Regional ITS Architecture Development

A Case Study

New York–New Jersey–Connecticut Region

Building a Framework for Regional ITS Integration

September 1999

Foreword

Dear Reader,

We have scanned the country and brought together the collective wisdom and expertise of transportation professionals implementing Intelligent Transportation Systems (ITS) projects across the United States. This information will prove helpful as you set out to plan, design, and deploy ITS in your communities.

This document is one in a series of products designed to help you provide ITS solutions that meet your local and regional transportation needs. We have developed a variety of formats to communicate with people at various levels within your organization and among your community stakeholders:

- **Benefits Brochures** let experienced community leaders explain in their own words how specific ITS technologies have benefited their areas;
- **Cross-Cutting Studies** examine various ITS approaches that can be taken to meet your community's goals;
- **Case Studies** provide in-depth coverage of specific approaches taken in real-life communities across the United States; and
- **Implementation Guides** serve as "how to" manuals to assist your project staff in the technical details of implementing ITS.

ITS has matured to the point that you don't have to go it alone. We have gained experience and are committed to providing our state and local partners with the knowledge they need to lead their communities into the next century.

The inside back cover contains details on the documents in this series, as well as sources to obtain additional information. We hope you find these documents useful tools for making important transportation infrastructure decisions.

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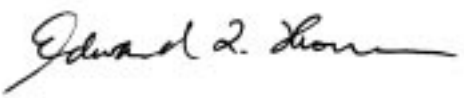

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Purpose

This is one of seven studies exploring processes for developing ITS architectures for regional, statewide, or commercial vehicle applications. Four case studies examine metropolitan corridor sites: the New York, New Jersey, and Connecticut Region; the Gary-Chicago-Milwaukee Corridor; Southern California; and Houston. The fifth case study details Arizona's process for developing a rural/statewide ITS architecture. A cross-cutting study highlights the findings and perspectives of the five case studies. The seventh study is a cross-cutting examination of electronic credentialing for commercial vehicle operations in Kentucky, Maryland, and Virginia.

Six of the studies were conducted by U.S. DOT's Volpe National Transportation Systems Center under the sponsorship of U.S. DOT's ITS Joint Program Office, with guidance from the Federal Highway Administration and Federal Transit Administration. The Houston case study was conducted by Mitretek Systems, with support by the Volpe Center.

This study was prepared for a broad-based, non-technical audience. Readership is anticipated to include mid-level managers of transportation planning and operations organizations who have an interest in learning from the experiences of others currently working through ITS architecture development issues.

Case Study Overview

The New York-New Jersey-Connecticut Region has been at the forefront of deploying Intelligent Transportation Systems (ITS). The development of this region's ITS architecture provides an instructive example because:

- The regional ITS architecture was developed with involvement from transportation, safety, and related agencies from three states,
- Transit agency involvement has been significant,
- The center of this region is a complex urban area with a complicated, intermodal transportation system, and
- The region adapted existing ITS architectures using the National ITS Architecture.

The New York-New Jersey-Connecticut Region covers 29 counties: 12 in New York, 14 in New Jersey, and three in Connecticut

Background

29-County Region

New York Counties:
Bronx
Dutchess
Kings
Nassau
New York
Orange
Putnam
Queens
Richmond
Rockland
Suffolk
Westchester

New Jersey Counties:
Bergen
Essex
Hudson
Hunterdon
Mercer
Middlesex
Monmouth
Morris
Ocean
Passaic
Somerset
Sussex
Union
Warren

Connecticut Counties:
Fairfield
Hartford
New Haven

"Over time, representatives of the transportation agencies in the New York-New Jersey-Connecticut Metropolitan Area recognized and accepted that they could no longer build their way out of congestion."

— Michael Ascher, President MTA Bridges and Tunnels and Chairman of TRANSCOM

The New York – New Jersey – Connecticut Region is the most highly populated and one of the most highly congested metropolitan areas in the country. Like most major metropolitan areas, this 29 county region has to balance significant transportation needs with limited physical and financial resources. The need to improve the existing infrastructure has resulted in interagency coordination and planning for the deployment of new transportation technologies.

The complex geography of the region exacerbates transportation problems. The region's population and employment core includes the five boroughs that make up New York City and all or part of Bergen, Essex, Hudson, and Union counties in New Jersey. The "core of the core" is Manhattan, which includes the region's central business district. Many of these population and business centers are divided by waterways and four of New York City's five boroughs are located on islands.

This geography creates a unique challenge for the region's transportation system. In many metropolitan regions, the physical constraints of the built environment reduce the opportunities to build additional infrastructure. In this region, the built environment is itself highly constrained by the natural limitations imposed by the waterways. These waterways must be spanned to connect the different population and business centers. The bridges and tunnels used to accomplish those tasks invariably become constriction points on the flow of regional traffic. The region's major waterway, the Hudson River, also serves as a state line.

A complex geography, coupled with a complicated jurisdictional structure affects the transportation system. In this tri-state region, there are a number of agencies that maintain overlapping responsibility for managing the area's transportation flow.

The combination of significant demands for transportation services and complex natural and jurisdictional geography led policy-makers to identify cooperative, regional, and multi-modal approaches to improving the area's transportation system. This interest led to a number of coordinated efforts by operating and planning transportation agencies. This interest also led to an exploration of ITS technologies.

Operating and planning agencies in the region view ITS as the next step in developing and deploying regional and multi-modal solutions to meet the region's pressing transportation demands. Improving operational efficiency by better managing the existing transportation system is the focus of ITS efforts in the region's three state departments of transportation and the numerous transit agencies, transportation authorities, and local transportation agencies. These agencies understand that creating a well managed, cost-effective, and functional ITS requires intermodal, interagency, and interstate coordination.

Background

Interagency coordination and interest in ITS has fostered the development of a regional ITS architecture. Transportation agencies, along with police, emergency services, and other related agencies see a tangible benefit from cooperation in the deployment of the new ITS technologies. The desire to share deployment costs and responsibilities for ITS opened new lines of interagency communication. This helped form the basis for the regional ITS architecture. The desire to deploy ITS as a solution to operational problems led to an interest in the development of the New York – New Jersey – Connecticut Regional ITS architecture.

In addition to the regional ITS architecture effort, four ITS Early Deployment Plans (EDP) have been, or are being, completed in the region. These EDPs are plans for ITS deployments in specific parts of the region. One of the objectives of these plans is to link developing and planned local ITS projects to the regional ITS architecture. Although each of these EDPs is important to the region, this case study focuses attention upon the largest of these plans, the New York City EDP.

Early Deployment Plan Areas

- Garden State Parkway, NJ
- New York City, NY
- Newark, NJ
- New York State DOT Region 8 (Columbia, Dutchess, Orange, Putnam, Rockland, Ulster, Westchester counties)

The Region

The New York – New Jersey – Connecticut Region was settled at the intersection of major transportation routes. The commerce that flourished between the international seaports and the ever-expanding hinterland, as transportation improvements such as canals, railroads and interstate highways were developed supported a densely populated metropolitan region.

To manage the transportation needs of the vast population, an extensive system of roads, bridges, tunnels, and railways has been constructed. As transportation operating agencies attempted to meet the challenging needs of the area, they commissioned some of the world's most innovative feats of engineering. Currently, this region holds the nation's most patronized subway and bus system, as well as some of the largest and most used bridges in the world. The continuous traffic growth in the region places increasing demands on the existing infrastructure. These transportation demands have resulted in the "critical problems of congestion, travel mobility and safety, air pollution, and quality of life."[1]

NY-NJ-CT Fact Sheet (1996 Bureau of Census Estimates)

Number of Residents:
21 million
Number of Employees:
9 million
Number of Businesses:
600,000

The geographic constraints of this region make the costs of expanding the physical transportation network prohibitive. To address the need for improved transportation operations, the region developed a proactive incident management and construction coordination system in the mid-1980s. While this early system provided significant regional benefits, its capabilities were limited. The emergence of ITS technologies is enabling this early system to be greatly expanded across the region.

[1] Framework for the Strategic *Local ITS Plan* – Draft. New York City Department of Transportation. Prepared by the Urban ITS Center at Polytechnic University. August 1998.

Regional ITS Architecture Development Process

"You need to get everyone in the room; you can't work through intermediaries."
— **Matt Edelman, General Manager, TRANSCOM**

"The Port Authority took the lead on setting up TRANSCOM. They were a big champion of the project."
— **Paul Cuerdon, Assistant Regional Traffic Engineer, New York State Department of Transportation, Region 1**

TRANSCOM Members

- Connecticut DOT
- New York Metropolitan Transportation Authority (MTA)
- MTA-Bridges and Tunnels
- MTA-New York City Transit
- New Jersey Department of Transportation (DOT)
- New Jersey Highway Authority
- New Jersey Transit Corp.
- New Jersey Turnpike Authority
- New York City DOT
- New York State DOT
- New York State Police
- New York State Thruway Authority
- Palisades Interstate Park Commission
- Port Authority Trans-Hudson Corp.
- Port Authority of New York and New Jersey

A 16th agency, the New York State Bridge Authority, will join TRANSCOM as a full partner during 1999.

The seeds of the regional ITS architecture were sown in 1986 when 14 operational agencies[2] recognized the need for interagency coordination to proactively manage the impacts of incidents and construction on the region's multi-jurisdictional road network. These agencies formed the Transportation Operations Coordinating Committee (TRANSCOM). The TRANSCOM coalition provides cooperative, multi-agency response to regional incidents and coordinates construction projects among member agencies to avoid parallel closing of roadways. TRANSCOM pursues these activities while its member agencies maintain direct operational control of their facilities.

One of the earliest proponents of creating a regionally coordinated system was the Port Authority of New York and New Jersey (Port Authority). The Port Authority has a uniquely regional mandate and is responsible for maintaining all of the Trans-Hudson River connections that link New York and New Jersey. These tunnels and bridges are constriction zones within the regional transportation network. Because of its responsibility for such critical areas within the region, the Port Authority was concerned about incidents on either side of its facilities. Such incidents in New York or New Jersey further constrict the flow of transportation in the region.

TRANSCOM

This regional outlook, as well as the difficulty of expanding capacity on its river crossings, led the Port Authority to become an early champion of interagency coordination. Its leadership efforts resulted in the creation of the TRANSCOM coalition. Significantly, the Port Authority guaranteed funding for TRANSCOM while the coalition's formal structure was developed and the member agencies began to contribute financially. That guarantor function was crucial to the creation and development of TRANSCOM.

The members of the TRANSCOM coalition are the core stakeholders of the regional ITS architecture development process. This group includes a wide range of operational agencies and a particularly strong transit contingent. The participating transit agencies include New Jersey Transit, Metropolitan Transportation Authority (MTA)-New York City Transit, New York City DOT's bus and ferry operations, the Port Authority Trans Hudson, and, through the New York MTA, the Long Island and Metro-North Commuter Railroads and Long Island Bus.

Metropolitan Planning Organizations (MPOs), while not official members of TRANSCOM, are extremely interested in regional coordination and participate in TRANSCOM activities. MPOs are strong supporters of multi-state integration of systems through the regional ITS architecture. This interest and involvement is very appropriate, as the scope of those planning agencies, like the scope of metropolitan ITS deployments, is regional.

[2] The number of members has grown to 15 and will soon be 16.

Regional ITS Architecture Development Process

The regional construction coordination and incident management system relies on a manual transfer of data between representatives of the individual agencies and TRANSCOM. This arrangement, referred to as the "manual architecture," was the first attempt at defining the regional data flows. In this manual system, the transportation agencies within the region report major roadway and transit incidents on their facilities to TRANSCOM. Reports are usually made by telephone. These updates are logged and entered into the TRANSCOM computer system, which in turn disseminates the information to the relevant public agencies and interested parties via alphanumeric pagers. TRANSCOM also works with member agencies to fax weekly construction reports (with updates as needed) to coordinate responses to road closings. TRANSCOM also maintains a comprehensive database of construction projects that is updated twice yearly. This manual system is being phased-out as automated systems are deployed.

Participating Organizations:

15 members of TRANSCOM
Many other local governments, police, fire, emergency services, and planning organizations also participate in TRANSCOM activities.

E-ZPass and I-95 Corridor Coalition

The manual architecture provided the institutional and technical precedents to facilitate the development of further regional ITS integration. Two important examples illustrate the connection between institutional cooperation and regional ITS architecture development.

The first example is the E-ZPass electronic toll collection (ETC) system. In 1990, seven toll authorities worked together on the E-ZPass Interagency Group to create a regionally compatible ETC system that could be used for travel on the many distinct toll facilities throughout and beyond the region. The five toll authorities operating within the New York-New Jersey-Connecticut region were all TRANSCOM member agencies. Their success in selecting a technology and creating an institutional management and reimbursement arrangement provided an important working relationship for ITS integration and for regional ITS architecture development.

The second example is the region's involvement with the I-95 Corridor Coalition. In 1992, following the passage of the Intermodal Surface Transportation Efficiency Act of 1991, TRANSCOM was one of the leaders in providing regional coordination for the I-95 Corridor Coalition. TRANSCOM members felt that, as a multi-agency coalition, TRANSCOM was well suited to represent their concerns. TRANSCOM now serves as the interim communication center for the I-95 Corridor Coalition.

E-ZPass Agencies

- MTA Bridges and Tunnels
- New Jersey Highway Authority
- New Jersey Turnpike Authority
- New York State Thruway Authority
- Port Authority of New York and New Jersey
- Pennsylvania Turnpike Commission*
- South Jersey Transportation Authority *

* *Not TRANSCOM Member*

Regional ITS Architecture Development Process

Developing the Regional ITS Architecture

The TRANSCOM manual architecture was the earliest framework for defining transportation information flows throughout the region. This framework demonstrated the benefits of coordination. As new ITS technologies and services were deployed by member agencies, TRANSCOM members identified the limitations of the manual architecture and began to investigate the potential for enhancing that architecture to create automated linkages. In 1993, the TRANSCOM coalition began to plan a strategy to implement an automated regional ITS architecture. The coalition published a request for proposals for consultants to chart the development of that enhanced regional ITS architecture.

The coalition's Technology and Operations Committee established an oversight committee to create a structure to improve and adapt the manual architecture. Members of the oversight committee are senior staff of the TRANSCOM member agencies. The objective of this effort was to improve the management of the region's complex interstate and intermodal transportation system. A consultant team provided the technical expertise and defined the regional ITS architecture's implementation strategy.

Use of the National ITS Architecture

The process to develop a new regional ITS architecture started with a review of the manual architecture. This process preceded the publication of the National ITS Architecture. TRANSCOM staff and partners were aware of and involved in the development of the National ITS Architecture. The manual architecture was subsequently reviewed for consistency with the developing National ITS Architecture.

Training and other tools created as part of the National ITS Architecture development process were effectively employed by agencies in the region. The partners in the regional ITS architecture are confident that the enhanced regional ITS architecture will be consistent with the National ITS Architecture. TRANSCOM maintains responsibility for updating the regional ITS architecture.

Pragmatic Approach to Architecture Development

The regional ITS architecture, currently consisting of the manual architecture and the planned automated enhancements, developed as a pragmatic response to the needs of operating agencies in the metropolitan area. This policy allowed form to follow function. The need for regional response to incident management, construction coordination, and special events resulted in the creation of TRANSCOM. That institutional framework provided the backdrop for development of the regional ITS architecture. The regional ITS architecture grew deliberately in response to the members' operational needs.

Regional ITS Architecture Development Process

Figure 1 demonstrates the elements and interconnects of the proposed regional ITS architecture.

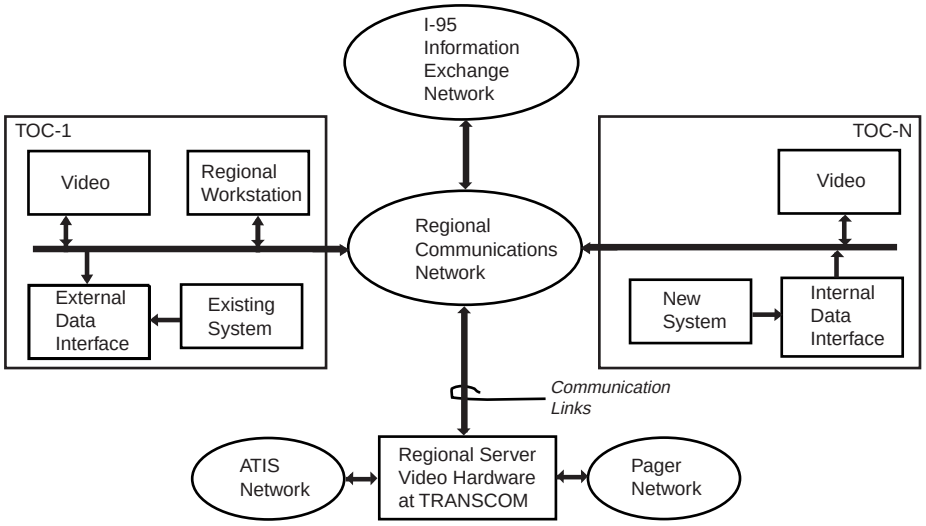

Figure 1 Model of TRANSCOM Regional ITS Architecture Configuration

The New York City Early Deployment Plan (EDP)

This case study emphasizes the TRANSCOM regional ITS architecture. It also considers the role of the sub-regional ITS architecture developed for New York City as part of the New York City EDP process. The development of TRANSCOM has helped bring transportation agencies throughout the region together to address transportation issues. The New York City EDP had the same impact on the many transportation agencies within New York City.

The NYC EDP is one of four EDPs completed or in process within the region. It is important because of the regional importance of New York City and its transportation system. Midtown and downtown Manhattan serve as the central business district for the region and New York City's five boroughs make up a significant portion of the region's population and employment center. The agencies leading the NYC EDP development are: the New York City Department of Transportation (NYCDOT); the New York Metropolitan Transportation Authority (MTA); the New York State Department of Transportation (NYSDOT); and the Port Authority of New York and New Jersey. These agencies, in addition to being members of TRANSCOM, are major transportation providers and ITS champions in the region.

New York City EDP Participants

- New York Metropolitan Transportation Authority
- New York City DOT
- New York State DOT
- Port Authority of New York and New Jersey

Regional ITS Architecture Development Process

"The NYC EDP is important because it provided the opportunity for transportation agencies in New York City to work together on ITS issues."
— **Charles Ukegbu, Chief of Planning and ITS, Office of Planning and Urban Mobility, New York City Department of Transportation**

In 1993, the NYSDOT Region 11 Office and the NYCDOT, in response to federal invitations outlined in ISTEA, jointly sought funds to investigate ITS deployments over their road and highway network. In a separate application, the MTA applied for ITS funding for its transit and river crossing facilities. These agencies were seeking to develop a strategic plan for ITS in New York City. They were interested in supplementing the forthcoming regional ITS architecture to address issues of more localized concern. The U.S. DOT encouraged intermodalism and integration by suggesting that the NYSDOT, NYCDOT, and MTA combine their ITS efforts.

The NYC EDP process began prior to the establishment of the National ITS Architecture. The partners involved in the NYC EDP process were aware of and involved with the development of the National ITS Architecture. Like the designers of the regional ITS architecture, the EDP partners relied on training and materials developed as part of the National ITS Architecture.

One product of the NYC EDP effort is a sub-regional ITS architecture. It is designed to address the specific information sharing needs of transportation agencies within New York City. This is also designed to work within the developing framework of the regional ITS architecture. To facilitate this interface, the same consultant team responsible for automating the existing regional manual ITS architecture was involved in the development of this sub-regional ITS architecture. TRANSCOM provided input and reviewed the work done by consultants to the NYC EDP.

PAAG Sub-groups

- Goals and Market Packages
- Information Linkages
- Traveler Information
- Interagency
- Implementation Phasing
- Public Outreach
- Operations and Maintenance
- Financing

The designers of the NYC EDP examined the user services in the federal EDP guideline. They then used the flow chart of the deployment process to design the sub-regional ITS architecture. They also reviewed the 53 market packages of the emerging National ITS Architecture and customized and created new market packages for parking, bicycling, and pedestrian use. Each agency then made a priority list, which ranked the market packages. The four agencies then worked together to prioritize a joint list of market packages.

Figure 2 demonstrates the recommended communication linkages for the NYC EDP.

Interagency Coordination in the NYC EDP

The NYC EDP process established a series of interagency roles to connect project deployment to these market packages. Fulfillment of these roles will not require additional staff. These deployments are established along a 20-year time frame and define the implementation of the NYC EDP. One exciting potential of this plan is to begin the joint control by NYSDOT and NYCDOT of the road network within New York City at a single dual-operating center.

Regional ITS Architecture Development Process

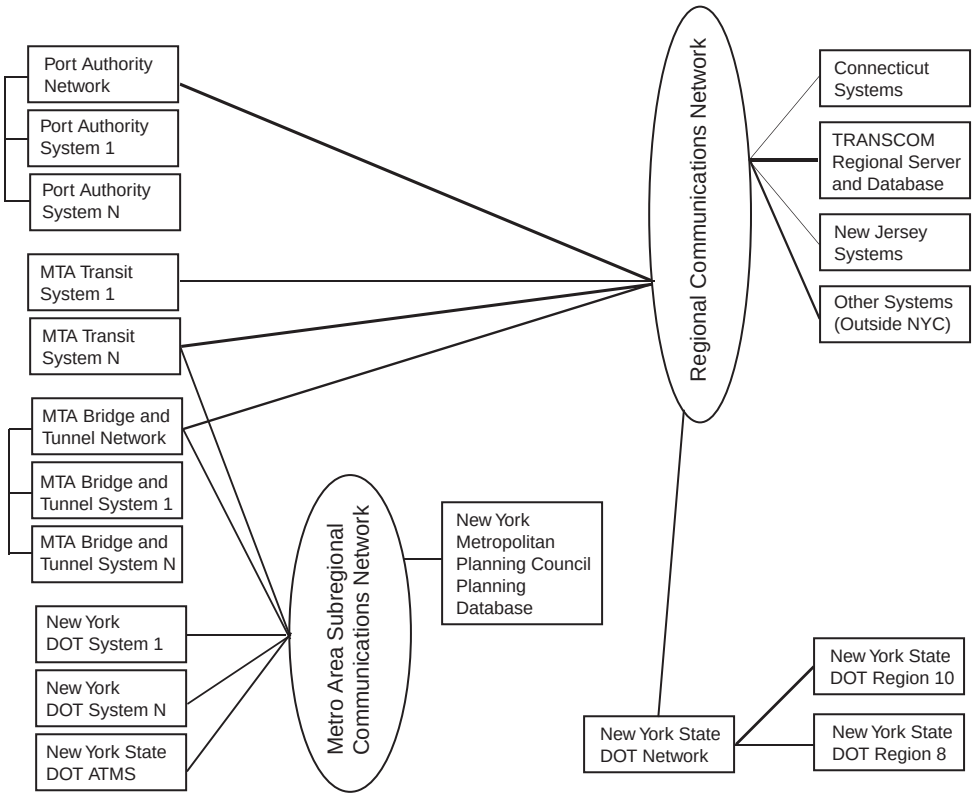

Figure 2 Recommended New York City EDP Sub-regional Architectural Concept

Stakeholder Involvement in the NYC EDP

The NYC EDP development process reached out to a broad range of stakeholders. Organizations in the region were invited to join a Public Agency Advisory Group (PAAG). The PAAG members include a variety of government agencies, private organizations, and advocacy groups interested in incorporating surface transportation, planning, environmental, and related issues into the EDP process. Eight PAAG subgroups were formed to provide input into specific aspects of the process. Through this process, a broad swath of interested parties participated in the creation of the EDP.

New York City Facts

Population: 7.5 million
Employment: 3 million
Employers: 300,000
(1996 Census Bureau Est.)

Daily Transit Ridership:
5.5 million people
Miles of Roads: 6,400

The Triborough Bridge and Tunnel Authority (TBTA) (MTA Bridges and Tunnels) serves more than a million people daily

Regional ITS Architecture Applications and Evolution

The regional ITS architecture will be used to improve the collection and dissemination of information to maximize performance of the existing transportation infrastructure. To accomplish this goal, the regional ITS architecture must enable an automated flow of data. The current manual system is not making full use of the technologies being deployed. As noted earlier, TRANSCOM is responsible for implementing, operating, and updating the regional ITS architecture. Currently, TRANSCOM is working to create an enhanced system through which data can flow automatically. Figure 3 provides a graphical illustration of the data flows between the different levels of the regional architecture.

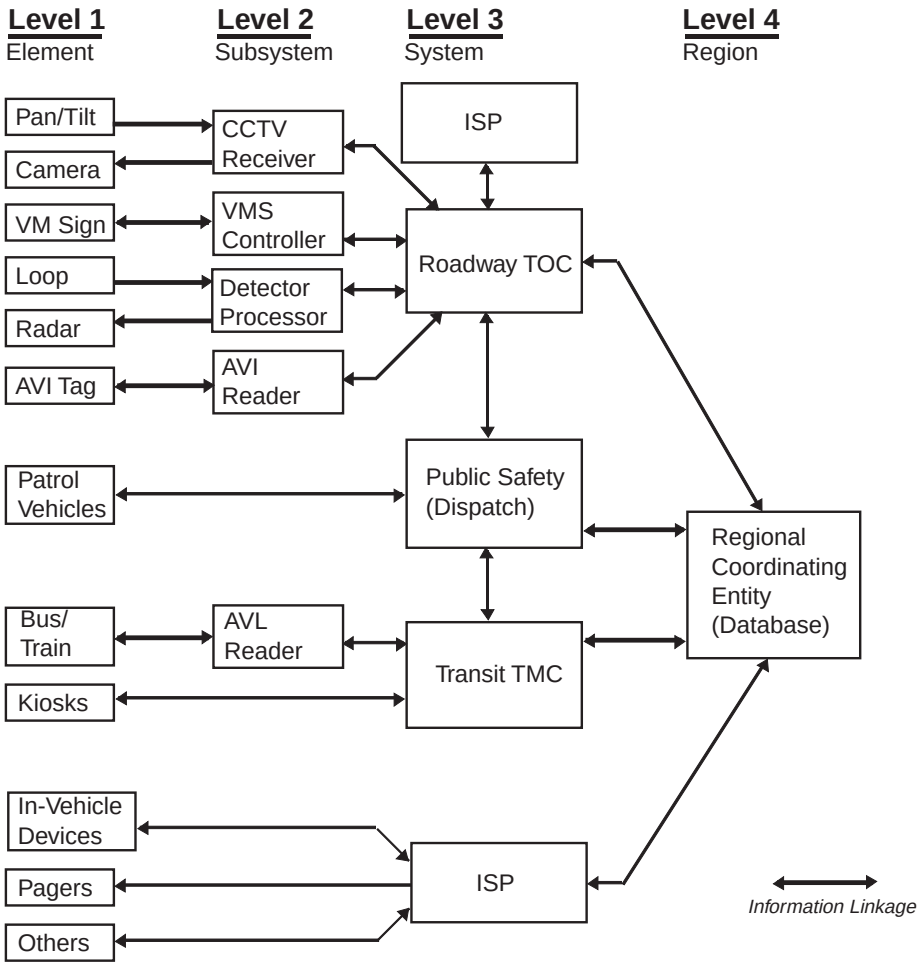

Figure 3 Automated Flow of Data

Regional ITS Architecture Applications and Evolution

Use of the Regional ITS Architecture for Transportation Planning

The New York-New Jersey-Connecticut Regional ITS architecture is designed to serve the operational needs of TRANSCOM member agencies. Systems connected by this architecture will provide a wealth of useful information for MPOs in the region. Planning agencies have been involved in this architecture development process and will incorporate the data collected by the various ITS projects into future planning.

Use of the Regional ITS Architecture for other ITS Projects

Each of the three states in the case study area have planned or developed ITS projects outside of the 29 county metropolitan region. The involvement of those states with TRANSCOM extends the influence of the regional ITS architecture as states employ compatible systems to these ITS deployment efforts outside of the study area. Conversely, ITS efforts in this 29 county region are influenced by outside efforts, such as the Commercial Vehicle Information Systems and Networks architecture and the I-95 Corridor Coalition.

Partnerships in New York City

The NYC EDP process has been useful in bringing together a variety of agencies in New York City to address a wide range of local transportation problems. The members hope that the same cooperation that facilitated the NYC EDP will continue for the implementation and maintenance of the ITS projects. The sub-regional ITS architecture is being developed to ensure continued cooperation of agencies by creating a structure to connect future ITS deployments. The NYC EDP is designed to anticipate future needs and potential future partners.

Maintaining the Regional and Sub-regional ITS Architectures

TRANSCOM has been responsible for operating and maintaining the manual architecture. In cooperation with the member agencies, it will retain this responsibility after the regional ITS architecture is finalized.

Both the regional and sub-regional ITS architectures establish a common foundation for ITS deployment. This framework is important since the operating agencies were concerned that deployment of incompatible systems may create new difficulties in managing the region's complex transportation system. In addition to the TRANSCOM and NYC EDP coalitions, several larger transportation agencies in the region have established in-house steering committees to insure that ITS deployments within their organizations are compatible.

The NYC EDP is a work in progress. Institutional issues, including maintenance of the architecture, need to be addressed by the four partners in this process. In its current form, the EDP is more specific to the NYC DOT and the NYS DOT. These agencies have identified the Urban ITS Center at the Polytechnic University to lead the development of their portions of the NYC EDP in the future. The New York MTA and the Port Authority will be responsible for updating their own portions of the NYC EDP.

"The proposed Interagency ITS Center for New York City should serve as the formal forum for continuing inter-agency technical coordination for multimodal ITS deployment projects beyond completion of the EDP."

— Ernest Athanailos, Director, ITS Engineering, New York City Department of Transportation

Lessons Learned

"An impetus for coordination was concern that deployment of incompatible systems would make transportation problems worse rather than better."
— **Rob Hess, Senior Manager, Transit Projects, Capital Program Budgets, New York Metropolitan Transportation Authority**

The major lessons learned in the development of both the regional ITS architecture and in the NYC EDP follow.

- Early establishment of interagency relationships is important.
- Education about ITS and regional ITS architecture is needed within agencies to garner critical senior management involvement and support for ITS and regional efforts.
- Federal support, including education and the establishment of standards, has been and continues to be important.
- The National ITS Architecture is a useful tool for guiding the regional ITS architecture process.
- Institutional issues must be considered and respected.
- ITS has created a new regionally focused paradigm for transportation planning and operations.

Interagency Relationships Important

"Establishing the relationships between the different agencies provided the primary benefits. Those institutional links are probably more beneficial than the technical ones."
— **Jim Paral, Director, Traffic Operations, New Jersey State Department of Transportation**

- The key to the success of both the regional and sub-regional ITS architecture development processes was the early establishment of interagency relationships. The impetus for these relationships was the need to maintain a level of operational performance in an environment of increasingly limited land and financial resources. ITS integration offered the benefits of performance improvements with shared financial burdens.

- While each agency was motivated by their own operational concerns, bringing those organizations together cultivated interest in regional ITS solutions. The interactions with different agencies benefited regional coordination and introduced the various agencies' key ITS champions to each other. This participation enabled the potential for partnerships.

- Various organizations held ITS at distinct priority levels. Understanding the institutional constraints of partner agencies is important to productive collaboration. Building relationships is necessary to reach this understanding.

"It's difficult to educate the stakeholders about the architecture. It's so high level it's sometimes tough to describe."
— **Bill Stoeckert, Director of Highway Operations, Connecticut State Department of Transportation**

Education and Senior Management Support

- Participants in both the regional ITS architecture development process and the NYC EDP process understood the importance of and the need for ITS integration. They often had difficulty translating its potential to their organizations.

- Most agencies reported a need for *inreach* to enable their own agencies to buy into the concept of a regional ITS architecture.

- In many agencies both senior management and operation staff found the idea of an "ITS architecture" a confusing and not easily explained concept.

Lessons Learned

- For a good idea to become reality it is crucial that it receives the support of senior management. This is particularly crucial since in many cases, ITS is not its own budget category. Lacking an exclusive funding source, it is relatively easy to reduce funding for ITS projects. This is especially true if people fear losing operational control to the new technologies and institutional arrangements.

- Agencies need interest and involvement in ITS at all levels. Senior management must see the benefits of ITS and of regional coordination for resources to be directed towards the development of ITS systems and a regional ITS architecture.

- Operation staff need to understand how the coordination of systems and information will help in meeting their operational responsibilities. Planning staff, who are often proponents of cooperation and regional involvement, need to understand the responsibilities of operational staff.

- Tangible interagency ITS successes such as the E-ZPass electronic toll collection system also helped illustrate the potential of an orchestrated ITS framework. Nonetheless, many agencies reported the need for further education and guidance at the outset of the regional ITS architecture development process. This outreach could also be fruitfully aimed at the public to encourage and support interagency initiatives.

"You need champions in the agency to move forward on ITS and on coordination with other agencies. It is important that high-level staff see the usefulness of ITS and coordination."

— Isaac Takyi, Director, Facilities & Equipment Planning/ITS Operations Planning, NYC Transit

"The acceptance and success of the E-ZPass has given agencies the confidence to both deploy new technologies and to work together."

— Abiyu Berlie, ITS Strategic Planner, New York Metropolitan Transportation Authority, Bridges and Tunnels

Federal Support

- Many agencies found the support from the U.S. DOT very helpful for explaining the concept and benefits of a regional ITS architecture. Both the division offices and ITS training courses were cited as particularly useful.

- For some individuals, participation on national boards and task forces established with Federal support served as a vehicle for learning about ITS and its associated issues. Some agencies found their consultants able to provide a critical institutional education function.

National ITS Architecture a Helpful Tool

- Most respondents found the National ITS Architecture to be an excellent tool for planning a regional ITS architecture. It provides a framework from which innovation can occur and a language for discussing that innovation. However, regional stakeholders must still adapt the concepts of the National Architecture to address local needs.

- The National ITS Architecture is an important resource for regional ITS integration. Stakeholders also reinforced the need for standards as a crucial issue requiring attention at the national level.

"Using the National ITS Architecture is helpful. It provides a common language."

— Eduardo Serafin, Formerly with the Polytechnic University of New York

Lessons Learned

"Get your ducks lined up first and establish necessary buy-ins and institutional relationships with the people responsible for operations before embarking on an inter-agency process to develop a regional ITS architecture."

— Ira Huttner, ITS Specialist, Information Services, Port Authority of New York and New Jersey

"Agencies developing an ITS architecture should not be afraid to involve as many organizations as possible."

— Louis Neudorff, Senior Vice President, TRANSCORE

"ITS is a new way of thinking. It's about systems, not projects."

— John C. Falcocchio, Professor and Head of the Department of Civil and Environmental Engineering, Polytechnic University of New York

"Each region is different. The key is to get the ball rolling."

— Matt Edelman, General Manager, TRANSCOM

Institutional Considerations

- Once convinced of the need for coordination, stakeholders were able to discuss common goals. There was some wariness among the participants about embarking on this process. Agencies were reluctant to open up their traditional jurisdictions to forms of joint control

- Working through these concerns was one of the major successes of the entire regional ITS architecture development process. This institutional bridge building helped the interagency planning process to create better coordination and avoid wasteful duplication for ITS deployment.

- Creating new lines of communication was seen as something that extended beyond the framework of just ITS. It was, as one agency reported, "an attitudinal shift towards the compounded benefits of coordination" in all spheres. This reflected the kind of thinking that some people in the region thought should be applied to discussions of ITS itself: ITS should be a part of a regional mobility strategy and not be viewed separately.

New Paradigm

- Many of the agencies interviewed discussed the importance of ITS as a new paradigm for transportation planning and operation. Unlike other transportation projects, which have often been done in isolation of the larger transportation system, ITS projects are designed to improve management of the larger transportation system. It is difficult to easily demonstrate the benefits of the interagency collaboration necessary to a system-wide outlook. Nonetheless, the interviewed agencies discovered that the regional ITS architecture has to be connected to existing needs and policies and institutional structures. The act of developing a regional ITS architecture created a new set of realities. Thus, the regional ITS architecture development process incorporates the status quo into a more integrated and connected future state.

References and Additional Resources

Web Sites

Connecticut DOT:
http://www.state.ct.us/dot/

New Jersey DOT:
http://www.state.nj.us/transportation/

New Jersey Transit:
http://www.njtransit.state.nj.us/

New York MTA :
http://www.mta.nyc.ny.us/

New York MTC:
http://www.nymtc.org/

New York City DOT:
http://www.ci.nyc.ny.us/html/dot/html/

New York State DOT:
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Port Authority:
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