National/Regional Intelligent Transportation System (ITS) Architecture

Ronald E. Boenau, P.E.
Federal Transit Administration, U.S.
Department of Transportation
URBAN MOBILITY POLICY AND TECHNOLOGY FORUM

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Ronald E. Boenau, P.E.
Senior Transportation Systems Manager - Special Operations
Federal Transit Administration, U.S. Department of Transportation

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THE ISSUE:
- Desire to deploy new advanced transportation technologies.

THE PROBLEM:
- Limited resources to deploy all the technologies at the same time.
- No overall framework or logical strategy existed for technologies that will be deployed over a period of years that would assure a well-integrated, connected transportation system.

THE SOLUTION:
- Create a common framework for planning, defining, and integrating intelligent transportation systems.
EXAMPLES OF ADVANCED TRANSPORTATION TECHNOLOGIES

- Automatic vehicle location
- Database interface/integration
- Reservation/eligibility systems
- Routing/scheduling/dispatching systems
- Geographic information systems
- Mobile data computer
- Interactive pre-trip and en-route traveler information
- Interactive voice response (for customer service and reservation)
- Electronic fare payment media and collection
- Realtime bus arrival information
- Automated passenger counters
BENEFITS OF PUBLIC TRANSPORT  ITS

- Fleet requirements: *decrease of 2% to 5%.*
- Schedule adherence: *increase of 9% to 23%.*
- Boarding time with automated fare collection: *decrease of 38%.*
- Transit travel times with transit signal priority: *increase of 1.5%-15%.*
- Customer satisfaction with realtime travel information: *increase from 68% to 92%.*
- Operating cost per transit vehicles miles of travel: *decrease of 8.5%.*

Large transit agencies:
- 43% have in-vehicle video surveillance.
- 64% have magnetic stripe payment systems.
- 31% have smart card technology.
- 60% have automatic vehicle location on fixed-route buses.

Source: Intelligent Transportation Systems Benefits, Costs, Deployment, and Lessons Learned: 2008 Update
USDOT NATIONAL ITS ARCHITECTURE PROGRAM

- **Purpose**
  - Congress required a National ITS Architecture be defined in 1991 legislation
  - Foundation of FHWA Rule 940 & FTA Policy on ITS Architecture & Standards
  - Necessary to integrate multiple transportation systems
  - ITS Architecture promotes common approaches and standardization of interfaces
    - Interoperability and interchangeability objectives
    - Efficient use of Federal funding for ITS projects

- **What is ITS Architecture?**
  - Framework for ensuring institutional agreement and technical integration for the implementation of integrated transportation systems
  - Identifies:
    - Organizations
    - Systems operated
    - Functions performed
    - Communications
    - Information exchanged
    - Standards
  - Supports transportation planning
PROGRAM PURPOSE AND HISTORY

- Architecture Program Task Areas
  - National ITS Architecture Evolution (Maintenance and Support)
  - Deployment Support
  - Border Architecture Activities (Canada and Mexico)
  - V2x Cooperative Systems Architecture

- Architecture Program History
  - Development initiated in 1993 with 4 competitive team contracts
  - First version released in 1996
  - Currently available as Version 7.0
ARCHITECTURE EVOLUTION

- Task Objectives
  - Maintain National ITS Architecture definition in line with industry developments and practices
  - Maintain Architecture alignment with and support for ITS Standards development
  - Provide overall Architecture Program support and outreach

- Task Activities
  - National ITS Architecture maintenance/update
  - Website maintenance
  - Turbo Architecture maintenance/upgrade
  - Turbo Architecture user support
  - ITS Standards support
  - Program Outreach/Presentations
  - Initiatives Support
ARCHITECTURE EVOLUTION - ACCOMPLISHMENTS

- National ITS Architecture Maintenance
  - Website Updated to include on-line training links
  - New website format released with Version 7.0 in January 2012 received positive stakeholder comments [www.iteris.com/itsarch/]

- Turbo Architecture Software Tool
  - Minor software updates to address bug fixes for Version 7.0 released in March 2012
    - Included better support for future software update notification

- Program Support
  - Met with Inter American Development Bank (IADB) to develop a case study of the National ITS Architecture development and broader ITS environment in US and other countries
ARCHITECTURE EVOLUTION – ACTIVITIES

- Incorporate Connected Vehicle Reference Implementation Architecture (CVRIA) features
  - Architectures will remain separate for a length of time (~2 years)
  - Alignment opportunities to be explored to allow stakeholders to leverage both architectures in ITS planning

- Update Turbo Architecture to support CVRIA and National ITS Architecture definitions
  - Support early connected vehicle planning activities

- Align National ITS Architecture standards mapping for CVRIA interface standardization
CONNECTED VEHICLE

- Task Objectives
  - Maintain Connected Vehicle Core System Architecture definition
  - Develop and align Connected Vehicle interfaces with National ITS Architecture
  - Develop and support tools to promote Connected Vehicle planning within the context of National ITS Architecture

- Task Activities
  - Program Outreach
  - Architecture and Standards Harmonization
  - Core System Architecture Maintenance
  - Website Maintenance
  - Turbo Architecture Maintenance/Upgrade
CONNECTED VEHICLE – ACCOMPLISHMENTS

- Supported Connected Vehicle Core System stakeholder analysis

- Initiated development of Connected Vehicle Reference Implementation Architecture (CVRIA)
  - Foundation for development of Connected Vehicle Standards Plan supporting standards development and harmonization activities

- Primary CVRIA development activities
  - Connected Vehicle application concepts of operation reviews
  - Needs identification
  - Requirements development
  - Functional, Physical, Enterprise, and Applications viewpoint developments
  - Interface identification
  - Standardization Plan development
  - Stakeholder engagement
Ronald E. Boenau, P.E.
Senior Transportation Systems Manager
    Special Operations
Federal Transit Administration, USDOT

Phone: +1 202-366-0195
Email: Ronald.Boenau@dot.gov

National ITS Architecture: www.iteris.com/itsarch/