3 ITS Standards Deployment and Testing Strategies

In chapter 2, this report reviewed some of the ITS deployments shaping the application of ITS Standards in New York State. These projects, and others, taken together represent the "first generation projects" deploying ITS standards in the State. The next sections outline an action plan, strategy, and risk assessment to allow NYSDOT to support future deployments, and to answer the following:

- How do we capture the lessons learned and experience of the "first generation projects" and apply them to the next generation of projects?
- How do we move from proof-of-concept, early deployment, small scale or laboratory environment projects to large ITS deployments? And, what are the risks involved?
- What testing and/or certification strategy should we implement to make sure that large deployments go smoothly?

3.1 Action Plan

While NYSDOT has been an active supporter of the ITS Standards program and developed significant experience, many project planners and designers are unfamiliar with ITS, standards, and communications technologies. Several things can be done to help the "second generation" of ITS deployers to learn from the early pioneers, and focused help (in the form of example and sample specifications) can be developed to aid in the process of ITS standards-based communications specification development. Three key action points are defined below:

1. Develop Guidance and Courses on ITS Standards-based Deployments
2. Develop a Statewide ITS Standards Specification Catalog
3. Encourage Agency and Consultant Participation in ITS Standards Committees

Action Plan Item 1: Develop Guidance and Courses on ITS Standards-based Deployments

Support projects to develop guidance materials and courses for ITS designers and engineers specifically targeted towards specification development and ITS standards-based deployment.

Action Plan Item 2: Develop a Statewide ITS Standards Specification Catalog

A Statewide ITS Standards Specifications Catalog would define pre-defined materials from which specification can be developed. Given these pre-defined specifications, ITS engineers could quickly pull together draft ITS specifications, draft feasibility studies for alternatives for deployment of ITS communications, and Systems Engineering Analysis reports.

Action Plan Item 3: Encourage Agency and Consultant Participation in ITS Standards Committees

Continue to support and encourage agency and consultant participation in ITS Standards Committees. The knowledge gained at ITS Standards Committees and speaking directly with the standards developers greatly helps designers and engineers assess the status of standards and deployments (both early successes and pitfalls).

3.2 Strategy for Deployment and Testing

This section will discuss specific risks in specifying the key standards identified above. Risks for each key ITS standard will be reviewed. Mitigation strategies for reducing risks will also be discussed.

Starting from the list of Key ITS Standards (see Appendices), which identified standards as potential deployment and testing opportunities, four strategy goals were developed:

1. Broaden Experience and Deployment of Center-to-Center Communications
2. Broaden Experience and Deployment of Center-to-Field Device Communications
3. Broaden Experience and Deployment of WAVE/DSRC Communications
4. Develop a Testing Framework for Hardware and Software in ITS Project Deployments

Strategy Goal 1: Broaden Experience and Deployment of Center-to-Center Communications

NYSDOT has developed experience across many of the information level standards for center-to-center, including: IEEE 1512 Incident Management, TMDD Traffic Management, and TCIP Transit Management standards. Other information level standards that may be applicable to NYSDOT operations include:

- SAE-J2354 Message Sets for Advanced Traveler Information Systems. Specific areas for consideration may include: weather and roadway weather information dissemination for travelers.
- Archived Data Management Systems. These message sets are still under development, but NYSDOT may assess application of the ASTM standards for archiving information, which could then be shared with planners.
- Broaden use, based on project needs, of IEEE 1512, TMDD, and TCIP. Currently, these standards are being apply in projects, but all three standards have broad scopes, a small part of which, is actually being deployed.

Risk Mitigation Strategy – Leverage existing system deployments that have deployed a center-to-center infrastructure.

Strategy Goal 2: Broaden Experience and Deployment of Center-to-Field Device Communications

NYSDOT has successfully specified and deployed ITS projects based on the NTCIP field device communication standards. Most notable Dynamic Message Signs.

Others neighboring agencies have also deployed NTCIP-based center-to-field communications. Monroe County has deployed and NTCIP-based CCTV control system, and New York City is deploying NTCIP-based traffic signal control.

NYSDOT should consider the following devices, as they play a major role in freeway management:

- CCTV
- Data Collection Devices
- Environmental Sensor Stations

Risk Mitigation – Focus on standards that have been deployed by others. Deploy only few devices, and consider using the testing services of a laboratory, university, or research institutions.

Strategy Goal 3: Broaden Experience and Deployment of WAVE/DSRC Standards

The WAVE/DSRC device and communication standards are still emerging. No large deployments are planned at this time, but the U.S. has a National Prototype Program in place, and a trial project is underway in Long Island, New York. Because of the potential importance long-term of WAVE (vehicle-to-roadside and vehicle-to-vehicle) communications technologies, NYSDOT may wish to become involved early on to help assess how best to develop a solid knowledge base and experience prior to embarking on deployments.

ITS applications of potential interest to NYSDOT long-term include: parking management and payment, commercial vehicle operations, electronic toll collection, in-vehicle roadside alert, emergency vehicle preemption, transit signal priority, electronic border crossing, and port operations.

Specific activities may include:

- Participate in the development of the SAE-J2734 Roadside Alerts information level standard. The approaches developed with this standard will likely influence the development of information level standards in other areas using WAVE IP applications, though which ones is unknown at this time.
- Join WAVE/DSRC Consortium (e.g., OmniAir) and participate in the development of the OmniAir EPS Committee standards.

- Participate in the development of the IEEE 1609 specifications (covers application, transport, and portions of the subnetwork level standards).
- Volunteer as an early deployment (trial) test project site (for example, similar to the 915 MHz/5.9 MHz prototype in Long Island).

Risk Mitigation – Focus on participation and development of the WAVE/DSRC standards. These will likely support NYSDOT interests, long-term.

Strategy Goal 4: Develop an ITS Standards Testing Framework

It is recommended that New York State develop and adopt an ITS Standards Testing Framework.

One such testing framework is documented in the NTCIP 9012 – Testing and Conformity Assessment Users Guide. Though, this document covers only the topic of center-to-field communications, many of the concepts translate to other areas, such as center-to-center and WAVE/DSRC. Also, the OmniAir Consortium has initiated a certification testing program for WAVE/DSRC products.

Chapter 9 covers the topic of an ITS Testing Framework in more detail. Appendix L provides ITS Standards test procedure development and test tool guidance.

3.3 Risk Factors and Mitigation Strategy

Two factors influence the deployment of ITS Standards above others: the maturity and stability of the standard, and deployment experience. Each is described

3.3.1 Risk Factor: Maturity and Stability of Standard

Maturity of an ITS Standard may be an important factor. If an ITS Standard is not yet mature, meaning the ITS Standard is still under development or subject to significant changes, the deployment of an immature ITS Standard can lead to significant risks. These risks may include significantly higher development costs, particularly to upgrade an existing system to comply with the ITS Standard once the its development is complete, incompatibility or interoperability issues, and the risk that the ITS Standard may be incomplete.

3.3.2 Risk Factor: Deployment Experience

An ITS Standard that has not been widely deployed may pose high risk. ITS Standards that have been widely deployed leads to experience in the industry, familiarity, lessons learned, and perhaps proof of concept that the ITS Standard is stable and mature. Weaknesses in the ITS Standard are likely to have been exposed with wide deployments, further reducing the risk of the unknown for New York State.

3.3.3 Risk Mitigation

The table below represents some ways to manage the risks of standards maturity and stability and deployment experience. These are compiled into “Low Risk” and “High Risk”

Table 3-1. Factors Influencing ITS Project Risk

Lower Risk

- Low Cost
- Deploying with relatively few numbers of devices
- Deploy in a concentrated geographic area (e.g., Urban Area)
- Deploy using standards that have gone through several revisions, are stable, and have been deployed elsewhere
- Participate in standards development until the time is right
- Incremental Deployment where experience and infrastructure are in place

Higher Risk

- High Cost
- Deploying large numbers of devices
- Deploying across large geographic areas (e.g., Rural Areas, Statewide)
- Deploy using newly available communications standards and products
- Be the first to deploy, with little experience, and infrastructure (especially communications infrastructure and hardware) need to be put in place