TAKE AWAY

WHAT WILL YOU LEARN TODAY

- What is Big Data
- Why is Big Data important
- How can we get Data at remote intersections
- What does the data look like
- What are the benefits of Remote communication and the data that comes with it.
BUZZ WORDS

WHAT IS ALL THE BUZZ ABOUT

– Big Data
– Performance Measurements
– Internet of Things\(^1\)
– Travel Time
– D/O (Destination / Origin)

\(^1\)The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.
DEFINITION

BIG DATA

- **Big data** is a term for data sets that are so large or complex that traditional data processing applications are inadequate. Challenges include analysis, capture, data curation, search, sharing, storage, transfer, visualization, querying, updating and information privacy.
On December 4, 2015, President Obama signed the Fixing America’s Surface Transportation (FAST) Act (Pub. L. No. 114-94) into law—the first federal law in over a decade to provide long-term funding certainty for surface transportation infrastructure planning and investment. The FAST Act authorizes $305 billion over fiscal years 2016 through 2020 for highway, highway and motor vehicle safety, public transportation, motor carrier safety, hazardous materials safety, rail, and research, technology, and statistics programs. The FAST Act maintains our focus on safety, keeps intact the established structure of the various highway-related programs we manage, continues efforts to streamline project delivery and, for the first time, provides a dedicated source of federal dollars for freight projects. With the enactment of the FAST Act, states and local governments are now moving forward with critical transportation projects with the confidence that they will have a federal partner over the long term.
FHWA EAR PROGRAM

WHAT IS EAR?

- Exploratory Advanced Research

FHWA EAR PROGRAM

WHAT IS EAR

– Focus Areas

- Connected highway system concept
- Breakthrough concepts in material science
- Human behavior and travel choices
- New technology and advanced policies for energy and resource conservation
- Technology for assessing performance
FHWA EAR PROGRAM

WHAT IS EAR

– Connected Highway Systems
  - New Data
    - Real time data, data fusion, data analytics
  - New Communications
    - DSRC, Cellular, etc.
  - Enabling Technologies
    - Localization and mapping
    - Extended situational awareness
    - Adaptive control systems

WHAT IS EAR

– Human Behavior
  ▪ Massive New Data
    ▪ Naturalistic driving studies
    ▪ Communications metadata
    ▪ Social networking
  ▪ Enabling Technologies
    ▪ Automation
    ▪ Predictive modeling
    ▪ Real time, large scale markets

WHAT IS EAR

– Assessing Performance

- Massive New Data
  - Roadside sensors
  - Vehicle based sensors
  - Structural monitoring
- Predictive Modeling
  - Actionable information

FHWA EAR PROGRAM

WHAT IS EAR

– Opportunities
  • Use of data to improve
    – Highway safety
    – Asset conditions
    – System reliability, efficiency
    – Energy, resource sustainability

WHERE CAN YOU GET THE DATA?

FROM EXISTING INFRASTRUCTURE

- 360,000+ intersections in the US alone
- Data can be derived from many components in the traffic signal cabinet
- Connected intersections provide a lot of that data already
  - But they don’t provide all information available
- Remote intersections required more effort and cost
  - Distance to TOC is an issue
  - Infrastructure is missing or very low band width
  - Hard to get to and visit regularly
DA-DATA AGGREGATOR™

DA-300 BASIC CABINET MONITORING

- The next generation cellular based system that provides cost effective remote traffic cabinet status and intersection data.
DA-DATA AGGREGATOR™
DA-300 (ORIGINAL FUNCTIONALITY)

- Real time cabinet status and data
- Remote Accessibility and Data Collection
- Designed for Traffic signal Cabinets
- Easy to install
- Controller / Cabinet agnostic
- Data streamed to a Cloud based server
DA-DATA AGGREGATOR™

COMMUNICATIONS AND CABINETS

- Communications
  - GSM (3G), Wi Fi, Ethernet

- Cabinet Configurations
  - NEMA:
    - TS1 (Type 1 and 2)
    - TS2
  - CALTRANS
    - 33X
  - Flasher Cabinets
TRAFFIC SIGNAL TECHNICIAN / ENGINEER

BENEFITS

- **Remote access** to cabinet status and parsed intersection data
- Perfect to access remote intersections where there is no connectivity to central
- Alarms generated via SMS to maintenance and/or on-call staff
- Detector counts and diagnostics through up to 8 Eberle Oracle™ detectors
  - 24 / 7 detector counts for Left Turn counts or other vital count needs such as bike detections, pedestrian detection, EVP, Rail Preemption, etc.
WHAT DOES THE DA-300 PROVIDE

DA-300 FULFILLS LOTS OF NEEDS

– A Need to connect to remote intersection
– A Need for Back up to connected intersections
– Data Collection – Cabinet information and intersection status / operations
– Safety and Security of intersection
– Last Gasp notification
DA-300 DATA AGGREGATOR™

WHERE BIG DATA AT YOUR INTERSECTION BEGINS

DA-300 by EDI features basic connectivity and functionality. It also provides Travel Time data to be used for enhanced performance measurements such as:

- Travel Time
- O / D
- Data similar to Indiana Performance Measures.

Features:

- Low cost IP-Connectivity solution
- Small Form Factor
- Variety of connectivity options
- Compatible with iCITE® G2™ Cloud Software
- GPS enable for geolocating and mobile position tracking
- Low Power Consumption
- Local data storage
- Real Time Clock for scheduling applications
- Internal 6 VDC battery back-up for alarms during power failure.
DA-300 DATA AGGREGATOR™

DATA AVAILABLE

- Last Gasp
  - Provides information to TOC during Off-line Event
    - Comm Failure
    - Power Failure
    - Catastrophic Failure (Cabinet Knockdown)

- SDLC information
  - Detector activations
  - Phase colors

- BBS System Status
  - Charging / Discharging
  - Voltages – 24VDC / 120 VAC
DA-300 DATA AGGREGATOR™

DATA AVAILABLE

- Cabinet Health
  - Fan / Heater / Temperature
  - Cabinet Door - Open/ Closed
  - Stop Time / Cabinet Flash - On / Off
  - BBS – Charging / Discharging / Operational
  - Cabinet Voltage – AC / DC

- Additional Information
  - Oracle Detection – Counts, Failures
  - TS-1 / 332 Detector inputs for counts
  - Ped Push button activations
DA-300 DATA AGGREGATOR™

ADDITIONAL REMOTE FUNCTIONALITY

- External Outputs
  - 4 in All
  - 3 configurable
  - 1 Sync Pulse
    - Programmable for time of day, Time Zone and DST
<table>
<thead>
<tr>
<th>Feature</th>
<th>Function</th>
<th>DA-300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cellular Plan</td>
<td>Remote connectivity/backup</td>
<td>●</td>
</tr>
<tr>
<td>GPS</td>
<td>Location and time source</td>
<td>●</td>
</tr>
<tr>
<td>Ethernet</td>
<td>Connectivity to devices</td>
<td>●</td>
</tr>
<tr>
<td>Sync Pulse</td>
<td>Traffic Signal Coordination</td>
<td>●</td>
</tr>
<tr>
<td>SDLC</td>
<td>Communication to devices</td>
<td>●</td>
</tr>
<tr>
<td>Oracle interface (RS-485)</td>
<td>Accurate Detector Counts</td>
<td>●</td>
</tr>
<tr>
<td>I/O’s (16 analog /20 digital in) (4 digital out)</td>
<td>Inputs from devices</td>
<td>●</td>
</tr>
<tr>
<td>ECcom or RAEComM</td>
<td>Connection to Monitors</td>
<td>●</td>
</tr>
<tr>
<td>API development</td>
<td>3\textsuperscript{rd} party device interfaces</td>
<td>●</td>
</tr>
<tr>
<td>Travel time / O-D</td>
<td>Performance Measurement</td>
<td>●</td>
</tr>
<tr>
<td>Private Label / OEM</td>
<td>Unique functionality</td>
<td>●</td>
</tr>
</tbody>
</table>
The DA-300 by RAE / EDI provides additional information regarding the cabinet that is derived by connecting to EDI / Reno A&E equipment to produce Performance Measurement information:

- **Oracle Detector Interface** provides a way to get accurate detector counts off the EDI Oracle® Detector.
- **Sync pulse** generated by GPS to provide a way to keep controller time up to date.
- **SDLC communications** now capable of retrieving valuable information about the cabinet.
ICITE™ G2 SOFTWARE

G2 provides the user with the information that is sent from the intersection.
CONFIGURATION SOFTWARE

INTUITIVE SET UP

Configuration software for viewing status of hardware or traffic cabinets
Basic data analytics Software
Google GIS Maps based user interface
Provides alarms for cabinet malfunctions and other user identified alarms
Graphs, logs and alarms for all devices in one location
CONFIGURATION SOFTWARE

CLOUD BASED

Fully Configurable and can set up default configurations
CONFIGURATION SOFTWARE

DASH BOARD

Configure Phases, Sync pulse, detection and cabinet equipment

<table>
<thead>
<tr>
<th></th>
<th>Input Source</th>
<th>Channel</th>
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<tbody>
<tr>
<td>Fan</td>
<td>Analog AC</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>0 to 890: Off</td>
<td></td>
</tr>
<tr>
<td></td>
<td>890 to 2400: On</td>
<td></td>
</tr>
<tr>
<td>Heater</td>
<td>Analog AC</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>0 to 890: Off</td>
<td></td>
</tr>
<tr>
<td></td>
<td>890 to 2400: On</td>
<td></td>
</tr>
<tr>
<td>Cabinet Door</td>
<td>Analog AC</td>
<td>5</td>
</tr>
</tbody>
</table>

4655 Aircenter Circle, Reno, NV 89502 USA  P: +1.775.826.2020 www.renoae.com
CONFIGURATION SOFTWARE

CABINET CONFIGURATION

Phase to Channel, Detector to Channel, Etc.

Step by step cabinet setup
ANALYTIC SOFTWARE

BASIC DIAGNOSTICS
ANALYTIC SOFTWARE

Dashboard information about the cabinet health
ANALYTIC SOFTWARE

HISTORICAL DATA
ANALYTIC SOFTWARE

HISTORICAL DIAGNOSTICS
ANALYTIC SOFTWARE

INTEGRATED SYSTEM INFORMATION
CONCLUSION

- Meets needs for Big Data and Performance Measurements
- Can be paid for from FAST grants and projects
- Simple and complete
  - Configuration for any type of cabinet or function
  - Alarms can be modified to meet any needs
  - Easy to install and set up
  - Multiple alarm and alert levels
  - Data is configurable for what is important to the end user.
Contact Information

Matt Zinn
Sales Manager
Reno A&E
Phone: (602) 321-2969
Email: mattz@RenoAE.com
Website: RenoAE.com