

4. SYSTEM ARCHITECTURE OVERVIEW

The Illinois Statewide Intelligent Transportation Systems (ITS) Strategic Plan uses the Statewide ITS Concept of Operations, the Statewide ITS Architecture, and regional ITS architectures to provide a roadmap for deployment and operations of enhanced transportation services across the state. The Concept of Operations reflects the current and anticipated transportation services from transportation stakeholders and identifies the organizational responsibilities of IDOT. The Statewide ITS Architecture identifies the current and planned technical framework for providing the transportation services described in the Concept of Operations.

4.1 Statewide ITS Concept of Operations

4.1.1 SERVICES FROM IDOT

The State of Illinois is a unique combination of urban and rural environments grouped into districts and regions. In November of 2004, IDOT underwent a reorganization that streamlined district boundaries and identified regions. A region usually consists of a pair of districts. Because the Chicago Metropolitan area has such a large population, District 1 is a region by itself (Region 1). The specific description of regions as shown in Figure 4-1 is as follows:

- **Region 1** encompasses District 1. This region includes Chicago and the collar counties.
- **Region 2** encompasses Districts 2 and 3. This region includes Rockford, the Quad Cities, the La Salle-Peru-Ottawa areas, and the Kankakee metropolitan area.
- **Region 3** encompasses Districts 4 and 5. This region includes Galesburg, Peoria, Bloomington, Champaign-Urbana, and Danville.
- **Region 4** encompasses Districts 6 and 7. This includes Quincy, Jacksonville, Springfield, Decatur, Mattoon-Charleston area and Effingham. Also included is the I-70 corridor from Vandalia to the Indiana state line.
- **Region 5** encompasses Districts 8 and 9. This includes the Metro East St Louis region, Mt Vernon, Marion and Carbondale. Region Five includes the entire I-64 corridor.

Transportation services are provided at a district level. Regions coordinate transportation services that cross district boundaries. The Central Office provides assistance in technical areas, auditing processes at a district and regional level, and providing oversight. Operations begin at the district level.

The Statewide ITS Concept of Operations leverages off the existing ITS infrastructure throughout the state. The Gary-Chicago-Milwaukee (GCM) Gateway Hub operates along the GCM Corridor and shares information with Wisconsin and Indiana. The Illinois Statewide hub coordinates information and activities among the regions of the state. In addition to supporting the cooperating regions, the Illinois Statewide Hub supports both 511 for traveler information across the state and commercial vehicle operations via CVO/CVISN.

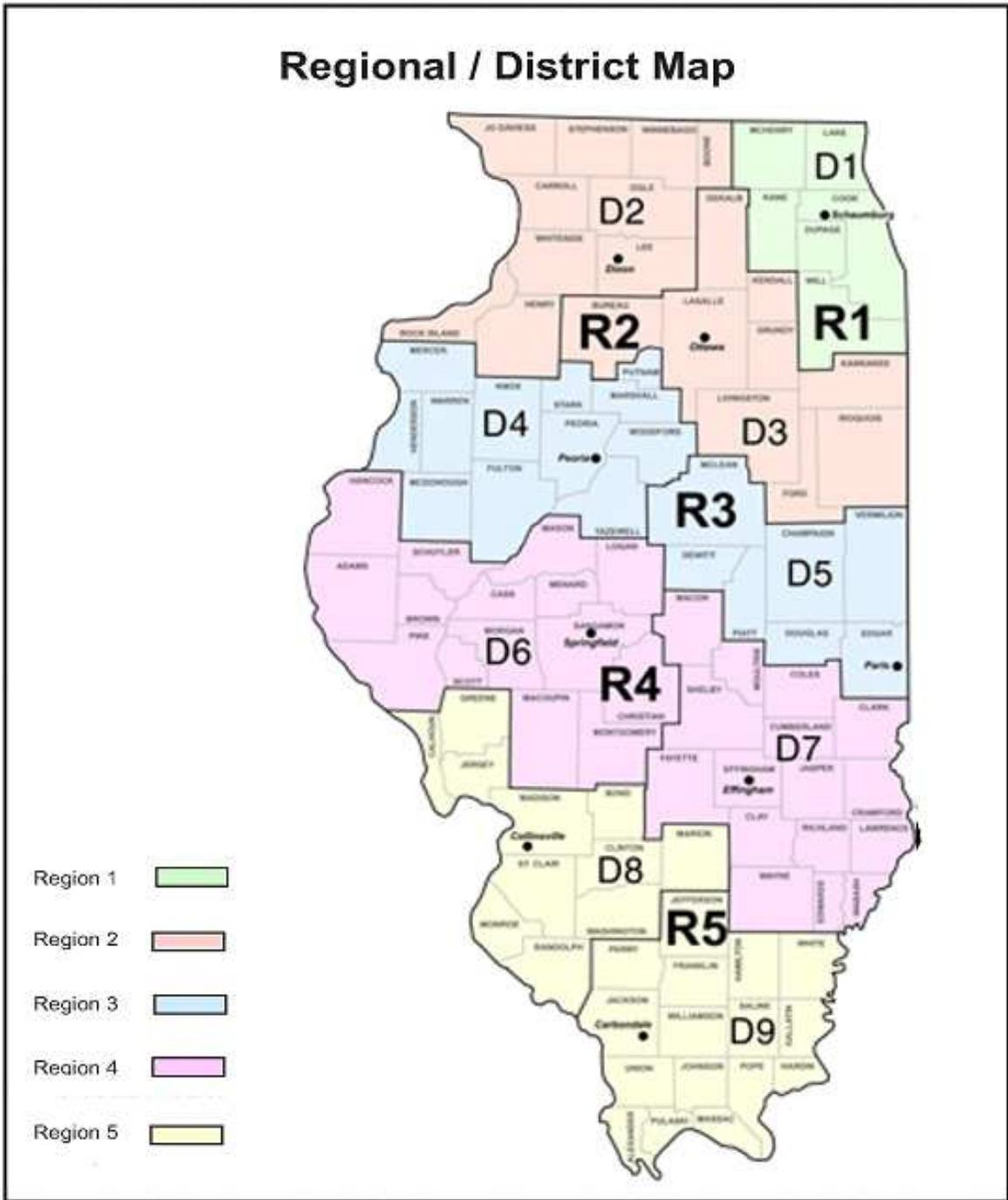


Figure 4-1: Relationship between IDOT Regions and IDOT Districts

4.1.2 CURRENT SERVICES

The state and each region provide transportation services by implementing functions identified in the Statewide ITS Architecture. These functions are grouped into ITS “market packages” as defined by the National ITS Architecture, and reflect the unique characteristics of Illinois by using the results of stakeholder workshops and the national ITS architecture as the starting point. A complete listing of ITS market packages applicable to Illinois can be found in the Statewide ITS Architecture Document.

IDOT is currently active in the planning, programming and deployment of ITS initiatives throughout Illinois, as it has been for many years. This includes both IDOT initiatives and those at the local level, in addition to coordination with bordering states. These activities have been based in IDOT’s ITS Program Office, which is part of the Office of Planning and Programming. The ITS Program Office is located in Schaumburg, Illinois and performs activities that can be divided into three categories as illustrated below in Table 4-1. Further discussion of these services is contained in Section 11, Program Management.

Policy	Program Planning	Deployment
Resource Sharing	ITS Architecture Development & Maintenance	Standards Deployment
Procurement	Peer to Peer Coordination for Planning	Technical Support to Districts > Systems Engineering > Acceptance Testing
Peer to Peer Coordination for Funding	Accounting/Funds Tracking	Support to ITS Market Packages > Communications > TMC Coordination > Technical Infrastructure
Budgeting	MOE Tracking and Reporting	Application of R&D
	Research & Development	
	Manage/Administer earmarks	

Table 4-1: IDOT ITS Program Office Responsibilities and Activities

4.1.3 PLANNED SERVICES

Figure 4-2 is a context diagram illustrating the Statewide ITS Concept of Operations at the highest level of information exchange potentially for the state of Illinois. This “Level 0” diagram is intended to focus on the concept that each region and district will gather information locally about the surface transportation network and share information between and among the various state and local agencies as warranted and as necessary. The State of Illinois consists of multiple regions and districts, and each one has a specific collection of services, functions, and requirements. The districts and the state work together to provide transportation services to the public.

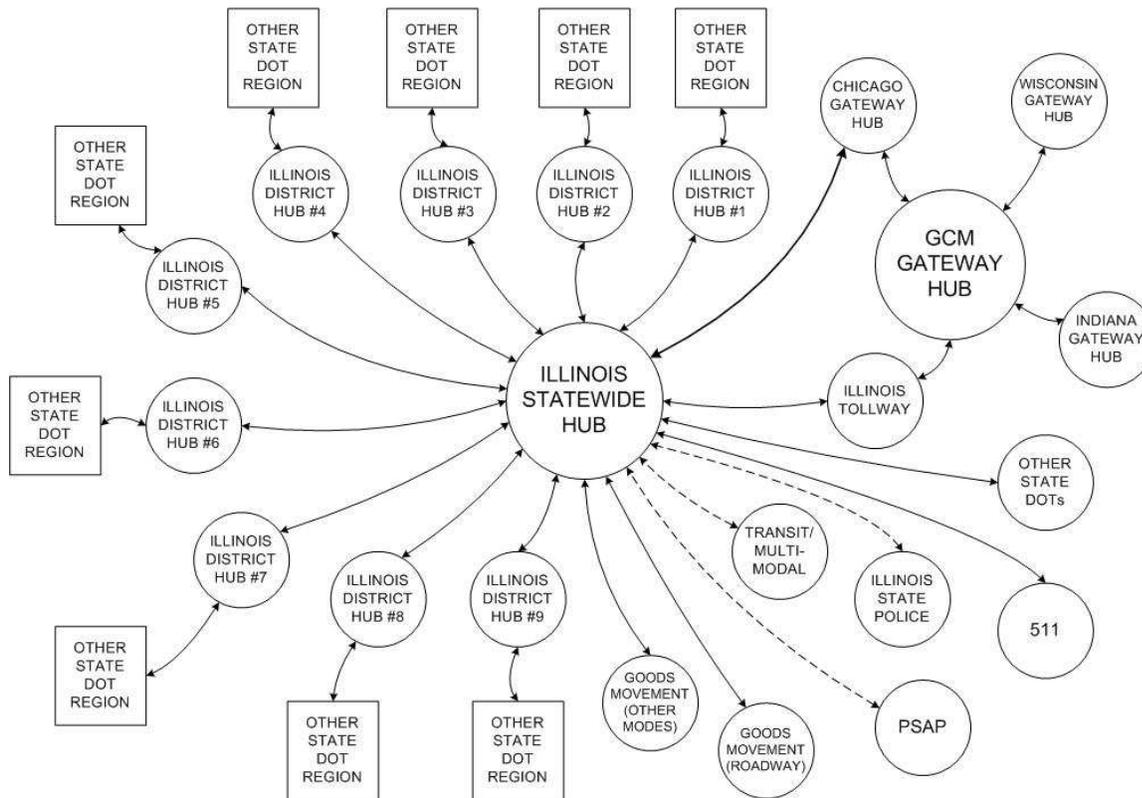


Figure 4-2: Statewide ITS Architecture Level 0 Diagram

In this context diagram, each circle represents an entity, along with its services, functions, and requirements. A solid line between circles represents explicit protocols and procedures that the two entities use in performing operations in general. A dashed line represents information exchange or other communications that can *support* operations, but which do not perform a *primary* or *direct* operational function or service.

At a statewide level, the Illinois Statewide Hub performs operations for traveler information (via 511), Commercial Vehicle Operations (for movement of goods), and coordination of statewide operations with District Hubs, the Illinois Tollway Authority, and neighboring State Departments of Transportation.

The Illinois Statewide Hub shares statewide transportation information with the Illinois State Police, transit operations, and public safety answering points (PSAPs)/emergency dispatch centers. These entities also share appropriate safety, transit, and law enforcement information to the Illinois Statewide Hub. For most activities, police, safety officials, and transit organizations operate at a regional level. Information exchange at a statewide level occurs, but the primary interaction is at a regional or district level.

Police” - this dashed line shows that the law enforcement entities have their own means to share information; IDOT is not their primary means of information exchange.

Each district communicates and shares information with the Illinois Statewide Hub, which shares that information with all regions that need that data.

Figure 4-3 details Level 1. While still a high-level concept, in addition to IDOT it includes a broader range of stakeholders (e.g., MPOs/RPCs, transit agencies, State Police) that are expected to exchange information through a typical Illinois District Hub.

The Concept of Operations Document provides additional details on the relationship between district hubs and also provides more detailed context diagrams for transit operations.

4.2 Statewide ITS Architecture

Details of the Statewide ITS Architecture have been developed using Turbo Architecture® software developed by the Federal Highway Administration. Illinois is a complex state with multiple cooperating stakeholders providing transportation services at both a regional and statewide level. Because of the limitations of the Turbo Tool, the Statewide ITS Architecture has been divided into two files – one file for commercial vehicle operations – based on the CVISN (Commercial Vehicle Information Systems and Networks) Program plan currently being developed – and a second file for all other statewide transportation needs.

Within the statewide Turbo file, three levels of entities are modeled in the statewide ITS architecture (Table 4-2). One is a Metropolitan template corresponding to major population centers like Chicago and East St. Louis. Another is a Medium Community or City template corresponding to the Rockford, Peoria, Springfield, Quad Cities, Champaign-Urbana, and other communities of similar size and transportation complexities. Lastly, there is a template that is rural in nature covering small communities and large areas of the state where the population is dispersed and the transportation infrastructure needs are less complex. Whether it be transit, corridor traffic and incident management, emergency management, or traveler information, these three models provide a framework that all areas of the state and all ITS projects can fit into. More detailed interfaces and more complex inventories are in the regional level as opposed to the statewide level; at the statewide level, the focus is on the sharing of information across the state and with the traveling public.

When looking at the statewide architecture entities, one sees that they are generic in most cases in keeping with the template approach. Specific names of regional operations centers or regional entities have been made generic so that each template fits to the appropriate region. The specific (i.e., named) regional entities are addressed in the individual regional architectures, which encompass metropolitan areas (e.g., Chicago, St. Louis area) and large cities (e.g., Rockford, Quad Cities). Statewide functions such as CVO and traveler information reference specific entities because they are statewide in scope and all regions will need to interface to those statewide entities. The Nomenclature Guide (Appendix F of the Statewide ITS Architecture Document) can help identify the naming conventions related to entities in an individual project.

Population Area	Architecture Template			
	Metropolitan Area	Medium Community/ City	Small Community/ Rural	
Chicago/NE Illinois				Separate regional ITS architecture
St. Louis Metro				
Rockford/DeKalb				
Peoria				
Springfield				
Quad Cities				
Champaign				
Decatur				Included in Statewide ITS Architecture
Bloomington-Normal				
Danville				
Kankakee				
Remainder of state				

Table 4-2: Statewide Architecture Template Hierarchy

Further details about the Illinois Statewide ITS Architecture are contained in the separate Statewide ITS Architecture Document. Questions regarding the Statewide ITS Architecture should be directed to the IDOT ITS Program Office.

The Statewide ITS Strategic Plan uses the Concept of Operations, Statewide ITS Architecture, and regional ITS architectures to provide a roadmap to deployment, integration, and operation of enhanced transportation services throughout the state. The Strategic Plan provides the guidance; the Concept of Operations describes elements used to provide transportation services, and the Statewide ITS Architecture defines how elements and entities fit together to provide the services.

As demand for transportation services continues to evolve, the Illinois Statewide ITS Strategic Plan, Concept of Operations, and Architecture can and should be updated to assure better integration and deployment. The Statewide ITS Architecture Maintenance Plan (Appendix G of the Statewide ITS Architecture Document) outlines recommended steps to keep the architecture in step with the evolution of ITS in Illinois. The iterative process described in the Architecture Maintenance Plan helps transportation agencies provide enhanced service with maximum re-use of current transportation investments.