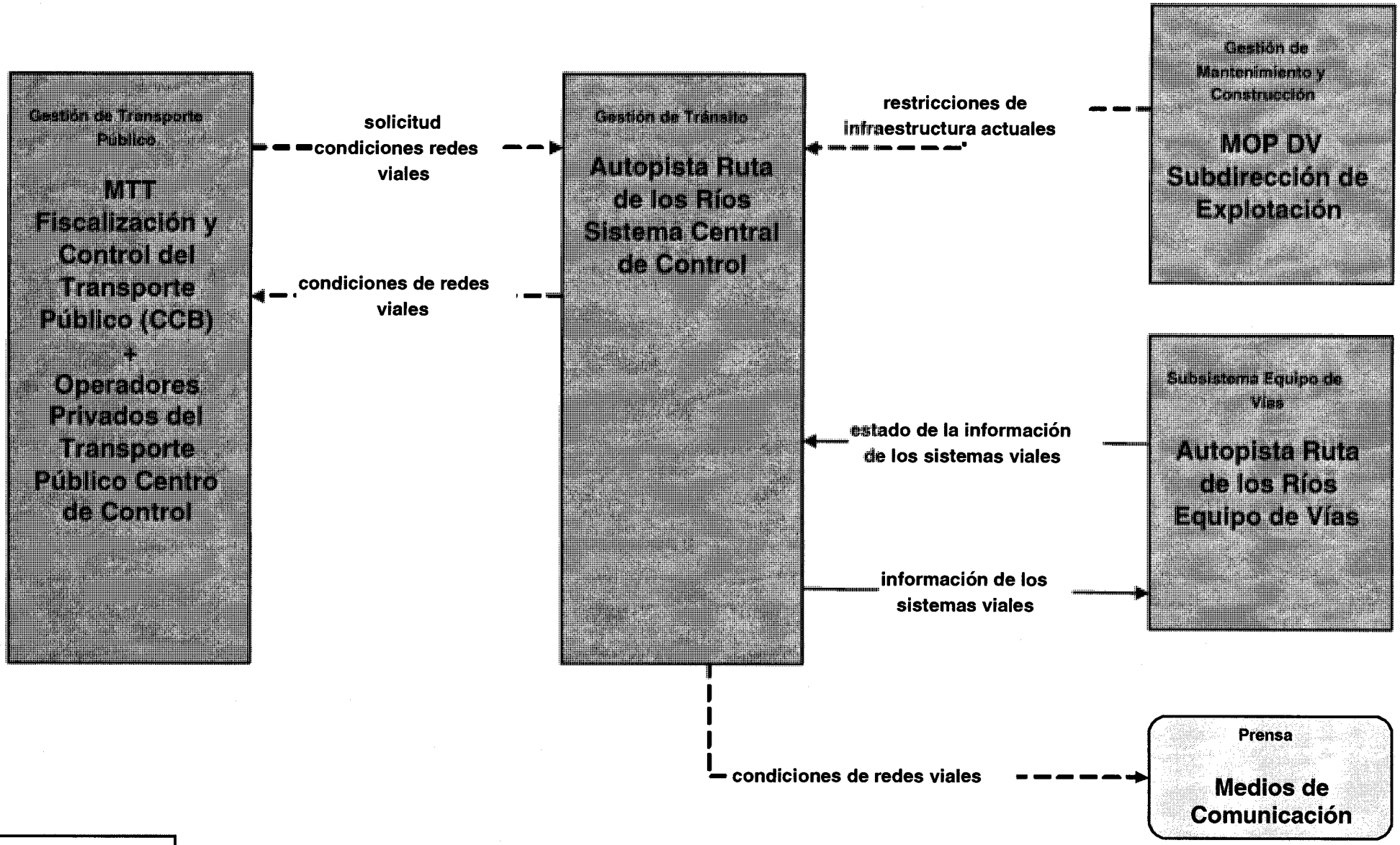
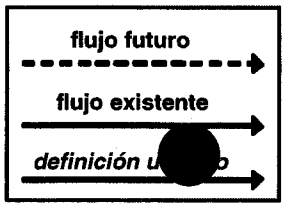
definición usuario

ATMS06 - Difusión de Información de Tránsito

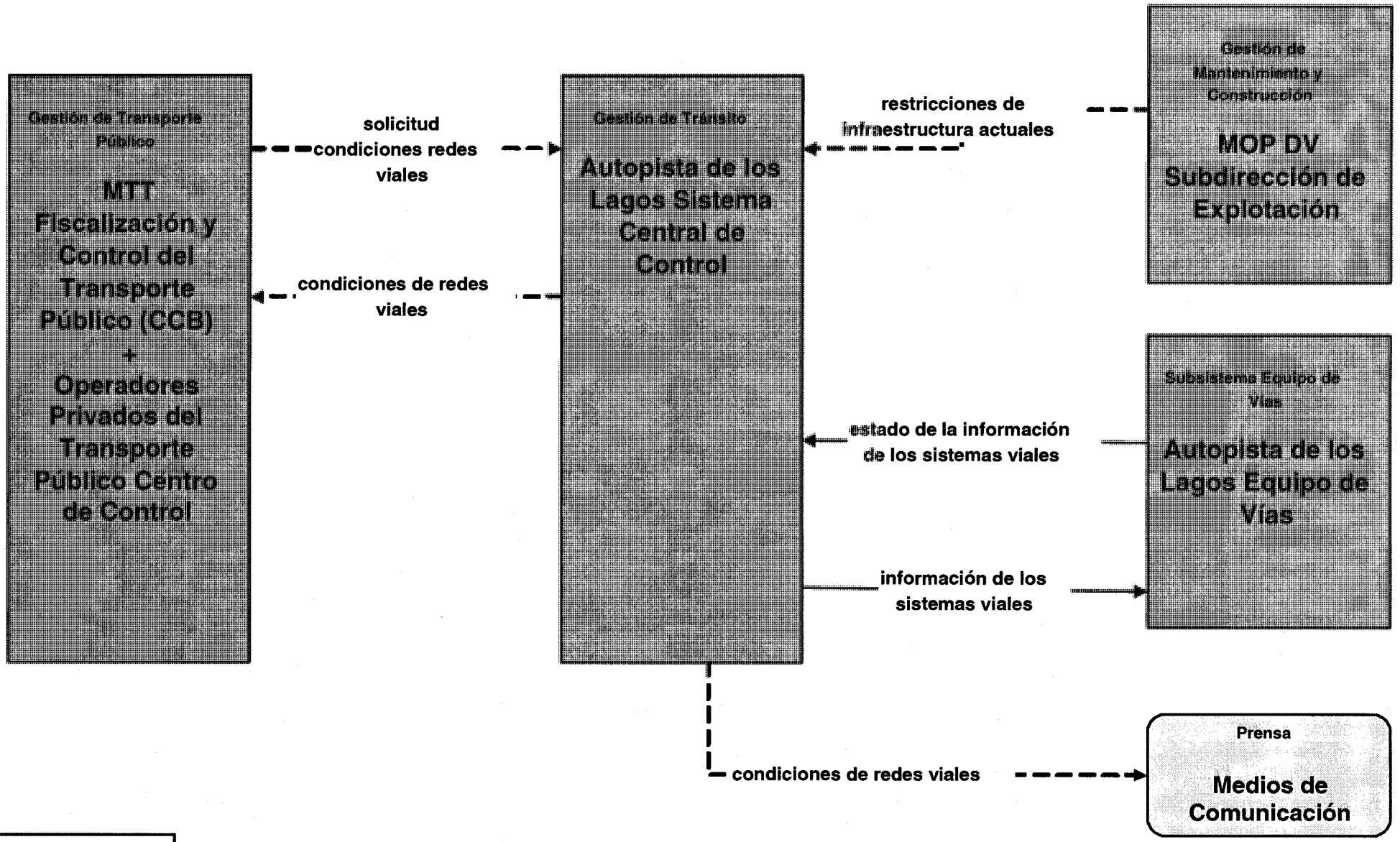
Autopista Ruta de los Ríos





ATMS06 - Difusión de Información de Tránsito

Autopista de los Lagos

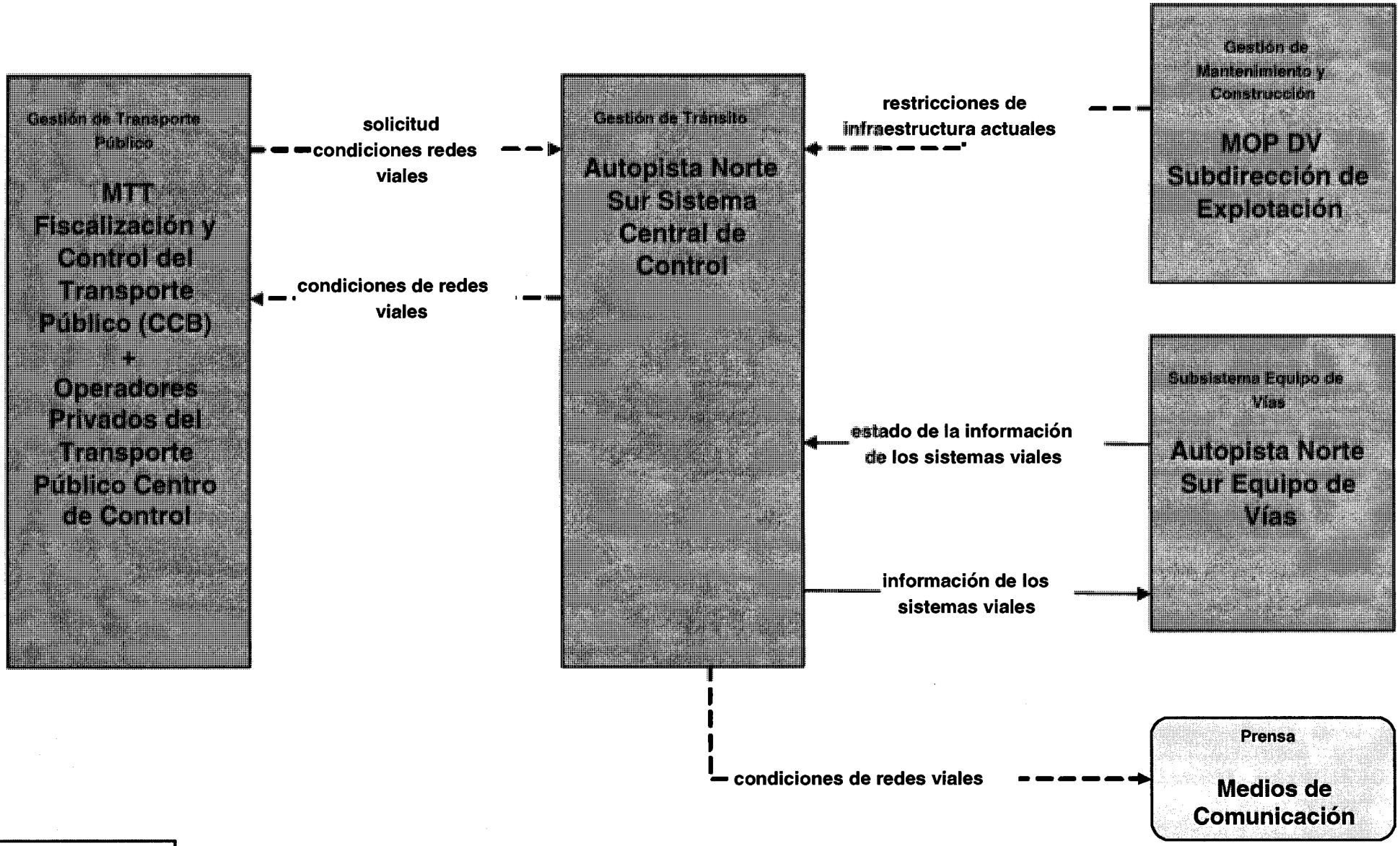


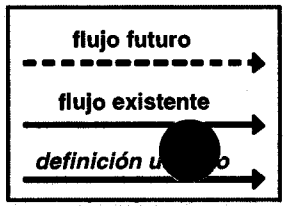
flujo futuro

flujo existente

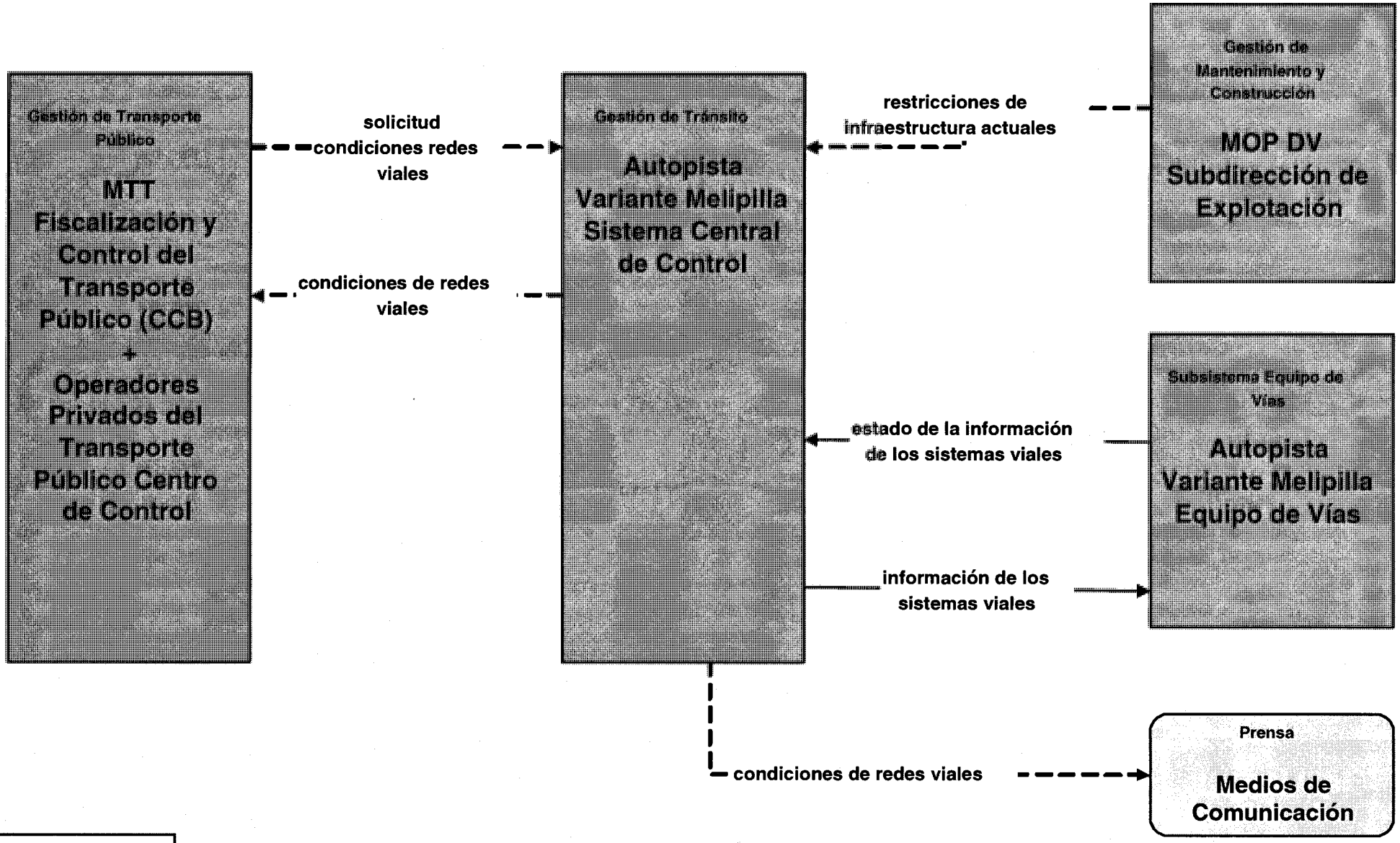
definición usuario

ATMS06 - Difusión de Información de Tránsito
Autopista Norte Sur





ATMS06 - Difusión de Información de Tránsito
Autopista Variante Melipilla

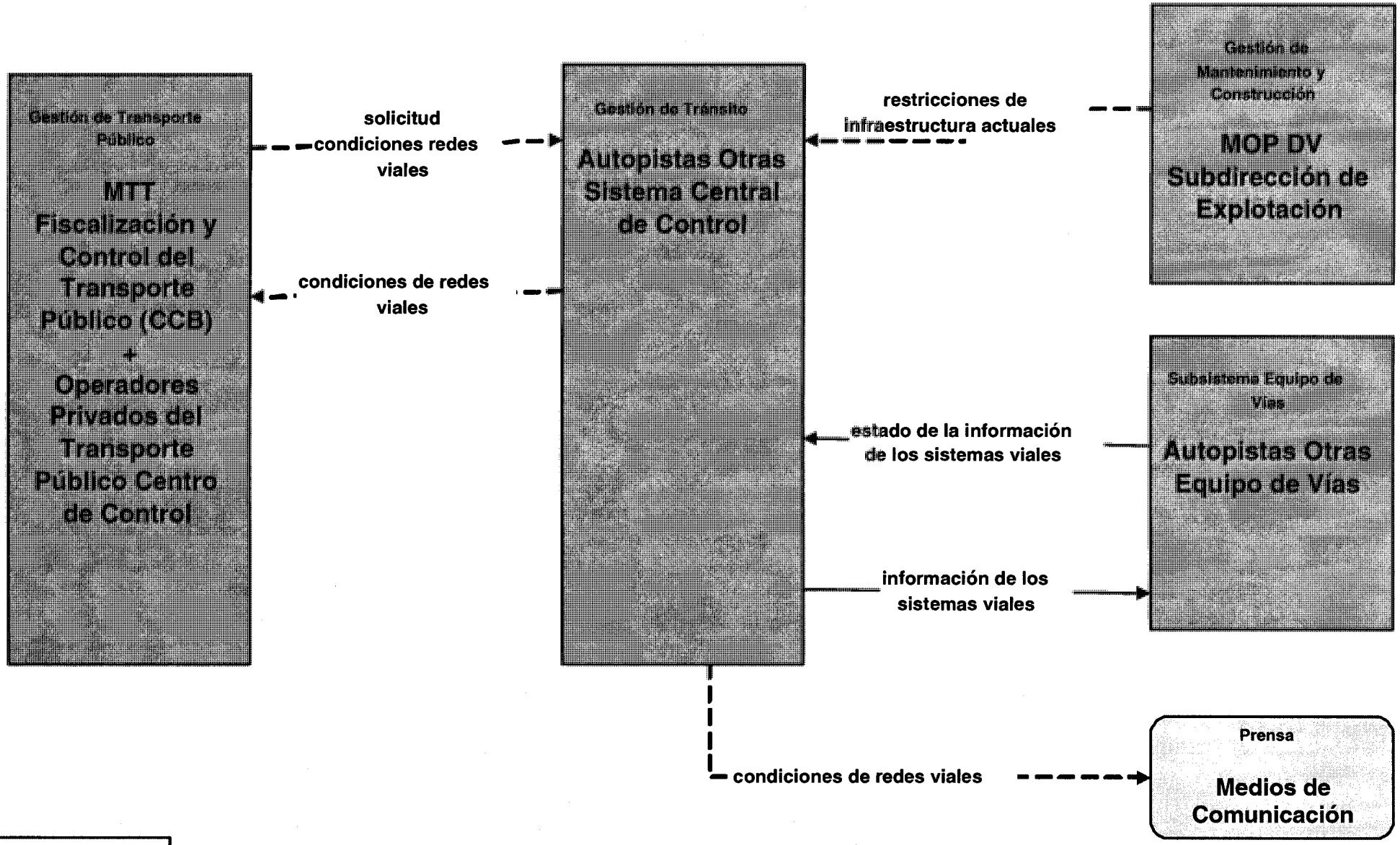


flujo futuro

flujo existente

definición usuario

ATMS06 - Difusión de Información de Tránsito
Autopistas Otras Sistema Central

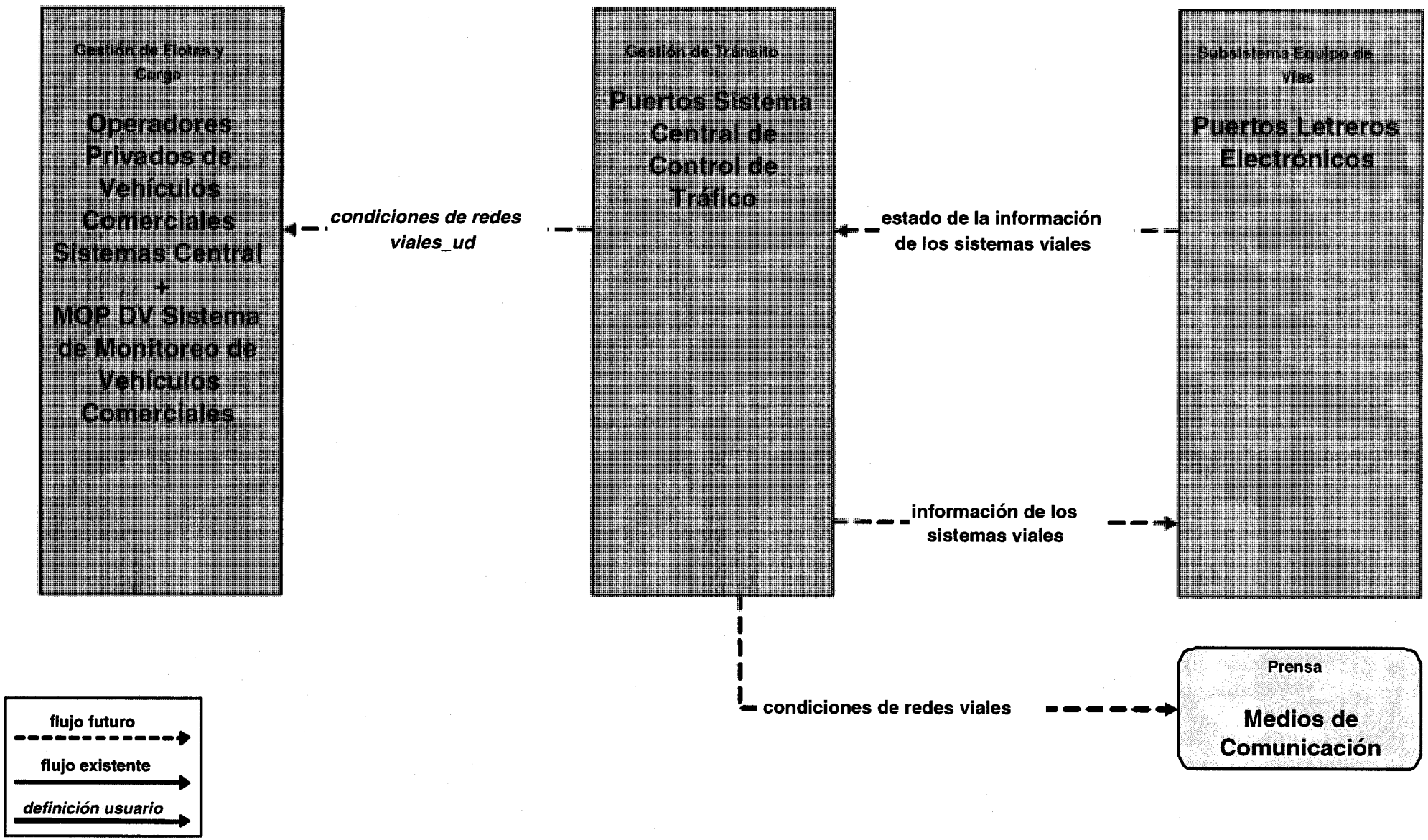


flujo futuro

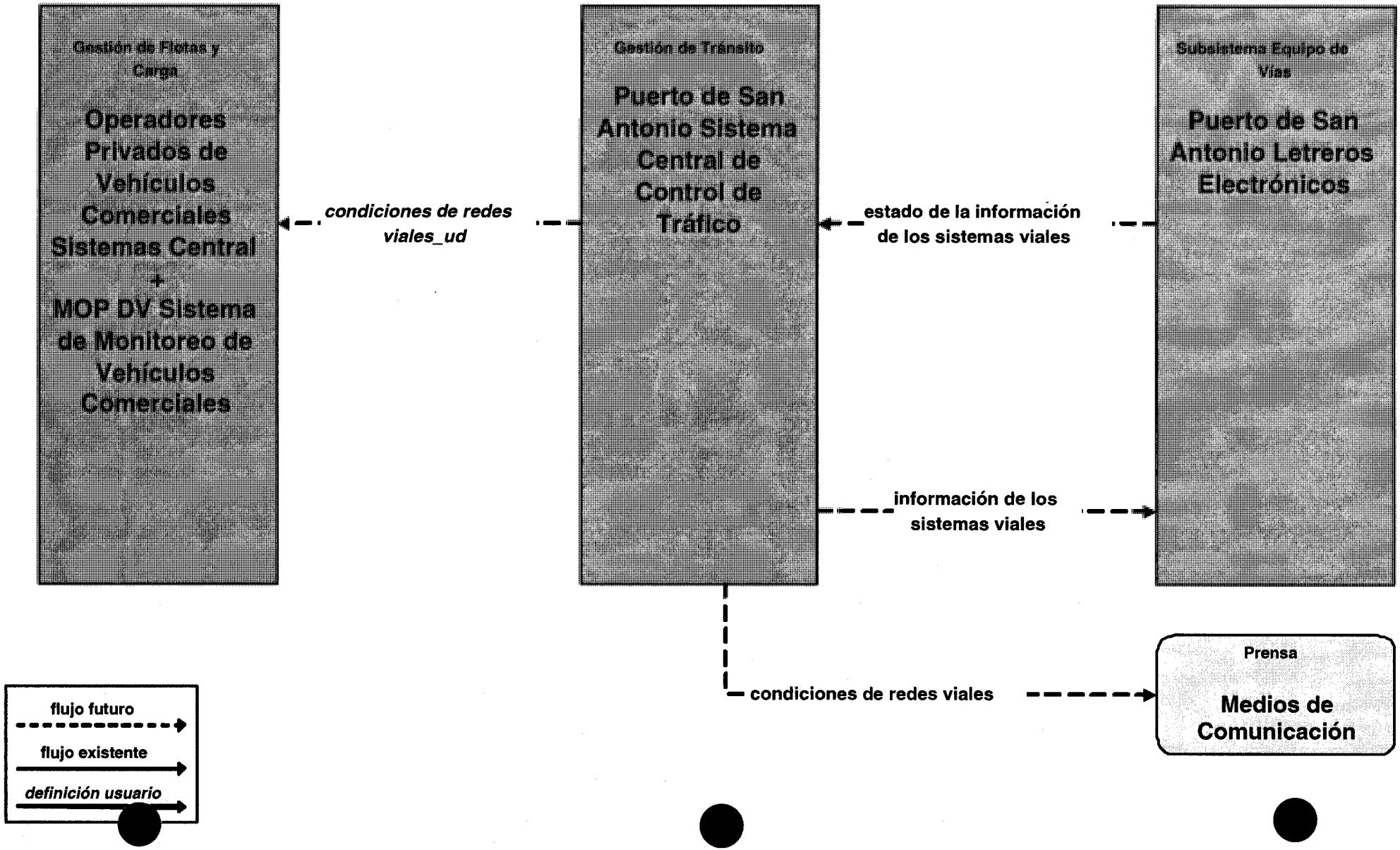
flujo existente

definición us

ATMS06 - Difusión de Información de Tránsito
Puertos



ATMS06 - Difusión de Información de Tránsito
Puerto de San Antonio



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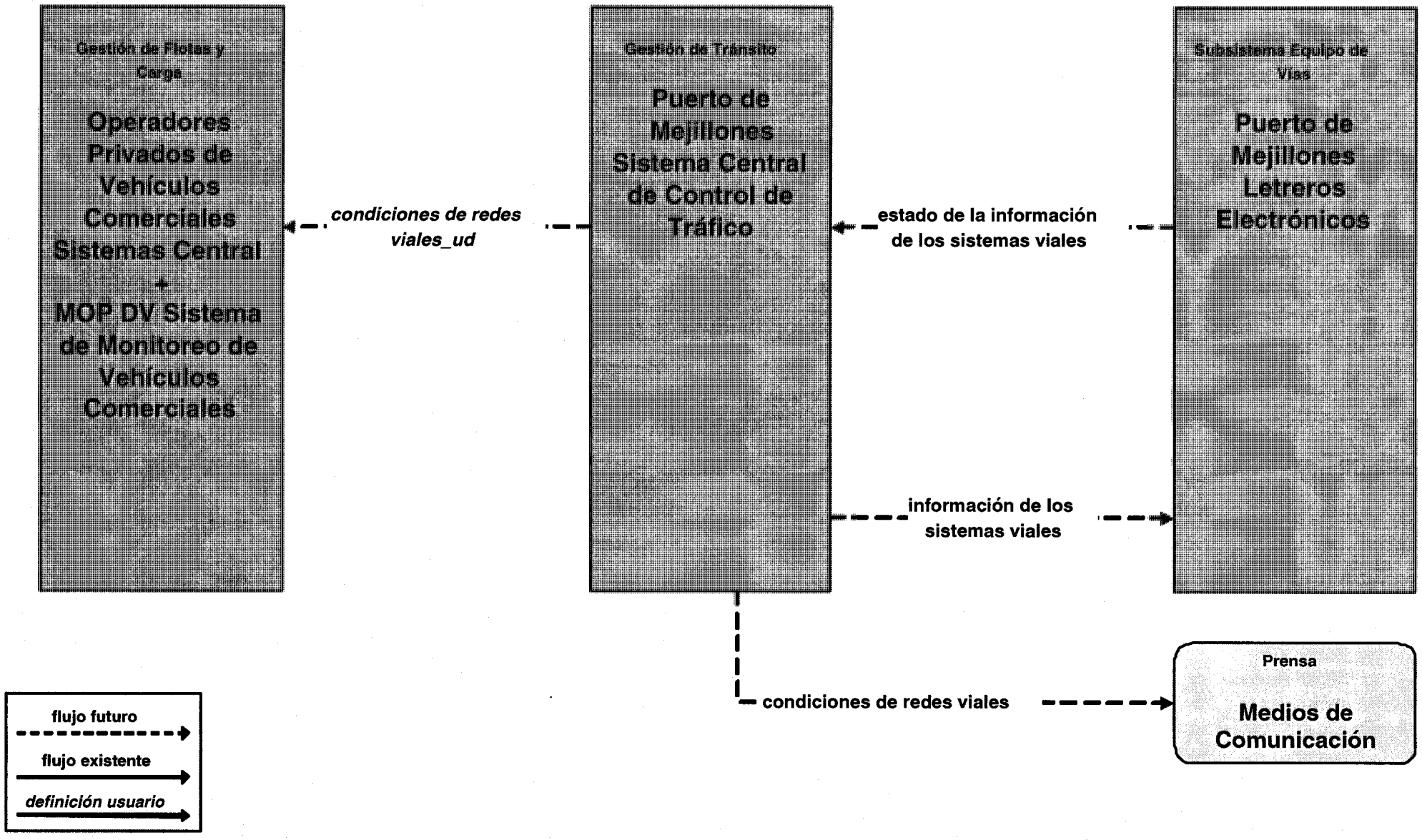
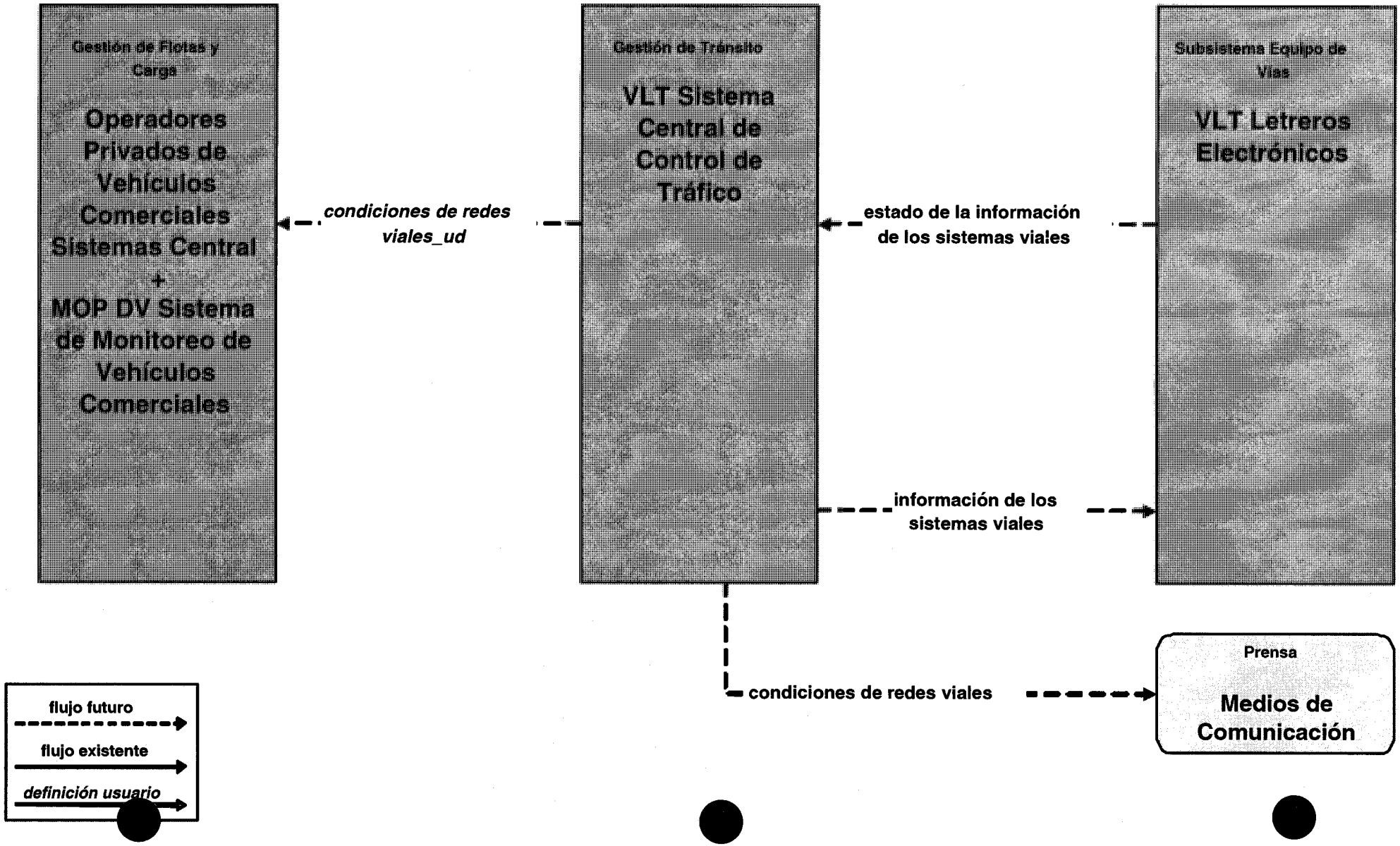
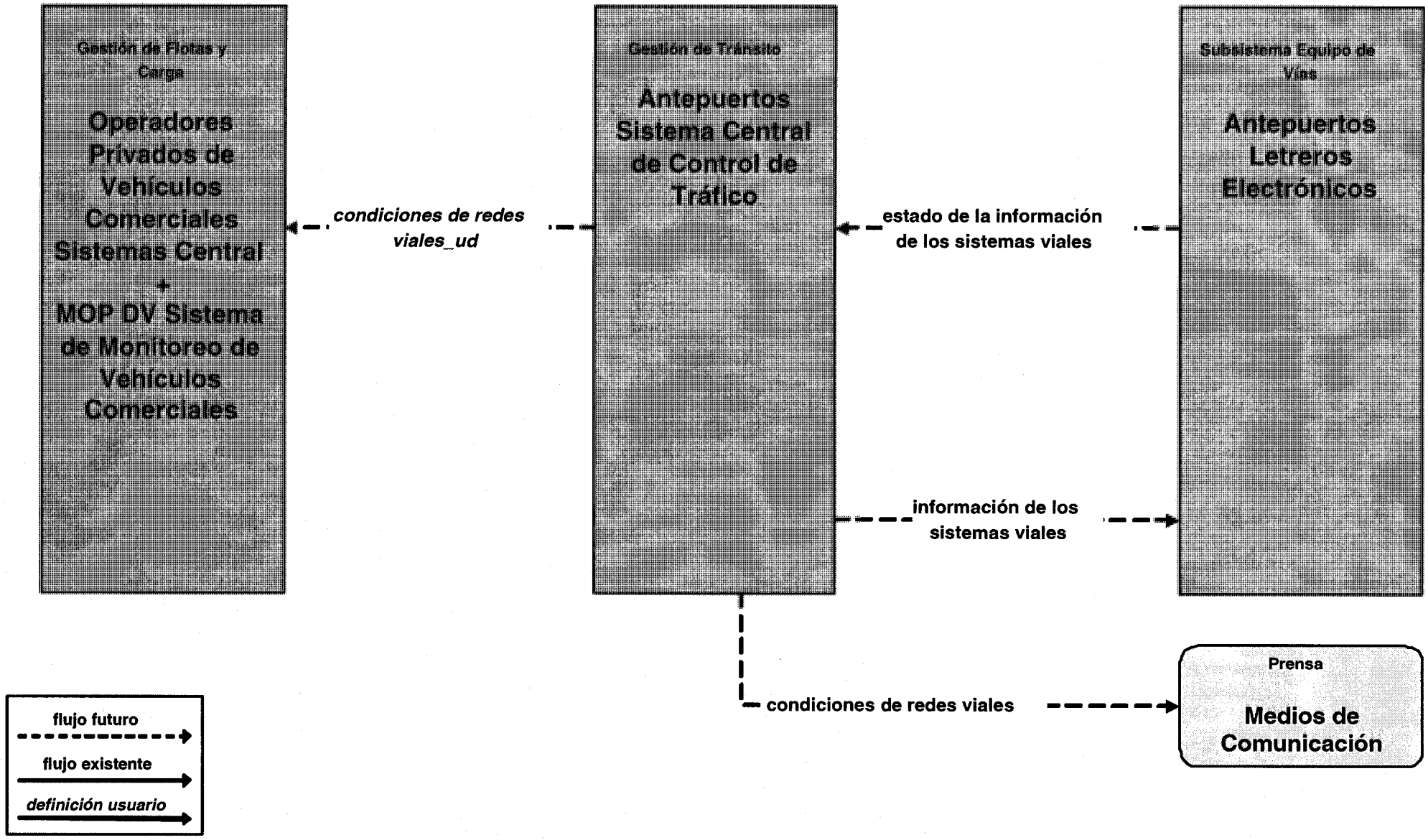
Puerto de Mejillones



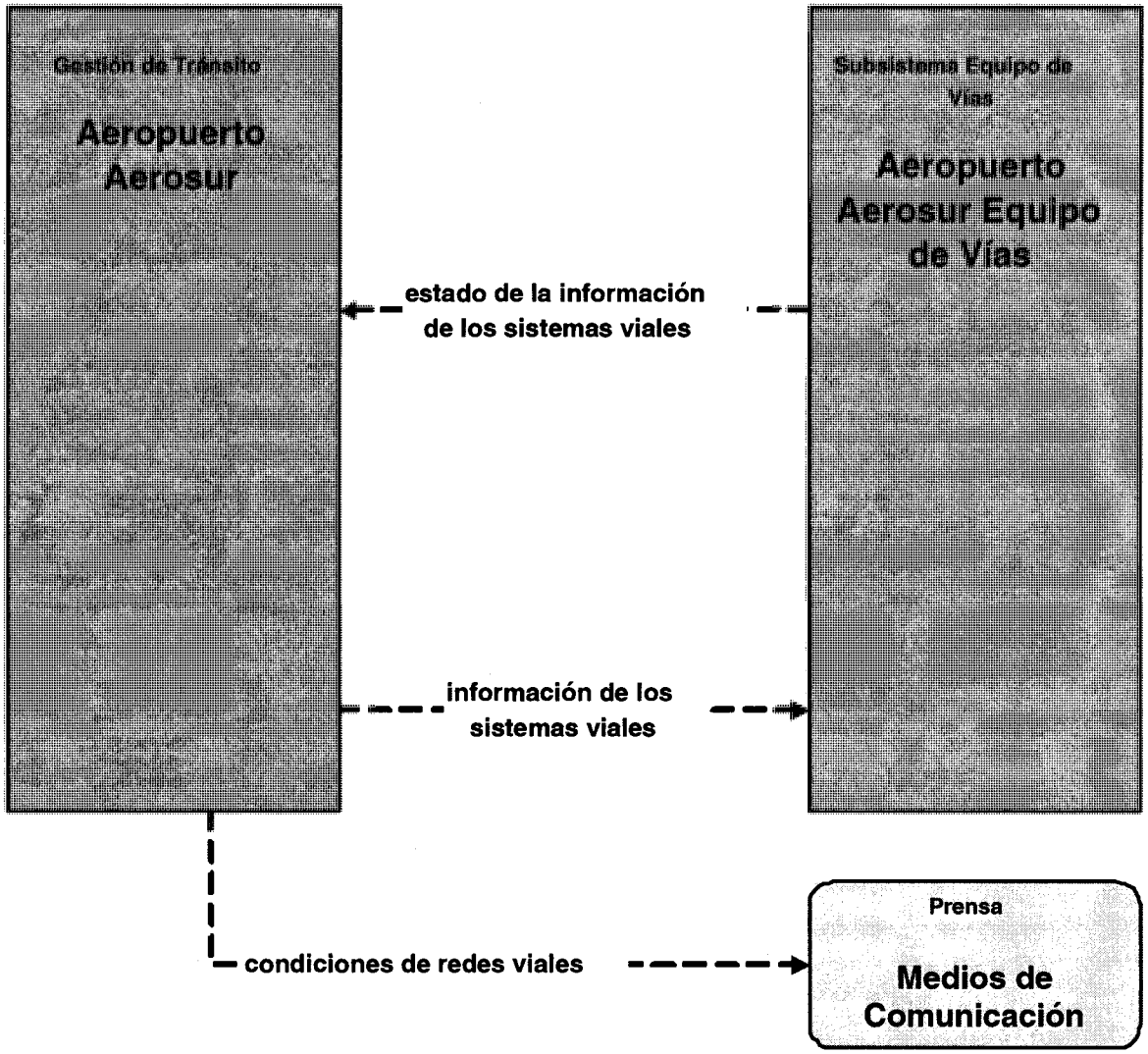
ATMS06 - Difusión de Información de Tránsito
VLT

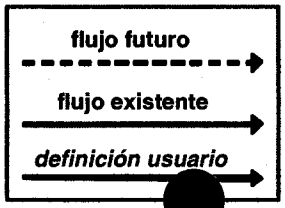


ATMS06 - Difusión de Información de Tránsito
Antepuertos



ATMS06 - Difusión de Información de Tránsito
Aeropuerto Aerosur





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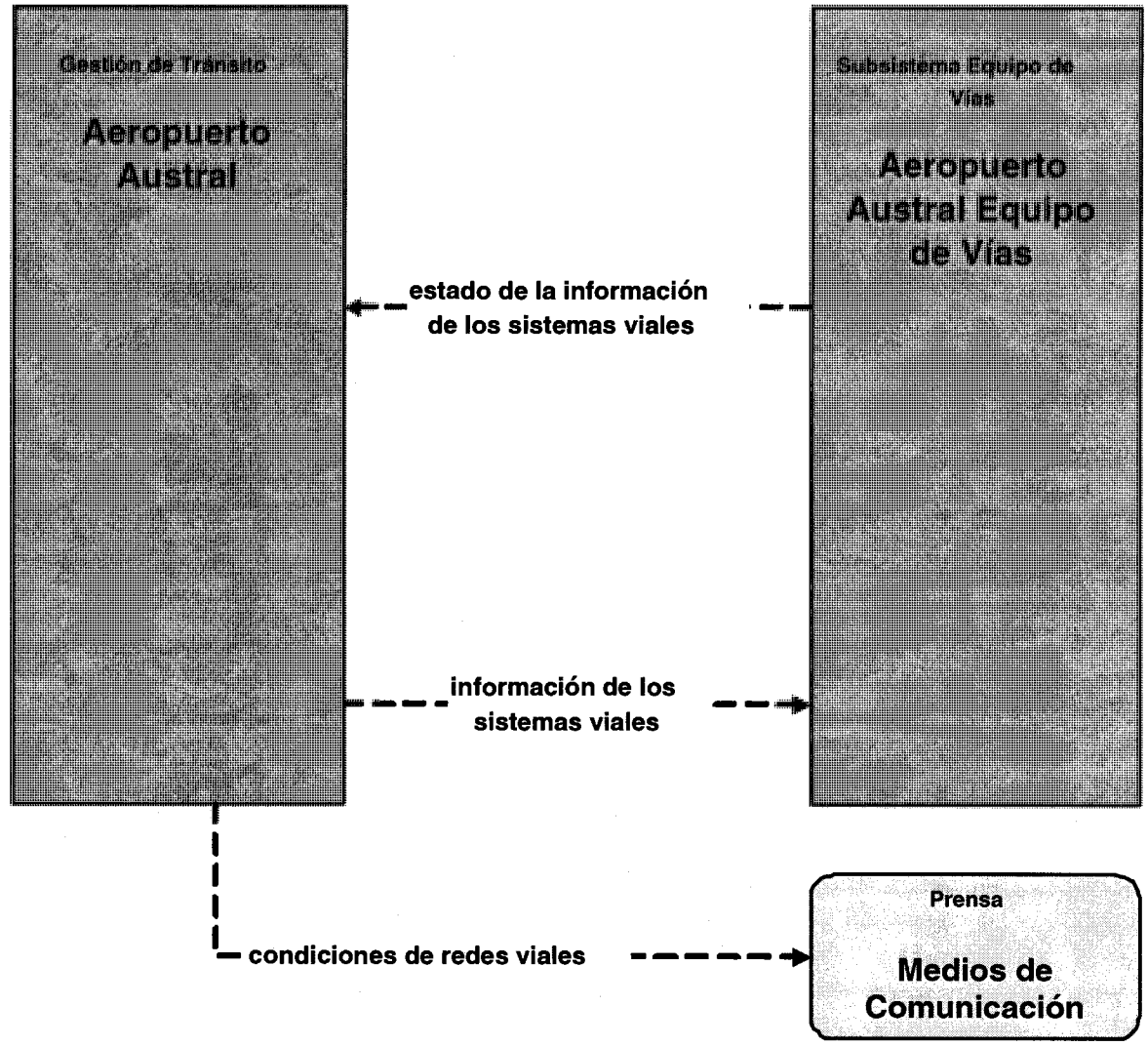
Aeropuerto Austral

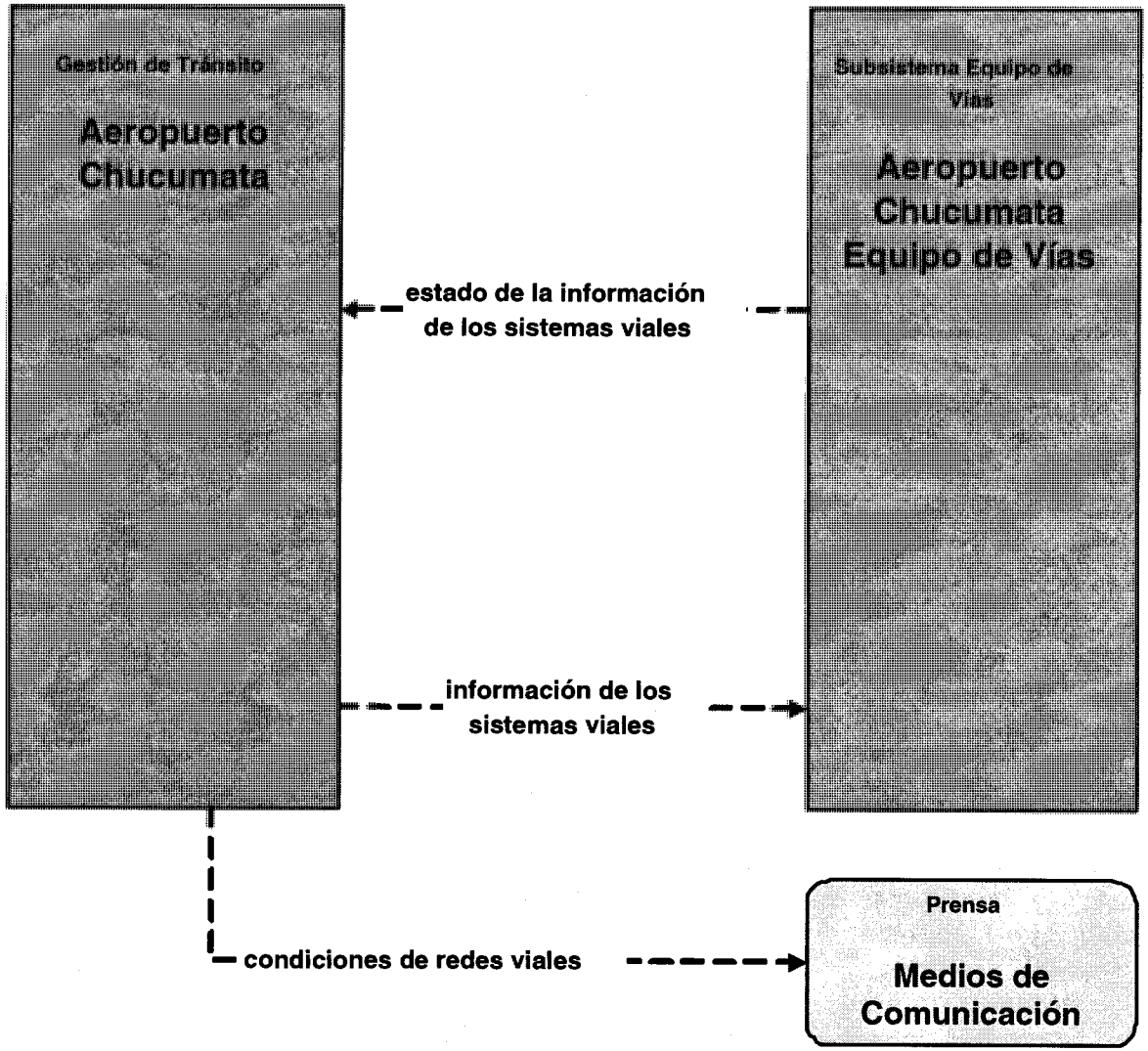


flujo futuro

flujo existente

definición usuario

ATMS06 - Difusión de Información de Tránsito
Aeropuerto Chucumata

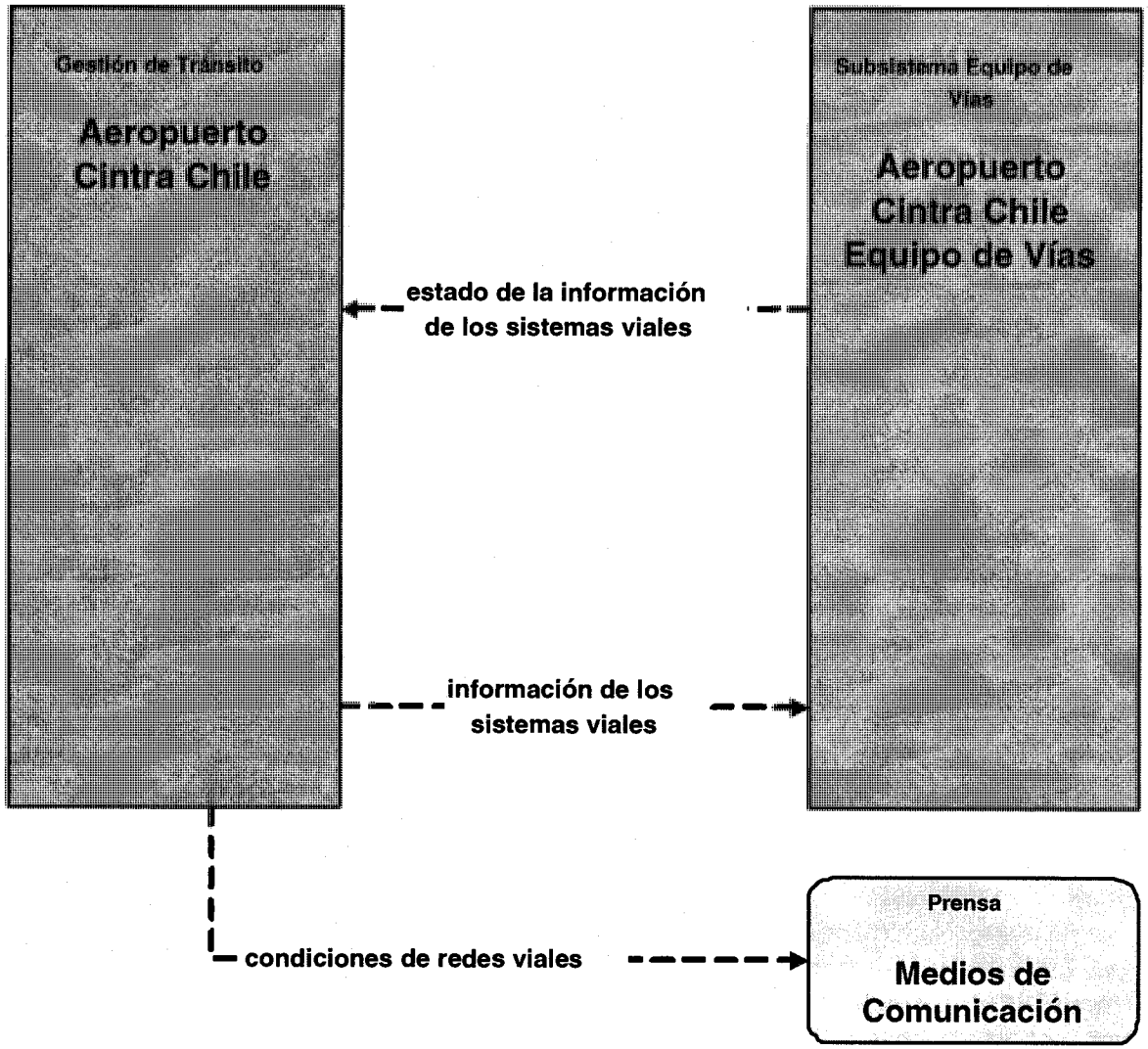


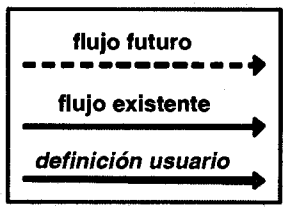
flujo futuro

flujo existente

definición usuario

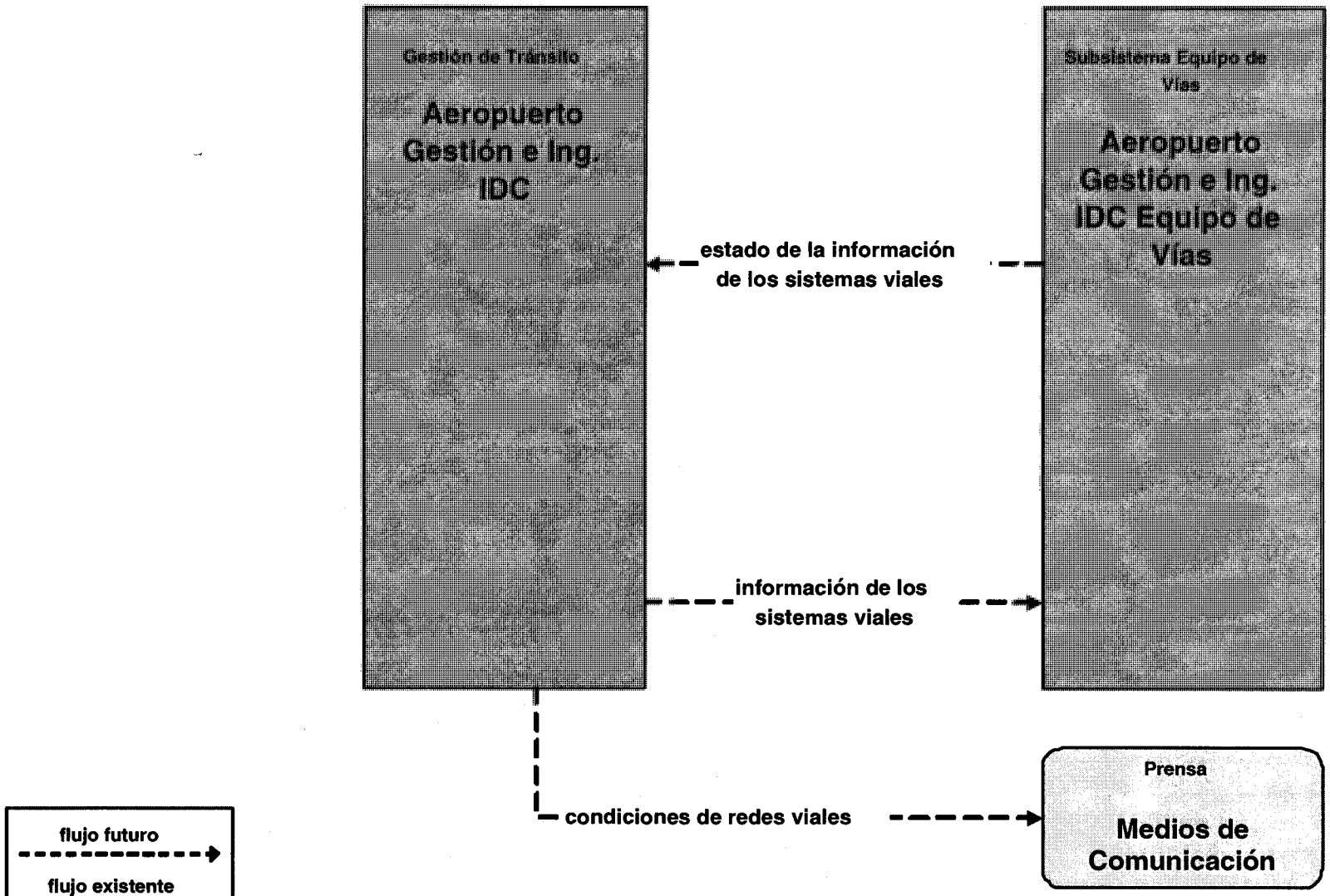
ATMS06 - Difusión de Información de Tránsito
Aeropuerto Cintra Chile





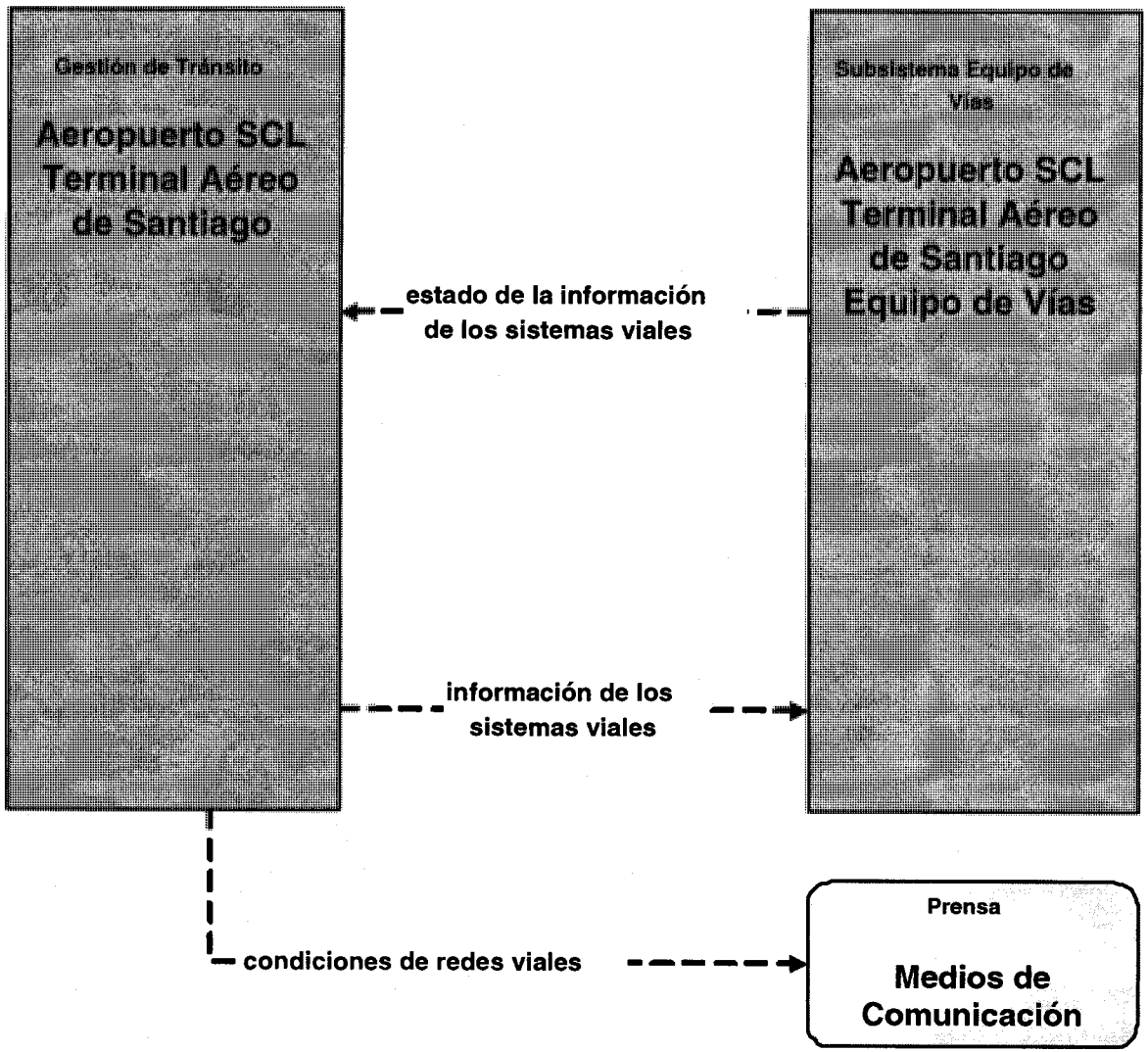
ATMS06 - Difusión de Información de Tránsito

Aeropuerto Gestión en Ing. IDC



ATMS06 - Difusión de Información de Tránsito

Aeropuerto SCL Terminal Aéreo de Santiago



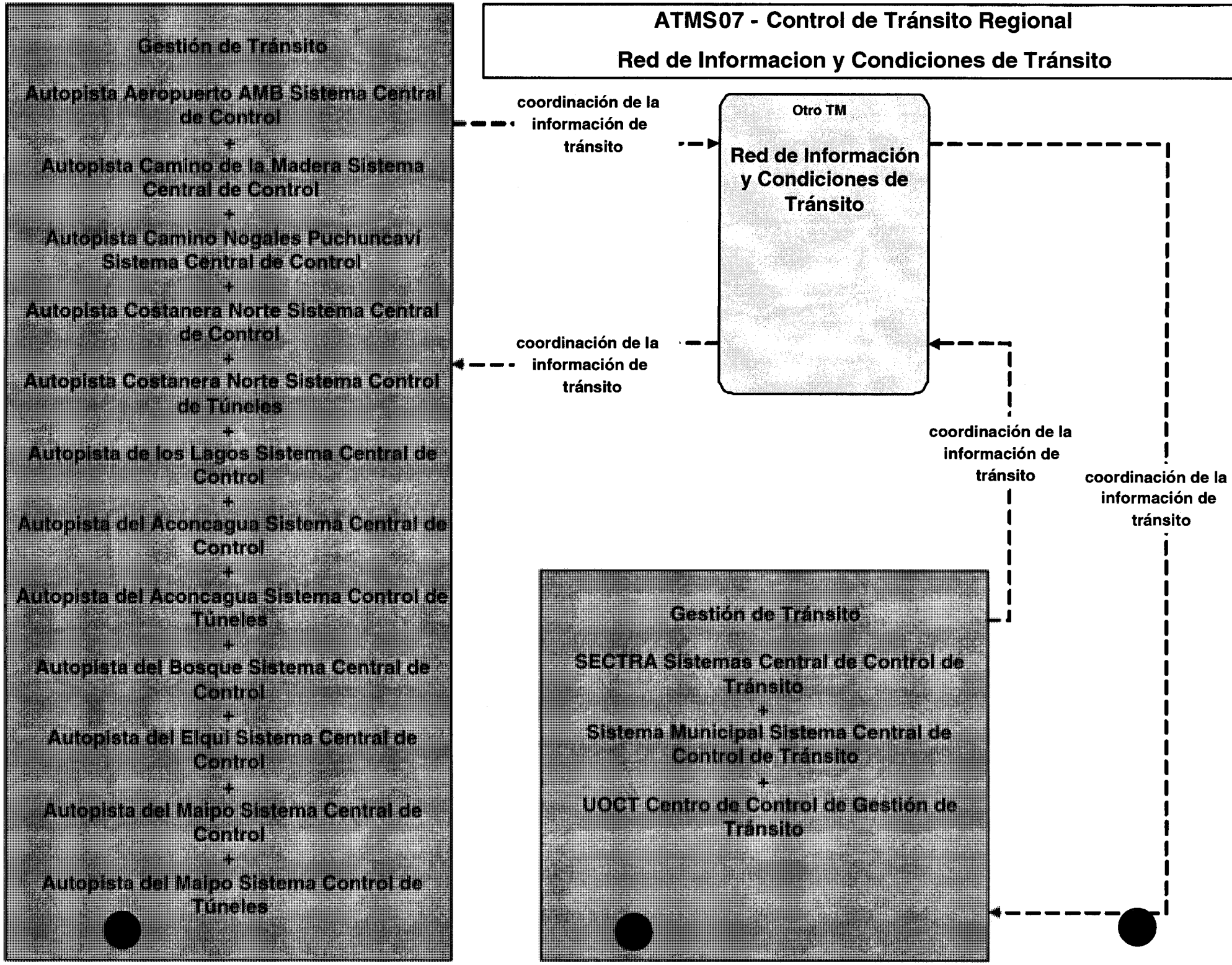
flujo futuro

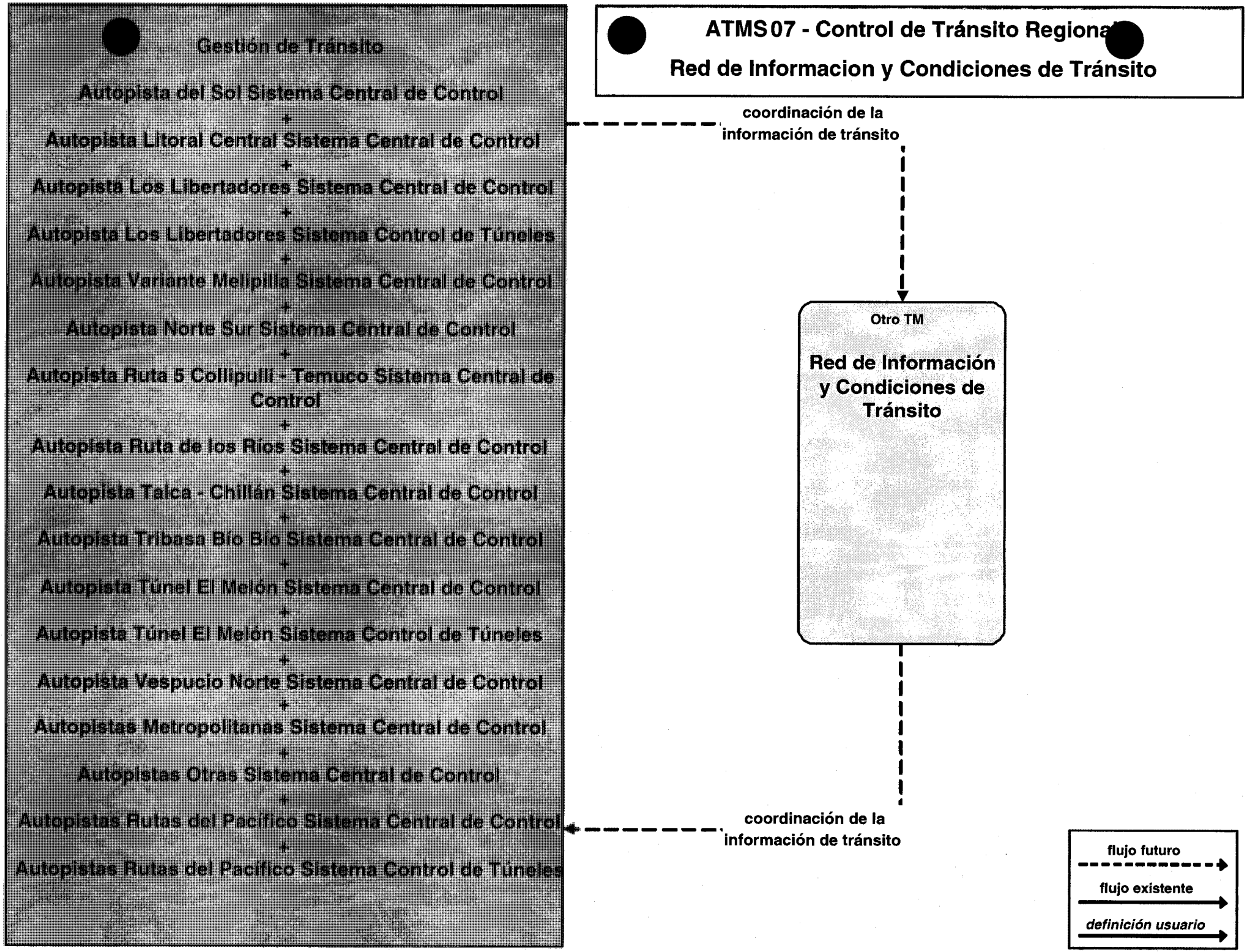
flujo existente

definición usuario

ATMS07 - Control de Tránsito Regional

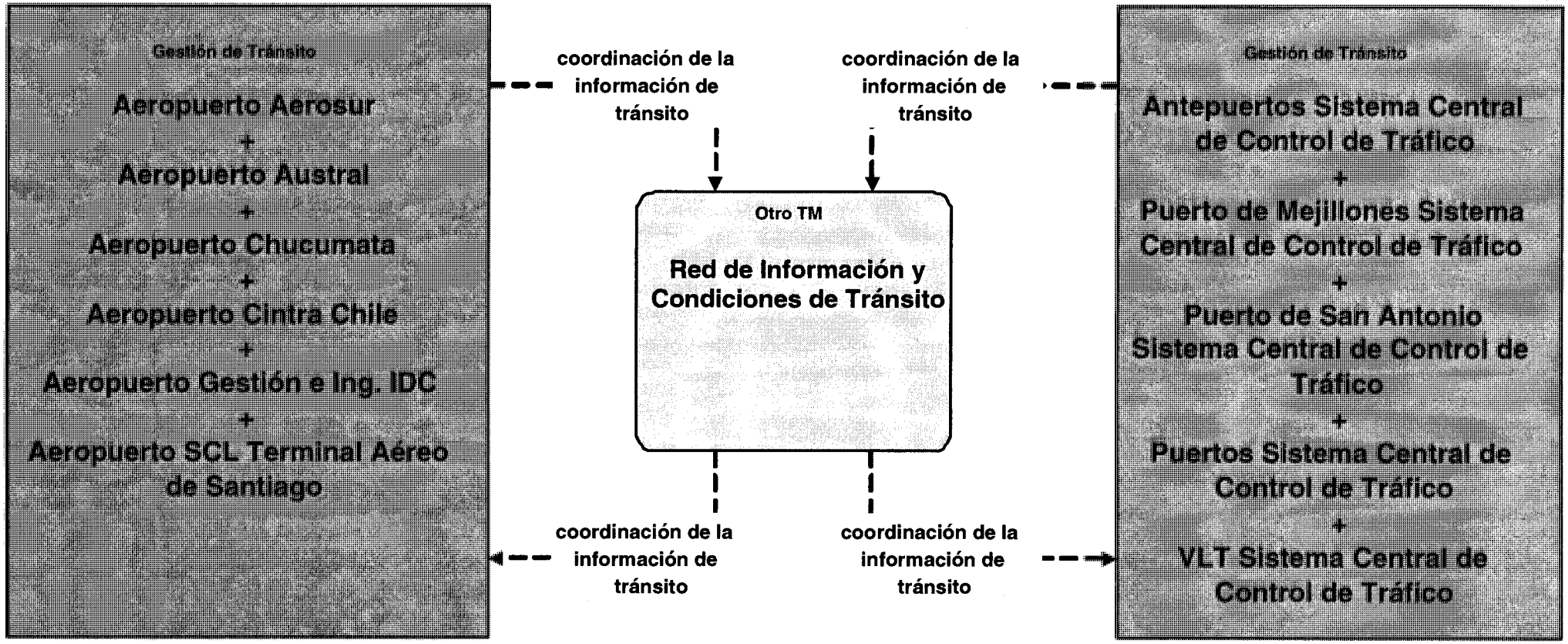
Red de Informacion y Condiciones de Tránsito

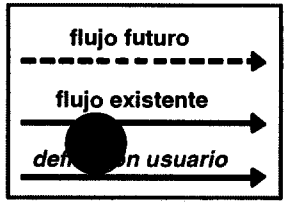



Gestión de Tránsito
Autopista del Sol Sistema Central de Control
+
Autopista Litoral Central Sistema Central de Control
+
Autopista Los Libertadores Sistema Central de Control
+
Autopista Los Libertadores Sistema Control de Túneles
+
Autopista Variante Melipilla Sistema Central de Control
+
Autopista Norte Sur Sistema Central de Control
+
Autopista Ruta 5 Collipulli - Temuco Sistema Central de Control
+
Autopista Ruta de los Rios Sistema Central de Control
+
Autopista Talca - Chillán Sistema Central de Control
+
Autopista Tribasa Bío Bío Sistema Central de Control
+
Autopista Túnel El Melón Sistema Central de Control
+
Autopista Túnel El Melón Sistema Control de Túneles
+
Autopista Vespucio Norte Sistema Central de Control
+
Autopistas Metropolitanas Sistema Central de Control
+
Autopistas Otras Sistema Central de Control
+
Autopistas Rutas del Pacífico Sistema Central de Control
+
Autopistas Rutas del Pacífico Sistema Control de Túneles
ATMS 07 - Control de Tránsito Regional
Red de Informacion y Condiciones de Tránsito
coordinación de la información de tránsito
Otro TM
Red de Información y Condiciones de Tránsito
coordinación de la información de tránsito
flujo futuro
flujo existente
definición usuario

ATMS 07 - Control de Tránsito Regional

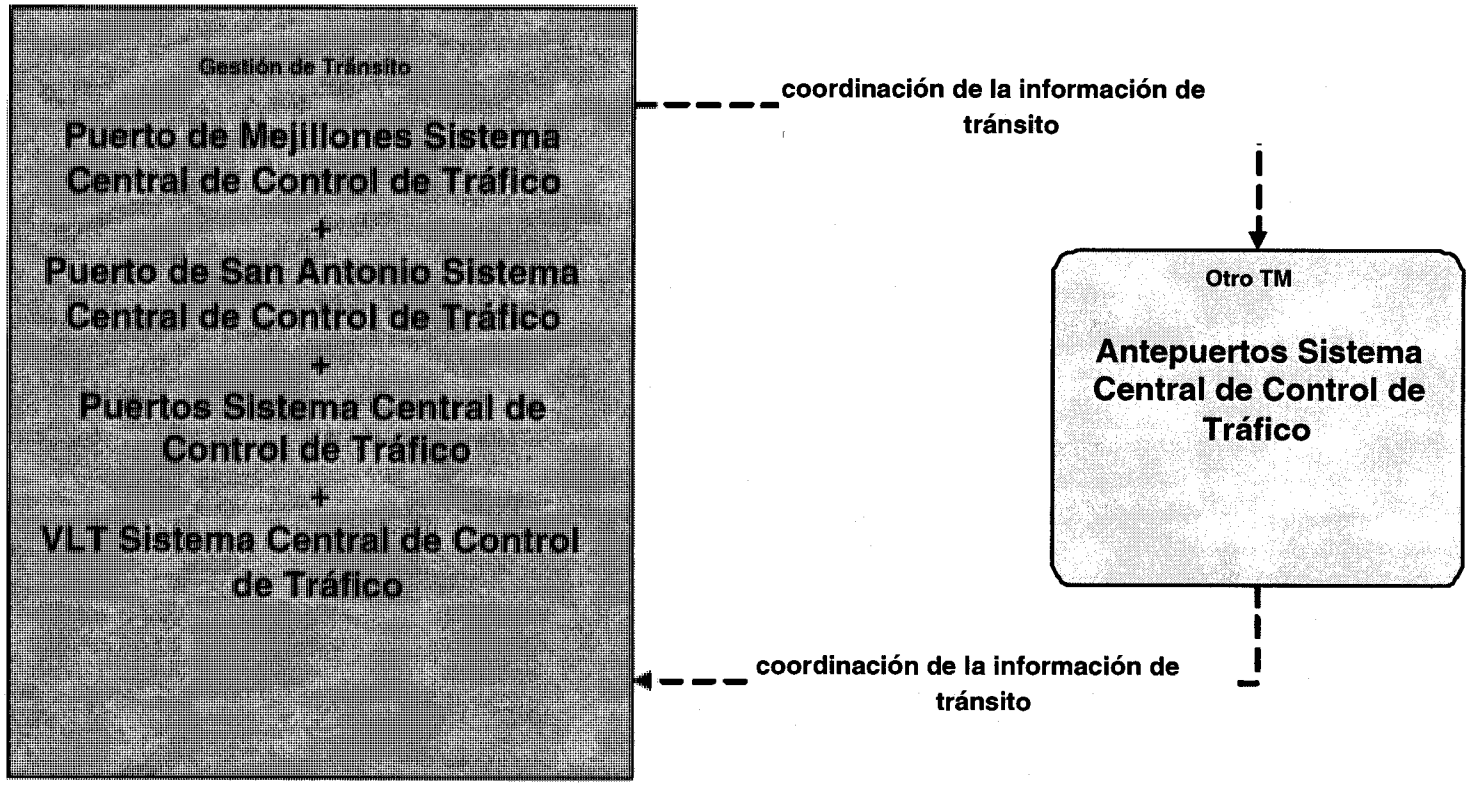
Red de Informacion y Condiciones de Tránsito

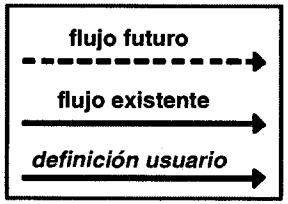




ATMS 07 - Control Tránsito Regional

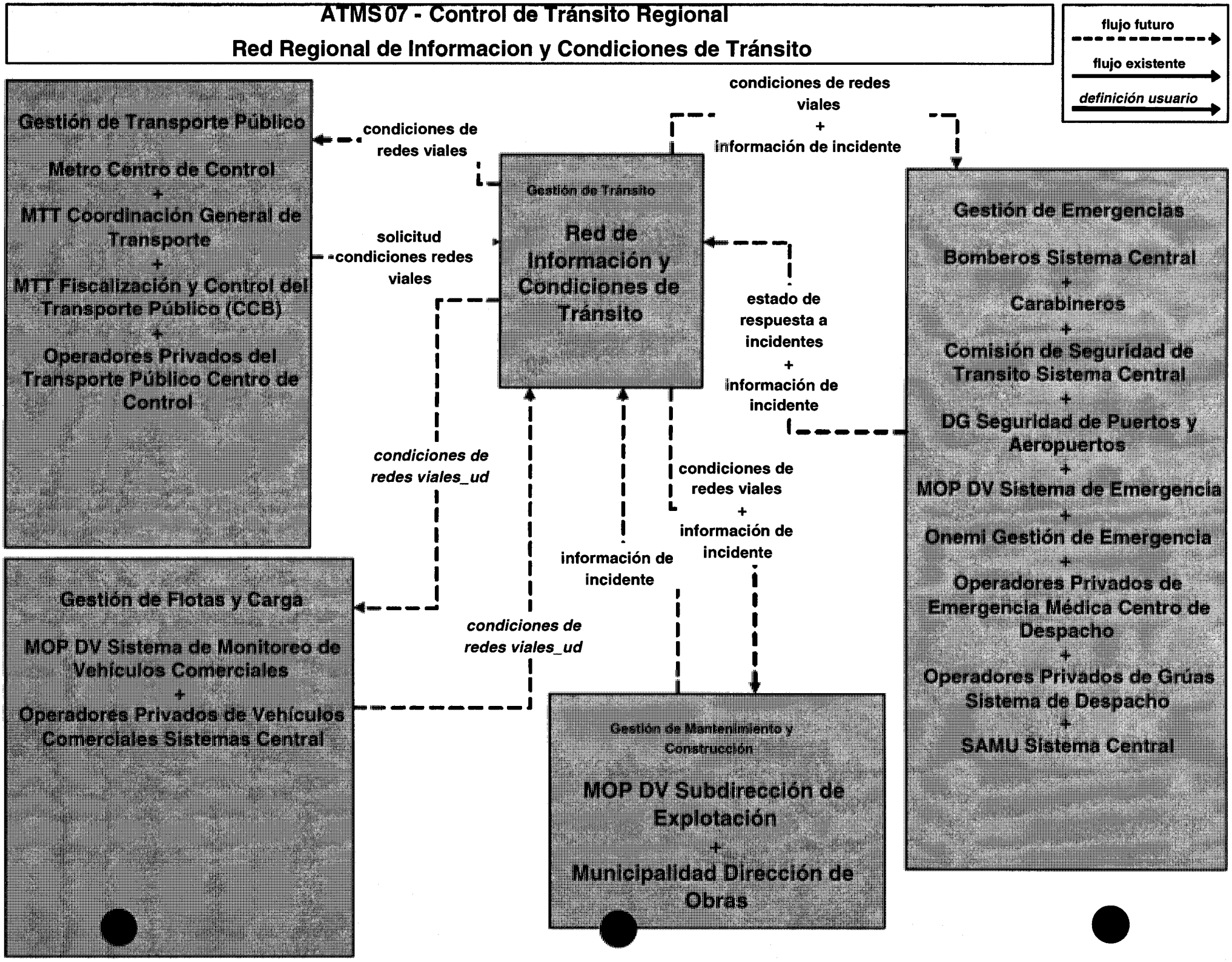
Puertos y Antepuertos





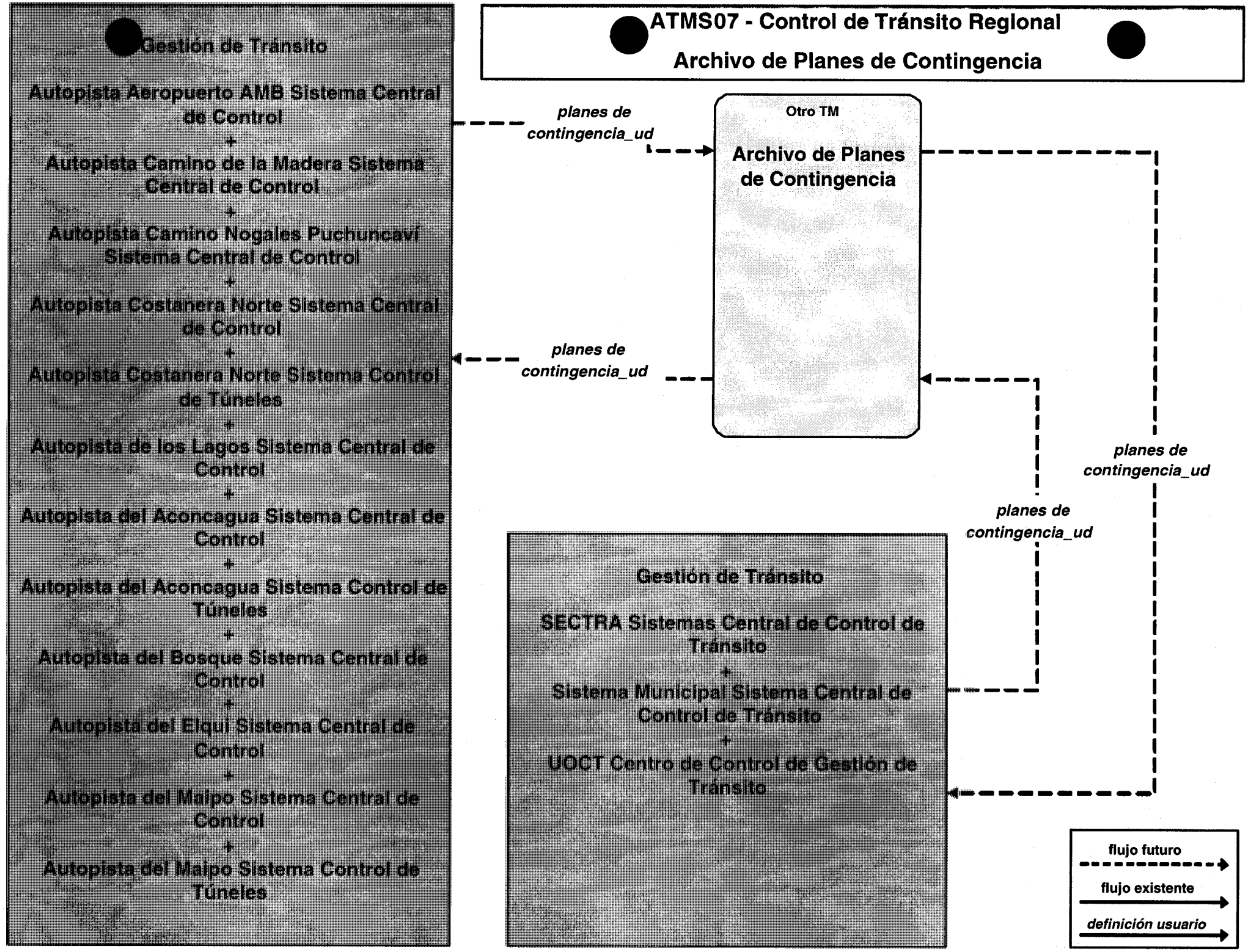
ATMS 07 - Control de Tránsito Regional

Red Regional de Informacion y Condiciones de Tránsito



ATMS07 - Control de Tránsito Regional

Archivo de Planes de Contingencia



ATMS 07 - Control de Tránsito Regional

Archivo de Planes de Contingencia

Gestión de Tránsito

Autopista del Sol Sistema Central de Control
+
Autopista Litoral Central Sistema Central de Control
+
Autopista Los Libertadores Sistema Central de Control
+
Autopista Los Libertadores Sistema Control de Túneles
+
Autopista Variante Melipilla Sistema Central de Control
+
Autopista Norte Sur Sistema Central de Control
+
Autopista Ruta 5 Collipulli - Temuco Sistema Central de Control
+
Autopista Ruta de los Ríos Sistema Central de Control
+
Autopista Talca - Chillán Sistema Central de Control
+
Autopista Tribasa Bío Bío Sistema Central de Control
+
Autopista Túnel El Melón Sistema Central de Control
+
Autopista Túnel El Melón Sistema Control de Túneles
+
Autopista Vespucio Norte Sistema Central de Control
+
Autopistas Metropolitanas Sistema Central de Control
+
Autopistas Otras Sistema Central de Control
+
Autopistas Rutas del Pacífico Sistema Central de Control
+
Autopistas Rutas del Pacífico Sistema Control de Túneles

planes de contingencia_ud

Otro TM

Archivo de Planes de Contingencia

planes de contingencia_ud

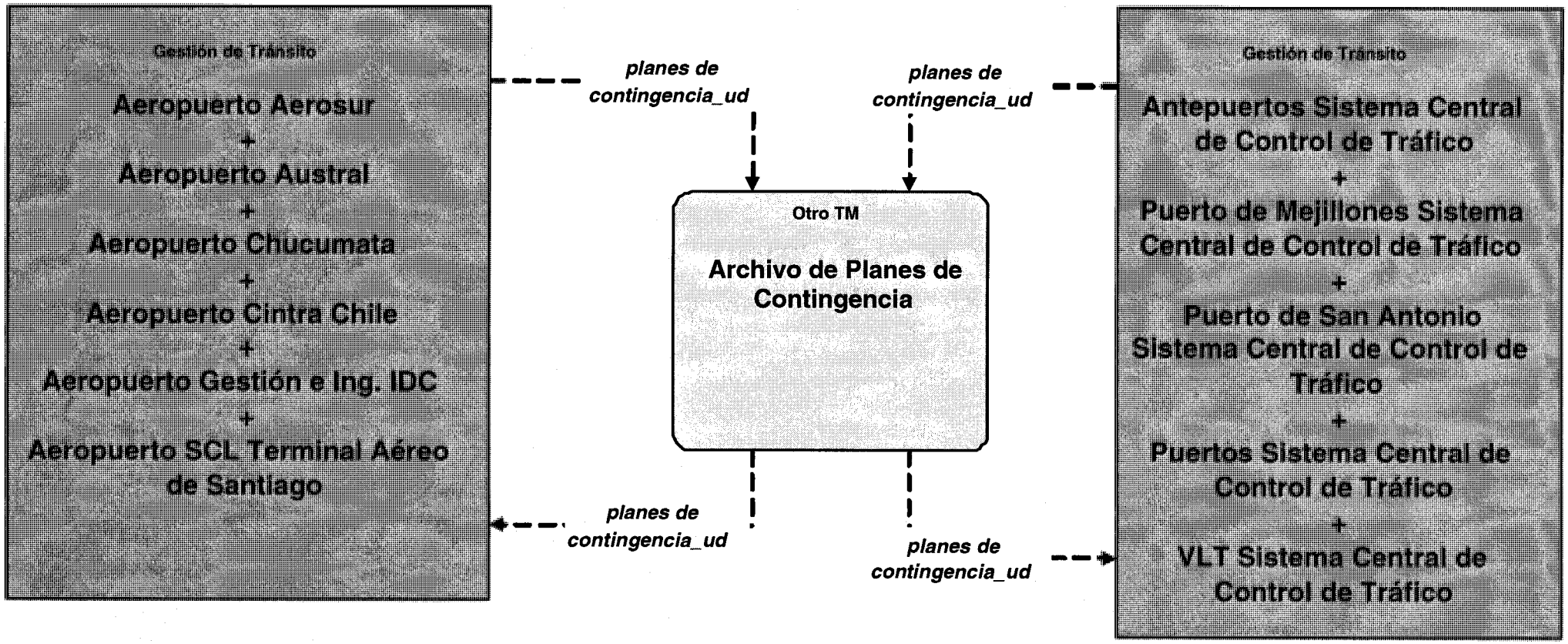
flujo futuro

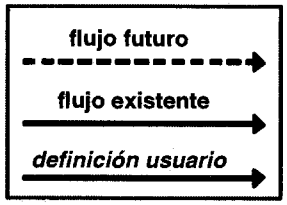
flujo existente

definición usuario

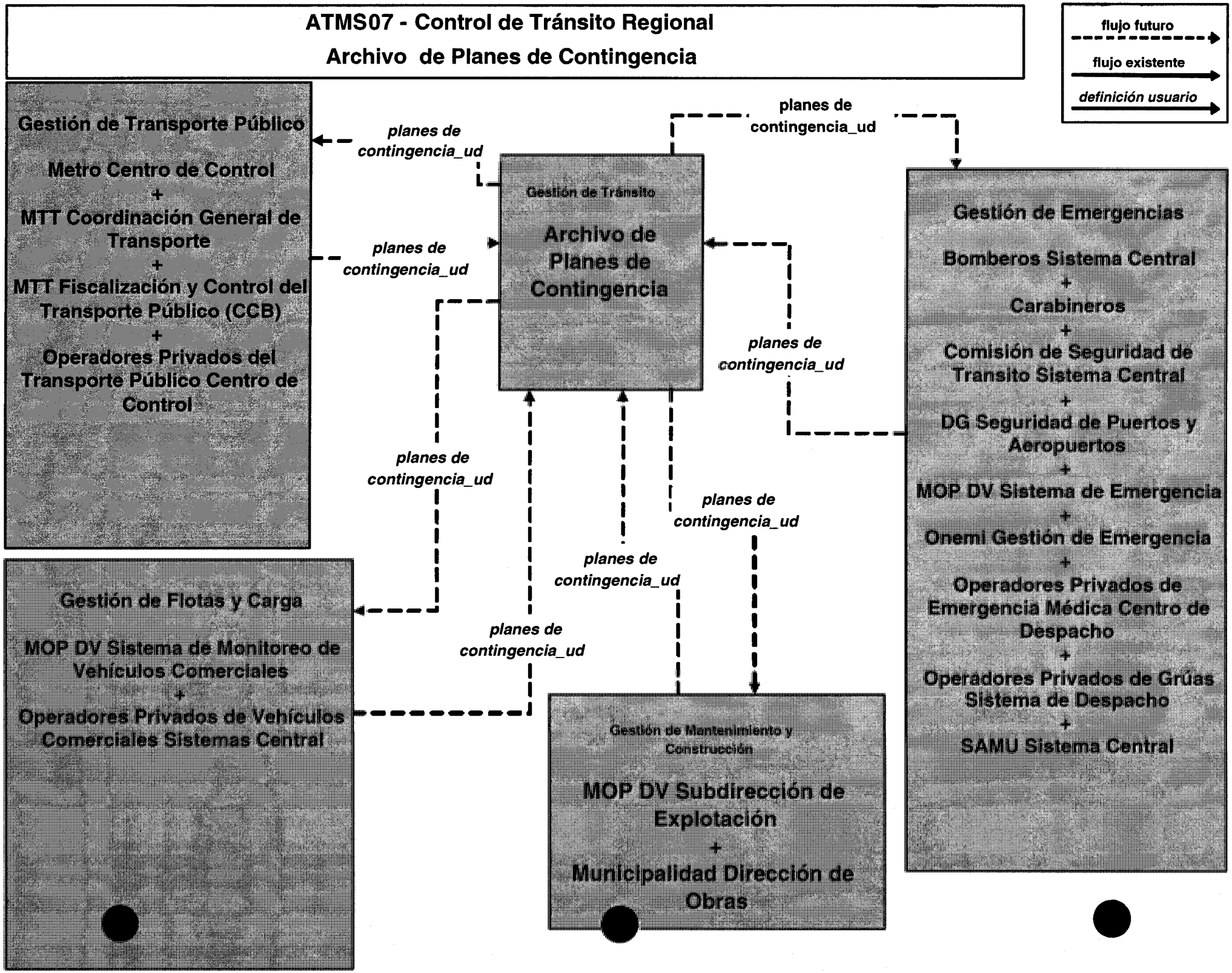
ATMS 07 - Control Tránsito Regional

Archivo de Planes de Contingencia



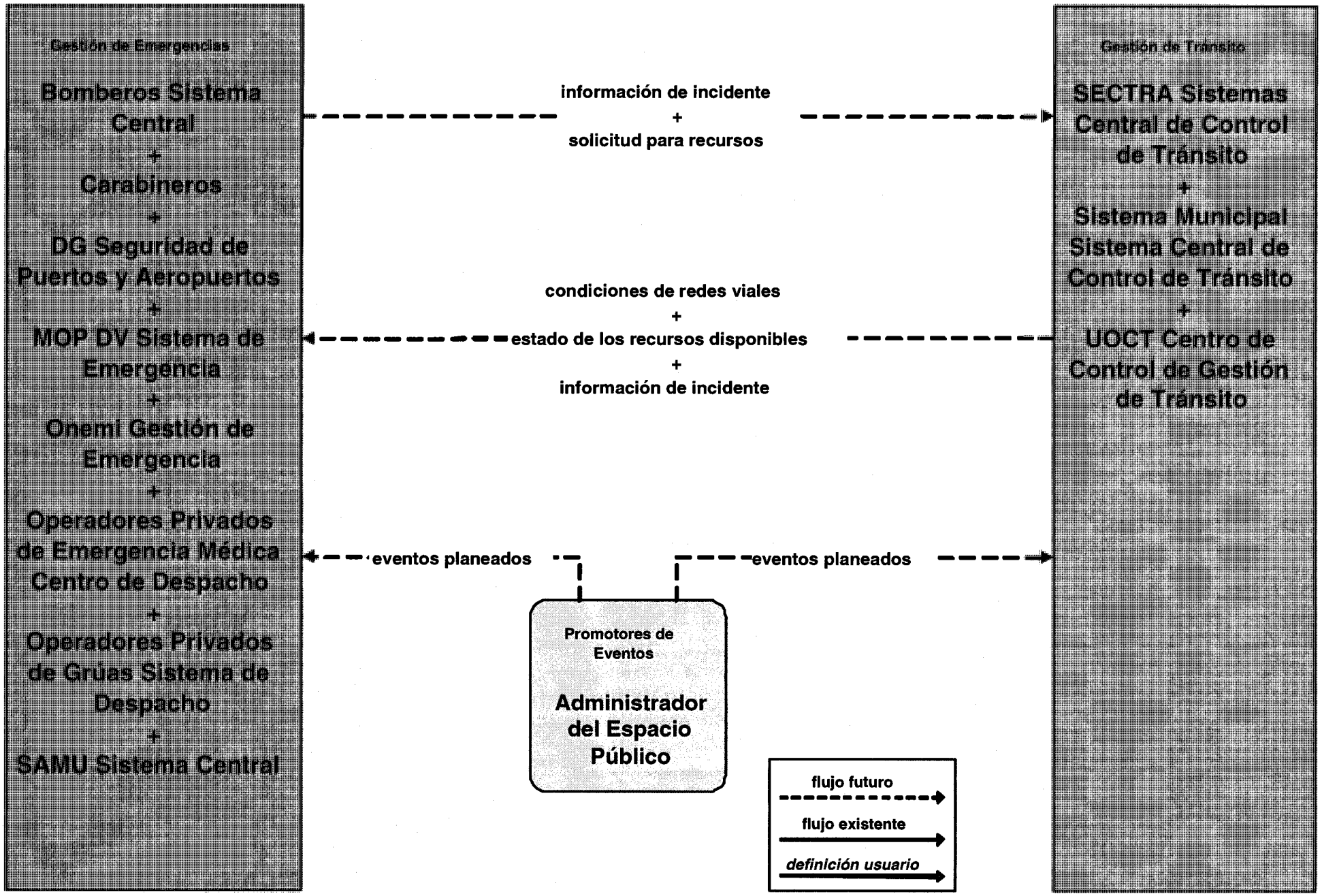


ATMS07 - Control de Tránsito Regional
Archivo de Planes de Contingencia

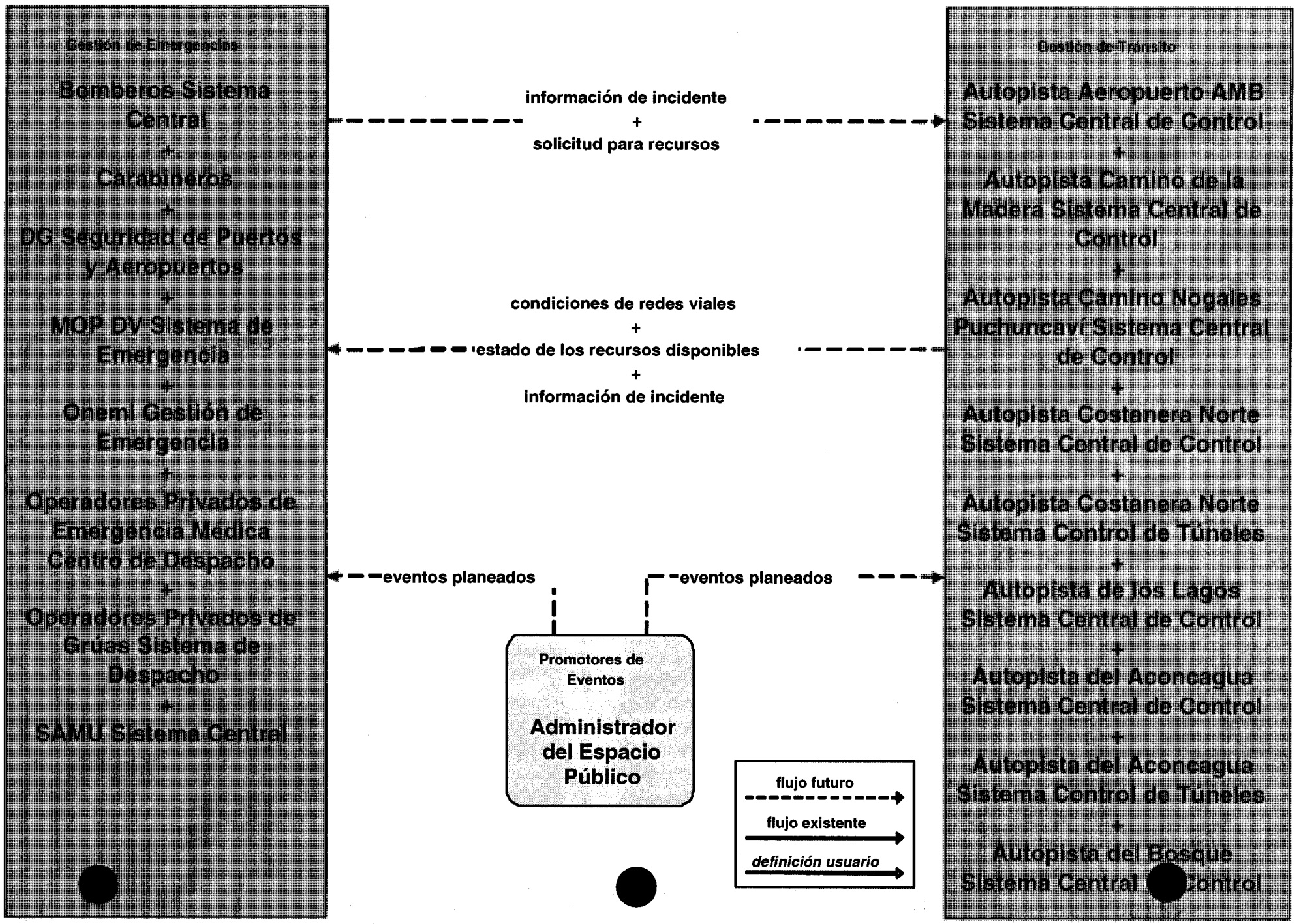


ATMS 08 - Gestión de Incidentes

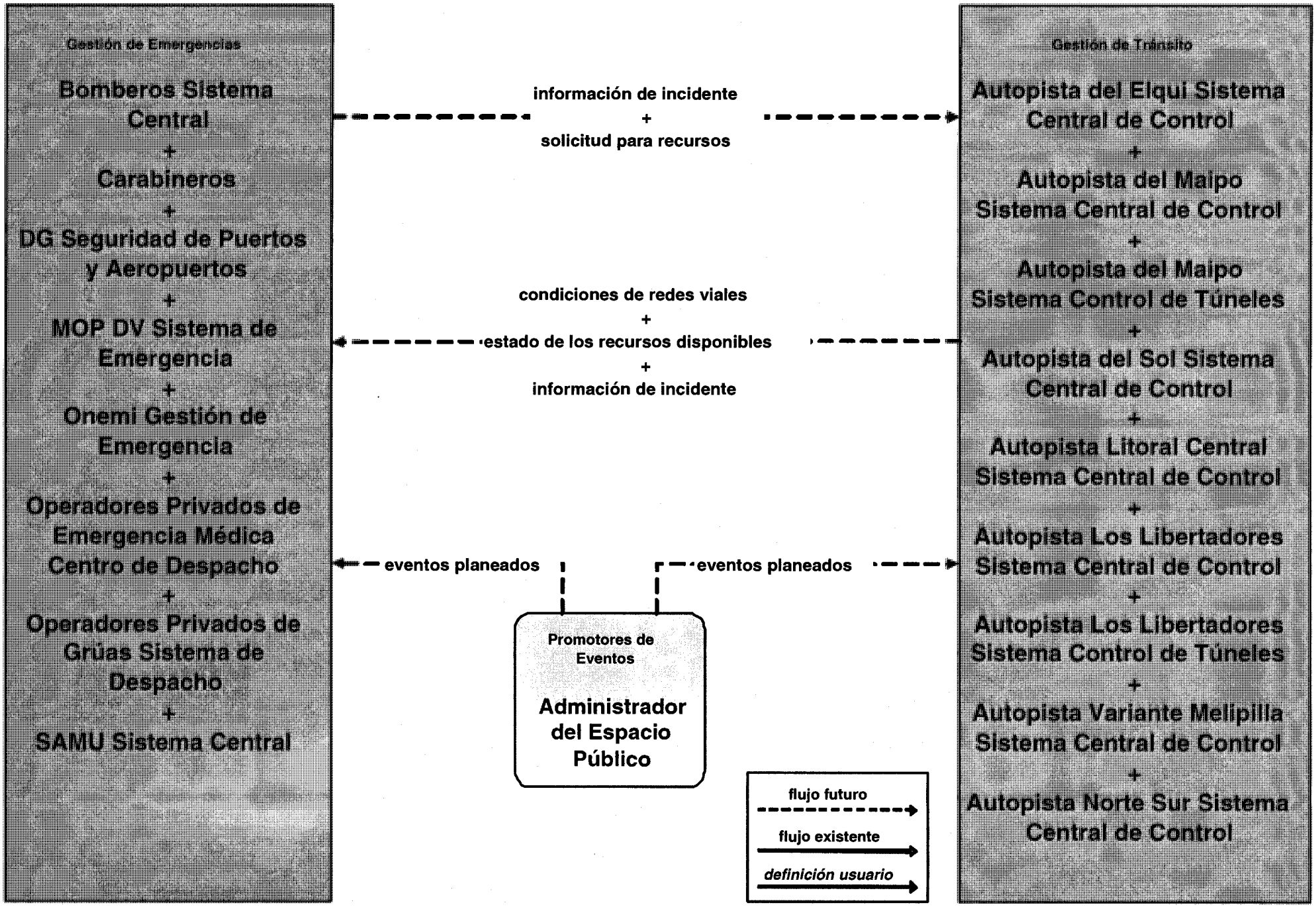
SECTRA, Sistemas Municipales, UOCT



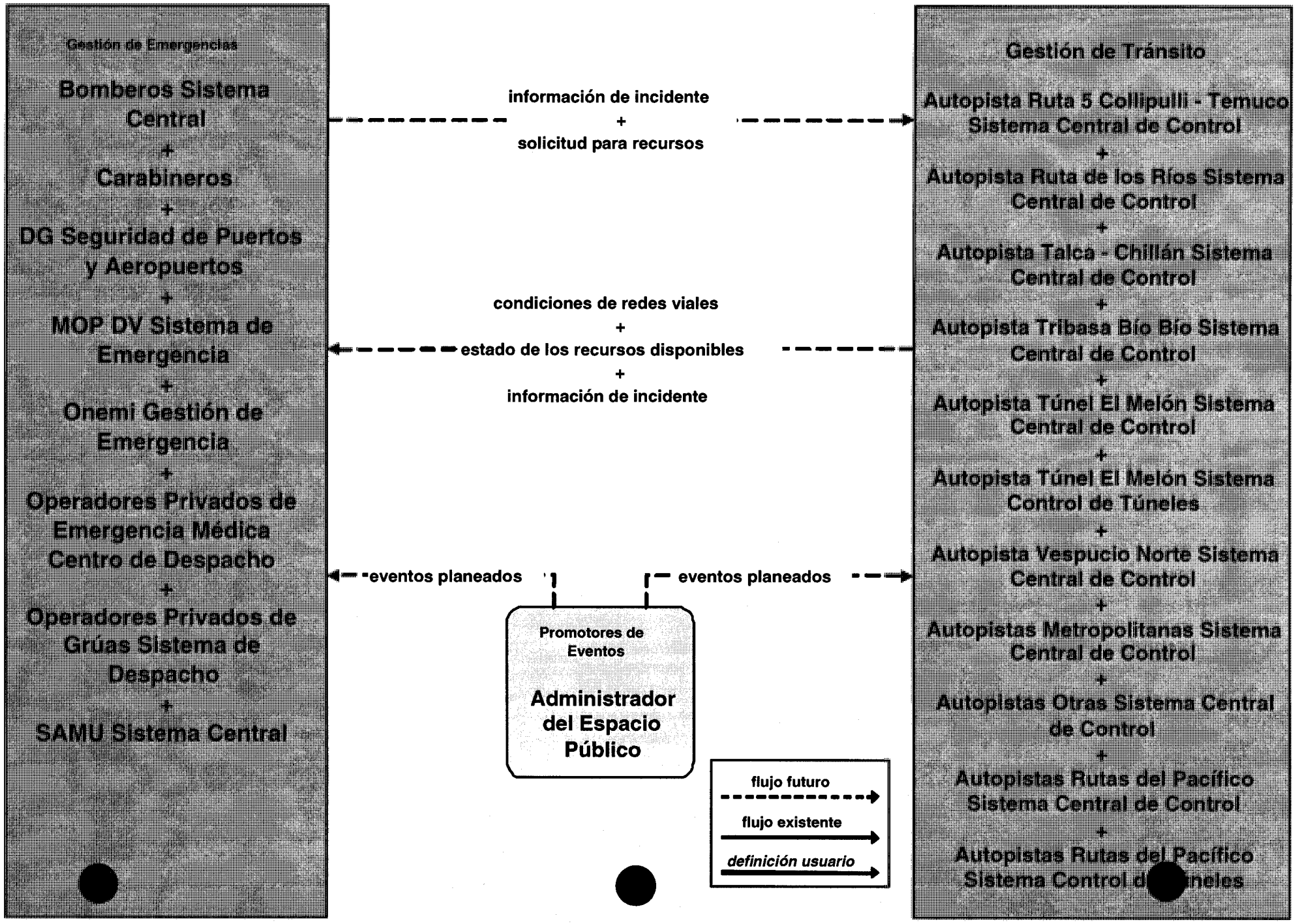
ATMS08 - Gestión de Incidentes
Autopistas



ATMS 08 - Gestión de Incidentes Autopistas

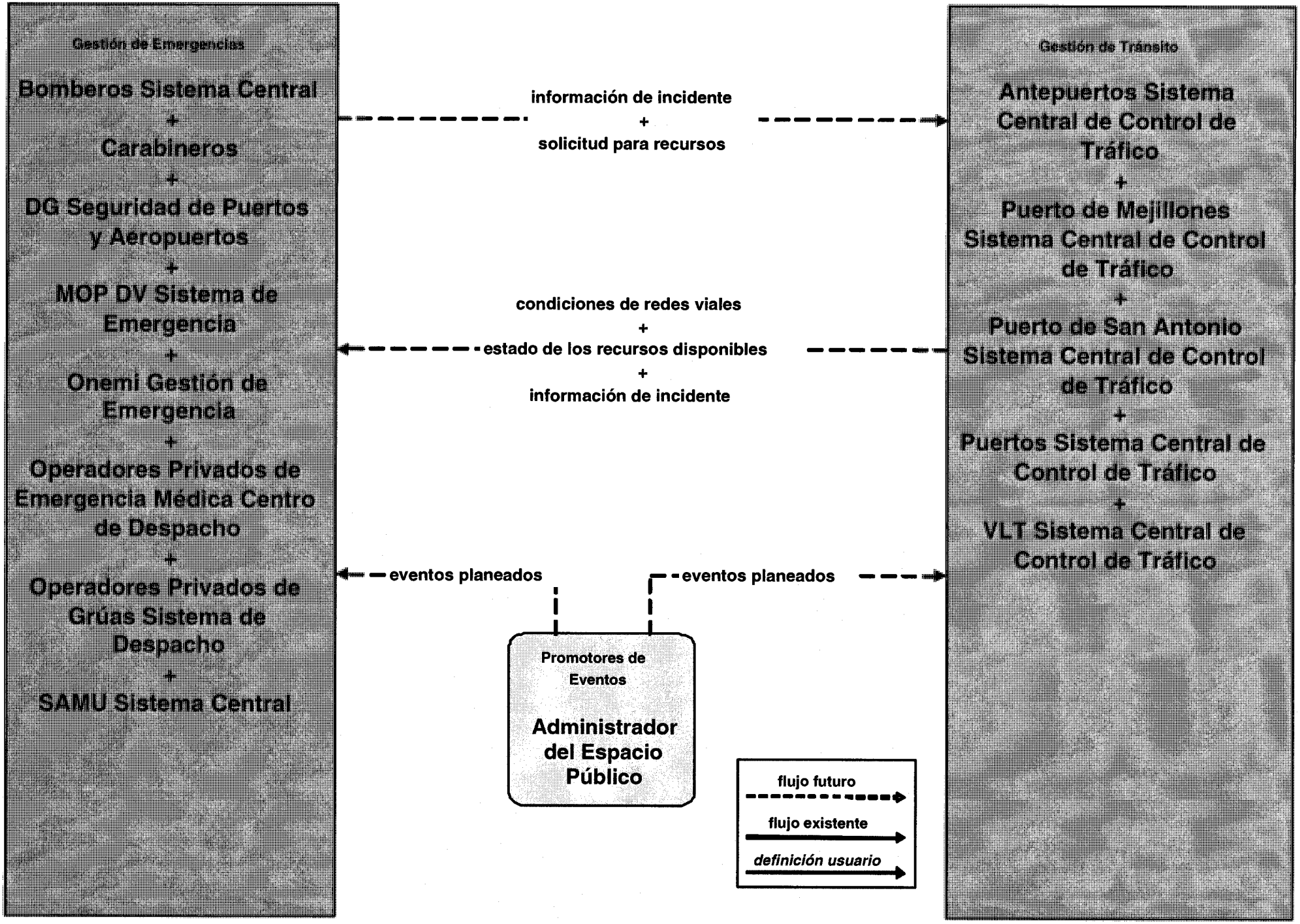


ATMS 08 - Gestión de Incidentes
Autopistas

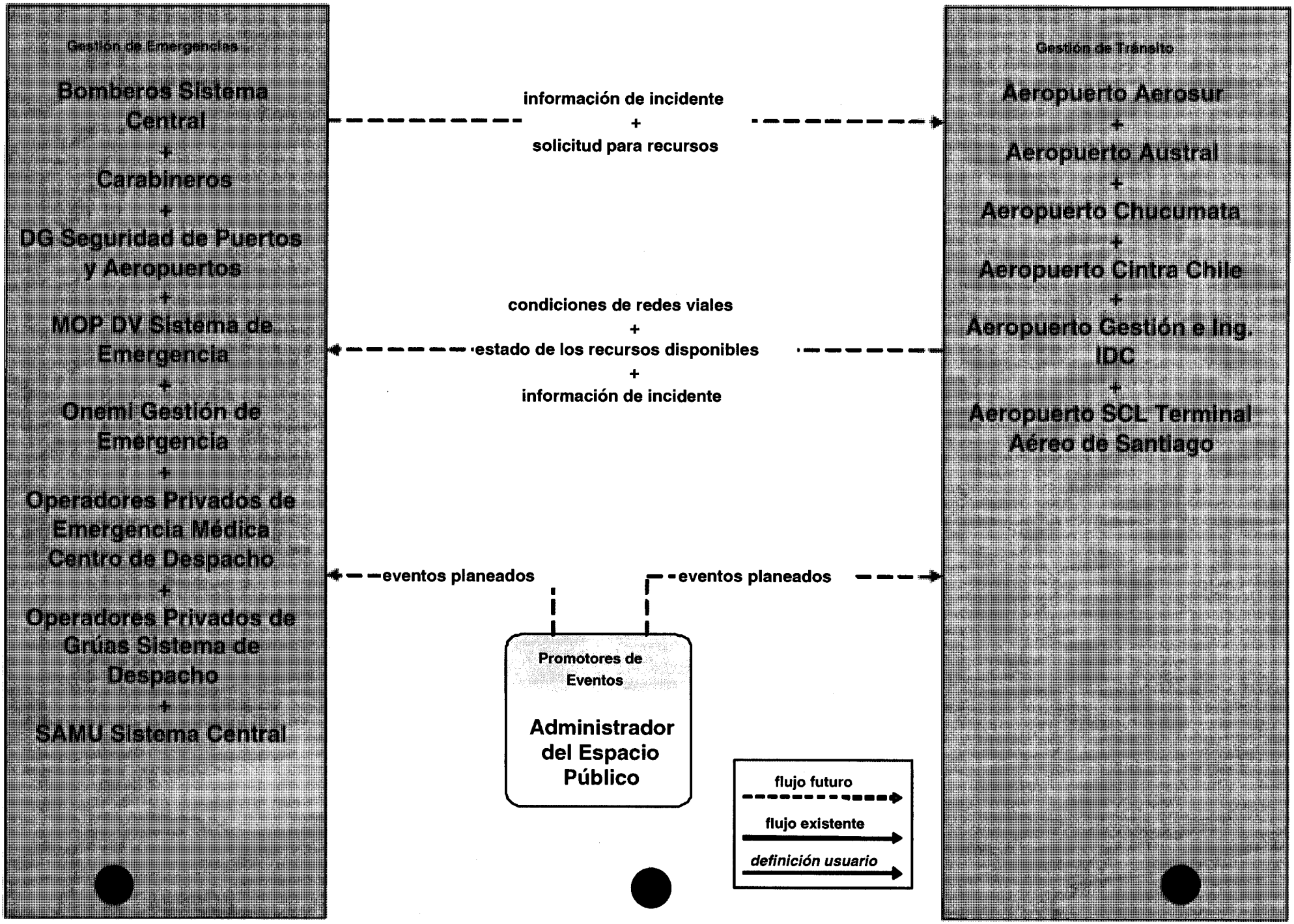


ATMS 08 - Gestión de Incidentes

Puertos y Antepuertos

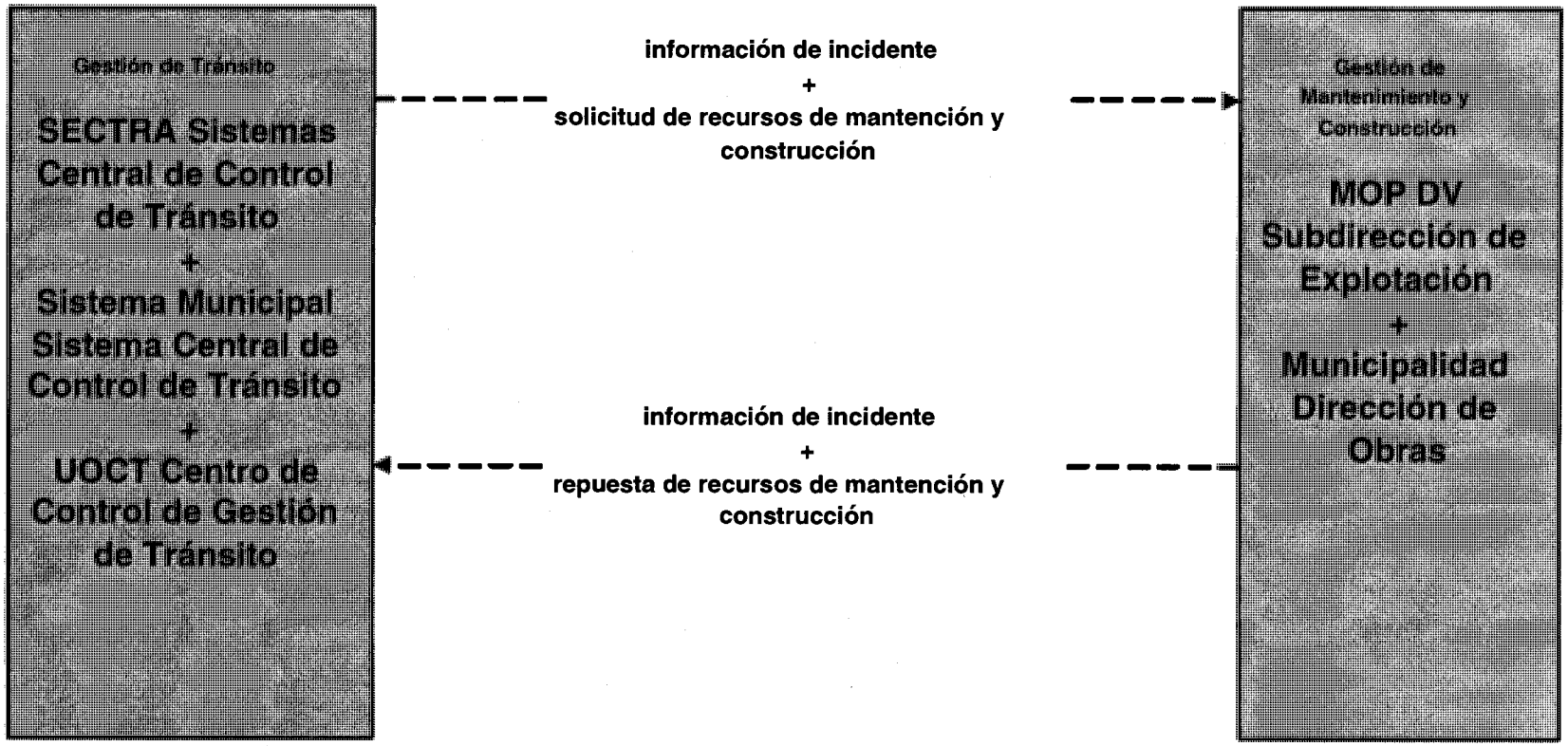


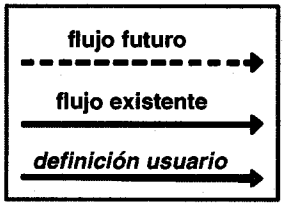
ATMS 08 - Gestión de Incidentes
Aeropuertos



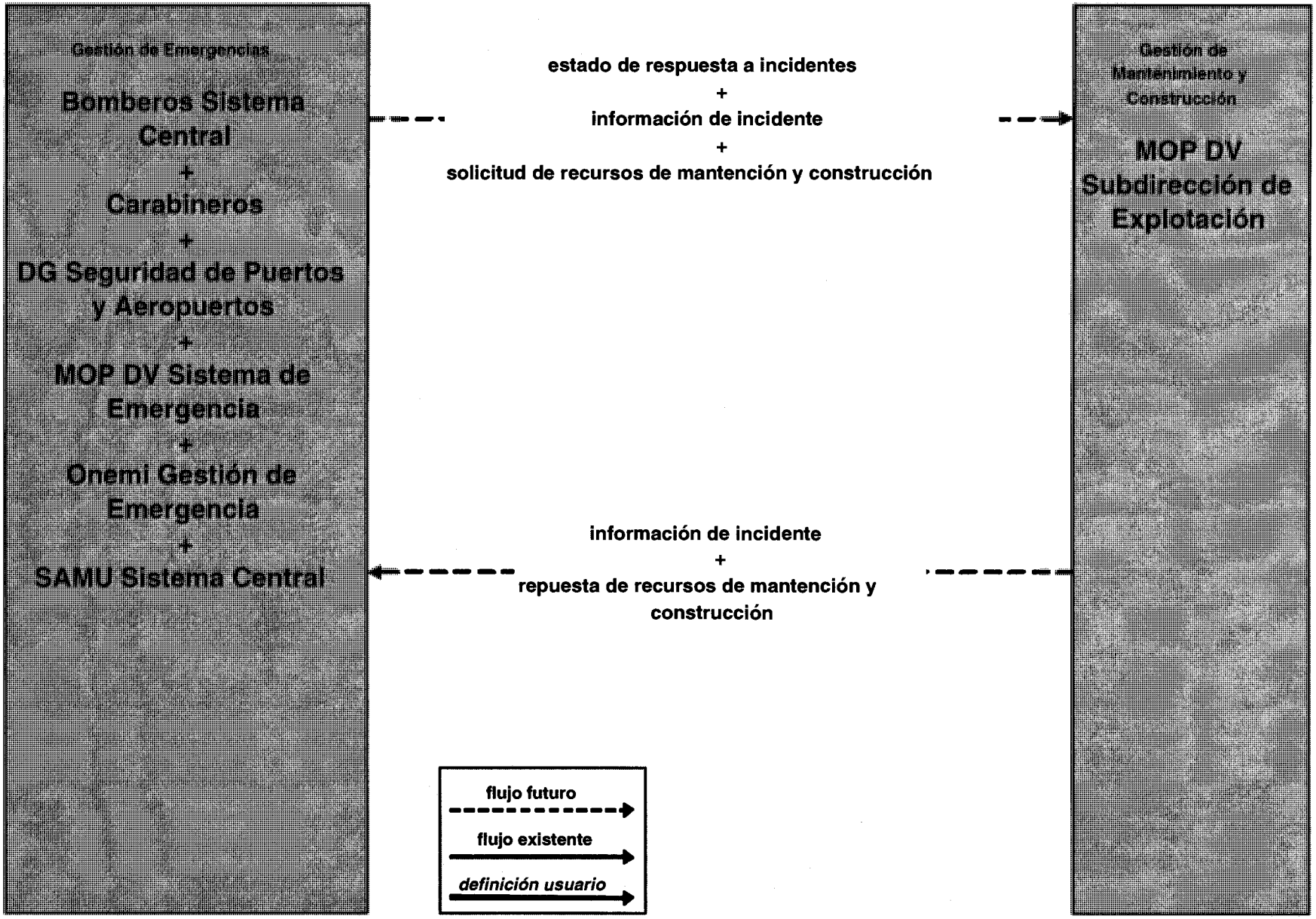
ATMS 08 - Gestión de Incidentes

Tránsito a Mantenimiento y Construccion
SECTRA, Sistemas Municipales, UOCT

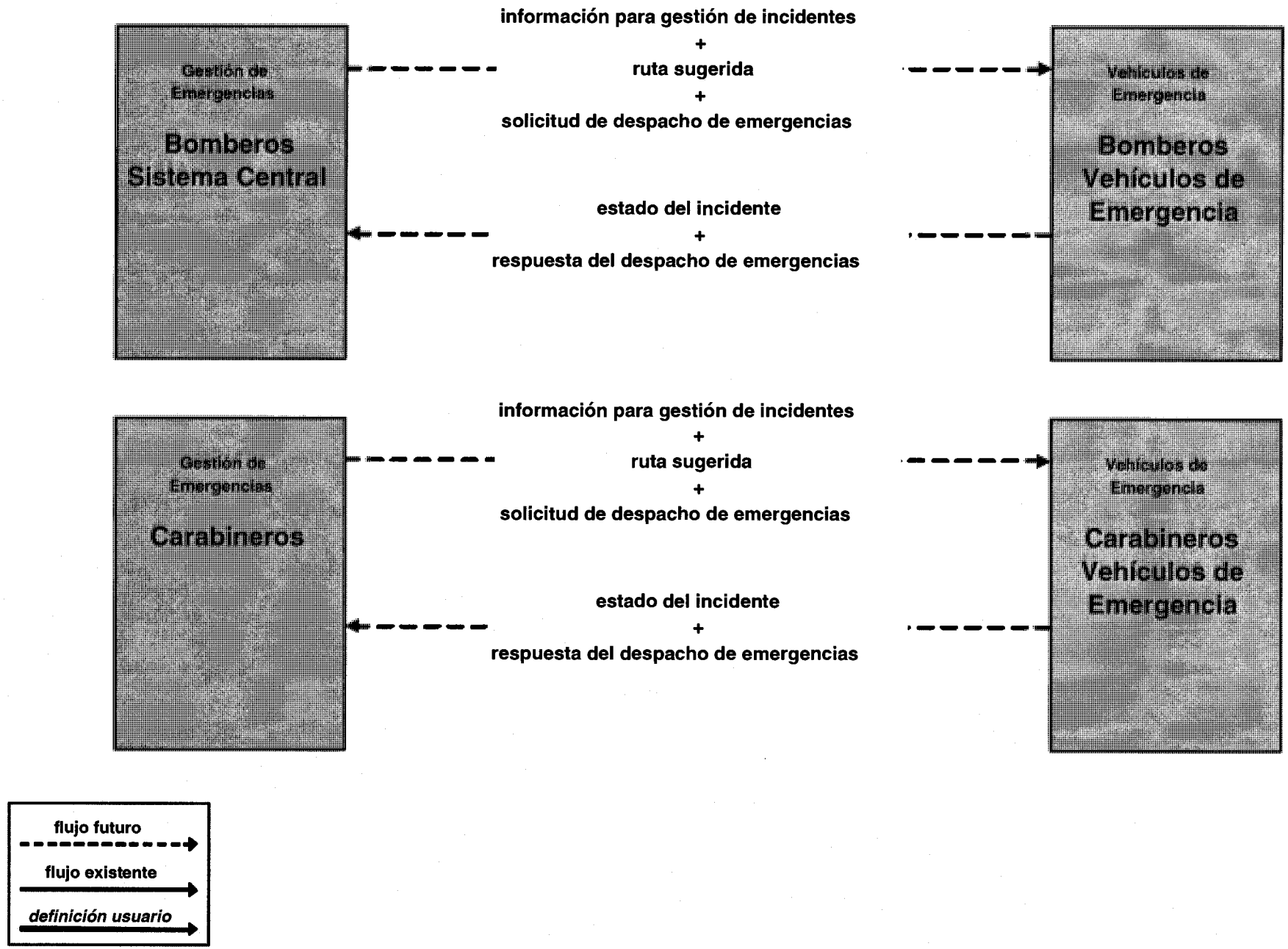




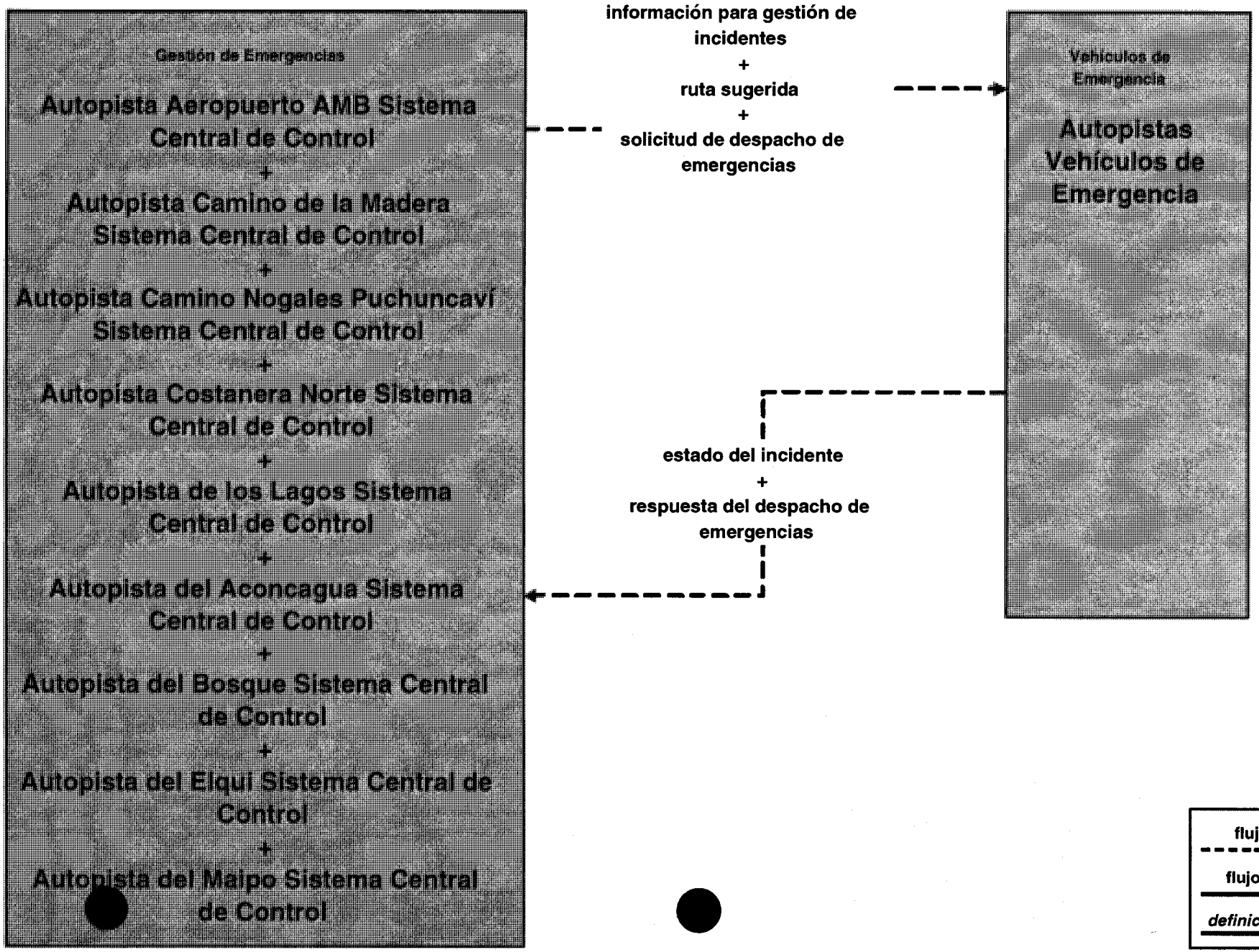
ATMS08 - Gestión de Incidentes
Emergencia a Mantenimiento y Construccion

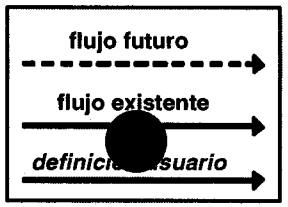


ATMS 08 - Gestión de Incidentes
Vehiculos de Emergencia

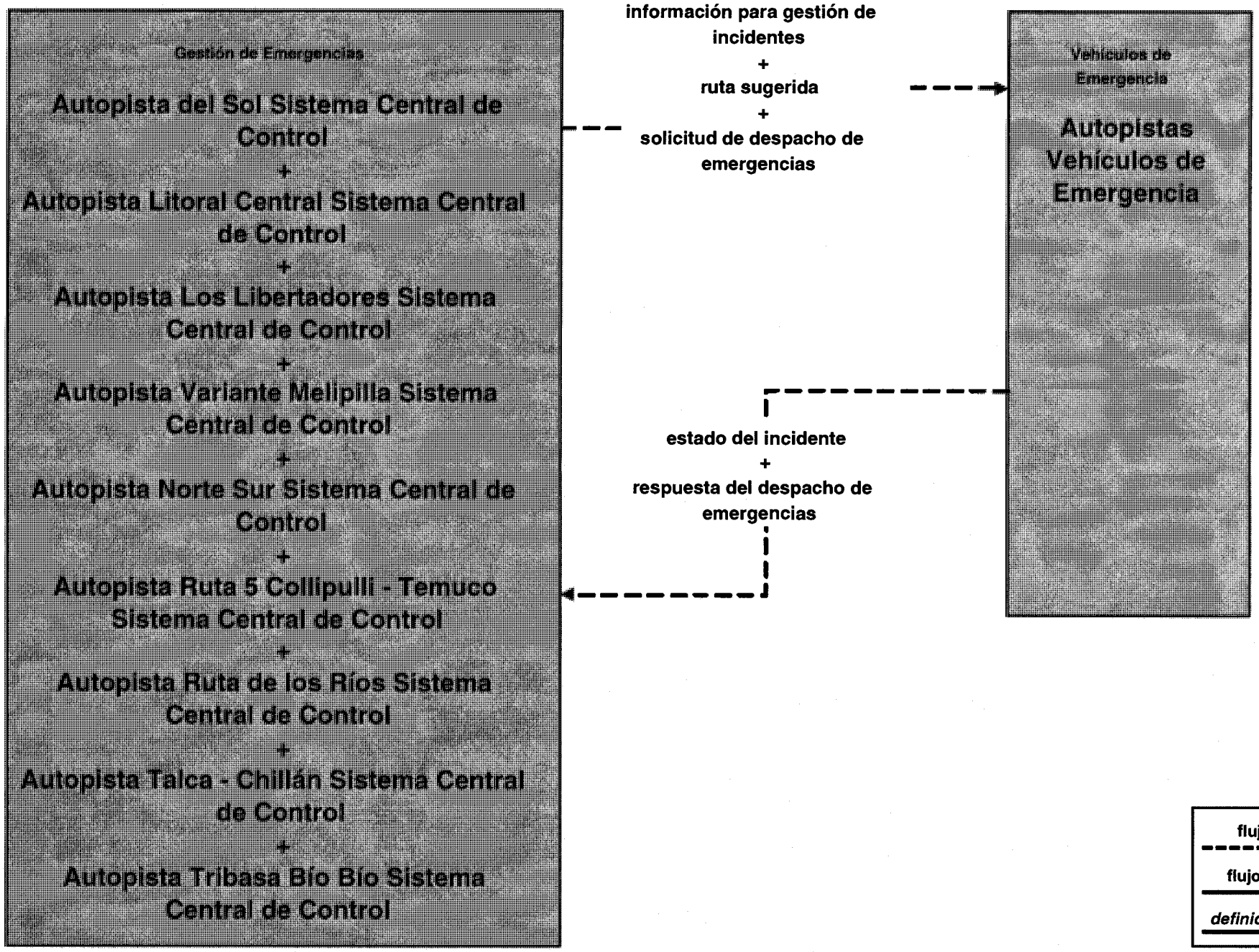


ATMS 08 - Gestión de Incidentes
Autopistas Vehiculos de Emergencia

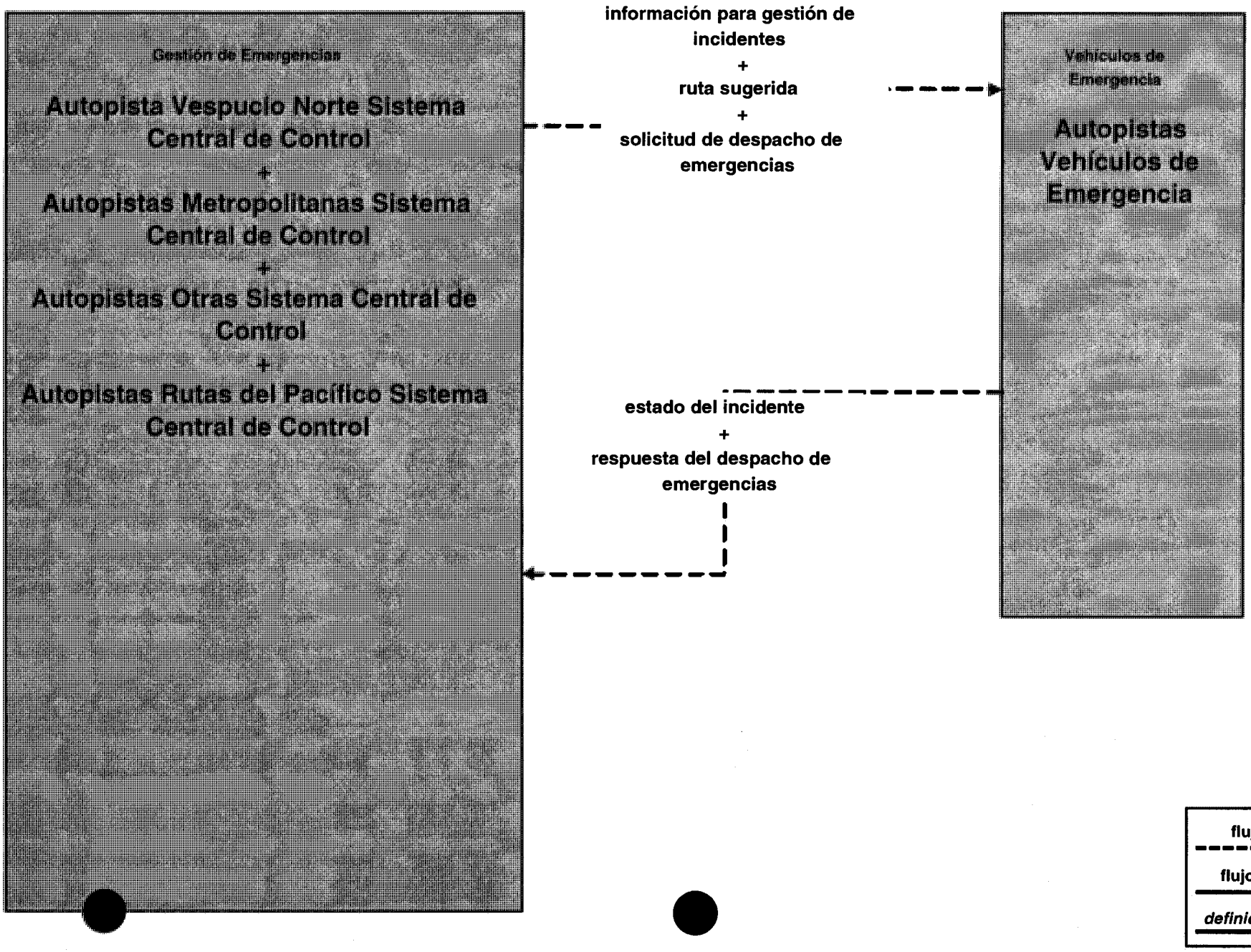




ATMS08 - Gestión de Incidentes
Autopistas Vehiculos de Emergencia



ATMS08 - Gestión de Incidentes
Autopistas Vehiculos de Emergencia

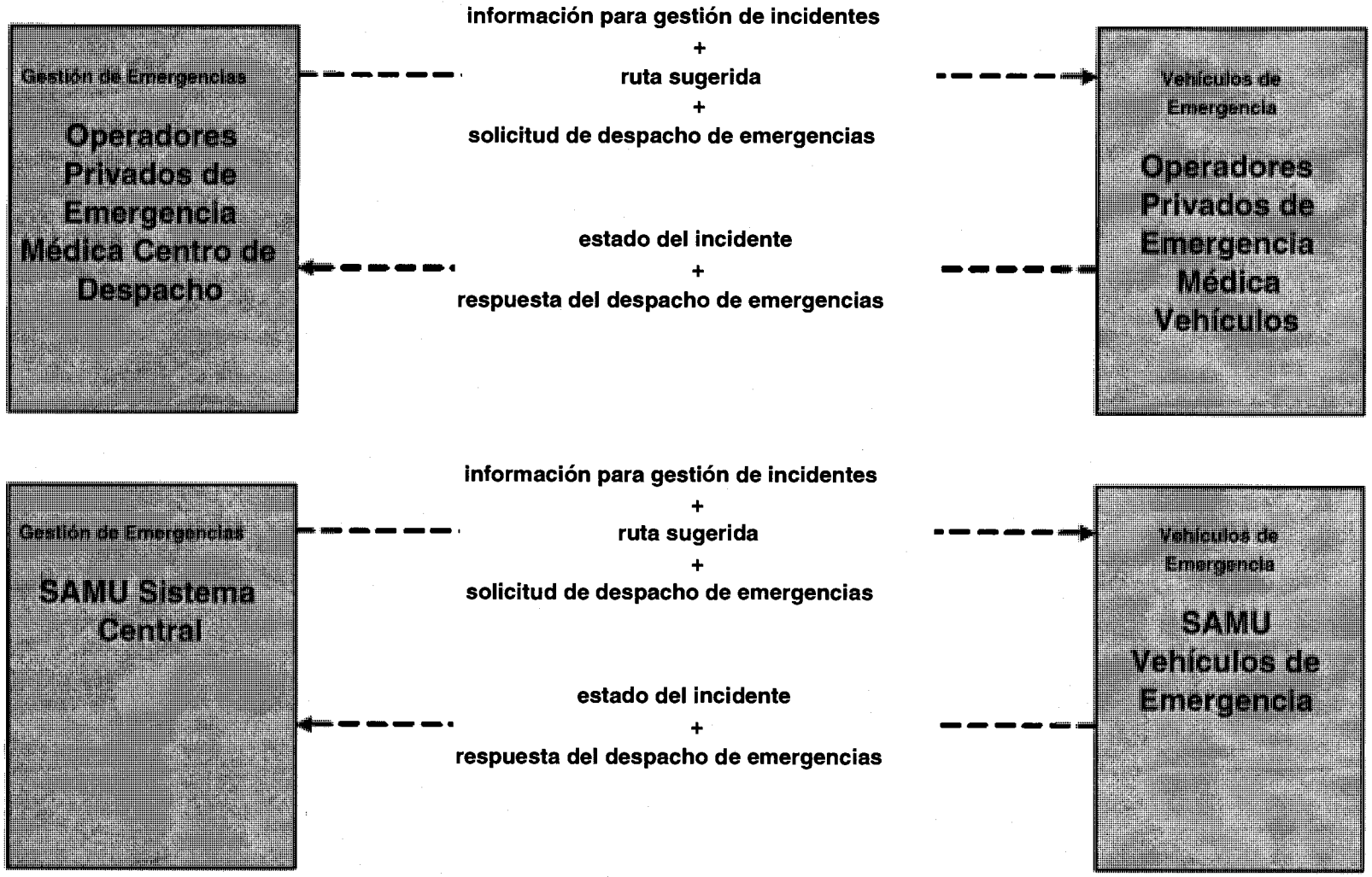


flujo futuro

flujo existente

definic[illegible]suario

ATMS 08 - Gestión de Incidentes
Vehículos de Emergencia



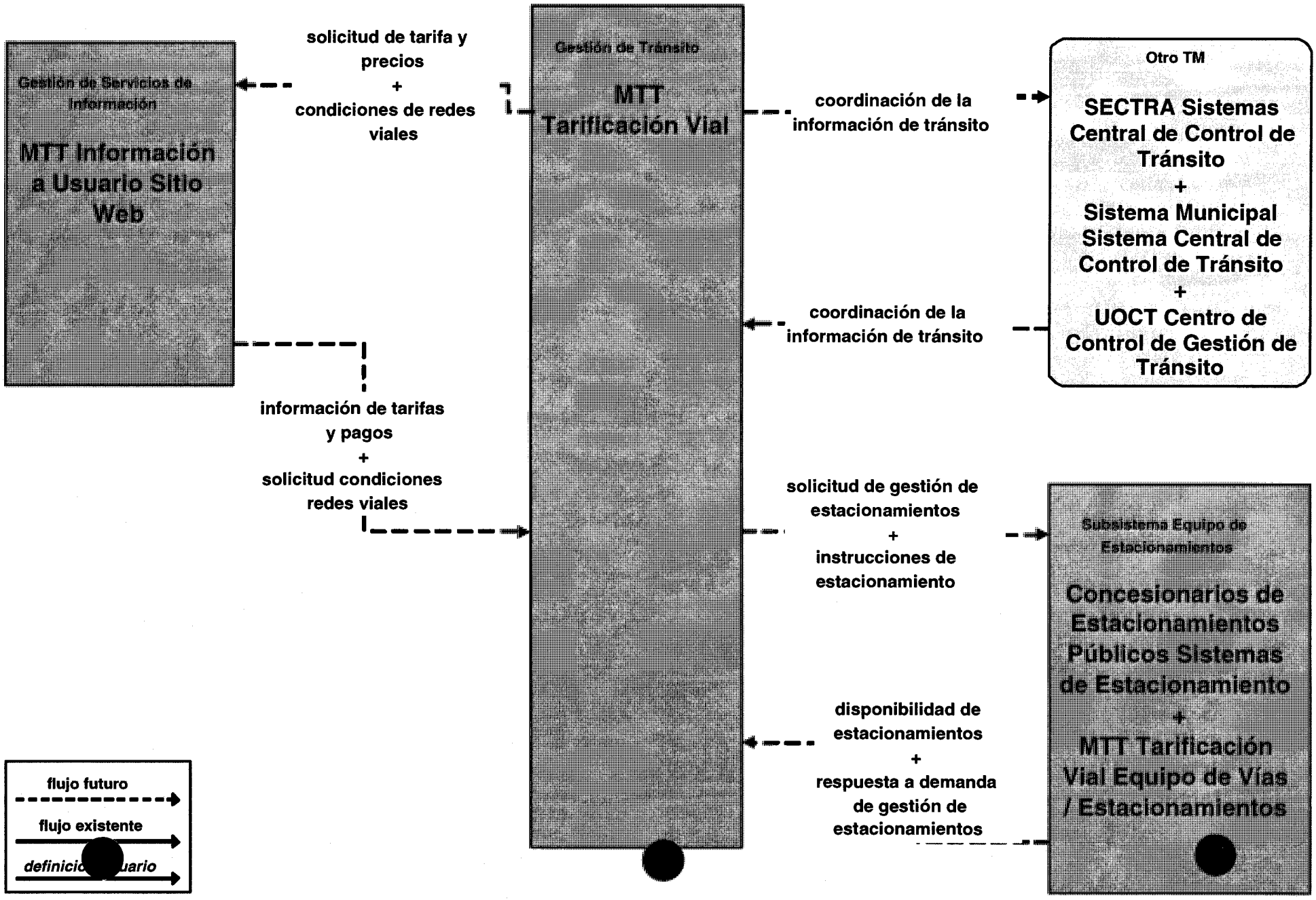
flujo futuro

flujo existente

definición usuario

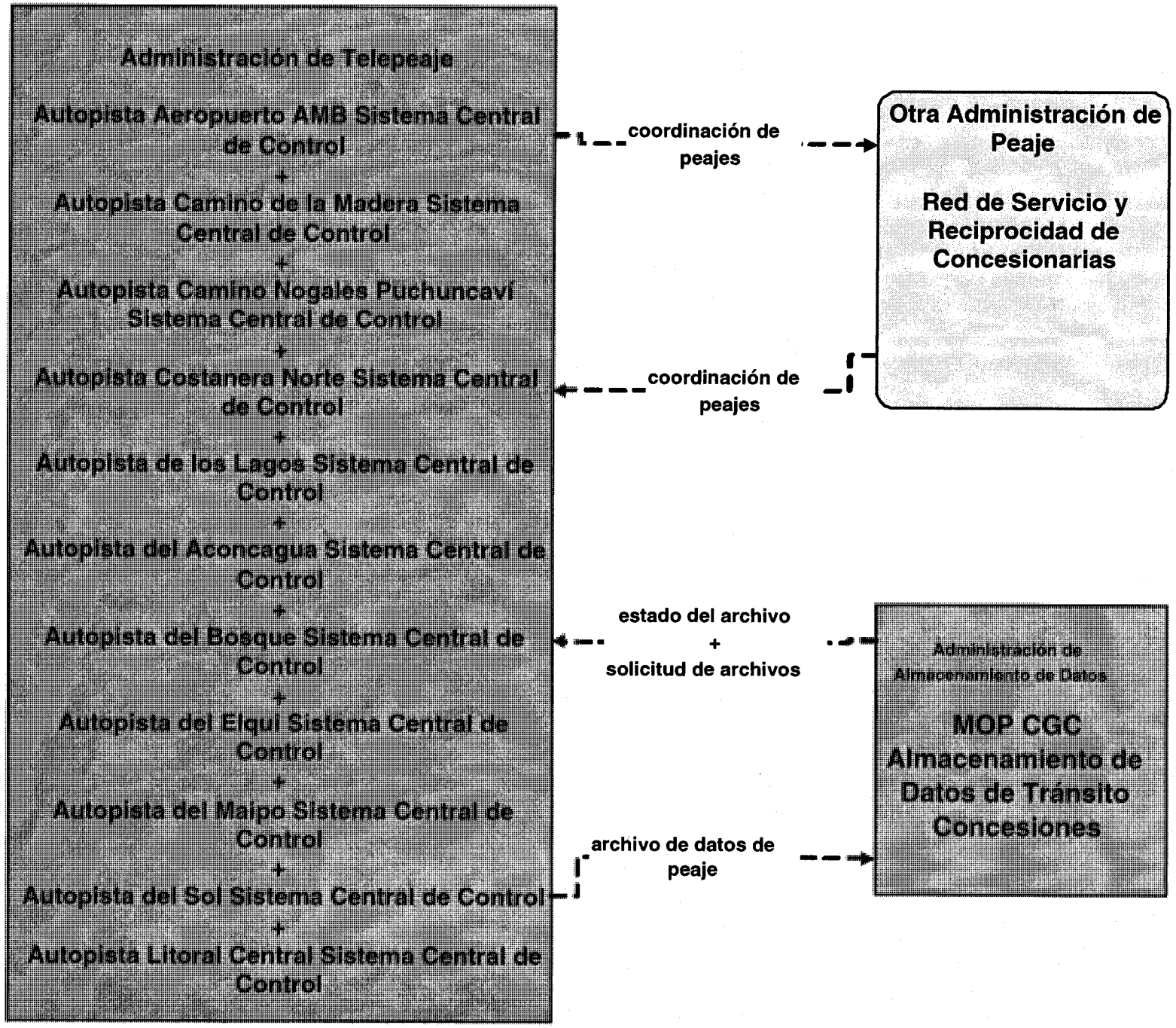
ATMS09 - Gestión de Demanda y Pronóstico del Tránsito

MTT Tarificacion Vial



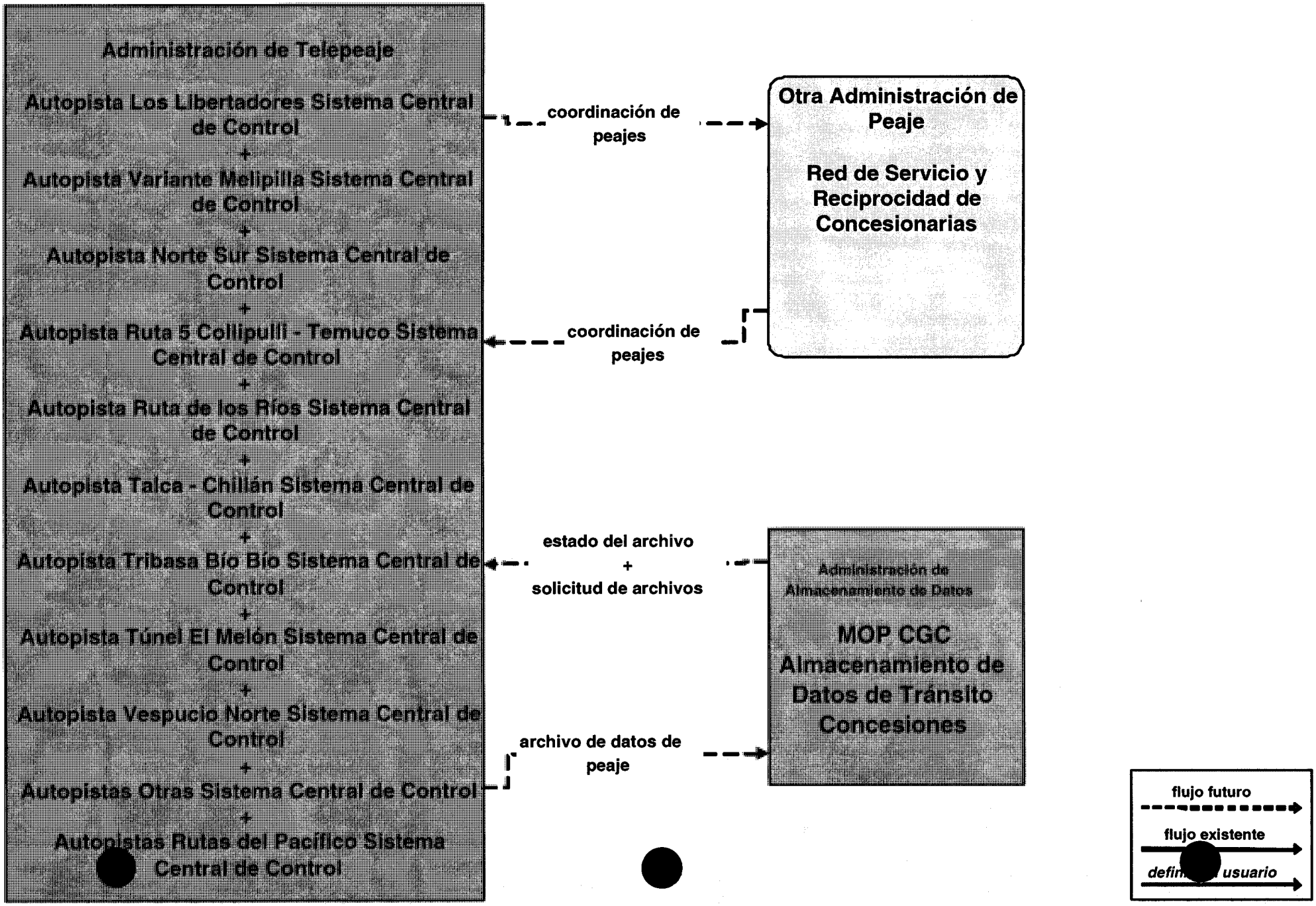
ATMS10 - Pago Electrónico de Peaje

Red de Servicio y Reciprocidad de Concesionarios, MOP CGC

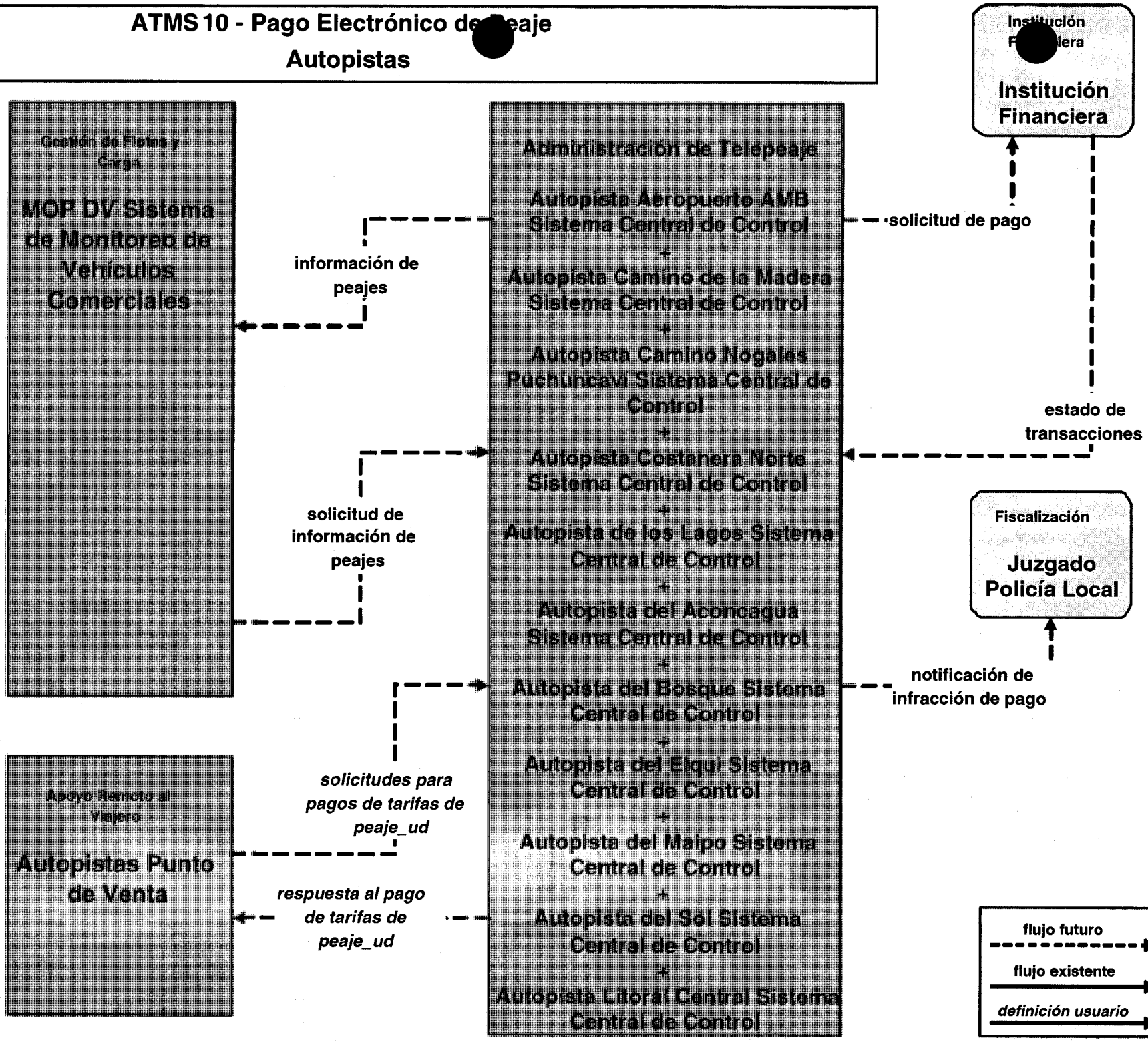


ATMS 10 - Pago Electrónico de Peaje

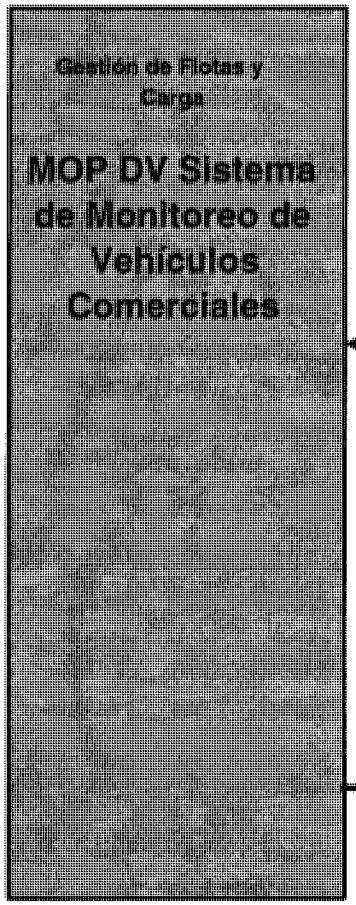
Red de Servicio y Reciprocidad de Concesionarios, MOP CGC



ATMS 10 - Pago Electrónico de Peaje
Autopistas

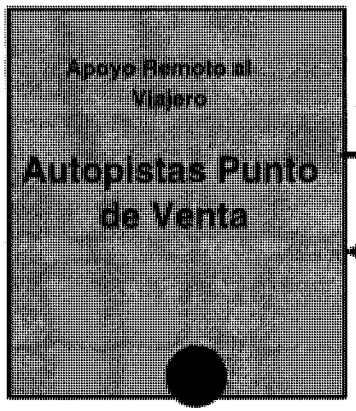


ATMS 10 - Pago Electrónico de Peaje
Autopistas



información de peajes

solicitud de información de peajes

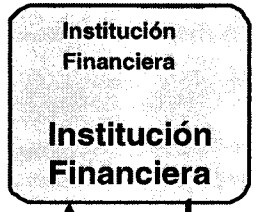


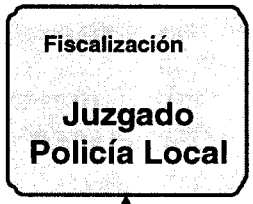
solicitudes para pagos de tarifas de peaje_ud

respuesta al pago de tarifas de peaje_ud

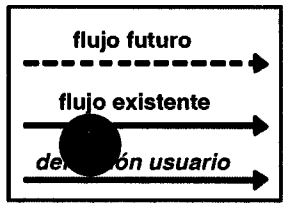
solicitud de pago

estado de transacciones

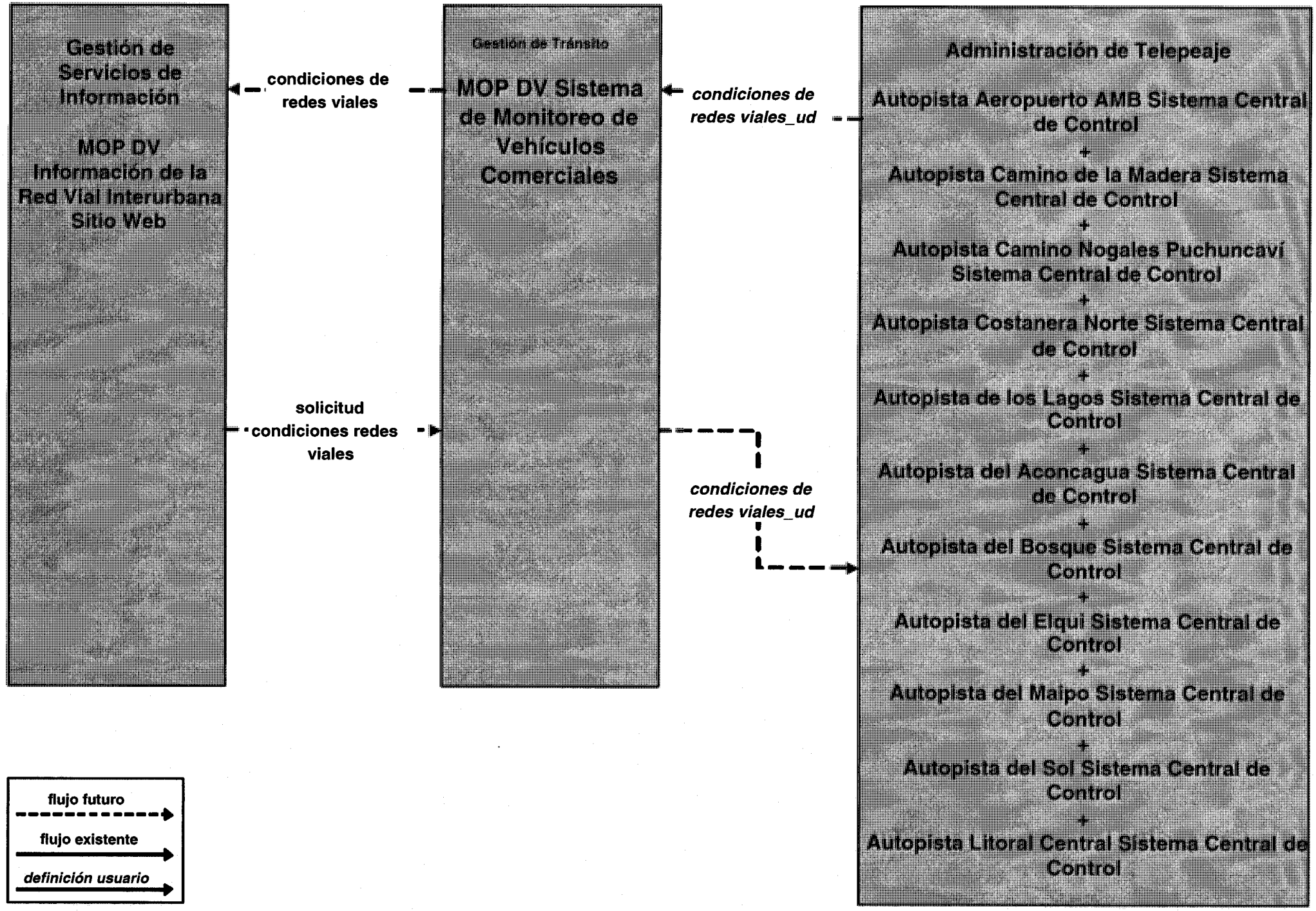




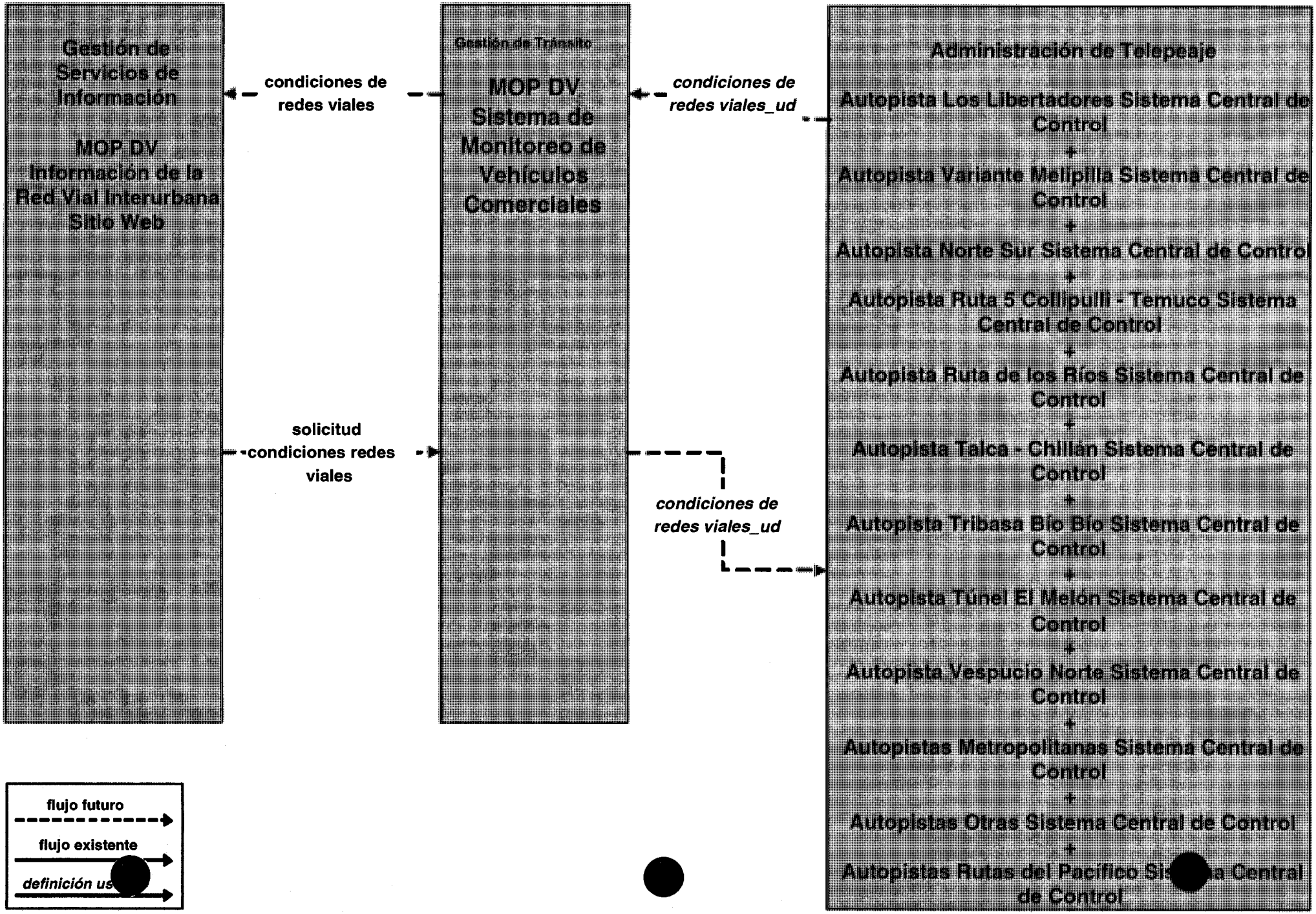
notificación de infracción de pago



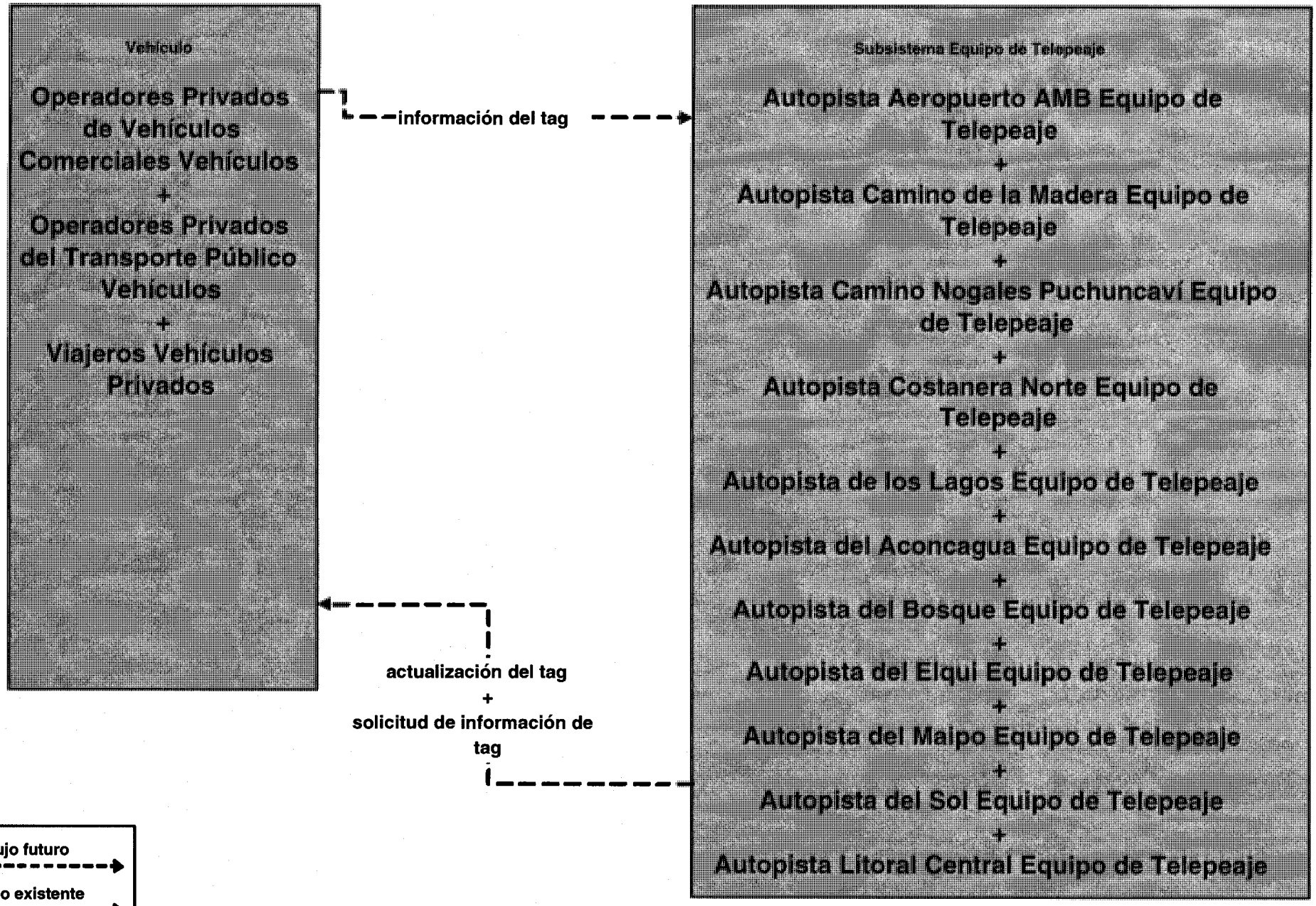
ATMS 10 - Pago Electrónico de Peaje Autopistas



ATMS 10 - Pago Electrónico de Peaje
Autopistas



ATMS 10 - Pago Electrónico de Peaje
Autopistas

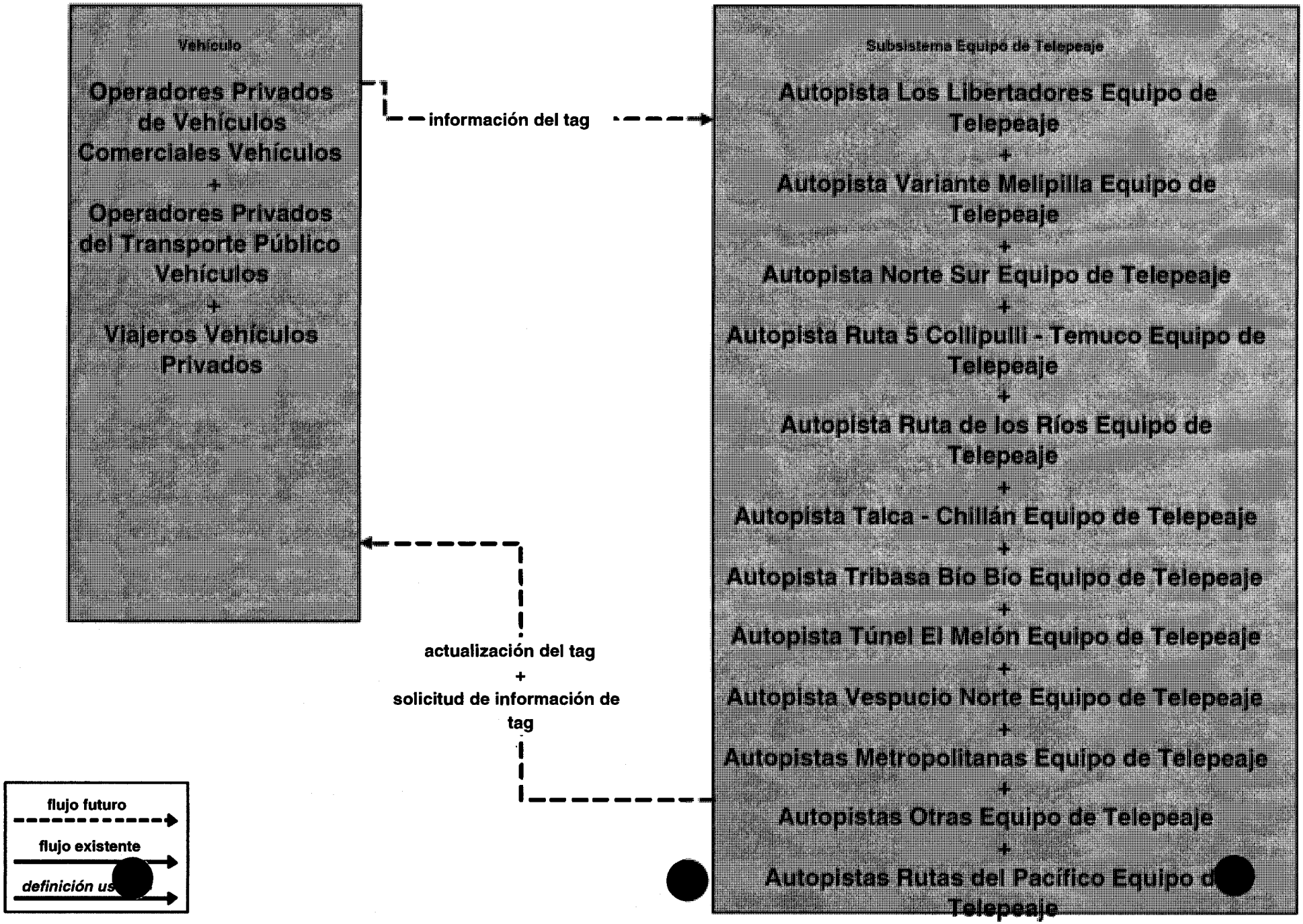


flujo futuro

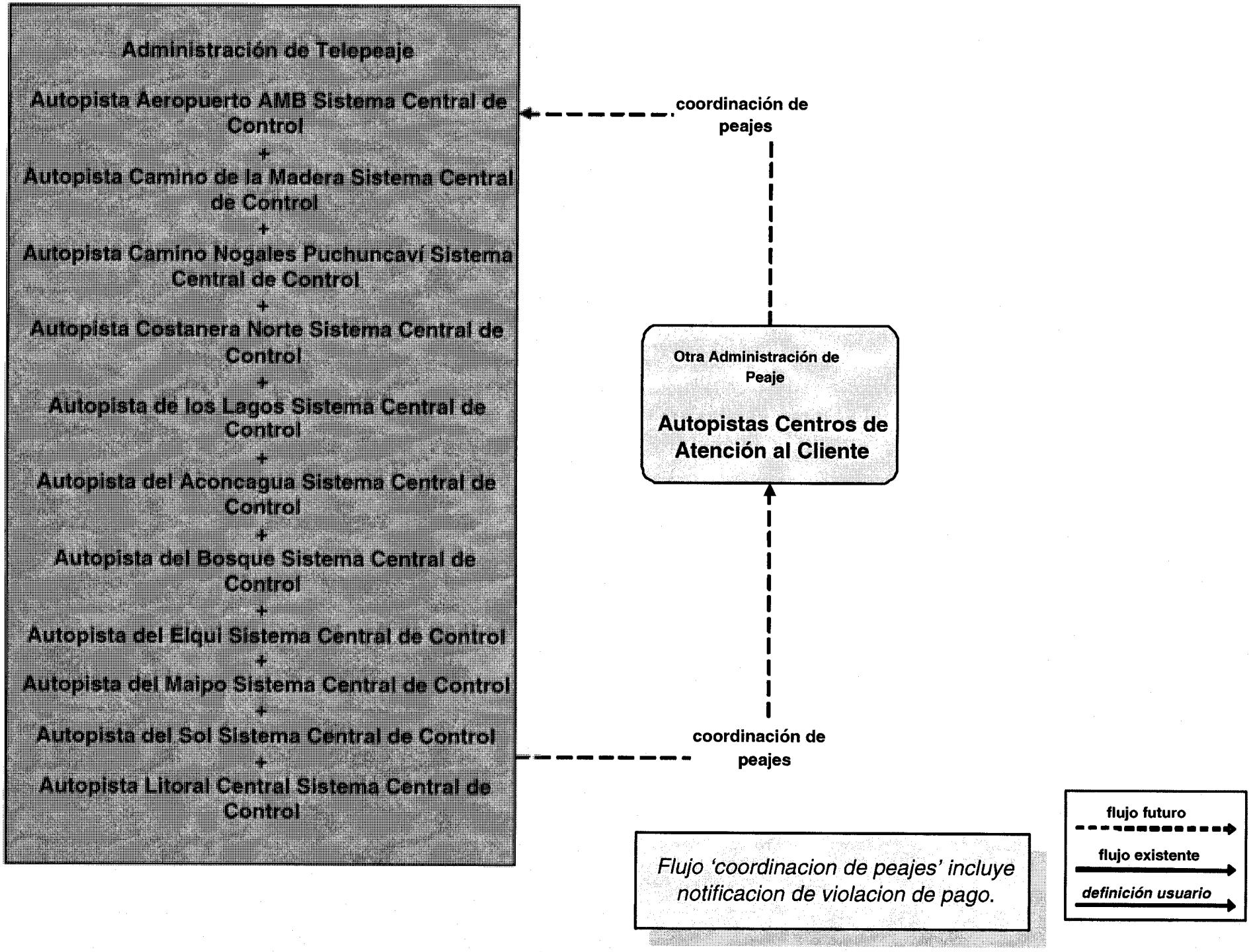
flujo existente

definición usuario

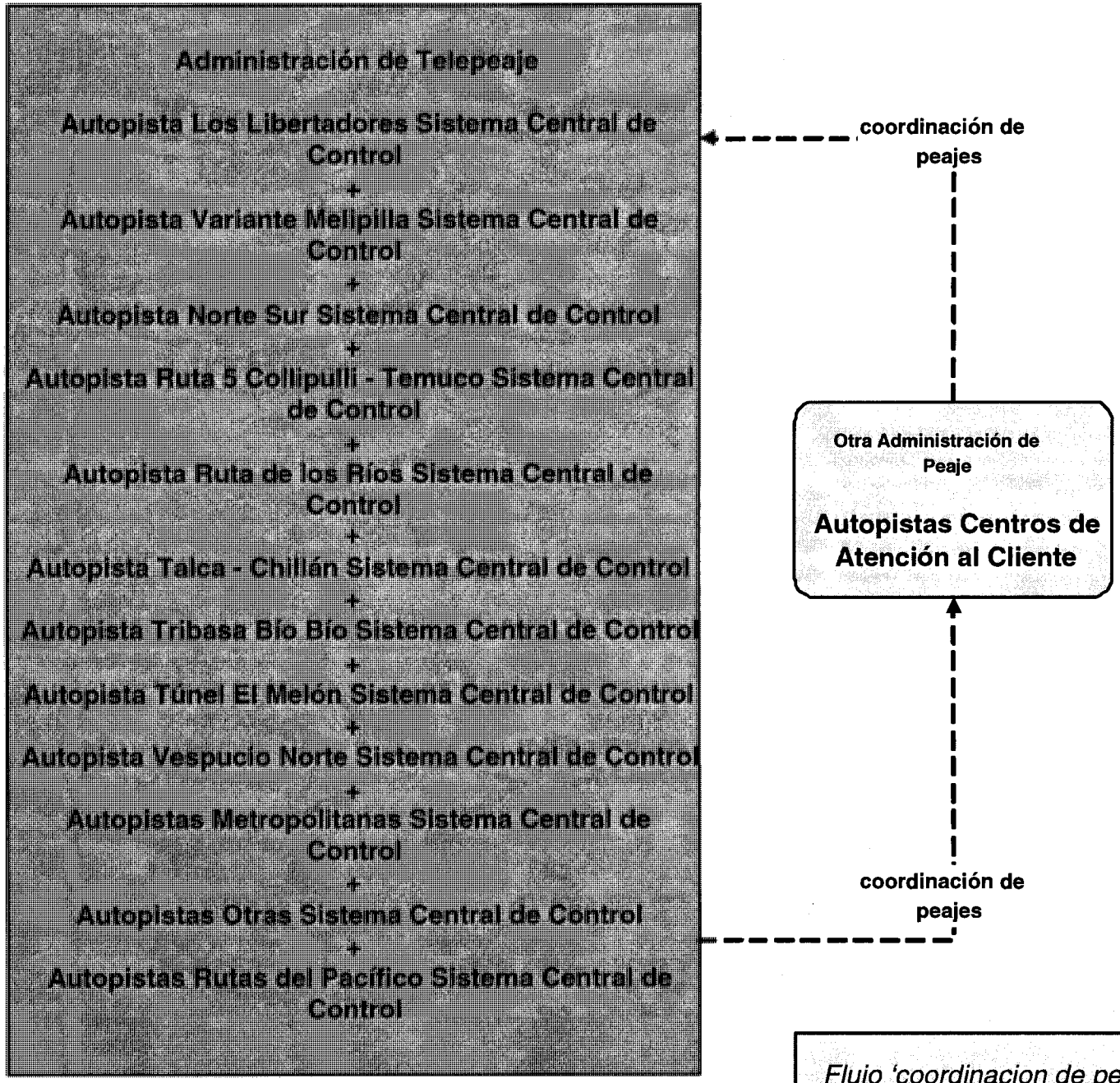
ATMS 10 - Pago Electrónico de Peaje
Autopistas



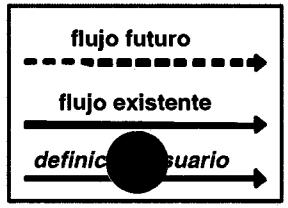
ATMS 10 - Pago Electrónico de Peaje
Autopistas



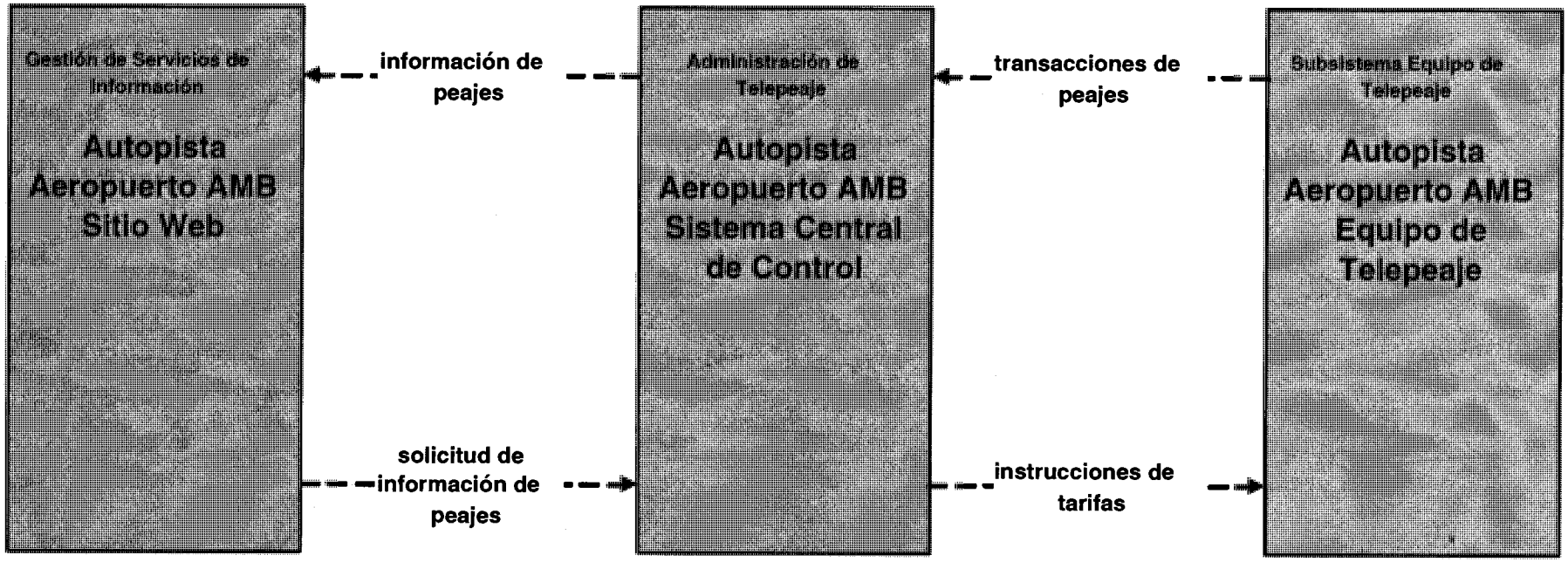
ATMS 10 - Pago Electrónico de Peaje
Autopistas

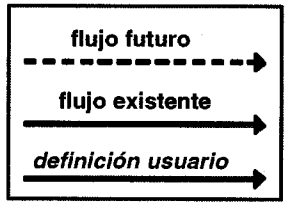


Flujo 'coordinacion de peajes' incluye notificacion de violacion de pago.



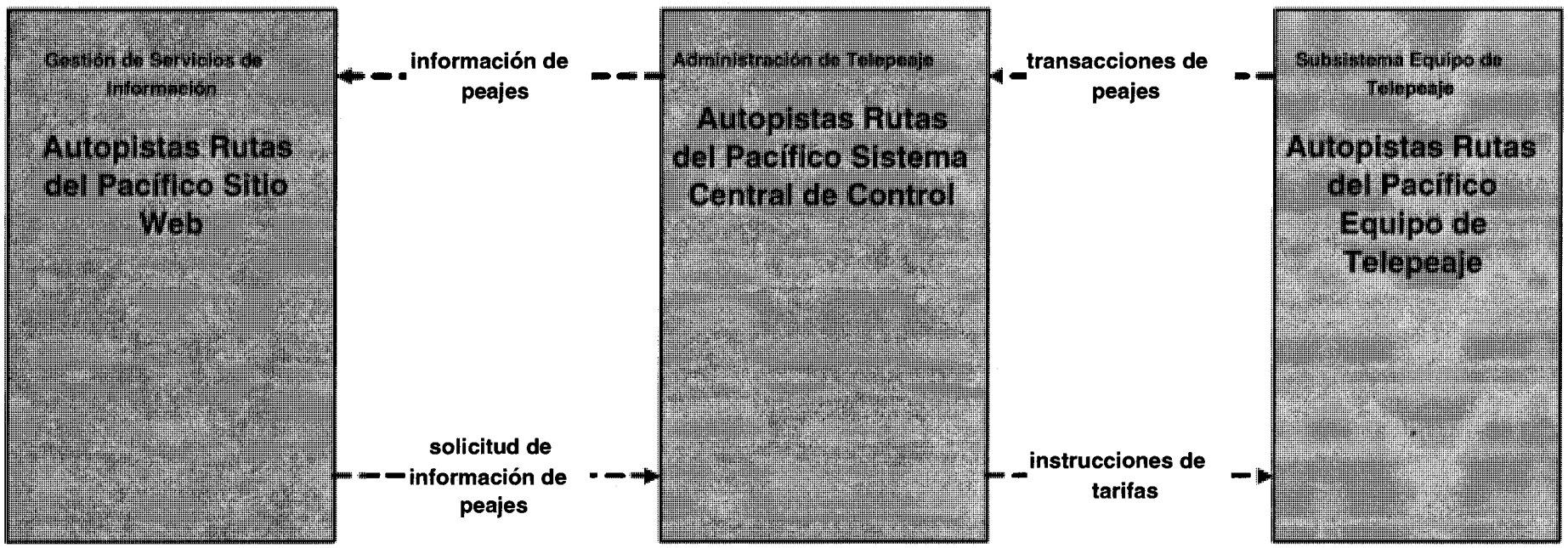
ATMS 10 - Pago Electrónico de Peaje
Autopista Aeropuerto AMB



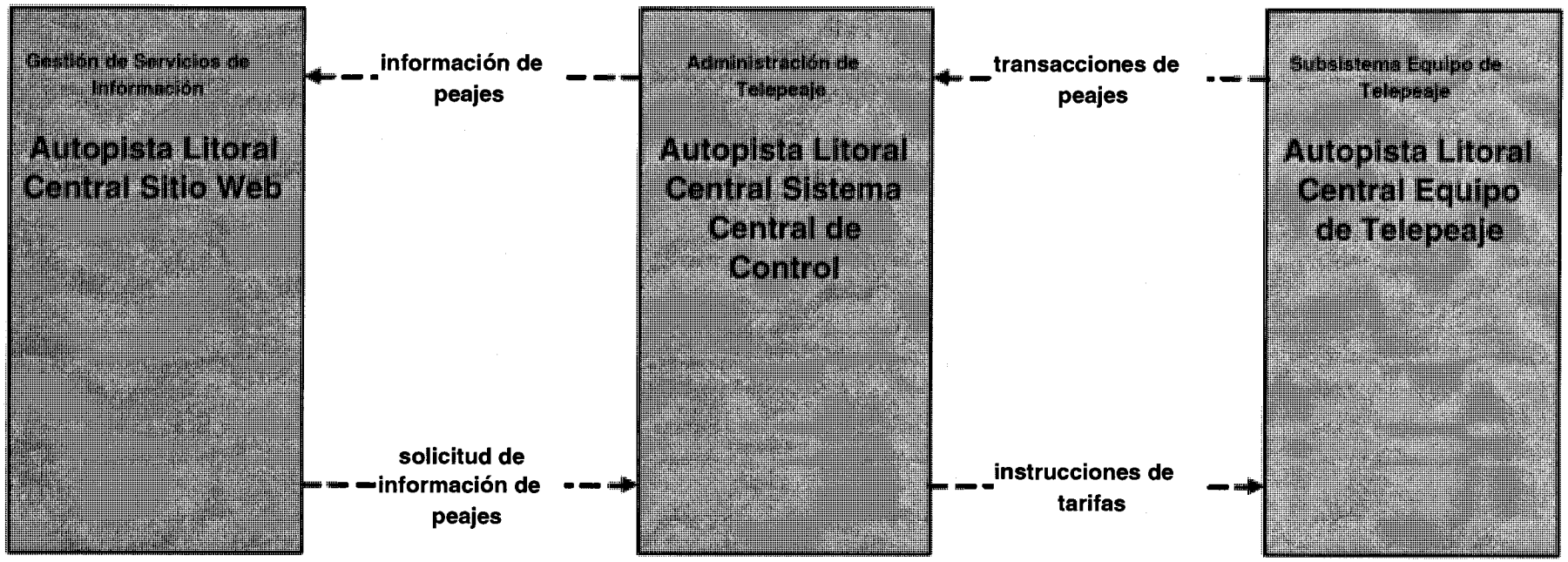


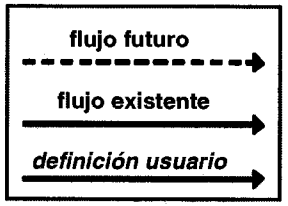
ATMS 10 - Pago Electrónico de Peaje

Autopistas Rutas del Pacifico

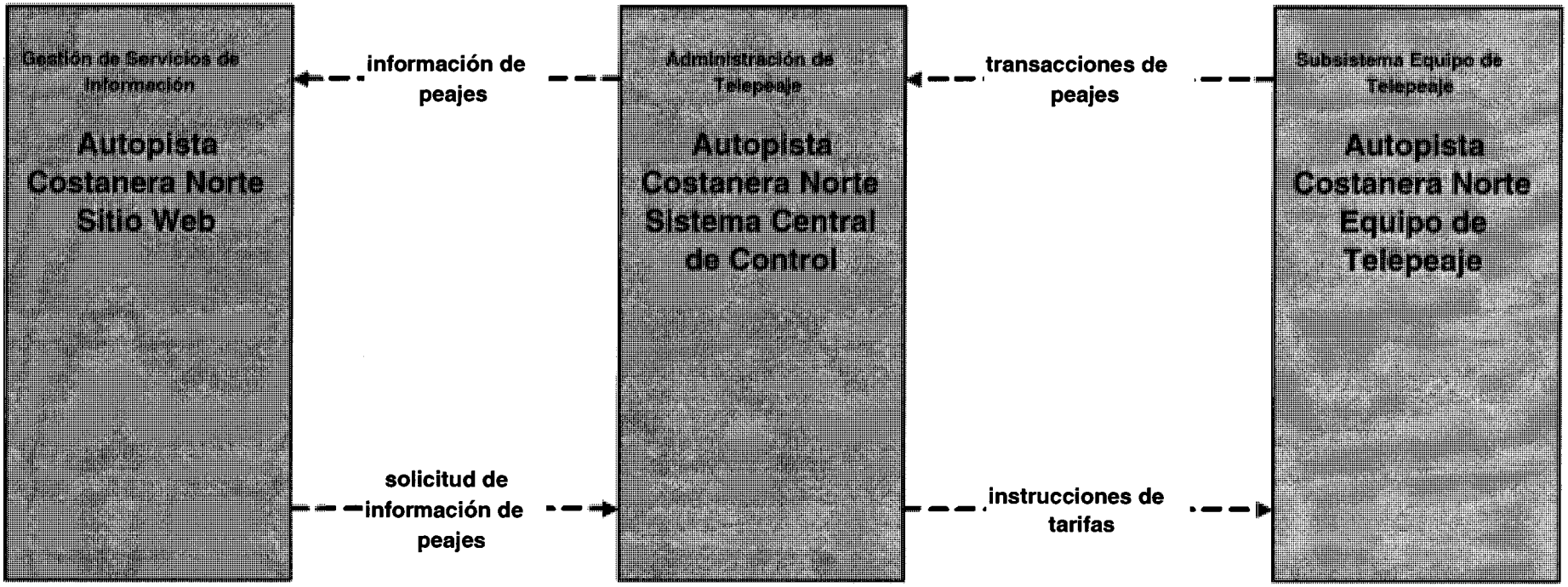


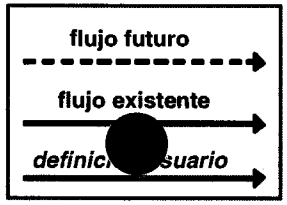
ATMS 10 - Pago Electrónico de Peaje
Autopista Litoral Central



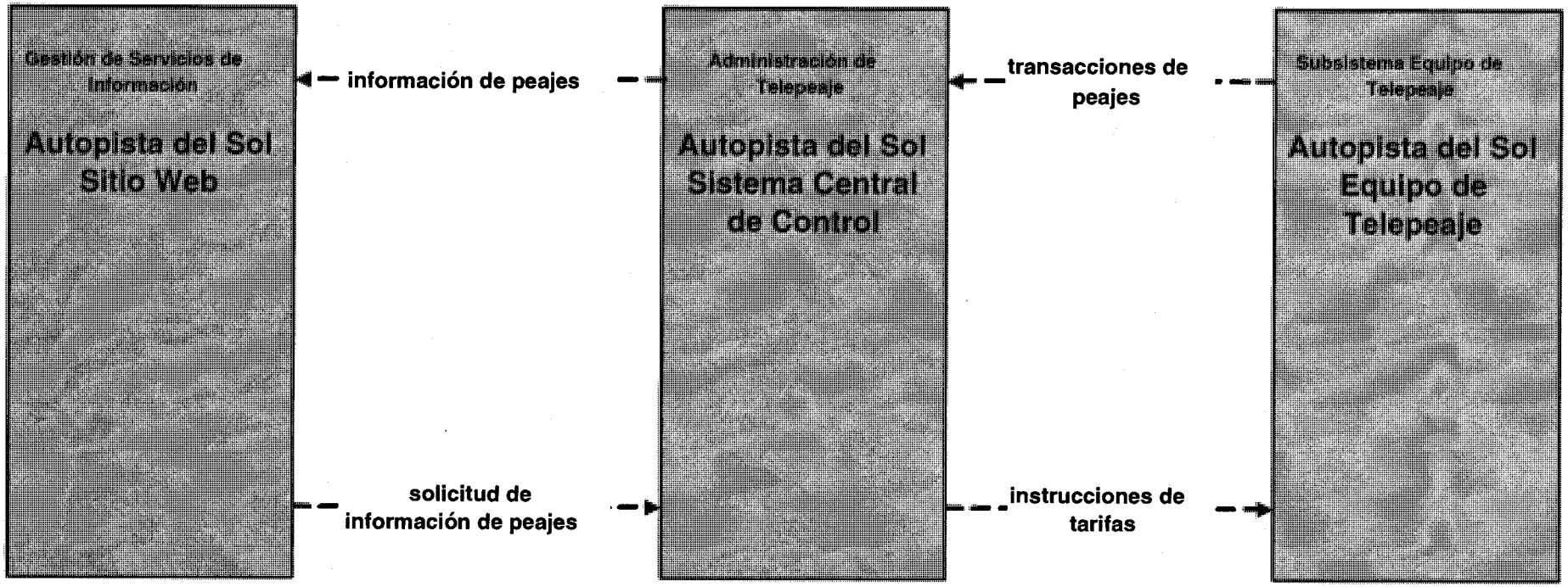


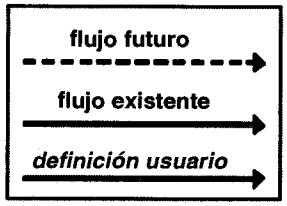
ATMS 10 - Pago Electrónico de Peaje
Autopista Costanera Norte



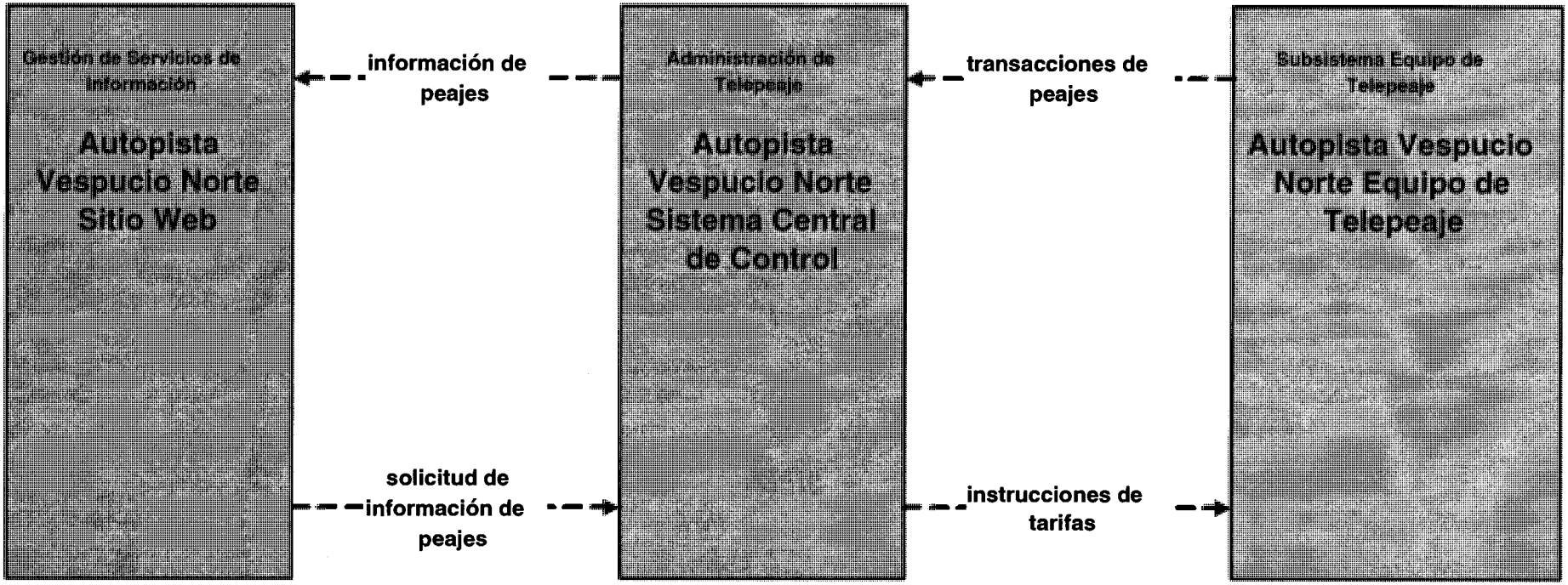


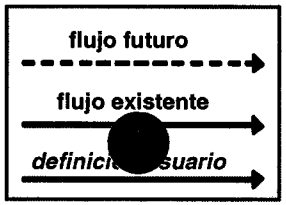
ATMS 10 - Pago Electrónico de Peaje
Autopista del Sol



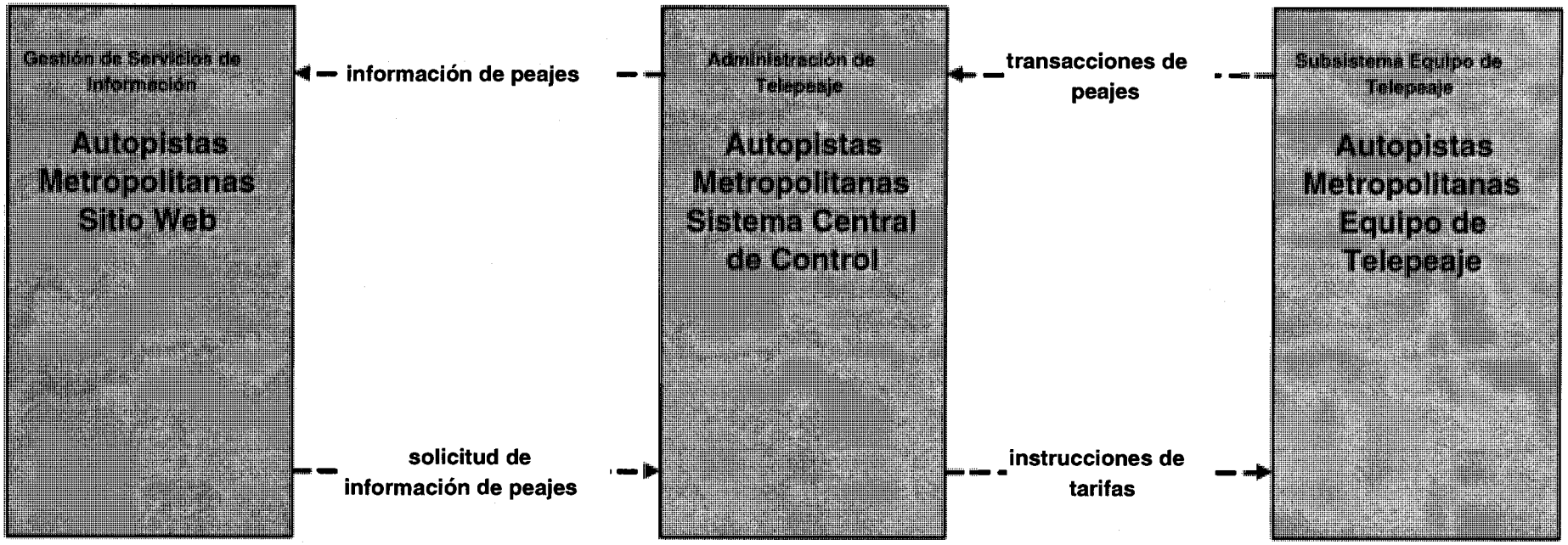


ATMS 10 - Pago Electrónico de Peaje
Autopista Vespucio Norte





ATMS 10 - Pago Electrónico de Peaje
Autopistas Metropolitananas



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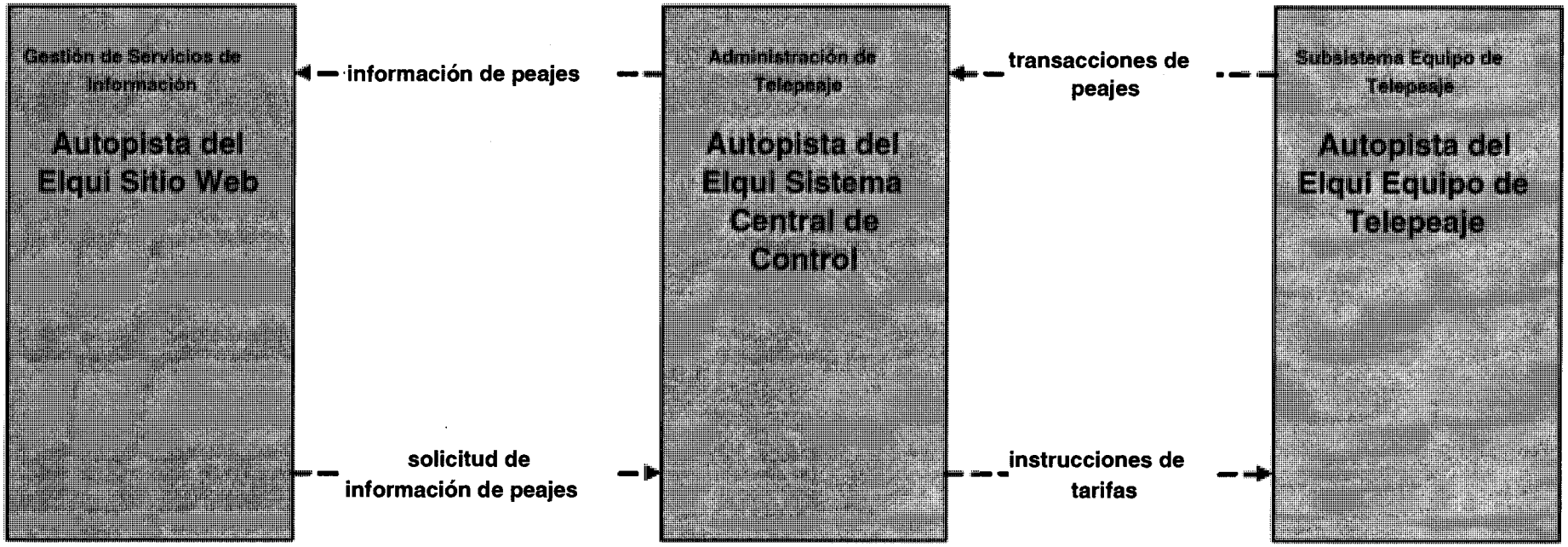
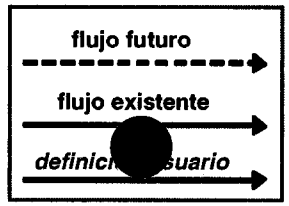
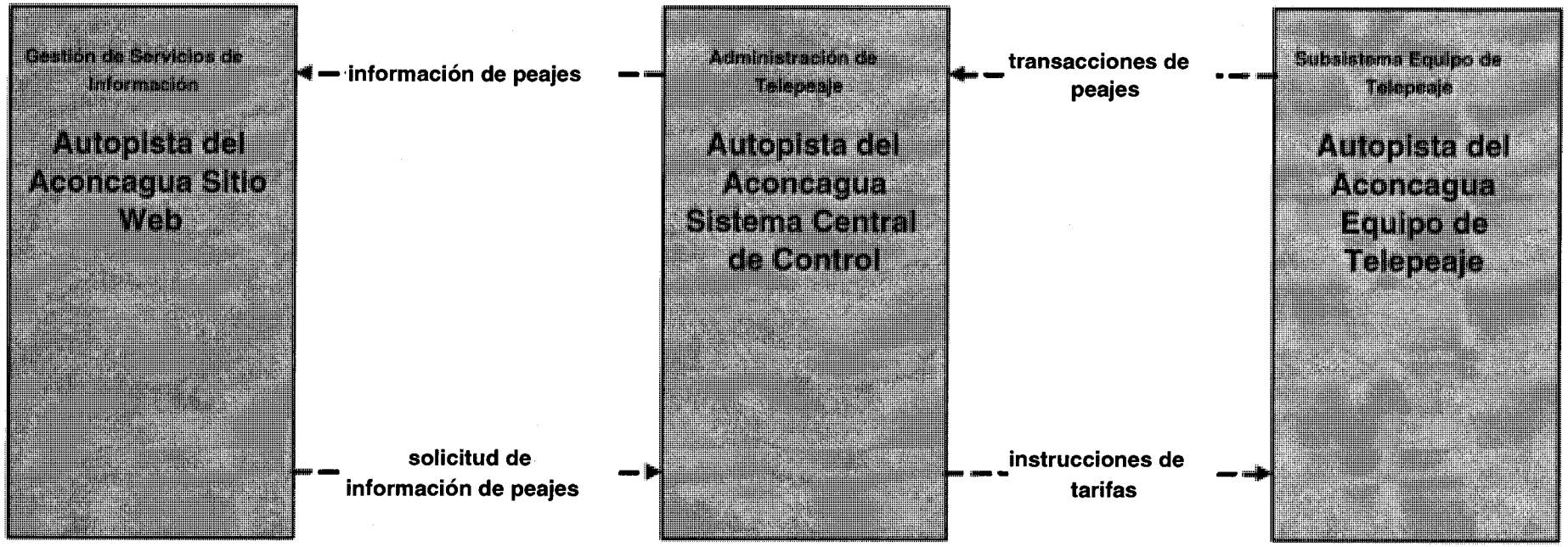
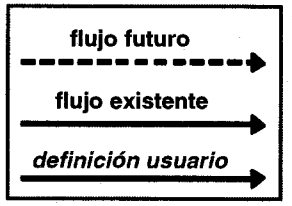
Autopista del Elqui



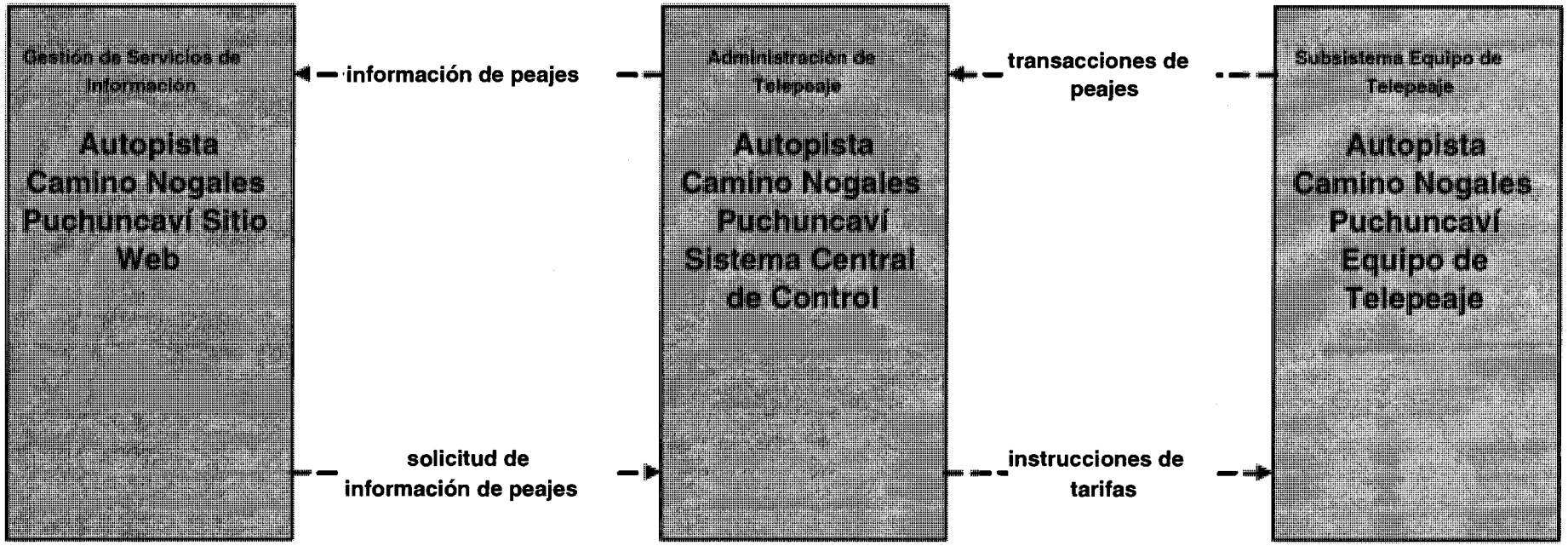


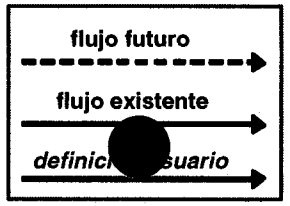
ATMS 10 - Pago Electrónico de Peaje
Autopista del Aconcagua



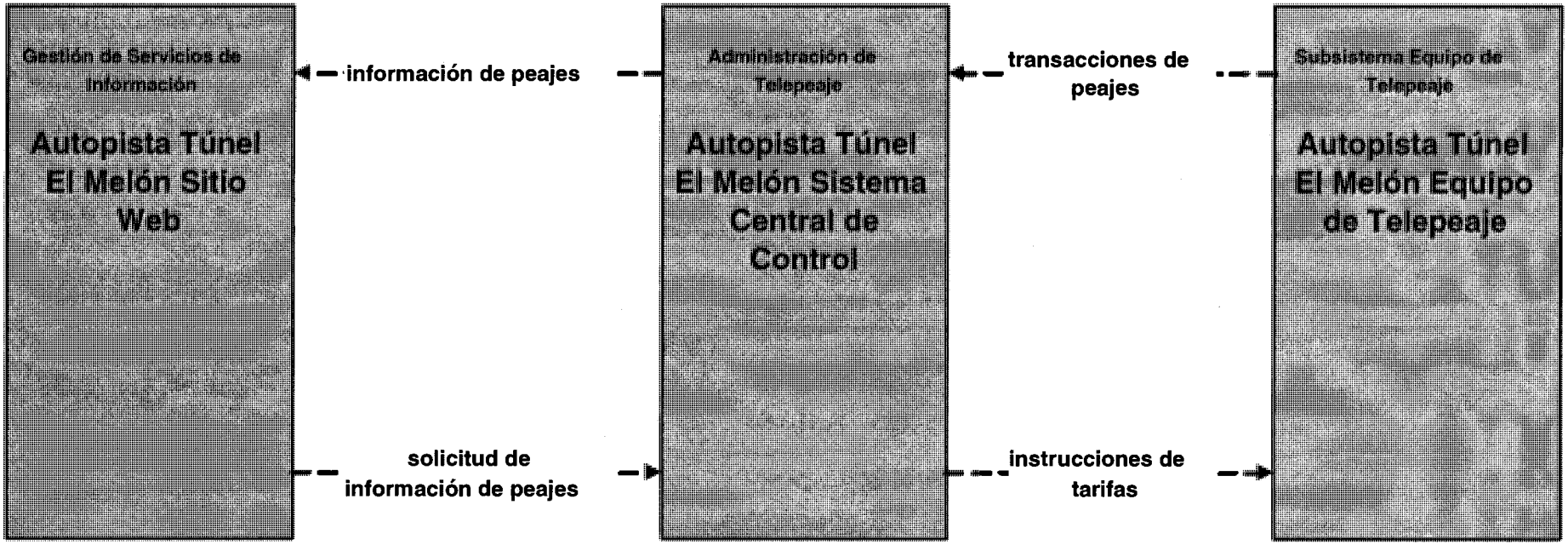


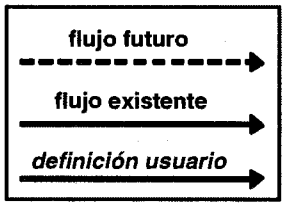
ATMS 10 - Pago Electrónico de Peaje
Autopista Camino Nogales Puchuncaví



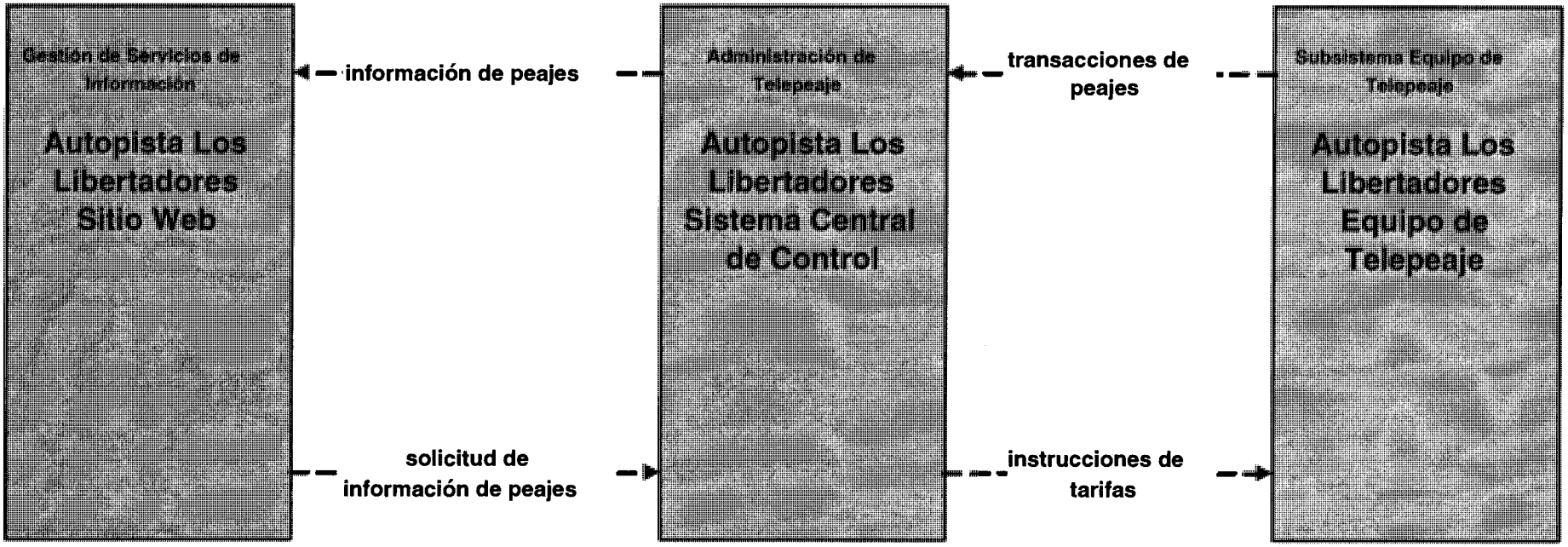


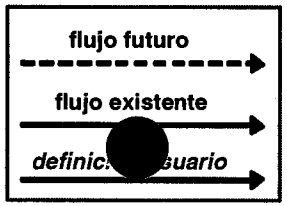
ATMS 10 - Pago Electrónico de Peaje
"Autopista Túnel El Melón



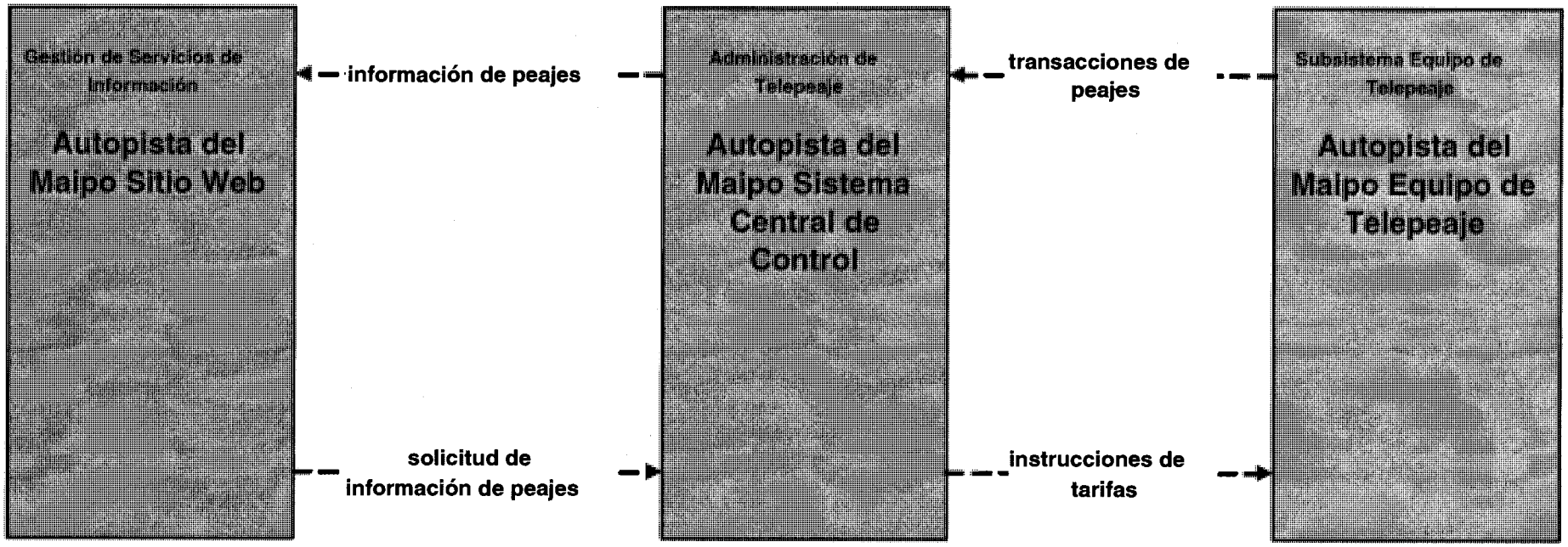


ATMS 10 - Pago Electrónico de Peaje
Autopista Los Libertadores

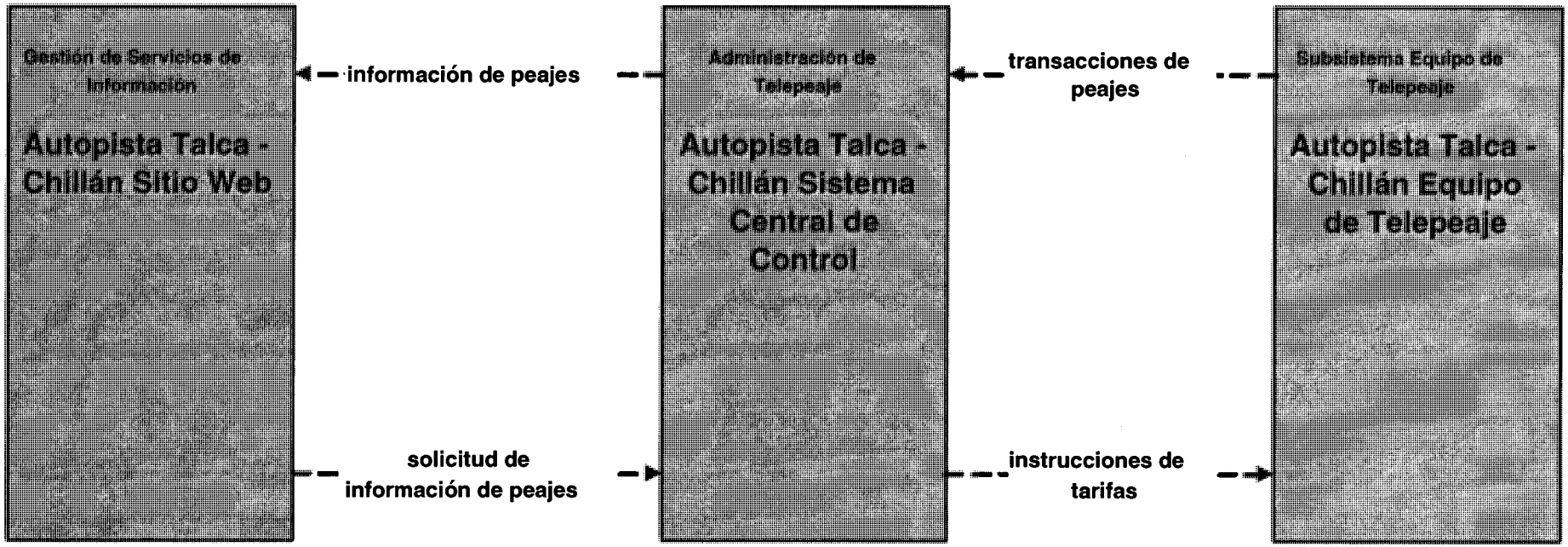


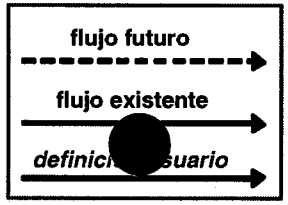


ATMS 10 - Pago Electrónico de Peaje
Autopista del Maipo

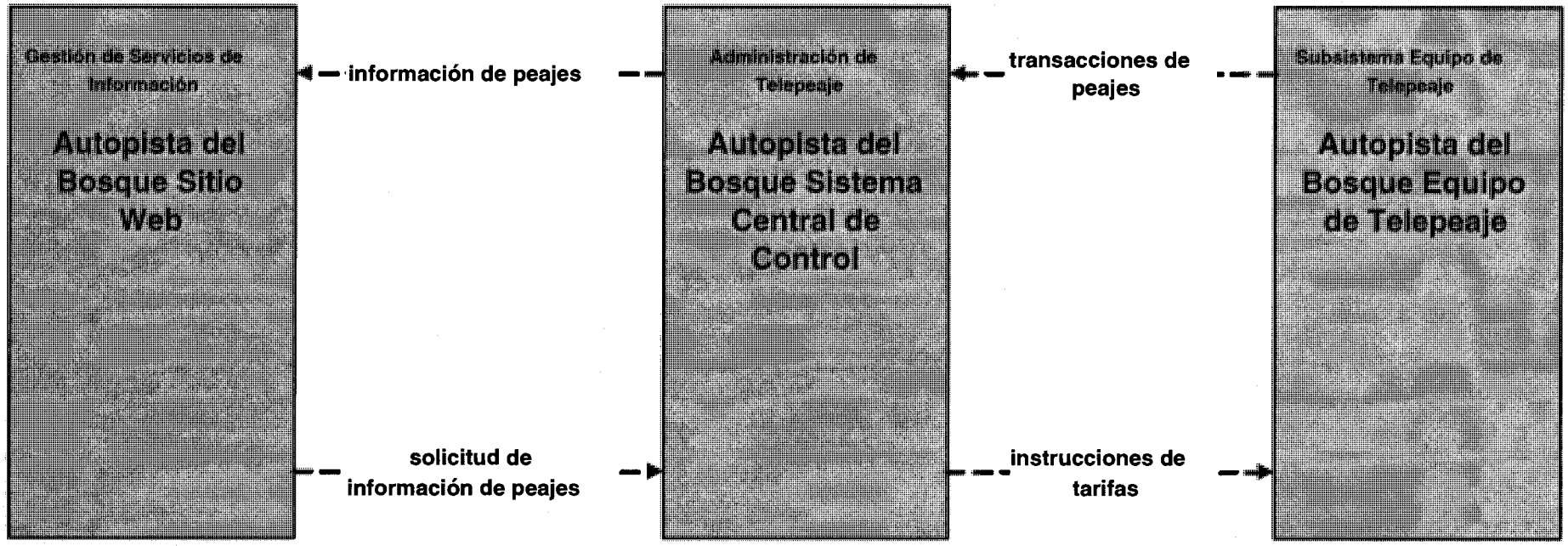


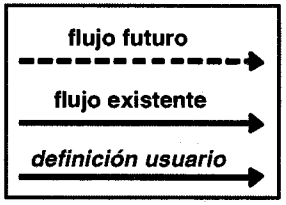
ATMS 10 - Pago Electrónico de Peaje
Autopista Talca - Chillán





ATMS 10 - Pago Electrónico de Peaje
Autopista del Bosque





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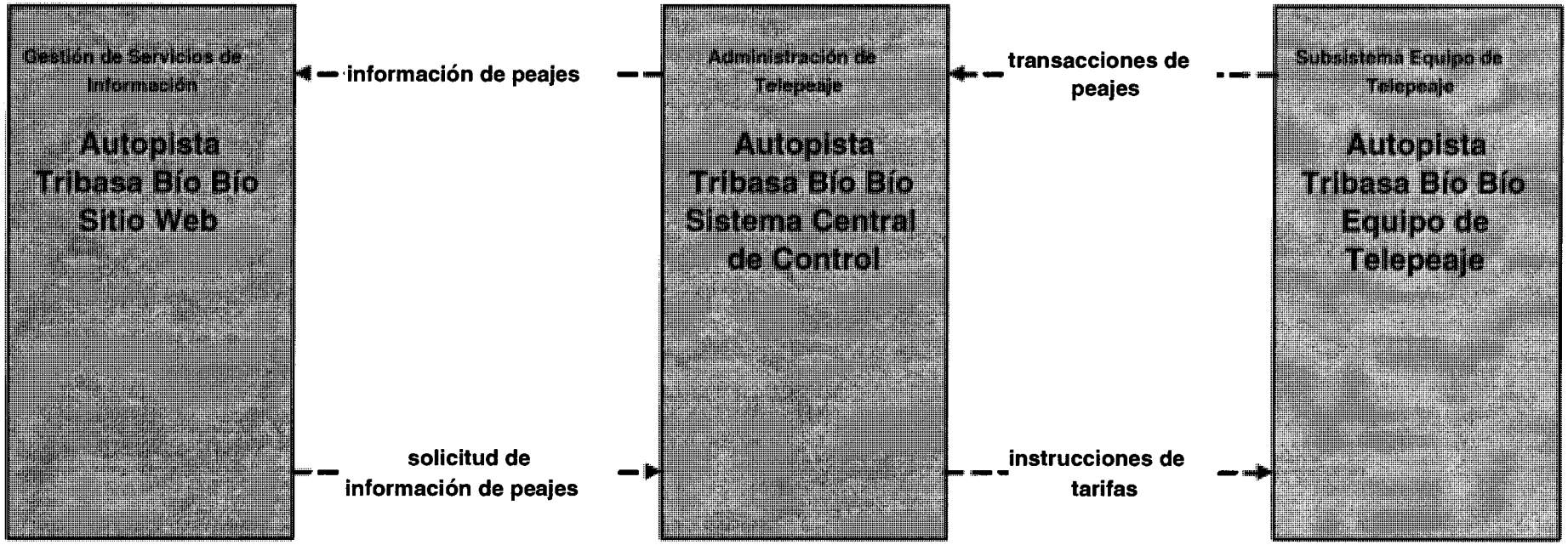

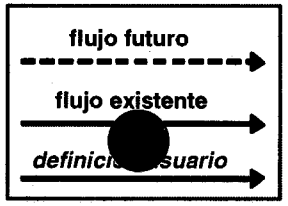

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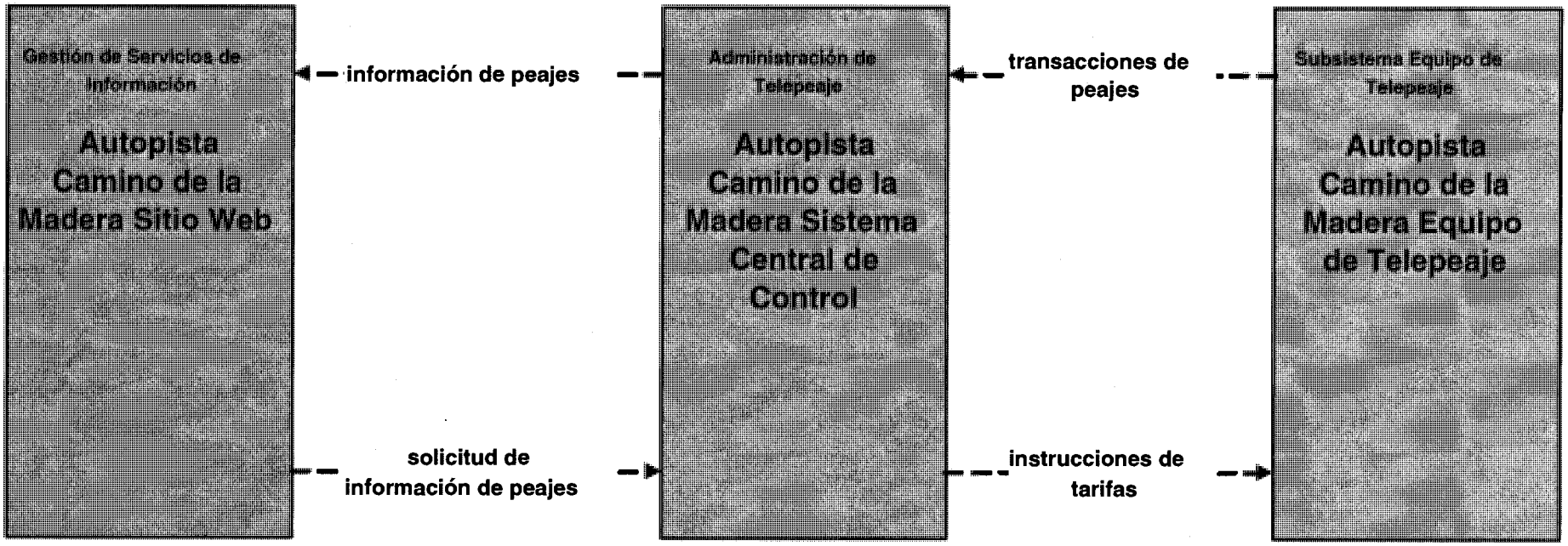
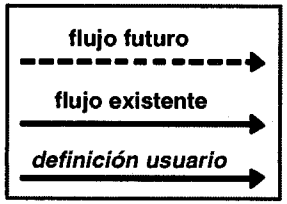
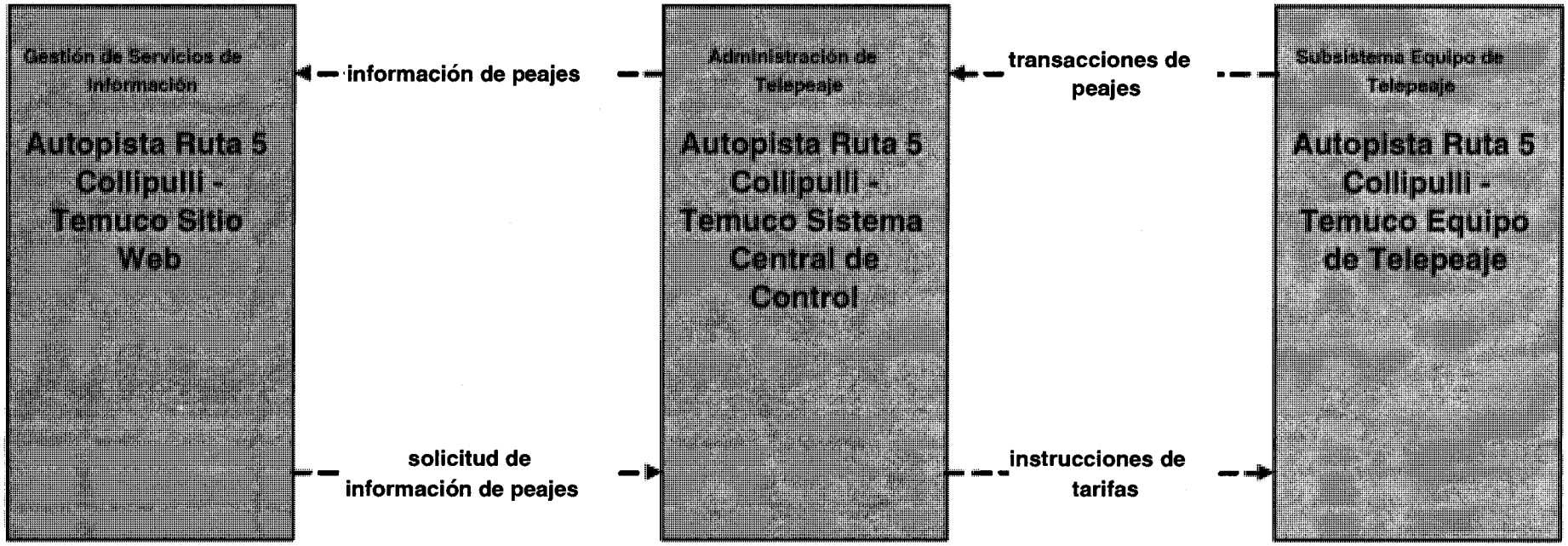
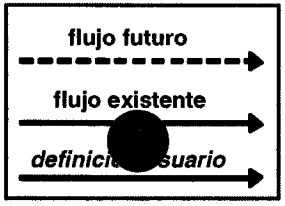
Autopista Camino de la Madera



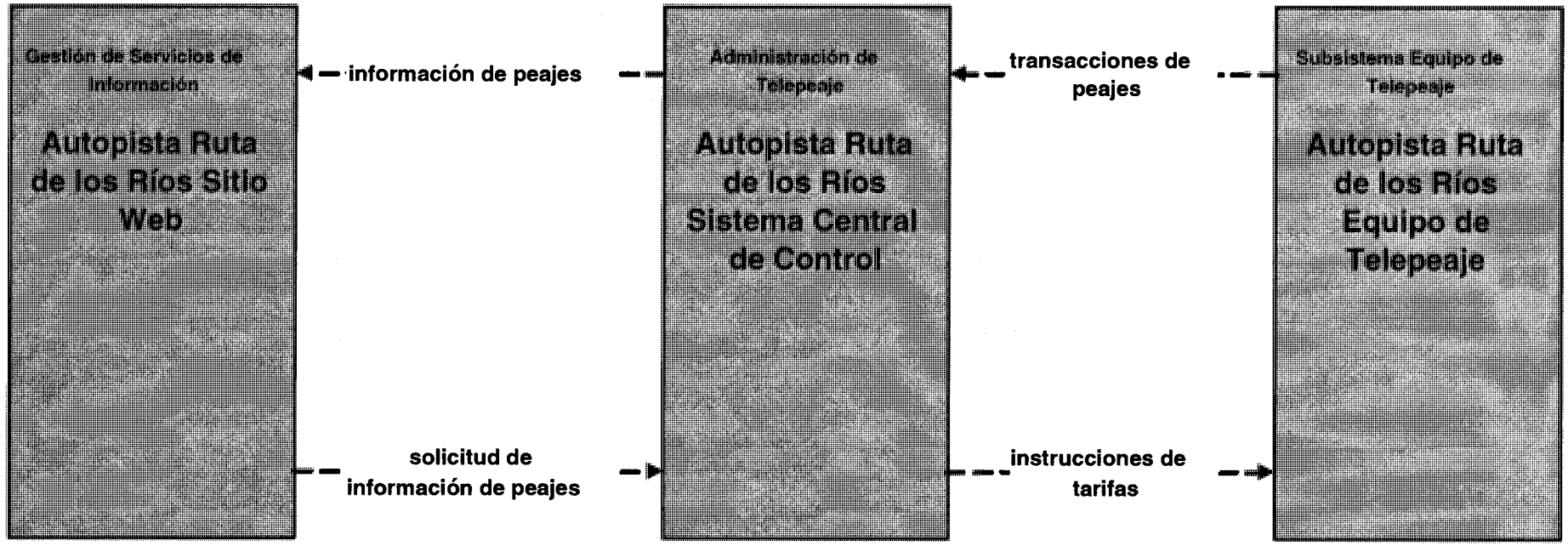


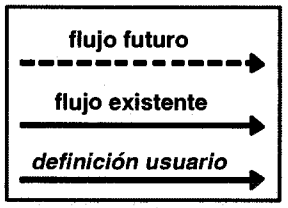
ATMS 10 - Pago Electrónico de Peaje
Autopista Ruta 5 Collipulli - Temuco



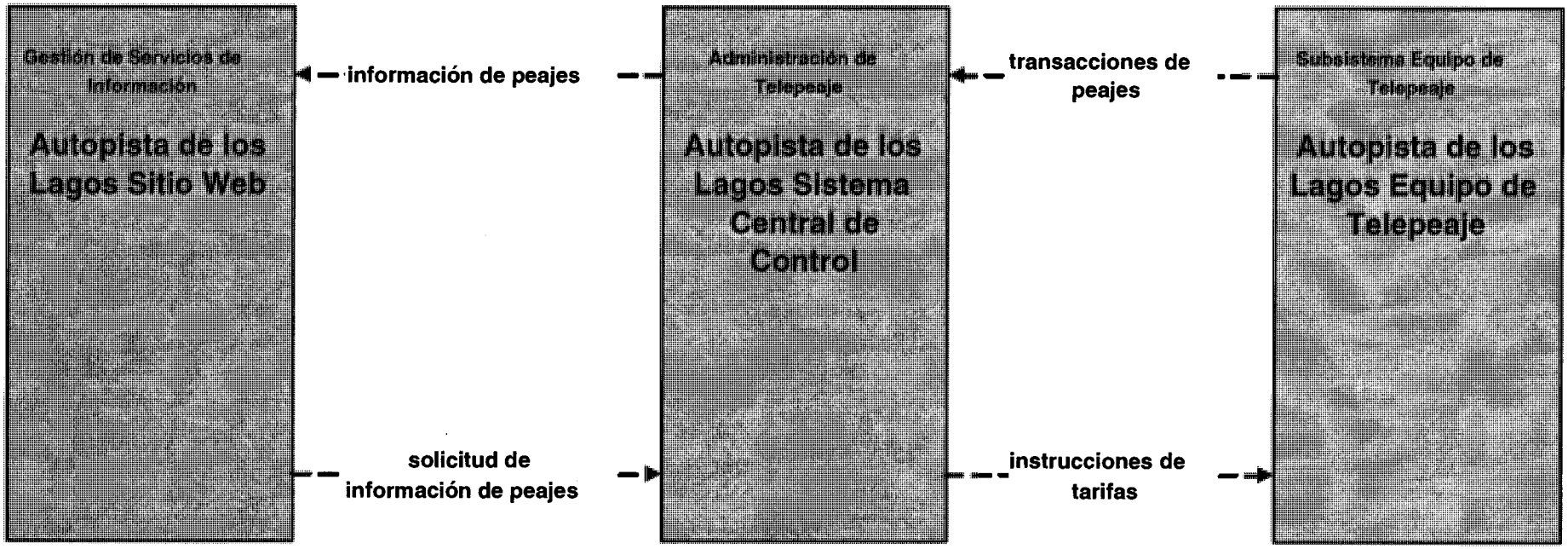


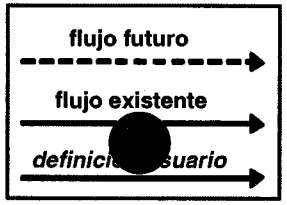
ATMS 10 - Pago Electrónico de Peaje
Autopista Ruta de los Ríos





ATMS 10 - Pago Electrónico de Peaje
Autopista de los Lagos





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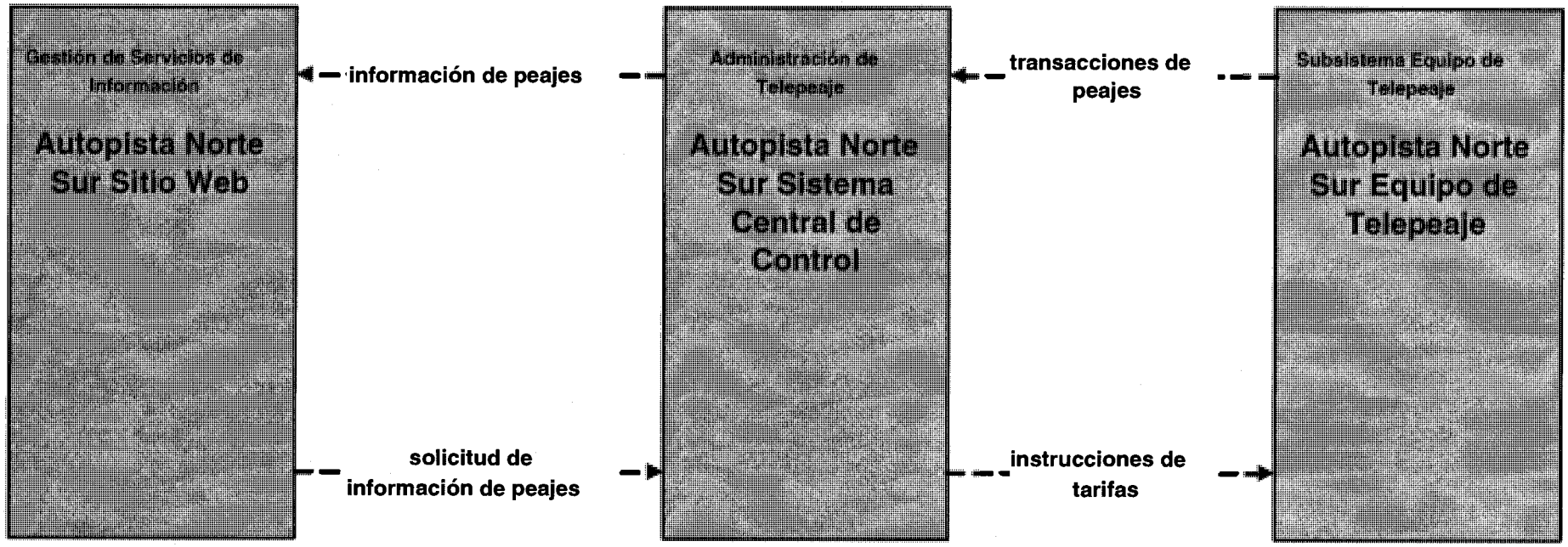
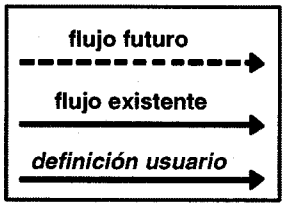
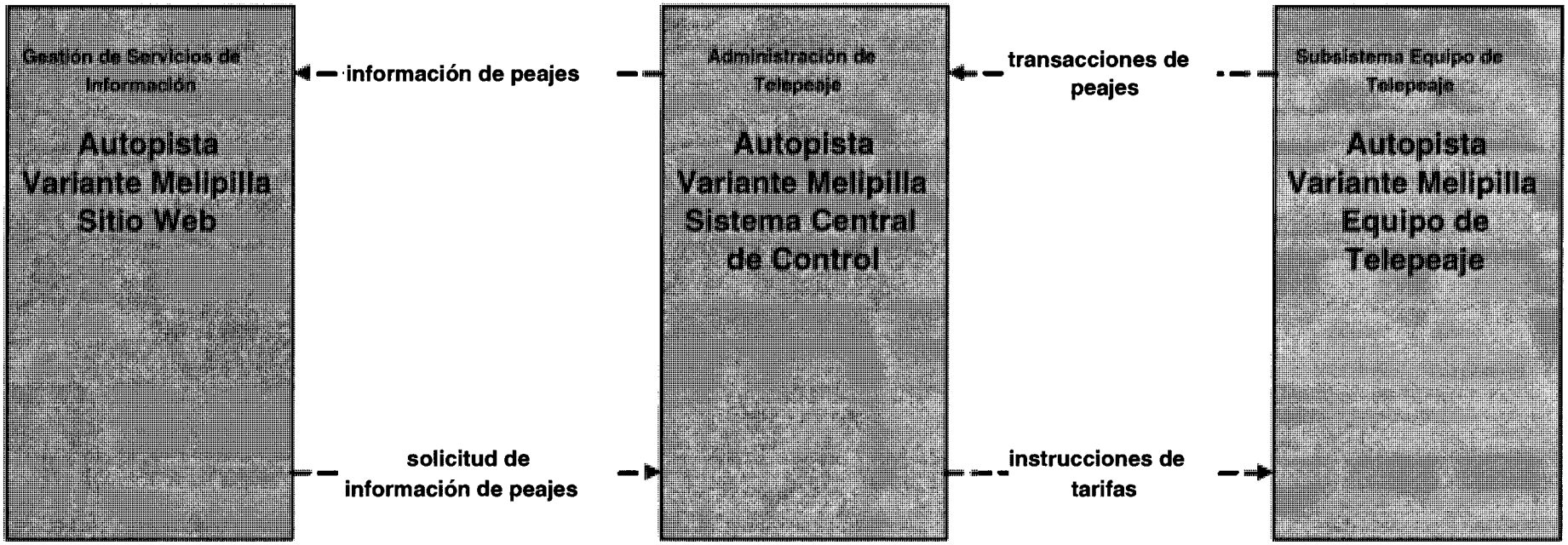
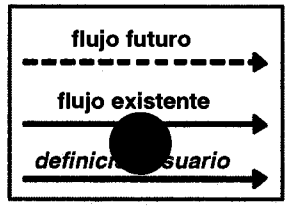
Autopista Norte Sur



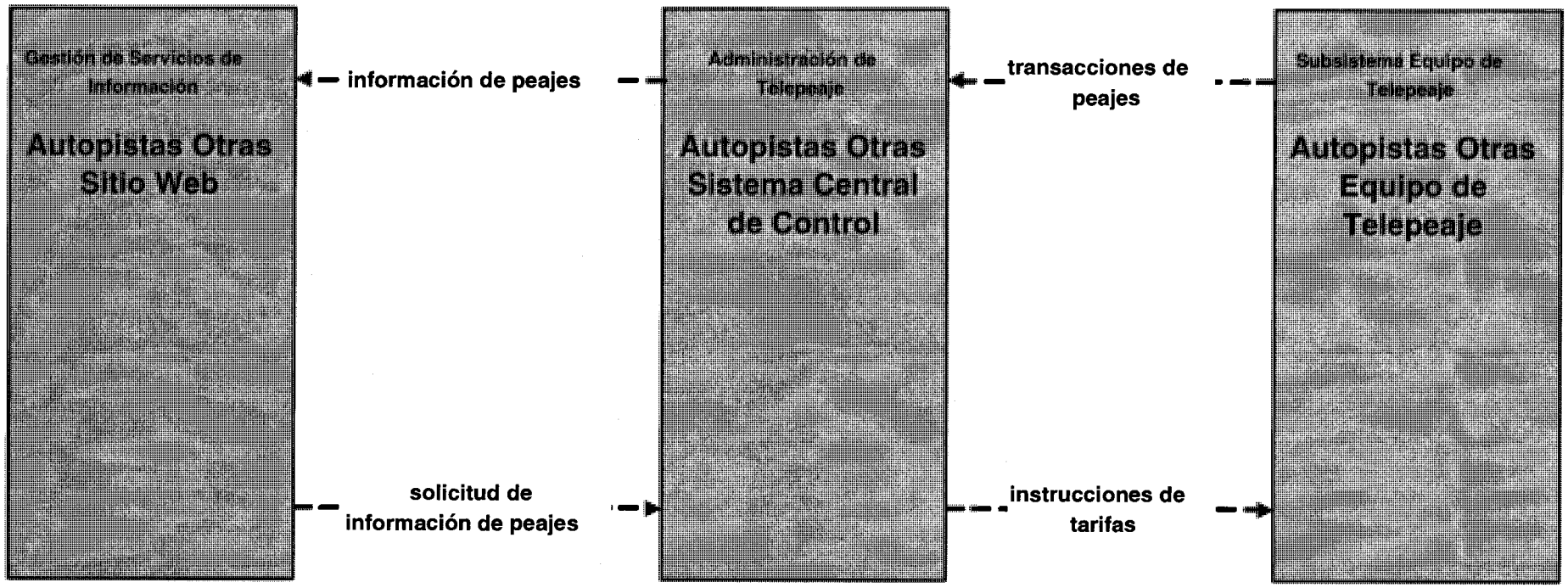


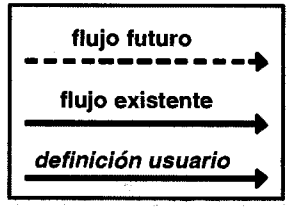
ATMS 10 - Pago Electrónico de Peaje
Autopista Variante Melipilla





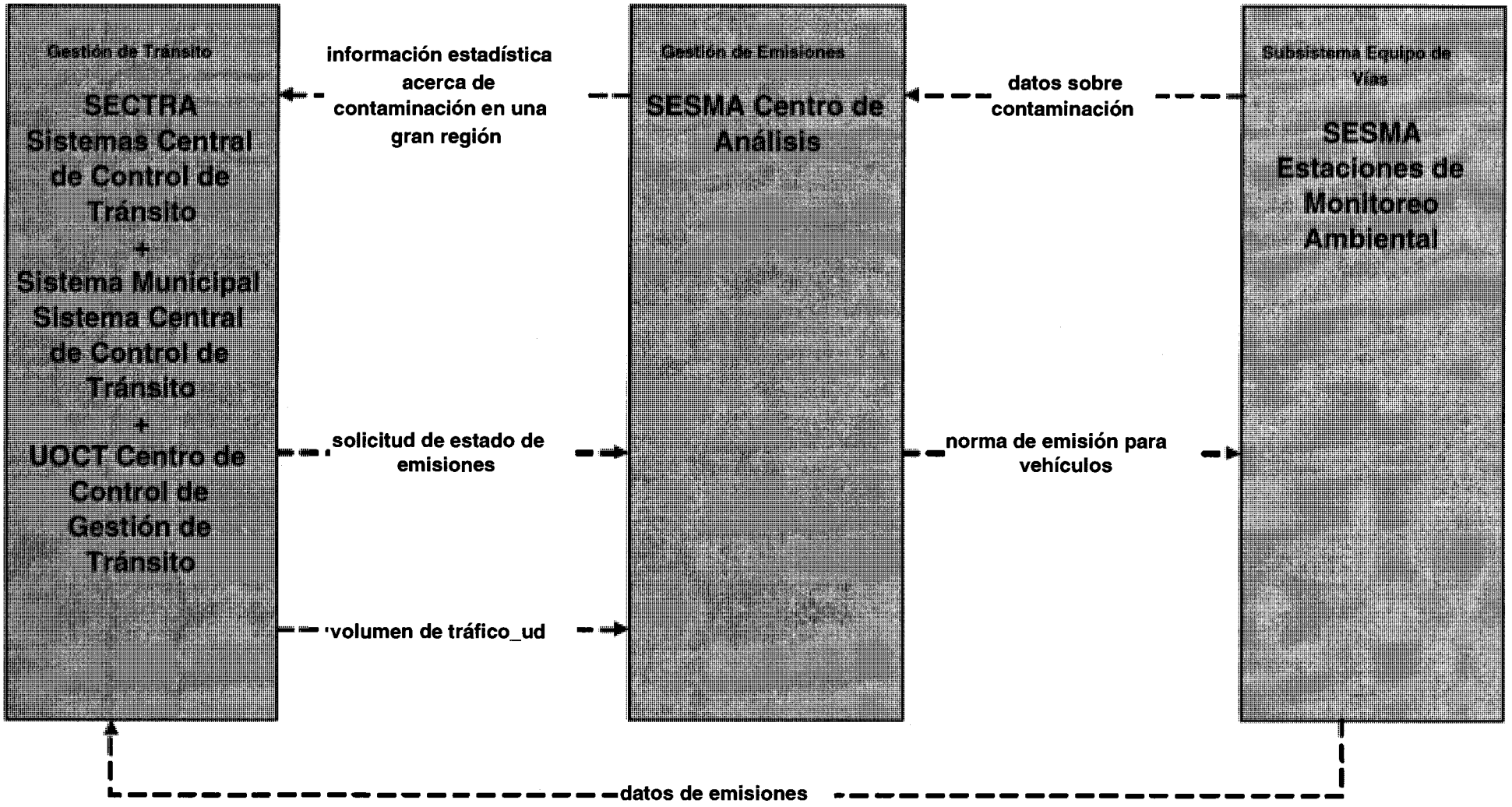
ATMS 10 - Pago Electrónico de Peaje
Autopistas Otras

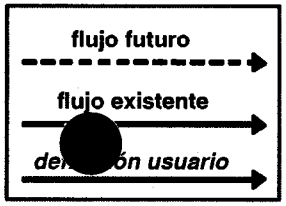




ATMS 11 - Gestión y Monitoreo de Emisiones

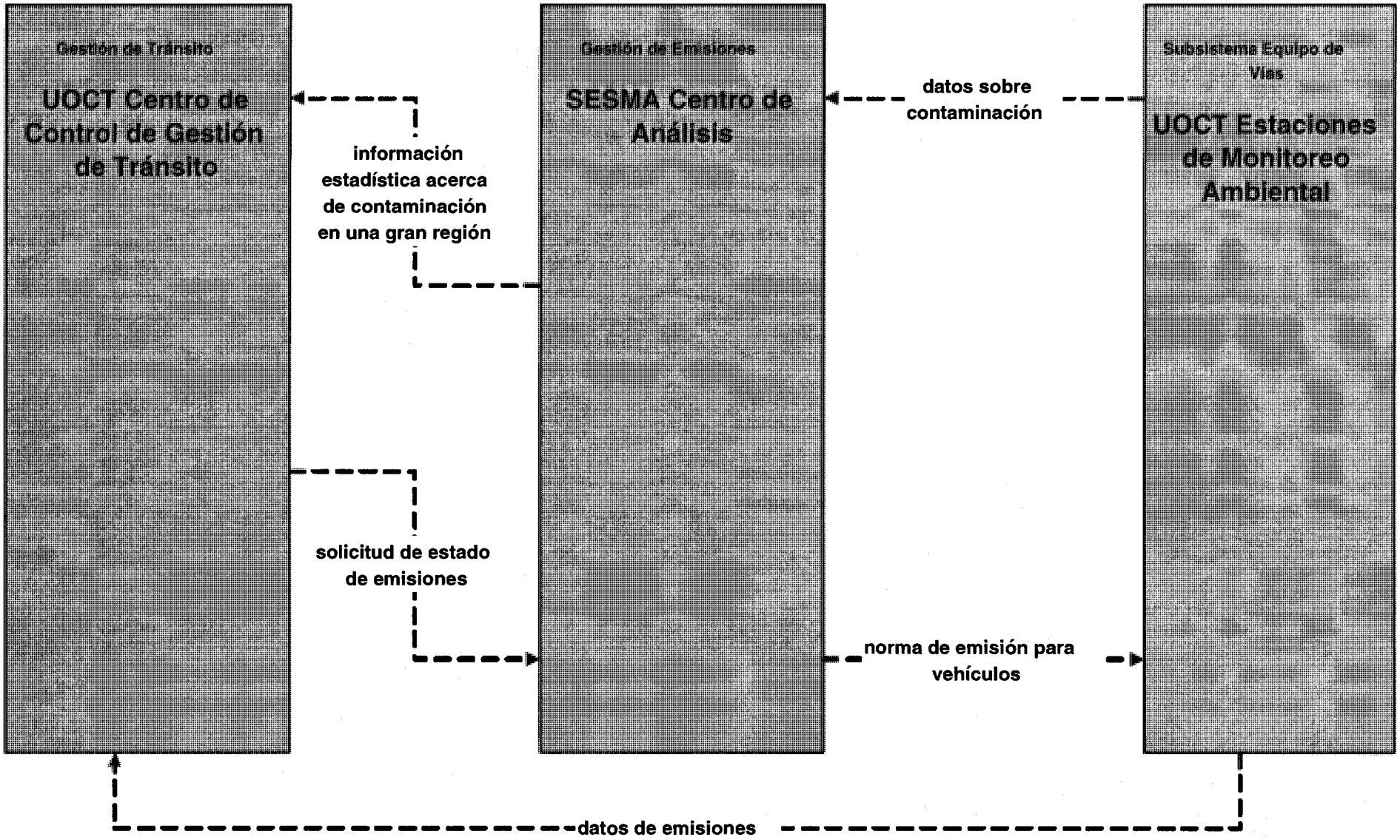
SESMA, SECTRA, Sistema Municipal, UOCT





ATMS11 - Gestión y Monitoreo de Emisiones

SESMA, SECTRA, UOCT



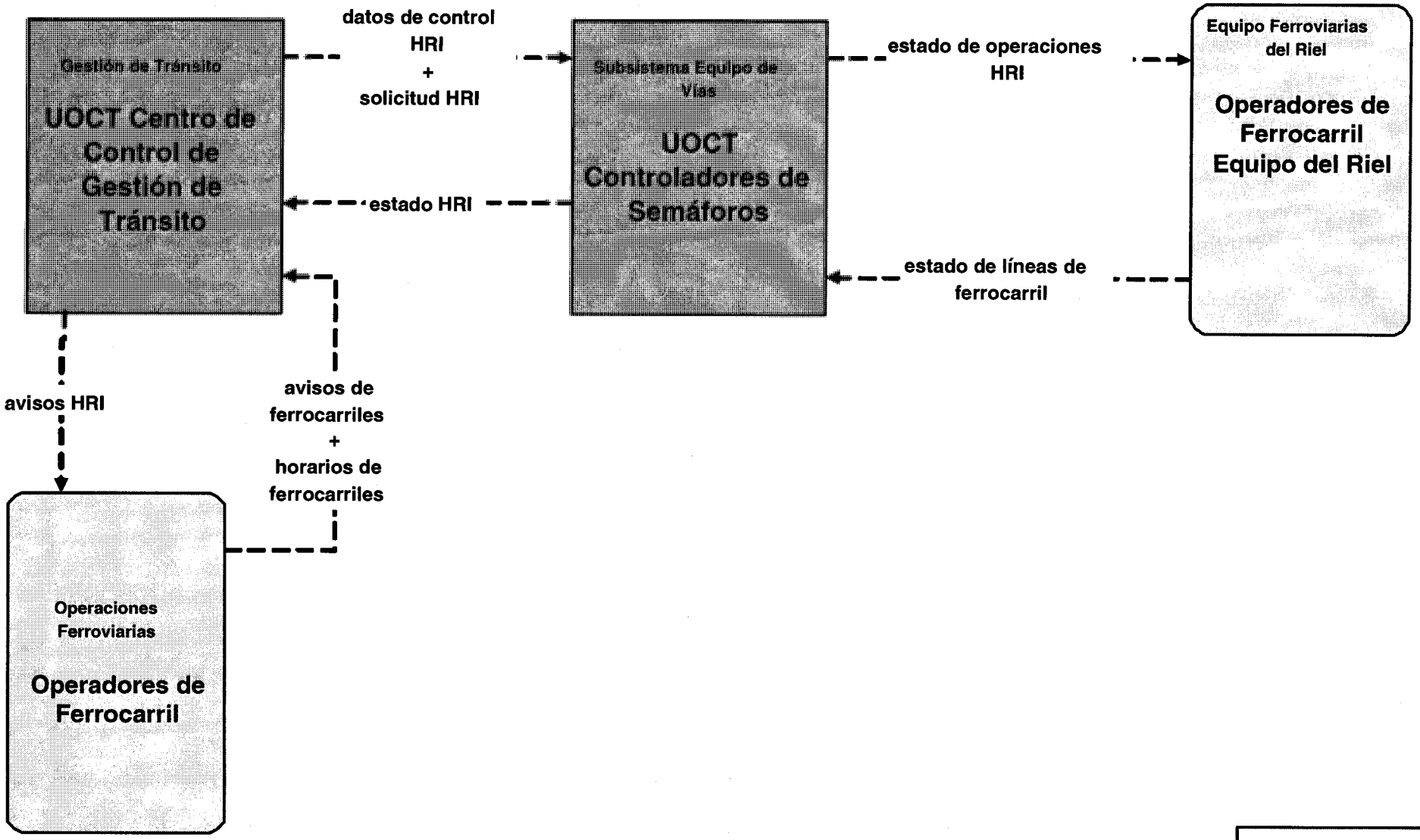
flujo futuro

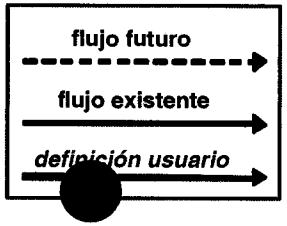
flujo existente

definición usuario

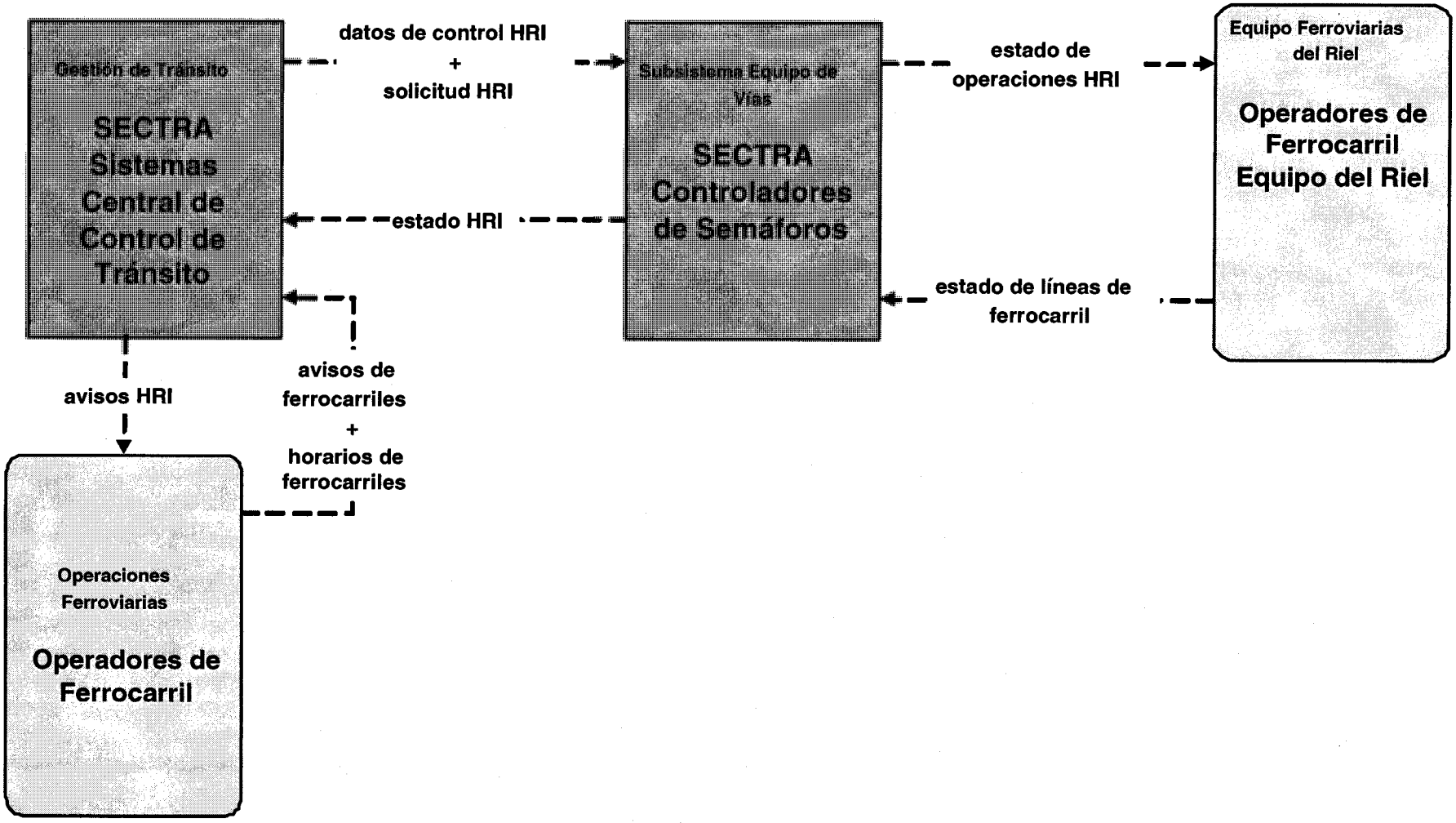
ATMS 13 - Cruce de Ferrocarril Estándar a Nivel

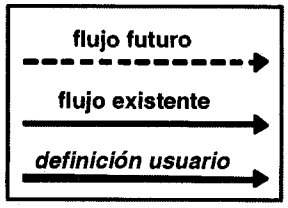
UOCT



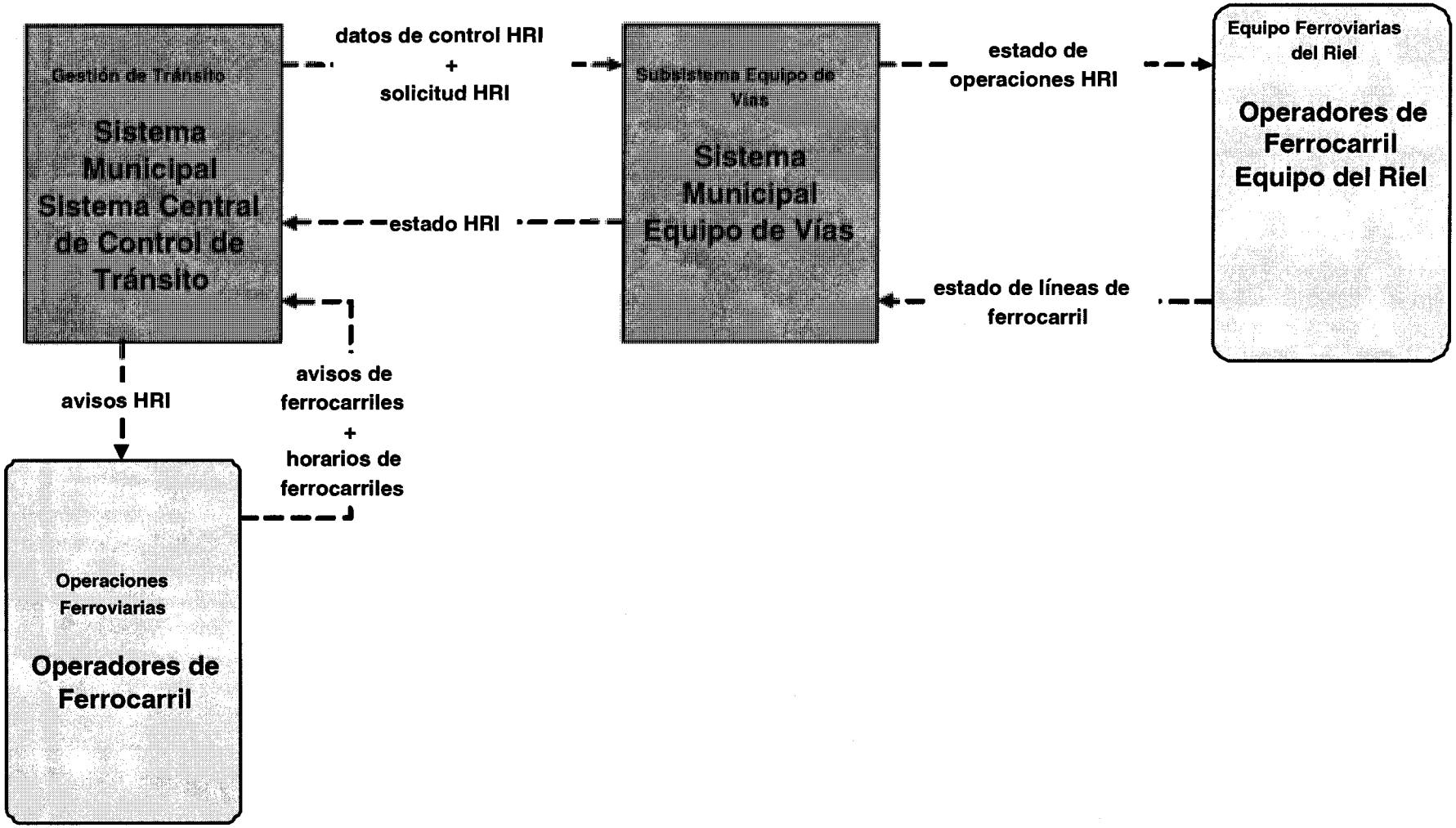


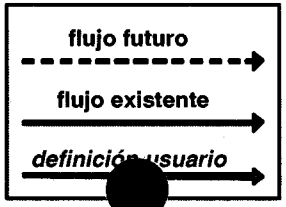
ATMS 13 - Cruce de Ferrocarril Estándar a Nivel
SECTRA



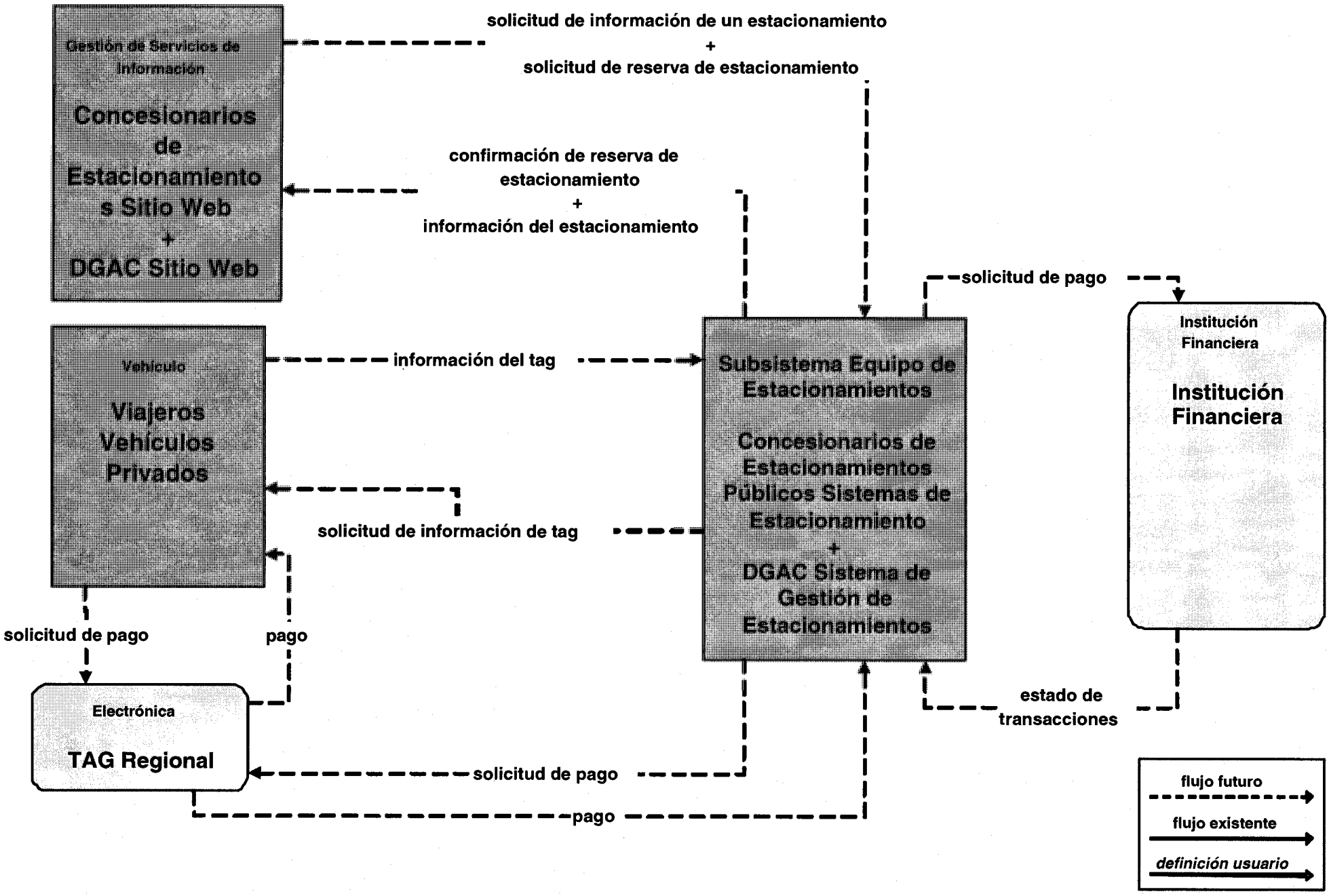


ATMS 13 - Cruce de Ferrocarril Estándar a Nivel
Sistema Municipal



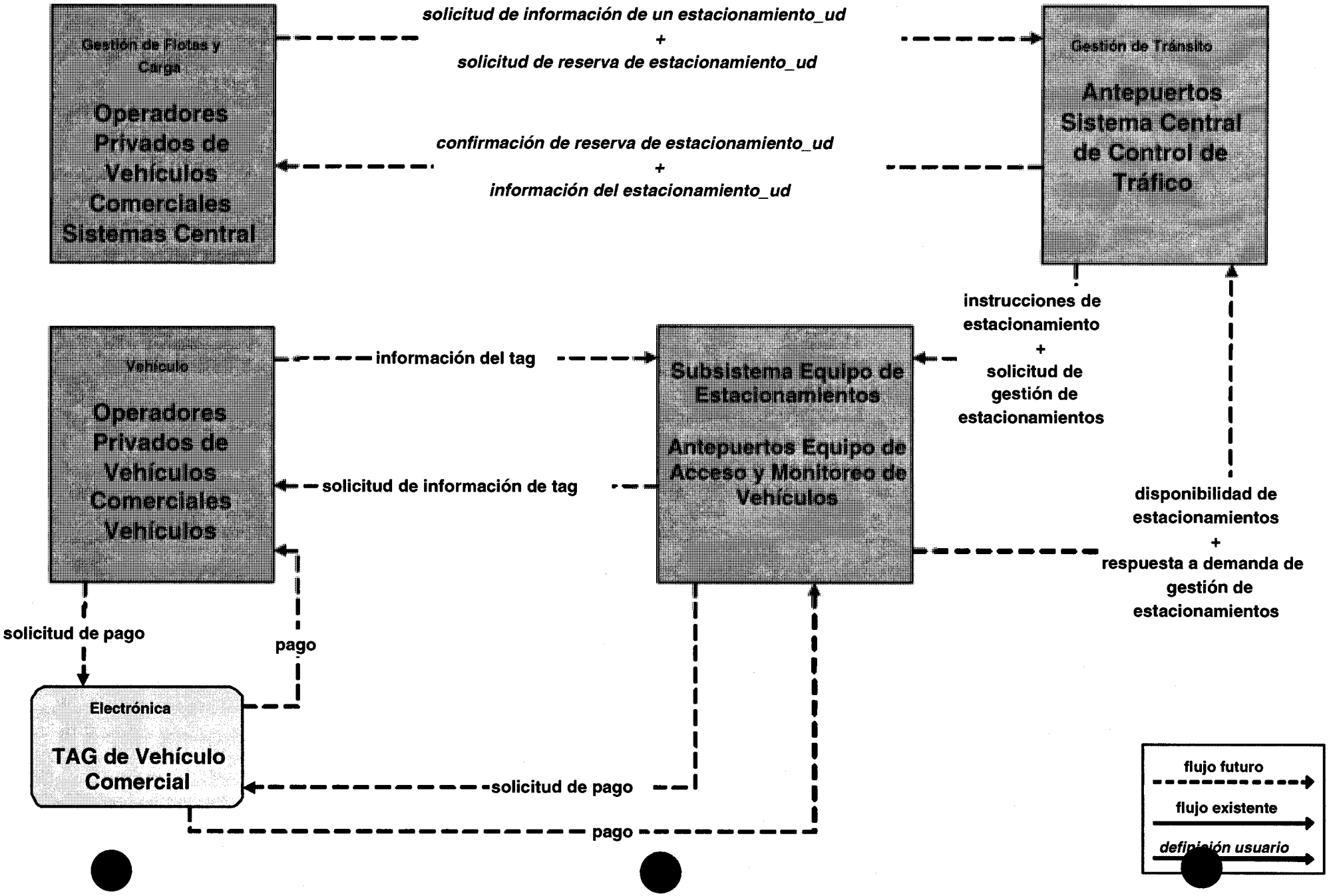


ATMS 16 - Gestión de Estacionamientos



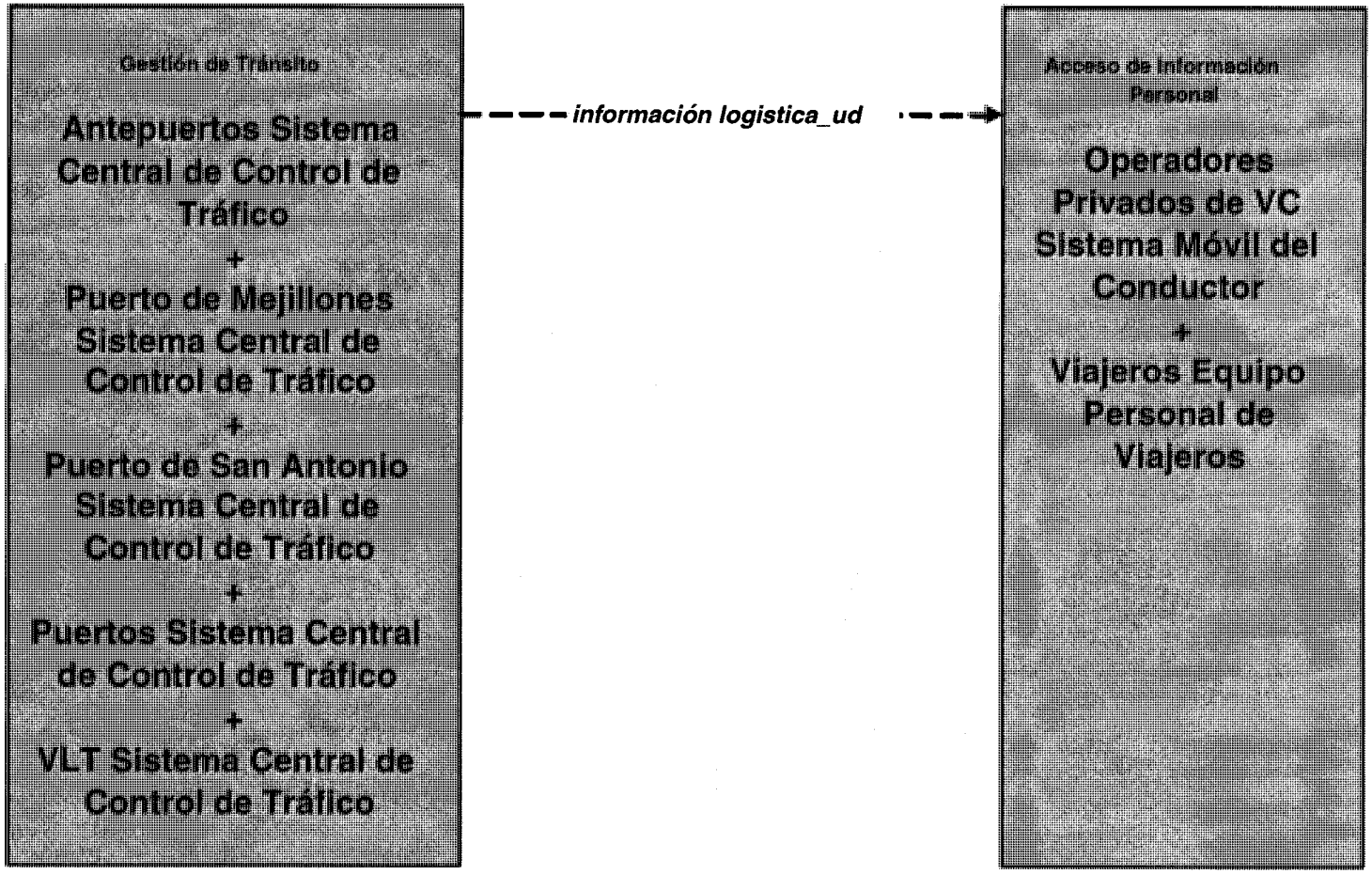
ATMS 16 - Gestión de Estacionamientos

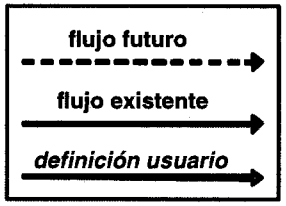
Antepuertos



ATMS 16 - Gestión de Estacionamiento (Extensión)

Puertos y Antepuertos

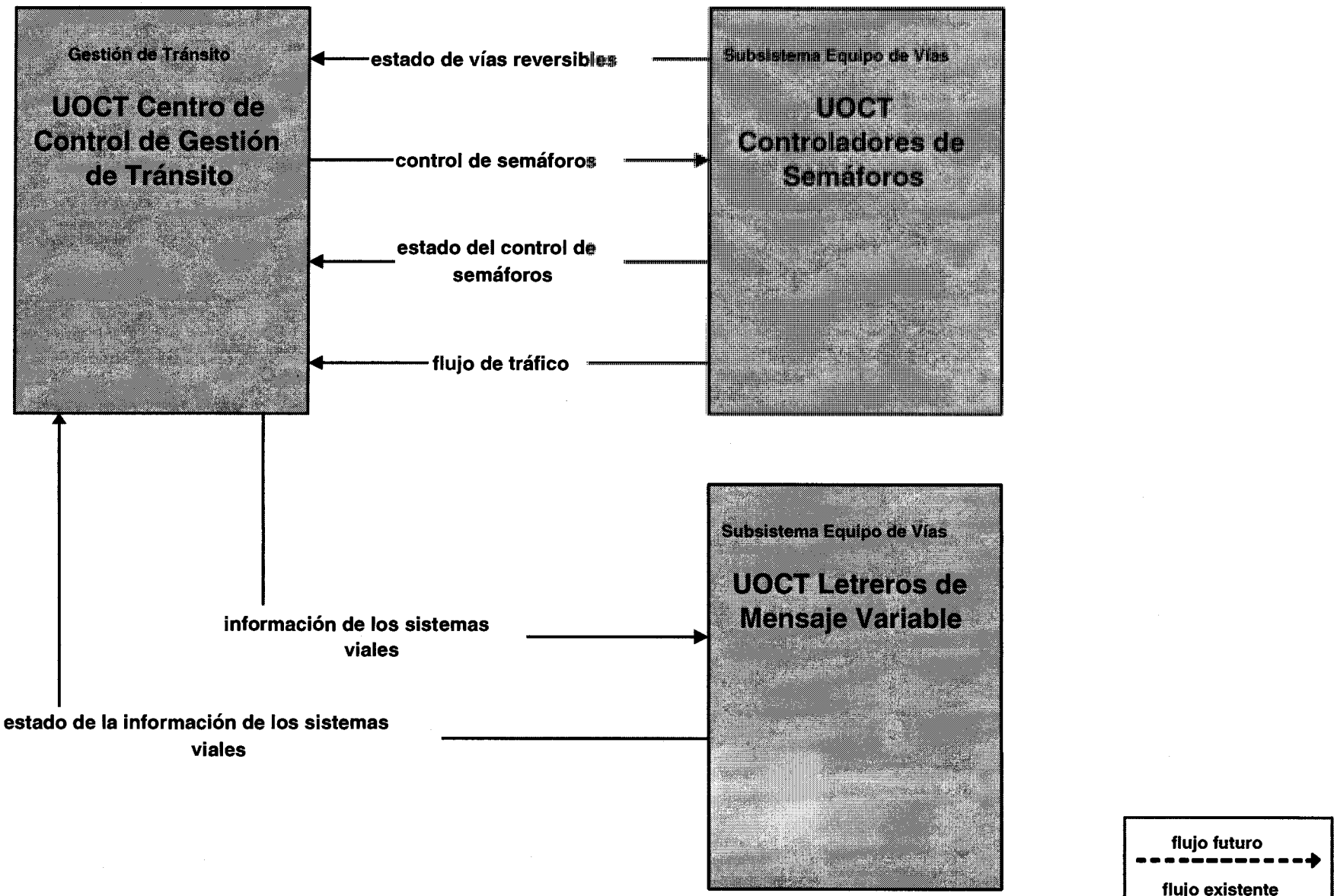




Sistemas de información al conductor de vehículos comerciales, ej., Noticel

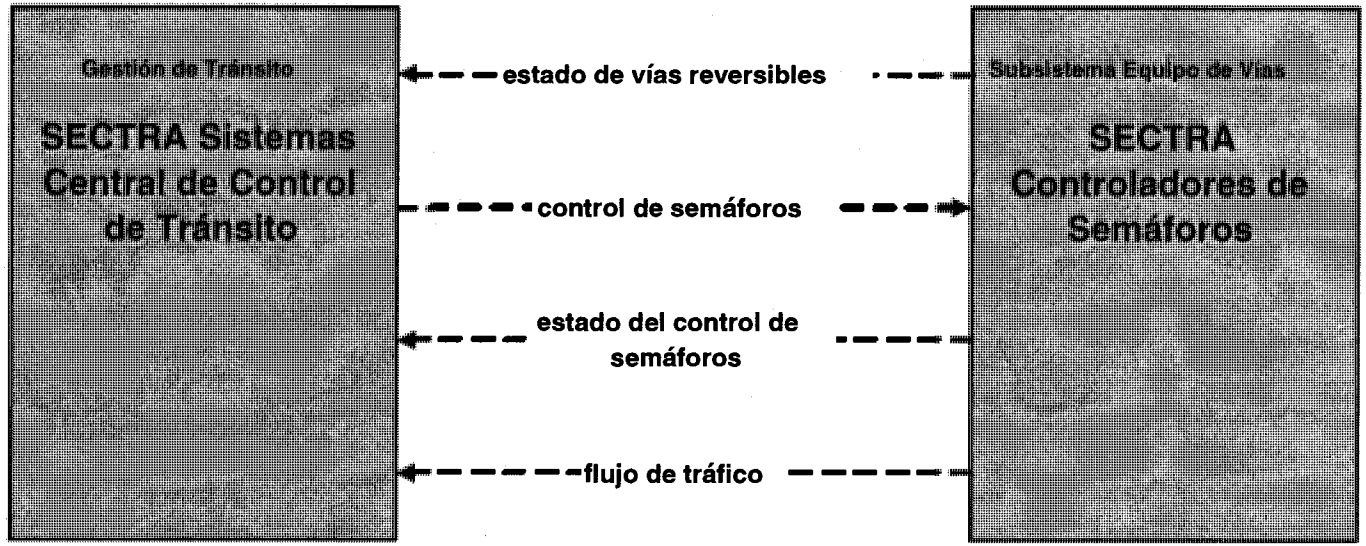
ATMS 18 - Gestión de Vías Reversibles

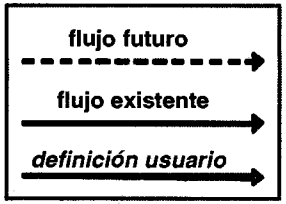
UOCT



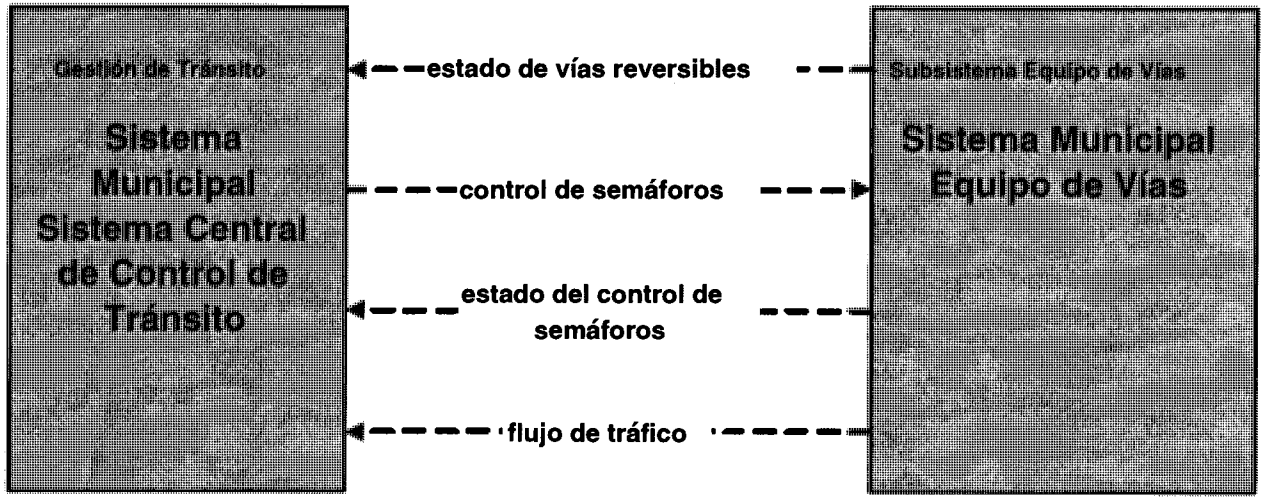
ATMS 18 - Gestión de Vías Reversibles - Reversible Lane Management

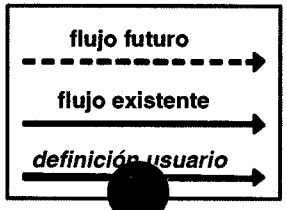
SECTRA





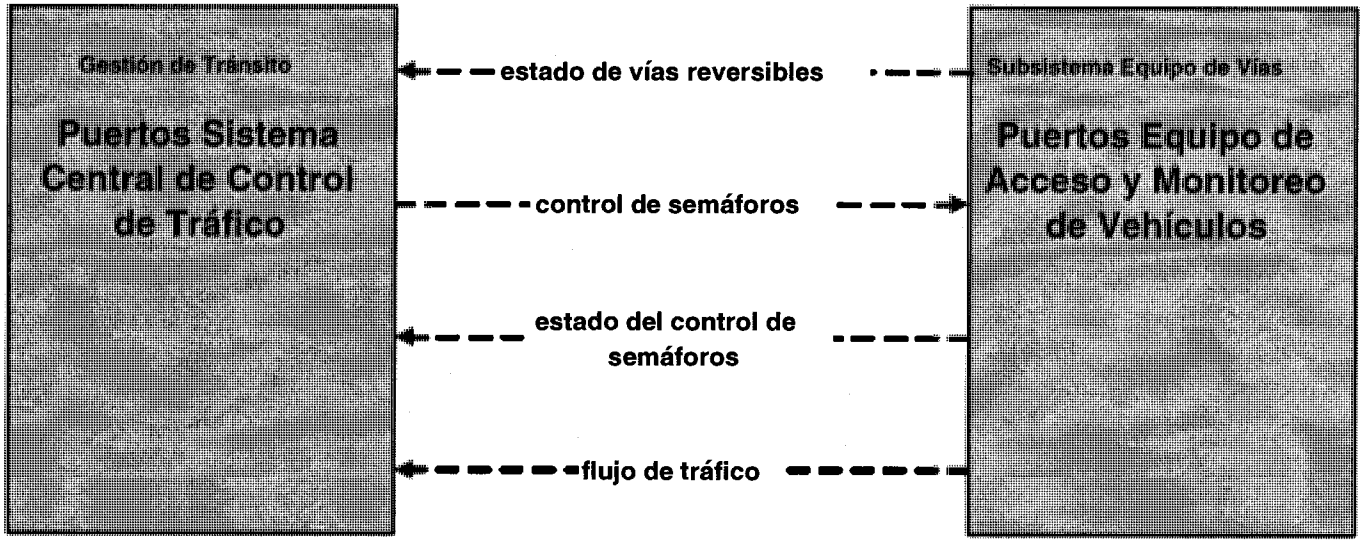
ATMS 18 - Gestión de Vías Reversibles
Sistema Municipal Central de Tránsito

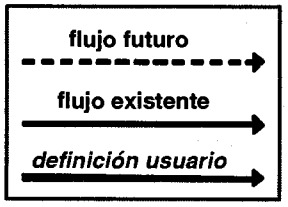




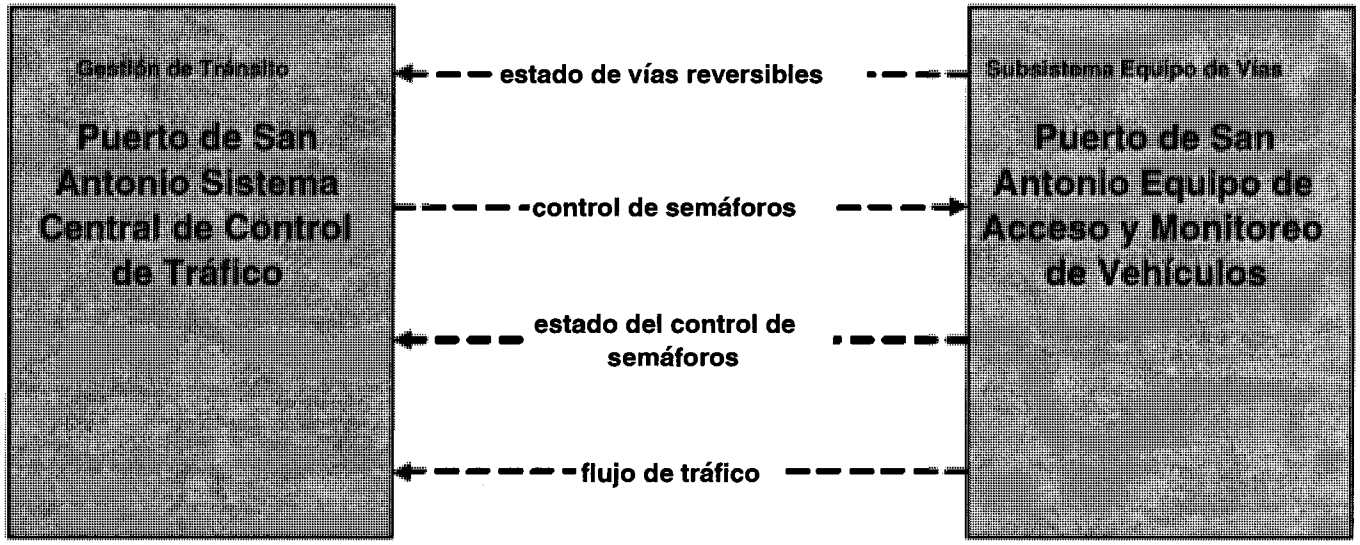
ATMS 18 - Gestión de Vías Reversibles

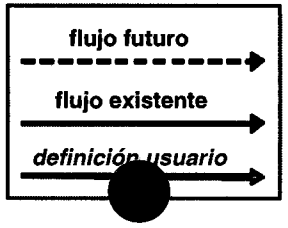
Puertos



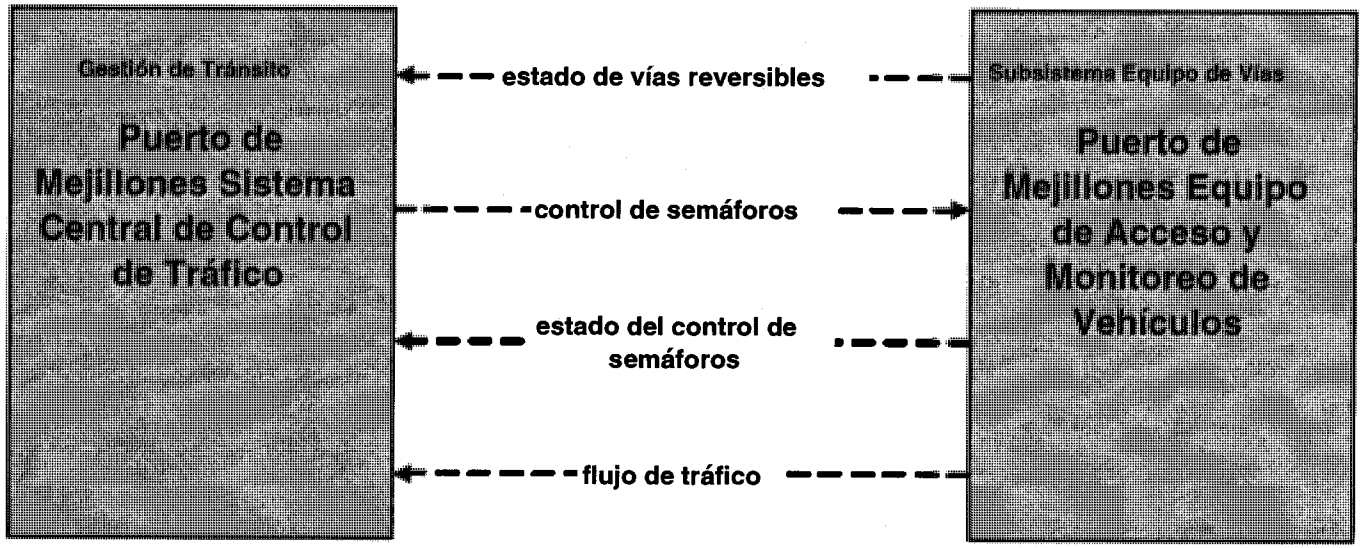


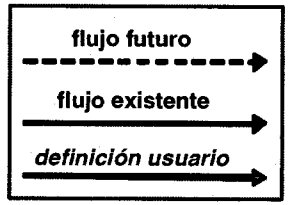
ATMS 18 - Gestión de Vías Reversibles
Puerto de San Antonio





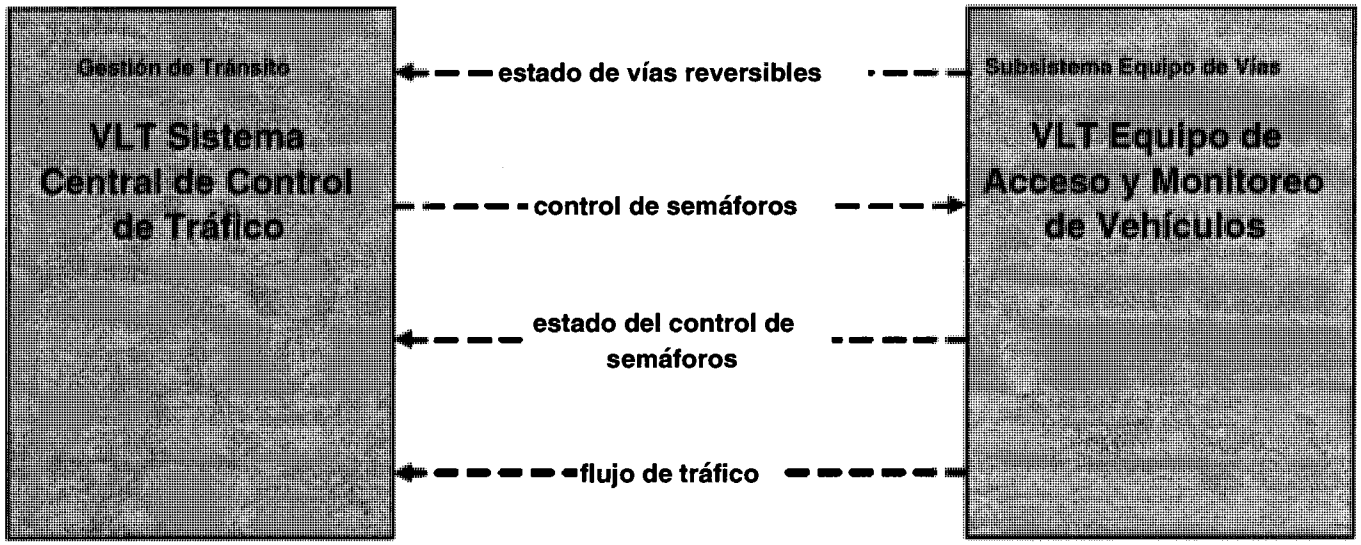
ATMS 18 - Gestión de Vías Reversibles
Puerto de Mejillones

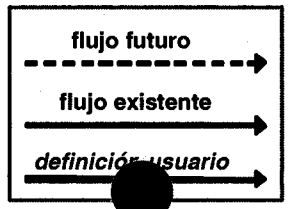




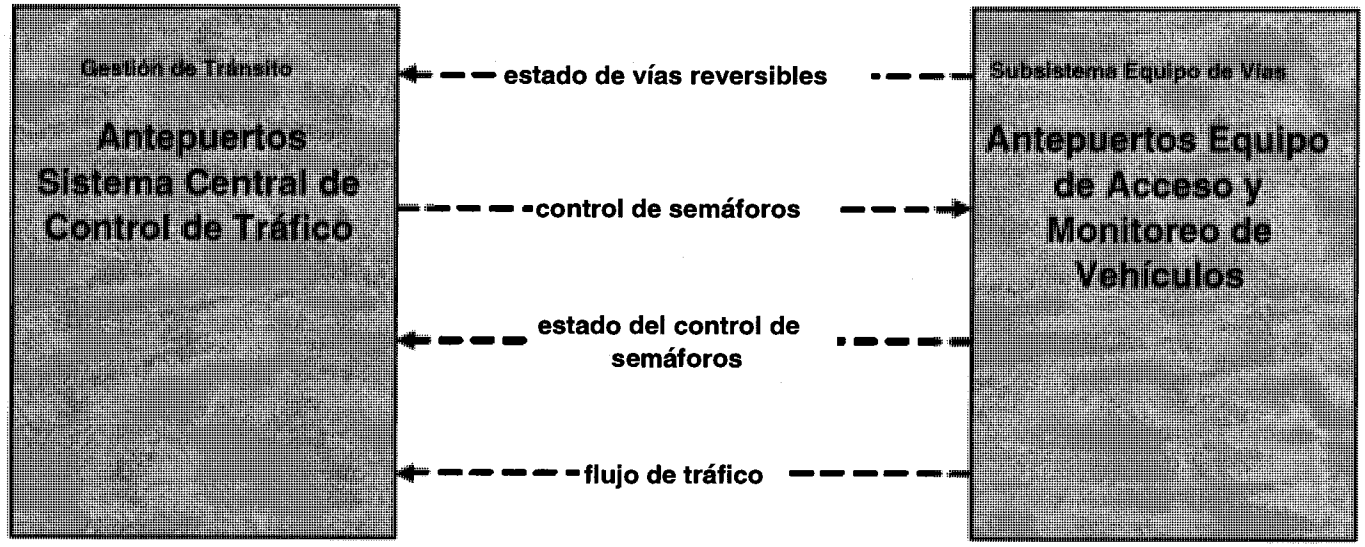
ATMS 18 - Gestión de Vías Reversibles

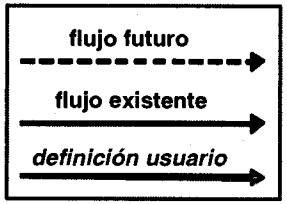
VLT





ATMS 18 - Gestión de Vías Reversibles
Antepuertos





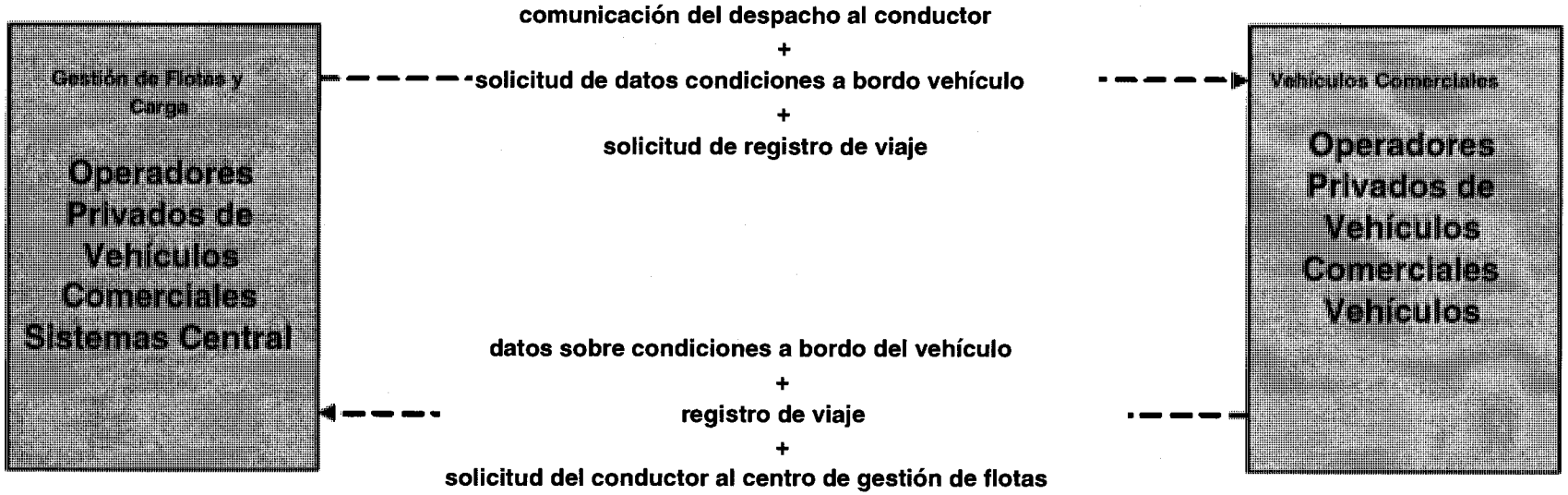
Task 7, Appendix L - Arquitectura Nacional ITS de Chile

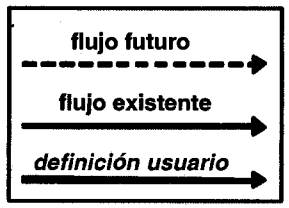
Paquetes de Servicios ITS

Gestión de Vehículos Comerciales

CVO01 - Gestión de Flotas

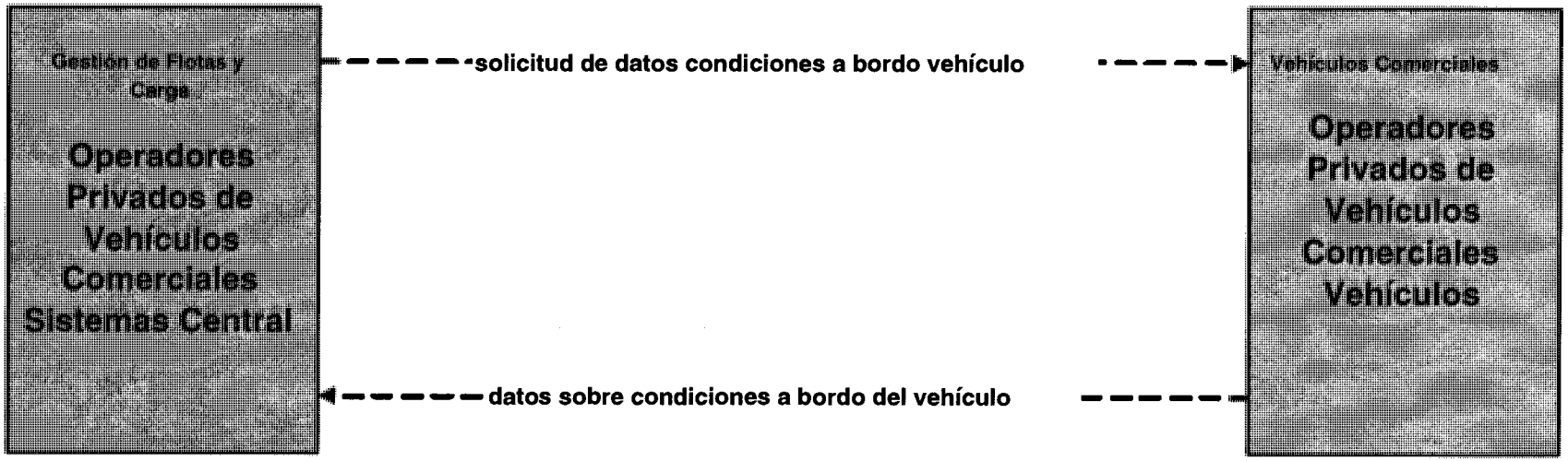
Operadores Privados de Vehículos Comerciales



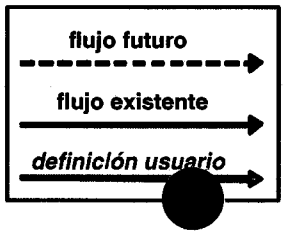


CVO02 - Gestión de Cargas

Operadores Privados de Vehículos Comerciales

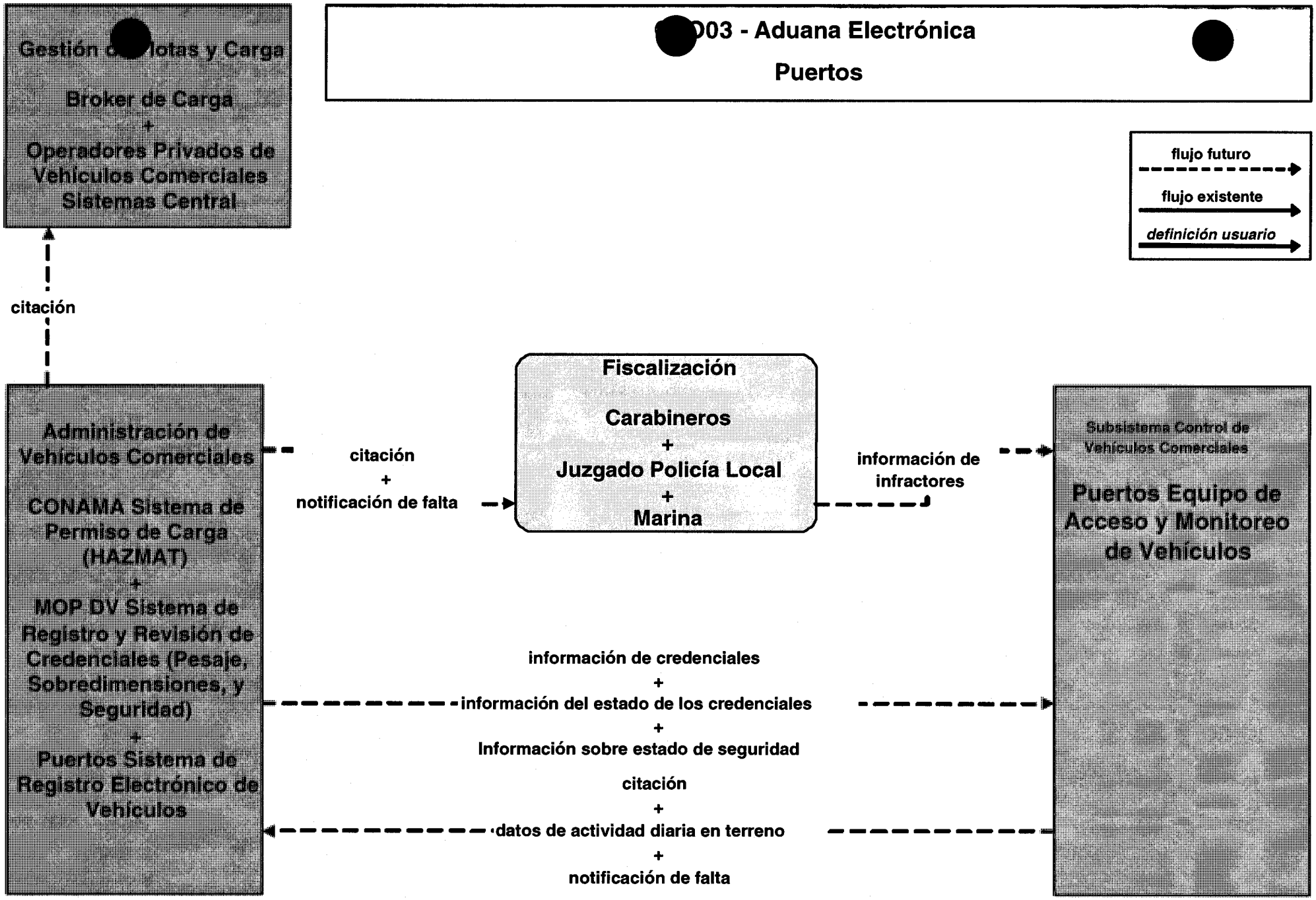


Datos sobre condiciones a bordo incluye información de carga



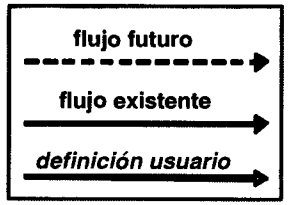
003 - Aduana Electrónica

Puertos



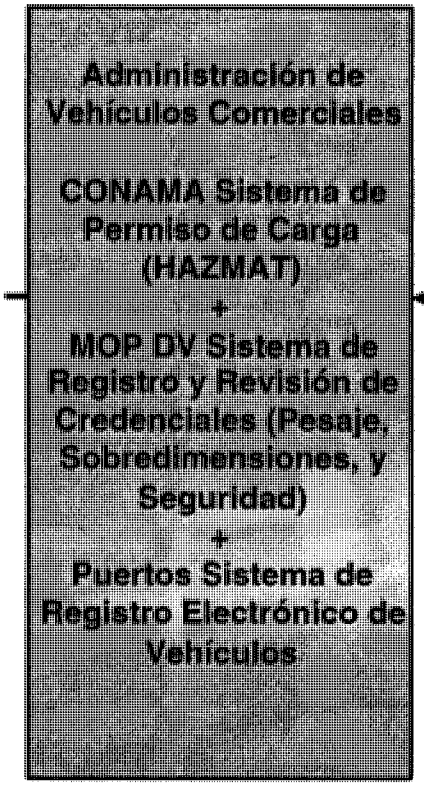
CVO03 - Aduana Electrónica

Puertos

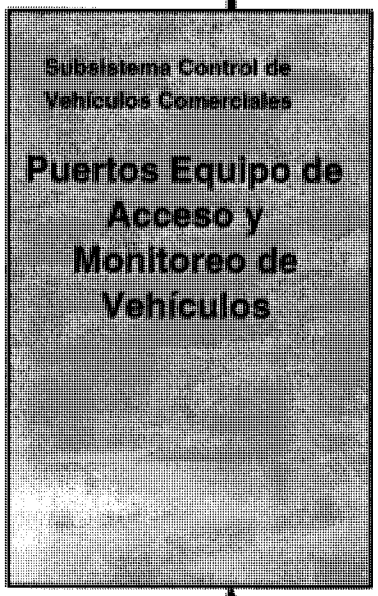


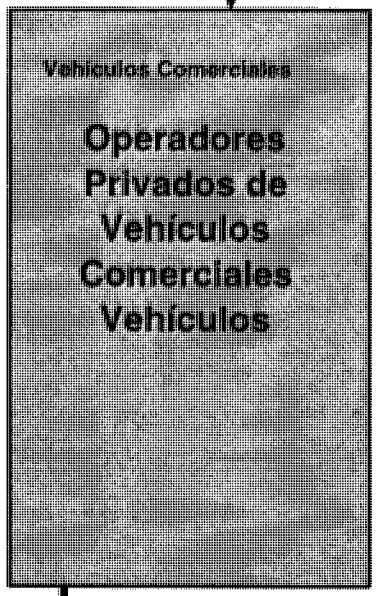
estado del despacho aduanero fronterizo + información doméstica de transporte

declaración de información + información doméstica de transporte



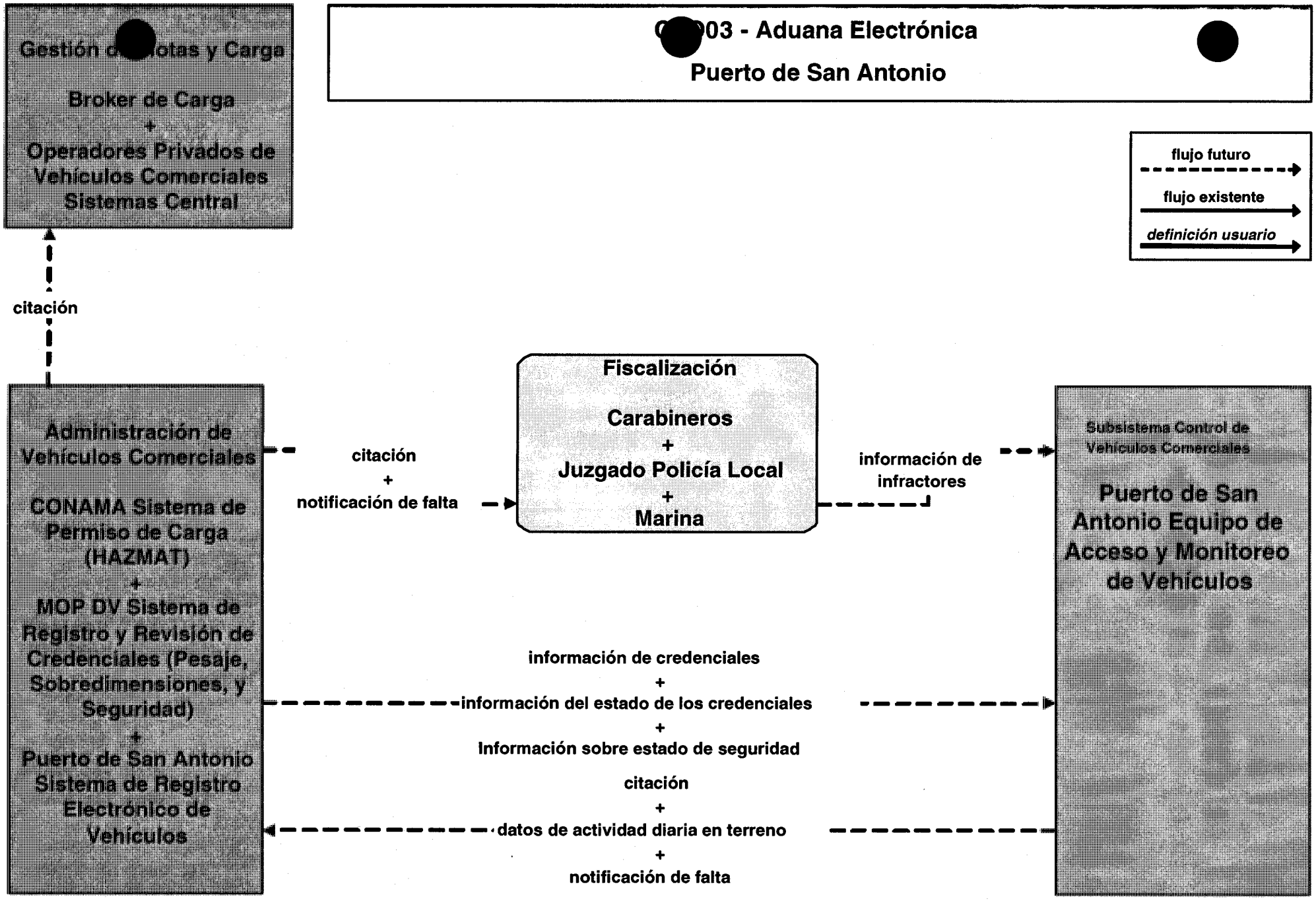
detención/pasar por alto + listado de eventos de revisión + solicitud de filtrado electrónico





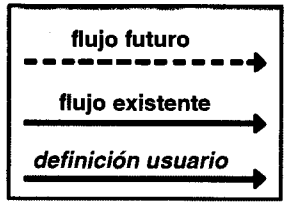
información del tag + listado de eventos de revisión

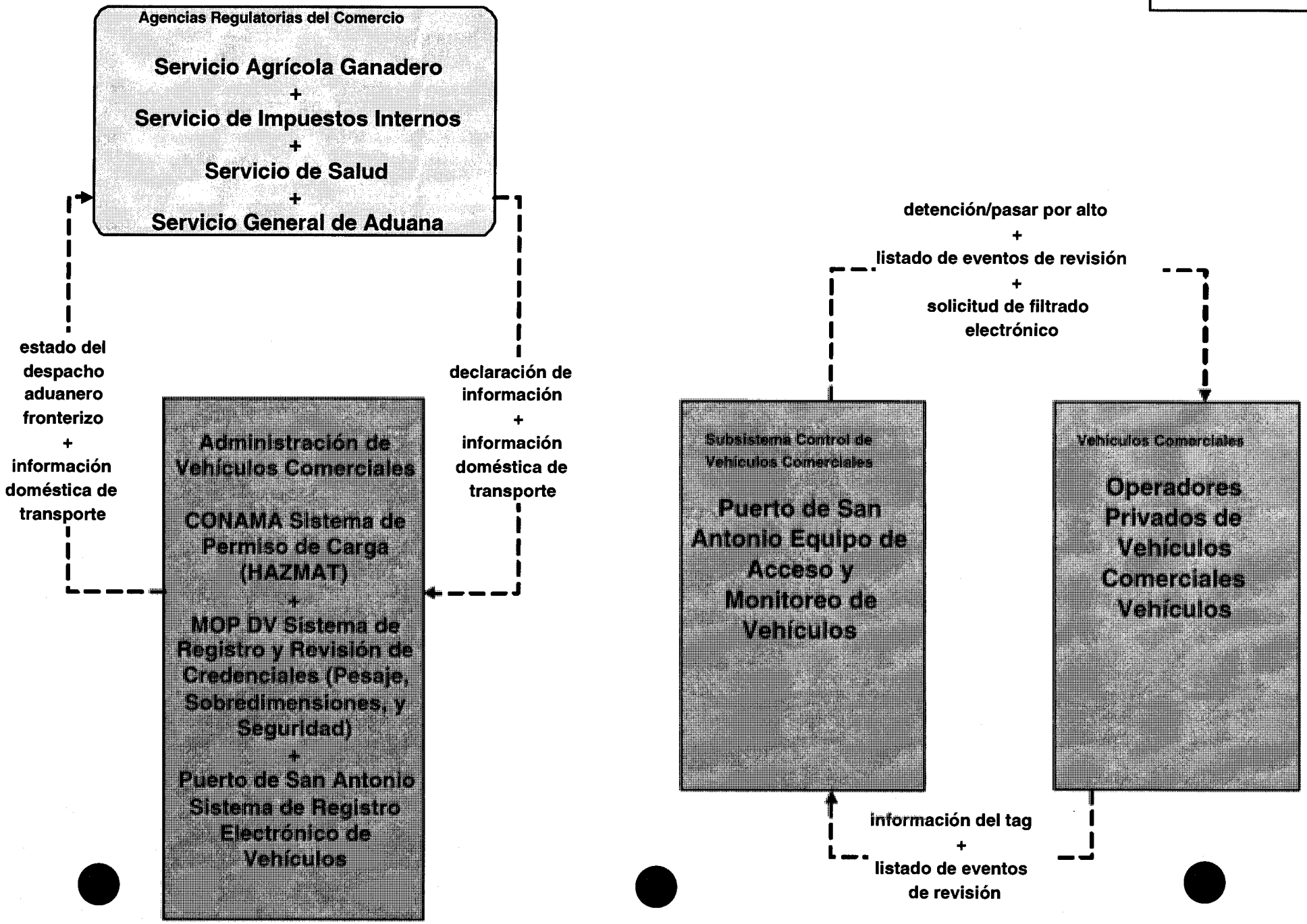
C[illegible]03 - Aduana Electrónica
Puerto de San Antonio



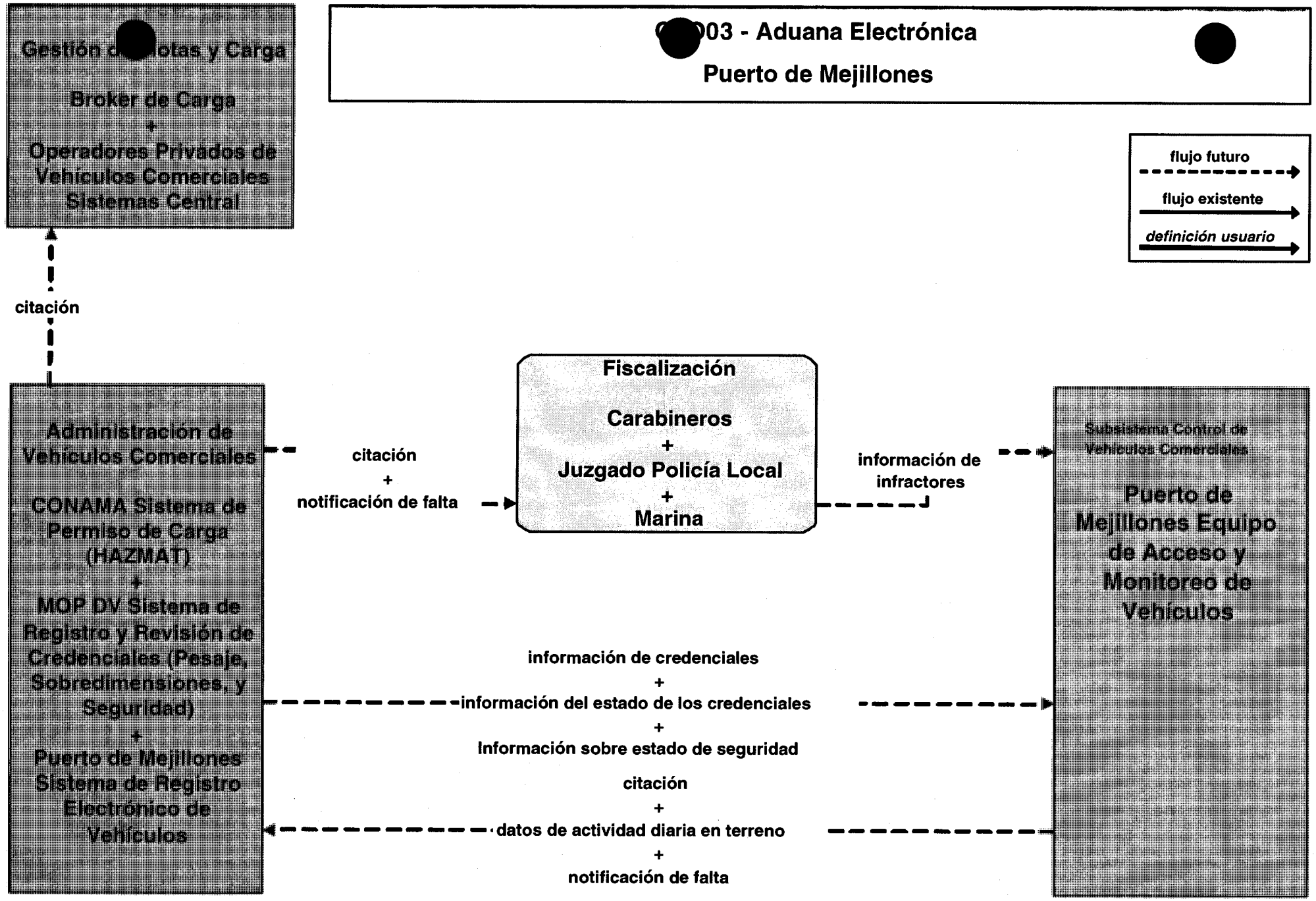
CVO03 - Aduana Electrónica

Puerto de San Antonio



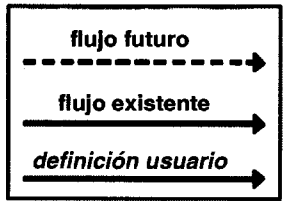


03 - Aduana Electrónica
Puerto de Mejillones



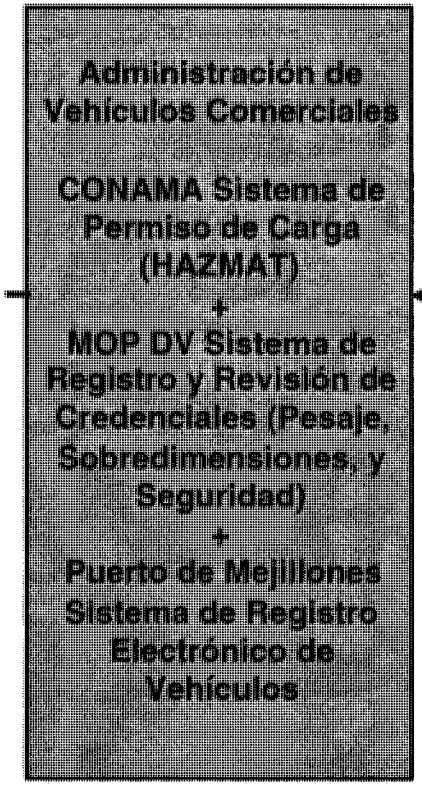
CVO03 - Aduana Electrónica

Puerto de Mejillones

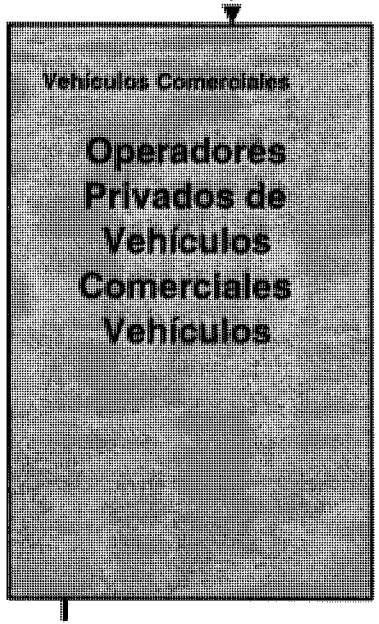


estado del despacho aduanero fronterizo + información doméstica de transporte

declaración de información + información doméstica de transporte



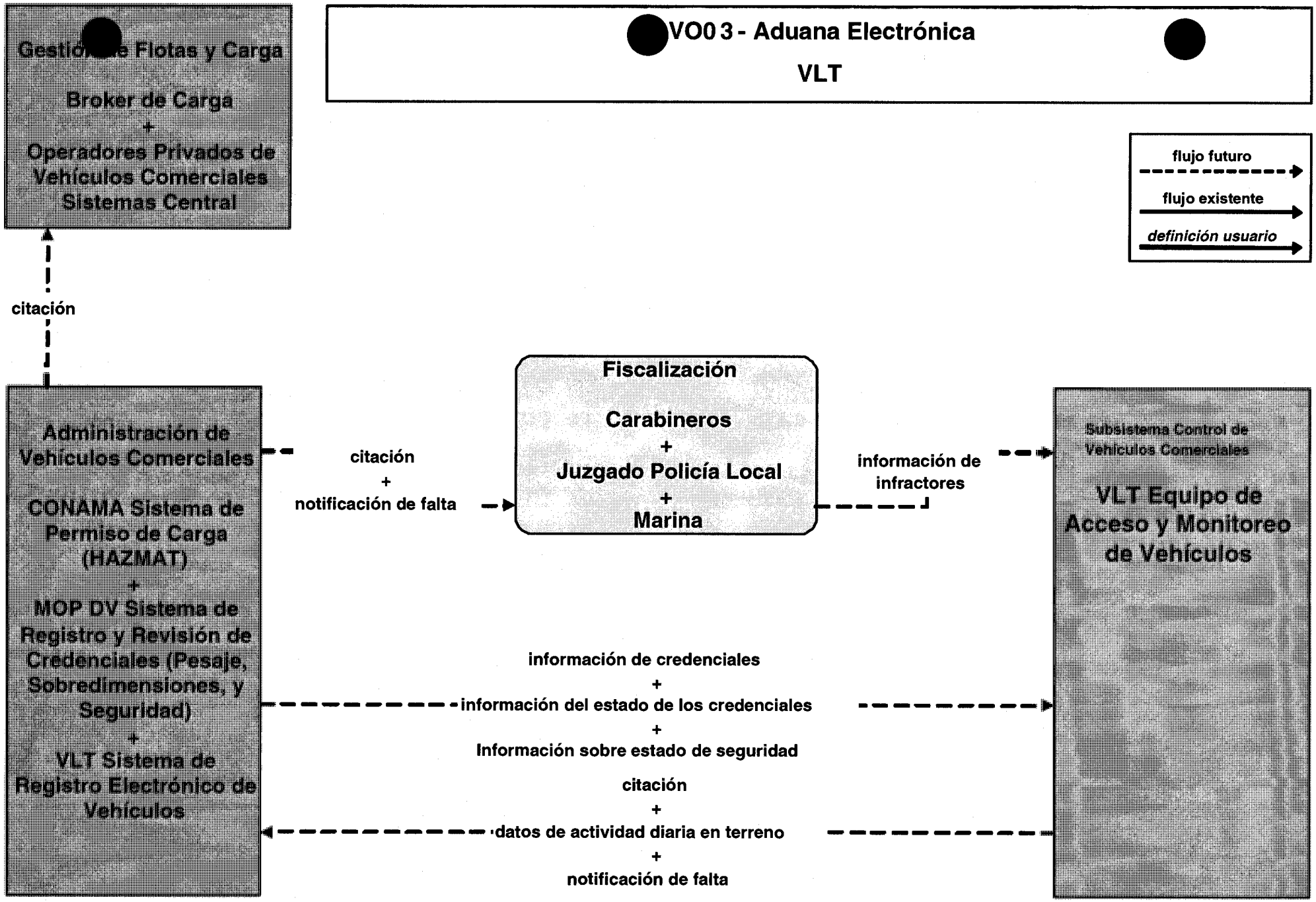
detención/pasar por alto + listado de eventos de revisión + solicitud de filtrado electrónico



información del tag + listado de eventos de revisión

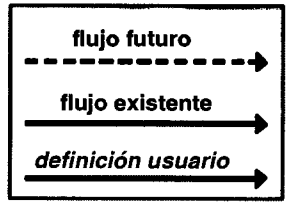
VO0 3 - Aduana Electrónica

VLT



CVO03 - Aduana Electrónica

VLT



Agencias Regulatorias del Comercio

Servicio Agrícola Ganadero
+
Servicio de Impuestos Internos
+
Servicio de Salud
+
Servicio General de Aduana

estado del despacho aduanero fronterizo
+
información doméstica de transporte

declaración de información
+
información doméstica de transporte

Administración de Vehículos Comerciales

CONAMA Sistema de Permiso de Carga (HAZMAT)
+
MOP DV Sistema de Registro y Revisión de Credenciales (Pesaje, Sobredimensiones, y Seguridad)
+
VLT Sistema de Registro Electrónico de Vehículos

detención/pasar por alto
+
listado de eventos de revisión
+
solicitud de filtrado electrónico

Subsistema Control de Vehículos Comerciales

VLT Equipo de Acceso y Monitoreo de Vehículos

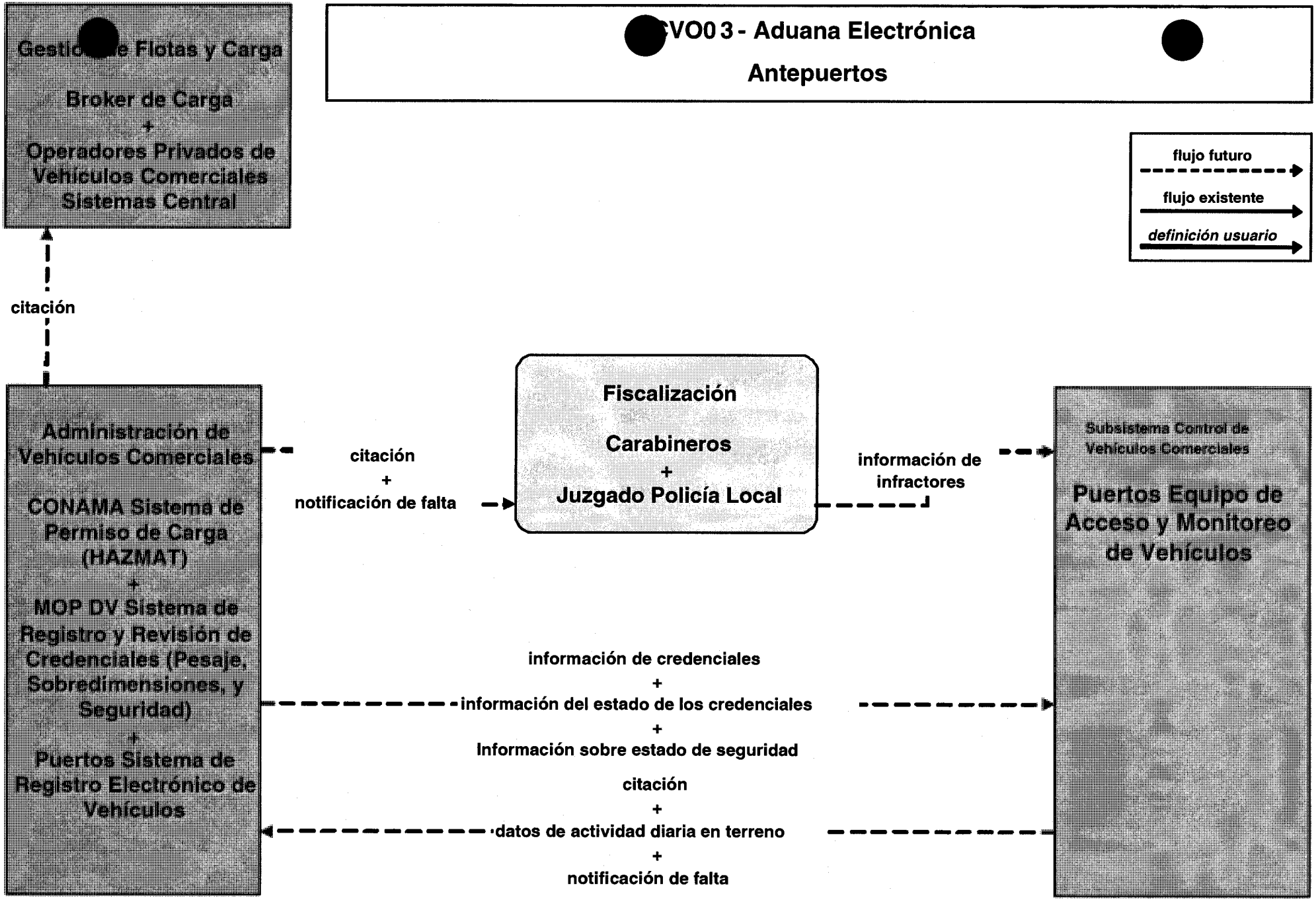
Vehículos Comerciales

Operadores Privados de Vehículos Comerciales Vehículos

información del tag
+
listado de eventos de revisión

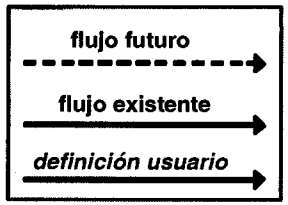
VO03 - Aduana Electrónica

Antepuertos



CVO03 - Aduana Electrónica

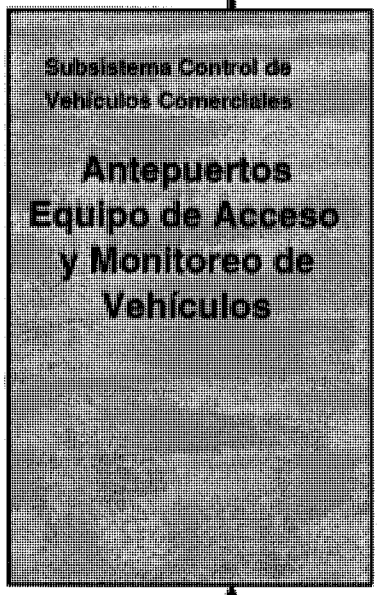
Antepuertos

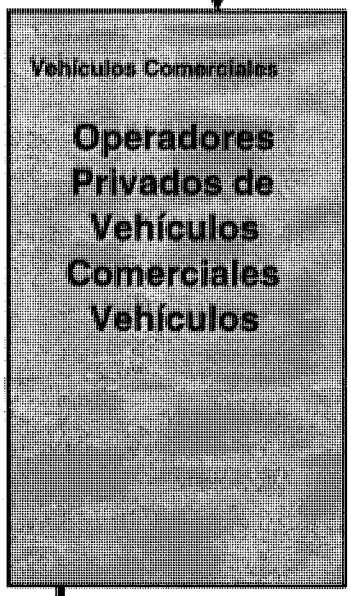


estado del despacho aduanero fronterizo + información doméstica de transporte

declaración de información + información doméstica de transporte

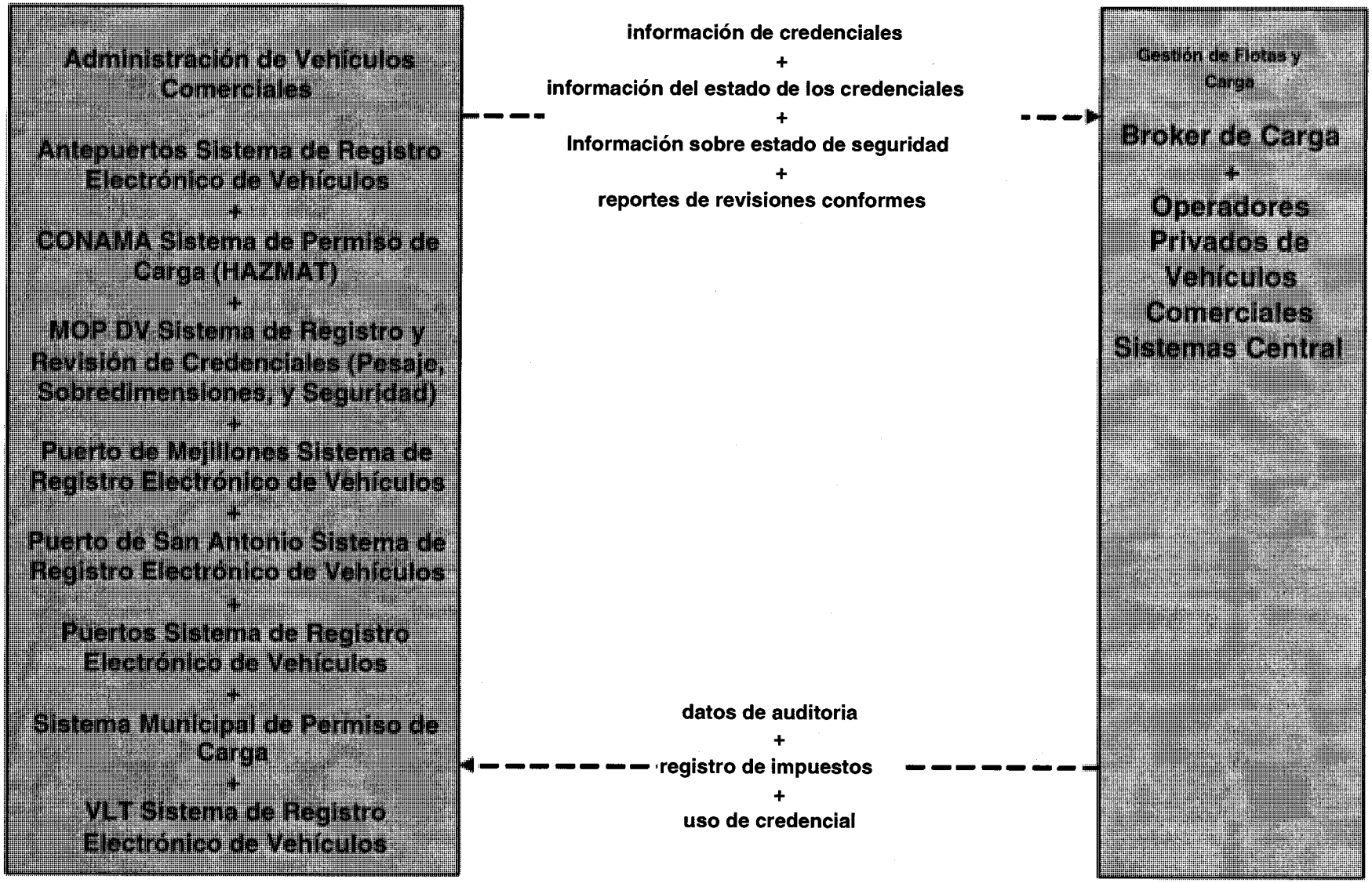
detención/pasar por alto + listado de eventos de revisión + solicitud de filtrado electrónico





información del tag + listado de eventos de revisión

CVO04 - Proceso Administrativo de Vehículos Comerciales

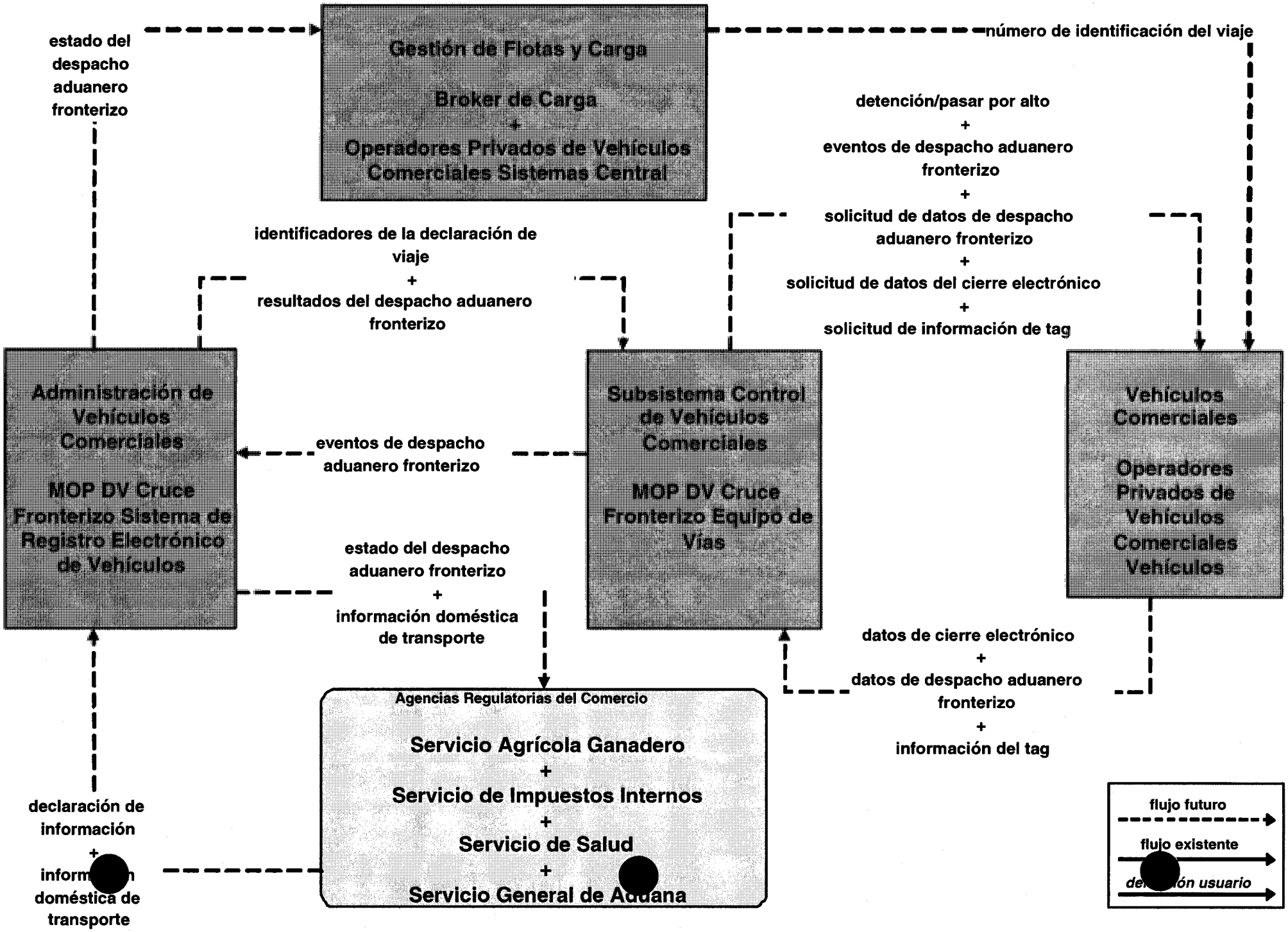


flujo futuro

flujo existente

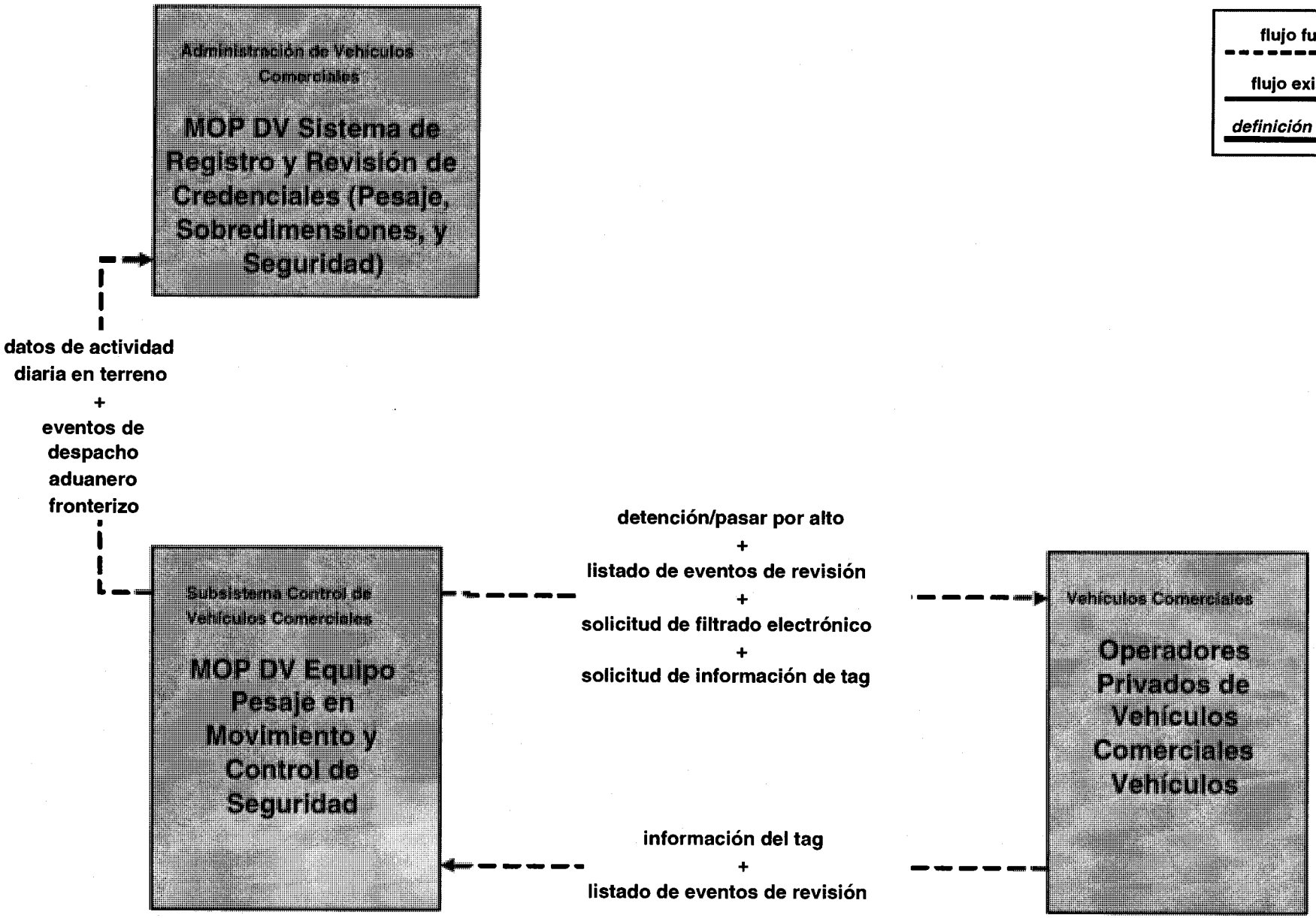
definición usuario

CVO05 - Aduana Electrónica de Paso Fronterizo



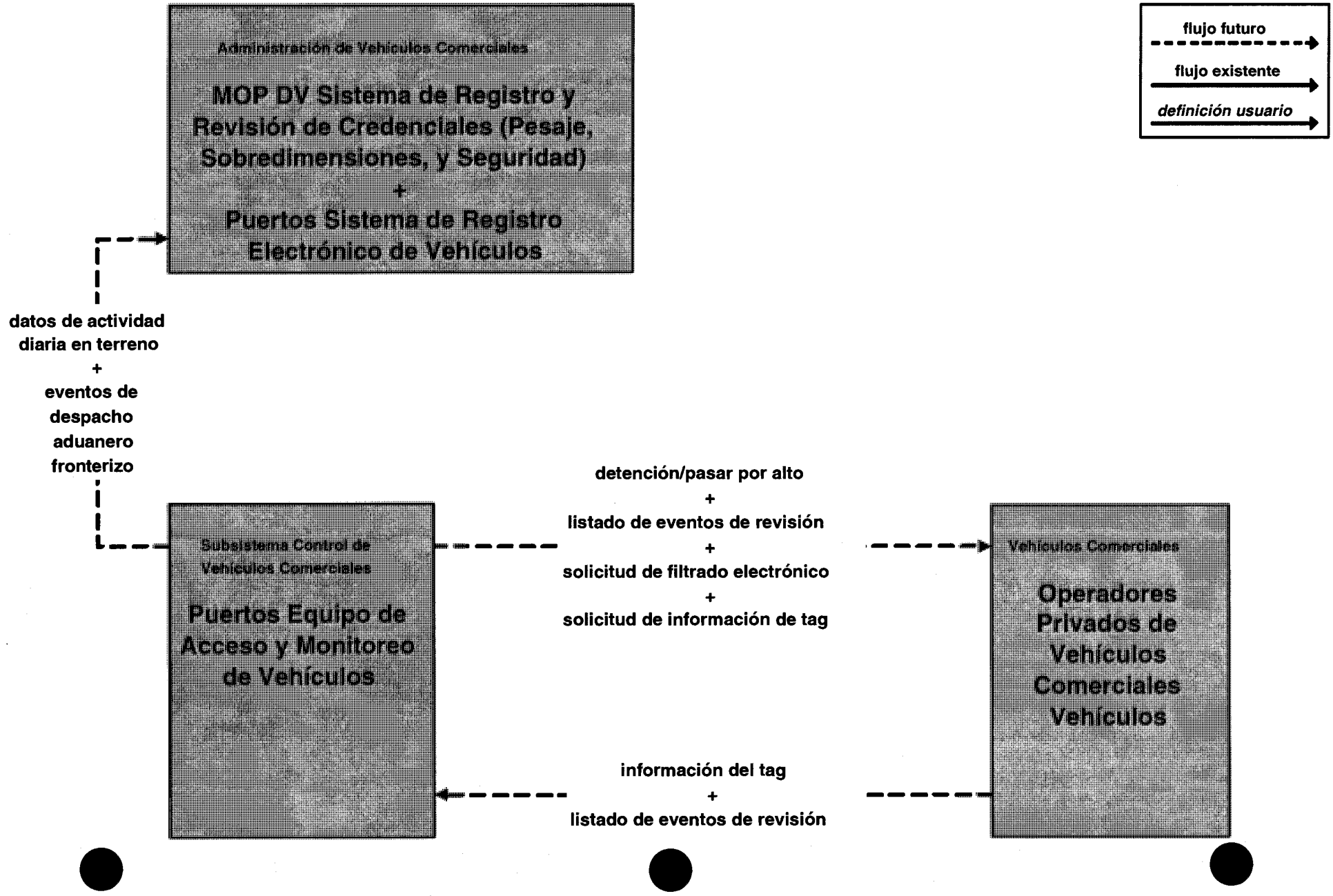
CVO06 - Pesaje en Movimiento

MOP DV



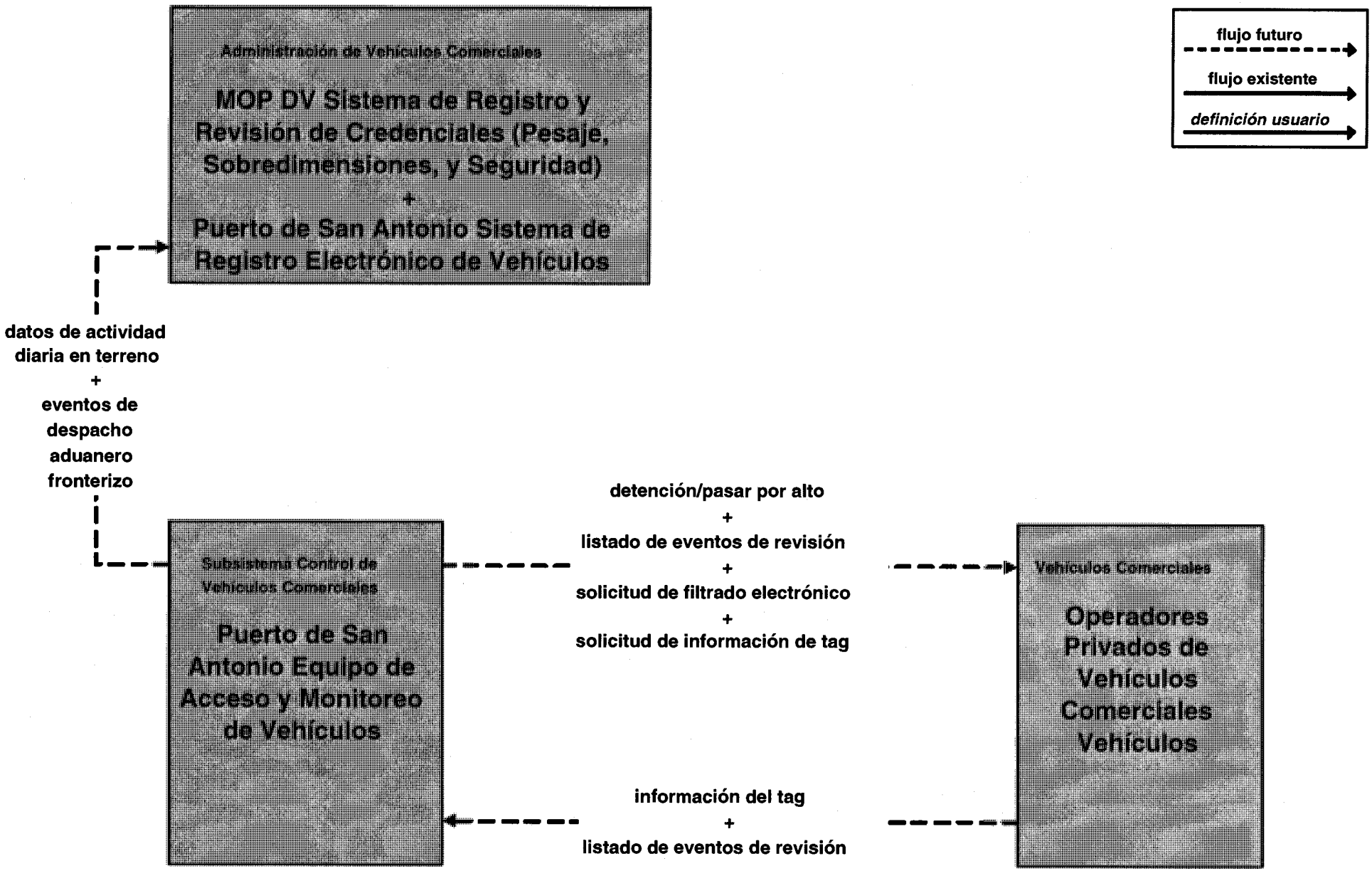
CVO06 - Peso en Movimiento

Puertos



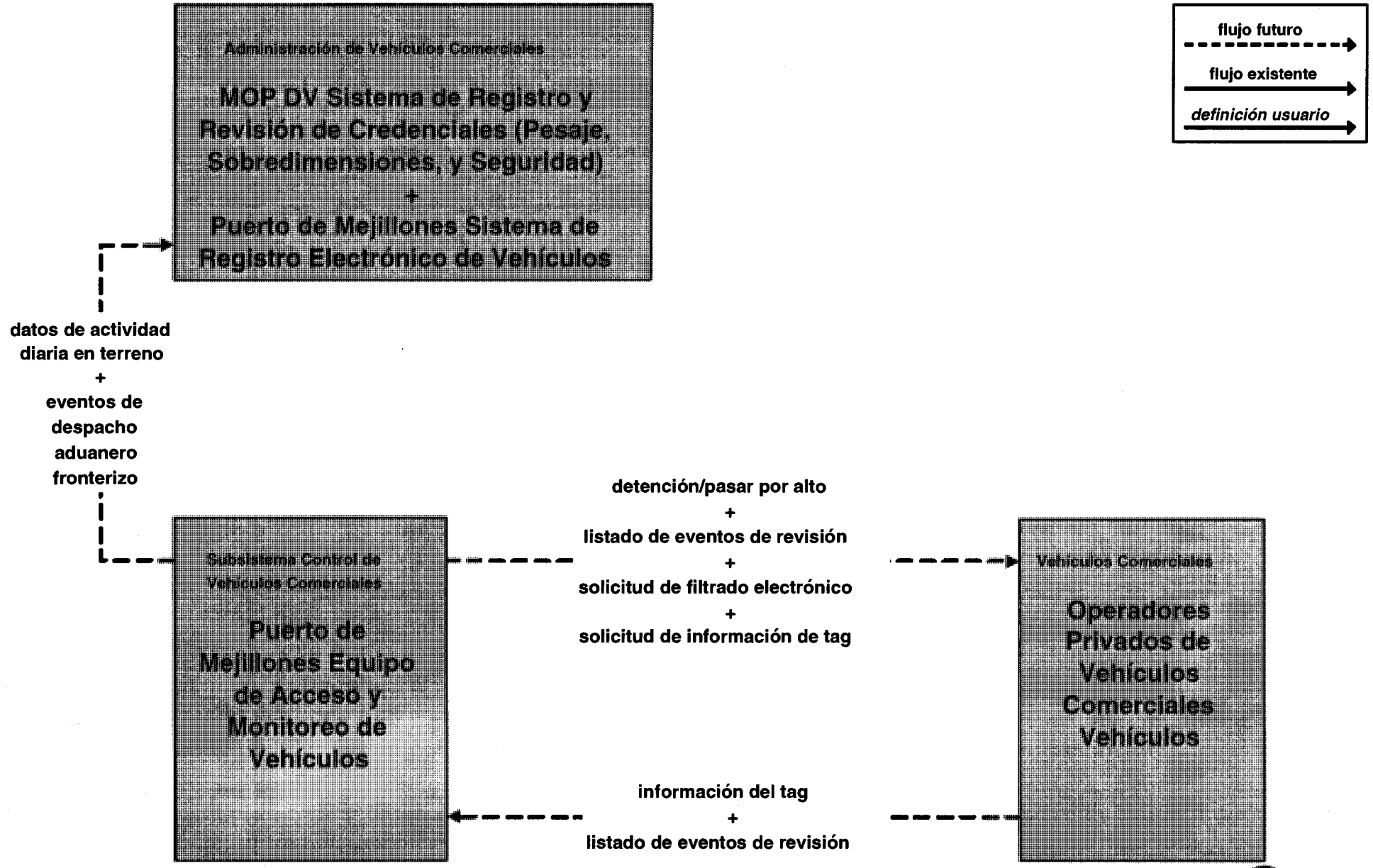
CVO06 - Peso en Movimiento

Puerto de San Antonio



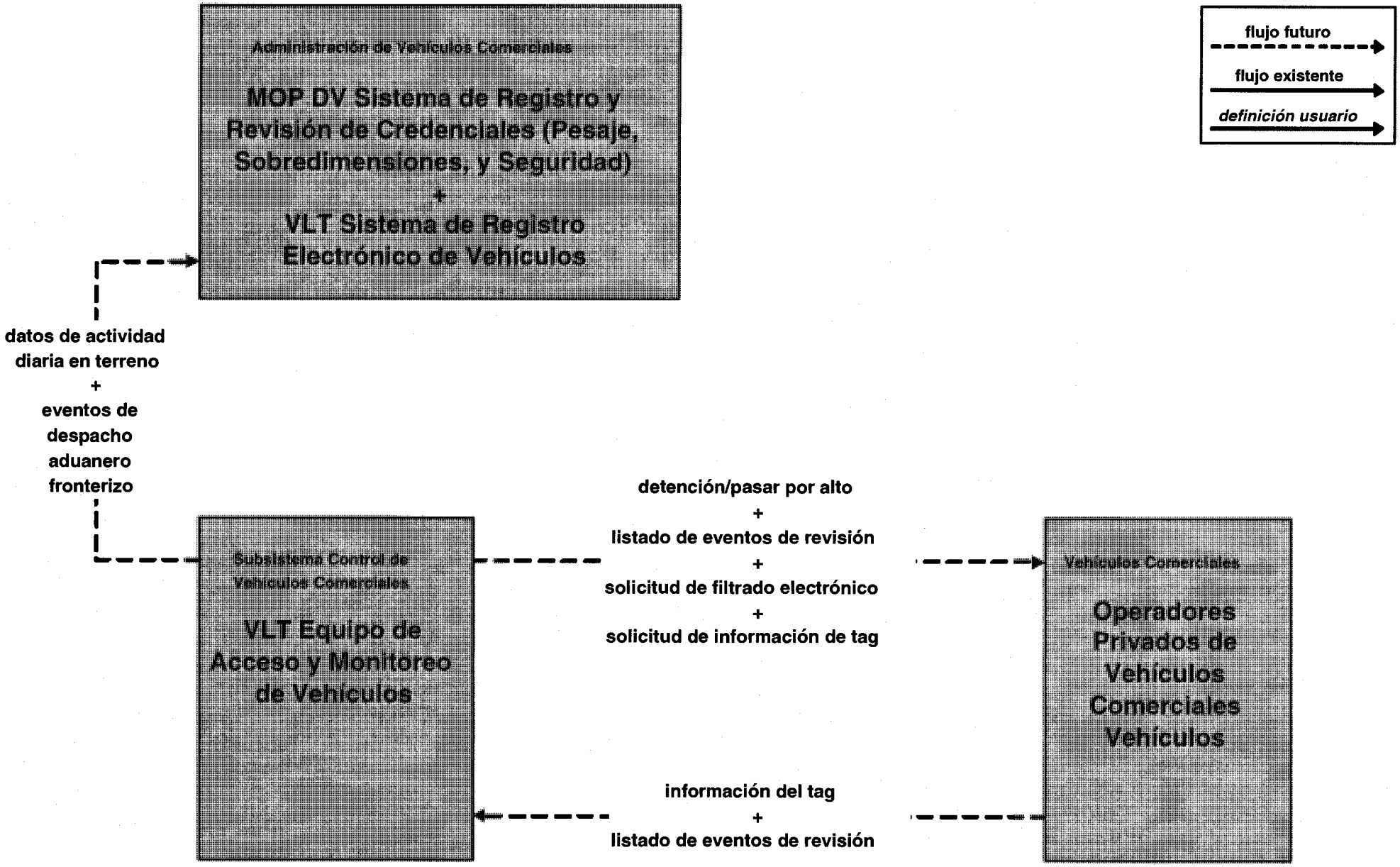
CVO06 - Peso en Movimiento

Puerto de Mejillones



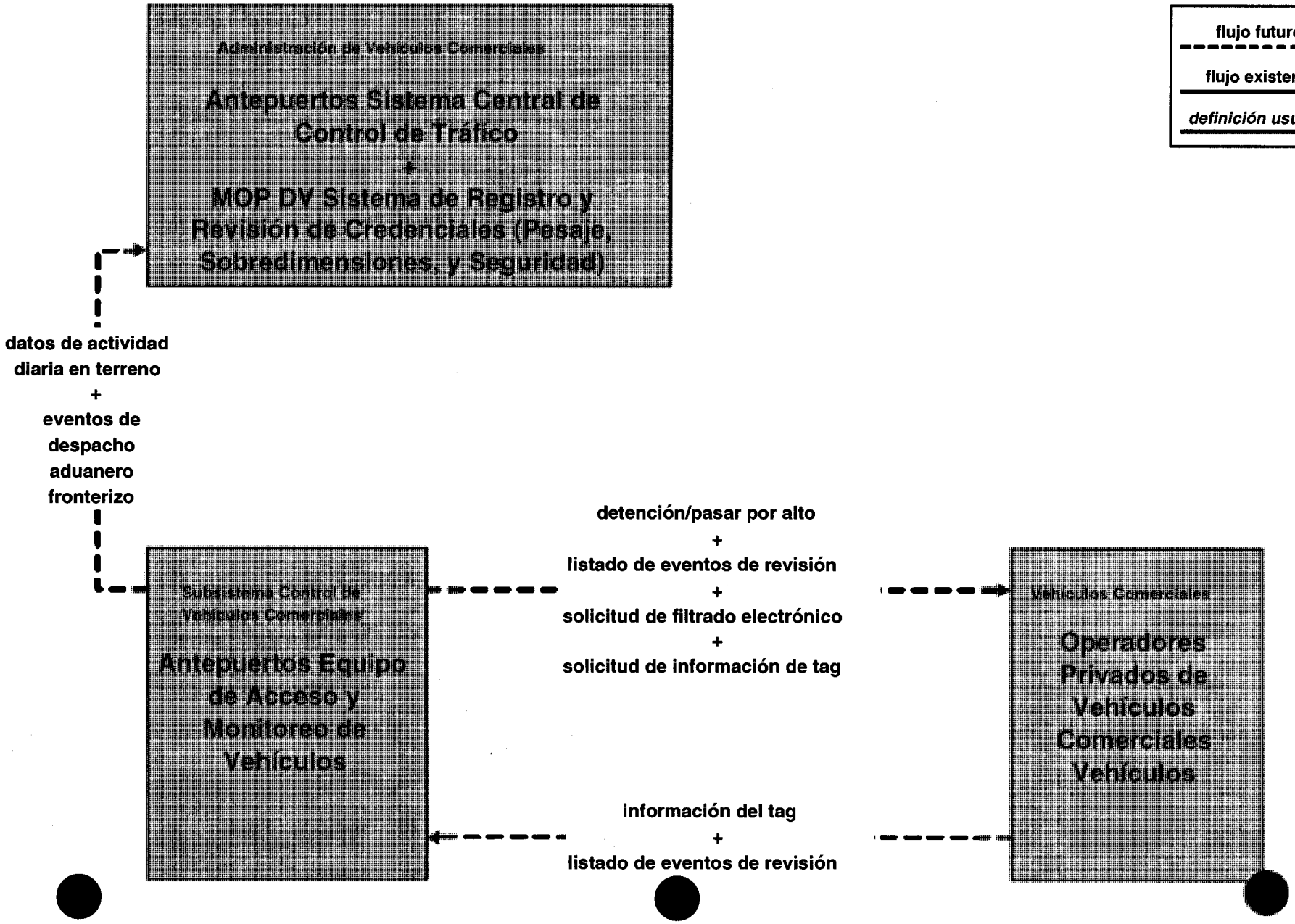
CVO06 - Peso en Movimiento

VLT

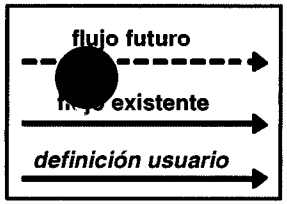


CVO06 - Peso en Movimiento

Antepuertos



CVO07 - Seguridad de Vehículos Comerciales



citación
+
informe de accidente
+
informe de inspección de seguridad

Gestión de Flotas y Carga

Broker de Carga
+
Operadores Privados de Vehículos Comerciales Sistemas Central

detención/pasar por alto
+
registro de inspecciones de seguridad
+
solicitud de informe de inspección de seguridad

citación
+
datos de actividad diaria en terreno
+
informe de accidente
+
informe de inspección de seguridad
+
notificación de falta

Administración de Vehículos Comerciales

MOP DV Sistema de Registro y Revisión de Credenciales (Pesaje, Sobredimensiones, y Seguridad)

Subsistema Control de Vehículos Comerciales

Antepuertos Equipo de Acceso y Monitoreo de Vehículos
+
MOP DV Cruce Fronterizo Equipo de Vías
+
MOP DV Equipo Pesaje en Movimiento y Control de Seguridad
+
Puerto de Mejillones Equipo de Acceso y Monitoreo de Vehículos
+
Puerto de San Antonio Equipo de Acceso y Monitoreo de Vehículos
+
Puertos Equipo de Acceso y Monitoreo de Vehículos
+
VLT Equipo de Acceso y Monitoreo de Vehículos

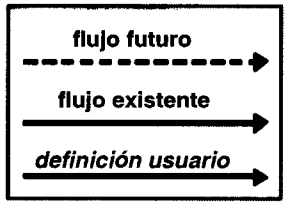
Vehículos Comerciales

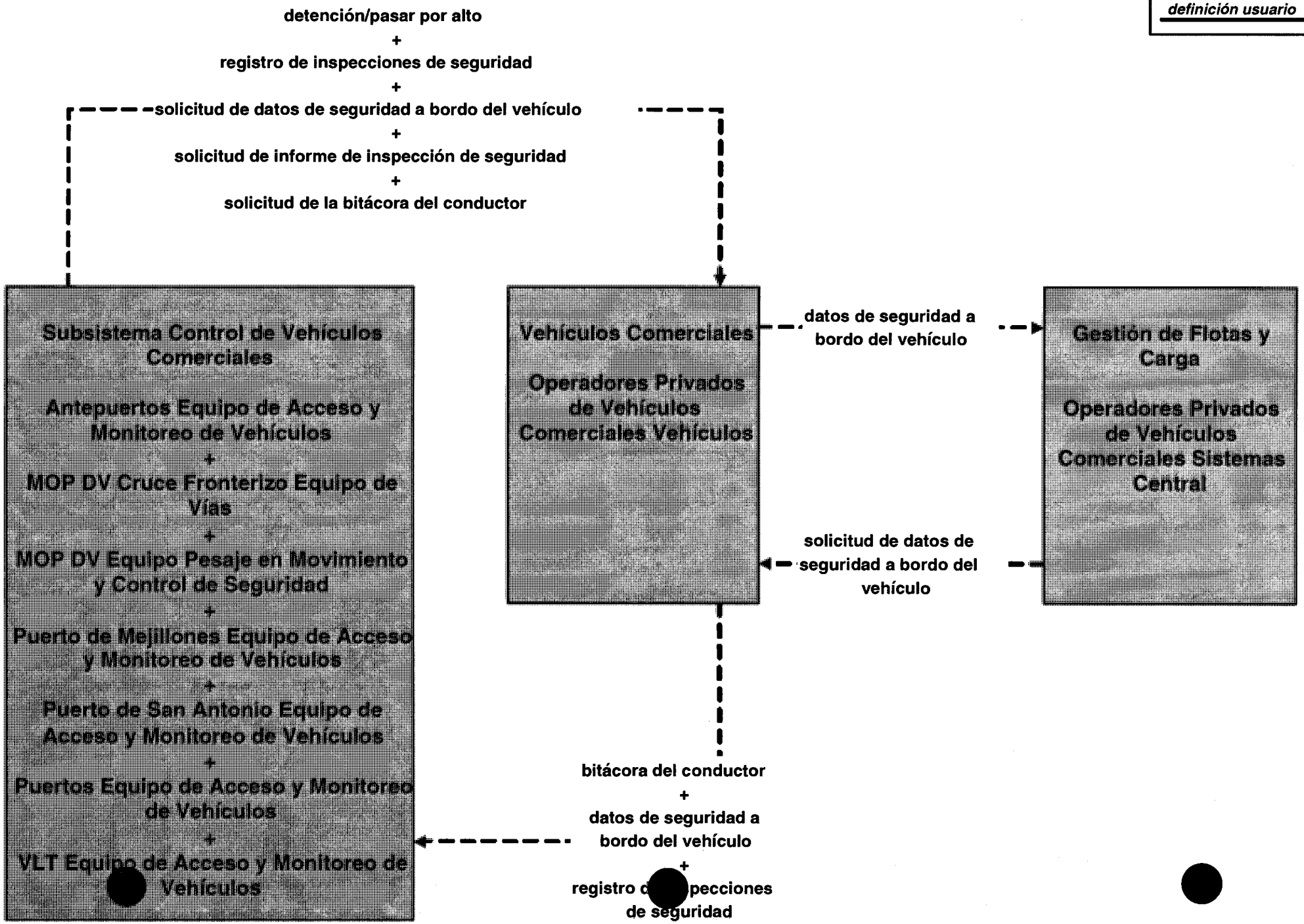
Operadores Privados de Vehículos Comerciales Vehículos

registro de inspecciones de seguridad

Información sobre estado de seguridad
+
informe de inspección de seguridad

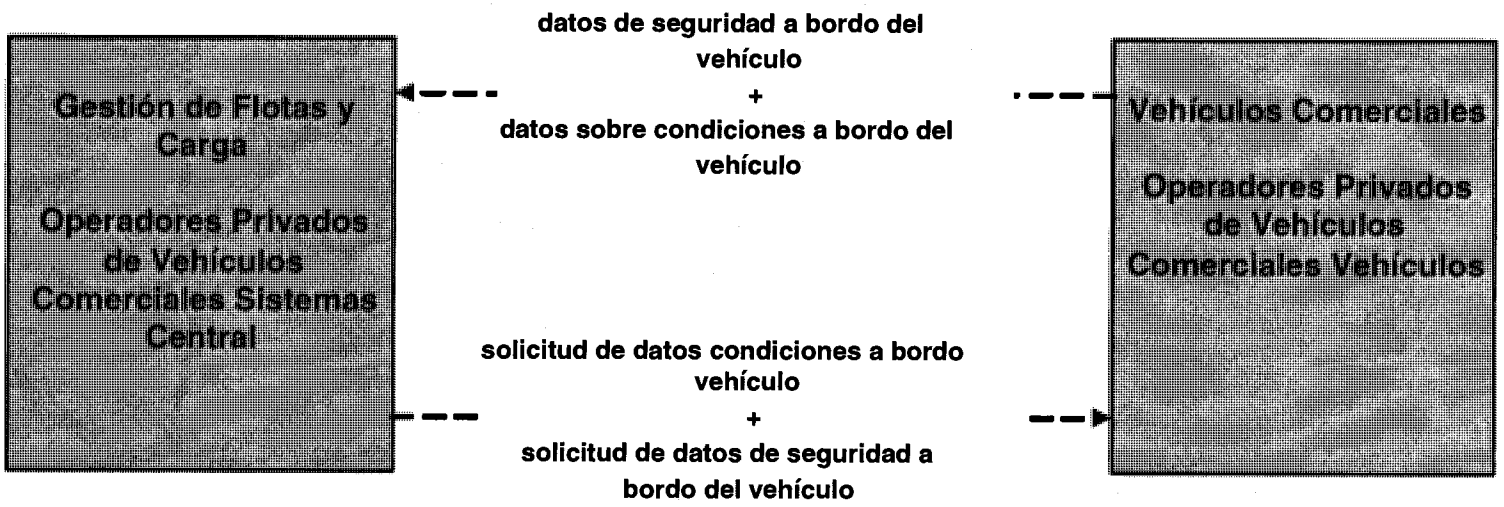
CVO08 - Seguridad de Carga





CVO09 - Mantenimiento de Flotas

Operadores Privadors de Vehículos Comerciales



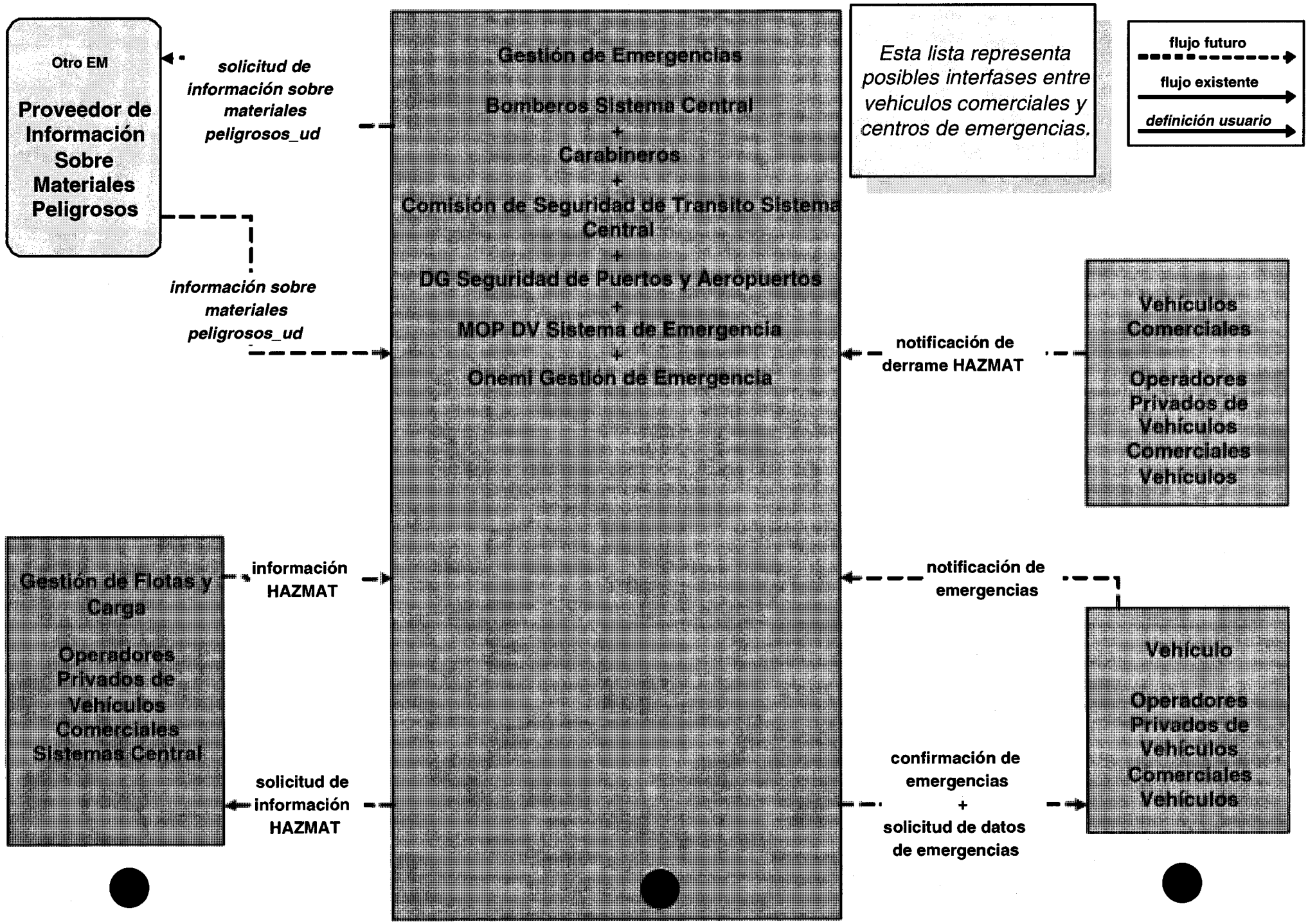
flujo futuro

flujo existente

definición usuario

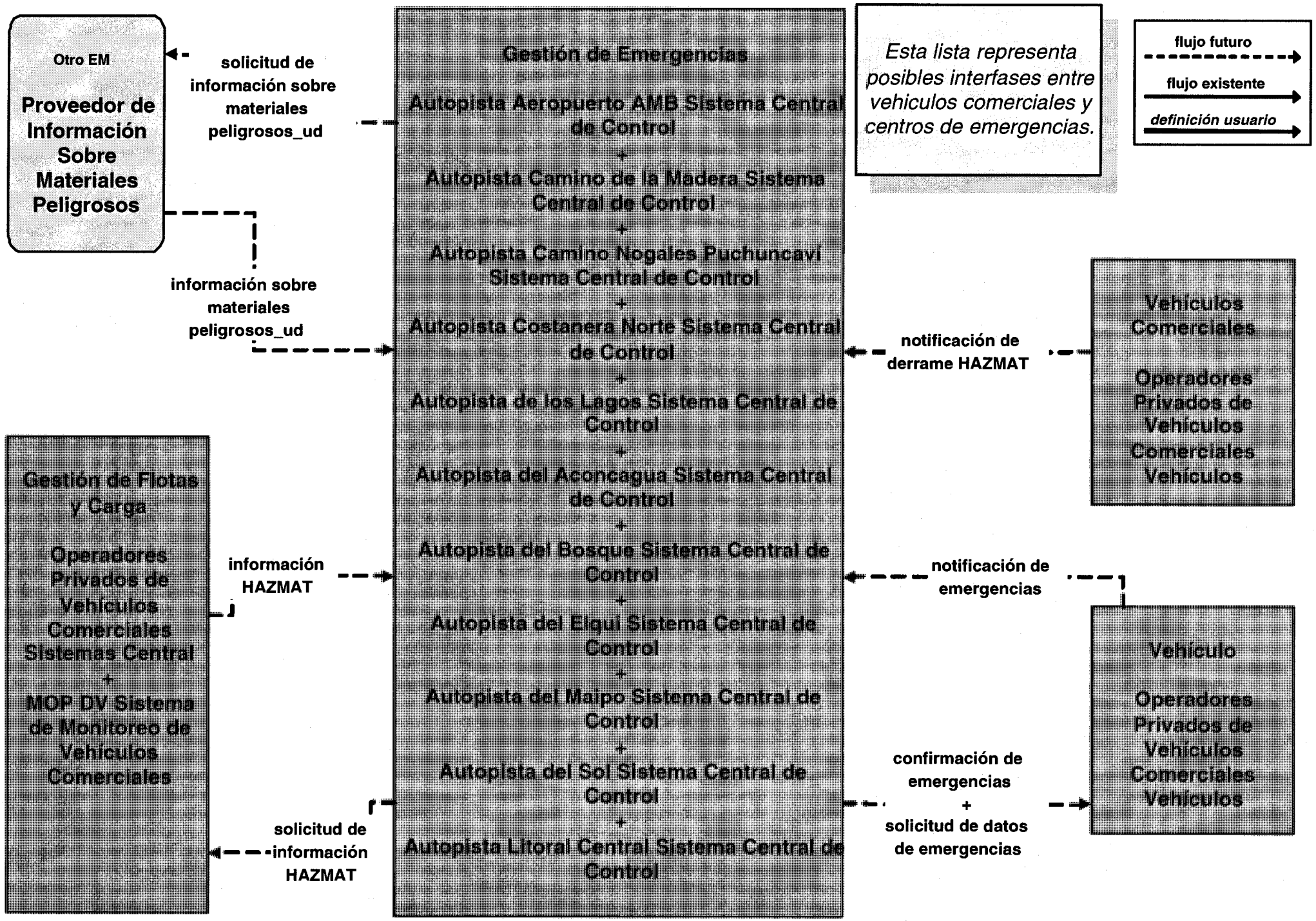
CVO10 - Gestión HAZMAT

Vehículos Comerciales



CVO10 - Gestión HAZMAT

Vehículos Comerciales



CVO10 - Gestión HAZMAT

Vehículos Comerciales

flujo futuro

flujo existente

definición usuario

Otro EM

Proveedor de Información Sobre Materiales Peligrosos

solicitud de información sobre materiales peligrosos_ud

información sobre materiales peligrosos_ud

Gestión de Emergencias

Autopista Los Libertadores Sistema Central de Control
+
Autopista Variante Melipilla Sistema Central de Control
+
Autopista Norte Sur Sistema Central de Contro
+
Autopista Ruta 5 Collipulli - Temuco Sistema Central de Control
+
Autopista Ruta de los Ríos Sistema Central de Control
+
Autopista Talca - Chillán Sistema Central de Control
+
Autopista Tribasa Bío Bío Sistema Central de Control
+
Autopista Túnel El Melón Sistema Central de Control
+
Autopista Vespucio Norte Sistema Central de Control
+
Autopistas Metropolitanas Sistema Central de Control
+
Autopistas Otras Sistema Central de Control
+
Autopistas Rutas del P[illegible]co Sistema Central de Co[illegible]ol

Esta lista representa posibles interfases entre vehiculos comerciales y centros de emergencias.

notificación de derrame HAZMAT

Vehículos Comerciales

Operadores Privados de Vehículos Comerciales Vehículos

Gestión de Flotas y Carga

Operadores Privados de Vehículos Comerciales Sistemas Central
+
MOP DV Sistema de Monitoreo de Vehículos Comerciales

información HAZMAT

solicitud de información HAZMAT

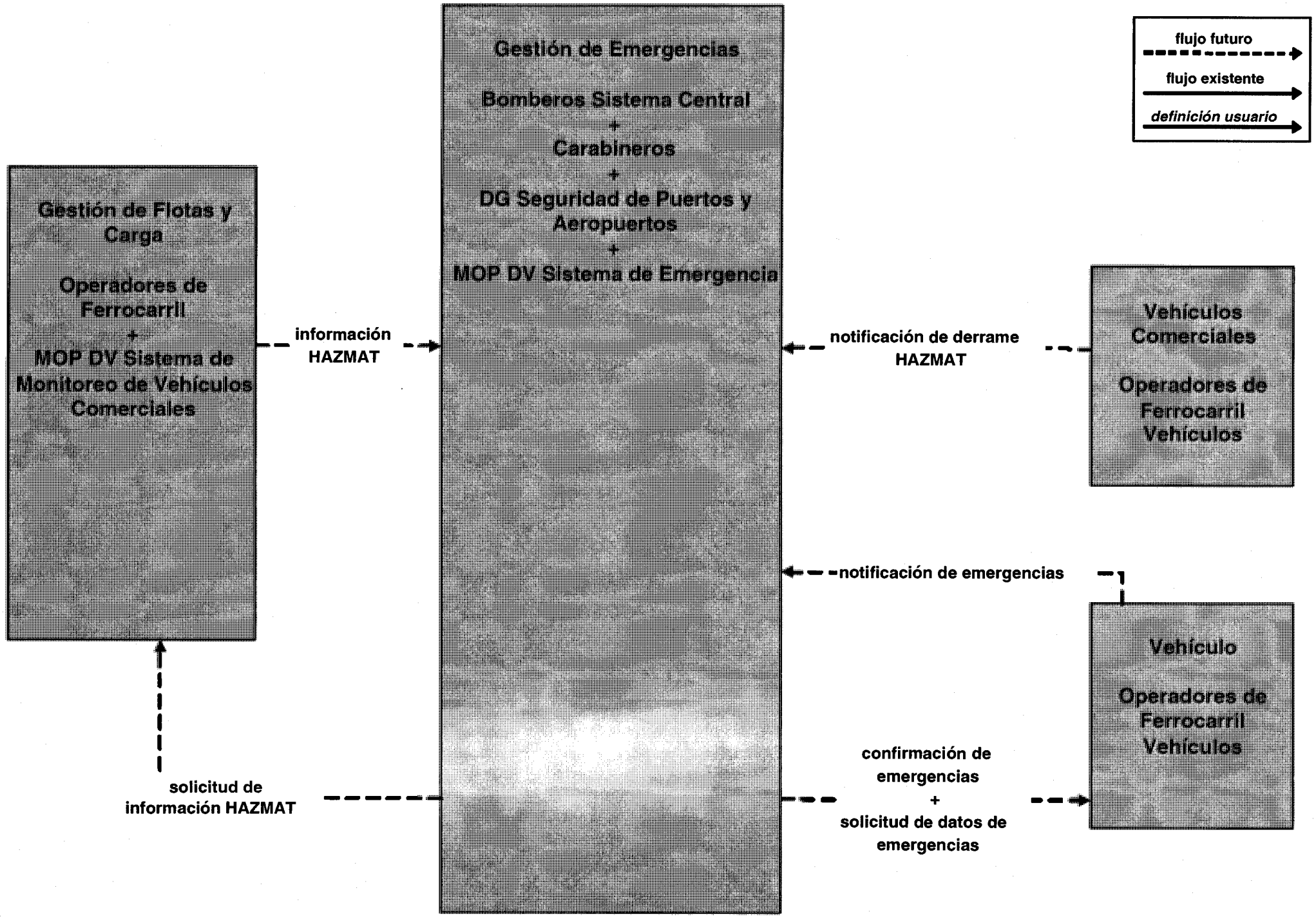
notificación de emergencias

confirmación de emergencias
+
solicitud de datos de emergencias

Vehículo

Operadores Privados de Vehículos Comerciales Vehículos

CVO10 - Gestión HAZMAT
Ferrocarriles



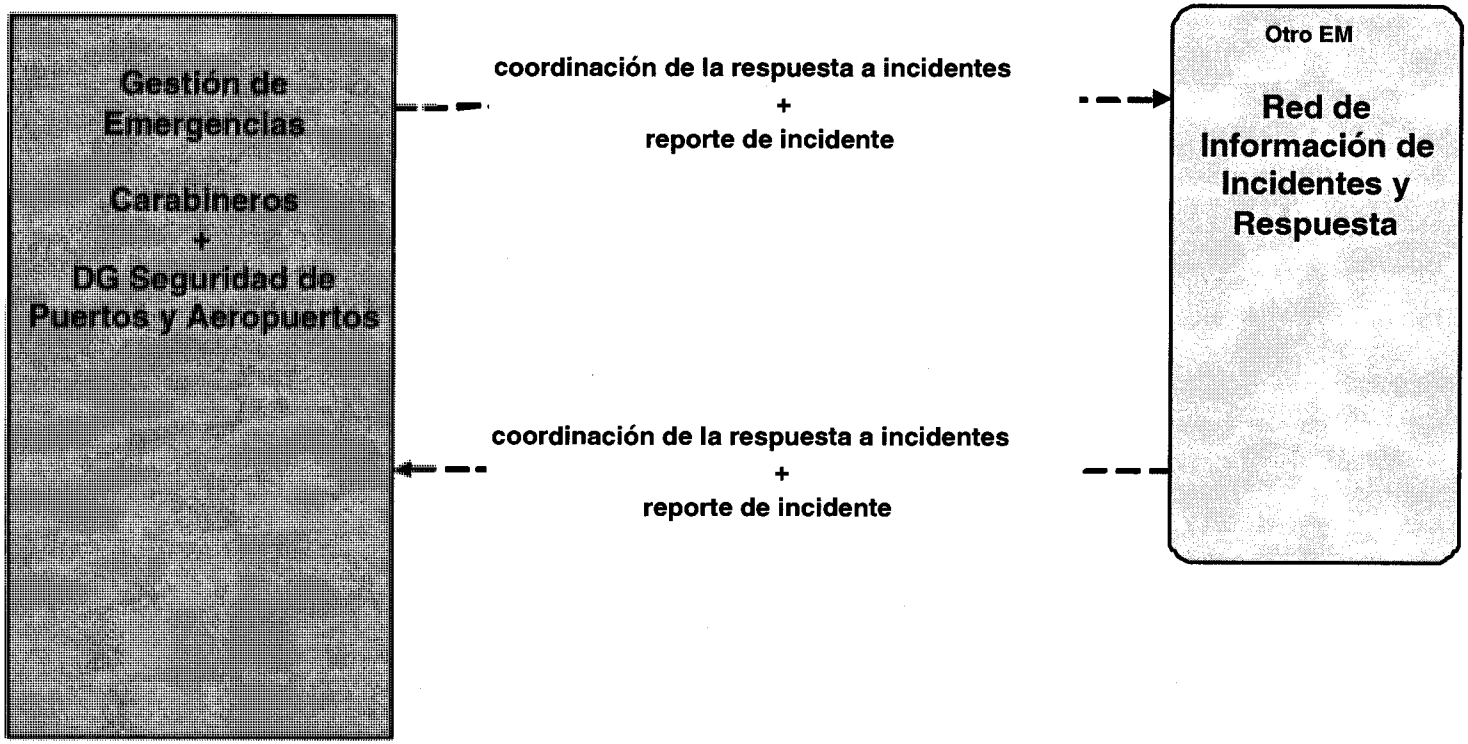
Task 7, Appendix M - Arquitectura Nacional ITS de Chile

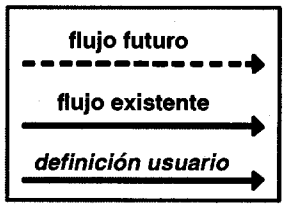
Paquetes de Servicios ITS

Gestión de Emergencias

EM1 - Respuesta a Emergencias

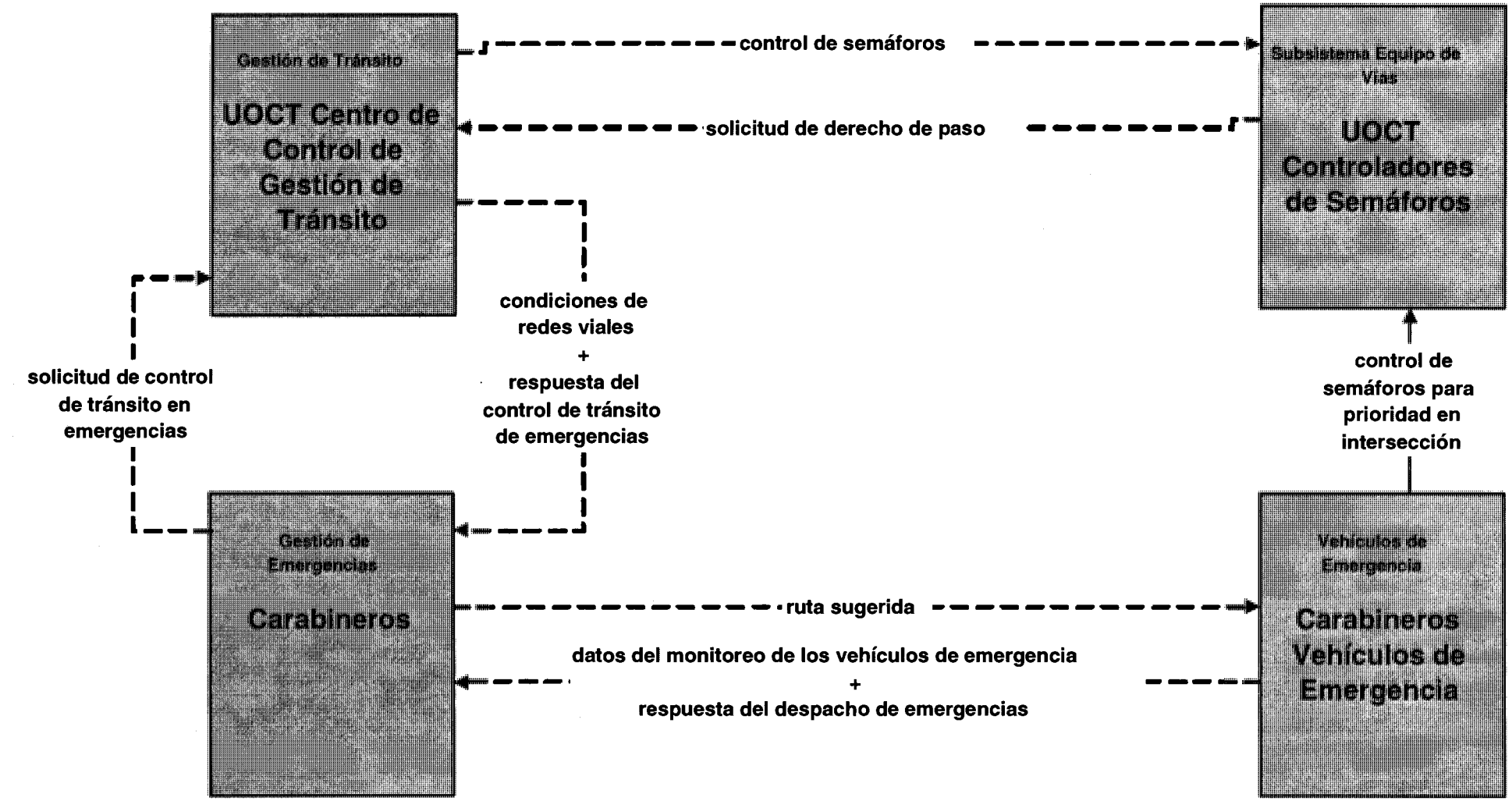
Red de Informacion de Incidentes y Respuesta





EM2 - Ruteo a Vehículos de Emergencia

UOCT

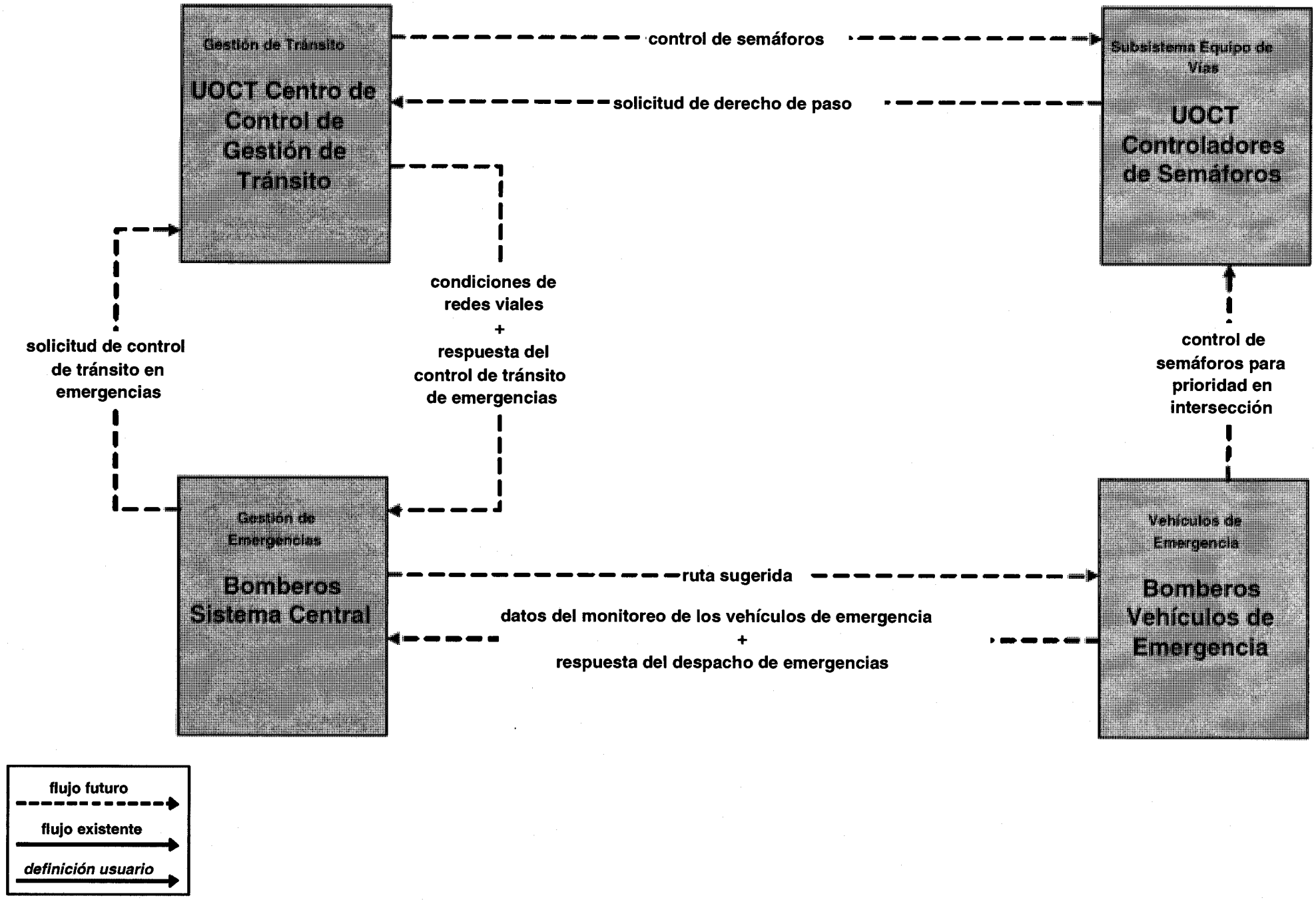


flujo futuro

flujo existente

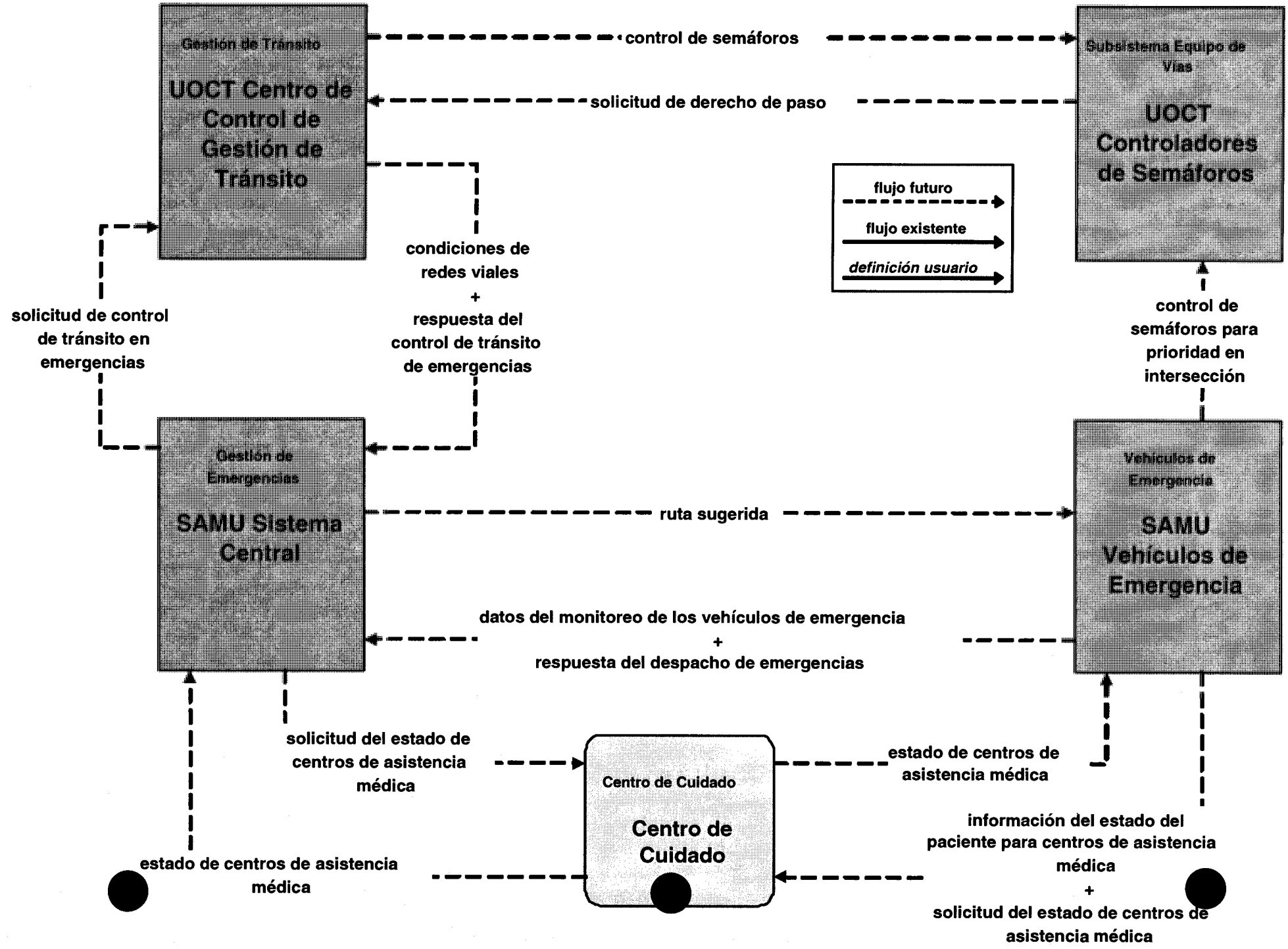
definición us

EM2 - Ruteo a Vehículos de Emergencia
UOCT

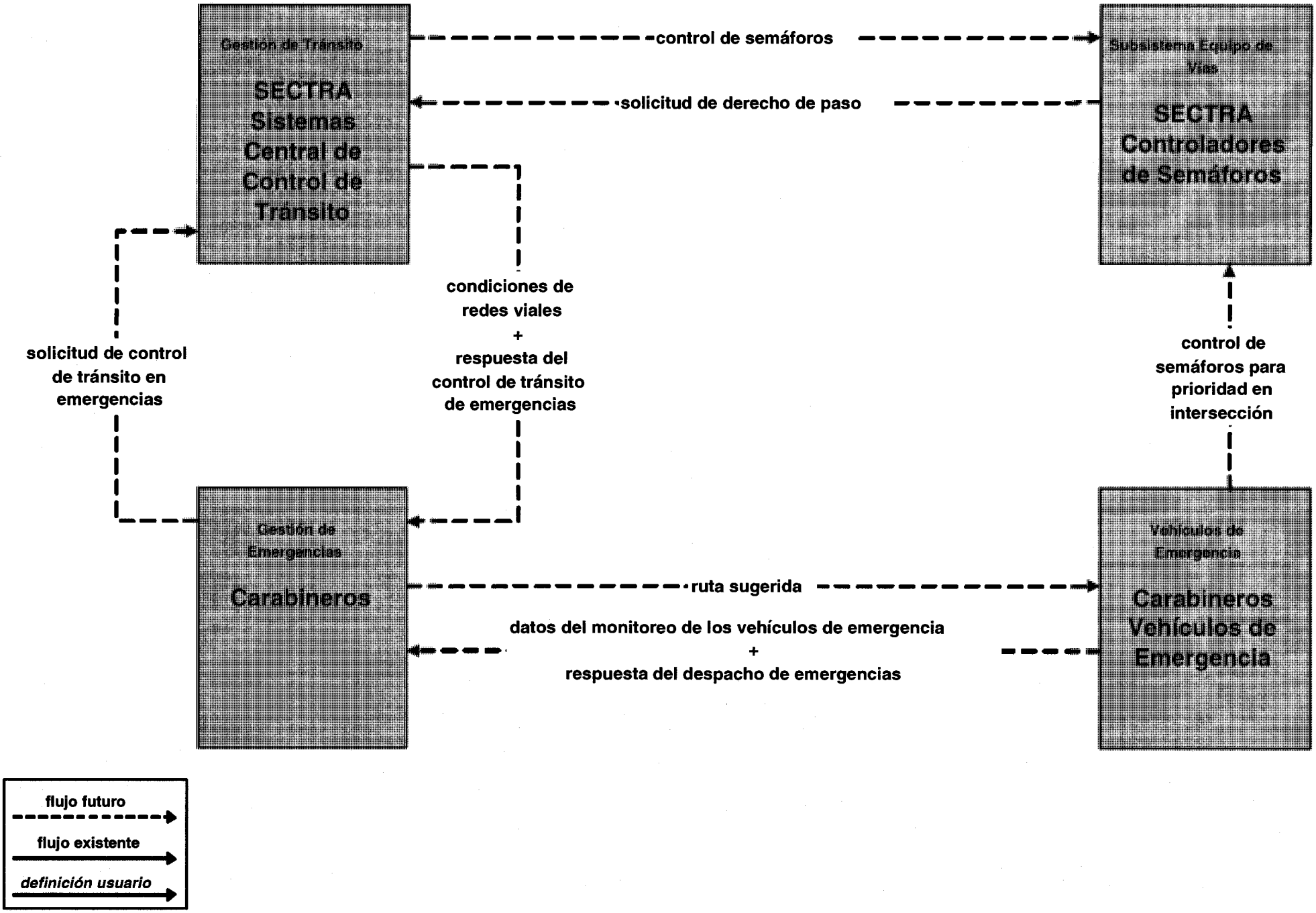


EM2 - Ruteo a Vehículos de Emergencia

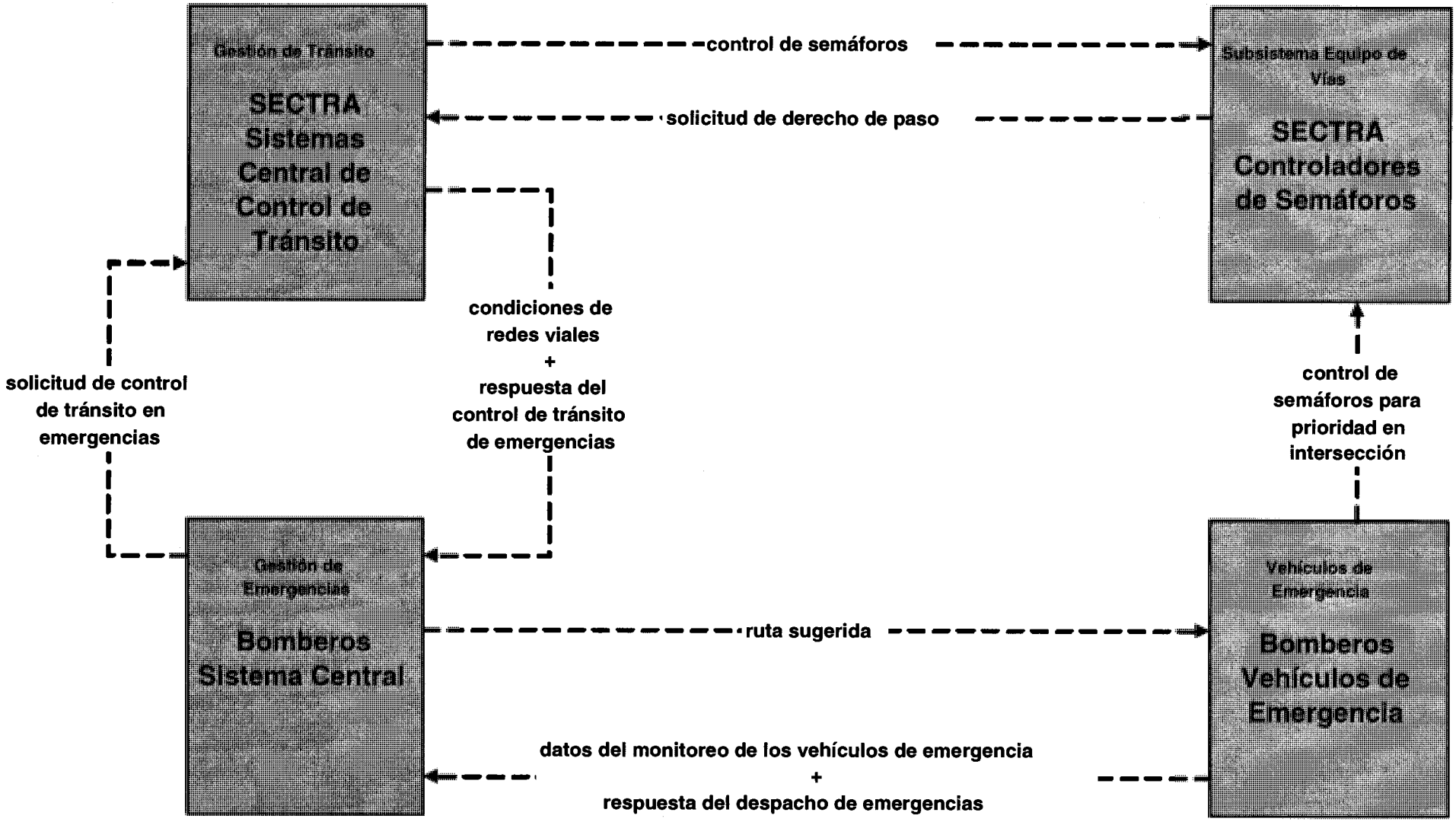
UOCT

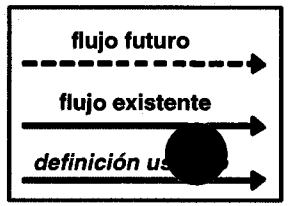


EM2 - Ruteo a Vehículos de Emergencia
SECTRA

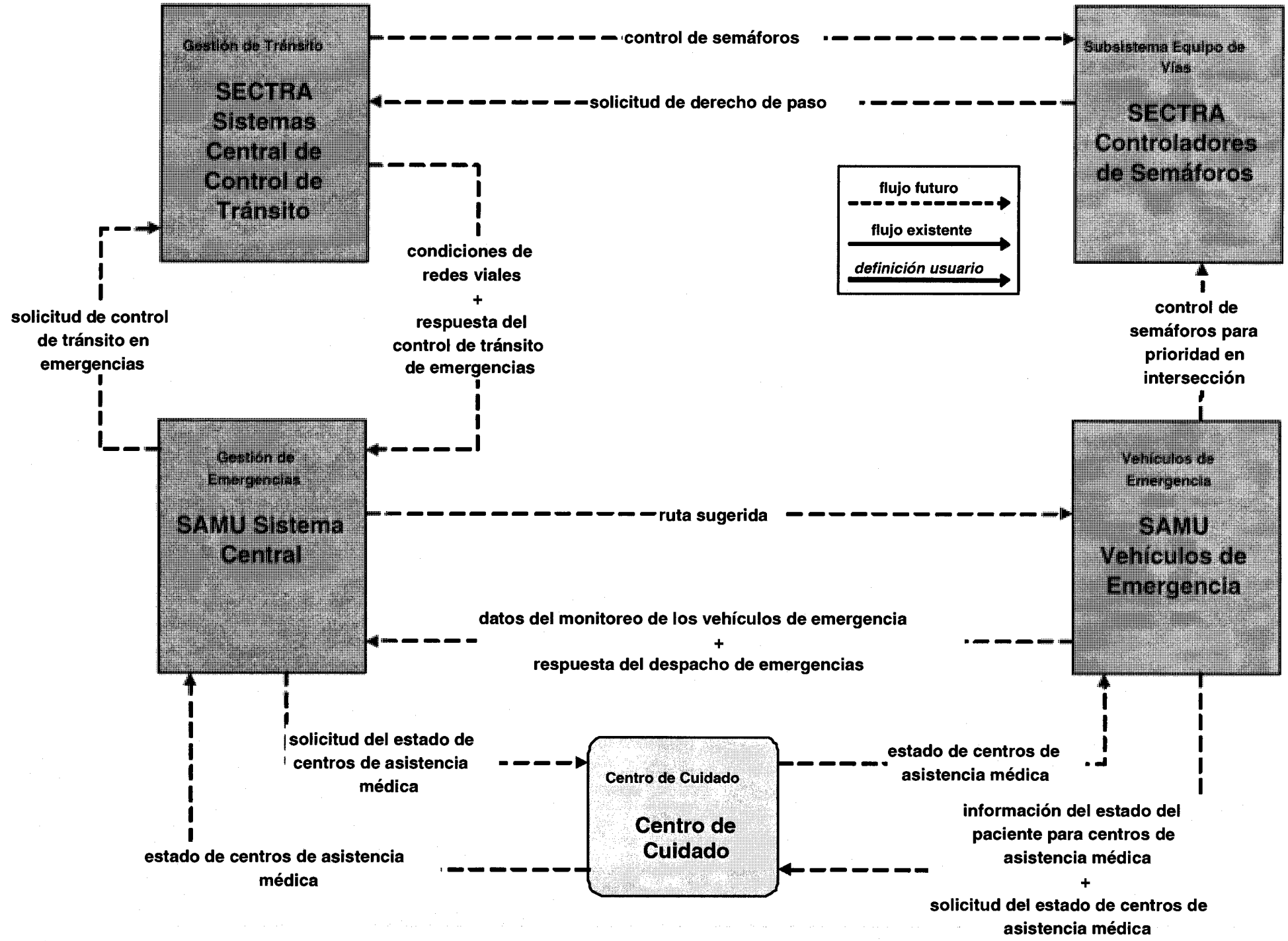


EM2 - Ruteo a Vehículos de Emergencia
SECTRA

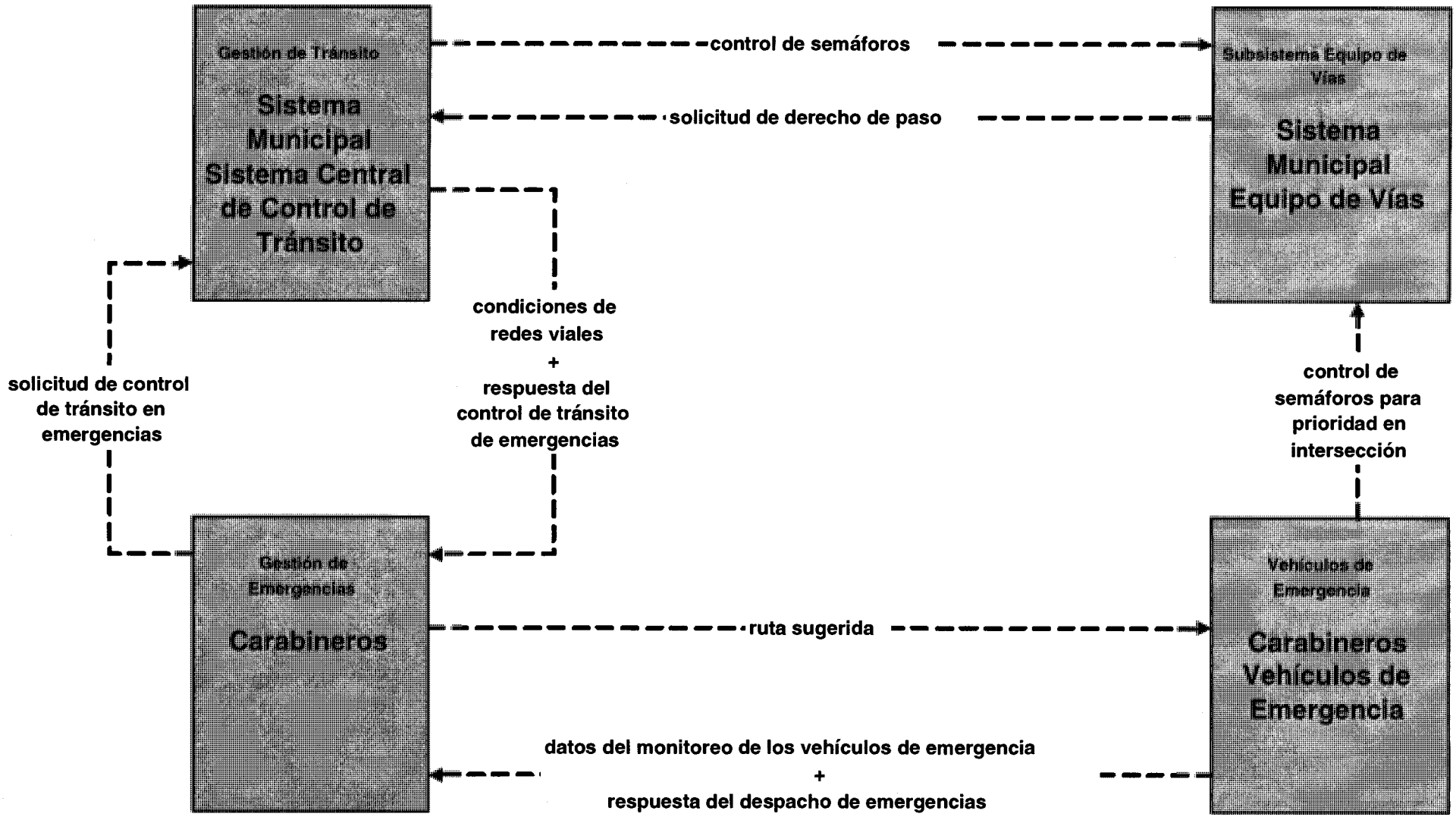




EM2 - Ruteo a Vehículos de Emergencia
SECTRA



EM2 - Ruteo a Vehículos de Emergencia
Sistemas Municipales

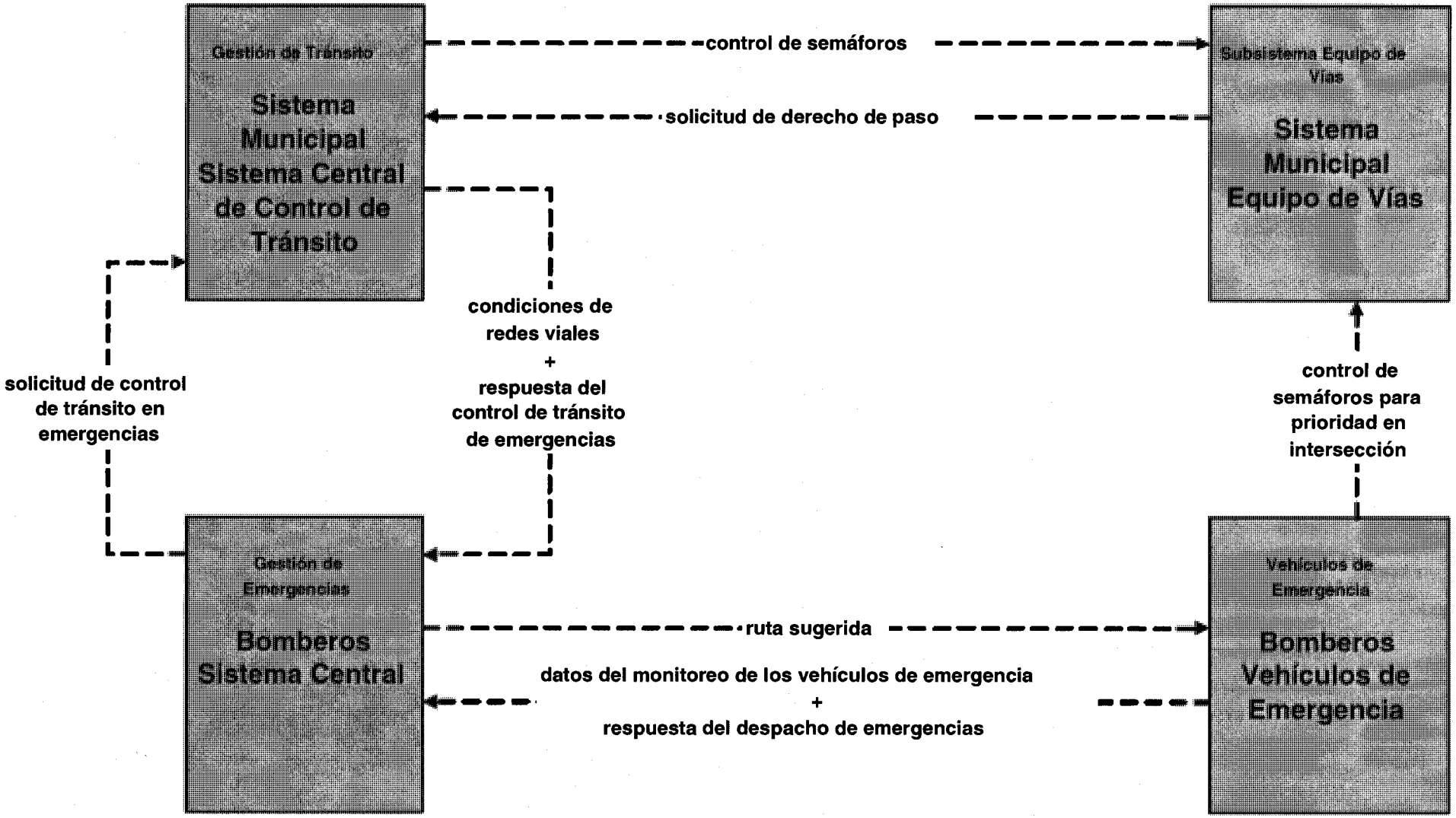


flujo futuro

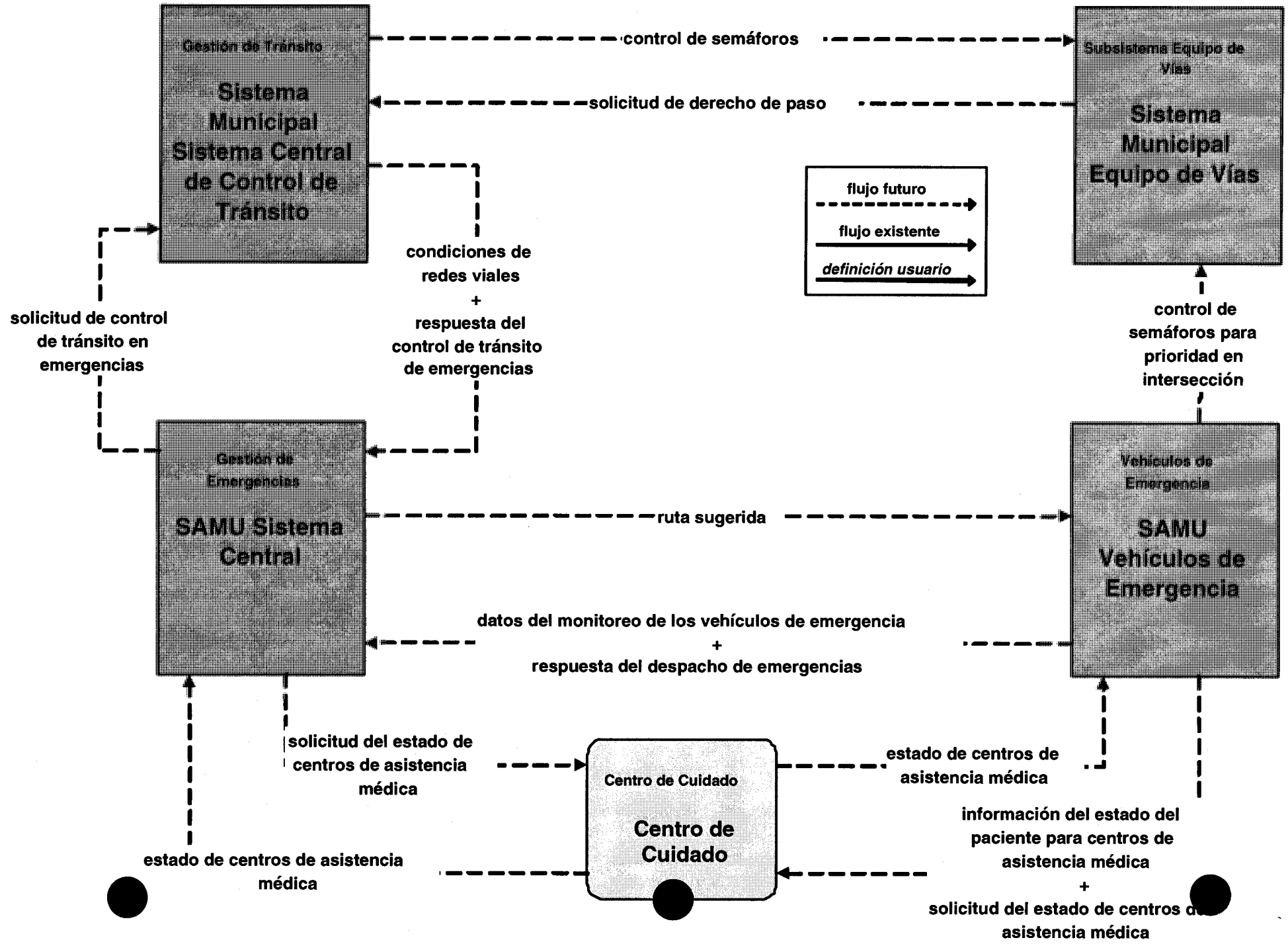
flujo existente

definición us

EM2 - Ruteo a Vehículos de Emergencia
Sistemas Municipales

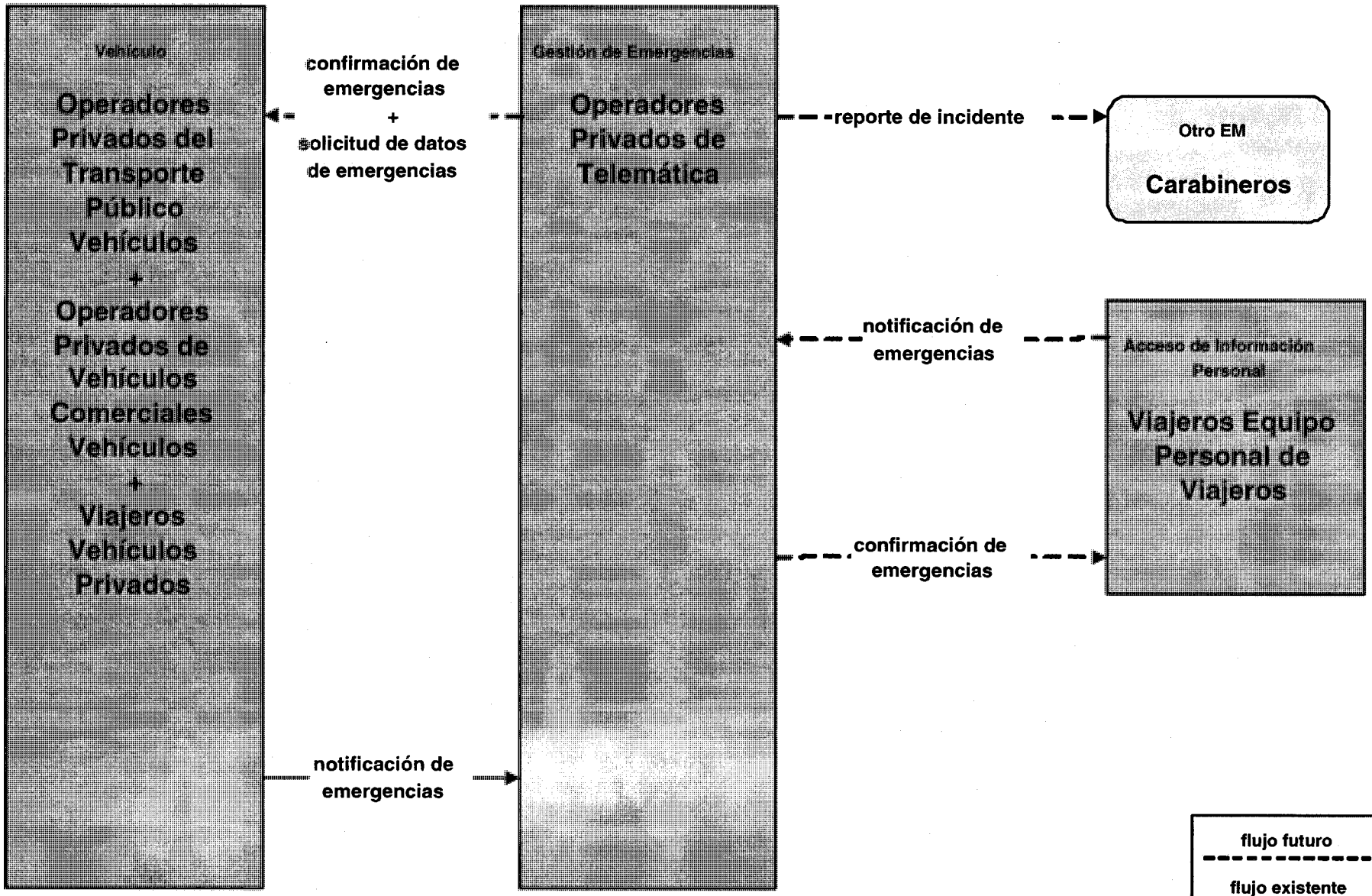


EM2 - Ruteo a Vehículos de Emergencia
Sistemas Municipales



EM3 - Ap[illegible] en SOS

Operadores Privados de Telematica



flujo futuro

flujo existente

definición usuario

Task 7, Appendix N - Arquitectura Nacional ITS de Chile

Paquetes de Servicios ITS

Gestión de Construcción y Mantenimiento

MC01 - Monitoreo de Vehículos de Mantención y Construcción

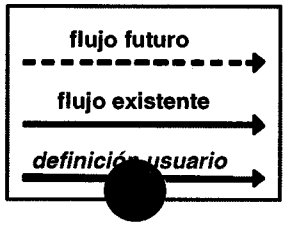
MOP DV Subdirección de Explotación

flujo futuro

flujo existente

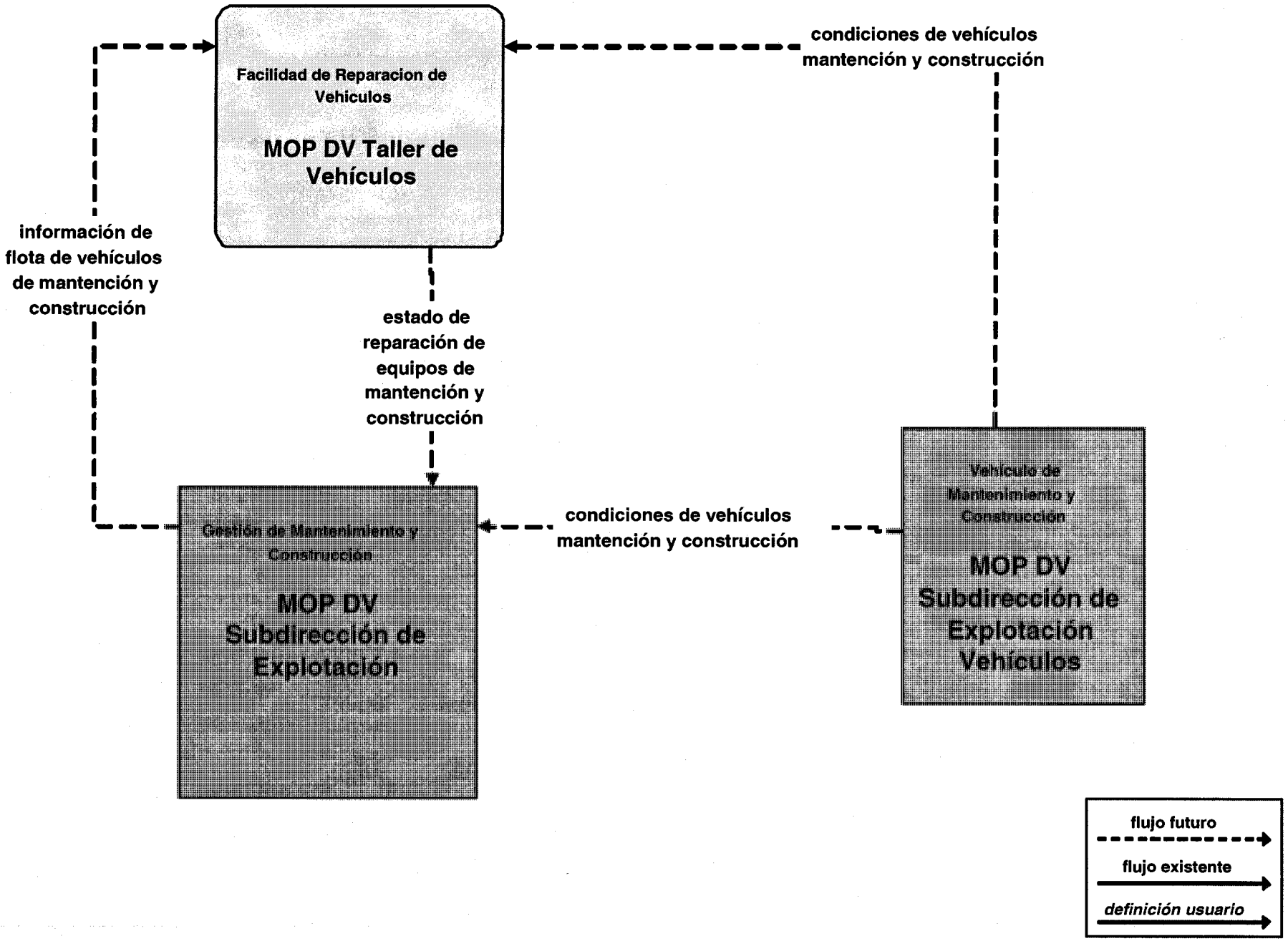
definición usuario

MC01 - Monitoreo de Vehículos de Mantención y Construcción
Municipalidad Dirección de Obras

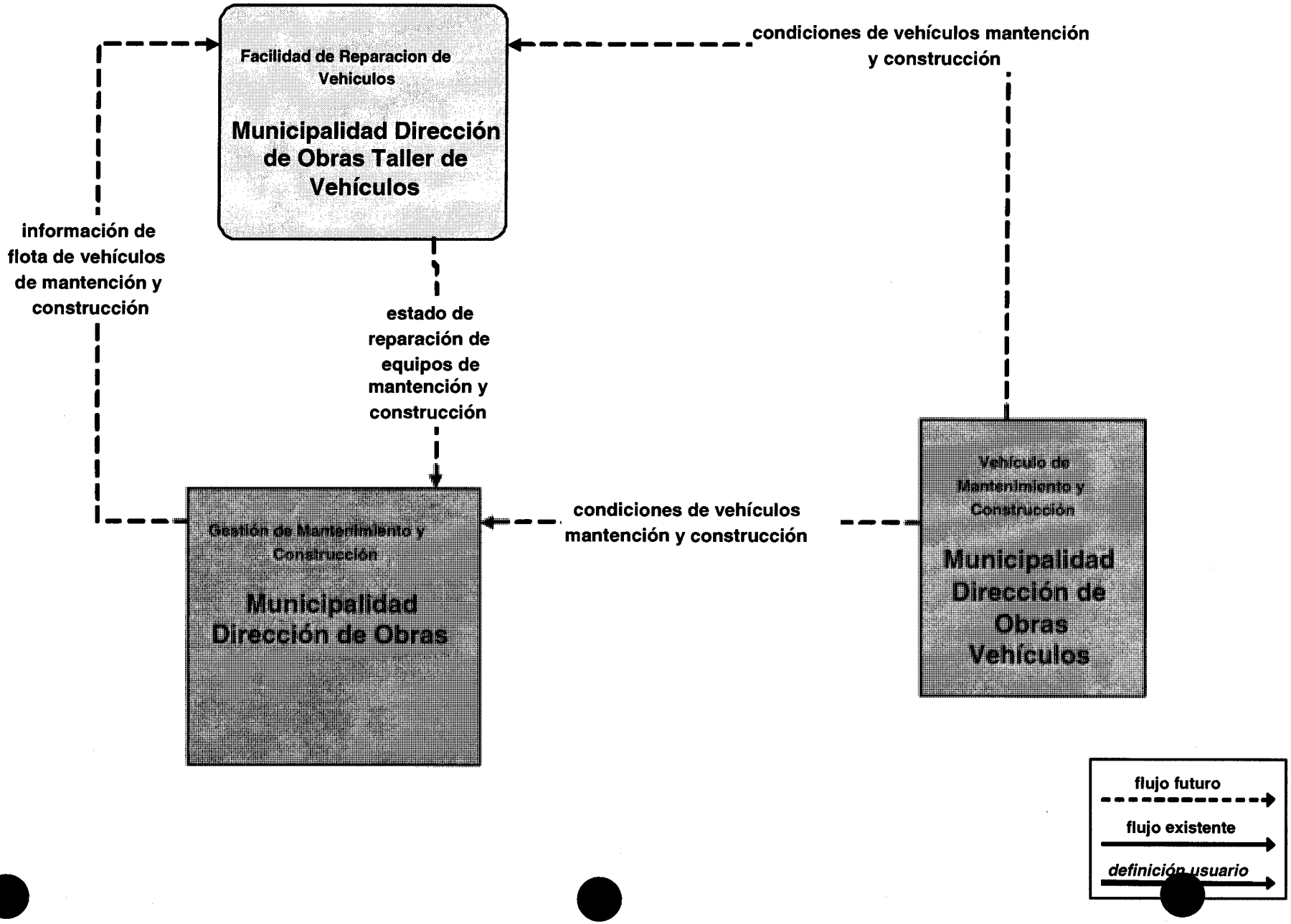


MC02 - Mantención de Vehículos de Mantención y Construcción

MOP DV Subdirección de Explotación

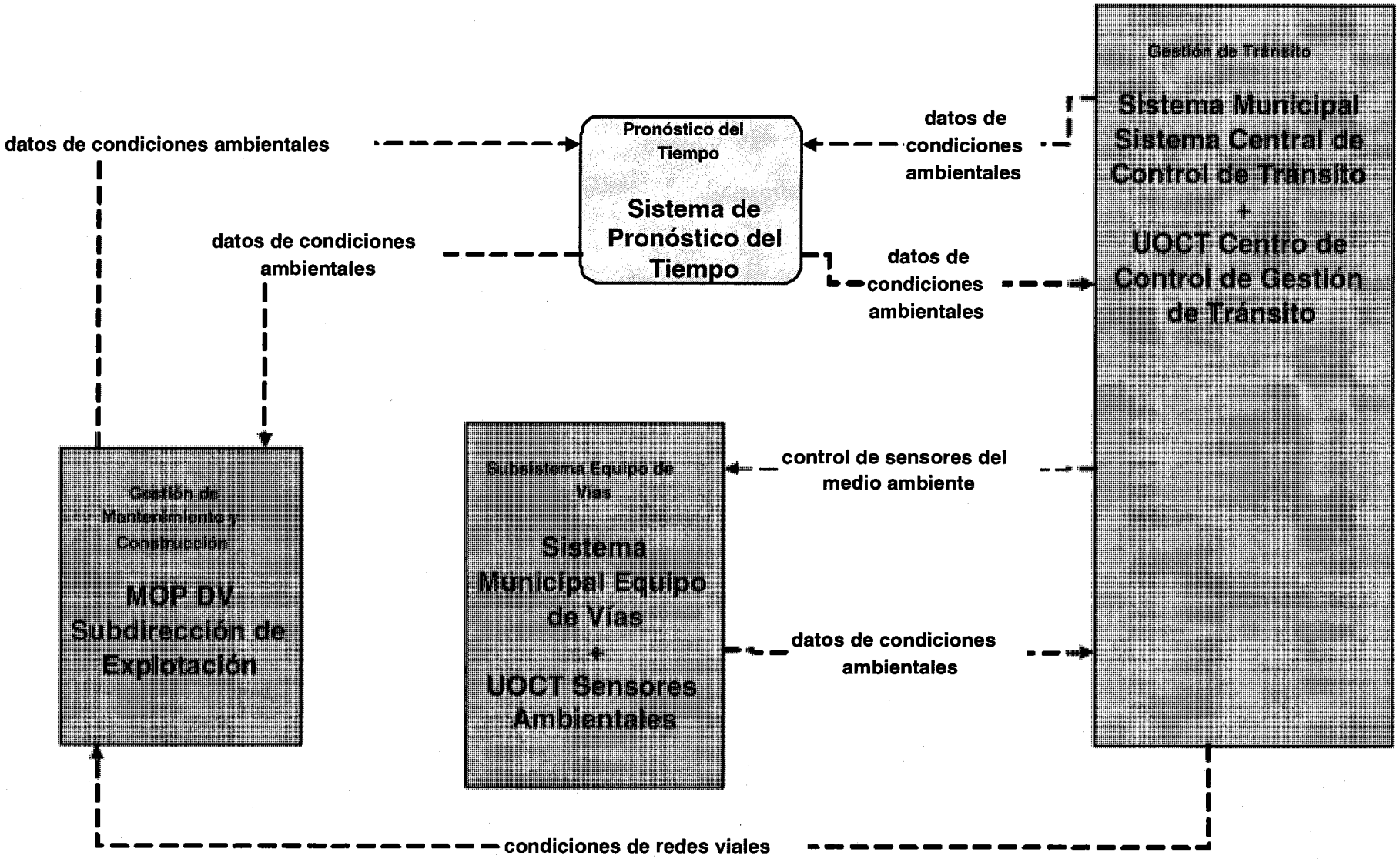


MC02 - Monitoreo de Vehículos de Mantención y Construcción
Municipalidad Dirección de Obras



MC03 - Recolección de Datos del Clima en Caminos

MOP DV Subdirección de Explotacion

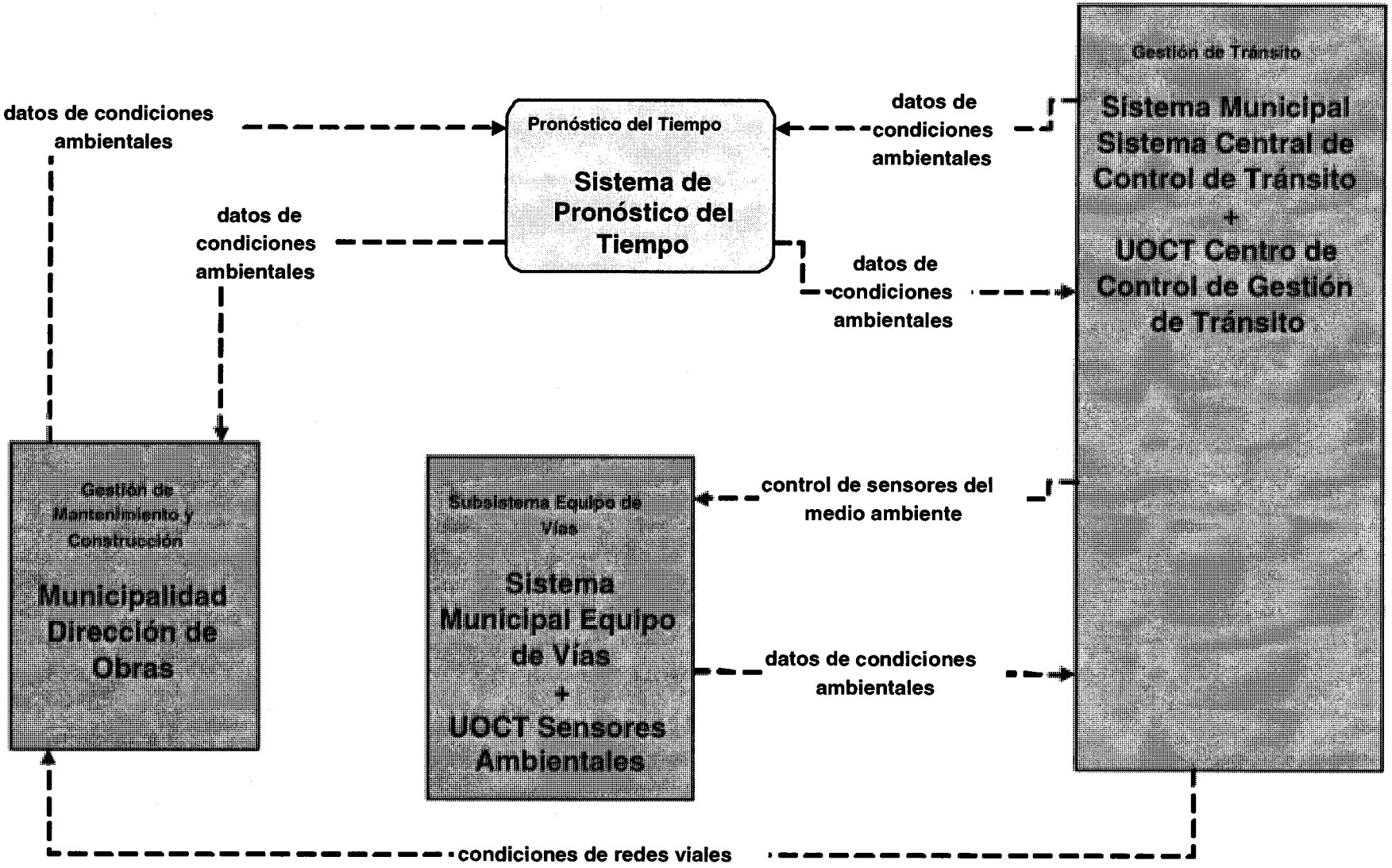


flujo futuro

flujo existente

definición usuario

MC03 - Recolección de Datos del Clima en Caminos
Municipalidad Dirección de Obras



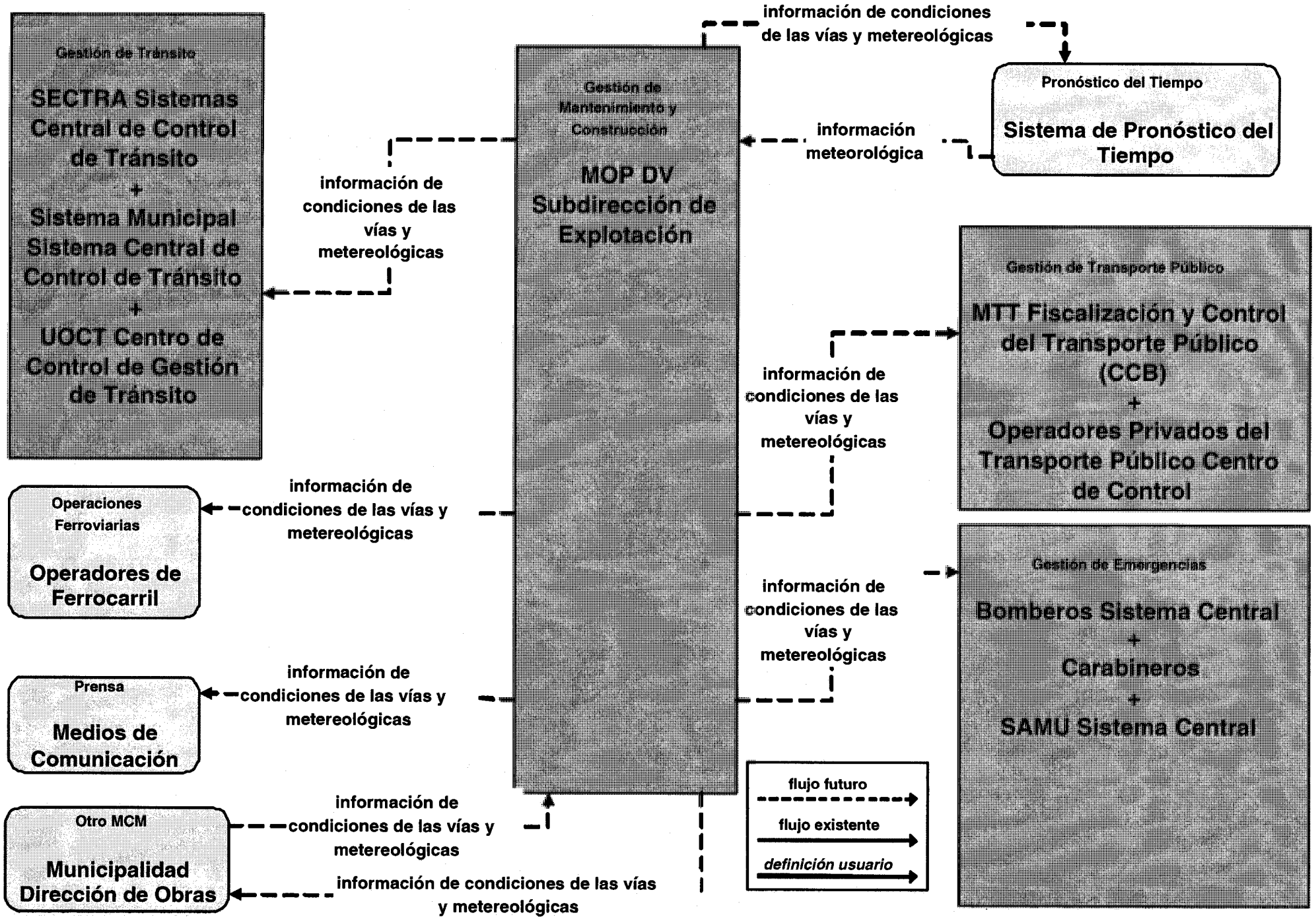
flujo futuro

flujo existente

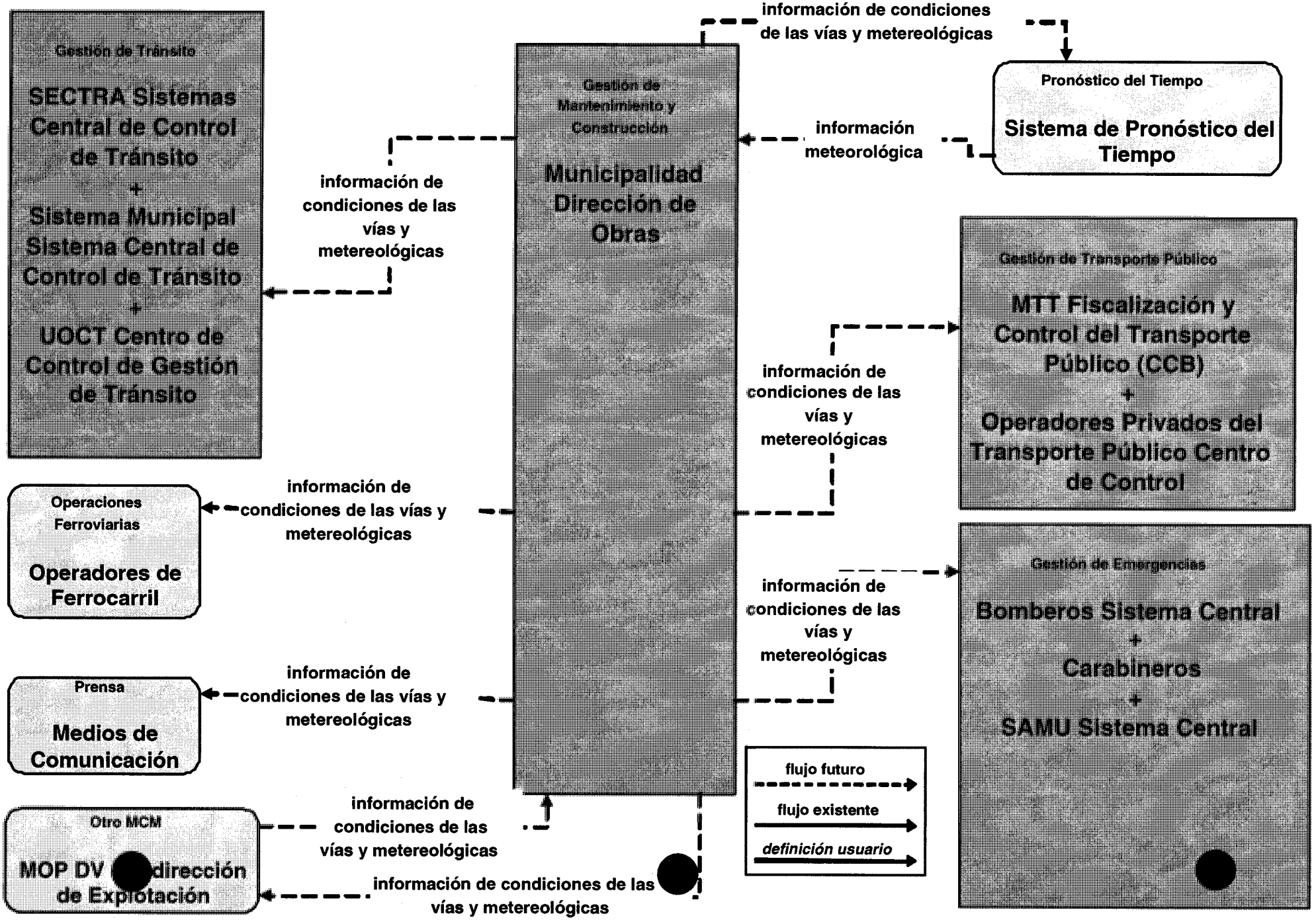
definici[illegible]suario

MC04 - Procesamiento y Distribución de Información Climátlca

MOP DV Subdirección de Explotación

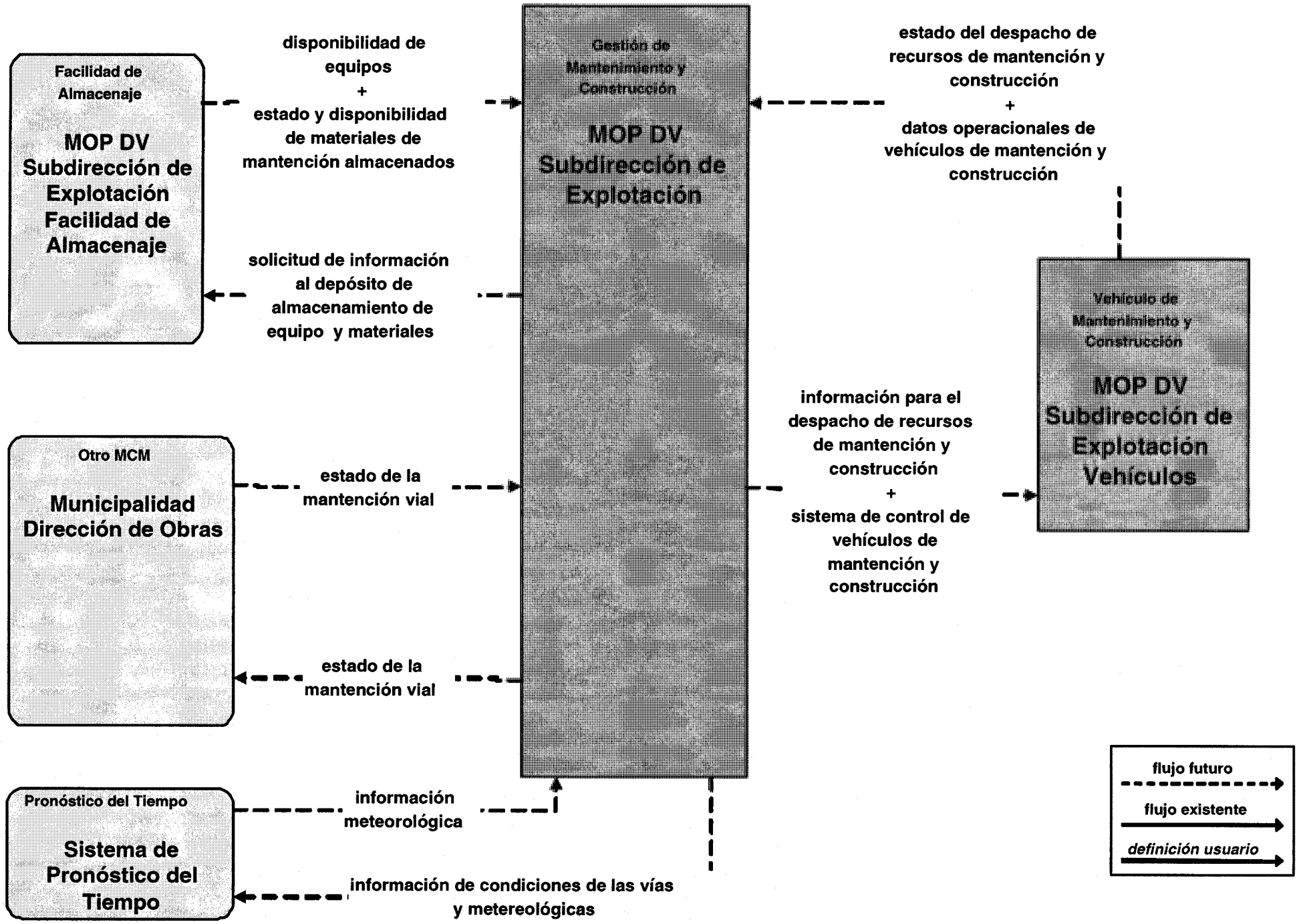


MC04 - Procesamiento y Distribución de Información Climática
Municipalidad Dirección de Obras

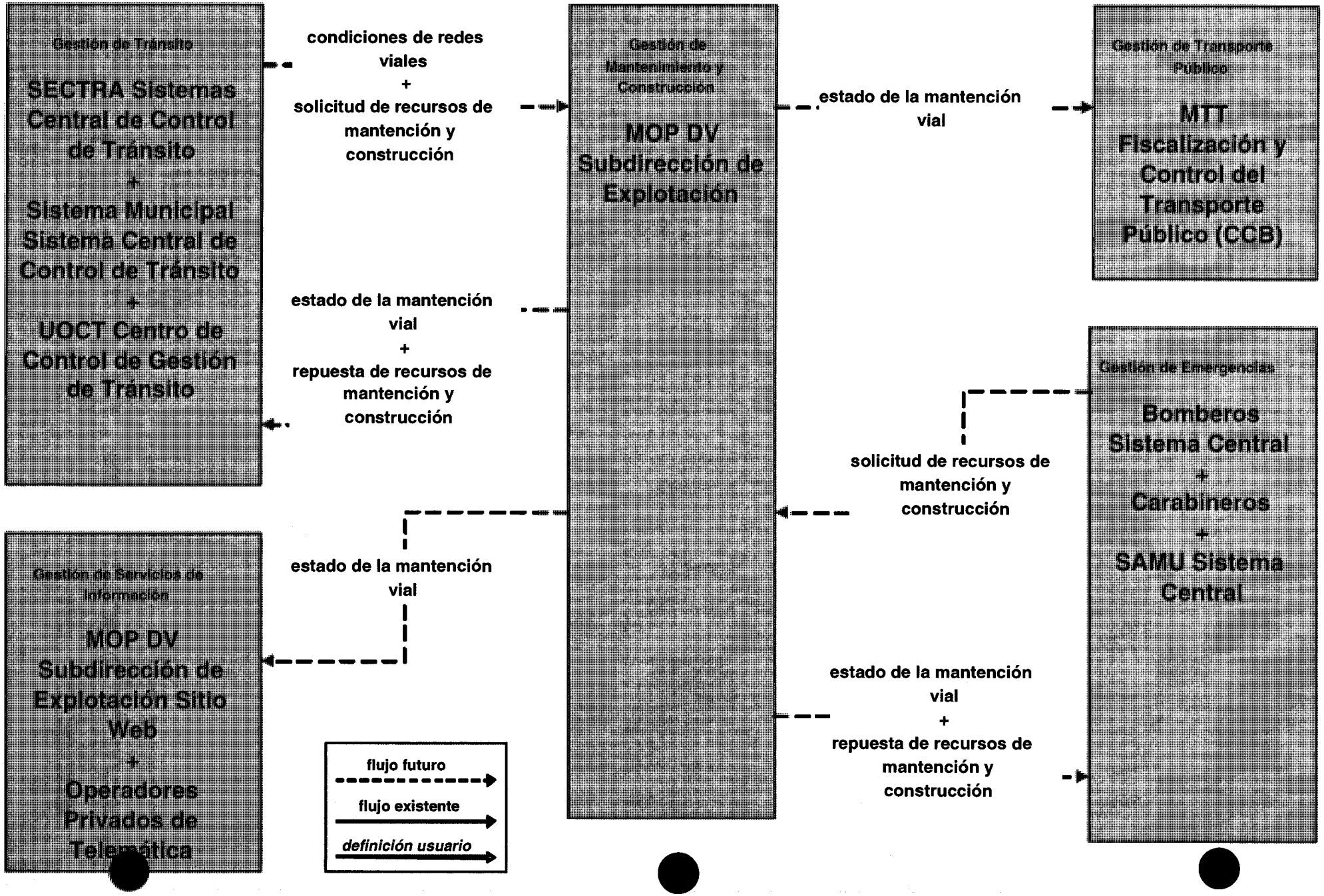


MC06 - Mantenimiento Invernal

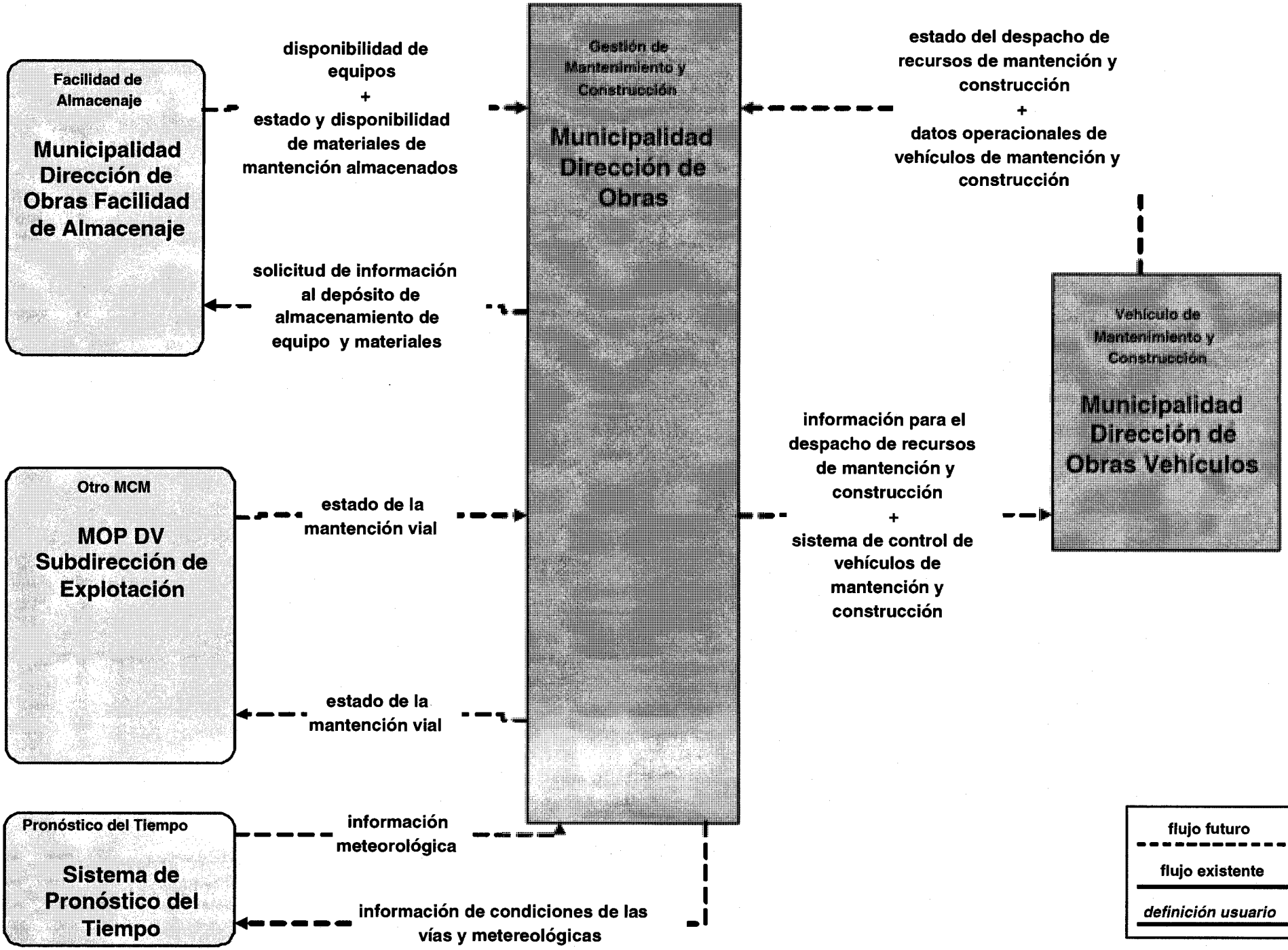
MOP DV Subdirección de Explotación



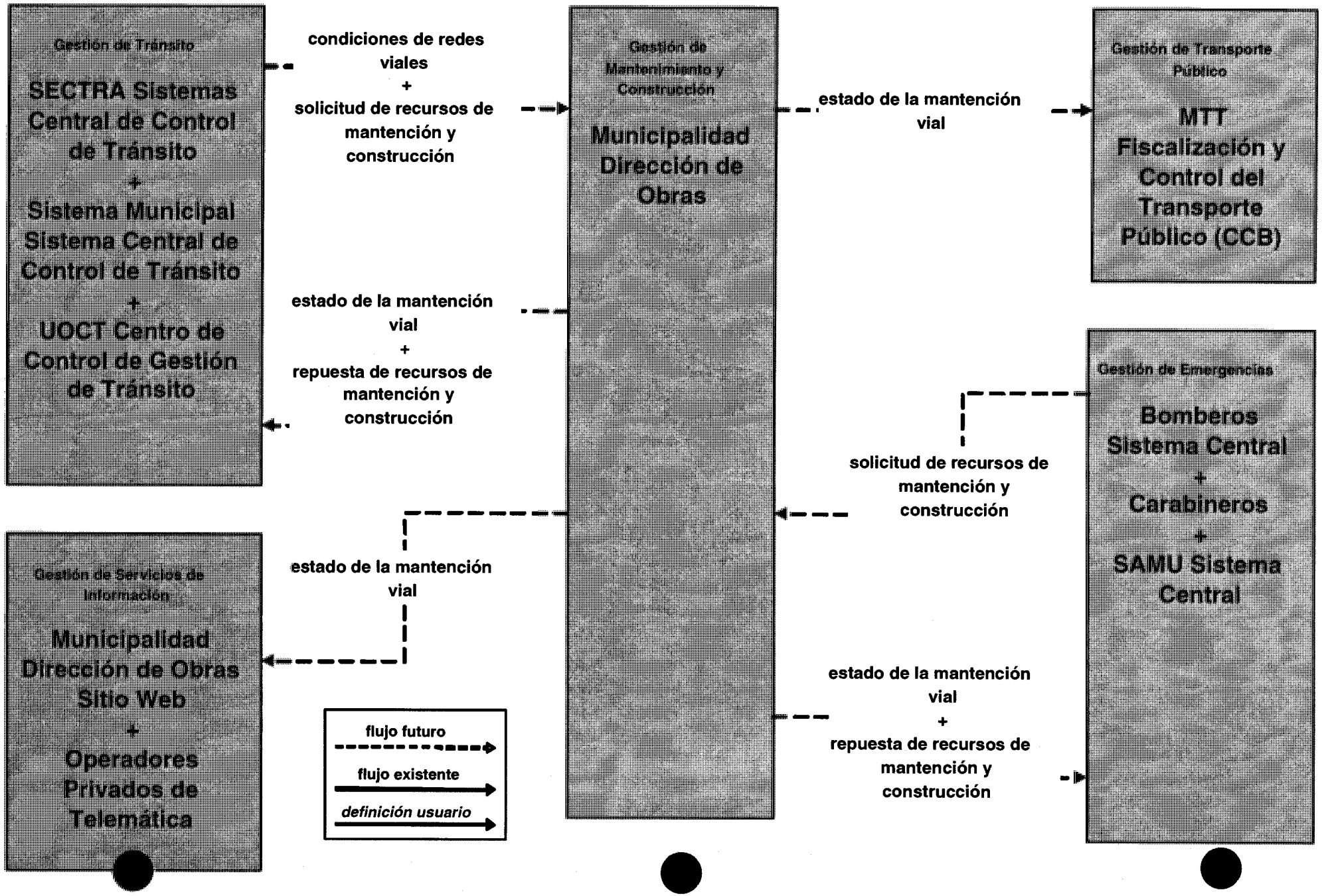
MC06 - Mantenimiento Invernal
MOP DV Subdirección de Explotación



MC06 - Mantenimiento Invernal
Municipalidad Dirección de Obras



MC06 - Mantenimiento Invernal
Municipalidad Dirección de Obras



MC07 - Mantención y Construcción de Caminos

MOP DV Subdirección de Explotación

flujo futuro

flujo existente

definición usuario

datos de sensores de monitoreo de infraestructura

control de sensores de monitoreo de infraestructura

Subsistema Equipo de Vías

MOP DV Subdirección de Explotación Equipo de Vías

estado de dispositivos en terreno + datos de sensores de monitoreo de infraestructura

Gestión de Mantenimiento y Construcción

MOP DV Subdirección de Explotación

información para el despacho de recursos de mantención y construcción + sistema de control de vehículos de mantención y construcción

Vehículo de Mantenimiento y Construcción

MOP DV Subdirección de Explotación Vehículos

control de sensores de monitoreo de infraestructura

información para el despacho de recursos de mantención y construcción + sistema de control de vehículos de mantención y construcción

condiciones de redes viales + estado de equipos en terreno + solicitud de recursos de mantención y construcción

Gestión de Tránsito

Red de Información y Condiciones de Tránsito

estado de mantención de equipos + repuesta de recursos de mantención y construcción

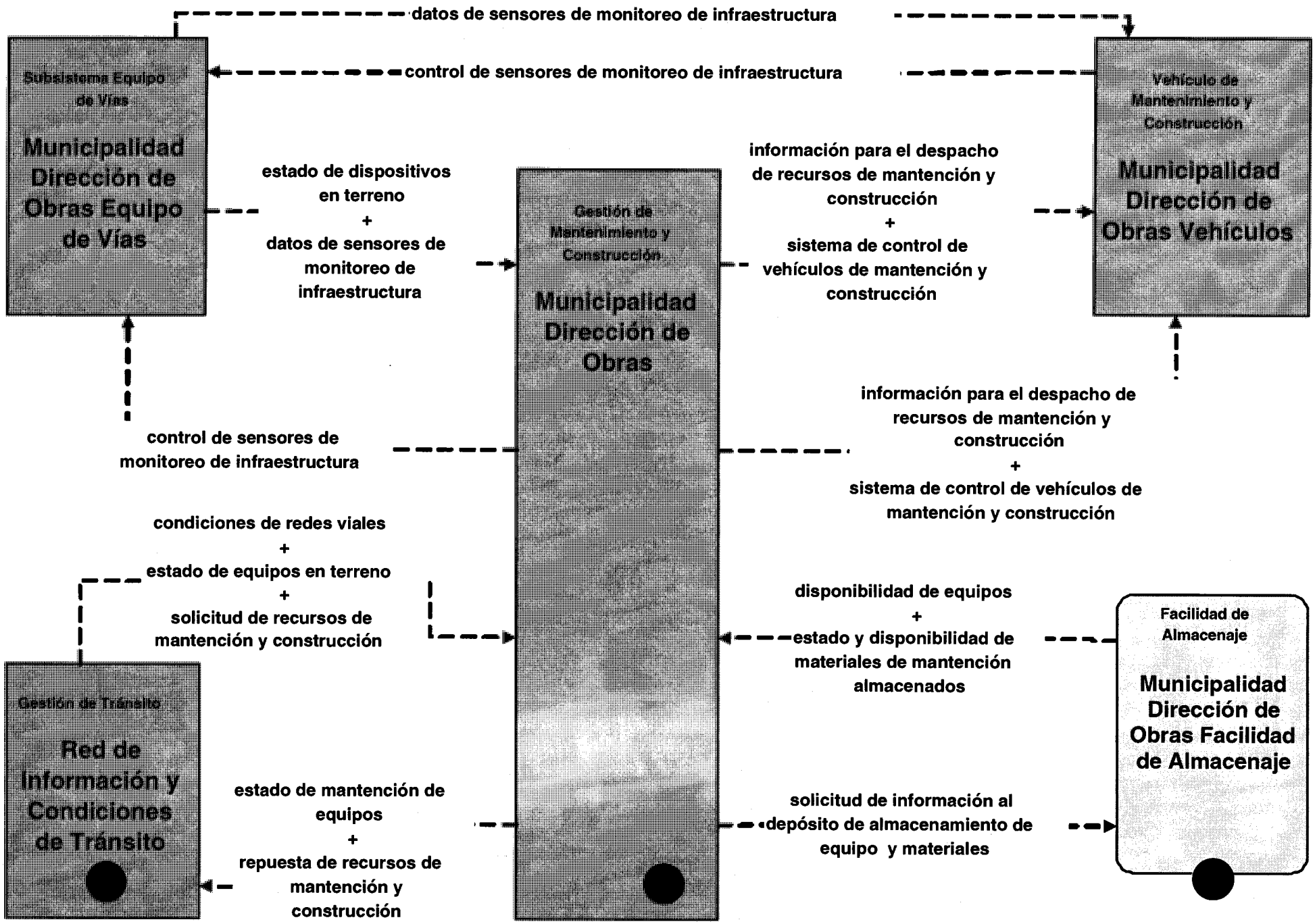
disponibilidad de equipos + estado y disponibilidad de materiales de mantención almacenados

solicitud de información al depósito de almacenamiento de equipo y materiales

Facilidad de Almacenaje

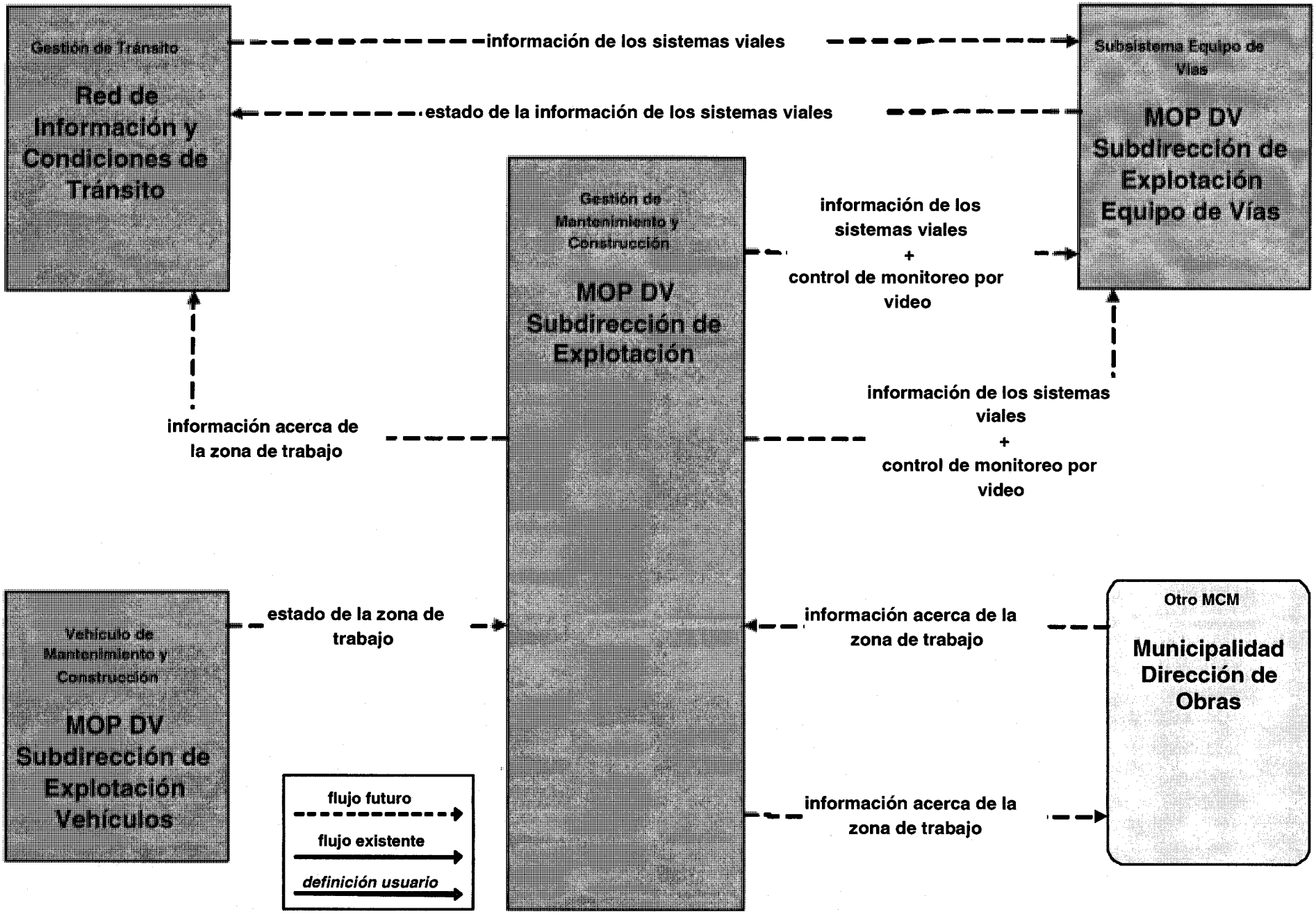
MOP DV Subdirección de Explotación Facilidad de Almacenaje

MC07 - Mantención y Construcción de Caminos
Municipalidad Dirección de Obras

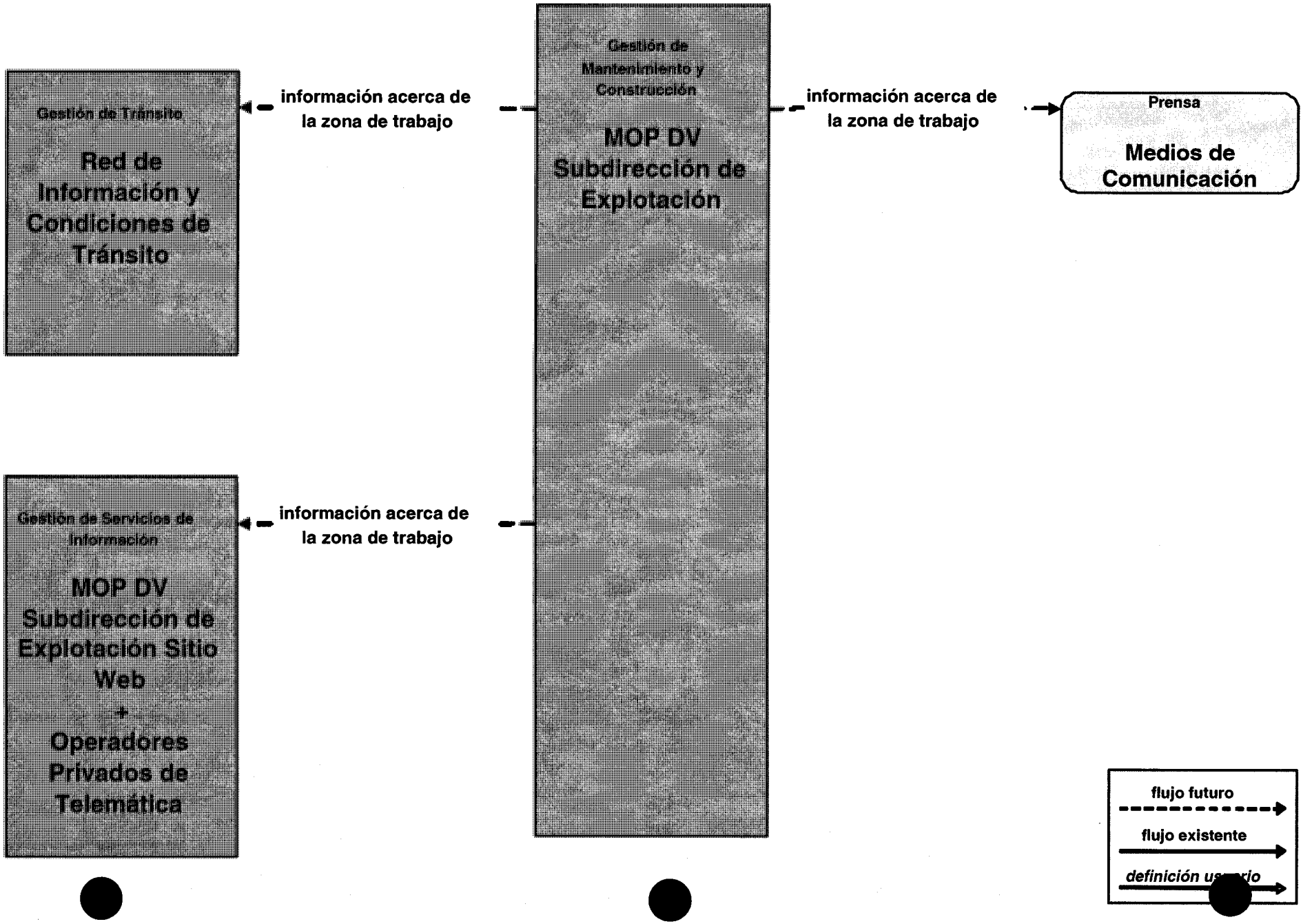


MC08 - Gestión de Trabajos en la Vía

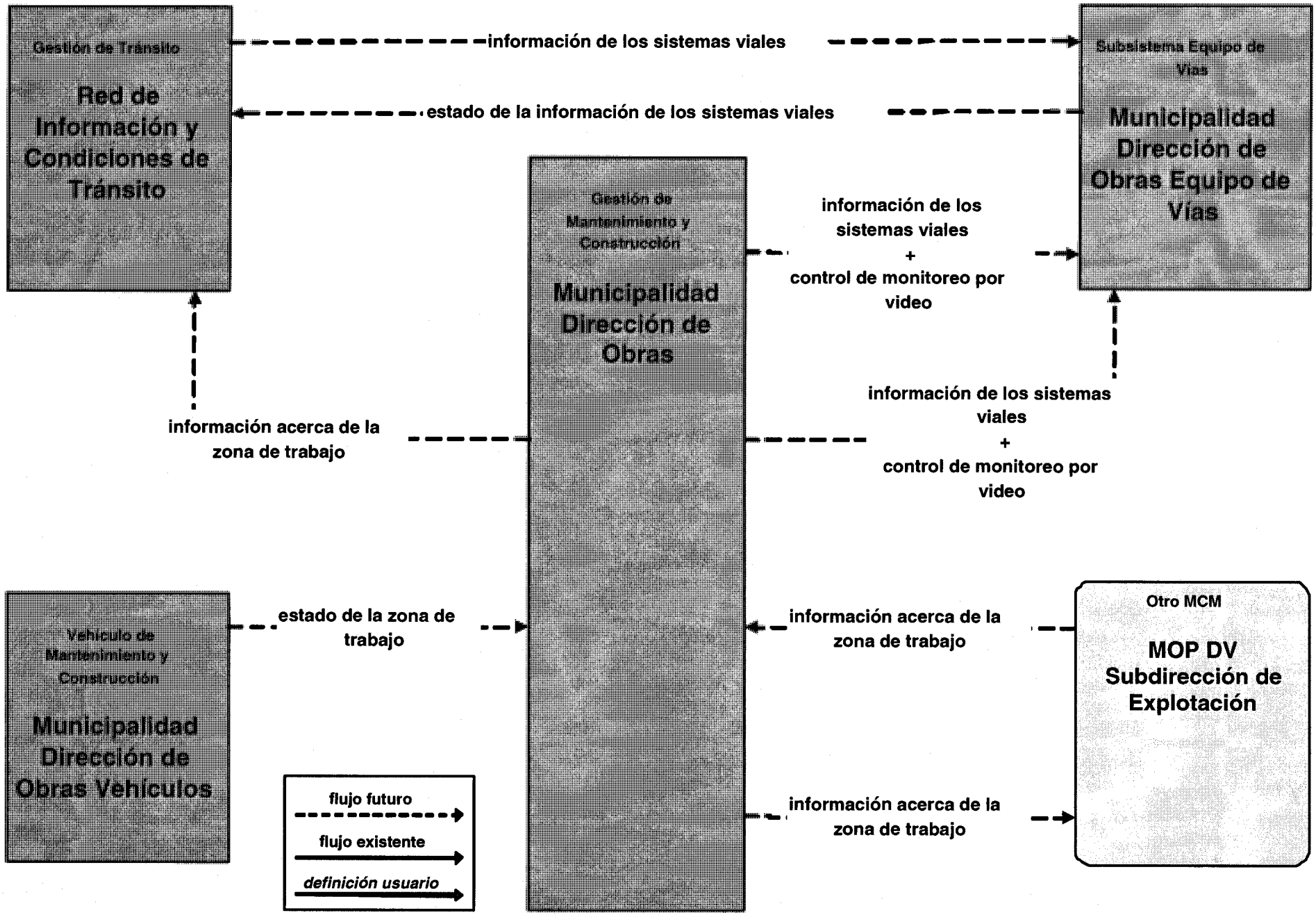
MOP DV Subdirección de Explotación



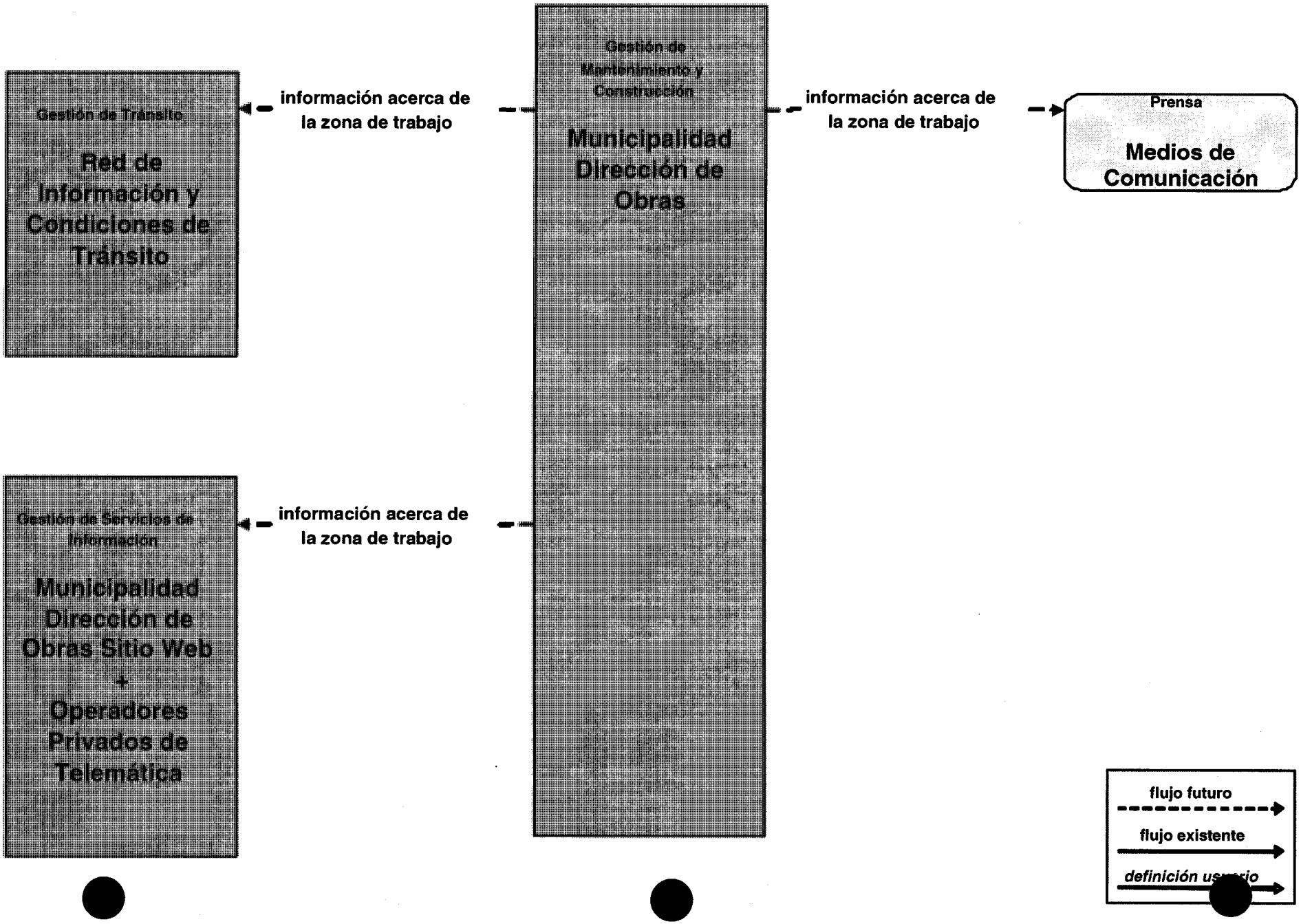
MC08 - Gestión de Trabajos en la Vía
MOP DV Subdirección de Explotación



MC08 - Gestión de Trabajos en la Vía
Municipalidad Dirección de Obras

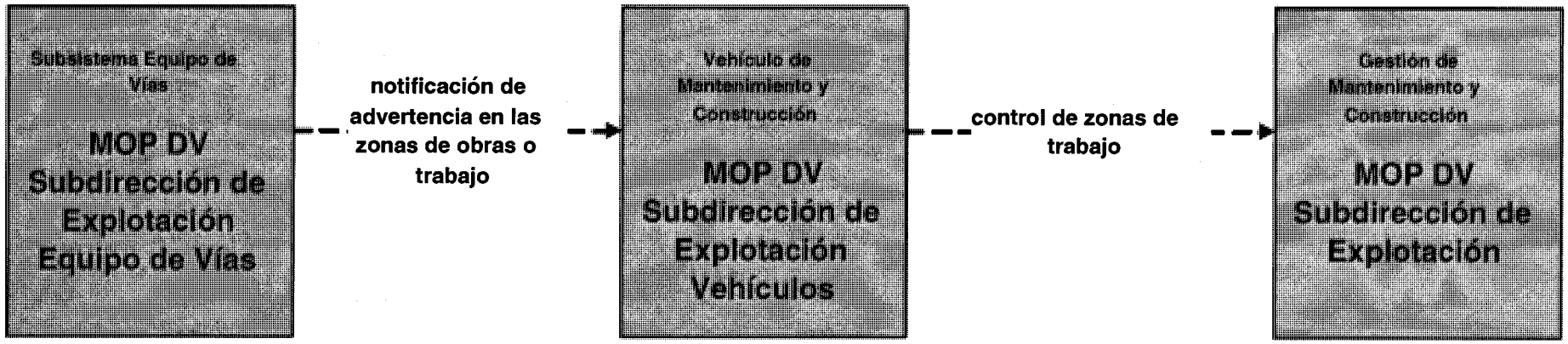


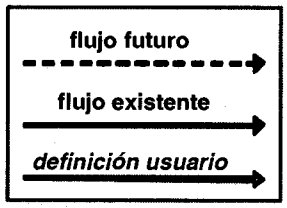
MC08 - Gestión de Trabajos en la Vía
Municipalidad Dirección de Obras



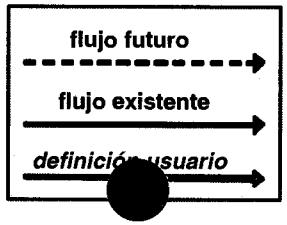
MC09 - Monitoreo de Seguridad en Trabajos en la Vía

MOP DV Subdirección de Explotación



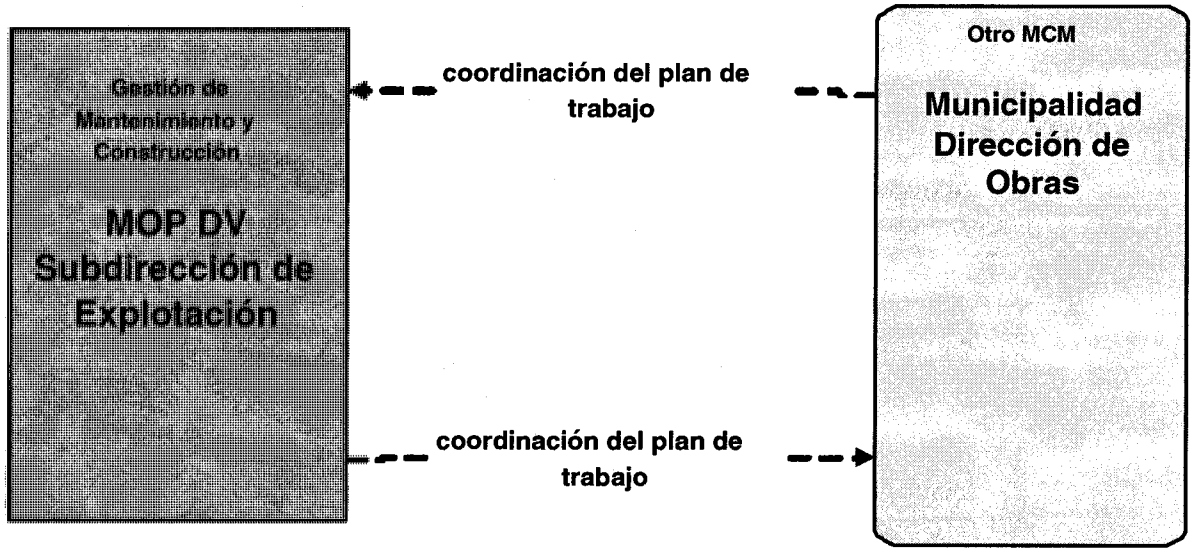


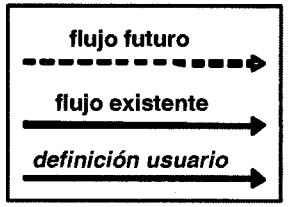
MC09 - Monitoreo de Seguridad en Trabajos en la Vía
Municipalidad Dirección de Obras



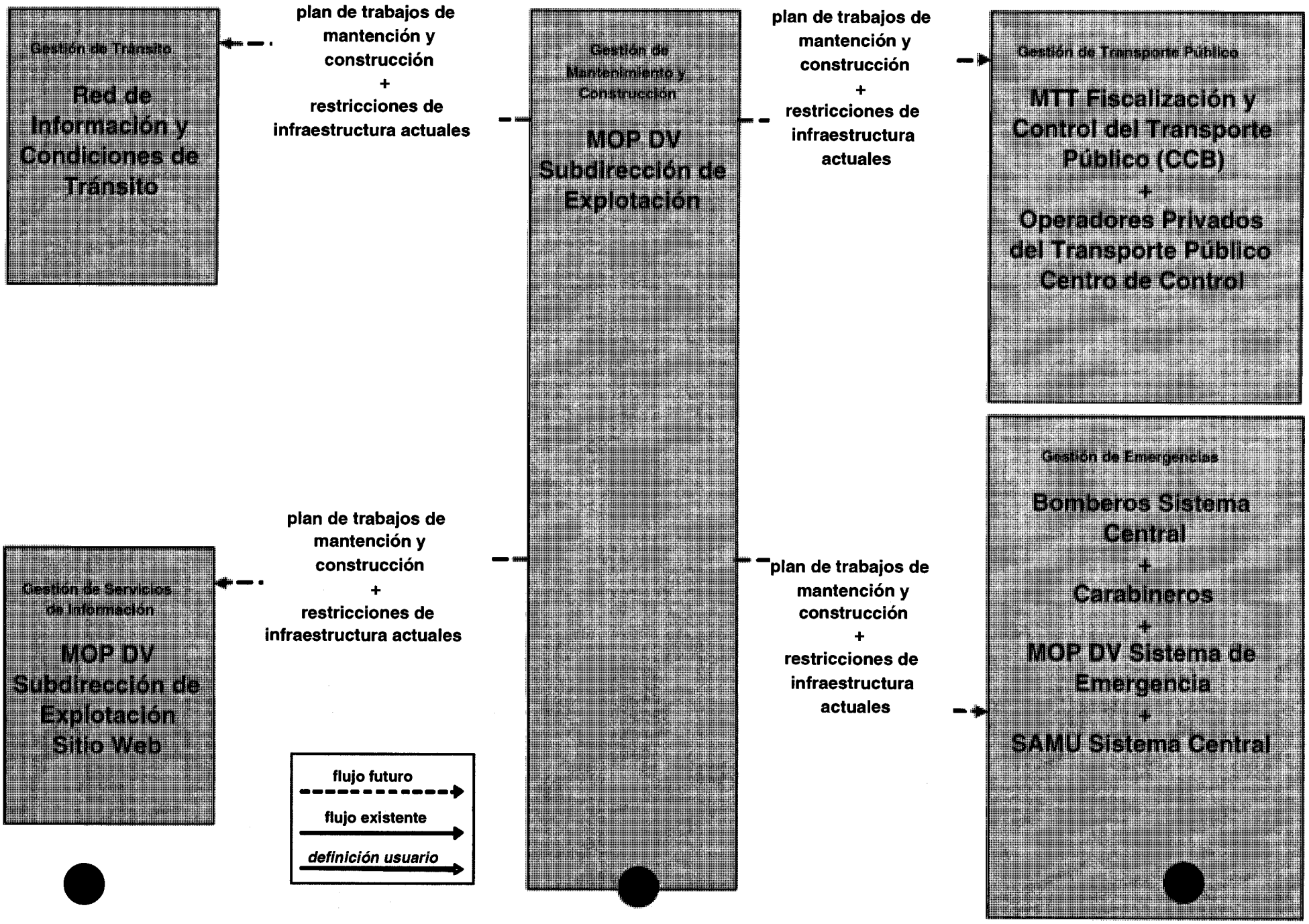
MC10 - Coordinación de Actividades de Mantención y Construcción

MOP DV Subdirección de Explotación

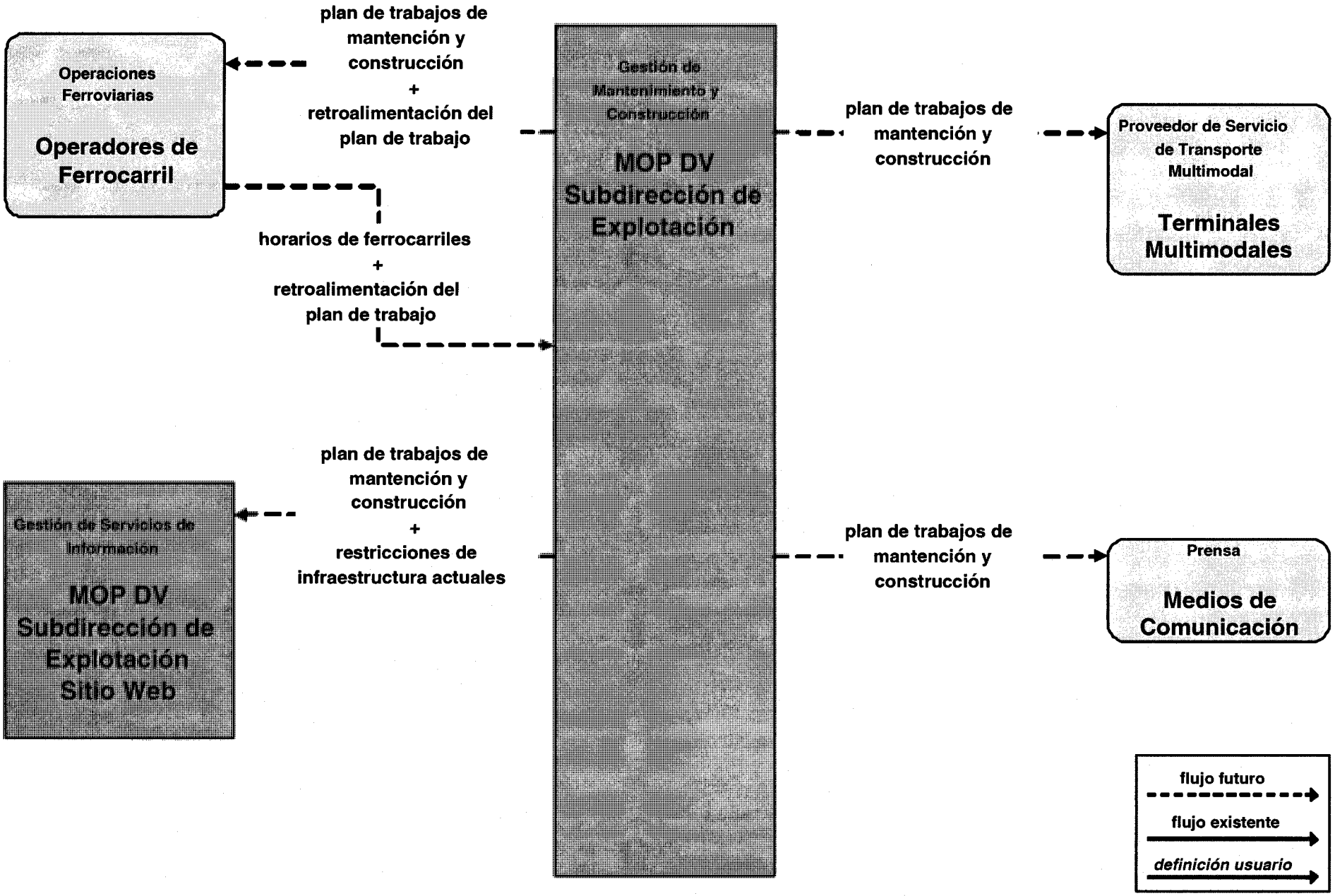




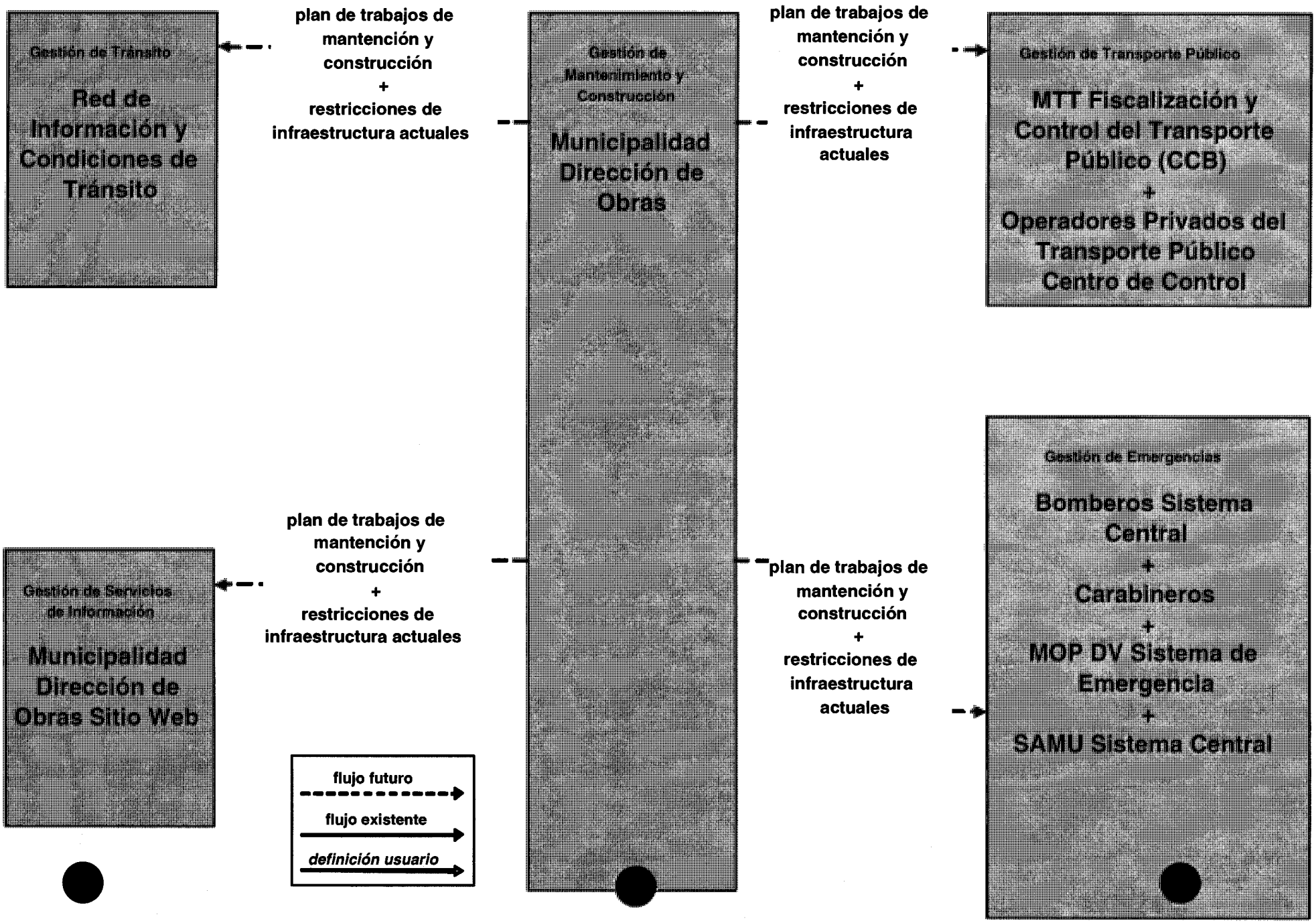
MC10 - Coordinación de Actividades de Mantención y Construcción
MOP DV Subdirección de Explotación



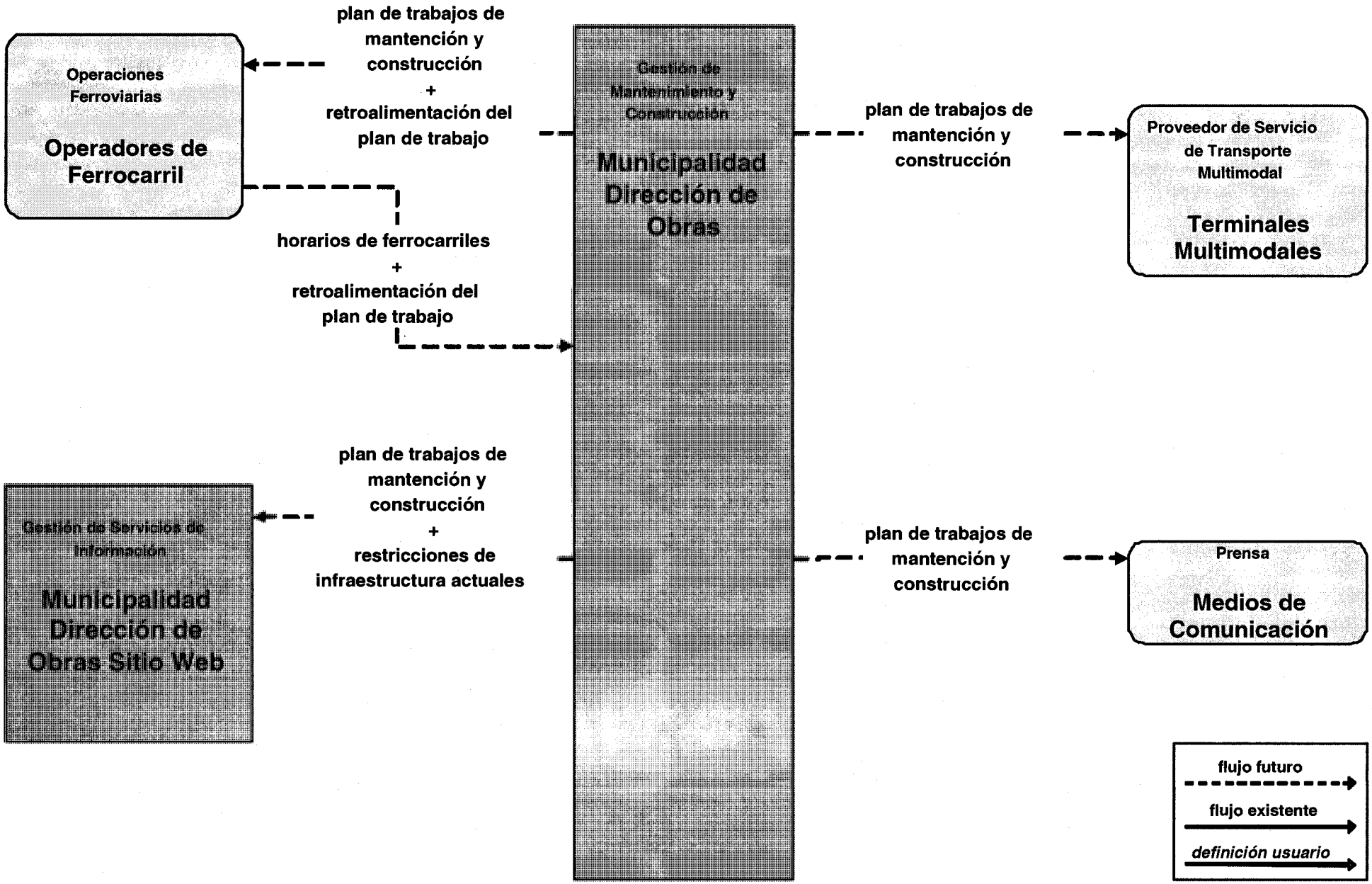
MC10 - Coordinación de Actividades de Mantención y Construcción
MOP DV Subdirección de Explotación



MC10 - Coordinación de Actividades de Mantención y Construcción
Municipalidad Dirección de Obras



MC10 - Coordinación de Actividades de Mantención y Construcción
Municipalidad Dirección de Obras



Task 7, Appendix O - Architecture Flow Descriptions

Architecture Flow	Description
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 intended to initiate a one-time response from the recipient.
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.
archived data product requests	A user-specified request for archived data products (i.e. data, meta data, or data catalogs). The request also includes information that is used to identify and authenticate the user and support electronic payment requirements, if any.
archived data products	Raw or processed data, meta data, data catalogs and other data products provided to a user system upon request. The response may also include any associated transaction information.
audit data	Information to support a tax audit.
border agency clearance results	Notification regarding the granting of permission for commercial freight shipment to enter the U.S.
border clearance data	Trip specific data regarding the movement of goods across international borders. Includes trip identification number. May also include results from recent border crossing screening events.
border clearance data request	Request for trip specific data regarding the movement of goods across international borders. Includes trip identification number. May also include results from recent border crossing screening events.
border clearance event	Reports clearance event data regarding action taken at border, including acceptance or override of system decision, and date/time stamp
border clearance status	Notification regarding the crossing status of commercial freight shipment scheduled to enter the U.S. Includes portions of border agency and transportation agency clearance results, as they become available. Recipients may include trade regulatory agencies that do not receive status information directly from U.S. Customs (e.g., other transportation agencies with trade related responsibilities, such as NHTSA, MARAD, etc.)
broadcast information	General broadcast information that contains link travel times, incidents, advisories, transit services and a myriad of other traveler information.
care facility status	Information regarding facility type and capabilities, facility status, and its ability to admit new patients.
care facility status request	Request for information regarding care facility availability and status.
citation	Report of commercial vehicle citation. The citation includes references to the statute(s) that was (were) violated. It includes information on the violator and the officer issuing the citation. A citation differs from a violation because it is adjudicated by the courts. 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.
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 of proactively by the source. The query flow is not explicitly shown.
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.

Architecture Flow	Description
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." The status information may be provided as a response to a real-time query or as a result of a standing request for updated information (subscription). This may also include information about non-U.S. fleets for use by U.S. authorities, and information regarding U.S. fleets made available to Mexican and Canadian authorities. The query flow is not explicitly shown.
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, and temporary facility restrictions that are imposed during maintenance and construction.
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.
declaration information	Notification containing information regarding pending commercial freight shipment into the U.S.
domestic transportation information	Real-time or near real-time data regarding trade transportation activity. Potentially categorized by shipper classification, carrier, commodity, etc. Intended for use as a transportation decision tool.
driver instructions	Transit service instructions, traffic information, road conditions, and other information for both transit and paratransit drivers.
driver log	A daily log showing hours in service for the current driver.
driver log request	Request for driver log data.
driver to fleet request	Requests from the driver and vehicle for routing, payment, and enrollment information.
electronic lock data	Notification to roadside (via transponder) of the presence and status of electronic cargo locks.
electronic lock data request	Request from roadside for data regarding presence and status of electronic cargo locks.
electronic screening request	Request for identification data to support electronic screening.
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 that describes the archived information.
emergency data request	A request for additional information or a control command issued by the emergency response agency in response to an emergency request for assistance from a traveler.
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 along an emergency vehicle route, or request another special traffic control plan.
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.
emissions data	Emissions data and associated imagery collected by roadside equipment.

Architecture Flow	Description
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 availability	An inventory of the maintenance and construction equipment available at the storage facility. This flow includes the type of equipment, enough descriptive information to indicate its suitability for use, and its current status. This flow may contain information for a specific type of equipment or include all equipment available at the facility.
equipment maintenance status	Current status of field equipment maintenance actions.
event plans	Plans for major events possibly impacting traffic.
fare and price information	Current transit, parking, and toll fee schedule information.
field device status	Reports from field equipment (sensors, signals, signs, controllers, etc.) which indicate current operational status.
field equipment status	Identification of field equipment requiring repair and known information about the associated faults.
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.
hazmat spill notification	This data flow is used by the on-board cargo monitoring equipment package to contact emergency response organizations when the cargo sensors detect a release of hazardous material. This information will include the vehicle location discussed above as well as identifying the carrier. 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.
hri advisories	Notification of Highway-Rail Intersection equipment failure, intersection blockage, or other condition requiring attention, and maintenance activities at or near highway rail intersections.
hri control data	Data required for HRI information transmitted at railroad grade crossings and within railroad operations.
hri operational status	Status of the highway-rail grade crossing equipment including both the current state or mode of operation and the current equipment condition.
hri request	A request for highway-rail intersection status or a specific control request intended to modify HRI operation.
hri status	Status of the highway-rail intersection equipment including both the current state or mode of operation and the current equipment condition.
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 that enables emergency or maintenance personnel in the field to implement an effective, safe incident response.
incident information	Notification of existence of incident and expected severity, location, time and nature of incident.
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. This flow also coordinates a positive hand off of responsibility for all or part of an incident response between agencies.

Architecture Flow	Description
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.
information on violators	Response from law enforcement agency to request for information on violators. May include information about commercial vehicle violations or other kinds of violations associated with the particular entity.
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.
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 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, decision support information, maintenance schedule data, dispatch instructions, personnel assignments, and corrective actions.
maint and constr dispatch status	Current maintenance and construction status including work data, operator status, crew status, and equipment status.
maint and constr equipment repair status	Current maintenance and repair status of the maintenance and construction vehicle fleet and other support equipment. This information includes a record of all maintenance and repair activities performed.
maint and constr fleet information	Information supporting maintenance of the maintenance and construction vehicle fleet and other support equipment. This information includes vehicle status and diagnostic information, vehicle utilization, and coordination of when vehicles will be available for preventative and corrective maintenance.
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 concerning the operational condition of the vehicle and ancillary equipment.
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 pattern), vehicle safety status, and other measures associated with the operation of a maintenance, construction, or other special purpose vehicle. Operational data may include basic operational status of the vehicle equipment or a more precise record of the work performed (e.g., application of crack sealant with precise locations and application characteristics).
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 and spread patterns.
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.
maintenance materials storage status	The amount and availability of maintenance materials in storage facilities.
map update request	Request for a map update which could include a new underlying map or map layer updates.

Architecture Flow	Description
map updates	Map update which could include a new underlying static or real-time map or map layer(s) update.
multimodal archive data	Operational information from alternate passenger transportation modes including air, rail transit, taxis, and ferries. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.
multimodal information	Schedule information for alternate mode transportation providers such as train, ferry, air and bus.
multimodal information request	Information request for alternate mode transportation providers such as train, ferry, air and bus.
multimodal service data	Multimodal transportation schedules and other service 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.
parking availability	Current parking lot occupancy, parking availability, and cost information.
parking demand management request	Request to change the demand for parking facility use through pricing or other mechanisms.
parking demand management response	Response to parking demand management change requests indicating level of compliance with request.
parking information	General parking information and current parking availability.
parking instructions	Information that allows local parking facilities to be managed to support regional traffic management objectives.
parking lot data request	Request for parking lot occupancy, fares, and availability. The request can be a subscription that initiates as-needed information updates as well as a one-time request for information.
parking lot reservation confirmation	Confirmation for parking lot reservation.
parking reservations request	Reservation request for parking lot.
pass/pull-in	Command to commercial vehicle to pull into or bypass inspection station.
patient status	Information that supports assessment of the patient's condition. Information could include general categorization of patient status, patient vital signs, pertinent medical history, and emergency care information.
payment	Payment of some kind (e.g., toll, parking, fare) by traveler which, in most cases, can be related to a credit account.
payment request	Request for payment from financial institution.
payment violation notification	Notification to enforcement agency of a toll, parking, or transit fare payment violation.
personal transit information	General and personalized transit information for a particular fixed route, flexible route, or paratransit system.
pollution data	Measured emissions data comprised of various atmospheric pollutants.
pollution state data request	Aggregated emissions data information request.
railroad advisories	Real-time notification of railway-related incident or advisory.
railroad schedules	Train schedules, maintenance schedules, and other information from the railroad that supports forecast of HRI closures.
request fare and price information	Requests for current fare and price information from a service provider that can be used to augment the traffic manager's overall view of current transportation network status.
request for payment	Request to deduct cost of service from user's payment account.
request for right-of-way	Forwarded request from signal prioritization, signal preemption, pedestrian call, multi-modal crossing activation, or other source for right-of-way.

Architecture Flow	Description
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 that allow preparation of a tailored response. The request can be a subscription that initiates as-needed information updates as well as a one-time request for information.
request for vehicle measures	Request for vehicle performance and maintenance data collected by onboard sensors.
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.
reversible lane status	Current reversible lane status including traffic sensor and surveillance data and the operational status and mode of the reversible lane control equipment.
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 network probe information	Aggregated route usage, travel times, environmental conditions, and other aggregated data collected from probe vehicles.
road weather information	Road conditions and weather information that are made available by road maintenance operations to other transportation system operators.
roadside archive data	A broad set of data derived from roadside sensors that includes current traffic conditions, environmental conditions, and any other data that can be directly collected by roadside sensors. This data also indicates the status of the sensors and reports of any identified sensor faults.
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). This flow can provide message content and delivery attributes, local message store maintenance requests, control mode commands, status queries, and all other commands and associated parameters that support remote management of these systems.
roadway information system status	Current operating status of dynamic message signs, highway advisory radios, beacon systems, or other configurable field equipment that provides dynamic information to the driver.
roadway maintenance status	Summary of maintenance fleet operations affecting the road network. This includes the status of winter maintenance (snow plow schedule and current status).
safety inspection record	Record containing results of commercial vehicle safety inspection.
safety inspection report	Report containing results of commercial vehicle safety inspection. The information may be provided as a response to a real-time query or proactively by the source. The query flow is not explicitly shown.
safety inspection request	Request for safety inspection record.
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 or as a result of a standing request for updated information (subscription). This may also include information about non-U.S. fleets for use by U.S. authorities, and information regarding U.S. fleets made available to Mexican and Canadian authorities. The query flow is not explicitly shown.
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.

Architecture Flow	Description
signal control data	Information used to configure and control traffic signal systems.
signal control status	Status of surface street signal controls.
storage facility request	Request for information about the equipment and/or materials available at a maintenance storage facility.
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.
tag update	Update data held in tag which can be read by another roadside device (Commercial Vehicle Check Subsystem, Toll Collection Subsystem, etc.).
tax filing	Commercial vehicle tax filing data. Authorization for payment is included.
toll archive data	Data indicating toll facility usage and pricing schedules. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.
toll coordination	This flow supports reciprocity between toll agencies/service centers by exchanging information that supports reconciliation of toll charges by customers that are enrolled with other toll service centers. In addition to toll charge reconciliation, exchanged information may include toll schedule information, customer information and other toll service information that is coordinated between toll agencies or centers.
toll data	Current toll schedules for different types of vehicles as well as advanced toll payment information.
toll data request	Request made to obtain toll schedule information or pay a toll in advance. The request can be a subscription that initiates as-needed information updates as well as a one-time request for information.
toll instructions	Demand management toll pricing information based on current congestion.
toll transactions	Detailed list of transactions from a toll station.
track status	Current status of the wayside equipment and notification of an arriving train.
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 that describes the archived information.
traffic control priority request	Request for signal priority at one or more intersections along a particular route.
traffic control priority status	Status of signal priority request functions at the roadside (e.g. enabled or disabled).
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.
transaction status	Response to transaction request. Normally dealing with a request for payment.
transit and fare schedules	Specific transit and fare schedule information including schedule adherence.
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 fare payment requests	Information provided from the transit user location that supports fare payments and associated record-keeping.

Architecture Flow	Description
transit fare payment responses	Information provided by transit management that supports a fare payment transaction.
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 multimodal information	Transit schedule information for coordination at modal interchange points.
transit request confirmation	Confirmation of a request for transit information or service.
transit system data	Current transit system operations information indicating current transit routes, the level of service on each route, and the progress of individual vehicles along their routes for use in forecasting demand and estimating current transportation network performance.
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 conditions	Operating conditions of transit vehicle (e.g., mileage).
transit vehicle location data	Current transit vehicle location and related operational conditions data provided by a transit vehicle.
transit vehicle passenger and use data	Data collected on board the transit vehicle pertaining to availability and/or passenger count.
transit vehicle schedule performance	Estimated times of arrival and anticipated schedule deviations reported by a transit vehicle.
traveler information	Traveler information comprised of traffic status, advisories, incidents, payment information and many other travel-related data updates and confirmations.
traveler information for media	General traveler information regarding incidents, unusual traffic conditions, transit issues, or other advisory information that has been desensitized and provided to the media.
traveler profile	Information about a traveler including equipment capabilities, personal preferences and recurring trip characteristics.
traveler request	Request by a traveler to summon assistance, request information, make a reservation, or initiate any other traveler service.
trip confirmation	Acknowledgement by the driver/traveler of acceptance of a route.
trip declaration identifiers	Specific identifiers extracted from notification containing information regarding pending commercial freight shipment into the U.S. Includes carrier, vehicle, and driver identification data.
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.
trip plan	A sequence of links and special instructions comprising of a trip plan indicating efficient routes for navigating the links. Normally coordinated with traffic conditions, other incidents, preemption and prioritization plans.
trip request	Request by a driver/traveler for special routing.
TRMS coord	Coordination information between local/regional transit organizations including schedule, on-time information, incident information, and ridership.
vehicle pollution criteria	Vehicular pollution acceptance criteria.
vehicle probe data	Vehicle probe data indicating identity, route segment identity, link time and location.
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 and how far out of adjustment it was). A violation differs from a citation because it is not adjudicated by the courts.

Architecture Flow	Description
weather information	Accumulated forecasted and current weather data (e.g., temperature, pressure, wind speed, wind direction, humidity, precipitation, visibility, light conditions, etc.).
widearea statistical pollution information	Aggregated region-wide measured emissions data and possible pollution incident information.
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 and finalized.
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. This information may be augmented with images that provide a visual indication of current work zone status and traffic impacts.
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 notification	Notification of a work zone emergency or safety issue. This flow identifies that a work zone emergency or safety issue has occurred so that warnings may be generated by more than one system in the work zone.
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.

Task 7, Appendix P - Equipment Package Descriptions

Equipment Package	Description
Credentials and Taxes Administration	This Equipment package provides administrative capabilities for commercial vehicle operations including database management and administrator-to-roadside and administrator-to-administrator interfaces. For example, this Equipment package would manage the electronic credentials database for a state, perform reconciliation of mileage and fuel taxes (possibly post trip), and interface with roadsides performing credential checks. This equipment package communicates with similar packages in other CVAS locations to exchange credentials database information. Example locations would be state agency or regional offices that are involved with commercial vehicle operations.
Fleet Administration	This Equipment package provides vehicle tracking, dispatch, and reporting capabilities to fleet management center personnel. It gathers current road conditions and traffic information, prepares vehicle routes, and provides a fleet interface for toll collection. It also provides route plan information for network performance evaluation.
Toll Administration	This Equipment package provides the capability to maintain database information with pricing structure information. This capability shall be provided through database software containing pricing structure and current traffic conditions on the transportation network obtained from the transportation management center. This capability allows the determination of dynamic tolls according to congestion levels for demand management. Secure wireline communications with the financial infrastructure and distributed toll plazas supports electronic payments and other ancillary requirements such as lost/stolen tag identification and management. Dependent on customer account requirements and the clearinghouse arrangement, this Equipment package may also contain a billing database.
CV Safety Administration	This Equipment package augments the Credentials and Taxes Administration Equipment package with safety data. This package ensures that safety criteria are available for automated roadside safety checks. It supports the collection and review of carrier safety data and determines the carrier safety rating.
Transit Garage Operations	This Equipment package automates and supports the assignment of transit vehicles and drivers to enhance the daily operation of a transit service. It provides the capability to assign drivers to routes or service areas in a fair manner while minimizing labor and overtime services, considering driver preferences and qualifications, and automatically tracking and validating the number of work hours performed by each individual driver.
International CV Administration	This Equipment package is used by government agencies such as customs and immigration, carriers, and service providers (e.g., brokers) to generate and process the entry documentation necessary to obtain release of vehicle, cargo, and driver across and international border, report the results of the crossing event, and handle duty fee processing.
Freight Administration and Management	This equipment package provides the communication necessary to track cargo from source to destination via links to intermodal freight shippers and depots. There are also communication links to cargo routing services.

Equipment Package	Description
ITS Data Repository	This equipment package collects data and data catalogs from one or more data sources and stores the data in a focused repository that is suited to a particular set of ITS data users. This equipment package includes capabilities for performing quality checks on the incoming data, error notification, and archive to archive coordination. This equipment package supports a broad range of implementations, ranging from simple data marts that collect a focused set of data and serve a particular user community to large-scale data warehouses that collect, integrate, and summarize transportation data from multiple sources and serve a broad array of users within a region.
Vehicle Probe Support	This Equipment package includes capabilities for the probe vehicle to identify its location, measure traffic conditions such as link travel time and speed and possibly environmental hazards such as icy road conditions, and transmit these data to either the ISP or TMC.
MCV Work Zone Support	This equipment package provides communications and support for local management of a work zone.
On-board EV En Route Support	This Equipment package provides capabilities that support safe and expedient arrival to and departure from the incident scene. This package provides dispatch and routing information, tracks the vehicle, and preempt signals via short range communication directly with traffic control equipment at the roadside.
Mayday Support	This Equipment package receives Mayday messages, determines an appropriate response, and either uses internal resources or contacts a local agency to provide that response. The nature of the emergency is determined based on the information in the mayday message as well as other inputs. This package effectively serves as an interface between automated mobile mayday systems and the local public safety answering point for messages which require a public safety response.
Transit Center Multi-Modal Coordination	This Equipment package provides the transit management subsystem the capability to determine the need for transit priority on routes and at certain intersections and request transit vehicle priority at these locations. It also supports schedule coordination between transit properties and coordinates with other surface and air transportation modes.
Transit Center Fixed-Route Operations	This Equipment package enhances the planning and scheduling associated with fixed route transit services. The package allows fixed-route services to develop, print and disseminate schedules and automatically updates customer service operator systems with the most current schedule information. Current vehicle schedule adherence and optimum scenarios for schedule adjustment shall also be provided.
Transit Center Tracking and Dispatch	This Equipment package provides the capabilities for monitoring transit vehicle locations and determining vehicle schedule adherence. The Equipment package shall also furnish users with real-time travel related information, continuously updated with real-time information from each transit system within the local area of jurisdiction, inclusive of all transportation modes, from all providers of transportation services, and provide users with the latest available information on transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents conditions, weather conditions, and special events. This Equipment package also supports the capability for two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility.

Equipment Package	Description
Transit Center Security	This Equipment package provides the capability to monitor key transit locations and transit vehicles with both video and audio systems automatically alerting operators and police of potential incidents and supporting traveler activated alarms. The monitoring equipment shall also include capabilities to assist in responding to terrorist incidents.
Transit Center Information Services	This equipment package collects the latest available information for a transit service and makes it available to transit customers and to Information Service Providers for further distribution. Customers are provided information at transit stops and other public transportation areas before they embark and on-board the transit vehicle once they are enroute. Information provided can include the latest available information on transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, and special events. In addition to general service information, tailored information (e.g, itineraries) are provided to individual transit users.
Transit Center Fare and Load Management	This Equipment package provides the capability to accept collected data required to determine accurate ridership levels and implement variable and flexible fare structures. Support shall be provided for the traveler for use of a fare medium for all applicable surface transportation services, to pay without stopping, have payment media automatically identified as void and/or invalid and eligibility verified, and allow for third party payment. In addition, capability to provide expansion into other uses for payment medium such as retail and telephone and for off-line billing for fares paid by agencies shall be supported. This Equipment package also supports the capability for two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis if desired. These capabilities shall be provided through a workstation type processor with GUI, high capacity storage, ride share software housed in a building with dialup lines and wireline telephone and require integration with an existing Transit Center Tracking and Dispatch Equipment package.
Roadway Freeway Control	Ramp meters, CMS and other freeway control effects which will control traffic on freeways.
TMC Signal Control	This Equipment package provides the capability for traffic managers to monitor and manage the traffic flow at signalized intersections. This capability includes analyzing and reducing the collected data from traffic surveillance equipment and developing and implementing control plans for signalized intersections. Control plans may be developed and implemented that coordinate signals at many intersections under the domain of a single traffic management subsystem. In advanced implementations, this package collects route planning information and integrates and uses this information in predicting future traffic conditions and optimizing the traffic control strategy for these conditions. These capabilities are achieved through real-time communication of logged routes from an Information Service Provider. The planned control strategies can be passed back to the Information Service Provider so that the intended strategies can be reflected in future route planning.
Roadway Signal Controls	This Equipment package provides the capabilities to control traffic signals at major intersections and on main highways for urban areas. This Equipment package is generally constrained to a single jurisdiction.

Equipment Package	Description
Roadway Reversible Lanes	This Equipment package provides the capability for control of reversible lanes using sensor and actuator type equipment. This Equipment package also provides the capability to notify users the direction of the reversible lanes using electronic lane signs.
TMC Regional Traffic Control	This Equipment package provides capabilities in addition to those provided by the TMC Basic Signal Control Equipment package for analyzing, controlling, and optimizing area-wide traffic flow. These capabilities provide for wide area optimization integrating control of a network signal system with control of freeway, considering current demand as well as expected demand with a goal of providing the capability for real-time traffic adaptive control while balancing inter-jurisdictional control issues to achieve regional solutions. These capabilities are best provided using a Traffic Management Center (TMC) to monitor and manage freeway ramp meters and intersection traffic signals and software to process traffic information and implement traffic management measures (e.g., ramp metering, signalization, and traffic coordination between both local and regional jurisdiction). The TMC shall be able to communicate with other TMCs in order to receive and transmit traffic information on other jurisdictions within the region.
MCM Work Activity Coordination	This equipment package disseminates work activity schedules to other agencies. Work schedules are coordinated, factoring in the needs and activities of other agencies and adjacent jurisdictions.
TMC Incident Dispatch Coordination/Communication	This Equipment package provides the capability for an incident response formulation function minimizing the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as coordinating response with all appropriate cooperating agencies.
TMC Multimodal Coordination	This Equipment package provides traffic signal priority for transit vehicles. Two options are provided including a wide-area option based on center to center communications between the Traffic Management and Transit Managemetn Subsystems and a localized option based on direct communications between the transit vehicle and the individual intersection.
TMC Toll/Parking Coordination	This Equipment package provides the transportation management center with the capability to transform and transmit network traffic congestion information to the Toll Administration or Parking Management so that dynamic pricing for demand management is possible.
Standard Rail Crossing	This Equipment Package manages highway traffic at highway-rail intersections (HRIs) where operational requirements do not dictate advanced features (e.g., where rail operational speeds are less than 80 miles per hour). Either passive (e.g., the crossbuck sign) or active warning systems (e.g., flashing lights and gates) are supported depending on the specific requirements for each intersection. These traditional HRI warning systems may also be augmented with other standard traffic management devices. The warning systems are activated on notification by interfaced wayside equipment of an approaching train. The equipment at the HRI may also be interconnected with adjacent signalized intersections so that local control can be adapted to highway-rail intersection activities. Health monitoring of the HRI equipment and interfaces is performed; detected abnormalities are reported through interfaces to the wayside interface equipment and the traffic management subsystem.
International Border Crossing	This Equipment package is used by government agencies such as customs and immigration to check compliance with import/export and immigration regulations to allow release of cargo, vehicle, and driver across an international border.

Equipment Package	Description
On-board CV Electronic Data	This Equipment package provides the Commercial Vehicle Subsystem the capability for two-way data exchange between the vehicle and the roadside facility with the transmission of information such as status of driver, vehicle, and carrier IDs and cargo information. The driver, vehicle and carrier are identified via the tag so that actual weight from roadside mainline weigh-in-motion may be checked. This includes only the equipment on the commercial vehicle including a processor/tag for identification, especially a HAZMAT identification. The actual reading and processing required for the credential checking and weigh-in-motion will be performed by the roadside.
Emergency Dispatch	This Equipment package supports efficient dispatch of emergency vehicles. It tracks emergency vehicles, dispatches these vehicles to an incident, and provides safe and efficient routes based on real-time traffic information.
TMC Incident Detection	This Equipment package provides the capability to traffic managers to detect and verify incident. This capability includes analyzing and reducing the collected data from traffic surveillance equipment, including planned incidents and hazardous conditions.
TMC Traffic Information Dissemination	This Equipment package provides the capability to disseminate incident related information to travelers, potential travelers, and private information service providers. These capabilities shall be provided using a workstation type processor within a facility connected to traveler information providers by utilizing existing wireline links.
Roadway Traffic Information Dissemination	This Equipment package provides the roadside elements of traffic information dissemination including DMS, HAR, and talking pedestrian signs.
Basic Information Broadcast	This Equipment package provides the capabilities to collect, process, store, bill, and disseminate traveler information including traveler, transit, ride matching, traffic, and parking information. The traveler information shall include maintaining a database of local area services available to travelers with up-to-the-minute information and providing an interactive connectivity between, sponsors, and providers of services. The transit information shall include the latest available information on transit routes and schedules, transit transfer options, transit fares, and real-time schedule adherence. The traffic information shall include latest available information on traffic and highway conditions, and current situation information in real-time including incidents, road construction, recommended routes, current speeds on specific routes, current parking conditions in key areas, schedules for any current or soon to start events, and current weather situations. This Equipment package shall also provide users with real-time travel related information while they are traveling, and disseminate to assist the travelers in making decisions about transfers and modification of trips. These capabilities shall be provided using equipment such as a fixed facility with a communications system such as a data Subcarrier multiplexing device.
On-board Transit Signal Priority	This Equipment package provides the capability for transit vehicles to request signal priority through short range communication directly with traffic control equipment at the roadside.
TMC Traffic Network Performance Evaluation	This Equipment package provides the capability to predict travel demand patterns to support traffic flow optimization, demand management, and incident management. This Equipment package requires the data collected by surveillance Equipment packages as well as input from other management subsystems including the ISP Subsystem, Transit Management Subsystem.

Equipment Package	Description
TMC Freeway Management	Control system for efficient freeway management including integration of surveillance information with freeway road geometry, vehicle control such as ramp metering, CMS, HAR. Interface to coordinated traffic subsystems for information dissemination to the public.
Emissions Data Management	This Equipment package assimilates and stores air quality measures and roadside collected emissions data. General air quality measures are distributed as general traveler information and also may be used for in demand management programs. Collected roadside emissions are analyzed and used to detect, identify, and notify concerned parties regarding vehicles that exceed emissions standards.
Parking Management	This Equipment package provides the capability to detect and classify properly equipped vehicles entering and exiting the parking facility, and to maintain database information with parking availability and pricing structure information. This capability shall be provided through the utilization of active/passive tag readers and database software containing parking pricing structure and current availability. Wireline communications with clearinghouse operators (the Financial Institution terminator) enable processing of financial transactions.
Fleet HAZMAT Management	This Equipment package provides the Fleet and Freight Management Subsystem the capabilities to enhance the Fleet Administration Equipment package functions by adding HAZMAT tracking. The additional requirements to perform this function include enhanced processing and enhanced fleet management software. In order to effectively track HAZMAT cargo, communication interfaces to Information Service Providers, and Emergency Management Subsystems shall be provided, including additional communication software.
MCM Incident Management	This equipment package supports coordinated response to highway incidents. Incident notifications are shared, incident response resources are managed, and the overall incident situation and incident response is coordinated among allied response organizations.
Fleet Maintenance Management	This Equipment package provides the capability to use vehicle mileage data to automatically generate preventative maintenance schedules for each specific vehicle by utilizing vehicle tracking data from the prerequisite tracking Equipment package. In addition, capability to automatically ensure that proper service personnel are provided information for maintenance activities and to record and verify that maintenance work was performed shall be provided.
MCM Winter Maintenance Management	This equipment package manages winter road maintenance, tracking and controlling snow plow operations, roadway treatment (e.g., salt spraying and other material applications) based on weather information.
TMC Reversible Lane Management	This Equipment package provides the capability for access and management of reversible lane facilities, including the direction of traffic flow changes during the day, especially between the peak hours and dedication of more lanes to the congestion direction during special events.
Emergency Response Management	This Equipment package develops and stores emergency response plans and manages overall coordinated response to emergencies. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. This Equipment package provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It provides vital communications linkages which provide real-time information to emergency response personnel in the field.

Equipment Package	Description
On-board Transit Fare and Load Management	This Equipment package provides the capability to collect data required to determine accurate ridership levels and implement variable and flexible fare structures. Support shall be provided for the traveler for use of a fare medium for all applicable surface transportation services, to pay without stopping, have payment media automatically identified as void and/or invalid and eligibility verified, and allow for third party payment. In addition, capability to provide expansion into other uses for payment medium such as retail and telephone and for off-line billing for fares paid by agencies shall be supported. This Equipment package also supports the capability for two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis if desired. These capabilities require integration with an existing On-board Trip Monitoring Equipment package.
HRI Traffic Management	This equipment package monitors highway-rail intersection (HRI) equipment at the roadside which manages highway traffic. Various levels of roadside equipment may be interfaced to, and supported by, this equipment package to include standard speed active warning systems and high speed systems which provide additional information on approaching trains and detect and report on obstructions in the HRI. This equipment package remotely monitors and reports the status of this roadside equipment. A two way interface supports explicitly status requests or remote control plan updates to be generated by this equipment package. Status may also be received periodically in the absence of a request or asynchronously in the event of a detected failure or other unsafe condition at the intersection.
TMC Work Zone Traffic Management	This equipment package supports coordination with maintenance systems so that work zones are established that have minimum traffic impact. Traffic control strategies are implemented to further mitigate traffic impacts associated with work zones that are established.
MCM Work Zone Management	This equipment package remotely monitors and supports work zone activities, controlling traffic through portable dynamic message signs (DMS) and informing other groups of activity (e.g., ISP, TM, other maintenance and construction centers) for better coordination management. Work zone speeds and delays are provided to the motorist prior to the work zones.
MCM Vehicle and Equipment Maintenance Management	This equipment package monitors vehicle and equipment condition, tracks maintenance history, and schedules routine and corrective maintenance.
Remote Transit Fare Management	This Equipment package provides the capability for the traveler to use a common fare medium for all applicable surface transportation services, to pay without stopping, have payment media automatically identified as void and/or invalid and eligibility verified. This may be implemented as a payment instrument reader at a kiosk. In addition, capability to provide expansion into other uses for payment medium such as retail and telephone and for off-line billing for fares paid by agencies shall be supported.

Equipment Package	Description
Fleet Credentials and Taxes Management and Reporting	This Equipment package provides the Fleet and Freight Management Subsystem the capabilities to purchase credentials and file trip reports electronically by the fleet managers, to perform automated enrollment at the roadside facilities, and electronically manage the credentials checking by the roadside commercial vehicle inspectors. The electronic purchase shall be performed in accordance with developing standards such that a single integrated system for electronic payments might develop ensuring that deployment across multiple agency political boundaries is performed without degradation. Inherent to credential management shall be the management of the vehicles, with a prerequisite of the vehicle tracking software from the Fleet Administration Equipment package.
Personal Provider-Based Route Guidance	This Equipment package coordinates with an ISP-Based route planning service to select a suggested route plan that is tailored to the traveler's preferences. Coordination may continue during the trip so that the route plan can be modified to account for new information. Many equipment configurations are possible including systems that provide a basic route plan to the traveler as well as more sophisticated systems that can provide transition by transition guidance to the traveler along a multi-modal route plan.
Vehicle Provider-Based Route Guidance	This Equipment package coordinates with an ISP-Based route planning service to select a suggested route plan that is tailored to the driver's preferences. Coordination continues during the trip so that the route plan can be modified to account for new information and vehicle probe data can be returned to the ISP. Many equipment configurations are possible including basic systems that provide only a route plan to the driver as well as systems that include the necessary on-board equipment to provide turn by turn route guidance following the selected route.
Interactive Infrastructure Information	This Equipment package shall have as prerequisite the capabilities of the Basic Information Broadcast Equipment package. This Equipment package augments the Basic Information Broadcast Equipment package by providing the capabilities for interactive traveler information.
Infrastructure Provided Route Selection	This Equipment package shall have as prerequisite the capabilities of the Interactive Infrastructure Information Equipment package. In addition, this Equipment package provides the capability to provide specific directions to travelers by receiving origin and destination requests from travelers, generating route plans, returning the calculated plans to the users, and then potentially logging the route plans with Traffic Management Subsystem. Route plans can include bicycle routes, walkways, skyways, and multi-use trails. This additional capability shall be provided using equipment such as a workstation type processor and software for route planning and traffic measurements along with additional communications capabilities including dialup lines, PCS telephones, and wireless data transceivers.
CV Information Exchange	This equipment package supports the exchange of safety and credentials data among jurisdiction. The package also supports the exchange of safety and credentials data between agencies (for example, an administrative center and the roadside check facilities) within a single jurisdiction. Data are collected from multiple authoritative sources and packaged into snapshots (top-level summary and critical status information) and profiles (detailed and historical data).
Vehicle Toll/Parking Interface	This Equipment package shall provide the capability for vehicle operators to pay toll without stopping their vehicles and pay for parking without the use of cash. These capabilities shall be provided through the use of equipment such as an active tag interface and debit/credit card interface.

Equipment Package	Description
MCV Vehicle Location Tracking	This equipment package tracks vehicle location and reports this location to a dispatch center.
Traffic Maintenance	This Equipment package provides monitoring and remote diagnostics of field equipment to detect field equipment failures, issues problem reports, and tracks the repair or replacement of the failed equipment.
MCV Winter Maintenance	This equipment package supports snow plow operations and other roadway treatments (e.g., salt spraying and other material applications).
MCM Roadway Maintenance and Construction	This equipment package provides overall management and support for routine maintenance on a roadway system or right-of-way. Services managed are landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment on the roadway (e.g., signs, traffic controllers, traffic detectors, dynamic message signs, traffic signals, etc.). Environmental conditions information is also received from various weather sources to aid in scheduling routine maintenance activities.
MCV Roadway Maintenance and Construction	This equipment package includes the on-board systems that support routine non-winter maintenance on a roadway system or right-of-way. Routine maintenance includes landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment on the roadway (e.g., signs, traffic controllers, traffic detectors, dynamic message signs, traffic signals, etc.).
On-board Maintenance	This Equipment package provides the capability to use transit vehicle mileage data to automatically generate preventative maintenance schedules for each specific bus by utilizing vehicle tracking data and storing with a trip computer. It also provides the capability for real-time condition monitoring on board the vehicle, and transmission of this information via two-way communication to the management center.
Emergency Secure Area Surveillance	This Equipment package monitors Remote Traveler Subsystem locations such as transit stations, rest areas, tourist centers, park and ride lots, and other locations frequented by travelers. It provides both video and audio surveillance information to emergency personnel. It automatically alerts emergency personnel of potential incidents and supports traveler activated alarms at these locations.
Roadway Basic Surveillance	This Equipment package provides the capabilities to monitor traffic flow in major intersections and on main highways for urban areas and to monitor road conditions using fixed equipment such as loop detectors and wireline communication.
Secure Area Monitoring	This Equipment package provides the capability to monitor the safety of travelers at Remote Traveler Subsystem locations such as transit stations, rest areas, tourist centers, park and ride lots, and other locations frequented by travelers. It collects surveillance images and data and relays this information back to the Transit Management and Emergency Management Subsystems.
Roadway Emissions Monitoring	This Equipment package monitors emissions and general air quality and communicates the collected information back to the emissions management subsystem where it can be monitored, analyzed, and used. This equipment package supports point monitoring of individual vehicle emissions as well as general monitoring of standard air quality measures.

Equipment Package	Description
Roadway Infrastructure Monitoring	This equipment package monitors the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts). It includes sensors that monitor the infrastructure and the communications necessary to report this data to a center or vehicle-based maintenance system.
MCV Infrastructure Monitoring	This on-board equipment package monitors the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts). It includes vehicle-based sensors that directly monitor the infrastructure, communications that allow roadway-based infrastructure monitoring sensors to be controlled and read, and data communications that allows collected infrastructure condition information to be reported back to a center.
MCV Vehicle Safety Monitoring	This equipment package detects vehicle intrusions in the vicinity of the vehicle and warns crew workers and drivers of imminent encroachment. Crew movements are also monitored so that the crew can be warned of movement beyond the designated safe zone. This equipment package can be used for stationary work zones or in mobile applications where a safe zone is maintained around the moving vehicle.
TMC Environmental Monitoring	This equipment package assimilates current and forecast road conditions and surface weather information using a combination of weather service provider information and an array of environmental sensors deployed on and about the roadway. The collected environmental information is monitored and presented to the operator. This information can be used to more effectively deploy road maintenance resources, issue general traveler advisories, and support location specific warnings to drivers. Other equipment packages process the collected information and provide decision support.
Roadway Environmental Monitoring	This Equipment package measures environmental conditions and communicates the collected information back to a center where it can be monitored and analyzed. A broad array of general weather and road surface information may be collected. Weather conditions that may be measured include temperature, wind, humidity, precipitation, and visibility. Surface and sub-surface sensors can measure road surface temperature, moisture, icing, salinity, and other measures.
On-board Trip Monitoring	This Equipment package provides the capabilities to support fleet management with automatic vehicle location and automated mileage and fuel reporting and auditing. This package may also record other special events resulting from communication with roadside equipment. This includes only the equipment on board the vehicle to support this function including the vehicle location devices such as GPS equipment, communication interfaces, a processor to record trip length, and the sensors/actuators/interfaces necessary to record mileage and fuel usage.
On-board Transit Trip Monitoring	This Equipment package provides the capabilities to support fleet management with automatic vehicle location and automated mileage and fuel reporting and auditing. This package may also record other special events resulting from communication with roadside equipment. This includes only the equipment on board the vehicle to support this function including the vehicle location devices such as GPS equipment, communication interfaces, a processor to record trip length, and the sensors/actuators/interfaces necessary to record mileage and fuel usage.
Parking Electronic Payment	This Equipment package supports electronic payment of parking fees.

Equipment Package	Description
Toll Plaza Toll Collection	This Equipment package provides existing toll plazas the capability to identify properly equipped vehicles and automatically perform toll collection. These capabilities are provided with active tag readers and vehicle identification software running on a workstation type processor. A camera for performing violation identification shall interface to a monitor, the workstation, and database software. Automated account reconciliation and notification to authorities of violations shall be supported using wireline communications.
Roadside WIM	This Equipment package allows for roadside high speed weigh in motion. This package can be fixed to a location or mobile. It can include an interface to the credential check package and augment electronic credentials check with electronic weight check or it can be a stand alone package with display.
Roadway Probe Beacons	This Equipment package monitors traffic and road conditions by collecting information from passing vehicles that are equipped with a transponder or other short range communications device. The probe data collected by this equipment package may include link travel times, average speeds, road conditions, and any other data that can be measured and communicated by passing vehicles. This equipment package consists of roadside equipment that communicates with passing vehicles using dedicated short range communications, collects the information provided by the vehicles, and forwards this information back to the Traffic Management Subsystem.
MCM Environmental Information Processing	This equipment package processes current and forecast weather data, road condition information, local environmental data, and uses internal models to develop specialized detailed forecasts of local weather and surface conditions. The processed environmental information products are presented to the user.
Emergency Call-Taking	This Equipment package supports the emergency call-taker, collecting available information about the caller and the reported emergency, and forwarding this information to other equipment packages that formulate and manage the emergency response. This equipment package receives 9-1-1, 7-digit local access, and motorist call-box calls and interfaces to other agencies to assist in the verification and assessment of the emergency and to forward the emergency information to the appropriate response agency.
Interactive Vehicle Reception	This Equipment package shall provide the capability for drivers to interface with the ISP Subsystem Infrastructure Equipment packages including the Interactive Infrastructure Information Equipment package, the Infrastructure Provided Route Selection, Yellow Pages and Reservation, and Dynamic Ridesharing Equipment packages. These capabilities shall be provided using the Vehicle Subsystem equipment.
Traffic Data Collection	This equipment package collects and stores traffic information that is collected in the course of traffic operations performed by the Traffic Management Subsystem. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
Collect Traffic Surveillance	This Equipment package collects, stores, and provides electronic access to the traffic surveillance data.
MCM Environmental Information Collection	This equipment package collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway. In addition to fixed sensor stations at the roadside, this equipment package also collects environmental information from sensor systems located on Maintenance and Construction Vehicles, and sensor data that is made available by other systems..

Equipment Package	Description
ISP Probe Information Collection	This Equipment package supports the collection of vehicle probe data by the ISP. It provides the capability to accept and process probe vehicle information. This capability shall be provided through the use of additional hardware and probe vehicle control and tracking software.
TMC Probe Information Collection	This Equipment package provides the capability to accept and process probe vehicle information. This capability shall be provided through the use of additional hardware and probe vehicle control and tracking software.
Citation and Accident Electronic Recording	The equipment package documents violations and forwards the information to the Commercial vehicle if available and to the CVAS for processing as part of the normal credentials processing package
Roadside Safety Inspection	This Equipment package provides the Commercial Vehicle Check Subsystem the capabilities for operators to automate the roadside safety inspection process including the support of use of hand held devices to rapidly inspect the vehicle and driver. In addition this Equipment package provides the Roadside Check Subsystem the capabilities for operators to automate the roadside safety inspection process including the support of automated mainline speed reading of on-board safety data to rapidly screen the vehicle and driver. This Equipment package shall also provide the capabilities to collect, store, maintain, and provide safety data and access historical safety data after receiving identification from vehicles at mainline speeds or while stopped at the roadside. Results of screening and summary safety inspection can be written back onto the tag. The capabilities to process safety data and issue pull-in messages or provide warnings to the driver, carrier, and enforcement agencies shall be provided. These capabilities have a prerequisite of the Roadside Electronic Screening Equipment package and shall be provided primarily through the utilization of an additional safety database.Since a vehicle may cross jurisdiction boundaries during a trip, this equipment package supports the concept of a last clearance event record (aka trip ticket) carried on the vehicle s tag. The last clearance event record reflects the results of the roadside verification action. For example, if the vehicle is pulled over in State A and undergoes credential, weight, and safety checks, the results of the clearance process are written to the vehicle s tag. If the vehicle continues the trip and passes a roadside station in State B, the State B station has access to the results of the previous pull-in because it can read the last clearance event record written by the State A roadside station.
On-board CV Safety	This Equipment package provides the Commercial Vehicle Subsystem the capability to collect and process on board vehicle and driver safety information to monitor the safety status and supply this information to the roadside facilities both at mainline speeds and while stopped for inspections. The capability to alert the commercial vehicle driver whenever there is a critical safety problem or potential emergency shall also be provided. These capabilities include only the equipment on the commercial vehicle including the sensors and processors to monitor the vehicle and driver with the information stored on the vehicle. When the information is transmitted to the roadside facility or after the trip, it will utilize the communication devices already in place. The package will also support onboard driver safety log maintenance and checking.
On-board Transit Security	This Equipment package provides the capability to monitor the safety of transit vehicles using on-board safety sensors, processors and communications from the prerequisite On-board Trip Monitoring Equipment package.
Roadway Work Zone Safety	This equipment package detects vehicle intrusions in work zones and warns crew workers and drivers of imminent encroachment. Crew movements are also monitored so that the crew can be warned of movement beyond the designated safe zone.

Equipment Package	Description
Roadside Electronic Screening	This Equipment package provides the Commercial Vehicle Check Subsystem the capabilities for two-way communication with approaching properly equipped commercial vehicles at mainline speeds, reading tags for automated vehicle identification and credential checking. There will be a capability to appropriately screen all vehicles, not just those that are equipped. This Equipment package shall be able to process the data from the commercial vehicles along with accessed database information to determine whether a pull-in message is needed or to generate random pull-in messages with provisions for facility operators and enforcement officials to have manual override capabilities. Support shall be provided to both interstate and intrastate carriers.
Roadside Signal Priority	This Equipment package shall provide the capability to receive vehicle signal priority requests and control roadside signals accordingly.
Virtual Data Warehouse Services	This equipment package provides capabilities to access "in-place" data from geographically dispersed archives and coordinate information exchange with a local data warehouse. While many of the functions performed by this equipment package are similar to the functions inherent in other archived data management subsystem equipment packages (e.g. data management, fusion, analysis) this equipment package also provides the specialized publishing, directory services, and transaction management functions associated with coordinating remote archives. In addition, this equipment package performs functions on an as-needed basis, thereby negating the need to maintain the comprehensive set of data from the remote archives in the local data warehouse.
MCV Vehicle System Monitoring and Diagnostics	This equipment package includes on-board sensors capable of monitoring the condition of each of the vehicle systems and diagnostics that can be used to support vehicle maintenance.
Personal Interactive Information Reception	This Equipment package shall provide the capability for travelers to interface with the ISP Subsystem Infrastructure Equipment packages including the Interactive Infrastructure Information Equipment package, and the Infrastructure Provided Route Selection, Yellow Pages and Reservation, and Dynamic Ridesharing Equipment packages. These capabilities shall be provided using the Personal Information Access Subsystem equipment such as cellular telephone, interactive TV, Personal Computer, and pager with alpha display using communication medium and equipment such as two-way radio, CATV, and wireless data transceivers.
Personal Mayday I/F	This Equipment package shall provide the capability to initiate a distress signal and cancel a prior issued manual request for help using the Personal Information Access Subsystem. This capability shall be provided using equipment such as a processor to automatically dial the Emergency Management Subsystem and provide location.
Remote Transit Information Services	The Equipment package furnishes transit users with real-time travel-related information at transit stops, multi-modal transfer points, and other public transportation areas. It provides transit users with the latest available information on transit routes, schedules, transfer options, bicycle accessibility, fares, real-time schedule adherence, current incidents, weather conditions, and special events. In addition to tailored information for individual transit users, this equipment package supports general annunciation and/or display of imminent arrival information and other information of general interest to transit users.

Equipment Package	Description
Remote Mayday I/F	This Equipment package provides the capability to report an emergency and summons assistance. The equipment includes a traveler interface that facilitates generation of a distress signal under duress and wireline communications that carries this distress signal and allows follow-up verification and determination of the nature of the emergency and the required response. This equipment package notifies either the Emergency Management or Transit Management Subsystem depending on the implementation.
Vehicle Mayday I/F	This Equipment package shall provide the capability for an in-vehicle manually initiated distress signal with cancel a prior issued manual request for help feature. This capability shall include automatically identifying that a collision had occurred using equipment such as collision detection sensors with interface to mayday type equipment that would automatically detect vehicle problems and for some cases, automatically send appropriate distress signals to the Emergency Management Subsystem.
On-board Cargo Monitoring	This Equipment package provides the Commercial Vehicle Subsystem the capability to monitor both interstate and intrastate cargo safety such that enforcement and HAZMAT response teams can be provided with timely and accurate information. This includes only the equipment on board the cargo container such as a communication device, possibly the addition of a cell-based radio, and equipment for the processing and storage of cargo material. This can also include optional sensors for temperature, pressure, load leveling, or acceleration depending upon the items monitored. It is already expected that the cargo location devices such as GPS equipment and an integration processor already exist. These items are presented as part of the On-board Trip Monitoring Equipment package.
Transit Garage Maintenance	This Equipment package provides advanced maintenance functions for the transit property. It collects operational and maintenance data from transit vehicles, manages vehicle service histories, and monitors drivers and vehicles. It collects vehicle mileage data and uses it to automatically generate preventative maintenance schedules for each vehicle by utilizing vehicle tracking data from a prerequisite vehicle tracking equipment package. In addition, it provides information to proper service personnel to support maintenance activities and records and verifies that maintenance work was performed. This equipment package receives special events and real-time incident data from the traffic management subsystem and assigns operators to vehicles and transit routes. Garage maintenance also receives information about incidents involving transit vehicles from the TMC in order to dispatch tow trucks and other repair vehicles.

Task 7, Appendix Q - Equipment Packages by ITS Element

ITS Element	Equipment Package
Aeropuerto Aerosur	
	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
Aeropuerto Aerosur Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Traffic Information Dissemination
Aeropuerto Austral	
	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
Aeropuerto Austral Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Traffic Information Dissemination
Aeropuerto Chucumata	
	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
Aeropuerto Chucumata Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Traffic Information Dissemination
Aeropuerto Cintra Chile	
	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
Aeropuerto Cintra Chile Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Traffic Information Dissemination
Aeropuerto Gestión e Ing. IDC	
	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication

ITS Element	*Equipment Package*
Aeropuerto Gestión e Ing. IDC	
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
Aeropuerto Gestión e Ing. IDC Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Traffic Information Dissemination
Aeropuerto SCL Terminal Aéreo de Santiago	
	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
Aeropuerto SCL Terminal Aéreo de Santiago Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Traffic Information Dissemination
Antepuertos Equipo de Acceso y Monitoreo de Vehículos	
	Citation and Accident Electronic Recording
	Parking Electronic Payment
	Roadside Electronic Screening
	Roadside Safety Inspection
	Roadside WIM
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Reversible Lanes
	Roadway Signal Controls
Antepuertos Letreros Electrónicos	
	Roadway Traffic Information Dissemination
Antepuertos Sistema Central de Control de Tráfico	
	Collect Traffic Surveillance
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Reversible Lane Management
	TMC Signal Control
	TMC Traffic Information Dissemination
Antepuertos Sistema de Registro Electrónico de Vehículos	
	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration

ITS Element	*Equipment Package*
Antepuertos Sitio Web	
	ISP Probe Information Collection
Autopista Aeropuerto AMB Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Aeropuerto AMB Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Aeropuerto AMB Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Aeropuerto AMB Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Camino de la Madera Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Camino de la Madera Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Camino de la Madera Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Camino de la Madera Sitio Web	

ITS Element	Equipment Package
Autopista Camino de la Madera Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Camino Nogales Puchuncaví Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Camino Nogales Puchuncaví Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Camino Nogales Puchuncaví Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Camino Nogales Puchuncaví Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Costanera Norte Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Costanera Norte Equipo de Túnel	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Traffic Information Dissemination
Autopista Costanera Norte Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Costanera Norte Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection

ITS Element	*Equipment Package*
Autopista Costanera Norte Sistema Central de Control	
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Costanera Norte Sistema Control de Túneles	
	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
Autopista Costanera Norte Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista de los Lagos Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista de los Lagos Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista de los Lagos Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista de los Lagos Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista del Aconcagua Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista del Aconcagua Equipo de Túnel	
	Roadway Basic Surveillance
	Roadway Traffic Information Dissemination
Autopista del Aconcagua Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control

ITS Element	*Equipment Package*
Autopista del Aconcagua Equipo de Vías	
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista del Aconcagua Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista del Aconcagua Sistema Control de Túneles	
	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
Autopista del Aconcagua Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista del Bosque Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista del Bosque Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista del Bosque Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista del Bosque Sitio Web	

ITS Element	*Equipment Package*
Autopista del Bosque Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista del Elqui Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista del Elqui Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista del Elqui Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista del Elqui Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista del Maipo Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista del Maipo Equipo de Túnel	
	Roadway Basic Surveillance
	Roadway Traffic Information Dissemination
Autopista del Maipo Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista del Maipo Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection

ITS Element	*Equipment Package*
Autopista del Maipo Sistema Central de Control	
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista del Maipo Sistema Control de Túneles	
	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
Autopista del Maipo Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista del Sol Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista del Sol Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista del Sol Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista del Sol Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Litoral Central Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Litoral Central Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Litoral Central Sistema Central de Control	

ITS Element	*Equipment Package*
Autopista Litoral Central Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Litoral Central Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Los Libertadores Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Los Libertadores Equipo de Túnel	
	Roadway Basic Surveillance
	Roadway Traffic Information Dissemination
Autopista Los Libertadores Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Los Libertadores Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Los Libertadores Sistema Control de Túneles	
	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
Autopista Los Libertadores Sitio Web	

ITS Element	*Equipment Package*
Autopista Los Libertadores Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Norte Sur Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Norte Sur Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Norte Sur Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Norte Sur Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Ruta 5 Collipulli - Temuco Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Ruta 5 Collipulli - Temuco Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Ruta 5 Collipulli - Temuco Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration

ITS Element	*Equipment Package*
Autopista Ruta 5 Collipulli - Temuco Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Ruta de los Ríos Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Ruta de los Ríos Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Ruta de los Ríos Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Ruta de los Ríos Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Talca - Chillán Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Talca - Chillán Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Talca - Chillán Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration

ITS Element	Equipment Package
Autopista Talca - Chillán Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Tribasa Bío Bío Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Tribasa Bío Bío Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Tribasa Bío Bío Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Tribasa Bío Bío Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Túnel El Melón Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Túnel El Melón Equipo de Túnel	
	Roadway Basic Surveillance
	Roadway Traffic Information Dissemination
Autopista Túnel El Melón Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Túnel El Melón Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection

ITS Element	*Equipment Package*
Autopista Túnel El Melón Sistema Central de Control	
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Túnel El Melón Sistema Control de Túneles	
	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
Autopista Túnel El Melón Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Variante Melipilla Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Variante Melipilla Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Variante Melipilla Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Variante Melipilla Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopista Vespucio Norte Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopista Vespucio Norte Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopista Vespucio Norte Sistema Central de Control	

ITS Element	*Equipment Package*
Autopista Vespucio Norte Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopista Vespucio Norte Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopistas Metropolitanas Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopistas Metropolitanas Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Traffic Information Dissemination
Autopistas Metropolitanas Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopistas Metropolitanas Sitio Web	
	Interactive Infrastructure Information
Autopistas Otras Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopistas Otras Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopistas Otras Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management

ITS Element	*Equipment Package*
Autopistas Otras Sistema Central de Control	
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopistas Otras Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection
Autopistas Rutas del Pacífico Equipo de Telepeaje	
	Toll Plaza Toll Collection
Autopistas Rutas del Pacífico Equipo de Túnel	
	Roadway Basic Surveillance
	Roadway Traffic Information Dissemination
Autopistas Rutas del Pacífico Equipo de Vías	
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Traffic Information Dissemination
Autopistas Rutas del Pacífico Sistema Central de Control	
	Collect Traffic Surveillance
	Emergency Response Management
	Mayday Support
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Toll Administration
Autopistas Rutas del Pacífico Sistema Control de Túneles	
	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
Autopistas Rutas del Pacífico Sitio Web	
	Interactive Infrastructure Information
	ISP Probe Information Collection

ITS Element	*Equipment Package*
Bomberos Sistema Central	
	Emergency Dispatch
	Emergency Response Management
	Mayday Support
Bomberos Vehículos de Emergencia	
	On-board EV En Route Support
Broker de Carga	
	Fleet Credentials and Taxes Management and Reporting
	Freight Administration and Management
Carabineros	
	Emergency Call-Taking
	Emergency Dispatch
	Emergency Response Management
	Emergency Secure Area Surveillance
	Mayday Support
Carabineros Registro de Accidentes	
	ITS Data Repository
Carabineros Vehículos de Emergencia	
	On-board EV En Route Support
Comisión de Seguridad de Transito Sistema Central	
	Emergency Response Management
	Mayday Support
CONAMA Sistema de Permiso de Carga (HAZMAT)	
	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration
Concesionarios de Estacionamientos Públicos Sistemas de Estacionamiento	
	Parking Electronic Payment
	Parking Management
DG Archivo de Datos Operacionales de VC	
	ITS Data Repository
DG Seguridad de Puertos y Aeropuertos	
	Emergency Call-Taking
	Emergency Response Management
	Mayday Support
DGAC Sistema de Gestión de Estacionamientos	
	Parking Electronic Payment
	Parking Management
Metro Centro de Control	
	Transit Center Fare and Load Management

ITS Element	*Equipment Package*
Metro Centro de Control	
	Transit Center Information Services
	Transit Center Security
Metro Estación	
	On-board Transit Fare and Load Management
Metro Información a Usuario en Viaje	
	Remote Transit Information Services
Metro Punto de Venta	
	Remote Mayday I/F
	Remote Transit Fare Management
	Remote Transit Information Services
	Secure Area Monitoring
Metro Sitio Web	
	Interactive Infrastructure Information
MOP CGC Almacenamiento de Datos de Tránsito Concesiones	
	ITS Data Repository
	Virtual Data Warehouse Services
MOP DV Cruce Fronterizo Equipo de Vías	
	Citation and Accident Electronic Recording
	International Border Crossing
	Roadside Electronic Screening
	Roadside Safety Inspection
MOP DV Cruce Fronterizo Sistema de Registro Electrónico de Vehículos	
	CV Information Exchange
	International CV Administration
MOP DV Equipo Pesaje en Movimiento y Control de Seguridad	
	Citation and Accident Electronic Recording
	Roadside Electronic Screening
	Roadside Safety Inspection
	Roadside WIM
MOP DV Sistema de Almacenamiento de Datos de Tránsito en Vías	
	ITS Data Repository
	Virtual Data Warehouse Services
MOP DV Sistema de Emergencia	
	Emergency Response Management
	Mayday Support
MOP DV Sistema de Monitoreo de Vehículos Comerciales	
	Fleet Administration
	Fleet HAZMAT Management
	TMC Traffic Information Dissemination
	Toll Administration

ITS Element	*Equipment Package*
MOP DV Sistema de Registro y Revisión de Credenciales (Pesaje, Sobredimensiones, y Seguridad)	
	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration
MOP DV Subdirección de Explotación	
	MCM Environmental Information Collection
	MCM Environmental Information Processing
	MCM Incident Management
	MCM Roadway Maintenance and Construction
	MCM Vehicle and Equipment Maintenance Management
	MCM Winter Maintenance Management
	MCM Work Activity Coordination
	MCM Work Zone Management
MOP DV Subdirección de Explotación Equipo de Vías	
	Roadway Infrastructure Monitoring
	Roadway Work Zone Safety
MOP DV Subdirección de Explotación Vehículos	
	MCV Infrastructure Monitoring
	MCV Roadway Maintenance and Construction
	MCV Vehicle Location Tracking
	MCV Vehicle Safety Monitoring
	MCV Vehicle System Monitoring and Diagnostics
	MCV Winter Maintenance
	MCV Work Zone Support
MOP Planificación Almacenamiento de Datos Multimodal	
	ITS Data Repository
	Virtual Data Warehouse Services
MTT Almacenamiento de Datos de Transporte Público	
	ITS Data Repository
	Virtual Data Warehouse Services
MTT Coordinación General de Transporte	
	Transit Center Fixed-Route Operations
MTT Fiscalización y Control del Transporte Público (CCB)	
	Transit Center Fare and Load Management
	Transit Center Fixed-Route Operations
	Transit Center Information Services
	Transit Center Multi-Modal Coordination
	Transit Center Security
	Transit Center Tracking and Dispatch
	Transit Garage Operations

ITS Element	*Equipment Package*
MTT Información a Usuario Sitio Web	
	Interactive Infrastructure Information
MTT Información en Paraderos	
	Remote Transit Information Services
MTT Punto de Venta	
	Remote Mayday I/F
	Remote Transit Fare Management
	Remote Transit Information Services
	Secure Area Monitoring
MTT Tarificación Vial	
	TMC Toll/Parking Coordination
	TMC Traffic Network Performance Evaluation
MTT Tranvía	
	Transit Center Fixed-Route Operations
	Transit Center Information Services
	Transit Center Multi-Modal Coordination
	Transit Center Security
	Transit Center Tracking and Dispatch
	Transit Garage Operations
Municipalidad Dirección de Obras	
	MCM Environmental Information Collection
	MCM Environmental Information Processing
	MCM Incident Management
	MCM Roadway Maintenance and Construction
	MCM Vehicle and Equipment Maintenance Management
	MCM Winter Maintenance Management
	MCM Work Activity Coordination
	MCM Work Zone Management
Municipalidad Dirección de Obras Equipo de Vías	
	Roadway Infrastructure Monitoring
	Roadway Work Zone Safety
Municipalidad Dirección de Obras Vehículos	
	MCV Infrastructure Monitoring
	MCV Roadway Maintenance and Construction
	MCV Vehicle Location Tracking
	MCV Vehicle Safety Monitoring
	MCV Vehicle System Monitoring and Diagnostics
	MCV Winter Maintenance
	MCV Work Zone Support
Onemi Gestión de Emergencia	
	Emergency Response Management

ITS Element	*Equipment Package*
Onemi Gestión de Emergencia	
	Mayday Support
Operadores de Ferrocarril	
	Fleet HAZMAT Management
Operadores de Ferrocarril Vehículos	
	On-board Cargo Monitoring
	Vehicle Mayday I/F
Operadores Privados de Emergencia Medica Centro de Despacho	
	Emergency Response Management
Operadores Privados de Grúas Sistema de Despacho	
	Emergency Response Management
Operadores Privados de Telemática	
	Basic Information Broadcast
	Emergency Secure Area Surveillance
	Infrastructure Provided Route Selection
	Interactive Infrastructure Information
	Mayday Support
Operadores Privados de Vehículos Comerciales Sistemas Central	
	Fleet Administration
	Fleet Credentials and Taxes Management and Reporting
	Fleet HAZMAT Management
	Fleet Maintenance Management
	Freight Administration and Management
Operadores Privados de Vehículos Comerciales Vehículos	
	Interactive Vehicle Reception
	On-board Cargo Monitoring
	On-board CV Electronic Data
	On-board CV Safety
	On-board Trip Monitoring
	Vehicle Mayday I/F
	Vehicle Probe Support
	Vehicle Provider-Based Route Guidance
	Vehicle Toll/Parking Interface
Operadores Privados del Transporte Público Centro de Control	
	Transit Center Fare and Load Management
	Transit Center Security
	Transit Garage Maintenance
Operadores Privados del Transporte Público Vehículos	
	Interactive Vehicle Reception
	On-board Maintenance
	On-board Transit Fare and Load Management

ITS Element	*Equipment Package*
Operadores Privados del Transporte Público Vehículos	
	On-board Transit Security
	On-board Transit Signal Priority
	On-board Transit Trip Monitoring
	Vehicle Mayday I/F
	Vehicle Probe Support
	Vehicle Provider-Based Route Guidance
	Vehicle Toll/Parking Interface
Puerto de Mejillones Equipo de Acceso y Monitoreo de Vehículos	
	Citation and Accident Electronic Recording
	Roadside Electronic Screening
	Roadside Safety Inspection
	Roadside WIM
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Reversible Lanes
	Roadway Signal Controls
Puerto de Mejillones Letreros Electrónicos	
	Roadway Traffic Information Dissemination
Puerto de Mejillones Sistema Central de Control de Tráfico	
	Collect Traffic Surveillance
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Reversible Lane Management
	TMC Signal Control
	TMC Traffic Information Dissemination
Puerto de Mejillones Sistema de Registro Electrónico de Vehículos	
	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration
Puerto de Mejillones Sitio Web	
	ISP Probe Information Collection
Puerto de San Antonio Equipo de Acceso y Monitoreo de Vehículos	
	Citation and Accident Electronic Recording
	Roadside Electronic Screening
	Roadside Safety Inspection
	Roadside WIM
	Roadway Basic Surveillance

ITS Element	*Equipment Package*
Puerto de San Antonio Equipo de Acceso y Monitoreo de Vehículos	
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Reversible Lanes
	Roadway Signal Controls
Puerto de San Antonio Letreros Electrónicos	
	Roadway Traffic Information Dissemination
Puerto de San Antonio Sistema Central de Control de Tráfico	
	Collect Traffic Surveillance
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Reversible Lane Management
	TMC Signal Control
	TMC Traffic Information Dissemination
Puerto de San Antonio Sistema de Registro Electrónico de Vehículos	
	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration
Puerto de San Antonio Sitio Web	
	ISP Probe Information Collection
Puertos Equipo de Acceso y Monitoreo de Vehículos	
	Citation and Accident Electronic Recording
	Roadside Electronic Screening
	Roadside Safety Inspection
	Roadside WIM
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Reversible Lanes
	Roadway Signal Controls
Puertos Letreros Electrónicos	
	Roadway Traffic Information Dissemination
Puertos Sistema Central de Control de Tráfico	
	Collect Traffic Surveillance
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control

ITS Element	*Equipment Package*
Puertos Sistema Central de Control de Tráfico	
	TMC Reversible Lane Management
	TMC Signal Control
	TMC Traffic Information Dissemination
Puertos Sistema de Registro Electrónico de Vehículos	
	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration
Puertos Sitio Web	
	ISP Probe Information Collection
Red de Información de Incidentes y Respuesta	
	Emergency Call-Taking
	Emergency Response Management
Red de Información y Condiciones de Tránsito	
	TMC Regional Traffic Control
	TMC Work Zone Traffic Management
	Traffic Maintenance
SAMU Sistema Central	
	Emergency Dispatch
	Emergency Response Management
SAMU Vehículos de Emergencia	
	On-board EV En Route Support
SECTRA Controladores de Semáforos	
	Roadside Signal Priority
	Roadway Reversible Lanes
	Roadway Signal Controls
	Standard Rail Crossing
SECTRA Letreros de Mensaje Variable	
	Roadway Traffic Information Dissemination
SECTRA Sensores de Tránsito	
	Roadway Basic Surveillance
	Roadway Probe Beacons
SECTRA Sistemas Central de Control de Tránsito	
	Collect Traffic Surveillance
	HRI Traffic Management
	TMC Environmental Monitoring
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Multimodal Coordination
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Reversible Lane Management

ITS Element	*Equipment Package*
SECTRA Sistemas Central de Control de Tránsito	
	TMC Signal Control
	TMC Toll/Parking Coordination
	TMC Traffic Information Dissemination
	TMC Traffic Network Performance Evaluation
	Traffic Data Collection
SECTRA Sistemas de Almacenamiento de Datos de Tránsito	
	ITS Data Repository
	Virtual Data Warehouse Services
SECTRA Sistemas de Planificación Multimodal	
	ITS Data Repository
	Virtual Data Warehouse Services
SESMA Centro de Análisis	
	Emissions Data Management
SESMA Estaciones de Monitoreo Ambiental	
	Roadway Emissions Monitoring
Sistema Municipal de Permiso de Carga	
	Credentials and Taxes Administration
	CV Information Exchange
Sistema Municipal Equipo de Vías	
	Roadside Signal Priority
	Roadway Basic Surveillance
	Roadway Environmental Monitoring
	Roadway Reversible Lanes
	Roadway Signal Controls
	Roadway Traffic Information Dissemination
	Standard Rail Crossing
Sistema Municipal Sistema Central de Control de Tránsito	
	Collect Traffic Surveillance
	HRI Traffic Management
	TMC Environmental Monitoring
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Multimodal Coordination
	TMC Regional Traffic Control
	TMC Reversible Lane Management
	TMC Signal Control
	TMC Toll/Parking Coordination
	TMC Traffic Information Dissemination
	TMC Traffic Network Performance Evaluation
	Traffic Data Collection
UOCT Centro de Control de Gestión de Tránsito	

ITS Element	*Equipment Package*
UOCT Centro de Control de Gestión de Tránsito	
	Collect Traffic Surveillance
	HRI Traffic Management
	TMC Environmental Monitoring
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Multimodal Coordination
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Reversible Lane Management
	TMC Signal Control
	TMC Toll/Parking Coordination
	TMC Traffic Information Dissemination
	TMC Traffic Network Performance Evaluation
	Traffic Data Collection
UOCT Circuito Cerrado de Televisión	
	Roadway Basic Surveillance
UOCT Controladores de Semáforos	
	Roadside Signal Priority
	Roadway Reversible Lanes
	Roadway Signal Controls
	Standard Rail Crossing
UOCT Equipo Control de Tráfico Autopistas	
	Roadway Freeway Control
UOCT Estaciones de Monitoreo Ambiental	
	Roadway Emissions Monitoring
UOCT Letreros de Mensaje Variable	
	Roadway Traffic Information Dissemination
UOCT Sensores Ambientales	
	Roadway Environmental Monitoring
UOCT Sensores de Tránsito	
	Roadway Basic Surveillance
	Roadway Probe Beacons
UOCT Sitio Web	
	ISP Probe Information Collection
Vehículos Tranvía	
	On-board Transit Security
	On-board Transit Trip Monitoring
Viajeros Equipo Personal de Viajeros	
	Personal Interactive Information Reception
	Personal Mayday I/F

ITS Element	*Equipment Package*
Viajeros Equipo Personal de Viajeros	
	Personal Provider-Based Route Guidance
Viajeros Vehículos Privados	
	Interactive Vehicle Reception
	Vehicle Mayday I/F
	Vehicle Probe Support
	Vehicle Provider-Based Route Guidance
	Vehicle Toll/Parking Interface
VLT Equipo de Acceso y Monitoreo de Vehículos	
	Citation and Accident Electronic Recording
	Roadside Electronic Screening
	Roadside Safety Inspection
	Roadside WIM
	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Probe Beacons
	Roadway Reversible Lanes
	Roadway Signal Controls
VLT Letreros Electrónicos	
	Roadway Traffic Information Dissemination
VLT Sistema Central de Control de Tráfico	
	Collect Traffic Surveillance
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Reversible Lane Management
	TMC Signal Control
	TMC Traffic Information Dissemination
VLT Sistema de Registro Electrónico de Vehículos	
	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration
VLT Sitio Web	
	ISP Probe Information Collection

Feasibility Study for the National Intelligent Transportation Systems (ITS) Architecture Project - Chile

Task 8: Propose Systems and Services

Prepared for

United States Trade and Development Agency

Ministerio de Obras Públicas de Chile

Prepared by

Lockheed Martin Corporation

Consensus Systems Technologies Corp.

Aristo Consultores

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1. INTRODUCTION

This report identifies potential US sources of equipment, systems, and services defined by the National ITS Architecture of Chile. Information included in this report is current through June 2003. The investigation of ITS system and services providers focused on the planned equipment, systems and services defined in the architecture. This report also includes a list of US vendors of ITS products, systems and services (Section 2) and a description of applicable planned elements and services of the architecture. Section 3 contains a list of transportation consulting companies specializing in the field of ITS.

2. U.S. VENDORS OF ITS PRODUCTS AND SERVICES

3M Traffic Safety & Management
3M Center, Building 0225-05-S-08
St. Paul, MN 55144-1000
Tel: (800) 553-1380
Fax: (800) 224-2085
Web: www.3M.com/its
Services/technologies: Vehicle detectors, priority control systems, vehicle ID tracking and scheduling and ATMS, dynamic message systems for changeable message signs, transportation asset management, signal priority control, traffic sensing and lane awareness systems.

ADDCO
240 Arlington Avenue East
St. Paul, Minnesota 55117
Tel: 651-488-8600
Fax: 651-558-3600
E-mail: info@addcoinc.com
Web: www.addco.com
Services/technologies: Dynamic message signs, vehicle mount and arrow signs, portable traffic management systems that incorporates video, sensors, solar power and wireless communications.

Ademco Video (Previously Javelin Systems)
Tel: 1-877-653-0302
E-mail: comments@ademcovideo.com
Web: www.ademcovideo.com
Services/technologies: Closed circuit television for ATMS, incident detection, video matrix switches.

Adesta, LLC
1200 Landmark Center, Suite 1300
Omaha, NE 68102-1892
Tel: (402) 233-7700 or (866) 221-5641
Fax: (402) 233-7650
E-mail: info@adestagroup.com
Web: www.adestagroup.com
Services/technologies: Electronic toll collection and traffic management systems.

AECOM
Systems Integration Group, Inc.
2950 Professional Place
Colorado Springs, CO 80904
Tel: (719) 471-9866
Fax: (719) 471-9063
E-mail: bob.russo(@aecom-sig.com
Web: www.sysig.com
Services/technologies: Electronic toll collection and traffic management systems and control centers.

American Electronic Sign Company
Spokane Industrial Park
3808 North Sullivan Road Building 10
Spokane, Washington 99216-1670
United States
Phone: 509-928-2296
Fax: 509-928-2968
Services/technologies: Variable message signs.

ARINC, Inc.
2551 Riva Road
Annapolis, MD 21401-7465
Tel: (800) 633-6882
Tel: (410) 266-4000
Fax: (410) 573-3300
Web: www.arinc.com
Services/technologies: Integration of control, communications, computer navigation, surveillance and sensor systems, rail and bus systems, ITS systems engineering and program management.

Barco America-Visual Systems
3240 Town Point Dr. NW
Kennesaw, GA 30144-7023
Tel: (770) 218-3200
Fax: (770) 218-3250
E-mail: bpsmarketing@barco.com
Web: www.barco.com
Services/technologies: High resolution large screen display systems

Base Technologies, Inc.
1749 Old Meadow Road Suite 500
McLean, VA 22102
Tel: (800) 284-1355
Tel: (703) 848-2400
Fax: (703) 848-0804
E-mail: info@basetech.com
Web: www.bastetech.com
Services/technologies: Systems integration, computer based information systems and telecommunications systems.

Battelle
505 King Avenue
Columbus, OH 43201
Tel: (800) 201-2011
Tel: (614) 424-6424
Fax: (614) 424-3633
E-mail: solutions@battelle.org

Web: www.battelle.org
Services/technologies: Advanced control systems, traveler information systems, crash avoidance technologies, ITS standards testing.

COHU, Inc. - Electronic Division
P.O. Box 85623
San Diego, CA 92186, USA
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Feasibility Study for the National Intelligent Transportation Systems (ITS) Architecture Project - Chile

Task 9: Development of an "Action Plan" for ITS Implementation

Prepared for

United States Trade and Development Agency

Ministerio de Obras Públicas de Chile

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August 15, 2003

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1 INTRODUCTION

This Chilean ITS Implementation Action Plan aims to propose a set of actions permitting both a harmonic and integrated ITS development. It must be recalled that ITS are the integrated application of computer, electronic and communicational technologies as well as sensors being oriented to mainly support a more efficient management of surface (road) transportation systems.

ITS technologies strive to achieve a better management of already existing roadway infrastructure, public transportation systems and railroad infrastructure to reduce congestion and improving the response to incidents and emergencies. It also seeks a safer and more comfortable travel environment for people, and higher effectiveness and safety in the transportation of goods. ITS systems have shown special usefulness and effectiveness in the management of integration and modal interchange terminals as well as at border crossings.

Utilizing ITS systems, however, pose new challenges that deeply affect the way in which transportation system's management and planning occur. The huge amounts of additional information about what is presently happening in the transportation system, and need to respond quickly to changing circumstances, presents a change in transportation management and planning. Thus, we find the most significant challenge being faced by various interconnected stakeholders of ITS systems (from public, private and academic sectors).

The ITS Action Plan development in Chile must reflect both current and projected domestic transportation system's needs, and the current actual processes in place for the implementation of ITS technologies in an efficient and integrated way. Hence, this ITS Action Plan considers current and planned ITS systems in Chile, as described in Task 1, the institutional and legal aspects as discussed in Task 2, the technical standards as listed in Task 3, the financial aspects as contained in Task 4, and the environmental impact, as discussed in Task 5, all of them being related to the ITS Architecture, as developed in Tasks 6 and 7.

2 METHODOLOGY

From a methodological viewpoint, building an ITS Implementation Action Plan for Chile must answer the domestic transportation system needs which may be approached by means of domestically feasible implemented ITS technologies.

For the purpose of this report, transportation system needs have been obtained primarily from several diagnoses performed through a series of specialized studies ordered by Chilean public entities (MOPTT – Ministry of Public Works, Transportation and Telecommunication – SECTRA, etc.) and urban and interurban government-made transportation plans.

As from the set of transportation system needs, naturally only one portion may be approached through ITS-related technologies. Particularly, the same technological developments attained during these last years have themselves opened some options for implementing new transportation policies which had not been recently deemed feasible, for instance road faring in urban area congestion cases, or road faring in high traffic density urban routes. International experience has shown that some areas where ITS may become an important contribution are: traffic management and safety, emergency management and user information. Indirectly, improving traffic management, with its subsequent delay, queue reduction and incident clear away, has significantly reduced negative environmental shock like air pollution and noise

The feasibility of implementing ITS systems, even when their benefits have already been demonstrated in other countries, largely depends upon the domestic limitations that may restrict their development, such as ITS-related extent of knowledge, technical expertise of national professional individuals and corporations and, particularly, financing restrictions for this type of projects whose benefits have not technically and/or experimentally encouraged in the country

In accordance with the above, Action Plan's proposal has been performed through a methodology considering the activities listed below:

1. **A Summary of the Analysis and the Objectives of Urban and Interurban Transportation Systems**: It has been made upon the basis of the analysis regarding prior studies ordered by Chilean MOPTT and Sectra, being particularly related to currently existing Chilean transportation plans: *Plan de Transporte Urbano de Santiago (PTUS) (Santiago de Chile Urban Transportation Plan)* and Plan de *Transporte Interurbano (PTI) (Interurban Transportation Plan).*
2. **A Summary of Chilean ITS Systems. Current Status and Projection**: This summary has been built as from the antecedents presented in Tasks 1 and 2 being related to both existing and planned ITS systems as well as the restrictions and limitations to ITS development within Chilean legal and institutional scope.

3. **Action Plan Proposal**: By utilizing all antecedents previously mentioned in addition to background information presented in Task 3 through 7, a proposal of a series of actions aimed to develop ITS successful implementation throughout Chile has been made. Such a proposal considers a 3-plan creation: *National ITS Plan*, consisting in domestic ranged programs; *Urban ITS Plan* for the city of Santiago de Chile, other metropolitan areas as well as other domestic middle-sized cities, and *Interurban ITS Plan*. In turn, each of these plans is composed of Programs containing one or more specific projects.

3 SUMMARY OF TRANSPORTATION SYSTEMS

Previously studies such as the Plan de *Transporte Interurbano (PTI) (Interurban Transportation Plan)*, *Plan de Transporte Urbano de Santiago (PTUS) (Santiago de Chile Urban Transportation Plan)* and diagnostic studies of the transportation systems in several Chilean cities.

This summary focuses on identifying the areas where the ITS technologies implementation may contribute to overcome the deficiencies of current transportation systems displayed both in urban and interurban scopes. Therefore, this summary does not include those failed aspects where ITS were not involved.

3.4 Urban Scope

Within the urban scope, it is necessary to distinguish Greater Santiago de Chile's situation from that of remaining Chilean cities.

Greater Santiago

Presently Greater Santiago has a general population of more than 5 millions inhabitants (about 1/3 of total Chilean population). Such a concentration has resulted in a deterioration of life quality matching the population's view about urban transportation system in which public transportation infrastructure and services are gradually deteriorated and with a low service level.

Greater Santiago transportation system crisis comes from all urban life scopes, mainly a disproportionate urban population and geographic growth. Santiago de Chile is a city not having a soil utilization plan facing transportation problems. Poor quality regarding public transportation services (with the exception of subway) together with a strong rise of motorization rate and income level have largely contributed to Santiago's urban transportation system's deterioration. All these events have given birth to traveling generation disturbances, higher automobile utilization and, consequently, a greater deterioration of road public transportation, the most significant transportation means, socially speaking.

The foregoing has been illustrated with the two figures below.

Figure 1.1 Evolution of Motorized Traveling Generation Rate.

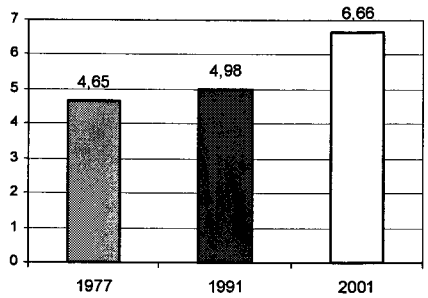
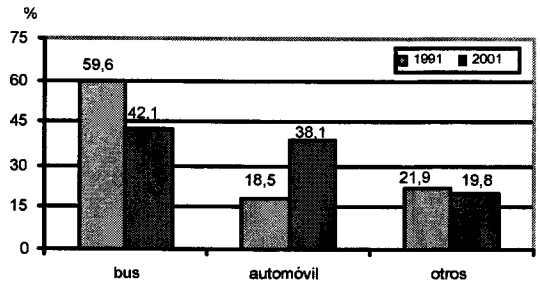


Figure 1.2 Modal Partition Evolution 1991-2001



Santiago de Chile has a vast range of studies and information enabling to get a reasonable approach to the best options for ITS systems utilization, namely: the *Unidad Operativa de Control de Tránsito (UOCT) (Traffic Control Operating Unit)* becoming the most advanced ITS-related unit throughout the Chilean country, the urban road licensed operators (with their ITS sound introductory portion and where toll collection subsystem (TCS) must be highlighted) and the public transportation modernization program do represent the most endeavored domestic scopes for implementing these transportation systems.

Other Cities

Until now, the *Secretaría Interministerial de Planificación de Transporte (Sectra) (Transportation Planning Interministerial Secretary)* has suggested the performance of a series of diagnostic studies about transportation systems in 20 of the main Chilean cities. Broadly speaking, these studies have shown that, out of Santiago's geographic area, urban transportation problems principally are related to the defective quality of public transportation vehicles, the excessive number of cabs and buses and a poorly developed road infrastructure. Though happening, traffic congestion-related disturbances arise from defective traffic management rather than an excess of demand.

A special mention should be given to the situation existing in two urban conglomerates: Greater Valparaiso and Greater Concepción. These cities are the most important urban centers following Santiago. Each of these conglomerates has 600 thousand inhabitants approximately. Traffic congestion problems appear to be highly significant, thus requiring advanced traffic control systems and infrastructure investments to find an appropriate solution.

Objectives

For the past couple of years, local authorities have applied their most devoted efforts to direct and systemize their actions within transportation scope. *Plan de Transporte Urbano de Santiago (PTUS) (Santiago de Chile Urban Transportation Plan)* development has become the first result of said efforts.

Pursuant to *Plan de Transporte Urbano de Santiago (PTUS) (Santiago de Chile Urban Transportation Plan)* Santiago's transportation system strategically aims to:

- Contribute to better life quality of inhabitants at both city and neighborhood levels.
- Contribute to correct the significant unbalance observed in income and in unequal chances to accede to basic social services as regards the different city areas.
- Encourage pubic transportation as main transportation mean in the city and improve service quality and system's overall safety.
- Encourage automobile use rationalization. This objective may be linked to the goal leading private transportation users to find out the actual costs of their modal option and to increase non-motorized traveling rate increase (either on foot or by bicycle)
- Influence over localization trends approaching dwelling houses and activities.
- Reorganize municipal transportation system-related institutions. Some partial goals leading to this aim are: upgrading coordination among the different governmental entities being involved in transportation scope matters and awarding more participation and responsibility to non-governmental characters dealing with city and life quality questions, in general, and citizens, in particular.

In brief, transportation system is gradually becoming a means to improve Santiago's inhabitants' life quality, thus satisfying motion needs of people by means of an efficient public transportation system in terms of equity, quality and safety, as based upon environmental maintenance. Simultaneously, the main factors causing system's distortion are expected to be regulated. Among these factors, the following must be highlighted: urban development policies and plans, excessive automobile utilization, cargo transportation-, city traffic management- and people safety-related aspects

Although PTUS is a transportation plan applicable to Santiago, its supportive objectives do have a widely general meaning and they will be deem valid for remaining Chilean cities.

In order to attain PTUS objectives, such a plan has included a set of 11 action programs. A number of 4, out of these 11 action programs, may be partially approached through the use of ITS technologies. The programs displaying a significant relationship to ITS and their general objectives are as follows:

- **P#1-Public Transportation Modernization.** This program leads to city public transportation system's modern, integrated and complementary development. This system is composed of Metropolitan subway and suburban trains, urban, interurban and rural buses arriving to the city, bas8c cabs and alternative technology vehicles like tramways and trolleys, where appropriate.
- **P#2-Road Investments and Private Transportation Regulation.** This program incorporates policies and actions mainly addressed to traveling made in private motorized vehicles, thus approaching their rationalization. It must be understood that this mode of urban transport appears to be the natural complement of collective modes. Within this program, one fundamental action deals with leveraging *Unidad Operativa de Control de Tránsito (UOCT) (Traffic Control Operating Unit)* by optimizing and expanding the capabilities of traffic management and user information systems.
- **P#8-Urban Cargo Load Transportation Regulation.** This program aims to regulate cargo transportation operational system within city limits, thus controlling its negative externalities without affecting normal supply level.
- **P#9-Inspection.** This program attempts to encourage the mechanisms of supervision and control being essential for the good operation of the different elements and agents composing and operating transportation system.

Remaining PTUS programs are closely linked to localization trend modification-oriented actions in order to reduce long-distance displacement needs, encourage the user of non-motorized traveling modes by means of adequate infrastructure building projects, like urban bikeways, solve critical traffic congestion and pollution problems through temporary traffic management and cost reduction measures finance PTUS and carry out activities to spread the Plan among users:

- P#3-Educational Facility Localization
- P#4-Encouraging New Trade & Services Areas;
- P#5-Changes n Localization Trends regarding Dwelling Houses;

- P#6- Non-motorized Modes of Transportation
- P#7-Immediate Steps;
- P#10-Financing Plan;
- P#11-Communication.

Above action programs are ITS-related, but P#7. Nevertheless, because of the temporary nature of the measures connected with said program, it has been decided not to include it within the range of the programs being directly connected with ITS.

Presently, P#1, P#2, P#7, P#10 and P#11have become PTUS programs displaying best domestic governmental efforts for enforcing ITS.

3.5 Interurban Scope

Creating the first interurban transportation plan, the so-called *Plan de Transporte Interurbano (PTI) (Interurban Transportation Plan)* considering international transportation level has been recently concluded. As part of this plan, a series of domestic interurban transportation system-related features (market efficiency and competitiveness, service integration, transport infrastructure and service quality) has been diagnosed and finally discussed. The main diagnostic elements are described below.

a) Efficiency and Competitiveness in Interurban Transportation Markets

Cargo Services

- Road Transportation: Truck-based road cargo transportation is a market having an oversized number of motor vehicles, including old vehicles and poor business management. There exist an extremely limited number of cargo transportation middle- and large-sized corporations, low merchandise containerization levels and overweight-related disturbances throughout highways. Other relevant problem deals with accidents where trucks either being in the highway or specially arriving at urban sites are involved. As a consequence of existing corporate structure, there are some difficulties against upgrading the sector and introducing new technologies which would permit reduce transportation costs and improving economic competitiveness
- Railroad Transportation. In terms of railroad transportation, although a cargo volume increase has been evidenced during these last years, there exists a low development of intermodal transportation. There are also some troubles concerning port area accessibility and deficient railroad crossing management resulting in significant safety level consequences.

Passenger Services

- Road Transportation: There exists a low competitiveness level among carriers. Indeed, market distribution occurs. This has given birth to monopoly formation tendency. These monopolies are characterized by high rates, high demand-dependent variability. There also exists a low auditing level of the services supplied throughout highways against the presence of the so-called "pirate" motor vehicles.
- Railroad Transportation. Lack of reliance and poor service frequency as well as passenger safety problems must be highlighted here although an important advance in equipment and service utilized in some lines (Santiago – Rancagua – San Fernando and, just lately, Santiago – Chillan) has been noted

b) Interurban Transportation Services and their Integration

- Connectivity between interurban and urban transportation systems and the different access sites to cities. An *ad-hoc* solution is required to harmonize different types of vehicles, different timetables and higher traffic flow dates, different O/D. A traffic management system especially concerning access / exit urban routes is mainly needed.
- Multimodal Transportation: There exist very few road-railroad combined transportation systems, low containerization level (both general cargo (20%) and refrigerated cargo (10%), railroad passenger systems not being linked to modal integration policy (bus-train combined service between Santiago and Conception (created in 2002) is an exception to the foregoing.

c) Transportation Infrastructure

- In highways there exists a low traffic management level and scarce technological utilization. Traffic management is required to be upgraded through building and maintenance works.
- At port areas, all urban conflicts caused by cargo trucks' circulation have become the most important aspect – it is an aspect that has been gradually controlled with the development of the so-called dry ports, or outer ports, containing, in some cases, the introduction of communication technologies and fleet management.

d) Transportation Services. Their Quality

- Major problems dealing with service supply quality have arisen in passenger road transportation. In the case of road mode (automobile), there exists traffic signaling problems regarding traffic bypass management and user information. Bus-related transportation display low user information level because of which users are not actually aware of the features of the service they are hiring and the reliance given by the courses offered.

- With respect to cargo transportation, there are also deficiencies in service quality, although these differences appear not to be a main problem for the corporations requiring these services. This situation is partially accounted for since low quality levels are deemed a fact and they are so considered during productive processes. In so far market competitiveness rises, a global improvement of cargo transportation service quality will be required. Within this context, an important feature comes from providing users with on-line information about the localization and status of goods carried.

Objectives

According to PTI provisions, domestic interurban transportation system's strategic objectives are listed below:

- Increasing the effectiveness in the use of economic resources o resources that can be stated in economic figures. This objective refers, including but not limited, to resources utilized in public infrastructure investment, management and administration, transportation market transactions. It also refers to the resources supplied by *Sistema de Transporte Interurbano (STI) (Interurban Transportation System)* users, such as traveling time of passengers and cargo. Under certain circumstances, economic effectiveness is globally sought so that transportation-related resources are only a portion of a mostly larger system
- Supporting, by means of transportation system the domestic goal of achieving better income allotment. This means to privilege the benefits received by the weakest social groups in connection with STI-related decision-making. This equitable concept may be also stated, though not exclusively, as a way for matching opportunities for certain social groups.
- Improving safety levels for people and cargo in above STI and reducing the number of deaths, injuries and, in general, accidents.
- Preserving and maintaining environment, natural resources and national and cultural property.
- Furnishing STI with minimum quality standards, that is, regarding public transportation or public-used infrastructure utilization (for instance, user information delivery). This objective may also include reliance and/or vulnerability aspects of transportation systems.

In order to attain above objectives, a set of 10 action plans was established in PTI. Mostly of these actions have evidenced that ITS may play a significant role. ITS-related PTI programs as well as their general objectives are described below:

- **P#1-Upgrading competitiveness conditions addressed to better passenger service.** This program aims to set forth a regulatory structure for passenger interurban transportation services neutralizing negative externalities, avoiding disloyal competitiveness among characters of a same transportation mode and enforcing equal requirement levels among modes in order not to deform intermodal competitiveness. Internalizing the external costs caused by each mode must be tended thus searching for an appropriate competitive outline to get socially-speaking optimum point. Moreover, this program attempts to guarantee the levels of information and safety and quality standards applicable to different interurban passenger transportation modes and markets resulting in loyal competitiveness

- **P#2- Upgrading competitiveness conditions addressed to better cargo service**. This program aims to set forth a regulatory structure for interurban cargo transportation services neutralizing negative externalities, avoiding disloyal competitiveness among characters of a same transportation mode and enforcing equal requirement levels among modes in order not to deform intermodal competitiveness. Regulation means both the enactment of adequate rules giving birth to competitiveness conditions and the control of monopoly situation as well as resulting in an inspection structure assuring full compliance of the rules for all the modes involved.

- **P#3- An Integrated Transportation System**. The strategic goal of this program focuses on getting a better integration grade among transportation modes within STI and between STI and the urban centers. Integrating among modes must be performed in such a way that the quality of transportation between the place of origin and the final destination must be fully improved. Indeed, integrating the cities must be achieved by considering urban activity characteristics when determining the localization of the terminals. Another approach of this program deals with solutions attempting to integrate transportation projects, especially infrastructure, to territorial development and soil utilization.

- **P#4-Interurban Transportation Infrastructure. Planning and Management**. This program is intended to ensure effective infrastructure supply levels. In other words, allotted public budget must maximize social profitability. It also tries to generate the incentives permitting the participation of private sector in infrastructure development, to achieve an efficient faring structure for the use of STI infrastructure thus eliminating economic distortions among modes and allowing to take charge of external costs, to significantly increase STI infrastructure management levels being able to reduce higher investment-grounded pressures and upgrade user service levels. On this last aspect, ITS technologies have provided their best contribution through a vast international experience.

- **P#6-STI Safety and Quality for Passengers, Drivers and Pedestrians**. This program has a two-fold goal. On the one hand, it improves STI safety so that it reduces the risk which people utilizing it are exposed to. Indeed, it particularly reduces the number of accidents; the costs involved and the number of died and injured individuals. On the other hand, this program is intended to give quality standards allowing the accomplishment of the travels under comfort as well as user information delivery minimum conditions. Simultaneously, these standards must generate loyal competitiveness conditions among competitive market operators

- **P#7-Sustainable Transportation. Property and Culture.** This program is intended to support environmental preservation, care and improvement conditions. It is also applicable to natural resources and to domestic and cultural property by means of a series of actions directly related to STI.

- **P#8-International Transportation**. This program is intended to promote justness and coordination conditions being harmonized to other countries that encourage and enable international transportation development, thus favoring Chilean integration worldwide. Creating competitiveness and market freedom within transportation scope, in a reciprocal environment toward relevant domestic corporations should be proficient enough to favor efficiency as required by international trade transportation. Special importance should be given to the last free trade agreements hat were already signed by Chile. All these agreements, specially those ones related to negotiation, have strengthen the need of having a competitive and effective transportation system to benefit higher exchange flow volumes that should be produced.

Remaining PTI programs are not ITS-related since they have been guided to encourage both social and territorial integration, for instance, through allowances to transportation services, training (seminars, courses, technical visits, etc.) in deficient areas, and coordination, management and spread connected with PTI achievements. These programs are:

- P#5-Social and Territorial Integration;
- P#9-Technological Training and Development encouraging better service;
- P#10- PTI Control and Monitoring.

Nowadays, there is not a single PTI management-related entity in Chile. Hence, there are neither amounts nor resources specifically allotted to some of its programs. However, both MOP (Ministry of Public Works) and SECTRA (transportation Planning Interministerial Secretary) have considered the extent of above plan upon defining the most recent transportation studies

4 SUMMARY OF CURRENT ITS PROJECTS

4.4 Urban Scope

Task 1 of this study introduced a full characterization of ITS systems operating in different Chilean cities. Their main features were described and owners and operators were identified. ITS initiatives in implementation or study stage were also included.

Presently, ITS urban systems are a part of Greater Santiago (UOCT) and Greater Valparaiso (SCAT-GV) traffic management centers. At both centers, there are traffic control systems (fixed and/or dynamic time traffic lights), user information systems (websites, variable message signs (VMS), traffic monitoring systems (CCTV and/or automatic vehicular count stations, for example). How these centers operate is extremely important for the appropriate process of the transportation system in both cities, as demonstrated in 2002 with the occurrence of UOCT traffic control system's generalized failure. During such an occurrence, urban vehicular circulation became extremely difficult.

Regarding ITS projects being under implementation or study, it must be noted that, with respect to UOCT case, both optimizing and extending current systems and incorporating new elements like incident detection and management have been foreseen on a middle-term basis. As regards above SCAT-GV Greater Valparaiso plan's traffic light system upgrading is being implemented. In relation to Greater Concepcion, it should be emphasized that a Traffic Control Center similar to that of Greater Valparaiso has started to be implemented. There also exist some plans addressed to develop traffic management centers in other Chilean cities (Antofagasta, Iquique, Copiapo, Temuco, Puerto Montt and Punta Arenas)

4.5 Interurban Scope

Task 1 of this study included a detailed description of ITS applications (either being already existing or under implementation / study) throughout interurban scope. As stated in the report of said Task, most of those applications correspond to MOP-defined requirements concerning certain road projects built by private-owned corporations under licensing agreements. Either existing or future developments are concentrated in toll electronic collection subsystems, user information (VMS, websites) and emergency case management (SOS posts, video monitoring, and highway police patrols).

By 2005, Metropolitan Region-licensed ITS systems (now being under building) will be expected to start up.

However the significant participation of private-owned corporations in ITS implementation, Chilean MOP has also made its own achievements in ITS development. Both WIM (Weigh-in

Motion) startup and the development of a website and a WAN (Wide Area Network) system reporting highway, border area and toll value status are clear examples of these achievements.

4.6 General Aspects

Background information presented in Task 2 of this study have allowed to conclude that in Chile there exists no ITS development-related entity and that there is no developed enough specific legislation. Although this has prevented MOP, UOCT and several private-owned corporations from developing ITS systems, it encouraged, in some cases, the development of systems not being consistent among themselves or not being actually integrated to other complementary systems, for instance, by means of data exchange. Toll electronic collection subsystems have become an exception to this rule thus permitting the utilization of a single TAG to move along Metropolitan Region licensed highways

A relevant consequence arising from current ITS failures deals with the loss of the benefits that ITS may furnish, if adequately developed, by firstly considering the integration and interoperation with other existing systems, as shown in ITS Architectures (see Tasks 6 and 7).

As from another viewpoint, the lack of specific financing lines for implementing technological or investigational solutions and the development of ITS-related matters has undoubtedly become a strong limitation to ITS advancement in Chile. Thus, for instance, Transportation Engineering career has not still incorporated the learning of ITS-related themes, or their first acknowledgments are starting to be introduced.

Another factor affecting ITS development is the scarce information in both public and private environment about ITS, in general, and ITS benefits if these systems are adequately applied to domestic reality. Their importance lies in the issue that public projects must have a certain minimum level of social profitability to be financed by the State. Said profitability depends upon project's costs and benefits. Several efforts for generating ITS utilization-related practical experiences have been accomplished. As from said experiences, the benefits produced (reduction of accidents, traveling times, pollutant emission, etc.) have been quantified. Some of those experiences cannot be straightforwardly applied to similar projects developed in Chile but they may be deemed as references due to the significant differences currently existing between both realities

5 ITS ACTION PLAN

A View of ITS in Chile on a Middle- and Long-term Basis

Considering the capabilities of ITS technologies, international experience and their middle-term developmental expectations in Chile, it is highly possible to formulate a view about the future transformations that might occur in Chilean transportation systems: In this context, the incorporation of ITS technologies in Chile has to offer the chance of achieving:

- An informative infrastructure addressed to transportation system users in agreement with physical infrastructure to both maximize transportation system effectiveness and usefulness and encourage modal integration.
- A safe transportation system promptly detecting and responding to road incidents.
- An important reduction in the number and seriousness of traffic accidents and a very quick response in accidental occurrence.
- An informative system addressed to transportation system operators and users to reduce congestion and increase road capacity, thus reducing the necessity of a new road infrastructure.
- A set of low power consumption devices and technologies, with reduced environmental impact.
- A better positioning of Chile as Latin America's leading country with respect to the application and development of ITS technologies.

The following might be consequently expected:

- Future Chilean transportation systems will be administered and operated to deliver door-to-door intermodal services, notwithstanding passenger or cargo features or localization.
- Future transportation systems will be safer and user-guided. They will also give an access to a vast range of communicational and monitoring technologies.

Development of the Action Plan

Considering the previously introduced viewpoints, as described in ***Sections 3*** and ***5*** above, it is possible to identify deficient areas related to transportation ("problem areas") where ITS technologies may furnish a significant contribution to overcome the problems detected and to achieve the strategic objectives as posed above.

These areas were called "ITS Development Strategic Areas". They were divided into sub-areas to appropriately identify the aspects that can be approached through ITS technologies. In turn,

each sub-area contains types of specific projects thus providing a more itemized level of the actions being proposed. The foregoing is illustrated in Chart 1.1 below.

Nevertheless, in order to make the proposal fall within an accomplishment plan of specific actions, it is essential to link the Action Plan to domestic institutional organization features. Therefore, it has been acknowledged that there are units being responsible for geographic and/or topical scopes that should be involved in the proposals made or their reviewing and implementation

Therefore, the Action Plan has been created upon the grounds of three major plans: 1) National Plan, 2) Interurban Plan, and 3) Urban Plan; thus representing a complete domestic institutional structure. In turn, each of these plans consists of programs and subprograms referring to the developmental areas and sub-areas (Chart 1.1.) and the ITS Architecture "Service Areas"

Chart 1.2 introduces Action Plan's general configuration, which is, the definition of Programs, Sub-programs and their Objectives.

To make this report's reading easier, a final Annex will describe a list of projects within each Plan, including a summarized description, relevant antecedents, specific objectives and a list of Market Packages being related to each project in particular. The information supplied by these Related Market Packages in connection with each project is very important since it provides a link with ITS Architecture documentation available in Task 7 report and in National ITS Architecture website.

Considering that a significant number of ITS project was identified and that there exist budget restrictions in the country, a set of prevailing projects within each Plan was identified in order to facilitate authority's investment decisions. These antecedents are described in ***Section 1.6*** below.

Chart 1.1 Definition of ITS Development Strategic Areas

Development Area	Development Sub-area	Area / Sub-area Objectives	Project Types
Traffic Safety	Accident Prevention	Prevent accident occurrence in urban and interurban routes.	▪ Railroad crossing control ▪ Speed automatic measurement ▪ Weather condition monitoring ▪ Preventive signing for users being under adverse conditions ▪ Variable message sign
	Emergency Case Management	Detect and manage situations requiring urgent attention in urban and interurban routes.	▪ Incident (accident) detection and management ▪ Incident-related alarm (SOS post)
Transportation Management	Traffic Management	Reduce recurrent and non-recurrent congestion in urban and interurban routes. Reducing delays experienced by transportation system users. Reduce the effects from urban and interurban traffic on environment.	▪ Urban traffic control ▪ Incident detection and management ▪ User information (VMS, web, telephone)
	Passenger Transportation Service Management	Achieve an improved and more effective operation of urban and interurban passenger transportation services.	▪ Vehicular follow-up ▪ Priority to public transportation ▪ Fare integration ▪ User information (bus-stops, vehicles) ▪ Vehicle safety ▪ Public transportation bus-stop safety

Development Area	Development Sub-area	Area / Sub-area Objectives	Project Types
	Cargo Transportation Service Management	Achieve an improved and more effective operation of urban and interurban cargo transportation services.	▪ Vehicular Electronic Recording ▪ Cargo Electronic Recording ▪ Vehicular follow-up ▪ Speed automatic measurement ▪ Vehicular WIM (Weigh-in Motion) ▪ Vehicular safety
Electronic Collection	N/A	Apply technologies related to toll payments, fare collections, etc. in order to optimize transportation system operation.	▪ New systems for toll payment on a free-flow modality throughout the country ▪ Use of electronic cards for transportation service fare payment
Inspection	Inspection: Safety and Environmental Aspects	Improve the inspection of traffic safety-related aspects such as flow rate speed and dangerous cargo carriage in urban and interurban routes.	▪ Speed automatic measurement ▪ Vehicular restriction inspection supporting systems
	Inspection: Commercial Aspects	Improve the inspection of product marketing-related aspects such as port, airport and border site controls, and of police-related aspects (ex. vehicle robbery).	▪ Vehicular Electronic Recording ▪ Cargo Electronic Recording
Transportation Information	Information Compiling Systems	Support transportation system planning and management tasks by implementing data compiling systems.	▪ Implementing a network of devices for automatically compiling traffic-related information (vehicular flow, origin-destination travels, images, etc.).

Chart 1.1 Definition of ITS Development Strategic Areas (continuation)

Development Area	Development Sub-area	Area / Sub-area Objectives	Project Types
Maintenance and Building Management	Working Area Management	Improve traffic management at both urban and interurban areas where road maintenance or building tasks are carried out.	▪ Fixed and portable VMS ▪ Speed automatic measurement
	Storage information systems	Get domestically integrated and updated transportation databases available.	▪ Creating and maintaining databases ▪ Implementing a network of devices for automatically compiling traffic-related information (vehicular flow, speeds, origin-destination travels, etc.
	Information Broadcasting Systems	Increase information service coverage and quality for transportation system users.	▪ Information systems through internet, mobile phone, radio ▪ Information systems in roads (VMS)
Training and Research	Training	Increase the knowledge about ITS systems both in public and private areas / scopes.	▪ Developing a training plan addressed to MOP and MTT officers ▪ Including ITS learning in university careers (transportation and electronic engineering)
	Research	Deepen domestic knowledge about ITS implementation and analysis.	▪ Developing test experiences or witness cases ▪ Developing ITS Evaluation Manual
ITS Institutional Nature and Legal Support	N/A	Develop the institutional nature and legislation being consistent with transportation challenge and integrated ITS implementation throughout Chile.	▪ Creating an entity coordinating ITS development and implementation ▪ Defining rules and standards regulating ITS
Financing	N/A	Get the resources addressed to ITS R&D.	▪ Licensing ITS systems to private-owned corporations (information, fleet management) ▪ Creating public financing sources for ITS purposes

Chart 1.2 ITS Implementation Action Plan Configuration

National ITS Action Plan		
Program	**Sub-programs**	**Program / Sub-Program Objectives**
ITS Institutional Nature and Legal Support	N/A	Develop the institutional nature and legislation being consistent with transportation challenge and integrated ITS implementation throughout Chile
Financing	N/A	Getting resources to encourage nationally ranged ITS R&D
Training and Research	Training	Increasing the knowledge about ITS both in public and private scopes / areas.
	Research	Deepening domestic knowledge about ITS implementation and analysis. Developing national technological capabilities to develop ITS-applicable software development, systems integration and communicational systems
Transportation Information	Storage information systems	Integrating and processing the information stored in regional databases and traffic control centers to be used upon domestic planning of transportation systems and upon providing information services to users.
	Information Broadcasting Systems	Increasing the coverage and quality of information services by providing domestic information to transportation system users.

Interurban ITS Plan		
Program	**Sub-programs**	**Program / Sub-Program Objectives**
Traffic Safety	Accident Prevention	Preventing accident occurrence in urban and interurban routes.
	Emergency Case Management	Detecting and managing situations requiring urgent attention in urban and interurban routes.
Transportation Management	Traffic Management	Reducing recurrent and non-recurrent congestion in urban and interurban routes. Reducing delays experienced by transportation system users. Reducing the effects from urban and interurban traffic on environment.
	Passenger Transportation Service Management	Achieving an improved and more effective operation of urban and interurban passenger transportation services.
	Cargo Transportation Service Management	Achieving an improved and more effective operation of urban and interurban cargo transportation services.
Electronic Collection	N/A	Increasing effectiveness regarding toll collection or other services supplied to users in interurban routes.
Inspection	Inspection: Safety and Environmental Aspects	Improve the inspection of traffic safety-related aspects such as flow rate speed and dangerous cargo carriage in interurban routes.

Interurban ITS Plan		
	Inspection: Commercial Aspects	Improve the inspection of product marketing-related aspects such as port, airport and border site controls
Transportation Information	Information Compiling Systems	Support transportation system planning and management tasks by implementing data compiling systems.
	Storage information systems	Compiling, pr9ocessing and storing several any transportation system-related information for planning and managing infrastructure and delivering information services to users
	Information Broadcasting Systems	Providing users with both updated and integrated information leading their transportation-related decisions at interurban scope.
Maintenance and Building Management	Working Area Management	Improving traffic management at both interurban areas where road maintenance or building tasks are carried out.

Greater Santiago ITS Plan		
Program	**Sub-programs**	**Program / Sub-Program Objectives**
Optimizing Current ITS Systems at UOCT	SCOOT Networks	Effectively utilizing all existing SCOOT infrastructure for traffic control purpose.
	Fixed Time Networks	Upgrading the utilization of non-suitable existing traffic control systems.
	Complementary Systems	Optimizing the utilization of CCTV, VMS and incident detection systems
Developing New ITS Systems at UOCT	Owned Systems	Increasing traffic management capabilities in Santiago through systems not being operated by UOCT.
	External Systems	Increasing traffic management capabilities in Santiago through systems being operated by UOCT n agreement with other entities.
Electronic Collection	N/A	Increasing the effectiveness concerning toll collection or other services provided to users in Santiago
Public-owned Transportation Supervision	N/A	Improving the supervision over the operation displayed by public transportation licensed systems by utilizing ITS technologies (vehicular follow-up, rate monitoring, etc.).
Urban Highway Management	N/A	Optimizing the operation of urban highways and their interaction to surrounding highway control authority.
Transportation Information at UOCT	Information Compiling Systems	Supporting Santiago's transportation system planning and management tasks by implementing data compiling systems.
	Storage information systems	Permanently storing information created by UOCT equipments *in situ*. Storing information created by other units like CCB, Centers controlling Road and County Licenses. Maintaining the integrity and safety in stored data-related operations.
	Information Broadcasting Systems	Providing users with information allowing them to take decisions about their travels considering vehicular circulation condition or to change their decisions while traveling..
Training	N/A	Defining and implementing training strategy to UOCT staff.
Public-Private Partnership	N/A	Identifying and discussing new initiatives encouraging partnerships between public entities and private corporations resulting in mutual benefits.

Other Cities ITS Plan		
Program	**Sub-programs**	**Program / Sub-Program Objectives**
Traffic Management	Optimizing Current ITS Systems	Permanently optimizing the operation of already existing ITS systems
	Developing New ITS Systems	Performing a more effective utilization of road infrastructure through the implementation of traffic control and monitoring systems.
Public Transportation Management	N/A	Getting better and more efficient functioning of public transportation-related urban services..
Transportation Information	Compilation Systems	Supporting transportation system planning and management tasks by implementing data compiling systems.
	Storage Systems	Permanently storing information created by CCT (Traffic Control Center) equipments *in situ*. Storing information created by other units like Centers controlling Road and County Licenses. Maintaining the integrity and safety in stored data-related operations.
	Broadcasting Systems	Providing users with information allowing them to take decisions about their travels considering vehicular circulation condition or to change their decisions while traveling..
Training	N/A	Defining and implementing training strategy to Traffic Control Center staff.

6 IDENTIFICATION OF PRIORITY ITS PROJECTS

ITS projects included in the Action Plans, whose details are described in the last pages of this document, embrace the large range of needs as evidenced by transportation users in Chile. Among these projects, a distinction should be made between those ones grounding other projects, or those projects giving birth to major benefits. Therefore, these projects should be awarded more priority upon their implementation stage.

A set of priority status ITS projects being enforceable to each Plan has been identified as from consulting staff's experience, the knowledge of the institutional nature of this country and ITS current condition in Chile and its middle- and long-term projections (as shown in Tasks 1 and 2) and the international experience concerning ITS project's benefits (Task 5).

Priority status ITS projects regarding each Plan are listed below. Moreover, their details (including their relation to National ITS Architecture's.

Priority Status National ITS Action Plan Projects

N1 - Creating an entity coordinating ITS development and implementation;

N2 - Defining rules and standards regulating ITS implementation and operation;

N3 - Updating Traffic Signing Manual by incorporating ITS (standardizing messages in VMS, variable message signs);

N4 - Creating a vehicular and cargo electronic recording domestic system;

N5 - Developing a ITS Project Evaluation Manual;

N6 - Developing a national training plan for MOP and MTT Ministry officers;

N7 - Developing test experiences or witness cases;

Priority Status Interurban ITS Action Plan Projects

I1 - Inspection center of road operation licenses;

I2 - Incident (accidents) detection and management system startup;

I3 - Development of new free-flow-based toll electronic collection subsystems;

I4 - Creation of a network of devices for information compilation (traffic status, weather conditions, etc.);

I5 - Development of transportation services and infrastructure status databases;

I6 - Implementation of user information systems.

Priority Status Greater Santiago ITS Action Plan Projects

S1 - Implementation of traffic control centers at urban highways;

S2 - Development of Buses Control Center (CCB) regarding both monitoring and inspecting of licensed public transportation services;

S3 - Reviewing, networking configuration and updating of SCAT UOCT programming;

S4 - Optimizing current SCOOT UOCT networking operations;

S5 - Designing UOCT traffic data storage system;

S6 - Implementation of free-flow-based toll electronic collection subsystems at urban highways;

S7 - Creating a traffic control regional center;

S8 - Development of a test project for detecting and managing incidents (accidents) in fixed time networks;

S9 - Development of a test project for detecting and managing incidents (accidents) in SCOOT networks;

S10 - Development of a travel planning website.

Priority Status Other Cities ITS Action Plan Projects

O1 - A review of networking configuration and programming updating;

O2 - Creation of a network of devices for information compilation (traffic status, weather conditions, etc.);

O3 - Development of new traffic control systems;

O4 - Development of new traffic monitoring systems;

O5 - Development of transportation services and infrastructure status databases;

O6 - Implementation of user information systems.

Within each Plan, *priority status* projects are related among themselves since it is highly evident that some of them are requirements of others or that there exists a more appropriate sequence to attain an integrated and interoperable development of these priority status projects. These relationships are illustrated in Figures 1.3 through 1.6 below. Note that red color-edged projects refer to those already having their budget assured.

It is also possible to consider that there are relationships at "Plans" level. Indeed, National Plan projects influence over the projects pertaining to other plans. It might be consequently stated that National ITS Action Plan should develop before the remainder of other plans. However, such a statement appears to be too harsh. In practice, a parallel development of all plans and projects has, and will likely, occurred. Now, the main difference lies in the fact that, by virtue of ITS Architecture's structure, these parallel developments will be performed in a more harmonized fashion.

Figure 1.3 Relationship among Priority Status National (N) ITS Action Plan Projects

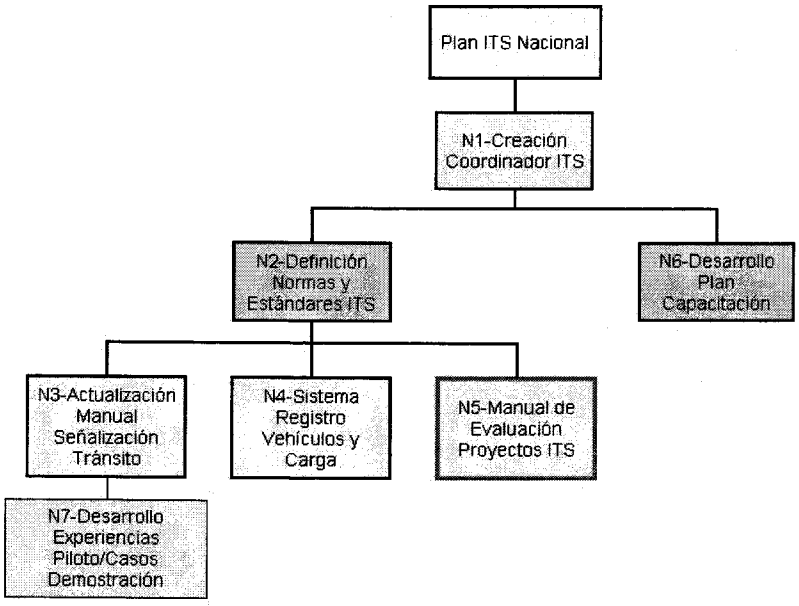


Figure 1.4 Relationship among Priority Status Interurban (I) ITS Action Plan Projects

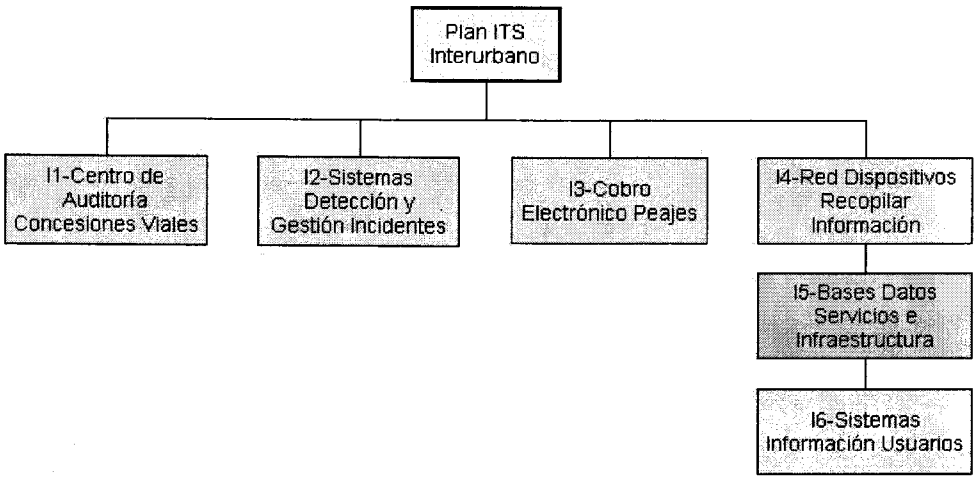


Figure 1.5 Relationship among Priority Status Greater Santiago (S) ITS Action Plan Projects

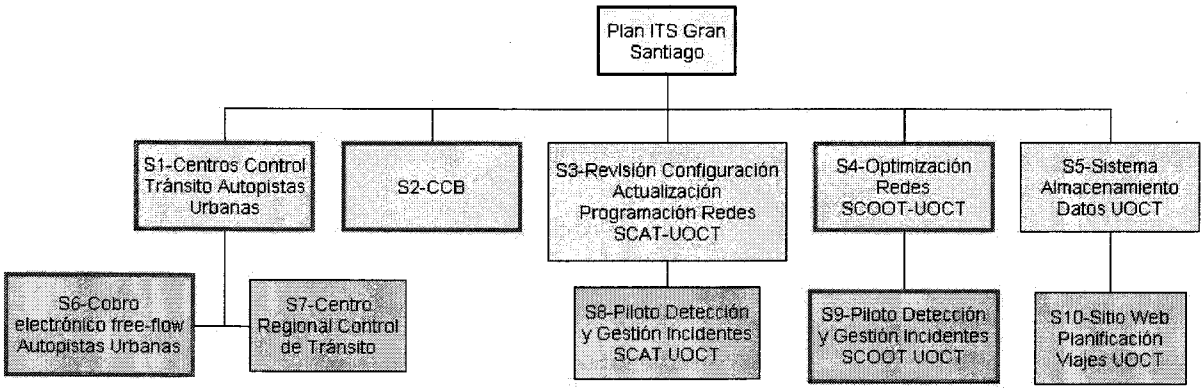
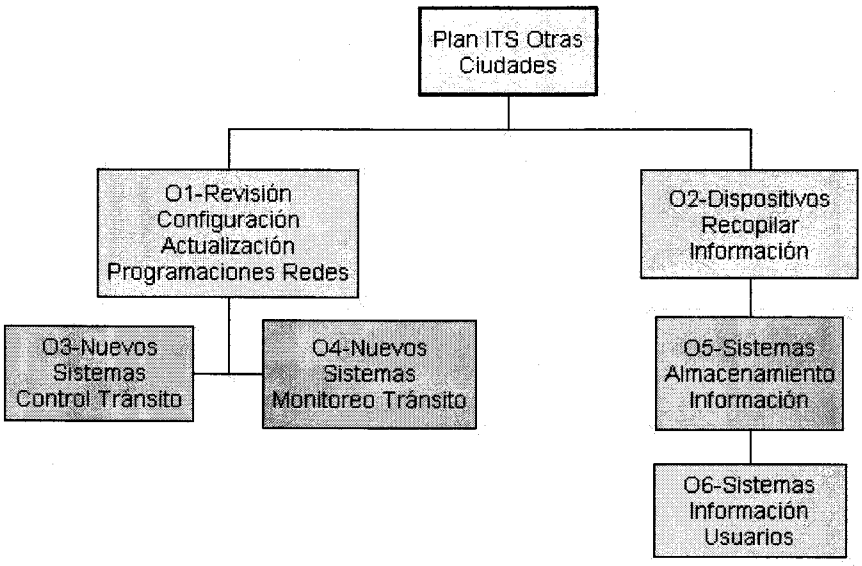


Figure 1.6 Relationship among Priority Status Other Cities (O) ITS Action Plan Projects



7 ITS SYSTEMS COST

Estimating ITS systems development, maintenance and operation costs is a significant aspect for which there are no enough antecedents in Chile. Accordingly, consulting staff has searched for relevant information in internet. Out of all information sources duly revised, IDAS* *(ITS Deployment Analysis System)* software documentation appears to be the most complete and structured. This information provides capital cost and operating and maintenance cost in the USA concerning a series of ITS systems components, their values being updated as of 2002. These components may be grouped so that they give birth to a ITS displaying specific functionalities.

As a working methodology, consulting staff made an adjustment to IDAS-reported values so that these values may match Chilean reality. Adjustments were as follows:

- Capital cost was multiplied by factor 1,2 to recount VAT and shipment cost of the equipment from USA to Chile;
- Involved staff's income was multiplied by factor 0,25 in order to take into consideration the difference between USA and Chile in terms of people's income;
- Maintenance and operation cost was multiplied by factor 0,75 to consider the maintenance cost lowering due to lower income level of the individuals performing the maintenance tasks.

For instance, Chart 1.3 below provides cost estimation details for the two systems: *"Incident Detection and Management"* and *"Traffic Information Delivery Radiobroadcasting"*. Reported values are stated in thousands of Chilean pesos (July, 2003). It should be emphasized that these costs are applicable only to components described in Chart 1.3 assuming there other complementary equipments or systems are already in existence.

Creating a Chilean database similar to that of IDAS would be extremely useful to facilitate ITS project-related cost-benefit analysis.

* IDAS software allows having an estimation of ITS systems-related benefits before their implementation *in situ*. Hence, a series of assumptions about user's behavior when facing ITS devices and other saving-based alternatives (like time and fuel) actually coming from the utilization of these technologies has been posed. These assumptions have been set forth in agreement with empirical experiences as developed in USA. Further details may be found in http://idas.camsys.com/

Chart 1.3 ITS Systems Development, Maintenance and Operation Costs

Source: IDAS Software Documentation, (Values adjusted by Local Consultant)

System	Components	Useful Life (yrs)	Capital Cost ($ Th.)		Operation & Maintenance Cost ($ 000 / yr.)		Comments
			Low	High	Low	High	
Incident Management	Video monitors for detecting incidents	5	34.020	41.580	1.063	1.299	It includes 5 19"-type video monitors and video monitors situated on a wall (3 x 3 = 9 monitors (a switch included))
	Hardware for detecting incidents	5	68.628	100.212	2.145	3.132	It includes 4 servers, 5 workstations and 2 laser printers
	Integration of systems for detecting incidents	20	75.600	92.400	2.363	2.888	Integration to other systems
	Software for detecting incidents	5	75.600	92.400	2.363	2.888	It considers COTS software and it includes development cost
	Hiring Incident-detection Staff				110.250	134.750	Operators (7 technicians)
	Video Monitor for giving responses to incidents	5	2.268	2.772	71	87	It includes a 19"-type monitor
	Hardware forgiving responses to incidents	5	2.268	2.772	71	87	It includes a workstation
	System integration for giving responses to incidents	20	151.200	184.800			Integration to other systems
	Software for giving responses to incidents	2	11.340	13.860	354	433	It considers COTS-type software (*)
	Hiring Incident-response staff				15.750	19.250	It considers an incident-management coordinator
	Hardware for giving responses to emergencies	10	12.600	25.200	158	315	It includes 3 workstations.
	Software for giving responses to emergencies	10	58.800	126.000	263	1.838	It includes databases containing emergency response plans, vehicular follow-up software and real time-based traffic coordination

System	Components	Useful Life (yrs)	Capital Cost ($ Th.)		Operation & Maintenance Cost ($ 000 / yr.)		Comments
			Low	High	Low	High	
	Hiring emergency-response staff				8.750	28.875	It considers 2 operators.
	DSO Communication line	20	420	840	315	630	A rented 56 Kbps line (ranging from 4 to 8 kilometers). The cost should not distance-dependent.
	Vehicular detecting system on route		18.228	24.360	105	210	A camera applicable to both traffic ways
	DS3 Communication line	20	2.520	4.200	12.600	37.800	A rented (T3) 77,736 Mbps line (ranging from 4 to 8 kilometers). The cost should not be distance-dependent.
	TOTAL COST ($ Thousands)		**510.972**	**707.196**	**144.019**	**196.680**	
Traffic Information Delivery Radio Broadcasting	Hardware for broadcasting traffic information	5	4.200	8.400	131	263	It includes a workstation
	Software for broadcasting traffic information	5	15.120	18.480	473	578	COTS-type software
	Integration for broadcasting	20	75.600	92.400	2.363	2.888	Integration to other systems
	Hiring traffic information broadcasting staff				15.750	19.250	It considers 1 operator

System	Components	Useful Life (yrs)	Capital Cost ($ Th.)		Operation & Maintenance Cost ($ 000 / yr.)		Comments
			Low	High	Low	High	
	DS0 communication line	20	420	840	315	630	A rented 56 Kbps line (ranging from 4 to 8 kilometers). The cost should not be distance-dependent.
	Radio broadcasting	20	13.440	26.880	315	525	Capital cost corresponds to a 10-watt radio broadcasting station. It includes processor, antenna, transmitters, backup batteries, cabin, rack, lights, connectors, wires and license). The cost of a radio station with more power is $ Th. 8,400 higher (a greater antenna will be required)
	COST TOTAL ($M)		**108.780**	**147.000**	**19.346**	**24.133**	

(*) COTS: Commercial Off-the-shelf. This term refers to the development of computer applications by making use of previously developed and tested software.

8 RECOMMENDATIONS

In the light of previously outlined antecedents, Consulting Staff has proposed a set of actions that the authority might implement to definitively encourage ITS development in Chile. These actions are straightforwardly linked to priority status ITS projects identified in ***Section 6*** of this report.

Creating a Chilean ITS Coordinating Entity

The Ministry of Transportation and Telecommunications (MTT), as traffic matters governing body throughout the country, has the authority to act in the capacity of public entity both planning and coordinating ITS development in Chile. Hence, MTT might limit itself to normative tasks, like updating Traffic Signing Manual and ordering National ITS Architecture's compulsory use during the functional designing of the systems. MTT might also have the support from the Ministry of Public Works (MOP) as regards constructive / technical matters, as enforced in Toll Collection Subsystems (TCS), but without any prejudice to the alternative that MOP may also develop and propose standards regarding specific projects but always within ITS Architecture's framework as defined for this country. On the other hand, the Transportation Planning Interministerial Secretary (SECTRA) and the Planning Direction Board (DIRPLAN), both depending on MOP, might address a portion of their resources to develop ITS R&D in the country. In turn, ITS-CHILE might continue enlarging their corporate activities as a linkage between public and private entities as on ITS development and application.

Defining ITS Rules and Standards

ITS-Coordinating Entity should firstly ascertain the rules and standards governing ITS development in Chile. Implementing National ITS Architecture in projects that are partially or totally financed by the National State is a sound example of this statement. Upgrading in the establishment of the communicational requirements required to interconnect systems becomes necessary too. In this sense, current American ITS standards have been proposed. Said standards should be either acknowledged or modified in accordance with domestic reality. Both MOP and the Department of Telecommunications should accomplish this task.

Developing a Training Program addressed to MOP, MTT or other public institutions Staff

Within the public scope, the knowledge about ITS is concentrated upon a very small number of professionals who have attended workshops or congresses or who are involved in ITS systems of urban road licensed corporations, either at the Metropolitan area or at the Buses Control Center. Because of the multidisciplinary nature of ITS the staff involved in these systems must be trained in certain topics like *ITS Architecture, benefits, costs, standards, communications, etc.*, so that they may also lead ITS development as from the public scope. This program should be sponsored with funds coming from the same institutions through counseling services rendered by domestic

and foreign corporations being specialized in the subject. It must be also permanent in terms of time to maintain an appropriate updating extent of knowledge

Updating Traffic Signing Manual through ITS Incorporation

The development of a new chapter in the Traffic Signing Manual (to be called "Dynamic Message Sign (DMS)" has been scheduled for next year. According to the information supplied by the national Traffic Safety Commission (CONASET), some aspects such as DMS reading distances, types of message signs, message sign colors, etc., will be included, without any discussion concerning technical details involved. Updating above Manual is essential to cause DMS to have legal support in the sense that violating DMS will result in traffic infractions. Presently, if a system displaying maximum speed permitted in pursuance of route conditions were implemented, drivers would not be compelled to fulfill such a speed limit. On the other hand, DMS standardization is fundamental so that drivers may correctly and promptly understand the information furnished to them from time to time.

Creating a Vehicle and Cargo Electronic Recording National System

This project should have a significant shock on ITS development in the country since it becomes the basis for a series of other highly beneficial initiatives in terms of economy. Using TAG along Metropolitan region urban highways is a remarkable step in this context. By 2006, there will be about 900,000 TAG-identified motor vehicles. These vehicles will be easily recorded during their passage through regional colonnades. At that time, using A TAG will be very common considering that above figure is comparable to 915,054 motor vehicles existing in the region in 2001.

It is then difficult to think about stipulating the compulsory TAG utilization in certain vehicles (firstly, State-owned ones and, secondly, passenger and cargo transportation ones). MTT has the authority to cause TAG utilization to become binding under all circumstances, like plate utilization. In this sense, there already exists an antecedent because, in December 2002, an amendment to Chilean Traffic Act was published. Said legal amendment provides punishment against drivers moving along toll or fare collection subsystem-licensed public routes but without carrying any electronic device permitting such a binding collection.

An adequate TAG operation as well as the accurateness of the information stored in it should be a new aspect to be checked during vehicular technical inspection.

Developing Incident Detection and Management Systems throughout Interurban Routes

Chile has witnessed significant incident detection and management-related improvements with respect to the situation existing before the 90's. For instance, installing S.O.S. telephone booths along licensed routes. By making a call from these boots, you may contact police, firemen or medical services to report a traffic incident. However, these improvements must be still

upgraded, specially in relation to implement S.O.S. telephone coverage to non-licensed routes, to have fixed and portable VMS available for reporting users of the occurrence of any incident, to implement follow-up systems applicable to emergency vehicles, to develop incident automatic detection systems at strategic sites throughout interurban road network, etc.

Incident automatic detection and management's test experience to be developed as part of the study titled "A Discussion about ITS Incorporation to Santiago de Chile's Traffic Control System" (under tender process) will surely provide us with more antecedents with respect to the cost and benefits offered by these systems throughout the urban scope. These antecedents should be helpful to implement said systems on an interurban basis.

Other Comments

Since there exists no Chilean sufficient experience concerning the benefits coming from ITS technologies, prior to the implementation of a particular project involving them, compiling relevant information is then necessarily required. Such information should deal with the transportation system service variables which are expected to be affected by said project. Therefore, the situations occurring both before and after project's implementation might be compared. For instance, MOP should adequately store and systemize this information in order to create a database of ITS-related benefits and costs, similar to that of US Department of Transportation, utilized as Task 5's foundation.

Permanent reviewing and updating ITS Architecture have also become a need to be considered. ITS Architecture must be dynamic enough in order to be actually useful in the functional design of ITS systems. Within this context, an entity both being in charge of Architecture's maintenance and considering the possibility of developing a website that enables the access to architecture-contained information must be finally defined and discussed.

Appendix A
Development of an ITS "Action Plan" for Implementation
Task 9

- National ITS Plan
- Interurban ITS Plan
- Greater Santiago ITS Plan
- Other Cities ITS Plan

ITS National Plan				
Program	Sub-programs	ITS Projects	Description of the Project	Related Market Packages
Transportation management	Management of Services of Passengers and Cargo Transportation	▪ Generation of a national system for the electronic registration of vehicles and cargo	Description: The project deals with all the necessary steps to implement in the country a system that permits to identify electronically a certain type of vehicles (travelers and cargo) and cargo (containers or sealed vehicles), so as to automatize, using the corresponding devices, the controls of vehicles and cargo made by Carabineros, SII or others. The system could be also used as a platform to develop systems to detect vehicles and cargo in specific points of the road network during their travels, in order to follow-up fleets and transported products. One alternative to implement a system of this type would be the compulsory use of a TAG in the vehicles as the one used for the electronic toll collection; Background: The availability of a system that permits to identify the vehicles and their cargos would give rise to the possibility of generating a large variety of ITS services related to traffic management, commercial vehicles management, control, information to users, etc.; Goals: To set the basis for the subsequent development of systems that permit to reduce the times involved in the control of vehicles and cargo on roads, on border passes, in ports, etc., to make those controls more effective, to contribute to increase the efficiency in transportation companies of the country, and to settle a platform for the development of detection systems and follow-up of vehicles and their cargo.	APTS1 APTS2 APTS5 CVO01 CVO02 CVO03 CVO04 CVO05 CVO10
Control	Commercial Aspects Control	▪ Generation of a national system for the electronic registration of vehicles and cargo	Ditto project included in the program of "Transportation management".	Ditto project included in the program of "Transportation management".
Transportation information	Storage Information Systems	▪ Development of database for the consolidation of information of public and cargo transportation service and private transportation service of the country	Description: The project consists of the design and physical implementation of a national system of storage of information about transportation services that consolidates, processes and selects the information stored in other regional systems; Background: The systems of information to users are one of the applications more familiar and useful within the ITS context. These systems require as an indispensable condition the existence of adequate and constantly updated database systems; Goals: Bring together, process and select, in a single system, all the information stored in other regional database systems, generate the support for an information system to national users concerning transportation services available in the country.	AD2

ITS National Plan				
Program	Sub-programs	ITS Projects	Description of the Project	Related Market Packages
Transportation information	Storage Information Systems	▪ Development of database for the consolidation of information about the condition of the transportation infrastructure (road works, weather conditions) of the country	Description: The project consists of the design and physical implementation of a national system of storage of information about the condition of the transportation infrastructure: road works, weather conditions, occurrence of incidents, etc., that consolidates, processes and selects the information stored in other regional systems; Background: The systems of information to users are one of the applications more familiar and useful within the ITS context. These systems require as an indispensable condition the existence of adequate and constantly updated database systems. The Highway Administration of the Ministry of Public Works (MOP) owns a data gathering system that provides information for a website about road work, condition of border passes, toll price, etc. Up to now there is no information about weather conditions on the roads, fundamental information for the users that helps to increase safety on roads. Weather information gathering requires the implementation of meteorological stations network and sensors; Goals: Bring together, process and select, in a single system, all the information stored in other regional database systems, generate the support for an information system to national users concerning transportation services available in the country.	AD2
	Systems of Information Broadcasting	▪ Implementation of a system to send information about transportation at a national level through the Internet	Description: The project consists of the design and implementation of a free information system to the users through the Internet that uses as a source of information the systems of storage of information of transportation services and the condition of the infrastructure, coming from different sources besides the systems of storage developed locally in cities or regions of the country. The system will include consulting tools to allow the users to select, for example, OD pairs and to obtain the information in an easy understandable format. The project could also count on the option to send information by other means or formats, such us WAP (Wireless Application Protocol), automatized response services through the telephone; Background: The use of the Internet is one of the most effective ways to provide information about transportation before the trip. The UOCT website (Unidad Operativa de Control de Tránsito – Transit Control Operative Unit) receives daily a great number of visitors interested in knowing, by different reasons, the condition of the roads in Santiago. There happens a similar situation with the Highway Administration website, though no traffic statistics are available on this site; in this case there also exists the possibility of receiving information in WAP format and by a telephone call to 800 (Fonocaminos); Goals: To implement a free information system for users through the Internet, containing national updated information related to the transportation services and infrastructure.	ATIS2

ITS National Plan				
Program	Sub-programs	ITS Projects	Description of the Project	Related Market Packages
Training and Research	Training	▪ Development of a national training plan for public sector employees (MOPTT and others)	Description: The project consists of the design, arrangement and working out of a training plan about ITS for MOPTT (Ministry of Public Works, Transportation and Telecommunications) employees and other public agencies being connected with the implementation of road works, transportation systems planning, legislation about transportation, etc. The training must consider topics such us: communications, architecture, evaluation, etc. Background: The knowledge about ITS technologies is limited to the public sector; only a reduced number of employees has participated in the workshops and congresses held in the country or abroad. Besides there is no ITS specialized unit in the public sector; Goals: To get the greatest possible number of MOPTT employees at a central and regional level to have the necessary knowledge to lead from the public sector the development of the ITS.	N/A
		▪ Development of training courses for the private sector with the support of public funds	Description: The project is similar to the previous one, but orientated to the private sector. Background: It is probable that in the private sector there exists a deeper knowledge of ITS than in the public sector, particularly in the case of transportation and telecommunication companies that depend upon international companies. Nevertheless in the majority of national companies there are not specialists on the issue; Goals: To take a greater advantage of ITS by the private sector, thus increasing the social benefits of ITS projects.	N/A
	Research	▪ Development of pilot schemes or demonstration cases	Description: The project consists of the design and starting up of a number of pilot schemes or demonstration cases through which information can be obtained for the analysis of cost / effective ITS projects and to show the advantages and disadvantages of the technologies used. Background: There exists as a UOCT initiative the working out of pilot projects for the detection and management of occurrence of incidents in Santiago, which should be extended to the interurban sector, including in those projects the emergencies management; Goals: To enlarge the practical knowledge of ITS to generate information about costs of implementation, operation and maintenance, and ITS benefits.	N/A
		▪ Development of Manual of Assessment of ITS projects, mandatory for public investment	Description: The project consists of a study to generate the methodology to assess ITS projects. This methodology must consider not only the benefits from the social point of view but also other benefits associated with life quality and sending of information. Background: Sectra (Secretaría Interministerial de Planificación de Transporte – Interministerial Secretary of Transportation Planning) has already considered to call for bids for this project in 2003; Goals: according to Sectra, the goal of the project is to define a common methodology and approach in order to assess projects of investment in technologies of ITS management at a national, regional and urban level during the different phases of the project (profile, feasibility and project).	N/A

ITS National Plan				
Program	Sub-programs	ITS Projects	Description of the Project	Related Market Packages
Training and Research	Research	▪ Generation of permanent public financing sources for ITS research	Description: The project consists of identifying and making all the necessary agreements both with the national and international organizations that support financially the development of new technologies research projects so as to count on a permanent financing for theoretical and applied research on issues related to ITS; Background: To date, Sectra has carried out some general research studies about ITS and the MOP, with the support of US TDA (US Trade and Development Agency), has requested the development of the present study. On the other hand, the universities do not consider the ITS as a fundamental area of research and development, due to some extent to the fact that the public sector has not require it; Goals: To increase the resources for research in order to have all the information about Chile, to adapt to the national situation the progress made in other countries, to incorporate the rising national experience, etc.	N/A
Institucionalidad y Soporte Legal de ITS	N/A	▪ Creation of a coordination agency for the ITS development and application	Description: The project consists of the identification and implementation of legal, institutional and other necessary actions for the creation of a public agency having the necessary powers to plan and coordinate the development of the intelligent transportation systems in Chile. This agency can be created by means of MOPTT's decrees or by means of institutional agreements (public-private); Background: Taking into account the analysis submitted in Task 2, it does not exist in Chile an agency in charge of the ITS development. The international experience proves that the participation of the public sector is absolutely necessary to attain an integrated development of the systems; Goals: To create a public agency in charge of the planning and coordination of the ITS development in Chile	N/A
		▪ Update of the Traffic Signals Manual incorporating the ITS (messages standardization in VMS [Variable Message Sign], variable signaling)	Description: The project consists of the creation of a study aimed to incorporate in the Traffic Signals Manual, various aspects related to the ITS: messages standardization in VMS; legal use of variable signals (speed) and minimal technical characteristics of the ITS set up in roads; Background: The CONASET (Comisión Nacional de Seguridad de Tránsito – National Security Traffic Commission) is at the present time developing the Chapter 8 "Dynamic Signaling" of the Traffic Signals Manual. This chapter will be useful as a starting point for this project; Goals: To establish the binding use of certain ITS devices (variable signals), to define minimal technical characteristics of the ITS devices set up in roads, to standardize the information given to the users in VMS, variable signals, etc.	N/A

ITS National Plan				
Program	Sub-programs	ITS Projects	Description of the Project	Related Market Packages
Legal Support of ITS	N/A	▪ Definition of the standards regulating the implementation and operation of the ITS	Description: The project deals with the creation of rules, regulations, decrees or other instruments that regulate the implementation and operation of the ITS; Background: the Chilean rules related to the ITS is scarce; to date there only exist mandatory technical advices for the electronic toll collection systems. The experience in US shows that the compulsory use of an ITS Architecture to get public financing for projects is a means of attaining an adequate development of the ITS; Goals: To generate a set of rules, regulations, decrees, etc. to define the technical characteristics and the basic proceedings to allow the integration, interoperability and compatibility of ITS.	N/A
Financing	N/A	▪ Identification of public-private partnerships projects	Description: The project consists of the identification and legal and economic analysis of ideas of public-private partnerships within the framework of ITS. Background: Both in US and in Europe the association between public agencies and private companies benefits from both sectors, by means of the private financing of the systems, income for services rendered to users or others, generally associated with the processing and retrieval of customized information. As part of the Technological Development Plan of the UOCT, a call for bids to private companies will allow the UOCT to obtain additional benefits coming from the use of the traffic data that the UOCT owns. (see Gran Santiago ITS Plan); Goals: To give ideas for a public-private association to allow the implementation of new ITS, able to be implemented from the legal point of view and which are to the interest of the private sector.	N/A
		▪ Creation of public financing sources for the implementation of ITS technologies at a national level	Description: The project consists of the identification of public financing sources so as to permanently have resources to invest in the implementation, maintenance and operation of the ITS; Background: At the present time, the MOP has no resources available to invest in ITS. The creation of a methodology of assessment for this type of projects is an essential step; importance. Goals: To guarantee the correct operation of the public ITS and to have the available resources to spread through the country.	N/A

ITS Interurban Plan				
Program	Sub-programs	ITS Projects	Description of the Project	Related Market Packages
Traffic Safety	Prevention of accidents	▪ Improvement of the control of railroad intersections	Description: The project consists of the analysis and the proposal of technological solutions for the major railroad intersections of the country Background: The ITS technologies have proved their effectiveness to lower the incidents and the environmental impact (noise generated by trains' warning horns) in railroad intersections; Goals: To lower the number of incidents that happen in railroad intersections, to lower the noise produced by trains' warning horns.	ATMS13
		▪ Implementation of automatic metering systems to measure speed and to warn drivers	Description: The project deals with the setting up of automatic metering devices which measure the speed of the vehicles at different points of the interurban road network where regularly there are accidents due to the fact that the speed limit is exceeded. Together with the speed metering devices, it shall be considered the installation of traffic signals to indicate the driver the speed and the ideal recommended speed at that point, according to its design and the weather conditions. Taking all this into account, the recommended speed could be lower than the maximum speed legally permitted. Background: Speeding is one of the major causes of car accidents. The international experience proves that a more careful driving occurs when the users are warned about their traveling speed and the recommended speed; Goals: To reduce the number of accidents caused by exceeding the speed limit in the interurban road network.	ATMS19
		▪ Implementation of a weather conditions monitoring network	Description: The project consists of the installation of devices to determine the weather conditions at certain points of the interurban road network. This devices must allow the measurement of rain, humidity, wind speed, temperature or other variables to the interest of each particular area. Thus for example, in the northern area, it is important to provide information about the temperature, dense fog, wind; while in the southern area the useful information is about rains, snow, ice. Ideally, a short term micro-forecast must be considered to determine the conditions for the sector in the following hours; Background: The gathering of weather information related to points of the road network will allow the implementation of information systems for users for a better planning of their trips, thus avoiding traveling on dangerous conditions or being better prepared to face those inconveniences. This systems will also help travelers to know what are the conditions coming ahead. Goals: To gather and process weather information at certain points of the interurban road network in order to provide information for users.	MC03

ITS Interurban Plan				
Program	Sub-programs	ITS Projects	Description of the Project	Related Market Packages
Traffic Safety	Prevention of accidents	▪ Implementation of warning signaling for users in the presence of heavy weather	Description: The project involves the installation of VMS at various strategic points of the road network to provide information for users in the presence of heavy weather. This system will use the data gathered through the monitoring network of weather conditions, besides a short-term weather forecast system that shows the foreseen conditions in the sector in the hours to come; Background: The information about weather conditions on the roads is generally supplied to users through the information systems developed in other countries. This information is highly appreciated by the users above all in sectors having rough weather as those existing in some sectors of Chile; Goals: To inform the travelers about the weather conditions to which they will be confronted in particular sectors of the interurban roads, in order to take the necessary preventive actions.	ATMS06 MC04
Traffic Safety	Emergencies management	▪ Development of systems of detection and incidents management	Description: The project deals with the design and implementation of systems capable of detecting automatically the occurrence of incidents and reacting in an efficient way and making use of the adequate means once the incident has been detected. Those systems consider the use of ITS technologies and proceedings to coordinate the action of Carabineros, SAMU (Servicio de Atención Médica de Urgencia – Emergencies medical service) and firemen, Onemi (Oficina Nacional de Emergencias – National emergency office) and other institutions; Background: The isolation that characterizes the majority of non-urban areas makes difficult the detection and emergency response times of serious incidents that happen on interurban roads. The sooner the occurrence of a serious incident is known and the sooner the measures to take care of the injured or to control the dangerous substances are taken, the better the possibilities to avoid deaths of people injured in accidents, to diminish the consequences of the injuries and to avoid the effects of the substances on the people and the environment. In countries having leading ITS like US, the detection and management of incidents is the application that nowadays is high on the list of priorities due to the major importance given to the decrease in number of dead people and the seriousness of the injuries due to the quickest medical aid to the persons involved. At the present time, SAMU, firemen and Carabineros count on a proceeding to act jointly in the presence of emergencies (ABC Manual), but not including the use of ITS technologies; Goals: to reduce the number of people killed in accidents and the sequels of incidents taking place on interurban roads. To diminish the effects on the traffic provoked by the incident. To improve the efficiency of emergency services in the case of serious incidents occurred on interurban roads establishing coordinated proceedings of action and communication between the institutions taking part in the emergency that use ITS technologies.	ATMS08 EM1 EM2

ITS Interurban Plan				
Program	Sub-programs	ITS Projects	Description of the Project	Related Market Packages
Traffic Safety	Emergencies Management	▪ Implementation of alarm systems in the case of incidents (SOS sign posts)	Description: The project consists of the installation of a set of devices that allow travelers to inform the authorities the occurrence of an incident on the road. One of these devices is the SOS sign post, like those put on licensed roads; Background: A way to generate a system of detection of incidents is the implementation of a devices network, large enough, so as to enhance the number of devices that are operating at present on the licensed roads. This will allow travelers to inform the occurrence of an incident; Goals: To enlarge the geographic scope of SOS systems on interurban roads with the purpose of reducing the delay in the detection and response to incidents on the part of the emergency authorities and institutions.	EM3
Transportation Management	Traffic Management	▪ Implementation of an Interurban Road Traffic Control Center	Description: The project involves the detailed specification and implementation of a traffic control center at a national level, in which there are means available to monitor the traffic, to gather and process information about transportation and to act in the presence of events that require to take decisions at a regional or national level (natural disasters). The project also includes a training plan for the professionals working at the control center; Background: The existence of traffic control centers on the licensed roads and the implementation of a Road Licenses Audit Center will constitute the basis for the creation of a national center. The national center must have access to the traffic management and to the monitoring devices of the licensees, having priority to control them in the case of specific situations; Goals: To improve the management of traffic on the interurban roads of the country in the presence of events having regional or national impact. To Improve the planning of the road transportation systems through the systematized and updated traffic information at a national level.	ATMS07
		▪ Development of systems of detection and incidents management	Ditto. Project included in sub-program "Emergencies Management".	Ditto. Project included in sub-program "Emergencies Management".

ITS Interurban Plan				
Program	Sub-programs	ITS Projects	Description of the Project	Related Market Packages
Transportation Management	Traffic Management	▪ Implementation of regional information systems to users through the Internet, telephone, wireless, etc.	Description: The project consists of the design and implementation of information regional systems for users through the Internet, telephone, wireless, etc., that uses as source of information the systems of storage of information of transportation services and the condition of the infrastructure, included in the sub-program "Storage Information Systems". The system will include consulting tools to allow the users to select, for example, OD pairs and to obtain the information in an easy understandable format; Background: The use of the Internet is one of the most effective ways to provide information about transportation before the trip. The UOCT website (Unidad Operativa de Control de Tránsito – Traffic Control Operative Unit) receives daily a great number of visitors interested in knowing, by different reasons, the condition of the roads in Santiago. There happens a similar situation with a Highway Administration website, though no traffic statistics are available on this site; Goals: To implement a free information system for users through the Internet, containing national updated information related to the interurban transportation services and infrastructure.	ATIS1 ATIS2
		▪ Implementation of information systems on the road (VMS)	Description: The project involves the identification of the points on the interurban road network (access ramps, tollgates, cities entrances, etc.) where information to travelers on traffic conditions is useful. The project also involves the installation of VMS at those points and their connection with a control center having the requested information available. Background: The information supplied to travelers is one of the more used and more valued ITS services. A survey made in Santiago showed that VMS system used by the UOCT has a very positive image; Goals: To inform travelers accurately about transit conditions on the interurban roads for them to take the necessary steps to help, for instance, to reduce congestion in the case of incidents.	ATMS06
	Management of Passengers Transportation Services	▪ Development of the infrastructure to detect and follow vehicles	Description: The project consists of the installation, at strategic points on the road network, of gates provided with antennas to register the passage of vehicles equipped with TAG (according to the national registration system of vehicles and cargo), so as to know the precise moment when the vehicles and the cargo transit through particular points all along their trips. The identification of the points where the gates should be installed and their connection with a control center where the gathered data is stored, is also a topic of the project; Background: The infrastructure for the tracing of vehicles is the basis for the development of different services that help to optimize the operation of the passengers and cargo transportation services, thus increasing their productivity, reducing the operative costs, etc.; Goals: To develop the necessary infrastructure to render ITS services in order to improve the management of passengers and cargo transportation services; to increase the scope of information gathering systems, to gather information for a better planning of the transportation system as far as transportation services and their associated infrastructure is concerned.	APTS1 APTS2 APTS5 CVO01 CVO02 CVO10

ITS Interurban Plan				
Program	Sub-programs	ITS Projects	Description of the Project	Related Market Packages
Transportation Management	Management of Passengers Transportation Services	▪ Implementation of the tariff integration for the interurban passengers transportation systems	Description: The project involves the development of an electronic payment system of buses and railway rates in order to facilitate the application of special rates in inter-modal trips. Background: EFE and ALSA have implemented a bus-railway combination trip system between Santiago and Concepción. The system has a preferential tariff compared to those for each separate mode; Goals: To increase the number of trips that combine the railway and bus modes to achieve a more efficient use of the transportation infrastructure and services available.	APTS4
		▪ Development of systems to make a more efficient control of the passenger transportation vehicles on roads and borders passes	Description: The project deals with the implementation of systems capable of performing the required check of passengers and cargo transportation vehicles on roads and border passes. The project must consider the use of the national system of cargo and vehicles registration according to National ITS Plan. Background: The delay in the processes of vehicles and cargo check produces significative losses in the economy of the country. These delays being reduced, the losses will lessen and this fact will foster the use of our country as a way to the Pacific of products coming from other countries. Regarding this point, common systems for cargo registration would be necessary; Goals: To reduce the delays provoked by the required checks supported in the country by passengers and cargo transportation, thus the transportation system will become more efficient and productive.	CV03 CV05
		▪ Implementation of information regional systems through the Internet, telephone, wireless, etc.	Ditto. project included in sub-program "Traffic Management".	Ditto. project included in sub-program "Traffic Management".
	Management of Cargo Transportation Services	▪ Development of infrastructure for vehicles tracing	Ditto. project included in the sub-program "Management of Passengers Transportation Services"	Ditto. project included in the sub-program "Management of Passengers Transportation Services"
		▪ Development of systems to make a more efficient control of and the cargo transportation vehicles on roads, ports, airports and borders passes	Ditto. project included in the sub-program "Management of Passengers Transportation Services"	Ditto. project included in the sub-program "Management of Passengers Transportation Services"

ITS Interurban Plan				
Program	Sub-programs	ITS Projects	Description of the Project	Related Market Packages
Transportation Management	Management of Cargo Transportation Services	▪ Implementation of regional information systems through the Internet, telephone, wireless, etc.	Ditto. project included in sub-program "Traffic Management".	Ditto. project included in sub-program "Traffic Management".
Electronic Toll Collection	N/A	▪ Development of new systems for the electronic toll collection in free-flow mode	Description: The project consists of the implementation of electronic toll collection systems to replace, partially or totally, the existing tollgates on certain interurban roads; Background: Since 2004, the licensed highways in the Metropolitana region will use toll collection systems through a TAG inside the vehicle and gates provided with antennas to register the passage of vehicles at a free-flow speed. The same gate system could be installed in the existing tollgates having a higher demand in the country; Goals: To reduce the delay and congestion associated with the manual toll collection, to have additional points where the passage of vehicles can be registered in order to obtain information related to the transportation system.	ATMS10
Control	Control Safety and Environmental Issues	▪ Development of infrastructure for vehicle detection and tracing	Ditto. project included in sub-program "Management of Passengers Transportation Services".	Ditto. project included in sub-program "Management of Passengers Transportation Services".
		▪ Creation of maximum speed control network	Description: The project deals with a technological solution similar to the one of the project "Implementation of automatic metering systems to measure speed and to warn drivers", but having the additional capacity to identify vehicles exceeding the speed limit with the purpose of imposing a fine; Background: Speeding is one of the more frequent causes of accidents on interurban roads. Then it is necessary to take actions to diminish the frequency of violation of established limits; Goals: To reduce the number of accidents on interurban roads, caused by speeding, imposing fines to the drivers. Consequently we expect to experience a decrease in the number of dead and injured people associated with this type of accident.	ATMS19

ITS Interurban Plan				
Program	Sub-programs	ITS Projects	Description of the Project	Related Market Packages
Control	Control Safety and environmental issues	▪ Implementation of new systems to weigh vehicles in movement	Description: The project involves the implementation of new systems to weigh in movement (WIM) at different points of the road network where the passage of vehicles carrying heavy loads is more frequent; Background: The MOP has a WIM System already working on the road between Chuquicamata and Tocopilla to control the weight of trucks related to copper mining. This system provides valuable information to implement other WIM systems. It is important that the rules about weight per axle are respected because this is the fundamental cause of the accelerated pavement deterioration. The use of WIM systems is a means of establishing points of control that do not require the presence of MOP's employees, thus cutting expenses. Goals: to carry out a more efficient control and to enlarge the scope of control of weight per axle on interurban roads.	CVO06
	Control Commercial Issues	▪ Development of systems to carry out a more efficient control of vehicles and cargo on roads, ports, airports and border passes	Ditto. project included in sub-program "Management of Passengers Transportation Services".	Ditto. project included in sub-program "Management of Passengers Transportation Services".
		▪ Implementation of a Roads Licenses Audit Center	Description: This project corresponds to the Center that the MOP must implement to audit the road licenses operation. Further details can be consulted at the MOP General Coordination of Licenses	N/A
Transportation information	Systems of information gathering	▪ Implementation of a Roads Licenses Audit Center	Ditto. project included in sub-program "Control Commercial Issues".	Ditto. project included in sub-program "Control Commercial Issues".
		▪ To start up an online automatic meters network on interurban roads	Description: The project involves the installation of systems capable to determine automatically the vehicle flow level in strategic points of the interurban road network, which will also communicate automatically the registered data to a storage center of traffic information; Background: The information about the congestion level on the roads is very much appreciated by the users because this allows them to know beforehand the transit conditions they will meet when traveling on those roads. A reliable and updated information will bring about great benefits. Goals: To have reliable and updated information available that will allow the generation information services to users.	ATMS01

ITS Interurban Plan				
Program	Sub-programs	ITS Projects	Description of the Project	Related Market Packages
Transportation information	Systems of information gathering	▪ To start up a weather conditions monitoring network on interurban roads	Ditto. project included in sub-program "Prevention of Accidents".	Ditto. project included in sub-program "Prevention of Accidents".
	Systems of information storage	▪ Development of public, private and cargo transportation services database	Description: The project consists of the design and implementation of systems of information storage of the different transportation services that operate in diverse geographic areas. Background: The information systems to users are one of the most well-known and useful applications within the context of the ITS. These systems require the existence of adequate and permanently updated systems of data storage; Goals: To create the data support for information systems to users about the available transportation services in the different geographic areas of the country. To allow the ulterior development of a national system of information storage on transportation services.	AD1
		▪ Development of database on infrastructure state (works on the roads, weather conditions)	Description: The project consists of the design and physical implementation of systems of information storage on the transportation infrastructure: works on the road, weather conditions, incidents, etc., in the different geographic areas of the country; Background: The information systems to users are one of the most well-known and useful applications within the context of the ITS. These systems require the existence of adequate and permanently updated systems of data storage. The Highway Administration of the MOP has a system of information about works on roads, state of border passes, tall price, etc. To date there exists no information about the weather conditions on the roads, which is of a capital importance for users and helps to increase the safety on the roads. The gathering of weather information requires the implementation of a meteorological stations network and sensors in the area to be covered; Goals: To create the data support in order to develop information systems for users about the state of the road infrastructure in the different geographic areas of the country. To allow the ulterior development of a national system of information storage on the conditions of the transportation infrastructure of the country.	AD1
	Systems of Information Broadcasting	▪ Implementation of regional information systems through the Internet, telephone, wireless, etc.	Ditto. project included in sub-program "Traffic Management".	Ditto. project included in sub-program "Traffic Management".

ITS Interurban Plan				
Program	Sub-programs	ITS Projects	Description of the Project	Related Market Packages
Transportation information	Systems of Information Broadcasting	▪ Implementation of systems of information on the road (VMS)	Ditto. project included in sub-program "Traffic Management".	Ditto. project included in sub-program "Traffic Management".
Maintenance and building management	Working areas management	▪ To start up a variable message signs systems on the road, both fixed and portable, to indicate road works, speed allowed in the working areas, etc.	Description: The project deals with the purchase of portable variable message signs (VMS) to be used for the signposting in working areas; Background: The use of portable VMS is very useful as a means of informing users about road works that obstruct the normal flow transit, indicating them the allowed speed, the estimated delay, etc. Taking all this into account it is possible to reduce the anxiety of the drivers and the accidents in working areas provoked by speeding of by the stress of the drivers; Goals: To accurately inform travelers about the road works, to diminish the occurrence of accidents in working areas.	MC08
		▪ Implementation of regional information systems through the Internet, telephone, wireless, etc.	Ditto. project included in sub-program "Traffic Management".	Ditto. project included in sub-program "Traffic Management".

Gran Santiago ITS Plan				
Program	Sub-programs	ITS Projects	Description of the Project	Related Market Packages
To optimize the present ITS in the UOCT	SCOOT networks	▪ To optimize the operation in present SCOOT networks (activation of non operative network, fitting of operative networks)	Description: This project is part of the study "Analysis of Incorporation of New Technologies of Intelligent Transportation to the Traffic Control System of Santiago", which call for bids took place in June 2003.	ATMS03
	Fixed time Networks	▪ Check and configuration of networks and update of SCAT network programming	Description: The project consists of studies of programming update of the traffic lights networks that operate on a basis of pre established plans and isolated intersections. To carry out this task it is necessary a global study of the city every 5 years to update the definition of the control areas and periods and to establish a program to update the network programming. This program will be carried out during 4 or 5 years and then the global study to define areas and periods will be repeated; Background: This project is part of the Technological Development Plan of the UOCT developed as part of the study "Analysis and Definition of Strategies to Improve the System of Traffic Control of Santiago". Further details about the project can be found in the Final Report of said study; Goals: ▪ To carry out a study of traffic at a whole city level to check and update the configuration of SCAT networks. ▪ To determine the programming for all the defined networks and periods. ▪ To establish a program and methodology of programming update.	ATMS03
	Complementary Systems	▪ Definition of the content and format of the information to be deployed in VMS	Description: The projects deals with the features of the type of complementary information that can be useful to deploy through the VMS, for example: notice of incidents, general conditions of congestion along an axis, news about special events and instructions for drivers, news about existing or programmed building, programming of road maintenance, announcement of heavy weather, car parking information, general promotion; Background: This project is part of the Technological Development Plan of the UOCT developed as part of the study "Analysis and Definition of Strategies to Improve the System of Traffic Control of Santiago". Further details about the project can be found in the Final Report of said study; Goals: ▪ To establish types and time of information to be deployed in VMS. ▪ To set rules for writing messages	ATMS06

Gran Santiago ITS Plan				
Program	Sub-programs	ITS Projects	Description of the Project	Related Market Packages
To optimize the present ITS in the UOCT	Complementary Systems	To optimize the CCTV system (closed circuit TV)	Description: The project consists of improving the operation of the CCTV system by providing the existing cameras with prepositioning systems. Background: This project is part of the Technological Development Plan of the UOCT developed as part of the study "Analysis and Definition of Strategies to Improve the System of Traffic Control of Santiago". Further details about the project can be found in the Final Report of said study; Goals: ▪ To put forward ideas to improve the cameras coverage choosing the most adequate ones to be set up according to their characteristics: panning, tilt and zoom. ▪ To propose changes in the placing of cameras within the same intersection, shifting to a place where the cameras can be of a greater use or the setting up of complementary cameras in order to have a larger viewing scope of certain intersections. ▪ To identify improvements regarding the priority control, sequencing capacities, switching, prepositioning and labeling in order to make easy the use of the cameras by the UOCT employees. ▪ To propose improvements to the system operation through an adequate integration with the incident detection tasks and the systems of report and traffic management using alarms or control interfaces. ▪ To specify a recording system that allows the ulterior analysis of the images picked up by the cameras.	ATMS01
Development of new ITS systems in the UOCT	UOCT Systems	▪ Enlargement of the SCOOT system	Description: The project consists of analyzing and carrying out the implementation of new SCOOT networks. Background: This project is part of the Technological Development Plan of the UOCT developed as part of the study "Analysis and Definition of Strategies to Improve the System of Traffic Control of Santiago". Further details about the project can be found in the Final Report of said study; Goals: ▪ To define new traffic lights networks where SCOOT traffic lights control systems can be implemented ▪ To trace the regions and to define the arc pattern for those networks. ▪ To adjust the parameters of the system ▪ To implement the additional SCOOT capacities to allow a better control and management of the new implemented networks.	ATMS03

Gran Santiago ITS Plan				
Program	Sub-programs	ITS Projects	Description of the Project	Related Market Packages
Development of new ITS in the UOCT	UOCT Systems	▪ Enlargement of the traffic monitoring scope through CCTV	Description: The project involves the planning and implementation of the enlargement of the CCTV system to be used on roads and strategic intersections. It also involves the development of devices to share images with other agencies; Background: This project is part of the Technological Development Plan of the UOCT developed as part of the study "Analysis and Definition of Strategies to Improve the System of Traffic Control of Santiago". Further details about the project can be found in the Final Report of said study; Goal: ▪ To provide, set up and operate new closed circuit television cameras in intersections and/or troubled sectors due to traffic congestion. ▪ To provide, set up and operate new cameras in strategic places of the city not having the same features of the aforementioned places but whose location allow to obtain useful and complete traffic data to provide users with information about other sectors of the city. ▪ To fit Santiago with a larger and better equipment for traffic control. ▪ To develop devices with the purpose of sharing video signals with other agencies such as the traffic control centers on urban licensed roads and the CCB (Buses Control Center).	ATMS01
		▪ Pilot Project for the detection and management of incidents in SCOOT and SCAT networks	Description: This project is part of the study "Analysis of Incorporation of New Technologies of Intelligent Transportation to the Traffic Control System of Santiago", which call for bids took place in June 2003.	ATMS08 EM1 EM2
		▪ Start up of an online vehicle automatic meters network	Description: This project is an initiative of the UOCT which consists of a network of about 100 vehicle flow automatic meters (SIG-FT project) and its corresponding storage system and information look-up.	ATMS01
		▪ Implementation of a travel time metering system through GPS (Global Positioning System)	Description: The project will increase the number of vehicles used to meter travel times by means of GPS; Background: This project is part of the Technological Development Plan of the UOCT developed as part of the study "Analysis and Definition of Strategies to Improve the System of Traffic Control of Santiago". Further details about the project can be found in the Final Report of said study; Goal: to increase to 10 the number of vehicles used to meter travel times so as to have additional meterings on road sections.	ATMS02

Gran Santiago ITS Plan				
Program	Sub-programs	ITS Projects	Description of the Project	Related Market Packages
		▪ Creation of a website in the UOCT for urban travel planning	Description: The project involves the development of an information system previous to the journey. The cornerstone of the system will be a website where all the information gathered by the Traffic Management Information Center will be deployed. It is considered the step by step use of other devices to provide information such as cell phones, voice mail faxes, e-mails, etc for users. Background: This project is part of the Technological Development Plan of the UOCT developed as part of the study "Analysis and Definition of Strategies to Improve the System of Traffic Control of Santiago". Further details about the project can be found in the Final Report of said study; Goal: ▪ To offer a great variety of services for travel planning.	ATIS1 ATIS2
Development of new ITS systems in the UOCT	External Systems	▪ Implementation of priority systems for public transportation on trunk corridors	Description: The project consists of implementing traffic management plans which give priority to the vehicles engaged in trunk services that move along certain public transport corridors in Santiago; Background: This project is part of the Technological Development Plan of the UOCT developed as part of the study "Analysis and Definition of Strategies to Improve the System of Traffic Control of Santiago". Further details about the project can be found in the Final Report of said study; Goals: ▪ To reduce the travel time of users of the public transportation by means of systems that give priority to the vehicles of public transportation running on certain trunk corridors. ▪ To make travel time in public transportation more reliable (to reduce its variability) and more independent of vehicle congestion on the chosen corridors ▪ To reduce the slow motion emissions of the vehicles of public transportation moving along the chosen corridors.	APTS7
		▪ Development of systems of coordination UOCT with Centers of Control of Licenses for transit and incident management	Description: This project corresponds to a stage previous to the implementation of a Regional Center of Traffic Control, and it consists of the reaching of agreements and the definition of proceedings to tackle difficulties which require a coordinated action between the Center of Traffic Control belonging to the licensed companies and the UOCT; Background: The UOCT is working to define common proceedings and the implementation of some systems (CCTV) in order to act jointly with Costanera Norte highway; Goals: To optimize the traffic management in situations requiring coordination between the UOCT and the licensed companies to lessen the effects of traffic congestion.	N/A
Electronic Toll Collection	N/A	▪ Implementation on electronic toll collection systems in free-flow mode	Description: This project corresponds to the electronic toll collection systems (free-flow) that will be implemented on each of the licensed urban highways of the Metropolitana region.	ATMS10

Gran Santiago ITS Plan

Program	Sub-programs	ITS Projects	Description of the Project	Related Market Packages
Public Transportation Control	N/A	▪ Development of the Buses Control Center (CCB) for the control of licensed public transportation services (vehicles tracing, frequency control)	Description: The project takes 2 different stages. The first one corresponds to the design of the Control Center; for this purpose the Transportation Department is making a study called "Analysis of the System of Public Transportation Control". The second stage deals with the implementation of the Control Center which will be carried out by means of a license whose call for bids will take place by the end of 2003 or the beginning of 2004.	APTS1 APTS2 APTS4 APTS5 APTS8
Urban Highways Management	N/A	▪ Implementation of traffic control centers on urban highways	Description: This project corresponds to the Traffic Control Centers that will implement the control of each of the urban licensed highways of the Metropolitana region.	ATMS1 ATMS04 ATMS06 ATMS08 ATMS10
Urban Highways Management	N/A	▪ Development of a Regional Traffic Control Center	Description: The project involves the detailed definition and posterior implementation of a Traffic Control Center having the capacity of monitoring and managing the traffic at a regional level; Background: The creation of a Traffic Control Center on each of the urban highways of the Metropolitana region, together with the UOCT infrastructure, will allow us to have a physical platform which constitutes a starting point to develop a center with the required capacities, for example to face the inconveniences due to traffic congestion or natural disasters. This center must have the capacity to use the equipment of the other control centers and to make a priority use of them when necessary; Goals: To reduce the traffic congestion and travel times of the users; to develop action plans to face events to be worth taking the necessary measures in broad sectors of the city.	ATMS07
	Systems of information gathering	▪ Implementation of an online vehicle automatic meters network	Description: This project consists of the implementation of a devices network, having a large geographic coverage, to gather information of vehicle flow to be complementary to the devices set up by the UOCT; Background: The UOCT is in the final stage of the implementation of a network of about 100 vehicle flow automatic meters (project SIG-FT) and its corresponding system of storage and access to the information: Goals: To have updated information available on vehicle flow in order to advise users about the existing traffic congestion levels and to support the planning of new projects of traffic management or transportation infrastructure in Santiago.	ATMS01

Gran Santiago ITS Plan				
Program	Sub-programs	ITS Projects	Description of the Project	Related Market Packages
Transportation information	Systems of information storage	▪ Design of the traffic data storage system for the UOCT	Description: The project deals with the detailed specification of the UOCT traffic data storage system; Background: This project is part of the Technological Development Plan of the UOCT developed as part of the study "Analysis and Definition of Strategies to Improve the System of Traffic Control of Santiago". Further details about the project can be found in the Final Report of said study; Goals: To specify a computing system to permanently store all the information provided by the UOCT's vehicles or any other interesting information useful for the traffic management in the city and to give information to users. A well-designed ITS data storage system is essential for the fulfillment of the UOCT's role as a Traffic Control Center.	AD1
	Systems of Information Broadcasting	▪ Design of a UOCT website for urban travel planning	Ditto. Project included in the sub-program "UOCT Systems".	Ditto. Project included in the sub-program "UOCT Systems".
		▪ Implementation of an information system for users of licensed public transportation in bus stops, stations and vehicles and through the Internet (CCB)	Description: This project is part of the implementation of the Buses Control Center included in the program "Public Transportation Control"	ATIS2 APTS8
Training	N/A	▪ Development of a training plan for UOCT's personnel	Description: The project deals with the development of a permanent specialized technical training program prepared for the UOCT's professionals; Background: This project is part of the Technological Development Plan of the UOCT developed as part of the study "Analysis and Definition of Strategies to Improve the System of Traffic Control of Santiago". Further details about the project can be found in the Final Report of said study; Goals: ▪ To permanently train the personnel on different issues such as: operation, evaluation and modifications of SCAT, VMS, CCTV, Vehicle Metering Stations, Systems of detection and management of incidents and other system belonging to the UOCT. ▪ To write up manuals about the operation of the traffic management systems and the solutions of the most common failures of such systems.	N/A

Gran Santiago ITS Plan				
Program	Sub-programs	ITS Projects	Description of the Project	Related Market Packages
Public-Private Partnerships	N/A	▪ Bidding of projects of service information to users	Description: The project deals with the call for bids to find a private company that has the exclusive right to use the information generated by the UOCT. This company will also add its own information and commercial services to satisfy the needs of information of the users; Background: This project is part of the Technological Development Plan of the UOCT developed as part of the study "Analysis and Definition of Strategies to Improve the System of Traffic Control of Santiago". Further details about the project can be found in the Final Report of said study; Goals: ▪ To define the business model to choose a private partner which helps achieve the UOCT's institutional goals and which furnishes funds to be used for the information area. ▪ To go over the legal and institutional aspects that help develop the business model. ▪ To call for an international bidding to pre classify the companies and/or consortiums to become UOCT's partners (under a license scheme) both in the area of information and other possible business. ▪ To outline the method to search for bidders in order to find companies for a competitive bidding. ▪ To prepare the terms and conditions with the participation of the pre classified companies or consortiums. ▪ To award the bid.	N/A