Integration of Tolling & ITS Solutions

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Samantha Soules
Atkins Division Manager, Tolls West
ITS & Toll Systems
Overlapping Objectives

**ITS**

- Traffic and congestion management
- Safety and security
- Use of data and technology

**+ TOLLING**

- Revenue to BUILD/MAINTAIN or MANAGE congestion
- Customer Interface
- Same/Similar Technologies
  - Application
  - Integration
  - Expectation of performance/accuracy
Express Lanes: Merging ITS & Toll

**ITS**

- **Active Traffic Monitoring & Management**
  - Volume, speed, and density detection
  - Dynamic Message Signs; Driver Information Channels
- **Real-Time Operations & Incident Management**
  - CCTV
  - Operations/Traffic Management Center
- **Reliable Communications Network**
- **Manage Congestion Points**
  - Signal Timing
  - Ramp Metering
- **Real-Time Travel Time Calculations**

**Tolling**

- **Revenue Collection**
- **Manage Corridor Congestion**
- **Demand Pricing Calculations**
- **Customer Experience**
- **Personally Identifiable Information Management**
- **Automatic Vehicle Identification**
  - RFID Readers & Transponders
  - Automatic License Plate Readers
- **Additional bandwidth and network communications traffic**
- **Increased need for redundancy and operational continuity**
Bay Area Express Lanes
Toll System Architecture
Express Lanes Toll System Architecture

Sample Data Flow from Express Lanes via Interfaces

Field Equipment

Operations Center

Lane Transactions (AVI/AVD/ALPR/VES)

CCTV

VTMS

TMS

Express Lanes Integrator 1
Lane Host

Express Lanes Integrator 2
Lane Host

Express Lanes Integrator 3
Lane Host

FasTrak®
Regional Service Center

Caltrans
BAVU/TMC

511
Regional Toll Elements

Operator
- Santa Clara Valley Transportation Authority
- Metropolitan Transportation Commission
- Alameda County Transportation Commission
- Bay Area Toll Authority
- Golden Gate Transportation District
- Treasure Island Mobility Management Authority

Toll Project
- SR 237 Express Lanes Milpitas (I-880 to N. 1st)
- SR 237 Express Lanes Extension Milpitas-Sunnyvale
- I-680 N Express Lanes (Benicia Bridge-Walnut Creek)
- I-680 Express Lanes Walnut Creek-San Ramon
- I-680 NB Express Lane Milpitas-Sunol
- I-580 Express Lanes Dublin-Livermore
- I-680 SB Express Lane Pleasanton-Milpitas
- Bay Area Bridges (7)
- Golden Gate Bridge (1)
- Treasure Island Ramps (4)

Lane System Integrator
- TransCore
- TBD
- Kapsch TrafficCom
- Electronic Transaction Consultants Corporation
- TransCore
- TBD
- TBD

Interfaces
- Lane Host
  - Typically one per integrator per operator
  - Potentially >7 lane hosts by 2020
- Back Office Processing & Customer Service
  - Regional for all operators
  - Owner: Bay Area Toll Authority
  - Vendor: Xerox
- Operational/User
  - Typically a function of the Lane Host (or an integrated module)
  - Specific to Operator and Integrator
  - Includes TMC-like functions
- Third Party
  - Real-time CCTV feeds and data traffic monitoring device
  - Real-time data for traveler information and alerts
  - Data sharing interfaces for analysis and planning
  - Data dumps/posts for external users (third party apps)
Generic Toll Point/Zone (Express Lane)

Roadside/Field Equipment

- License Plate Camera
- FastTrak Tag Reader
- Vehicle Detection (in-pavement option)
- Equipment Cabinet
- Traffic Monitoring System
- Variable Toll Message Sign
  - EXPRESS LANE
  - ONLY
  - TO 238 $ 2.50
  - TO 92 $ 5.00

Lane System Host

External Interfaces (RCSC, 511, CHP, etc.)
Toll System Integrators

- Highly competitive
- Small market
- Best value procurements
- Turnkey, performance-based contracts
- Proprietary design, software, and hardware
- Customization
Why, What, and When to Integrate
Why?

Potential Reasons

• Operational Efficiencies
• Maximize Value of Assets (Leverage Data & Technology)
• Provide a Comprehensive, Reliable, and Consistent Customer/Driver Experience
• Economies of Scale for Capital and Maintenance Costs

Opportunities to Leverage

• Vast deployment of data collecting field devices
• Coordination on regional policies to maintain consistency result in similar front-end system requirements
• ITS inventory allows for identification of where ITS and toll system operators functionally overlap
What?

Consolidate maintenance?
Integrate more field equipment?
Integrate another host?
Co-locate physical operations?
Integrate data hubs?

Existing Express Lane Architecture

FIELD EQUIPMENT  HOST  OPERATIONS CENTER  DATA HUB
What?

Is the integrated solution…

• Elegant and scalable?
• Able to provide long-term value compared to the capital and maintenance costs?
• Supported by contractual terms?
• Allow for flexibility for new technology?
• Considering proper allocation of risk?
• Delivering tangible value by:
  • Optimizing operations or maintenance
  • Streamlining agency process and reducing overhead costs
  • Leveraging public and private sector assets appropriately
When?

- Long-term program planning is necessary to compensate for staggered system lifecycles
- Potential integrations must be planned during the phases of specification development and procurement
- Disruptive and emerging technologies should be monitored and assessed for impacts
Challenges

• Maintenance and enhancement of proprietary systems
• Limitations of vendor licensing and warranties
• Custom development can hinder future agility
• Procurement methods that transfer risk (performance-based agreements)
Planning for Integration

- Long-term program planning
- Strategic procurements
  - Schedule system lifecycles to avoid conflicts and realize opportunities
  - Contracts that contemplate and cover future integration
  - Licensing terms that support maintenance and system transitions
- Plan for scalability in the supporting infrastructure
- Standardize interfaces and common denominator specifications
  - Field equipment specs (configuration, outputs, and minimum performance requirements)
  - Functions and dependencies for operations interfaces
Thank you

Contact: sam.soules@atkinsglobal.com