AGENDA

- Parsons & Harman Intro
- Background
- Goals and Benefits
- Program Phases
- STREETS Phase 1
- SMART Grant Details
- Project Status and Schedule
- Discussion / Questions





Dubuque STREETS and SMART Grant Projects

- Smart Traffic Routing with Efficient and Effective Traffic System
- Metro Dubuque Traffic Data Aggregation for Connected Vehicles SMART Grant Project















PARSONS CORPORATION

Delivering innovative solutions that make the world safer, healthier, and more connected.



MOST DEPLOYED ATMS SOLUTIONS

100+ ATMS Worldwide

76 iNET[®] Deployments

Numerous Large Deployments

iNET[®]



• Overview

HARMAN INTERNATIONAL



Patents







Intelligent Cockpit, Car Audio, **Connectivity** (Telematics + V2X), Safety & Security Solutions

AUTOMOTIVE

LIFESTYLE AUDIO

Premium Branded Audio Products for Use at Home, in the Car, on the Go, and on Big Stages

DIGITAL TRANSFORMATION

Customized & Innovative Solutions for IoT, Cloud Healthcare, Communications, Hi-Tech As part of Samsung, HARMAN has a legacy of innovation

> We leverage our **unparalleled global scale**, **R&D**, **and distribution channels** to accelerate transformation and growth.





And creating an end-to-end connectivity ecosystem in which the mobility industry can thrive.

HARMAN is helping to shape the industry

We participat	e We've	e helped define	We contribute to	o	Our products are certified for interoperability.				
in standards consor	tia and advance	ed mobility and 5G	cybersecurity inform	nation					
working group	os.	use cases.	sharing working gro	oups.					
SCAAA Automotive Association Board Member	ITS AMERICA Board Member	ETSI Board of Directors and Member	Board of Directors	Member and Working Group	(((@)) OMNIAR CONSORTIUM Board of Directors				

Industry advancement supported by policy & standards

Government Regulation & Policy

Global policy and regulations to **accelerate deployment** and improve **safety and sustainability**.

- Global alignment on V2X technologies
- Global Infrastructure Investments (US BIL, India Gatishakti, Korea National New Growth 4.0, ...)

Global Industry Standards & Consortia

Designed to increase **interoperability and scale** across markets:

- Emerging automotive connectivity uses cases: 5GAA
- V2X interoperability certifications: **OMNIAIR**
- 5G Telecommunication and MEC: 3GPP & ETSI
- Cybersecurity Automotive Information Sharing: A-ISAC
- Automotive functional and Security: ISO, SAE
- Automotive Software Defined Vehicle: Eclipse Foundation

BACKGROUND



- Over the past eight years ECIA and Dubuque have worked together to create the STREETS Program
- STREETS leveraged prior investments to obtain a federal grant to bring more advanced solutions to the region
 - Communications
 - Traffic signal infrastructure
 - CCTV deployments
- Supported with Federal Highway Administration funding, STREETS uses the current regional ITS infrastructure to improve mobility, reduce congestion, and enhance safety.
- These prior investments, and the STREETS program provided the base to request further Federal funding under the SMART Grant Program.

PROGRAM GOALS AND BENEFITS

Improve mobility, reduce congestion, and enhance safety

- Support optimization of signal timing
 - Optimize traffic flow
 - During normal operations and unusual events
 - Reduce travel time delays

Improve responses to incidents

- Better situational awareness
- Faster and more appropriate responses
- Provide tools to support optimal system management and maintenance
- More informed motorist
 - Allow motorist to make informed travel decision
 - Improve the balance of traffic
 - Improve travel time reliability



PROGRAM PHASES

STREETS Phase 1

- Initial Central System
 - Primary system west end corridors
 - First-of-its-kind, Automated traffic control program
 - Utilizing AI based video analytics to collect real time traffic conditions
 - Simulates future traffic conditions (based on real time modeling)
 - Automatically adjusts signal timing for maximum efficiency during unusual events or traffic conditions
 - Provides travel times along the major routes in the region to support dynamic routing
 - STREETS Website
- Combination Dynamic Message Signs

• STREETS Phase 2

- Fine tune the system based on operational feedback
- Fill gaps in field infrastructure, downtown area

• STREETS Phase 3

- Adds detection and Dynamic Message Signs to support I-35 messaging related to status of Bridges
- Includes planning, design and future deployment

SMART Grant Phase 1

- Grant provided to support the ability to get relevant traffic information directly into the vehicles
- Phase 1 is focused on planning, design and development of a data aggregation prototype for OEM and third-party access

SMART Grant Phase 2

- Providing funding to fill in infrastructure and data gaps
- Work with OEM infotainment system providers to get solutions into vehicles

STREETS PHASE 1 DATA AND SYSTEMS INTEGRATION



- INRIX
- Video analytics
- Acyclica
- Signal System
- WAZE
- Model output
- Automated congestion events
- Manually Enter

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STREETS PHASE 1 PROVIDE TRAVEL TIMES

- Distributes travel time data through DMS and web site
- Uses full DMS and Combination
 signs







Sensitive / Confidential / Proprietary 12

- The STREETS solution uses Parsons iNET[®] ATMS integrated with Aimsun Next.
 - Live model predicts near future traffic (i.e., 15, 30, 45, 60 minutes)
 - Integrates travel demand modeling, static and dynamic
 - Constantly compares the forecasted results to the future observed
 - Unusual traffic conditions detected by the real time model and/or events manually entered into the system.
 - Potential responses are modeled in the system in near real time and scored.
 - The system will allow for an operator to approve the response or automatically implement it.





STREETS PHASE 1 INTEGRATED MODELING

OFFLINE MODEL DEVELOPMENT WORKFLOW





A Siemens Business

STREETS PHASE 1

SIGNAL SYSTEM OPTIMIZATION





STREETS PHASE 1 REAL TIME PERFORMANCE MONITORING / OPTIMIZATION



Camera Snapshots

• Live Video from CCTV

- Travel Times
- Incidents
- Roadwork
- Congestion Map
- Links to other related sites





STREETS PHASE 1 PUBLIC WEBSITE

THE CITY OF

SMART GRANT PHASE 1 METRO DUBUQUE TRAFFIC DATA AGGREGATION FOR CONNECTED VEHICLES PROJECT

- OVERVIEWMulti agency federally funded regional project
- The long-term goal is to deliver near real-time transportation information directly to connected vehicles over the cellular network
- First stage of 2 phase SMART Grant Program
- Stage 1 provides an open and standardized data set for integration and distribution for use in a prototype display for vehicle infotainment system integration
- Stage 2 would support filling in data gaps and throughout the region to provide a complete data set for ingestion by OEMs and other third-party applications















SMART GRANT CONCEPT

- Original Equipment Manufacturers (OEM) are interested in getting complete transportation data sets for entire regions.
 - Dubuque perfect size for initial demonstrations
- Integrate the data in a standardized format
- Build appropriate intelligence to define distribution limits for each piece of data
- Develop an open interface to provide this data in near real time via cellular connections to OEM, infotainment system providers, and other third-parties
- This solution will support providing vehicles a full set of important transportation data, when and where they need it, to support safer and more optimized traffic flow.

This project has the potential to revolutionize the way transportation systems are managed, and traffic information is distributed to motorists



• Our MECWAVE Solution

HARMAN SITUATIONAL AWARENESS SaaSSYSTEM



DATA TYPES



Partnership with the City of Dubuque, City of East Dubuque, City ofAsbury, City of Peosta, Iowa Department of Transportation (Iowa DOT), Illinois Department of Transportation (IDOT), Wisconsin Department of Transportation (WisDOT), Parsons, and Harman

Comprehensive data set

- Congestion
- Road closures
- Railroad crossing blockages
- Crashes
- Traffic signal timing
- Special events
- Parking
- Weather / Road Weather etc.

• Integrate the data in a standardized format for the entire Dubuque metropolitan area

Meta data need to display the right info at the right time to motorist

THE CHALLENGE ATMS/WEB DATA FORMAT -> IN VEHICLE FORMAT

In Central ATMS



In Vehicle Infotainment Systems



ECIA

• V2X Opportunities

INDUSTRY CHALLENGE



SITUATIONAL AWARENESS FOR DRIVERS

 $\sim 20 \pm T$ seconds

Time to Collision/Event (TTC/TTE)

MAP

Few Mi / Km

- Dense information
- Not contextual
- Only useful if user uses specific map app
- Google maps competes with **OEM** branded maps

SITUATIONAL AWARENESS

- Contextual alerts
- Alerts at the right time for applicable vehicle
- Native to OEM experience
- Allows user to make safer choices based on insights

~2-4 seconds

- - Sensors based
 - No pre-warning for user action

ACTIVE SAFETY / ADAS

~0.8 seconds

- Vehicle intervention
- Higher costs to consumers

(~20 to 4) seconds to depending on use-case

Information: minutes, hours in advance

Less than 2 seconds

CONNECTIVITY OPTIONS FOR V2X SERVICES

Network based

V2N/I2N/P2N in bands designated for mobile communication networks



Dedicated HW* NOT required

- 1. Data must be exchanged/terminated at a server
- 2. Majority of the Application logic runs at server with only insights sent to vehicle
- 3. Target classification runs at server and short-list of threats are sent to vehicle for final analysis

Direct

V2V/V2I/V2P in ITS bands (e.g. ITS 5.9 GHz) independent of cellular network





Dedicated HW required (can be part of TCU or Standalone unit)

- 1. V2V Application logic runs independently on all vehicles
- 2. Connectionless has less delay but less dependable

PROGRAM STATUS AND SCHEDULE

• STREETS Phase 1 central system in place

- Interfaces to Aimsun, Iowa DOT, INRIX Data and WAZE in place
- Initial signal system responses in controllers
 - Testing signal responses
 - Will be optimized over time

Public website complete

- Live to public after data validation period
- Field design & environmental clearance complete for DMS construction contract
 - Bids were high, so working on resolution
 - Expect to have DMS in place next summer
- Phase 3 System design in progress
 - Detection, travel times, DMS approaching river bridges

SMART Grant Project started

- USDOT documentation
- Developing Use Cases
- Defining data elements and interface details
- Defining and designing the system
- US DOT reports and initial data integration due in Phase 1
- Phase 1 due in 16 months
- Phase 2 Application will be due in about 9 months
 - Defining Gaps
 - Opportunity to add field elements
 - Additional central system functionality
 - Real time rail crossing information
 - Upgraded intersections and signal controllers
 - More data integration



QUESTIONS & OPEN DISCUSSION



