

CABINET MONITORING AND DATA COLLECTION AT REMOTE INTERSECTIONS OCT 5TH 10:15 – 11:45

MATT ZINN

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 Things¹
- Travel Time
- D/O (Destination / Origin)

¹The *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.



- **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.



FAST

THE FAST ACT

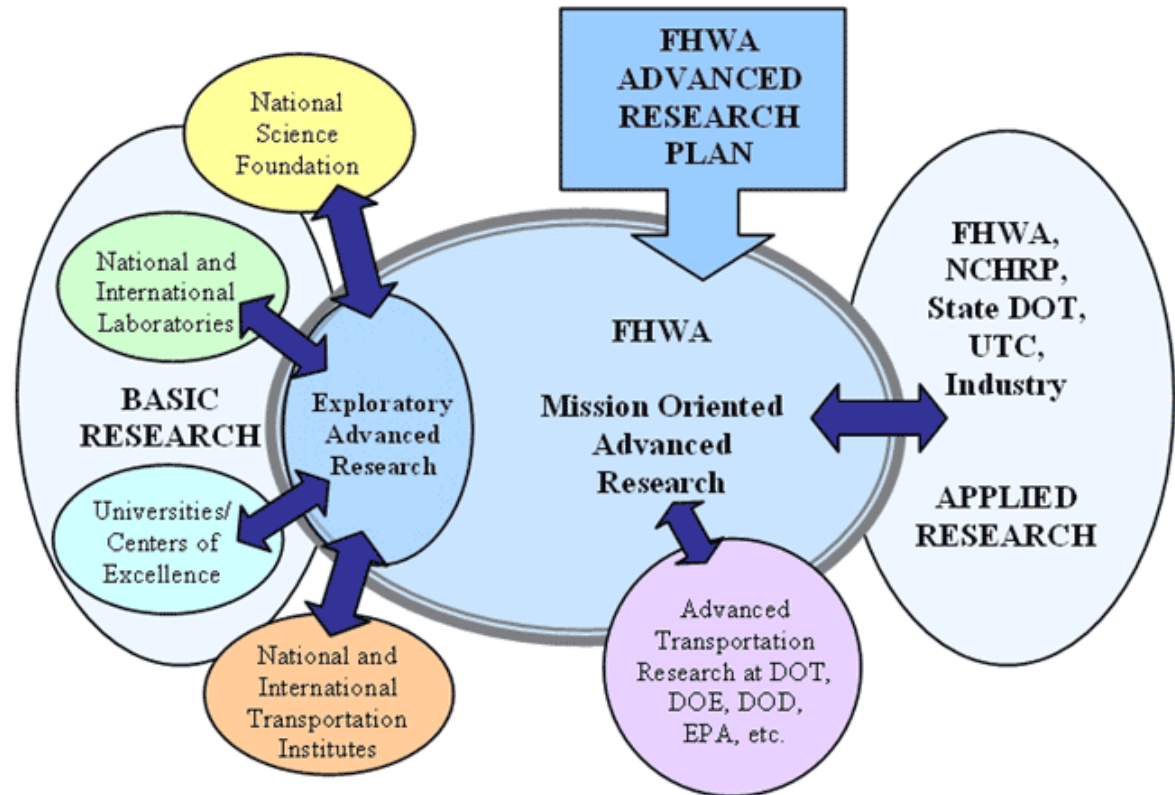


On December 4, 2015, President Obama signed the [Fixing America's Surface Transportation \(FAST\) Act](#) (Pub. L. No. 114-94) into law—the first federal law in over a decade to provide long-term funding certainty for surface transportation infrastructure planning and investment. The FAST Act authorizes \$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



https://www.fhwa.dot.gov/advancedresearch/pubs/presentations/big_data/index.cfm

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**



– 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

https://www.fhwa.dot.gov/advancedresearch/pubs/presentations/big_data/index.cfm

FHWA EAR PROGRAM

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

https://www.fhwa.dot.gov/advancedresearch/pubs/presentations/big_data/index.cfm

FHWA EAR PROGRAM

WHAT IS EAR



– Assessing Performance

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

https://www.fhwa.dot.gov/advancedresearch/pubs/presentations/big_data/index.cfm

FHWA EAR PROGRAM



WHAT IS EAR

– Opportunities

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

https://www.fhwa.dot.gov/advancedresearch/pubs/presentations/big_data/index.cfm

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 TM

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

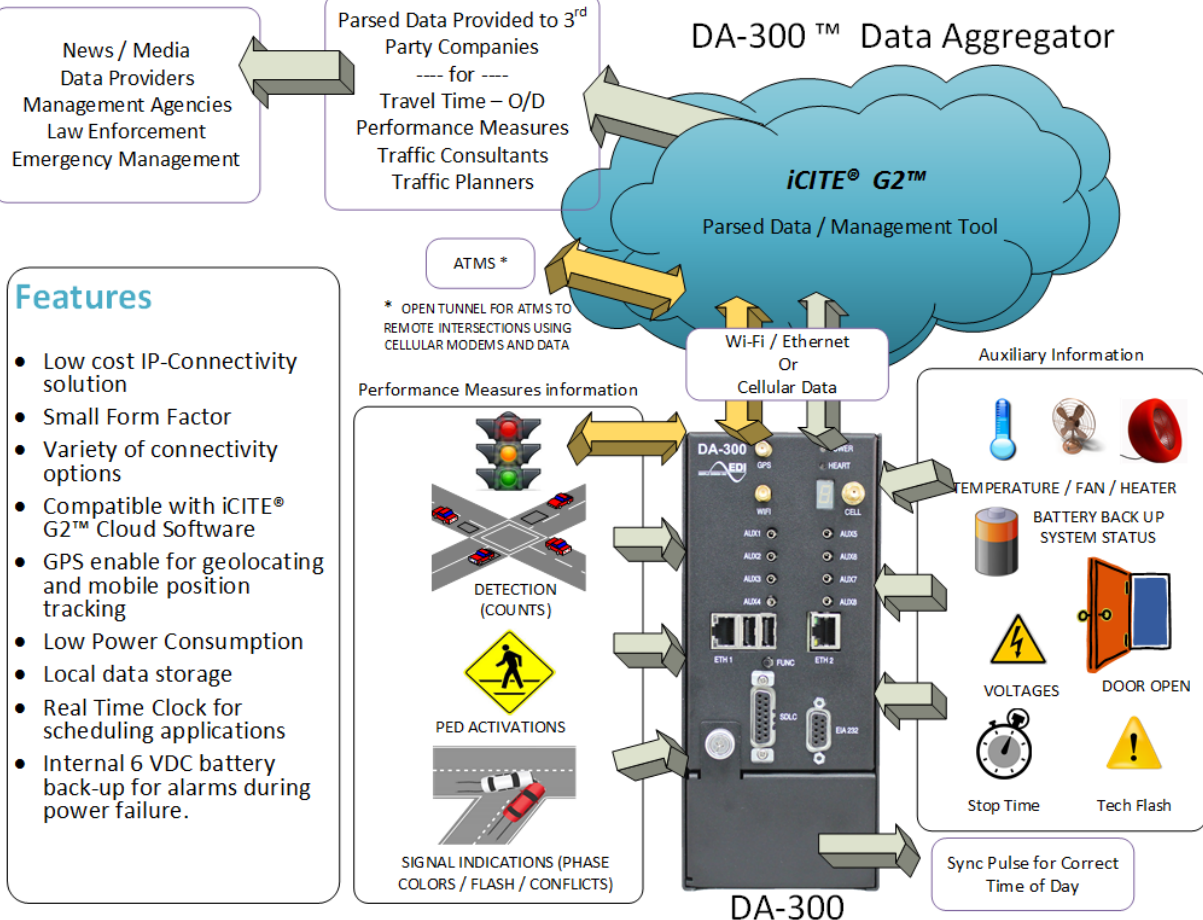
- A Need to connect to remote intersection
- A Need for Back up to connected intersections
- Data Collection – Cabinet information and intersection status / operations
- Safety and Security of intersection
- Last Gasp notification

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.



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

DA-300 FUNCTIONALITY



Feature	Function	DA-300
Cellular Plan	Remote connectivity/backup	•
GPS	Location and time source	•
Ethernet	Connectivity to devices	•
Sync Pulse	Traffic Signal Coordination	•
SDLC	Communication to devices	•
Oracle interface (RS-485)	Accurate Detector Counts	•
I/O's (16 analog /20 digital in) (4 digital out)	Inputs from devices	•
ECcom or RAECOMM	Connection to Monitors	•
API development	3 rd party device interfaces	•
Travel time / O-D	Performance Measurement	•
Private Label / OEM	Unique functionality	•

DA-300 BY RENO A&E AND EDI



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

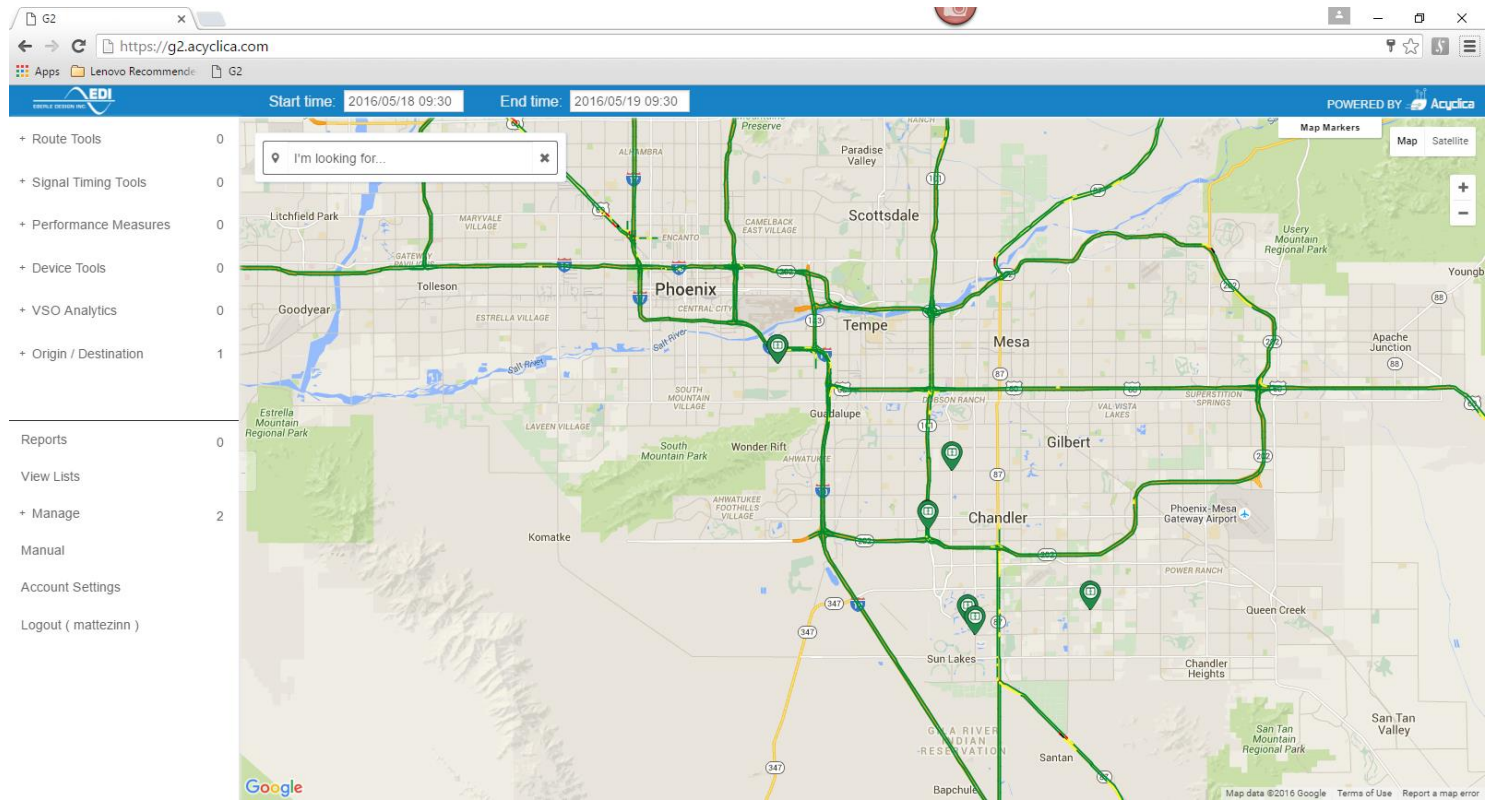
- **Oracle Detector Interface** provides a way to get accurate detector counts off the EDI Oracle® Detector
- **Sync pulse** generated by GPS provide a way to keep controller time up to date.
- **SDLC communications** now capable of retrieving valuable information about the cabinet.



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

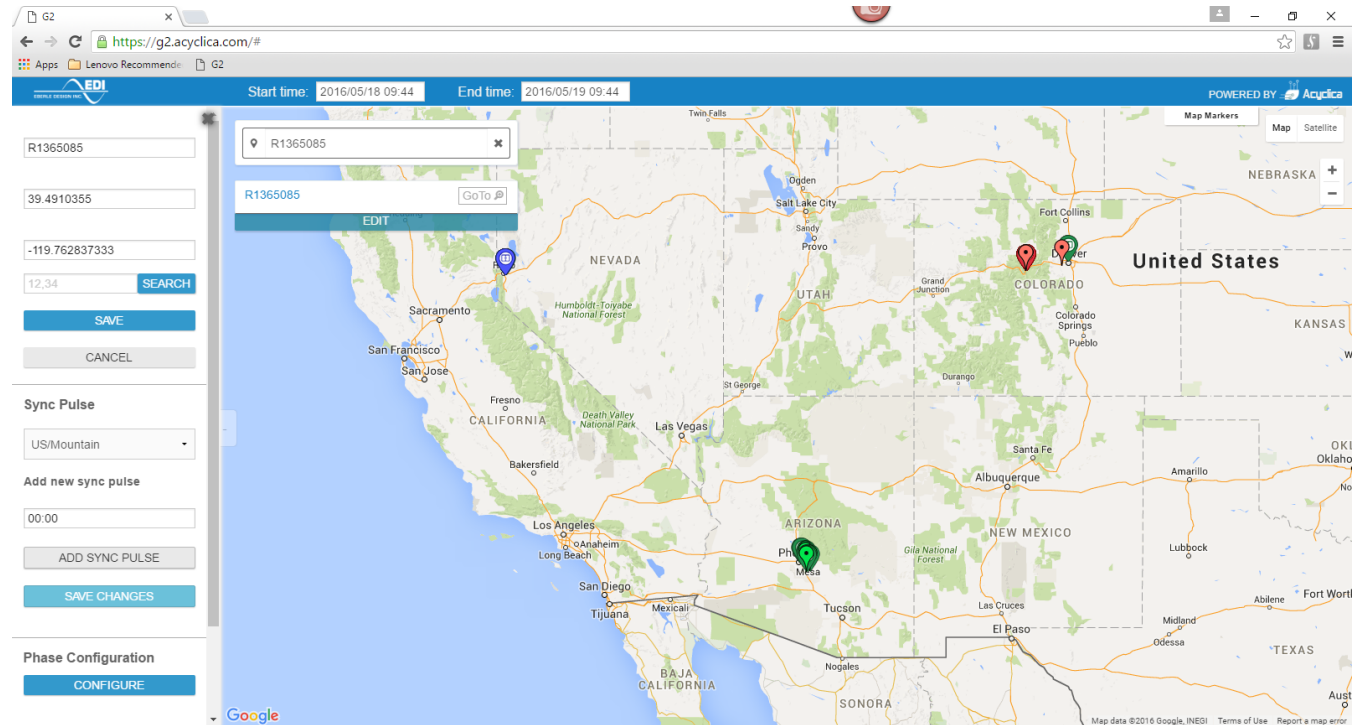
Provides alarms for cabinet malfunctions and other user identified alarms

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

The screenshot displays the G2 configuration software interface. The top navigation bar includes the G2 logo, a search bar, and a map of the United States. The main content area is divided into a left sidebar and a central configuration panel.

Left Sidebar:

- Search bar with input: -119.762837333
- Buttons: SEARCH, SAVE, CANCEL
- Sync Pulse section: US/Mountain, ADD NEW SYNC PULSE, 00:00, ADD SYNC PULSE, SAVE CHANGES
- Phase Configuration: CONFIGURE
- Cabinet Data Configuration: CONFIGURE

Central Configuration Panel:

Start time: 2016/05/18 09:44 End time: 2016/05/19 09:44

Map view showing the United States with a location marker at R1365085. Buttons: Map Markers, Map, Satellite, +, -.

Default Configuration (EDIT NAME)

Name	Input Source	Channel	+ THRESHOLD	ADD
Fan	Analog AC	1		
Heater	Analog AC	3		
Cabinet Door	Analog AC	5		

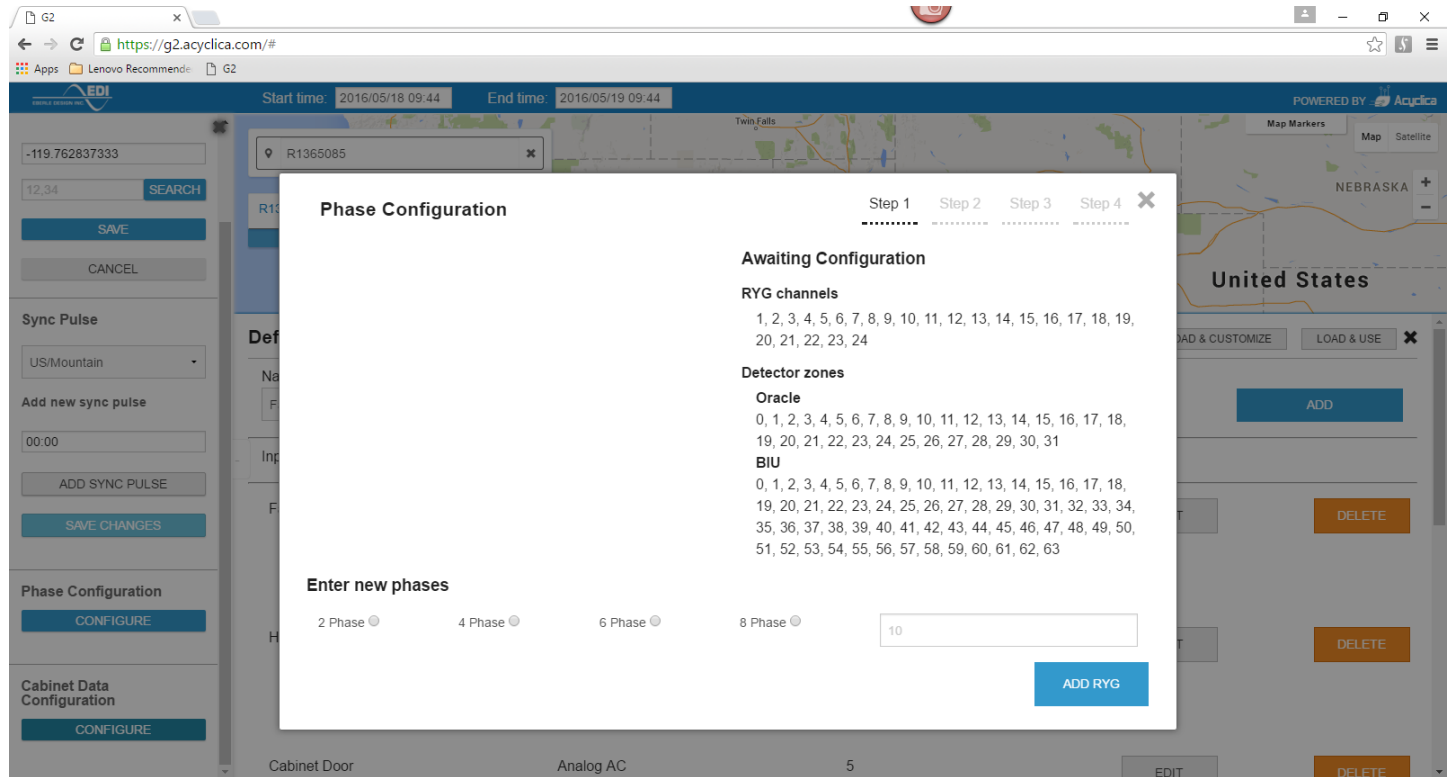
Configuration Details:

Input	Source	Channel	0 to 890:	890 to 2400:	EDIT	DELETE
Fan	Analog AC	4	Off	On		
Heater	Analog AC	3	Off	On		
Cabinet Door	Analog AC	5				

CONFIGURATION SOFTWARE

CABINET CONFIGURATION

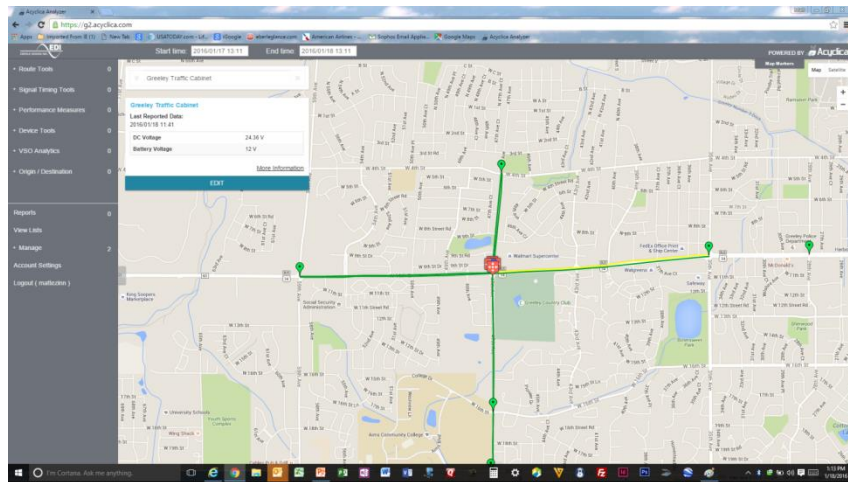
Phase to
Channel,
Detector to
Channel,
Etc.



Step by step cabinet setup

ANALYTIC SOFTWARE

BASIC DIAGNOSTICS



Greeley Traffic Cabinet

Greeley Traffic Cabinet

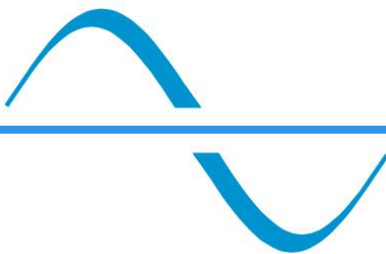
Last Reported Data:
2016/01/18 11:41

DC Voltage	24.36 V
Battery Voltage	12 V

[More Information](#)

EDIT

ANALYTIC SOFTWARE



Dashboard information about the cabinet health

Route Tools

Signal Timing Tools

Performance Measures

Device Tools

VSO Analytics

Origin / Destination

Reports

View Lists

Manage

Manual

Account Settings

Logout (mattezzinn)

Start time: 2016/05/18 09:30

End time: 2016/05/19 09:30

POWERED BY Acyclica

Lake & Alma School R1366697

VIEW DETAILS

Lake & Alma School R1366697

GoTo

Map

Satellite

Lake & Alma School R1366697

Current Status

Configured Data

Fan	Off (1 V)	0
Heater	Off (1 V)	0
Cabinet Door	Closed (1 V)	0
Flash Sense	Off (20.84 V)	0
BBS AC	Critical (1 V)	0
BBS Low Battery	(0.03 V)	0
BBS Battery	(0.03 V)	0

Details

DC Voltage	23.67 V	0
Battery Voltage	6.66 V	0
Temperature	136 F	0
SIM	8901260512783648363	0
GPS Satellites	10	0
Cell Signal Strength	7	0

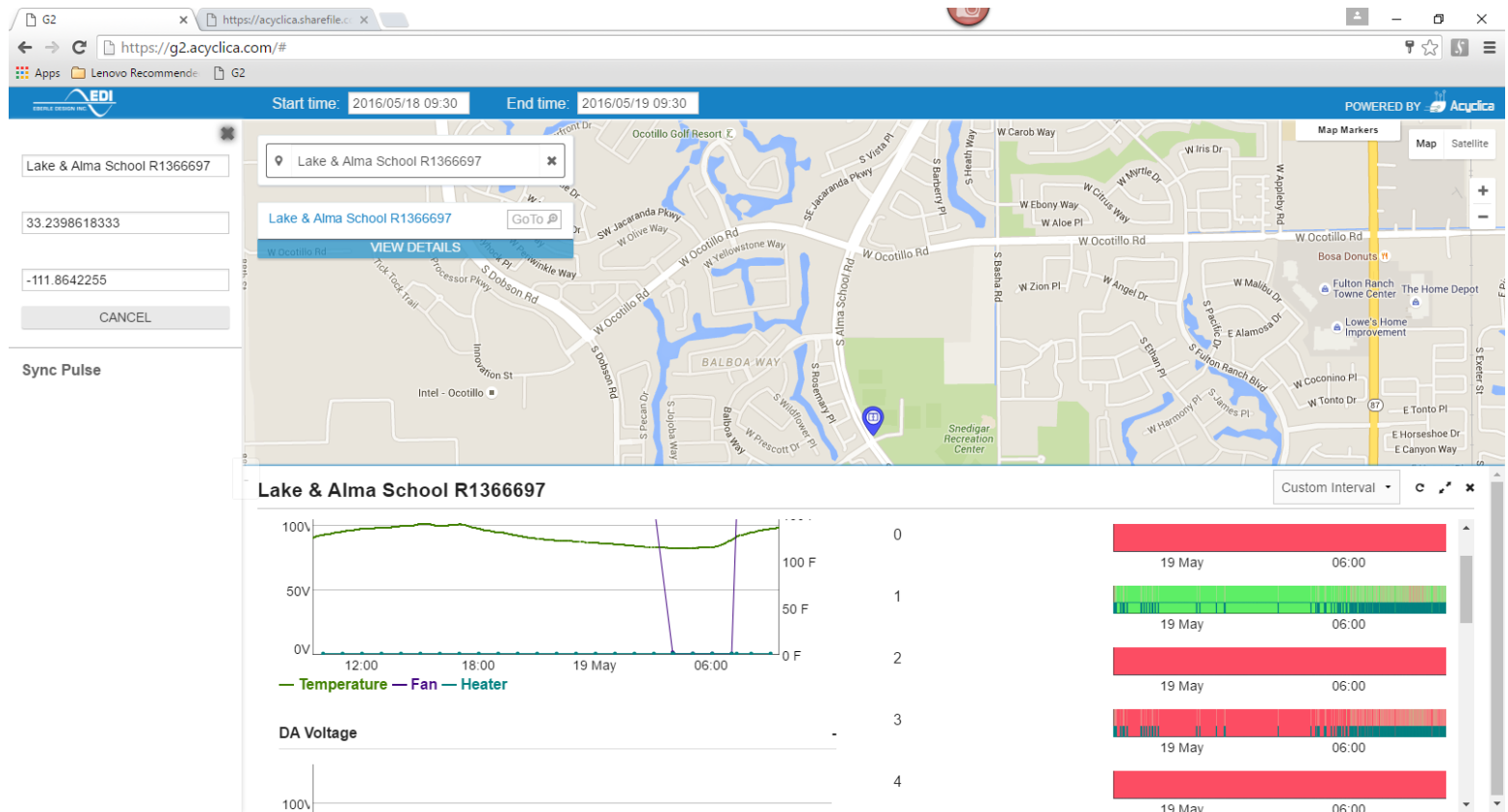
RYG Information

Channel	Status
1	red
2	red
3	red
4	green
5	red
6	red



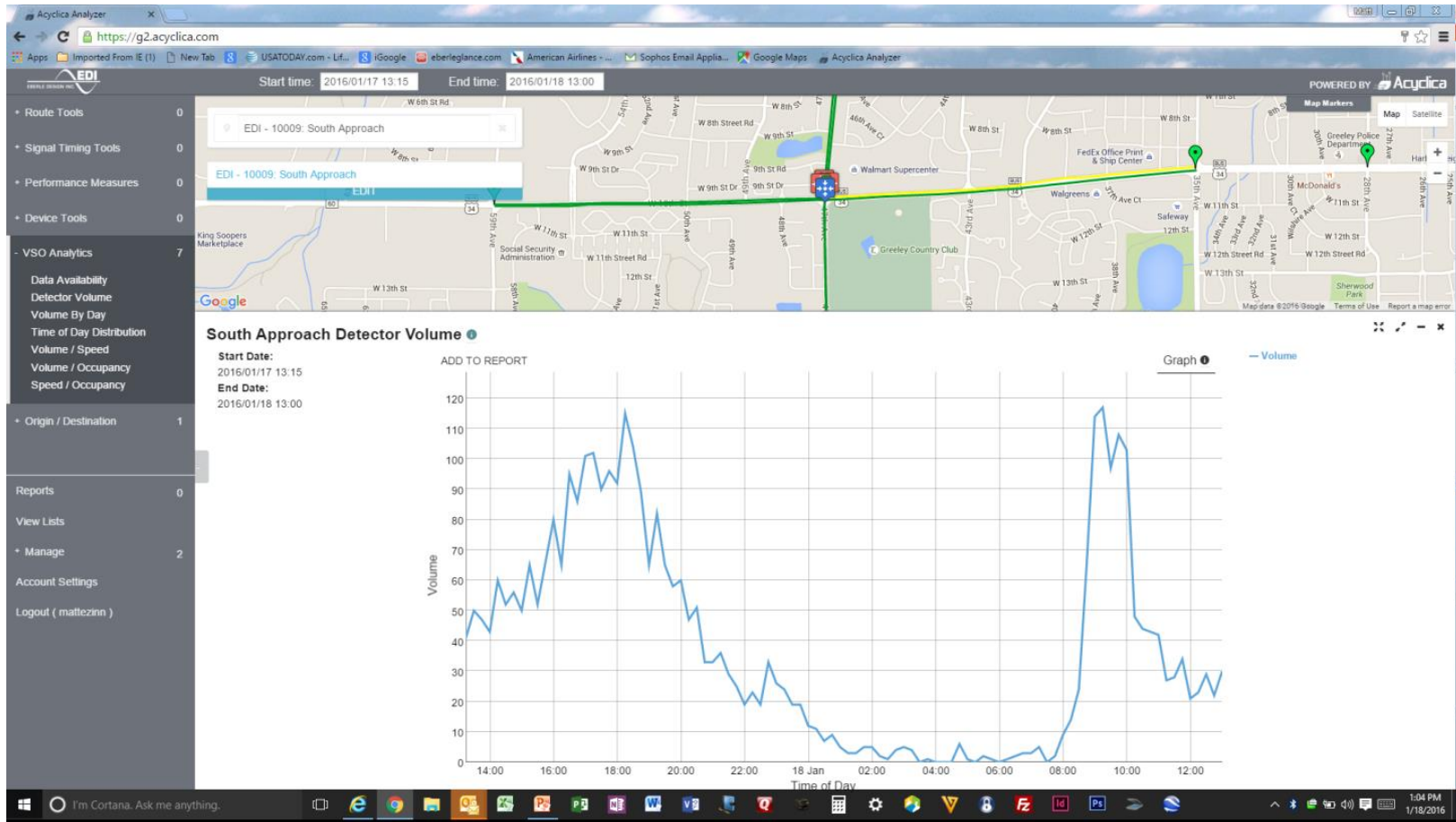
ANALYTIC SOFTWARE

HISTORICAL DATA



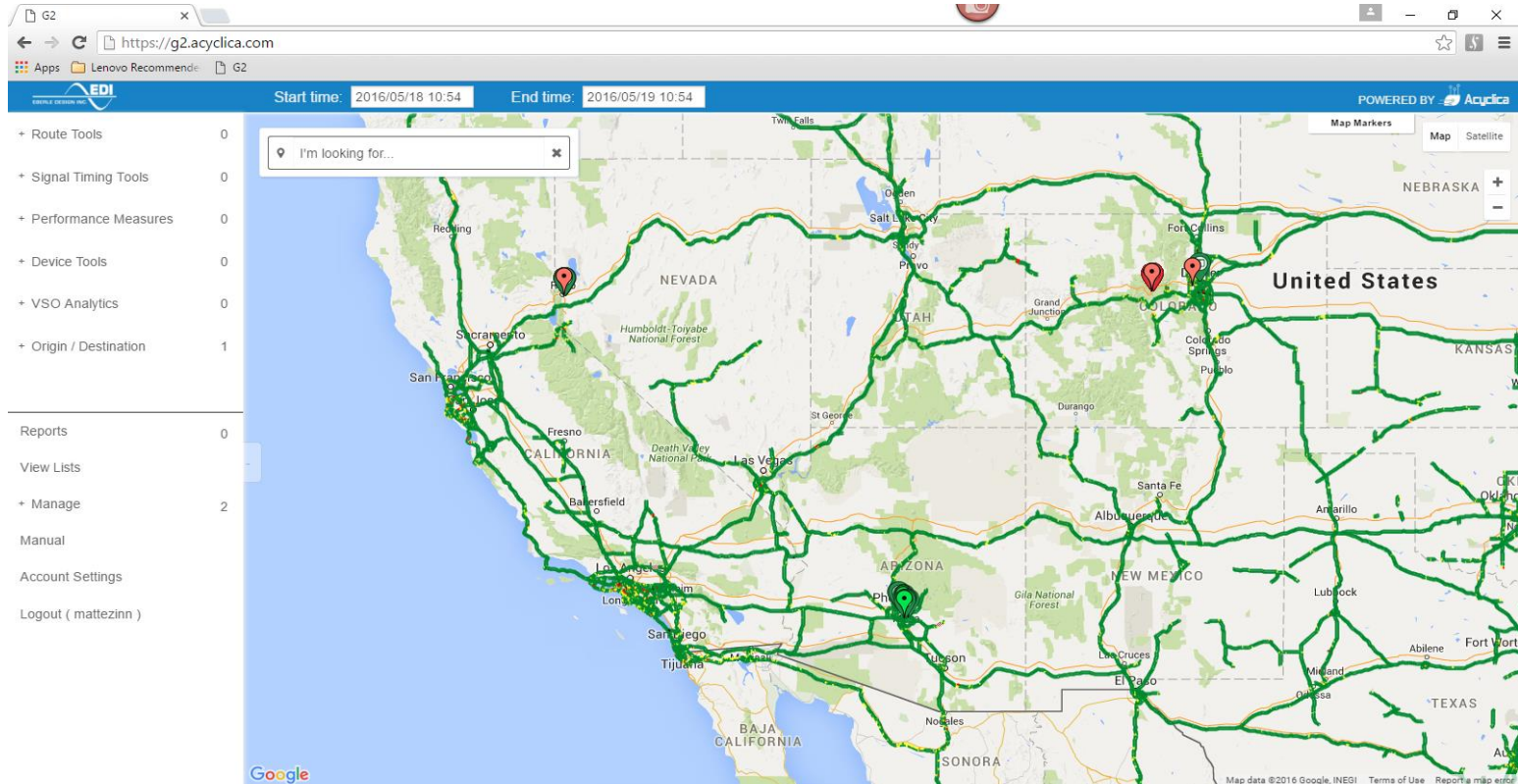
ANALYTIC SOFTWARE

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



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