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Accuracy Matters: Enhancing Detection and Alerting in Wrong-Way Systems

Presenters

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Agenda

1. TAPCO Mission
2. Wrong-Way Alert System Overview
3. Detection Technology
4. Alerting Motorists
5. Alerting Agencies
6. Maintenance
7. Questions

The TAPCO Family is driven to save lives by going the extra mile to enhance transportation and personal safety in our communities through innovative solutions and quality products.

We've been on the roads longer than the DOT (formed in 1967)

We manufacture, sell and service patented products and solutions

We're experts in solar-powered traffic safety solutions

Our service and distribution network is nationwide

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Wrong Way System Overview

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Wrong-Way Alert System

- TAPCO was first to innovate a wrong-way detection system
  - Leading the industry for 15 years
- Origin
  - There was a need to count vehicles on an off-ramp
    - TAPCO set out to innovate
- Detection
  - Performance evaluated based on the installation location and performance expectations of the project
    - Induction Loops
    - Radar
    - Thermal
    - Video-as-a-sensor with AI

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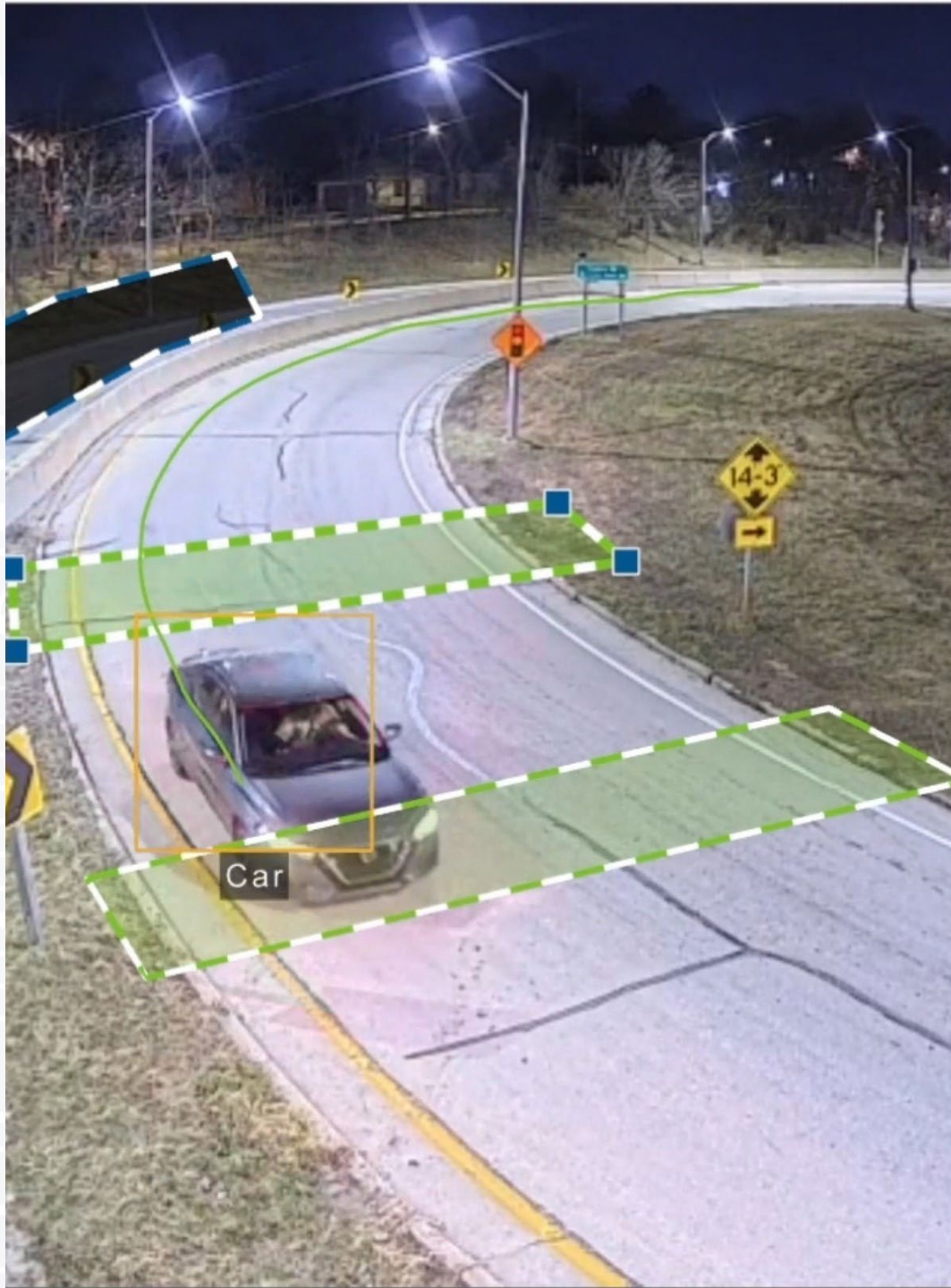
Wrong-Way Alert System

- How it works:
  1. Wrong-way vehicle detected and wrong-way driver alerts activated
     - BlinkerSign®, LegendViz®, BlinkerBeacon™, RFB
  2. Wrong-way vehicle self corrects or continues to drive in the wrong direction
  3. Wrong-way vehicle is detected as a wrong-way event in the Wrong-Way Alert Zone
  4. Wrong-Way Alert sent via BlinkLink®
- Two Zones
  1. Sign Activation Zone
     - Initial wrong-way vehicle detected
  2. Wrong-Way Alert Zone
     - Confirmation of wrong-way driver alert sent to TMCs, DOTs, law enforcement agencies, etc.



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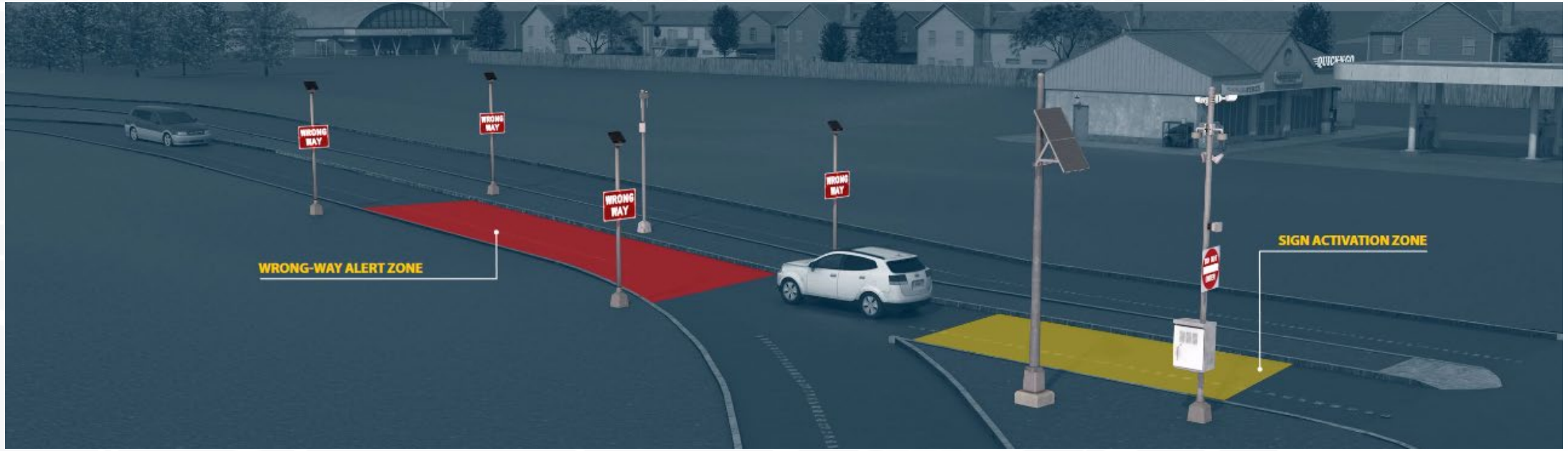
Wrong Way System Layout



- Multiple areas of detection
  - Sign activation zone
  - Wrong way alert zone
- Driver facing warning signs
- Flexibility to fit various roadway geometry

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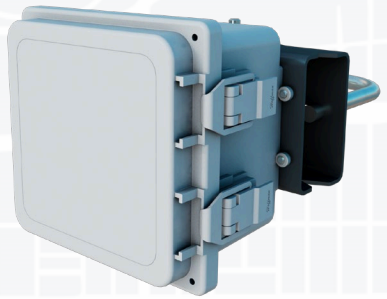
Detection Requirements

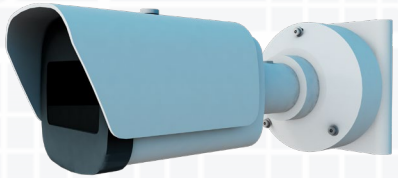
Wrong-Way Alert System

Detection

Sensing Technology

- Induction Loops
- Radar
- Thermal
- Video





Sensor Selection

- Location Dependent
  - Roadway geometry influences system configuration and performance of sensors
- Power Requirements
  - AC vs Solar
- Performance Requirements
  - Accuracy of Detection

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Intelligent Sensor

- Improved system accuracy
  - Electronic Image Stabilization (EIS)
    - Eliminates concerns for vibration and wind
  - Handles challenging environments such as:
    - Low light
    - Glare
    - Weather - rain, snow, etc.

- Incorporation of AI/ML technology
  - AI driven analytics moves technology from object detection to vehicle detection -> ability to discern between object types
  - Connected sensors can receive performance enhancing updates

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Intelligent Sensor

- Enhanced flexibility of deployment
  - Incoming and outgoing detection capabilities
    - Eases ability to upgrade existing system and use existing infrastructure for mounting
  - Flexible zones – polygon vs rectangular
    - Easier mapping of detection zones along roadway
  - Ability to “block out” areas to minimize false positives
    - Focusing sensor on specific area to be monitored

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Alerting Motorists

Wrong-Way Driver Alerts

- BlinkerSign®
  - Perimeter flashing upon detection
- LegendViz®
  - Internally illuminated from dusk-to-dawn
- LegendViz® BlinkerSign®
  - Internally illuminated from dusk-to-dawn
  - Perimeter flashing upon detection
- BlinkerBeacon™
  - Upon detection
- Rectangular Flashing Beacon
  - Upon detection

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LegendViz™ BlinkerSign®

- Strategic legend illumination to maximize legend to background contrast
- Legend illumination managed by system photocell
  - Activating Legend illumination when light drops below defined threshold
- Perimeter LEDs activation
  - 24/7 flashing
  - Dusk to dawn
  - Upon system detection of wrong way driver

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LegendViz™ Illumination in Action

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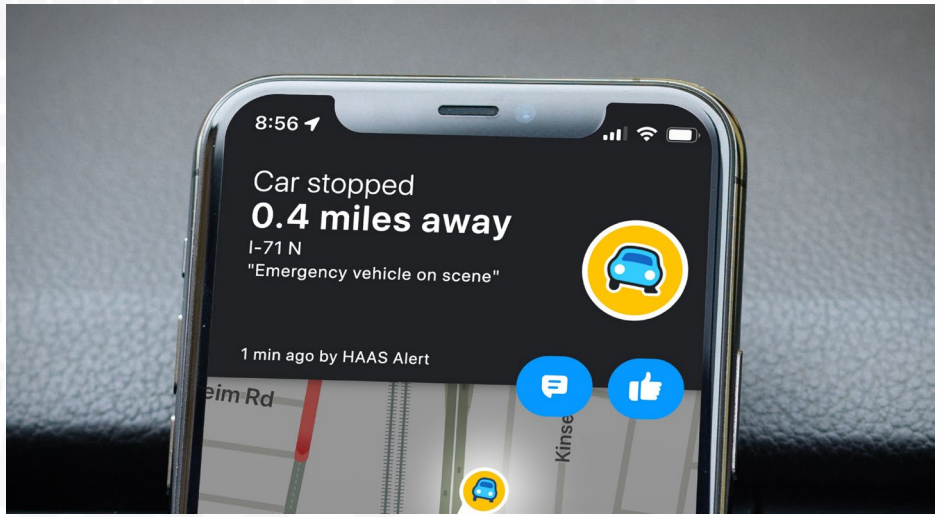
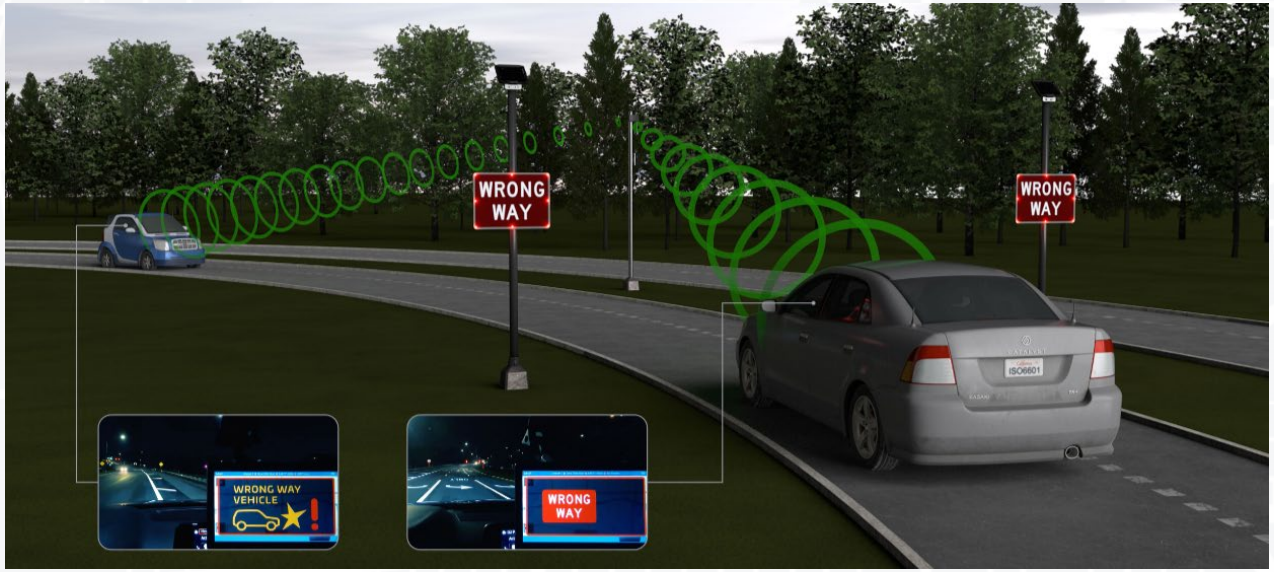
Right-Way Driver Alerts

- HAAS Alert via Safety Cloud®
  - Near real-time alerts to nearby right-way drivers
- Wrong-way vehicle detected in the Wrong-Way Alert Zone triggers HAAS Alert
  - In-vehicle navigation and via mobile map applications
  - Route determined in collaboration with DOTs and TAPCO engineers
- HAAS Alert's network
  - 2M connected vehicles
  - Tens of millions mobile navigation app users



Connected Vehicle Interface



- System upgrade option to allow for integration into connected vehicle infrastructure
  - Receives trigger from system and manages communication to roadside unit (RSU)
  - RSU manages communication to motorists
    - Alerting wrong way drivers to turn around
    - Alerting right way drivers that they are coming up to a hazard

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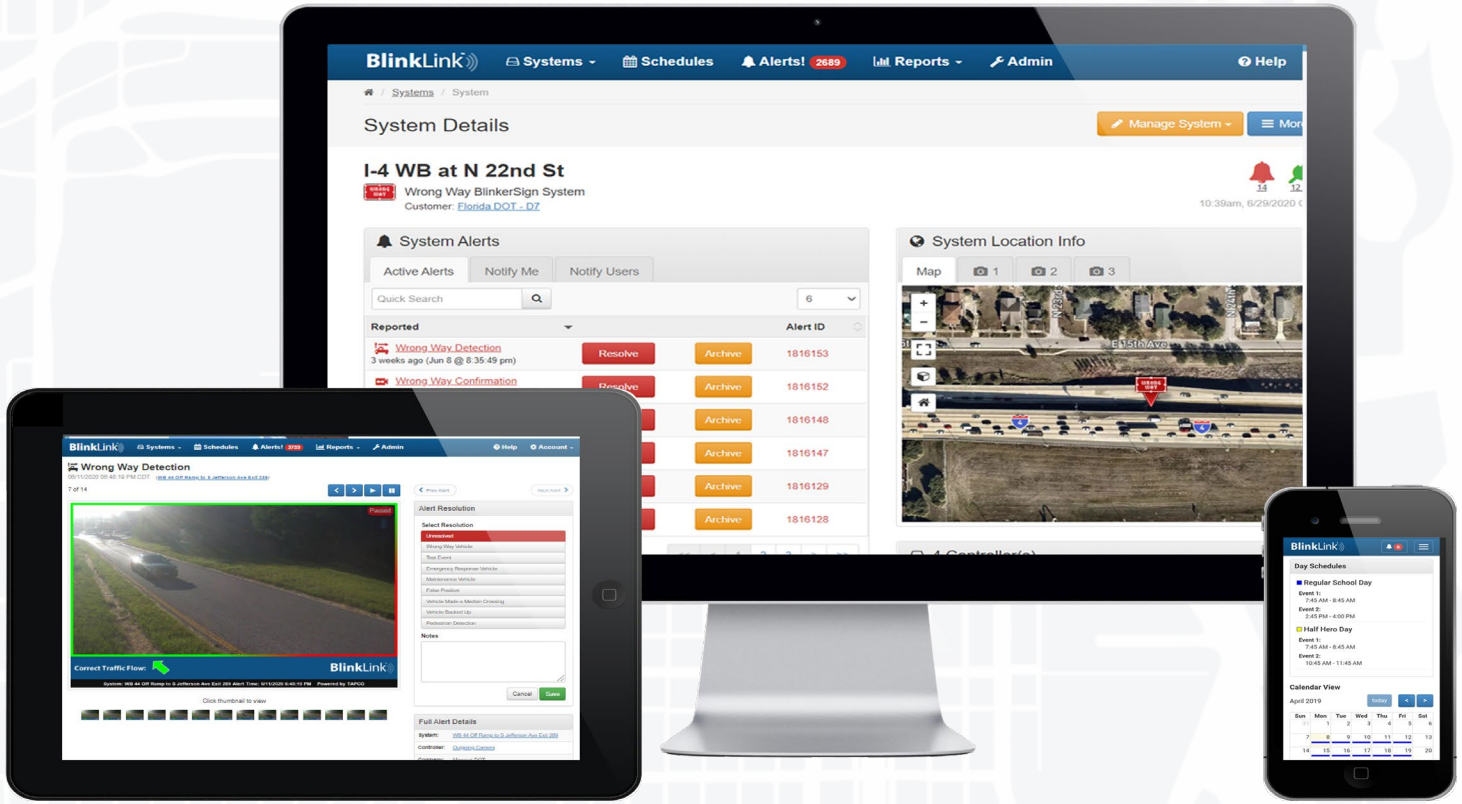
Alerting Agencies

System Management Software

BlinkLink®

- Wrong-way event livestreaming + event alerts
  - TMCs, DOTs, law enforcement agencies, etc.



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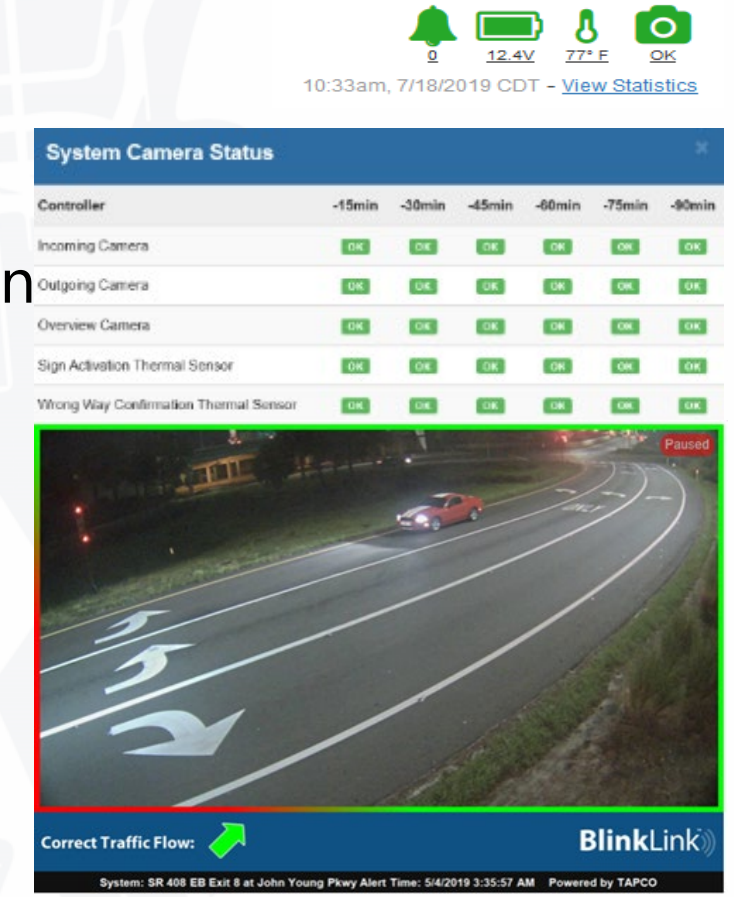
System management software

- Downloadable event video
- Immediate event streaming
- camera and sensor streaming
- System health and diagnostics for online confirmation
- Proactively identify and communicate system elements in need of maintenance
- Log and track system status's



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ATMS Integration

- Cloud based tools with ATMS integration options
- Alert response can be executed on a single platform
- Expands ITS device interconnectivity (DMS, Cameras, WWA Systems, etc.)
- Reduces and eases TMC labor and burden of multiple platform management
- Extends capabilities and reach of ATMS

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Preventative Maintenance

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Preventative Maintenance and Testing Checklist

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TAPCO Wrong Way Alert Systems

System Testing - Simulated Wrong Way Vehicle Checklist

Customer Name	TAPCO
System Location	TAPCO TEST TRACK
Start Date of Testing	8/2/22 10:00PM

Pass	Test Scenario			Controller Inputs		LEDs		BlinkLink Alerts				Result		
Test Run Number	Vehicle Type	Lane Position	Test Speed mph	Sign Activation	Wrong Way Alert	Primary RRIs or Signs Flashed	Secondary RRIs or Signs Flashed	Wrong Way Alert Received	Wrong Way Alert ID	Confirmation Alert Received	Confirmation Alert ID	Pass	Fail	Desc
1	Small	1	10-15	x	x	x	x	x	3516757	x	3516758	x		
2	Small	1	10-15	x	x	x	x	x	3516770	x	3516771	x		
3	Small	1	30-50	x	x	x	x	x	3516772	x	3516773	x		
4	Small	1	30-50	x	x	x	x	x	3516774	x	3516775	x		
5	Small	2	10-15	x	x	x	x	x	3516785	x	3516785	x		
6	Small	2	10-15	x	x	x	x	x	3516790	x	3516791	x		
7	Small	2	30-50	x	x	x	x	x	3516796	x	3516795	x		
8	Small	2	30-50	x	x	x	x	x	3516797	x	3516798	x		
9	Large	1	10-15	x	x	x	x	x	3516800	x	3516801	x		
10	Large	1	10-15	x	x	x	x	x	3516802	x	3516801	x		
11	Large	1	30-50	x	x	x	x	x	3516805	x	3516804	x		
12	Large	1	30-50	x	x	x	x	x	3516806	x	3516807	x		
13	Large	2	10-15	x	x	x	x	x	3516808	x	3516809	x		
14	Large	2	10-15	x	x	x	x	x	3516814	x	3516813	x		
15	Large	2	30-50	x	x	x	x	x	3516816	x	3516815	x		
16	Large	2	30-50	x	x	x	x	x	3516817	x	3516818	x		

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Wrong-Way Alert System Preventative Maintenance

System Location

System Detection Type
Dual Thermal (Activated Signal Receiver)

System Power Type
AC

Mechanical Checks and Maintenance Performed	
Pole or Part is Sturdy	YES
Detectors are Securely Mounted and Aimed Properly	YES
AC Breaker Box/AC Charge Panel is Securely Mounted	YES
Cabinet Securely Mounted	YES
Cleaned Inside Cabinet if Necessary	YES
AC Conduit is Securely Connected to the Cabinet	YES
Door Locks/Handles Functional and Lubricated	YES
Vents are Clear of Debris	YES
Performed Cable Management	YES
All Conduits Plugged	YES

Electrical Checks	
Measured AC Line Voltage	119.9 AC
Verified Lighting According to Positioning Properly	YES
Measured Resistance from Neutral to Ground	4 Ohms
Measured DC Voltage without Load	12.49 DC
Measured DC Voltage with Load	12.49 DC

Detection and Alerting Checks	
Call TMC and Put the System Into Maintenance Mode	YES
Verified the Sign Reflective Thermal Sensor's Image is Clear and Free of Debris.	YES
Verified the Sign Reflective Thermal Sensor's Beam are Positioned Properly for the Wrong Lanes and the Sensor's Specifications.	YES
Changed Reflective Mounting of the Sign Reflective Thermal Sensor's Beam and Verified the Sensor's Output Triggers the Input of the Logic Controller when Reflective Beams Monitoring Reflection of Right-Way Traffic for Several Small and Large	YES
Verified all of the System's Signal Receivers are being Reflected when Reflective Beams, Made to Open and Stay Flashing are the Configured System Timing.	YES
Verified the Wrong Way Thermal Sensor's Image is Clear and Free of Debris.	YES
Verified the Wrong Way Alert Thermal Sensor's Beam are Positioned Properly for the Wrong Lanes and the Sensor's Specifications.	YES
Changed Reflective Mounting of the Wrong Way Alert Thermal Sensor's Beam and Verified the Sensor's Output Triggers the Input of the ATR Module when Reflective Beams Monitoring Reflection of Right-Way Traffic for Several Small and Large	YES
Verified the Correct(d) Input is being Reflected when Reflective Beams.	YES
Verified Illumination is Positioned by Covering the Photocell on the Illuminator and Powering the Sign Test Button.	YES
Call the TMC and Place the System back into Active Mode to Performed a Blinklink Alert Reliance Test by Powering the Wrong Way Push Button. Confirming ATR Signal Received if Applicable / Powered Blinklink Alert Reliance Test is	YES

Main Cabinet Photo

Notes

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Wrong Way Alert System Preventative Maintenance

Location Details

Customer Name	DOT
System Location	
BlinkLink System Name	
Main Cabinet Serial Number	J-673916-3001
GPS Latitude	41.722223
GPS Longitude	-71.483736

10 AM

System Picture

Detection Pole Photo

Notes

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Complete Event Management

- Wrong way system implementation benefits from end-to-end management of events
  - Accurate detection of initial wrong way driver movement
  - Conspicuous warnings to alert wrong way motorist
  - Right way driver warnings of upcoming hazard
  - Actionable alerts for immediate response of wrong way events
    - System generated images of roadway event
    - Integration to agency's ATMS/TMC operations
  - Robust plan for maintenance and continued ownership of system

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Questions?

Thank You

Follow us on social!

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