



Update Regional ITS Architecture & Develop Communications System White Paper

Contract Team:



Charlie McCarthy, P.E.
Transportation Systems Engineer

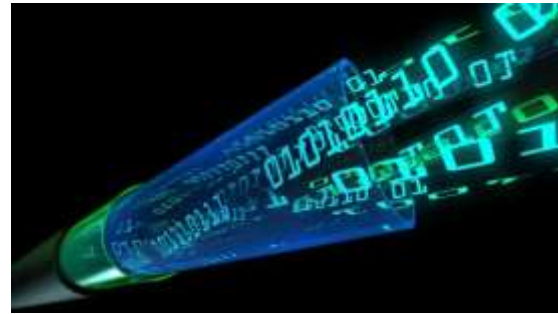
Scott Lee, P.E.
Chief Engineer Technology & Innovation
TranSmart/EJM

Advanced Technology Task Force – January 7th, 2020

Objectives

- Architecture software enhancements
 - » Conversion: Turbo -> RAD-IT
 - » New service packages, antiquated flows, etc.
- Regional stakeholder engagement
 - » Pre-Interview materials
 - » Onsite meetings: Generate discussion, facilitate revisions and additions

Objectives



- Communications Scan and Whitepaper
 - » State-of-Practice
 - » Near-term considerations
- Updated ITS Architecture
 - » To reflect stakeholder input and communication assessment
 - » Maintenance Plan

Status Update

- Stakeholder outreach complete
 - » Interviews throughout 2019
 - » Thorough summaries created for each
 - » Key input for RAD-IT file revisions (ongoing)
- Communications Whitepaper
 - » Initial draft submitted, reviewed and returned
 - » Revised draft by end of week

Communications Whitepaper Outline

- Regional State of the Practice
 - » Fiber networks, investment
 - » Active traffic management
- National Perspective
 - » Fiber, Cellular
 - » Throughput, Partnerships
 - » Security considerations
- Connected and Autonomous Vehicles
 - » CV tech uncertainty
 - » DSRC, Cellular, SCMS
 - » Application type, latency tolerance

United States Department of Transportation
 OFFICE OF THE ASSISTANT SECRETARY FOR RESEARCH AND TECHNOLOGY
 Intelligent Transportation Systems
 Joint Program Office

Research Areas

- Assessing Deployment
- Accessible Transportation Technologies Research Initiative
- Automation
- Connected Vehicles
- Emerging Capabilities
- Enterprise Data
- Interoperability
- National Transportation Library
- ITS Research Archive

ITS Research 2015-2019
ENTERPRISE DATA

Enterprise Data White Paper

What is Enterprise Data?

A data revolution is upon us as we now create approximately 2.5 exabytes - that's 2.5 billion gigabytes (GB) - of data every day.¹ So much data are now generated that as much as 90% of all of the data in the world today has been created in the last two years alone. This surge of new data has been accompanied by an increase in connectivity among the vehicles, sensors, people, and infrastructure in the transportation network.

Already we are seeing applications that share, use, and leverage datasets to improve current transportation operations or capabilities, such as Waze and Google Maps. USDOT's Enterprise Data program aims to create value from the data collected from intelligent transportation systems (ITS)-enabled technologies, including connected vehicles (automobiles, transit, and commercial vehicles), mobile devices, and infrastructure to make our transportation system safer, more accessible, efficient, and environmentally sustainable, while also protecting the privacy of its users.

Benefits of Enterprise Data

Enterprise data have several potential benefits including:

- Providing new revenue opportunities – New data sources open the door for innovators to develop applications and methods that can support economic vitality.
- Monitoring performance and enabling more efficient responses – Increased data from new sources provide a complete, more detailed view of the whole transportation system allowing decision makers to make informed choices on how best to increase system efficiency.
- Increasing efficiency of information sharing – Enterprise data will reduce the costs of data management and eliminate technical and institutional barriers to the capture, management, and sharing of data.
- Improving the accuracy and timeliness of data – More refined data collection methods will lead to higher quality data, which in turn will support faster data distribution.
- Stimulating innovation of new research – The increase in data will spark novel development of software and tools to use the data in new innovative ways.

Communications Whitepaper Considerations

- Agencies owning, building, sharing physical networks
 - » Still fastest and most reliable means of communication
- Changing technology AND User, Agency needs
 - » Both evolving rapidly, yet inform one another
 - » E.g., Devices with Edge Computing required to satisfy more complex user and agency needs (like video analytics with PTZ)
 - » As cellular capabilities poised to increase 10x, number of smart devices poised to increase even more
- Comments on trajectory of CV:
 - » FCC actively debating and voting on 5.9 GHz spectrum (DSRC band)...

Communications Whitepaper Considerations: CV

- Two simultaneous debates on 5.9 GHz spectrum:
 1. Repurpose spectrum, take away from vehicle safety applications (ISPs)
 2. Maintain spectrum for vehicle safety, but reallocate to accommodate cellular technology that likely outperforms DSRC (CV2X using 5G)
 - » Most recent vote takes away 45 MHz, gives 20 MHz to CV2X.
- Buzz Words: DSRC, 5G, CV2X
 - » Compare DSRC to CV2X.... Compare 4G, LTE to 5G.
 - » Developers of 5G offer a 'Network' interface and 'Non-Network' interface
 - » Reframe mindset around latency and type of CV application
 - » Safety Apps: Need minimum latency (Non-network interface)
 - » Mobility Apps: Some latency acceptable (Network interface OK)
 - However, agency could opt to use non-network interface entirely in this model.





















Mobility Notes from CES 2020 January 6th, 2020

- Continued discussion of public communication infrastructure needs
 - » Still limited solutions on funding it
- Mobility companies such as VIA noted cities today only spend up to 2% on IT, likely to increase
- There is not a magic bullet to improving safety, emissions and congestion – Everything is “In-Play”
- Integration remains the biggest buzzword



RAD-IT SPs: Traffic Management

Included in NE IL

-  TM01: Infrastructure-Based Traffic Surveillance
-  TM02: Vehicle-Based Traffic Surveillance
-  TM03: Traffic Signal Control
-  TM05: Traffic Metering
-  TM06: Traffic Information Dissemination
-  TM07: Regional Traffic Management
-  TM08: Traffic Incident Management System
-  TM09: Integrated Decision Support and Demand Management
-  TM10: Electronic Toll Collection
-  TM11: Road Use Charging
-  TM12: Dynamic Roadway Warning
-  TM13: Standard Railroad Grade Crossing
-  TM14: Advanced Railroad Grade Crossing
-  TM15: Railroad Operations Coordination
-  TM16: Reversible Lane Management
-  TM17: Speed Warning and Enforcement
-  TM18: Drawbridge Management
-  TM19: Roadway Closure Management
-  TM20: Variable Speed Limits
-  TM22: Dynamic Lane Management and Shoulder Use

All Available in ARC-IT

TM01	Infrastructure-Based Traffic Surveillance
TM02	Vehicle-Based Traffic Surveillance
TM03	Traffic Signal Control
TM04	Connected Vehicle Traffic Signal System
TM05	Traffic Metering
TM06	Traffic Information Dissemination
TM07	Regional Traffic Management
TM08	Traffic Incident Management System
TM09	Integrated Decision Support and Demand Management
TM10	Electronic Toll Collection
TM11	Road Use Charging
TM12	Dynamic Roadway Warning
TM13	Standard Railroad Grade Crossing
TM14	Advanced Railroad Grade Crossing
TM15	Railroad Operations Coordination
TM16	Reversible Lane Management
TM17	Speed Warning and Enforcement
TM18	Drawbridge Management
TM19	Roadway Closure Management
TM20	Variable Speed Limits
TM21	Speed Harmonization
TM22	Dynamic Lane Management and Shoulder Use
TM23	Border Management Systems

RAD-IT SPs: Vehicle Safety

Included in NE IL

Service Package Attributes

ID: VS13 Status (Region): Planned

Name: Intersection Safety Warning and Collision Avoidance

Description: This service package enables a connected vehicle approaching an instrumented signalized intersection to receive information from

All Available in ARC-IT

VS01	Autonomous Vehicle Safety Systems	VS10	Restricted Lane Warnings
VS02	V2V Basic Safety	VS11	Oversize Vehicle Warning
VS03	Situational Awareness	VS12	Pedestrian and Cyclist Safety
VS04	V2V Special Vehicle Alert	VS13	Intersection Safety Warning and Collision Avoidance
VS05	Curve Speed Warning	VS14	Cooperative Adaptive Cruise Control
VS06	Stop Sign Gap Assist	VS15	Infrastructure Enhanced Cooperative Adaptive Cruise Control
VS07	Road Weather Motorist Alert and Warning	VS16	Automated Vehicle Operations
VS08	Queue Warning	VS17	Traffic Code Dissemination
VS09	Reduced Speed Zone Warning / Lane Closure		

Next Steps

- Complete the Communications White Paper
- Updates to RAD-IT Architecture file ongoing
- Update Architecture Maintenance Plan

National ITS Architecture Reference

<https://local.iteris.com/arc-it/index.html>

Contact Information

Claire Bozic
Senior Analyst



**Chicago Metropolitan Agency
for Planning (CMAP)**
www.cmap.illinois.gov

cbozic@cmap.illinois.gov

Charlie McCarthy, PE, CVP
Scott Lee, PE



TranSmart/EJM Corporation
www.transmartinc.com

cmccarthy@transmartinc.com
slee@transmartinc.com