National ITS Architecture Update

ITS Joint Program Office
Professional Capacity Building Program
Talking Technology and Transportation (T3) Presentation
August 23, 2007
Agenda

- National ITS Architecture
  - Overview
  - Version 6.0 update
- Turbo Architecture version 4.0 preview
- Discussion of deployment support and resources available
- Presenters
  - David Binkley, Lockheed Martin
  - Mac Lister, FHWA
National ITS Architecture Overview
What is ITS?

- Intelligent Transportation Systems (ITS) include the electronics, communications or information processing used singly or integrated to improve the efficiency or safety of surface transportation.

- Examples:
  - Traffic signal controllers
  - Traffic Management Centers
  - “511” (traveler information)
  - Electronic toll-tagging
What is an ITS Architecture?

- Framework for Developing Integrated Transportation Systems
- Identifies:
  - Organizations
  - Systems operated
  - Functions performed
  - Communications
  - Information exchanged
ITS Architectures Provide a Framework for Integration
What is the National ITS Architecture?

- **HIGH-LEVEL** national framework, “blueprint”, used to help guide ITS deployment and transportation planning
- Based on 33 transportation related ITS User Services:
  - Physical Entities – Subsystems/Terminators
  - Logical Architecture – Processes, Data Flow
  - Interfaces – Information Flows
  - Deployment oriented Market Packages
Architecture Products

- Available on
  - CD-ROM
  - Website

- Contains
  - Hypertext
  - PDF docs
  - Databases

National ITS Architecture

Logical Architecture

Physical Architecture

Market Packages

Theory of Operations

Standards Support
Subsystems

- Part of the overall Intelligent Transportation System
- Identify major systems, functionality
- Identify major interfaces
- Define key standardization points
- 4 Categories
  - Centers
  - Field
  - Vehicles
  - Travelers
Terminators Define the ITS Boundary

- Entities outside of ITS
- Define interfaces but not functionality
- Four types of Terminators
  - Environment
  - Human
  - System
  - Other System
Market Packages

Architecture
Framework spanning all of ITS

Market Packages
Contain pieces of the architecture that provide a particular transportation service
“Architecture Flows” Define Information Exchanged

Event Promoter

Traffic Mgmt.

Emerg. Mgmt.

Event plans

incident information

resource request

incident information

resource deployment status
National ITS Architecture Version 6.0 Update
National ITS Architecture is a “Living Document”

- Continuing evolution of the architecture over 10 years
- Version 6.0 continues support for ITS technical evolution and deployment
Architecture Evolution in Step with Industry

- Research and Federal Programs
  - DOT Initiatives
  - Border Information Flow Architecture (BIFA)
  - Commercial Vehicle Information and System Networks (CVISN)
- ITS Standards
- Deployment Lessons Learned
Version 6.0 Changes
Subsystems, Terminators, Flows

- **Subsystems**
  - No Changes

- **Terminators**
  - New: Border Inspection Systems, Driver Identification Card, Public Health System
  - Renamed: Trade Regulatory Agency → Border Inspection Administration, Transit System Operators → Transit Operations Personnel

- **Architecture Flows**

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Market Package Changes

- 91 Total in V6.0 vs. 85 in V5.0
- New MPs
  - APTS09 Transit Signal Priority
  - APTS10 Transit Passenger Counting
  - ATIS06 Transportation Operations Data Sharing
    - replaced Integrated Transportation Management/Route Guidance
  - ATIS10 VII Traveler Information
  - ATMS12 Roadside Lighting System Control
    - replaced Virtual TMC and Smart Probe Data
  - AVSS12 Cooperative Vehicle Safety Systems
  - MC11 Environmental Probe Surveillance
  - MC12 Infrastructure Monitoring
Architecture & the Initiatives

- National ITS Architecture evolving as DOT initiatives are developed and tested
- Vehicle Infrastructure Integration (VII)
  - Modify existing services (probe surveillance), interfaces between Vehicles and Roadway / Infrastructure
  - New probe-based services: traveler information, environmental probe surveillance, infrastructure monitoring
New VII Market Package

ATIS10 – VII Traveler Information

Emergency Management
- incident information

Maintenance and Construction Management
- equipment maintenance status
- field equipment status
- maint and constr work plans
- roadway maintenance status
- work zone information

Transit Management
- transit and fare schedules
- transit incident information
- transit information request

Surface Transportation Weather Service
- transportation weather information request
- transportation weather information
- weather information

Information Service Provider
- parking lot data request
- parking information
- road network conditions
- toll data
- short range communications status
- emergency traveler information + broadcast traveler information
- emergency traveler information + broadcast traveler information
- emergency traveler information + broadcast traveler information

Parking Management

Traffic Management

Toll Administration

Roadway

Vehicle

ISP VII Traveler Information Distribution
ISP Traveler Data Collection

Vehicle Short Range Traveler Information Reception
Architecture & the Initiatives

- Clarus
- Revised interfaces with the Weather Service
- Modified MC03 Road Weather Data Collection
  MP to emphasize collection of sensor data, provision of qualified information back to ITS from Clarus
Architecture & Other Federal Activities

- Expanded CVISN Capabilities
  - Sync National ITS Architecture with CVISN V3
    - Support Smart Roadside
    - New Driver Identification Card terminator
- Border Information Flow Architecture (BIFA)
  - Modified International Border Electronic Clearance MP
    - New terminators: Border Inspection Administration, Border Inspection Systems
Other Changes

- Support use of ATIS in No-Notice Disasters, ITS role in BioHazard situations
  - Interfaces for Reverse 911
  - New Public Health System terminator

- Presentation, user access changes:
  - Functional requirements added to Equipment Package pages
  - Short user service descriptions added to top of each User Service Requirements page

- Documents Page, added:
  - User Service Document
  - Regional ITS Architecture Guidance Document, V2
  - Systems Engineering for ITS
Other Changes

- Rehosted Logical Architecture to Telelogic System Architect™
  - New look-and-feel in Data Flow Diagrams (DFDs)
- Databases, documents, hypertext updated
- Standards mapping updated
  - Sync with ITS Standards program web site
  - Map latest Standards activities to Architecture: TCIP V3, TMDD, DSRC/WAVE
- Application Areas
  - Flows, standards support key areas of deployment
Other Changes – Standards Support

- Support new NTCIP 1213 Electrical Lighting and Management Systems
- New functions, interfaces, and new Market Package: ATMS12 Roadside Lighting System Control
Version 6.0 Available Now

- Click on “National ITS Architecture Version 6.0”

- CD-ROM’s also available
*Turbo* is a software tool that automates use of the National ITS Architecture.
**Turbo Version 4.0**

- Comprehensive Upgrade will include
  - Support for Version 6.0 of the National ITS Architecture
  - Enhancements that focus on improving project definition based on a regional ITS architecture
  - Bug fixes to ensure trouble-free operation
Version 4.0 Project Enhancements

- Version 4.0 is the first Turbo upgrade to focus on project definition capabilities
  - Focus on Regional ITS Architectures until now
- Project definition interface will be revamped to make it more intuitive
- New features will be added to make project definition more useful and powerful
Improved Project Interface

- Modify Turbo interface to make project definition more intuitive
Improved Project Interface

- Improve capability to select and reuse regional ITS architecture Roles and Responsibilities
Improved Project Interface

- Improve capability to select and reuse regional ITS architecture functional requirements
Project Definition Challenge

- Bridging the gap between high-level regional ITS architecture and specific projects

Architecture

- WSDOT Inventory
- WSDOT NW Region Field Equipment
- WSDOT Olympic Region Field Equipment

• Technology Neutral
• Location Neutral

Specific Project

- WSDOT Projects
  - Technology Specific
  - Location Specific

The Gap
Project Definition Challenge (2)

- Bridging the gap between high-level regional ITS architecture and specific projects

Architecture

- WSDOT Inventory
- WSDOT NW Region Field Equipment
- WSDOT Olympic Region Field Equipment

Specific Project

- US 2–179th to Woods Cr.
  - Signal upgrade
  - Grade crossing coord.
  - Traffic Cameras

- Technology Neutral
- Location Neutral
- Technology Specific
- Location Specific
Turbo V4.0 Solution (1)

- Relate elements in different architectures

Turbo File

- Region
  - WSDOT NW Region Field Equipment

- Project 1
  - WSDOT US 2 CCTV Cameras

- Project 2
  - WSDOT Grade Crossing Integration

- Project 3
  - WSDOT NW Region VMSs

- Element Instances with different levels of detail
Turbo V4.0 Solution (2)

- Relate elements in different architectures

- Elements *Shared/Related* in different architecture *files*
Turbo V4.0 Solution (3)

- Support User Defined Flow Names
  - Pick flow names that make sense for your project
  - Relate flows to National ITS Architecture flows

Regional Architecture

- SDDOT Maintenance Decision Support System
  - maint and constr vehicle operational data

Project

- SDDOT Maintenance Decision Support System
  - plow status

SDDOT Maintenance Vehicles

SDDOT Snow Plows
Turbo Release Schedule

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- V1.0
- V2.0
- V3.0
- V4.0

• Version 4.0 Available October 2007
Turbo User Support

- 800 Number (800-260-1001)
- E-Mail (turbo@iteris.com)
- Web (www.iteris.com/itsarch)