

**Syracuse Metropolitan Area
Intelligent Transportation Systems
Strategic Plan**

**Final Report
EXECUTIVE SUMMARY**

Prepared for

**New York State Department of Transportation
&
Syracuse Metropolitan Transportation Council**

**Prepared by
PB Farradyne**

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EXECUTIVE SUMMARY

Syracuse Metropolitan Area Intelligent Transportation Systems Strategic Plan

The New York State Department of Transportation (NYSDOT) has retained PB Farradyne (PB) to develop a strategic plan for the deployment of Intelligent Transportation Systems (ITS) for the Syracuse Metropolitan Area (Onondaga County). PB Farradyne, in its efforts to develop the plan, is being assisted by Clough, Harbour & Associates, LLP and Howard/Stein-Hudson Associates, Inc.

In addition to providing recommendations for the NYSDOT, the study also included recommendations for the City of Syracuse Department of Public Works (DPW), the Onondaga County Department of Transportation (OCDOT), the New York State Thruway Authority and the Central New York Regional Transportation Authority (CNYRTA).

Since the detailed analysis of emergency service provider's overall ITS needs were not part of this study, a comprehensive section of the Project listed all available technology related equipment that could improve their performance in responding to transportation incidents without being specific.

The study's regional ITS architecture framework also included recommendations, intended to be advisory, for key regional transportation agencies in the spirit of developing integrated ITS in the region. This Executive Summary provides an overview of the findings and recommendations of the study.

Product of the Study

The detailed results of this study are presented in this Final Report consisting of the following Technical Memoranda:

- Technical Memorandum # 1 - ITS Concept Plan
- Technical Memorandum # 2 - ITS Regional Architecture
- Technical Memorandum # 3 - ITS Implementation Plan

ITS Opportunities in the Region

Intelligent Transportation Systems (ITS) refers to the application of electronics, communications, hardware, and software that support various services and products to address the transportation challenges. When deployed in an integrated fashion, ITS allows the surface transportation system to be managed as an intermodal, multi-jurisdictional entity, appearing to the public as a seamless system. The United States Department of Transportation (U.S. DOT) has been advancing the development and deployment of ITS through various programs including the National ITS Architecture and Standards development efforts.

Onondaga County, with an area of approximately 800 square miles, contains the fourth largest upstate city (Syracuse) in New York. Onondaga County and the City of Syracuse occupy a central position within the local, regional, and national transportation system. The region's roadways, public transportation, rail, and airport provide outstanding access to services and employment. In Onondaga County, two major interstates (Interstate 81, which provides connections to the north and south and the New York State Thruway - Interstate 90, which provides access to the east and west) meet and provide access to all of the Northeast and Canada. In addition, I-690 runs through the City connecting the east to the west. There are approximately 3,100 miles of roadway and almost 500 bridges in Onondaga County. However, in some cases, connections among these facilities, and between these facilities and the local road network, is limited. There are some gaps in the transportation system, and some facilities have reached capacity. Implementation or expansion of Intelligent Transportation System (ITS) strategies/elements can improve the overall safety and mobility of Onondaga County as well as of the region.

ITS Stakeholder Coalition

In order to build consensus to deploy ITS in an integrated manner, major ITS stakeholders in the region were identified and coalitions among them forged through monthly meetings, workshops and seminars. The core group of the stakeholders which met monthly for the duration of the project, included representatives from the New York State Department of Transportation (NYSDOT), the New York State Thruway Authority (NYSTA), the Syracuse Metropolitan Transportation Council (SMTCC), the City of Syracuse Department of Public Works (DPW), the Onondaga County Department of Transportation (OCDOT), the Central New York Regional Transportation Authority (CNYRTA), the New York State Police (NYSP), the City of Syracuse Police Department, the Onondaga County Sheriff's Office, the City of Syracuse Fire

Department, and the Onondaga County Department of Emergency Communications, 911 Center.

ITS Vision & Goals

The vision for the ITS strategic plan for the Syracuse Metropolitan Area depicts the future regional transportation system in a 20-year horizon. The ITS goals have been developed in view of the deficiencies identified in the region's existing transportation system as well as the long-term vision of the future regional transportation system. The process of identification of vision, goals, and of selection and prioritization of the appropriate ITS service options was accomplished via the participation of a wide coalition of ITS stakeholders. A series of seminars/meetings/workshops were held to develop a consensus and understanding of the ITS goals and service needs for the area. The visioning process, including the final vision statement as well as the goals, was presented in the Technical Memorandum # 1.

Market Packages

The market packages are comprised of specific ITS services. A market package is defined as a collection of equipment capabilities that satisfy a market need (or an objective) and are likely to be deployed as a group. The market packages were prioritized for the following participating stakeholders: NYSDOT Region 3, NYSTA, NYSP, SMTC, CNYRTA, City DPW, City Police, City Fire, County DOT, County Sheriff and County 911 Center. The deployment of an integrated and seamless ITS in the region would require cooperation and coordination among these agencies. The market packages were evaluated to one of the four levels of priority -- *high, medium, low, or not rated* -- in view of the region's ITS goals and objectives. The results are presented in Technical Memorandum # 1.

The market package definitions and priorities serve as an entry point into the National ITS Architecture program in order to develop the Regional ITS Architecture.

ITS Architecture

In the context of ITS, an "architecture" describes what a system does and, from a high-level perspective, how it does it. It provides the overall framework for system design and deployment; identifying the functions and operations to be performed, the basic subsystems and elements that make up the system and what functions each performs, and the flows of information between these components. In essence, an ITS architecture defines how system

elements interact and work together to achieve system goals. From a regional perspective, an ITS architecture is concerned with what types of information are exchanged between transportation related agencies and their respective transportation management systems and centers, how the center-to-center connections are accomplished, and the additional functionality this integrated information provides to users (e.g., travelers, system operators, transportation managers, information service providers).

The Syracuse Metropolitan Area ITS architecture was developed based on the guidelines provided in the National ITS Architecture (NITSA) program materials.

The importance of developing and subsequently deploying a regional ITS architecture cannot be overemphasized. The real-time sharing of information between transportation agencies and emergency management agencies and their respective systems promotes interagency coordination and enables an area-wide view of the transportation network. Such synergy between multiple systems is absolutely necessary to achieve the vision of an efficient, effective, and seamless transportation network throughout the Syracuse metropolitan region.

Assumptions Made for Study Purposes

For simplifying the complexities involved in the development of the Regional Architecture, the following assumptions were made.

1. Voice & Data Communication media such as telephone, fax and pagers are excluded from the architecture. This means only electronic communication handled through a computer on a wide area network (WAN) and/or a local area network (LAN) are included in this architecture.
2. Some of the statewide databases and informational networks represented in the Statewide Architecture such as NY State DMV Accident Reporting System are not included in this architecture as they were already addressed in detail in the New York Statewide ITS Architecture developed by NYSDOT and NYSTA. Also excluded in this architecture is the Commercial Vehicle Operation (CVO) issue, since it has been already addressed in the statewide ITS Architecture.

The study recommended the general concept of a centralized center (network) that collects and dissipates Transportation related information between regional agencies. This recommendation will require fewer interconnects eliminating the complexity of establishing a comparatively

expensive network that crisscrossed the study area connecting individual agencies to a multitude of other agencies.

Further discussions on the establishment of such centralized network revealed “sensitivity” of certain Emergency/Enforcement related data exchanged among the Regional emergency service providers (State Police, County Sheriff, etc) that are not apt for a network which contains other non-enforcement agencies. It was recommended that the “sensitive” emergency data exchange between emergency service providers be handled through a separate network called “**SY**racuse **R**egional **E**mergency **N**etwork (SYREN)”.

Theoretically, SYREN will be an integrated network of emergency information that is also connected to all emergency Computer Aided Dispatch systems and ultimately to all emergency vehicle mobile data terminals and will facilitate the exchange of emergency data among agencies. Examples of non-transportation related emergency data are; verification of criminal records, license data, fire incidents in city/county etc, while transportation related emergency data exchanged through SYREN would include transportation incident management/response data that directly impact the regional transportation operations.

Conceptually similar to that of SYREN, the **M**ETropolitan **T**ransportation **C**ommunication **N**etwork (METCON) was recommended for the transportation agencies. This network will integrate all of the regional transportation agencies, including the emergency service providers, and help exchange the transportation related data (including incident management data). The METCON interface at the agency user will be a simple Internet based browser that provides access to regional transportation related information. During the initial stages, METCON will be functionally designed to exchange basic operation information such as each agency’s construction activities and manually inserted incident information, and will later be expanded to include automated exchange of real-time traffic data such as video images, traffic conditions (detector data), etc.

Once operational, a data interface will be developed between the two networks (SYREN & METCON) to share the needed information. For example, a transportation incident related cellular 911 call will be received at the 911 Center with the approximate location. The entry of such information in to SYREN will either be manual or automated. Once the incident is verified, the information will automatically be transmitted to METCON via the data interface and from there to all other agencies (transportation service providers and others).

At all of the Emergency Service Provider centers, there will be two separate interfaces for METCON and SYREN where the dispatchers will be able to verify the transportation related incidents reported on one network by using the other network . For example, an accident on the highway reported from a cellular call on the scene through SYREN can be verified and magnified by monitoring the video/detector data exchanged through METCON. Thus the reported incident can be confirmed and appropriate response can be initiated from all the needed agencies in the region.

The METCON interface will not be available to the field vehicles connected through the SYREN network. Thus the needed information exchanged through METCON will be transmitted to field personnel/vehicles through the SYREN network.

In contrast to SYREN, since the nature of data exchanged though METCON is usually “non-sensitive”, entities such as local media can be linked to METCON to gain access to various information exchanged through this network such as live video feeds from traffic cameras in the region or traffic conditions on the roadways.

Provided below in Figure 1 are the various stakeholder agencies and their grouping under these two networks.

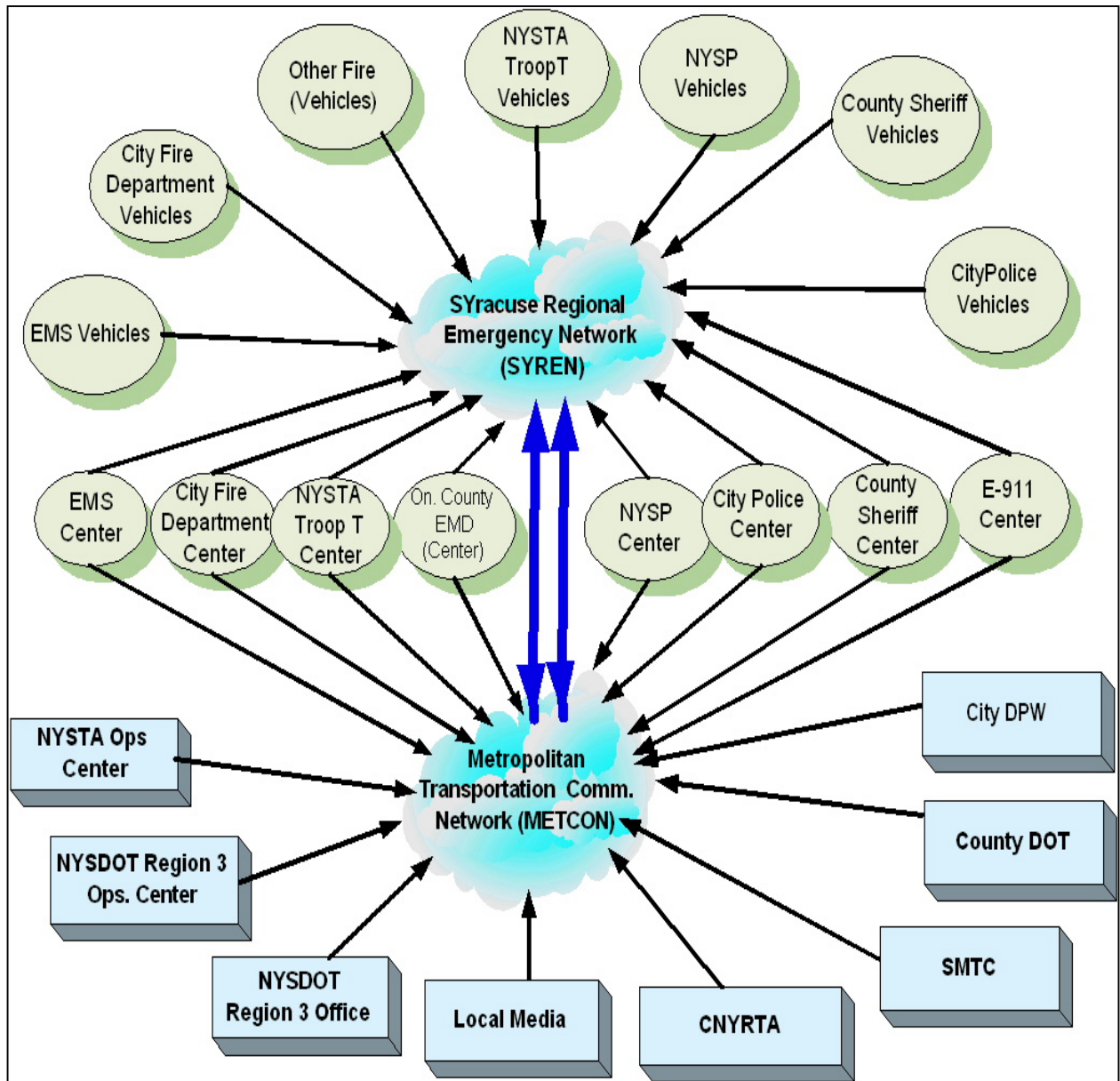


Figure 1 – Schematic Representation of Regional Data Exchange Networks, SYREN & METCON

ITS Standards

Deploying ITS technologies by conforming to widely accepted standards permit the agencies to use different vendors for the same element and help to ensure compatibility with future products and services. Major ITS standards development efforts that are currently in progress include the National Transportation Communications for ITS Protocol (NTCIP), Transit Communications Interface Protocol (TCIP), and Location Reference Message Specifications (LRMS). Initial versions of many ITS standards have been released but will be subject to refinement based on operational experience. In the near term it is recommended to consider the application of ITS standards on a case-by-case basis for ITS project design specifications. Over the long-term, specification of mature NTCIP standards is strongly recommended as they have the potential to greatly reduce the cost of ITS deployment as well as help achieve the National ITS Architecture vision of deploying compatible, inter-operable and integrated systems.

ITS Implementation Plan

The final product of this ITS study is an overall ITS implementation plan in the form of individual projects to be deployed over a period of time. The projects were identified considering all of the preceding topics discussed in this Executive Summary. The primary focus of the implementation plan is to provide recommendations to the NYSDOT Region 3. However, as ITS deployments will normally require cooperation among other agencies that are involved, directly or indirectly, in the operations and management of the regional transportation system, the ITS projects are also identified for the City of Syracuse Department of Public Works, the New York State Thruway Authority, the Onondaga County Department of Transportation, and the Central New York Regional Transportation Authority.

Each project identified in the implementation plan was defined with a time frame for implementation, the required components/technologies, locations of deployment, and costs of deployment and operations. With regard to defining a project's implementation time frame, the following criteria were used:

- “Early Action” projects are critical to the operations of the region's transportation infrastructure, and they are recommended for immediate deployment.
- “Short-term” projects are recommended for deployment in one through five years time horizon. These projects are intended to serve the region's immediate transportation needs.

- “Mid-term” projects are recommended for deployment in the six through ten years time horizon. These mid-term projects will build on the short-term projects and provide enhanced functionality and coverage.
- “Long-term” projects are recommended for deployment in the eleven through twenty years time horizon. The long-term projects are intended to expand on the short-term and mid-term projects to complete the comprehensive ITS deployment in the region.

Overall, the Project Implementation Plan is intended to serve as a road map for the ITS deployment program for the Onondaga County area and in particular the Syracuse Metropolitan Area.

With regard to costs, the implementation plan has provided planning level estimates of “capital costs” to deploy systems, and “annual operating and maintenance (O&M) costs”. The former two categories together comprise the total capital cost. The cost summaries were prepared providing a range (+/- 25%) of costs to account for uncertainties within the estimates for factors including rapid changes and innovations in technologies. Table 1 provides a summary of costs for the recommended projects.

Table 1 - Summary of Project Costs

Agency	Deployment Time Frame	Number of Projects	Capital Costs	Annual O&M costs
NYSDOT Region 3	Early Action	3	\$2.2 M	Included in short term
	Short Term	14	\$ 11 M	\$1.1 M
	Mid Term	9	\$16.2 M	\$1.8 M
	Long Term	8	\$9.3 M	\$2.2 M
	TOTAL	34	\$38.7 M	\$5.1 M
City of Syracuse DPW	Short Term	11	\$ 8.7 M	\$0.66 M
	Mid Term	9	\$6.9 M	\$1.1 M
	Long Term	4	\$10.2 M	\$1.5 M
	TOTAL	24	\$25.8 M	\$3.26 M
Onondaga County DOT	Short Term	10	\$5.6 M	\$0.53 M
	Mid Term	8	\$3.5 M	\$0.85 M
	Long Term	3	\$0.97 M	\$1.1 M
	TOTAL	21	\$10.1 M	\$2.48 M
New York State Thruway Authority	Early Action	3	\$1.6 M	Included in short term
	Short Term	3	\$ 1.35 M	\$0.31 M
	Mid Term	3	\$1.9 M	\$0.63 M
	Long Term	2	\$0.79 M	\$0.67 M
	TOTAL	11	\$5.6 M	\$1.61 M
	Short Term	12	\$5.4 M	\$0.7 M

	Short Term	12	\$5.4 M	\$0.7 M
	Mid Term	19	\$7.7 M	\$1.2 M
	TOTAL	32	\$18.1 M	\$3.3 M

Finally, it should be recognized that the long-term implementation plans would change over time. Therefore, it is important to periodically revisit the plan and revise the implementation strategies accordingly.

Many projects recommended in this study can be implemented through inter-agency cooperation and thus, economies of scale can be achieved in deployment, operations and management.

Recommended Interagency Projects

The National ITS Architecture attempts to promote the integration and share of resources among agencies. This has been the basis for the recommendations made and ITS projects defined in this study.

The first and most important step in provision of integration and share of information is to build an electronic communication network among the agencies where the regional construction activities, incidents and special events can be shared across the boundaries. The Regional Information Sharing Network, known to some as the METCON, has been defined as the first early action project to build the basis of all future integration and information sharing needs. It is recommended to use the available ITS standards for future ease of integration and compliance with the National Architecture. By using the approved ITS standards, all current and future local systems can translate their data into the same format via various data interfaces for integration using the METCON system. Even though this is considered an interagency project, NYSDOT has assumed the Champion role, has acquired the needed funds and will lead this effort on behalf of the region.

The architecture of the METCON system should provide for future integration with ITS systems as well as dissemination of real-time information among agencies. As such, the next phase of the METCON project will provide integration with the I-81 Freeway Management System to collect real time traffic conditions along the I-81 corridor. This integration will take place via a Data Interface (DI) and will provide real time traffic condition on the State facilities to other

agencies. Upon further expansion of the NYSDOT Region 3 freeway coverage (i.e., I-690, I-481, etc.) the DI will automatically share additional traffic conditions with all agencies.

It is also recommended that NYSTA, the City of Syracuse, the CNYRTA and Onondaga County will provide similar DIs from their existing and future system to the METCON for the benefit of all other agencies.

The existing and future planned expansion of the NYSDOT Weather monitoring system will provide the region with a wealth of weather information. The study recommends the integration and sharing of this information via the METCON system.

METCON will be a multi-modal, multi-agency system. Various information from the CNYRTA will be integrated into this system. It is also recommended to integrate METCON and future transit trips itinerary system to provide travelers with a single point of access to the regional information.

The study also recommends deployment of the SYracuse Regional Emergency Network (SYREN) under the 911 Center's authority. This network will upgrade the existing network and will provide additional functionalities such as the E911 system, upgraded GIS, AVL, etc. A direct data interface is recommended between SYREN and METCON to assure timely and real-time share of information.

The National ITS Architecture emphasizes, to the extent possible, sharing of each other's resources. The NYSDOT is about to deploy ITS along the I-81 freeway within the Syracuse Metropolitan area. There will be a minimum of eight cameras at the major interchanges. The City of Syracuse can benefit from video feeds from these cameras to enhance its operations. Both, the NYSP and City of Syracuse Police can use this real-time video feeds to better manage traffic conditions and incidents along the roadways. The 911 Center can take advantage of real time information to better dispatch the needed resources to an accident scene. The study recommends future expansion of the METCON system to provide interagency video sharing ability across all facilities.

The development of a regional 511 system is another recommended interagency project that will take advantage of the METCON system to provide travelers with unified, seamless transportation information. In July of 2000, the FCC at the request of the USDOT and various state and local agencies, designated the 3 digit phone number "511" as the national traveler

information number. The 511 traveler information service will be used in much the same way as the existing 411 telephone information system. A traveler will be able to call 511 and receive real-time traffic information (incidents, closures, special events, weather, travel time, etc.) for the roadways that the traveler requests.

It is also recommended to share CENTRO's Automated Vehicle Locater (AVL) infrastructure with the City of Syracuse, Onondaga County and the NYSDOT to provide the AVL functionalities to each agency's fleets.

The CNYRTA has funds on the Transportation Improvement Program (TIP) to deploy two Kiosks. It is recommended to use this opportunity to integrate with METCON and provide multi-agency, multi-modal information to the users.

Each agency can either develop or enhance their web-site and provide individual transportation information. It is recommended to use the METCON database for a regional transportation website to provide comprehensive information to the travelers.

The study recommends co-location of Transportation Management Centers to the extent possible to assure proper and needed integration of information and resources as well as minimize the cost of remote connections/integrations within agencies.

NYSDOT, City of Syracuse DPW and County DOT do not believe there is a need for coordination of interagency signal systems. The study recommends further discussion on this issue. In particular, there are NYSDOT signals at the bottom of off ramps from major interchanges that need to be integrated with the existing City signal system.

The study recommends as a Short-Term project, the creation of an incident management group that includes all emergency service providers and transportation facility operators that will be responsible for the development of a regional incident management plan. The plan will be comprehensive, multi-agency and multi-modal.

The study recommends for the continuation of ITS coordination activities as well as for revisions of the ITS Strategic Plan on a regular basis (every three to five years). This could take the form of a "Syracuse Regional ITS Policy Committee" or other formal (or informal) body that meets periodically to discuss issues and problems, and to plan for maintenance and continued upgrade of the region's ITS.

Intelligent Transportation Systems are widely recognized as the most cost effective way to improve traffic flow. Increasing infrastructure is a timely and cost intensive undertaking, with only a temporary benefit. These reports speak to many different projects that will benefit the Syracuse Metropolitan Area. As mentioned, all agencies/stakeholders that will be affected by any changes should be involved to the greatest extent possible. We firmly believe that if the recommendations put forth are followed the improvement to the area will far out way any costs associated with the upgrades.