CMAP

Northeastern Illinois ITS Architecture v.3.0 Summary

Draft
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Introduction

The Northeastern Illinois Regional Intelligent Transportation Systems (ITS) Architecture is a roadmap for transportation systems integration for the northeastern Illinois counties of Cook, DuPage, Kane, Kendall, Lake, McHenry, Will and a portion of Grundy County over the next 15 years. The Architecture has been developed through a cooperative effort by the region's transportation agencies, covering all modes and all roads in the region. 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 Architecture is an important 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 the Northeastern Illinois region.

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

Relationship to Other Architectures

The Architecture was developed in cooperation with the Illinois Department of Transportation (IDOT) and recognizes linkages to the Illinois Statewide ITS Architecture. The Architecture also supports information flows from the states of Wisconsin, Indiana, and Michigan who maintain their own Statewide ITS Architectures. Within the region, DuPage County has adopted the DuPage County Transportation Coordination Initiative, and the Regional Transportation Authority has adopted the Regional Transit Intelligent Transportation Systems Plan - both subregional ITS architectures whose activities are also supported and included within the Regional ITS Architecture.

Background

In 2001, the U.S. Department of Transportation (U.S. DOT) published the Federal Highway Administration (FHWA) Final Rule and Federal Transit Administration (FTA) Policy which implement section 5206(e) of the Transportation Equity Act for the 21st Century (TEA-21). The rule set out the requirement that regions who were implementing ITS projects must develop an ITS Architecture by April 2005.

Fortunately, the Chicago metropolitan area understood early on the value of a plan to guide the development of the region's intelligent transportation systems. In 1999, the Strategic Early Deployment Plan (SEDP) identified the need for a Regional ITS Architecture. A preliminary, high level Architecture of key regional systems was prepared through the Gary-Chicago-Milwaukee Corridor Multi-Modal Traveler Information System (GCM/MMTIS) and is described in the SEDP and in GCM documentation.

In July of 2000, IDOT and Chicago Area Transportation Study (CATS), now known as the Chicago Metropolitan Agency for Planning (CMAP), sponsored a regional Tier 1 Architecture workshop to continue the development of the preliminary regional architecture. This one-day workshop gathered local transportation stakeholders and introduced the basic steps and concepts necessary to continue the development of a Regional ITS Architecture. In March of 2001, the Tier II Architecture workshop was held which incorporated the information from GCM and SEDP documentation, and stakeholder input into the first Turbo Architecture © based Regional ITS Architecture for northeastern Illinois – well in advance of the deadline set out by U.S. DOT for this task. The resulting 2002 Regional ITS Architecture v1.0 was found to be consistent with the National ITS Architecture by the FHWA and FTA in June of 2003.

In 2007, another major update to the base Regional ITS Architecture was undertaken. Over a period of two days, half-day stakeholder meetings were held with groups of stakeholders from the region's agencies representing:

- Emergency Management and Security Functions
- Arterial Management Functions
- Expressway Management Functions
- Transit Management Functions

The stakeholders had a chance to review information included in the northeastern Illinois Regional ITS Architecture v1.0 and participate in discussions guided by consultants regarding ITS activities. In addition to stakeholder input, ITS documents from a variety of agencies were reviewed with information incorporated into the revised Regional ITS Architecture. The results of the document review and outreach produced the northeastern Illinois Regional ITS Architecture v2.0, adopted in early 2008.

On July 6, 2012, President Obama signed into law a new transportation bill P.L. 112-141, the Moving Ahead for Progress in the 21st Century Act (MAP-21). That bill retained funding for research in the area of Intelligent Transportation systems, and reiterated the requirement that ITS projects carried out with funding from the Highway Trust Fund must conform to the appropriate regional ITS Architecture.

National ITS Architecture and Turbo Architecture © Versions

The National ITS Architecture has been updated to version 7. The Turbo Architecture © database software has been updated to maintain consistency with the National ITS Architecture, and also skipping from version name 5.0 to version name 7.0 to maintain naming consistency with the National Architecture version name. Before updating the information contained within the database, the

2007/2008 northeastern Illinois ITS Architecture was updated from Turbo Architecture © 4.0 to Turbo Architecture © 7.0. This update resulted in a Regional ITS Architecture that is consistent with the current National ITS Architecture v7, which defines the functions that are required for ITS, the physical systems which supply them, and the information exchanges that connect the physical subsystems together into an integrated system.

Regional ITS Architecture Information Update

At the conclusion of the 2008 update, CMAP adopted a maintenance plan that called for a more continuous rather than periodic maintenance process based on information collected at regular meetings of the ATTF. The maintenance tasks could be either supported by consultants, as all updates had been in the past, or staff could take advantage of training provided by FHWA and develop the skills to maintain the ITS Architecture in-house. In the years that followed, CMAP staff availed themselves of this training. Time passed, however, and the continuous update model was not followed. In addition to the passing of time triggering the need for an update, the region approved its first regional comprehensive plan, GO TO 2040, which included a number of projects, action areas, and policies which are highly dependent on the region's ITS infrastructure and which were not reflected in the Regional ITS Architecture. Therefore, in spring 2013 CMAP began an outreach process with the Advanced Technology Taskforce (ATTF) members to collect information on desired Architecture revisions.

Information collection took place during interviews with stakeholder agencies, with two rounds of interviews being held. The first round of interviews took place in early 2013. The meetings were scheduled with individual ATTF members, who were free to invite additional participants who could add information to the conversation. CMAP traveled to the agency location, and in most cases the meetings were attended by multiple agency representatives. Prior to the meetings, CMAP staff developed review material consisting of reports generated from the Regional ITS Architecture for reference during the interviews. The material presented the current inventory items by stakeholder, project Architectures, and agreements listing. CMAP staff took notes during the wide-ranging conversation, focusing on Architecture items that should be changed or added.

Spring 2013 in-person meetings:

County Highway/ Transportation Departments	Statewide Agencies	Transit Operators	Municipalities
Cook 2-14-2013 DuPage 1-30-2013 Kane 1-30-2013 Lake 2-11-2013 Will 4-11-2013 McHenry – none	Illinois Tollway 1-28-2013 IDOT: ITS Office 1-11-2013 CVO Staff 2-4-2013 District 1 1-16-2013	CTA 2-13-2013 Pace 2-11-2013 Metra 2-19-2013, 3-5-2013 RTA 1-31-2013	City of Chicago 1-17-2013 City of Naperville 1-30-2013

Once the initial interviews were completed, draft changes were added to the Architecture. This included changes indicated by the GO TO 2040 projects, action areas, and policies. In 2014, CMAP held a second round of meetings with transportation stakeholders. For this round, a draft web-based Architecture was generated using the Turbo Architecture © database, as well as the summary documents of inventory, projects and agreements. These included the draft changes collected from the information collected in 2013. Except for CTA, these meetings were held via conference calls instead of in person. CTA had a staff change since the previous meeting and it was felt to be appropriate to again meet in person with the new CTA Chief Information Officer at the CTA offices.

Spring 2014 calls:

County Highway/ Transportation Departments	Statewide Agencies	Transit Operators	Municipalities
Cook 5-14-2014 DuPage 5-1-2014 Kane 4-24-2014 Lake 4-30-2014 Will 5-5-2014	Illinois Tollway 5-2-2014 IDOT: ITS Office 5-5-2014 CVO 4-24-2014 District 1 5-5-2014	CTA 5-21-2014 Pace 5-6-2014 Metra 5-6-2014	City of Chicago 4-30-2014 City of Naperville 5-23-2014

Meetings with police and emergency responders were not undertaken. Each of the ATTF agencies maintains a cooperative relationship with appropriate law enforcement and emergency response agencies. We relied on the ATTF members to comment on coordination activities underway with police and emergency response staff.

At the conclusion of the meetings and calls with the key stakeholders, all information was added to the revised Turbo Architecture© Database, exported to a revised web-based presentation, and the process documented in this Regional ITS Architecture v.3.

Maintenance Plan Update

CMAP is responsible for maintaining the Northeastern Illinois Regional ITS Architecture. While CMAP assumes responsibility for maintenance, a group of core stakeholders act as an "institutional framework" to provide information and to review proposed changes to the Architecture. The Regional ITS Architecture is a consensus framework for integrating ITS systems in the region. The "institutional framework" is the Advanced Technology Task Force.

The maintenance plan adopted in 2008 made a number of recommended steps:

- Identify Change – focus on ITS projects; take advantage of the ATTF to facilitate the use and maintenance of the Regional Architecture; update the Change Request Form.
- Evaluate/Approve Change – rekindle the ATTF Architecture subgroup to play a more active role in Architecture maintenance.
- Update Baseline – training or outside support should be provided to facilitate Architecture maintenance.
- Notify Stakeholders – approved Architecture changes should be distributed to regional ITS stakeholders to keep them updated and to encourage use of the Architecture.

CMAP has included these recommended steps in the updated maintenance plan except for the identification of an ATTF ITS Architecture subgroup. There was little appetite for the development of an additional group. As a result, the revised plan reflects that ATTF as a whole serves this purpose.

The updated maintenance plan also goes into more detail about the Architecture approval process and versioning. The main clarification is that minor error corrections or changes are only approved by the ATTF, and will be treated as minor version changes (e.g. 3.0 changes to 3.1). Substantial changes to the Architecture would initiate a new version number (e.g 3.0 changes to 4.0), and would require approval by the CMAP Policy Committee.

The Regional ITS Architecture V3 Maintenance Plan was recommended for approval by the Advanced Technology Task Force on September 19, 2014.

Status Categories

Throughout the Regional Architecture, inventory, services, interfaces, agreements, and projects are assigned a status of existing, planned, or potential.

An item is **planned** if the region has invested some efforts or funds on the item and intends to implement it at some point. For example, a traffic management center where a planning study has occurred but which none of the further work to implement it has taken place is defined as planned. An item may still be defined as planned when there is a demonstration project or a small amount of the system in place.

An item is **existing** if the item is in place and operating. The item does not have to be in place systemwide or for all stakeholders. For items which are partially in place, the boundary between whether it is planned or existing is fuzzy. How much should be in place to qualify as existing? The decision to categorize as planned or existing was determined based on the stakeholder conversation.

An item is **potential** if the region believes it is valuable and will likely come into existence one day, but nothing has been invested in developing it yet.

Stakeholder Update

Stakeholder coordination and involvement are key elements for developing a Regional ITS Architecture. The stakeholders have been identified and described with enough detail that a project developer can understand who the stakeholders are and what activities they are responsible for. The web-based presentation conveniently provides a list of elements associated with the stakeholder directly from the stakeholder list. The stakeholders represent a mix of specific agencies or organizations and generic names used to represent groups of stakeholders. Examples of specific agency or organizations are Metra and the Illinois Tollway. An example of a generic stakeholder group name is Municipalities/Townships, which represents any of the municipalities in the region that have ITS elements.

Updates to the stakeholder list for V3 were mainly based on agency name changes.

- Will County Highway Department became the Will County Division of Transportation.
- Cook County Highway Department became the Cook County Division of Transportation and Highways.
- The Illinois State Toll Highway Authority has not changed its official name, but is now referred to as the Illinois Tollway.
- A new "PPP partner" (public-private partnership, private entity) was added to represent a number of private partners associated with the region's system operators through agreements.

Web-Based Presentation Stakeholder List

Inventory

The inventory, viewable either by stakeholder or entity, provides a list of the ITS systems and equipment in the region along with some statewide elements and even some elements of adjoining states (Indiana and Wisconsin). The majority of elements in the inventory represent a specific existing or planned system. Examples of specific systems are the IDOT District 1 CommCenter and the Chicago Transit Authority Control Center.

Some elements represent sets of devices, rather than a single specific system or device. An example of this type of element is the element "City of Chicago Office of Emergency Management and Communications (OEMC) Field Equipment." This element represents all of the traffic signals, traffic detectors, Closed Circuit Television(CCTV), Dynamic Message Signs (DMS) and Highway Advisory Radio (HAR) that are or will be operated by the City of Chicago OEMC. The element describes the type of devices, not the specific numbers of devices. For example, the element calls out DMS, but does not say how many there are, or their precise location.

A third type of element in the inventory is a "generic" element that represents all of the systems of a certain type in the region. An example of this type of element is the Municipal Public Safety Dispatch, which represents the many municipal public safety answering points (PSAPs) in the region. There are

over 100 PSAPs in the region. Including these systems using a single element helps keep the Architecture from growing too large.

Each inventory element includes a link to the associated stakeholder, a description of the functionality the item is intended to provide, a context diagram presenting interfaces to all other inventory elements, and individual flow diagrams for interfaces to other elements. The individual flow information defines the flows and also links to the applicable ITS standards.

Some highlights of changes to the inventory include:

- Addition of potential IDOT toll collection and management systems to support congestion pricing.
- Addition of potential CMAP regional parking management systems to support management of parking supply using pricing. This is a recommendation of GO TO 2040. Ultimately, these elements will likely belong to another stakeholder but that stakeholder has not yet been identified.
- Addition of potential CMAP regional vehicle miles traveled (VMT) monitoring equipment to support conversion to VMT pricing. Considering VMT pricing to replace the motor fuel tax is a recommendation of GO TO 2040. Ultimately, these elements will likely belong to another stakeholder but that stakeholder has not yet been identified.
- Addition of planned Metra Positive Train Control System (PTC), which will be implemented as required.
- Addition of PPP contactless fare equipment, card vending machines and fare management systems to represent the Ventra system. This is equipment owned by the private partner in a public-private partnership.

Web-based Inventory Presentation

Needs and Services

The transportation needs for the region are defined as part of the transportation planning process. GO TO 2040, the region's comprehensive plan, emphasized maintaining and modernizing the system, implementing projects with ITS based operations strategies, and monitoring performance. The goal is to accommodate the transportation needs created by significant regional economic and population growth, while increasing the share of trips using public transportation and having a positive impact on traffic congestion. The Regional Mobility component of the plan includes recommendations for concrete activities which contribute to achieving this goal. They are presented within three categories: Invest Strategically in Transportation, Major Capital Projects, Increase Commitment to Public Transit, and Create a More Efficient Freight network.

Service packages in the Regional ITS Architecture provide the ability to implement systems to address the identified transportation needs. Each service package includes a definition of what service it provides and includes links to the inventory items which are associated with the service package.

Invest Strategically in Transportation

GO TO 2040 recommends modernizing the system through investments in ITS, replacing the motor fuel tax with something that could be VMT pricing, implementing congestion pricing, and implementing parking pricing.

Examples of service packages that support these goals are:

Network Surveillance
Traffic Signal Control
Regional Traffic Management
Traffic Incident Management
Electronic Toll Collection
Regional Parking Management
Traffic Metering
Lane Management

Major Capital Projects

GO TO 2040 recommends implementing a group of major capital projects. Some of the new major capital projects are recommended to include managed lanes. While not specifically mentioned, all new major capital projects will include significant ITS components.

Example service packages that support the major capital projects are:

Electronic Toll Collection
Variable Speed Limits
Dynamic Lane Management and Shoulder Use
Dynamic Roadway Warning
VMT Road User Payment
Transportation Decision Support and Demand Management

Increase Commitment to Public Transit

GO TO 2040 recommends modernizing the system using technological improvements to improve passenger experience and information, and to make it operate more efficiently. This includes implementing transit signal priority and bus rapid transit services.

Example service packages that support these goals are:

Transit Vehicle Tracking
Transit Fixed Route Operations
Demand Response Transit Operations
Transit Fare Collection Management
Transit Security
Transit Fleet Management
Transit Traveler Information
Transit Signal Priority

Create a More Efficient Freight Network

GO TO 2040 recommends supporting regional trucking improvements and reducing at-grade highway rail crossing delay.

Example service packages that support these goals are:

Advanced Railroad Grade Crossing
Weigh in Motion

Freight Electronic Clearance
CV Administrative Processes
On-Board CVO Safety
Roadside CVO Safety
Parking Facility Management
Railroad Operations Coordination

Operational Concept

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. Agency responsibilities in the following areas have been defined.

- Archived Data Systems
- Electronic Toll Collection
- Emergency Management
- Freeway Management
- Incident Management
- Maintenance and Construction
- Parking Management
- Road User Payment
- Surface Street Management
- Transit Services
- Traveler Information

Web-based Presentation Concept of Operations

Interfaces and Information Exchanges

While it is important to identify the various systems and stakeholders as part of a Regional ITS Architecture, a primary purpose of the Architecture is to identify the *connectivity* between transportation systems in the region and where appropriate, outside the region. How these systems interface with each other is an integral part of the overall Architecture. These interactions are referred to as interfaces, and are listed in the web-based presentation. The 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.

There are 312 different elements identified as part of the Northeastern Illinois Regional ITS Architecture. These elements include city, county and state traffic operations centers, transit centers, transit vehicles, public safety dispatch centers, media outlets, and others—essentially all of the existing and planned physical components that contribute to the regional intelligent transportation system. Interfaces have been defined for each element in the Architecture. For example, the IDOT District 1 Traffic Systems Center (TSC) has existing or planned interfaces with many other elements in the region ranging from field equipment to transit centers. Some of the interfaces are far less complex. For example, the City of Chicago Skyway Roadside Equipment has interfaces with only two other elements in the Architecture.

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 Architecture.

Web-based Presentation Interfaces and Information Exchange

Functional Requirements

Functional requirements are a description of the functions or activities that are currently performed by the ITS elements or that are planned to be performed in the future. The information describes what the systems are supposed to do. The Northeastern Illinois Regional ITS Architecture functions were developed using the functional assignments underlying the National ITS Architecture and the mapping from transportation services to elements. The functions are easily understood, and are presented as a list of "shall" statements.

Web-based Presentation Functional Requirements

Regional Projects and Project Sequencing

One focus of this update was to collect more information about ongoing projects. Because of this, the project list changed more than anything else in the Architecture.

The projects listed in the Architecture provide a way to learn about specific ITS development activities. The northeastern Illinois Regional ITS Architecture views the project entry as reflective of the process which takes place to:

- Expand an existing inventory

  For example, an agency may have traffic surveillance equipment on parts of its system. The inventory items will reflect that the agency owns such equipment. If the equipment is being expanded onto another roadway, a project is included to reflect the expansion on that roadway.

- Develop a new inventory item

  An agency may begin the process to develop a truck parking information system. A project will then be added that reflects the activity of building a truck parking system, while the inventory will be updated to reflect the existence of a planned truck parking system belonging to the agency.

- Link the inventory items in a new way to achieve a goal

The work to develop the links between inventory items is reflected as a project. For example, the region has 911 call centers, and the region has traffic management centers. The region has identified the flow of incident information to traffic management centers as an important goal. A project has been added that reflects the activity of establishing communication between those systems.

A number of projects have been added with CMAP as the primary stakeholder in response to GO TO 2040 implementation. These are: CMAP Congestion Pricing, CMAP Dedicated and Managed Truckways, CMAP Parking Management, CMAP Unified Oversize/Overweight Permit System and CMAP VMT Pricing. While it is unlikely that CMAP will ultimately be the primary stakeholder, the ITS projects needed to support the region's long range goals should be included in the ITS Architecture.

Two projects have also been added under the flag of the Regional Transportation Operations Coalition (RTOC), an operations group sponsored by CMAP. These are the RTOC Integration of Centers and RTOC PSAP Integration projects. In this case, RTOC is not an individual agency but a cooperative group representing the region's transportation system operators. These two activities have risen to the top of the list as this group's regional priorities. A number of agencies are already working on this activity (Kane County, Lake County, Will County, IDOT, Illinois Tollway and CDOT), but as other unlisted agencies begin work on this activity, the Regional ITS Architecture acknowledges that it is a known priority.

Other projects have had minor changes to descriptions or names and are not included in the table of new projects. One notable project was eliminated, *Illinois Statewide 511 System,* because it was identified as no longer planned or even potential.

Project sequencing is addressed in general terms. Projects are defined as short-term (0-5 years), mid-term (5-10 years), and long-term projects (10-15 years).

The following lists new projects added to the Architecture during this update.

Project Name

CDOT Adaptive Signal Control - Columbus Drive
CDOT Adaptive Signal Control - Irving Park Road
CDOT Bus Rapid Transit System
CDOT Divvy Bike Share
CDOT Transit Signal Priority
CMAP Congestion Pricing
CMAP Dedicated and Managed Truckways
CMAP Parking Management
CMAP Unified Oversize/Overweight Permit System
CMAP VMT Pricing
Cook County Central Signal Control
Cook County Department of Transportation and Highways Fleet AVL
Cook County Lake-Cook Traffic Management
Cook County Signal Interconnects

Cook-DuPage Smart Corridors
CTA Rail Station Audio Announcement Upgrade
CTA 4G Communications Network
CTA Bus Fuel Management System
CTA Bus Radio Communications Replacement and Upgrade
CTA Bus Rapid Transit
CTA Facility Access Security System
CTA Infrastructure Surveillance (Bus and Yard)
CTA Infrastructure Surveillance (Subway Tunnels)
CTA Network Operations Center (NOC)
CTA Platform Personal Security
CTA Rail Line of Site Monitors
CTA Station Master Project
CTA Subway CCTV Station Portal Security
CTA Transit Signal Priority Corridors
CTA Video Retrieval, Archiving and Review System
DuPage County Centralized Traffic Signal Control
DuPage County Dynamic Alternate Route System
DuPage County Field Device Expansion
DuPage County Gateway Integration
DuPage County Highway-Rail Information System
DuPage County ITS Hub
DuPage County Multi-Jurisdictional Communications Channel Integration
DuPage County Signal Interconnects
DuPage County Traffic Management Center
DuPage County Video Management System
IDOT Arterial Construction Closure Application Website
IDOT Expressway Construction Closure System
IDOT Highway Advisory Radio System Coordination
IDOT I-290 ITS Elements
IDOT I-55 Managed Lane
IDOT I-80 Traffic Data Collection
IDOT Joliet Remote Bridge Operations System
IDOT Predictive Travel Time Development
IDOT Regional Communications Backbone
IDOT Signal Interconnects
IDOT Smart Highway I-94 /US 41
IDOT Suburban Chicago ATMS – Centralized Traffic Control
IDOT Truck Parking System
Illinois Tollway DMS Expansion
Illinois Tollway Elgin O'Hare / Western Access ITS Infrastructure
Illinois Tollway Fleet Automatic Vehicle Location

Illinois Tollway Freight Efficiency Improvements
Illinois Tollway I-57/I-294 Interchange ITS Elements
Illinois Tollway I-90 Smart Corridor
Illinois Tollway Lane 0 Management
Illinois Tollway Ramp Queue Detection
Illinois Tollway Portable Queue Detection
Illinois Tollway Real Time Performance Measurement
Illinois Tollway Road Weather Information System Enhancement
Illinois Tollway Systemwide All Electronic Tolling
Illinois Tollway Time of Day Shoulder Running Demo
Illinois Tollway Vehicle Detection System Expansion
Kane County Randall Road Adaptive Signal Control
Kane County Randall Road Safety Improvements
Kane County Signal Interconnects / ATMS Integration
Kane County Stearns Road ITS Corridor
Lake County Adaptive Signal Control
Lake Count Asset Management System – Signs
Lake County Countywide Bluetooth Traffic Monitoring
Lake County Permanent Count Stations
Lake County PSAP Coordination
Lake County Signal Interconnects
Lake County Smart Street Lighting
Metra Automatic Passenger Count System
Metra Contactless Electronic Fare Collection
Metra Downtown CCTV Expansion
Metra Fiber Communications Backbone
Metra Mobile Electronic Ticketing
Metra Positive Train Control
Metra Ticket Vending Machine Expansion
Metra Visual Information Display Expansion
Metra Wi-Fi Service
Naperville Coordinated Traffic Signal Network
Naperville Washington Street Adaptive Signal Control
Pace Bus on Shoulders
Pace Call and Ride
Pace Paratransit Management System
Pace Queue Jump
Pace Real Time Transit Information Expansion
Pace Seat Broker Program
Pace TSP and ART Improvements
Rail Freight Positive Train Control
RTA Goroo Real Time /Predictive Trip Planner

Regional Transportation Operations Coalition Integration of Centers
Regional Transportation Operations Coalition PSAP Integration
Will County Department of Transportation Vehicle Fleet Management

Reasonable attempts were made to ensure that the project Architecture components (inventory, service packages, and data flows) made sense. However, we acknowledge these items will undergo closer scrutiny and require refinement as projects get underway. We expect that corrections to the project Architectures will be made as they are identified during project development.

Web-based Presentation Complete Projects Listing

Agreements

There are several types of arrangements associated with the interfaces included with the projects discussed previously. Data exchanges between systems require agreements on the transmission protocol and data formats to ensure compatibility. Coordinating field device operations owned by different agencies requires defined procedures for submitting message requests and rules governing when such requests can be honored. Such coordination can be accomplished either with handshake agreements or formal written instruments. Sharing control of field devices operated by different agencies involves more liability issues, which requires more formal agreements. Coordinated incident response may also require formal agreements, but also requires group training of personnel from various agencies. While all interfaces involve agreements for data compatibility, agreements for procedures and operations as well as training can also be critical elements to optimizing the benefits of the Architecture.

Web-based Presentation Agreements Listing

Standards

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 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.

Standards are developed by a number of standards development organizations:

- 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)
- American Public Transportation Association (APTA)
- National Electrical Manufacturers Association (NEMA)

Use of ITS standards is very important to project development in the northeastern Illinois region. These standards apply to many areas including center-to-center, center-to-roadside, center-to-vehicle/traveler, roadside-to-roadside, and roadside-to-vehicle. Based on the interfaces and information flows chosen for the Regional Architecture, a number of ITS standards are applicable to the region. Each information flow is associated with a standard. However, the Regional ITS Architecture does not link directly to details on the applicable standards, but simply lists the relevant standards leaving project developers to find the detailed information on their own. The USDOT Research and Innovative Technology Administration ITS Joint Program Office ITS Standards Program is a good place to start.

A specific plan for how the region will consider standards has not been developed, but the Regional Transit Signal Priority Working Group, hosted by the Regional Transportation Authority, provides a good example for how that process might be carried out. This group is working to develop standards for an interoperable system which will include bus equipment from two different transit agencies (Pace and CTA) and roadside equipment owned and operated by city, county and state transportation departments. The group is working cooperatively with all stakeholders involved to identify standards that will be used in our region for any transit signal priority projects.

Web-based Presentation Standards Listing

Using the Regional ITS Architecture

Once a Regional ITS Architecture has been created, it is important that it be used as a key reference in the transportation planning process. This will ensure that all proposed ITS projects are consistent with the Regional ITS Architecture and additional integration opportunities are considered, leading to more efficient implementations.

The Regional ITS Architecture should also be considered for support in the ITS project development cycle. This begins with project definition, followed by procurement, leading to implementation. Information in the Regional ITS Architecture can assist in all three of these areas of project development.

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 a very high level description of project functions and moving toward system specifications. By identifying the portions of the Regional ITS Architecture that define the project, the Regional ITS Architecture outputs can be used to create key aspects of the project definition.

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

- The identification of agency roles and responsibilities (including any interagency cooperation) that can come from the operational concept developed as part of the Regional ITS Architecture. This operational concept can either serve as a starting point for a more detailed definition, or possibly provide all the needed information.

- Requirements definition can be completely or partly defined by using the Regional ITS Architecture functional requirements applicable to the project.

- The Regional ITS Architecture includes a map to ITS standards and the project mapping to the Regional ITS Architecture can extract the applicable ITS standards for the project.

Procurement can commence once a project is defined, and funding for it is committed. This generally begins with the development of a Request for Proposal (RFP), which is the common governmental practice for initiating a contract with the private sector to implement the project.

The Regional ITS Architecture can support RFP development. First, the project definition described above forms the basis for what is being procured. Mapping the project to the Regional 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 Regional 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 Regional ITS Architecture development can be specified in the RFP.

Project Implementation begins once a contract is in place. Implementation moves through design, development, integration, and testing.

Because ITS projects involve systems and their interconnections, it is very important to follow a system engineering approach to designing and implementing the project. While the exact process followed is at the discretion of the local agency, the ITS Architecture and Standards Rule/Policy lay out a set of required system engineering analyses for ITS projects funded through the Highway Trust Fund.

The required systems engineering analysis steps are:

- Identification of portions of the Regional ITS Architecture being implemented (or if a Regional ITS Architecture does not exist, the applicable portions of the *National ITS Architectur*e)
- Identification of participating agencies' roles and responsibilities
- Requirements definitions
- Analysis of alternative system configurations and technology options to meet requirements

- Procurement options
- Identification of applicable ITS standards and testing procedures
- Procedures and resources necessary for operations and management of the system

The Regional ITS Architecture can provide inputs to a number of these steps as shown in the following table

System Engineering Requirements	**Regional ITS Architecture output**
Identification of portions of the regional ITS Architecture being implemented	Mapping project to the elements and interfaces of the regional ITS Architecture.
Identification of participating agencies' roles and responsibilities	Use Operational Concept as a starting point.
Requirements definitions	Use Functional Requirements as a starting point.
Identification of applicable ITS standards and testing procedures	Use Regional Architecture standards outputs as a starting point for the standards definition.

The Regional ITS Architecture represents a detailed plan for the evolution of the ITS systems in the region and can be used to support regional transportation planning efforts and project development efforts.