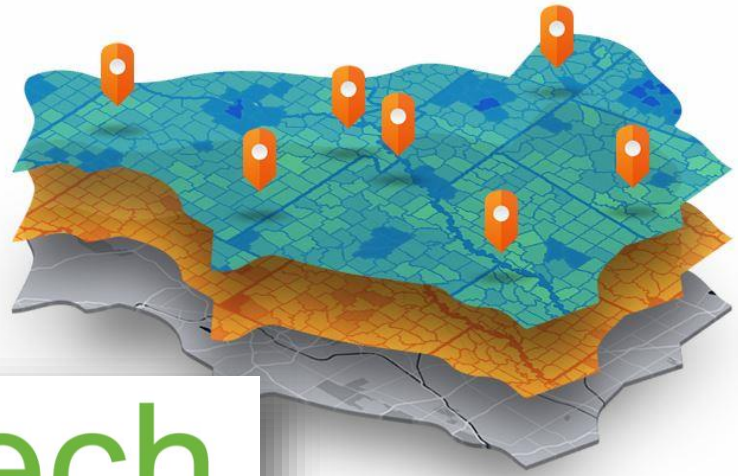

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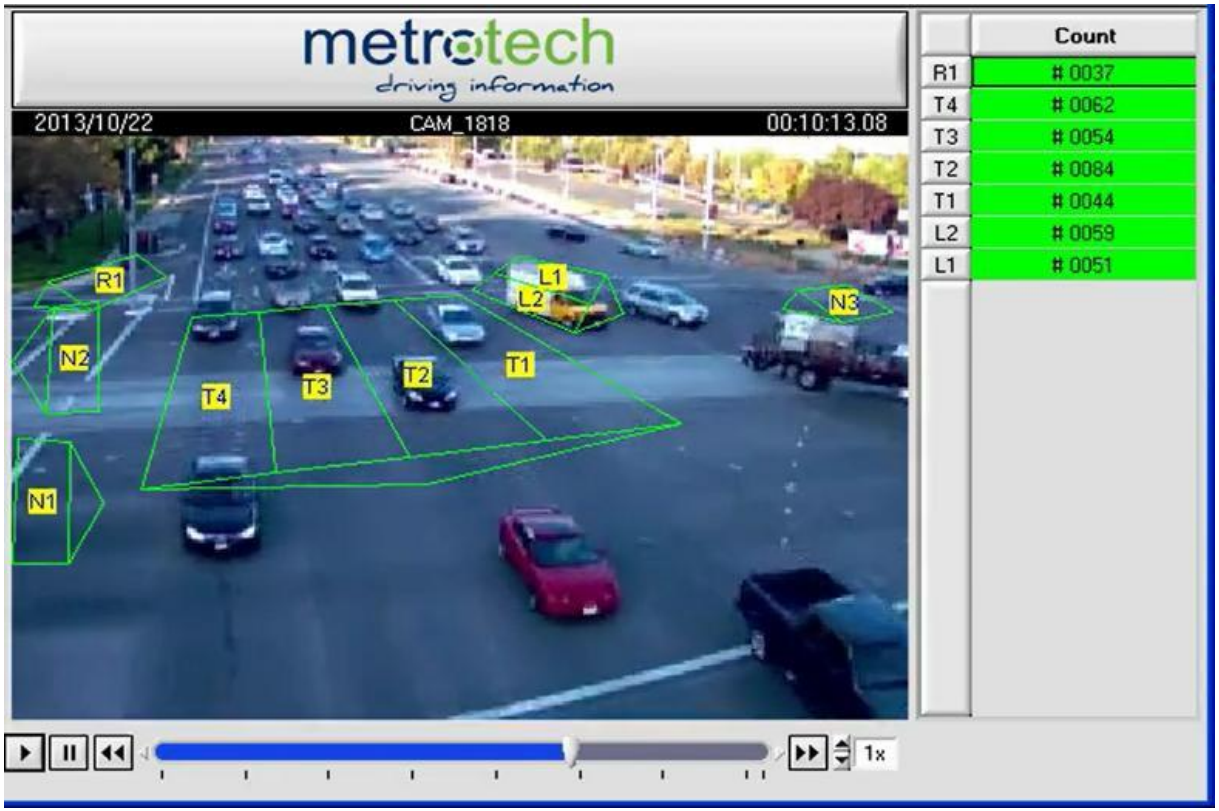
Visualizing and capturing highly accurate vehicle movement is BIG DATA and is driving new kinds of tools, maps, and visualization to consumers, business, and governments world wide…..

Video

MetroTech Video Analytics Improves Navigation and Traffic Management in "High Traffic Areas"

- **Improve Accuracy**
  95+% data accuracy
- **Accelerate Real-Time**
  <1 minute data delivery
- **Ecosystem Benefits**
  - Consumers
  - Enterprise
  - Government



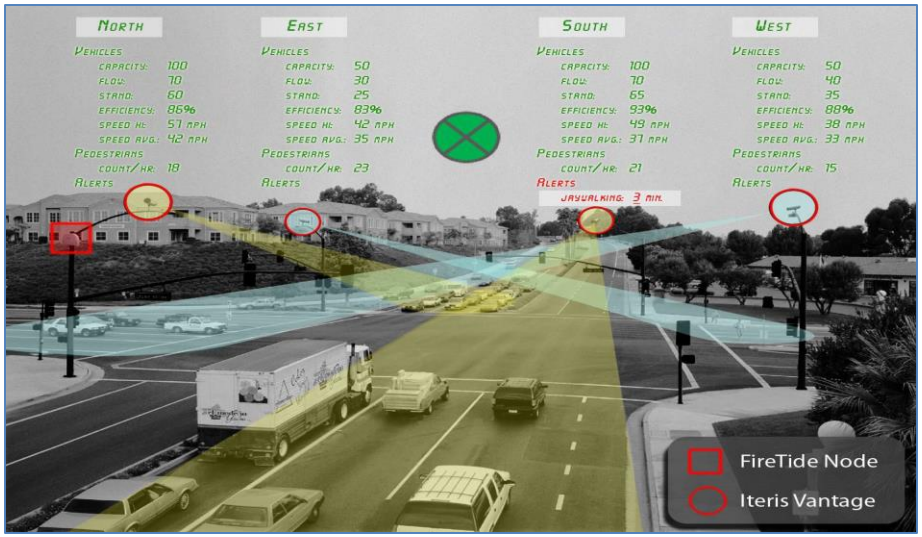
DPI 4 DPI 3 DPI 5 DPI 3 DPI 1 DPI 1 DPI 1 DPI 2

MetroTech's ***IntelliSection™*** patent pending technology, utilizes real-time traffic video data to perform data analytics within their Traffic Vision Center (TVC); utilizing the OSI_{soft} platform to develop innovative traffic products.

IntelliSection™ Basic delivers lane 'counts and speeds'

IntelliSection™ Custom creates unique applications including *Safety Alerts' - Wrong Way Drivers and Jam Tails, Incident Detection, Headway, Thru-Count, Right and Left Turns, and a Health Score*

IntelliSection™ Plus integrates multiple sources of traditional and non-traditional data to produce highly customized solutions for current and future market needs for traffic routing, mapping, connected vehicles, and smart cities.



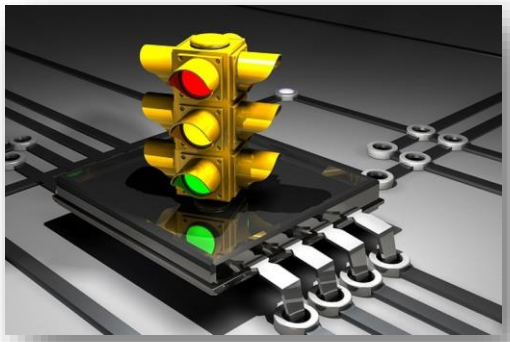
IntelliSection™ TMC Core Platform

History Archive

- Cloud-based data archive of MTN and external data
- Record, store, archive lane-level traffic and sensor data history in perpetuity
- Archive to enable apps centered around control, planning, modeling/simulation

Live Streaming Camera Data

- Translates video in real-time to data
- Extrapolates data sets
- Privacy and Security: video remains in client's control



Real-Time Traffic Reporting Basic

Level 1 Functionality

- Counts by lane, intersection, corridor
- Directional volumes of intersection, corridor
- Average Speed by lane, intersection, corridor
- "Health" of intersection
- Number of R and L turns by lane
- Headway

Asset Management

- Detection device / input monitoring
- 24/7 monitoring and management
- Alerts for break in communication

Video Analytics Appliance

MetroTech appliance added to existing network with access to video feeds to enable platform data sets

- ***Video Analytics:*** converts existing video cameras into traffic sensors
- ***Traffic Analytics:*** aggregates & analyzes traffic data and broadcasts through APIs
- ***Predictive Analytics****: "****searches the future****" — e.g., for* emerging congestion, planning, zoning, etc.
- ***Big Data Analytics:*** High Definition (HD) real-time, cloud-based information aggregation & publishing
- ***Sensor Aggregation:*** Combines with other traffic sensors including: Bluetooth, Loops, Pucks, Radar, Wifi, Probe, etc.

- ***Alerts***: Driven by speed change and expected lane-differential.
- ***Turning Movements:*** 24/7 turning movements allows for congestion flow tracking and dynamic signal change.
- ***Safety Movements:*** Illegal merging, wrong way driving.
- ***Planning:*** long term data used for construction, corridor studies and congestion mapping.
- ***Infrastructure:*** Easily maintained and upgraded, with notification of hardware malfunction.
- ***Real-Time Signal Control:*** more accurate data is needed for active, real-time control of signals

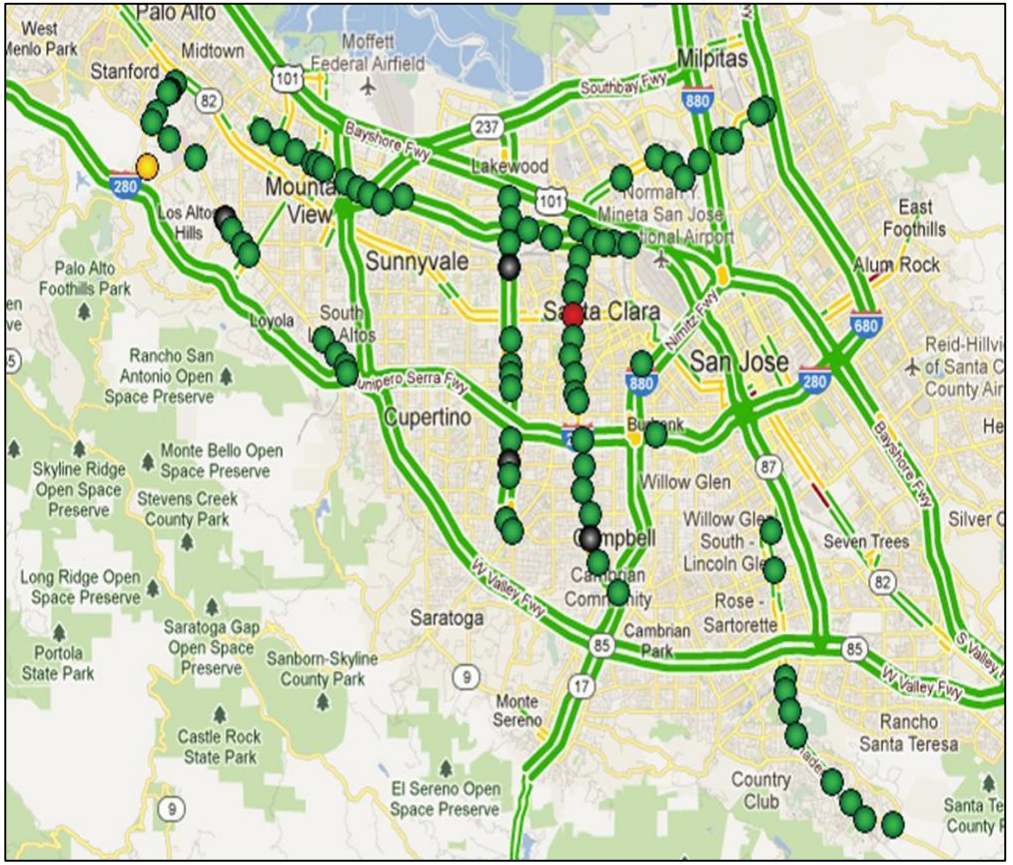
In Production: Case Study of Santa Clara, California

Silicon Valley Results

- Operating for 18 months
- Over 450 cameras within 100 intersections
- 3.7MM vehicle movements daily
- Reduces 700 TBs of unseen data into 250 MBs of analytics
- A-PeMS -- Data Archiving
  - Time, Delay, Queue
- Real-time data feeds *Naztec ITS*

95% Accuracy

< 1 Minute Latency



MetroTech App Strategy

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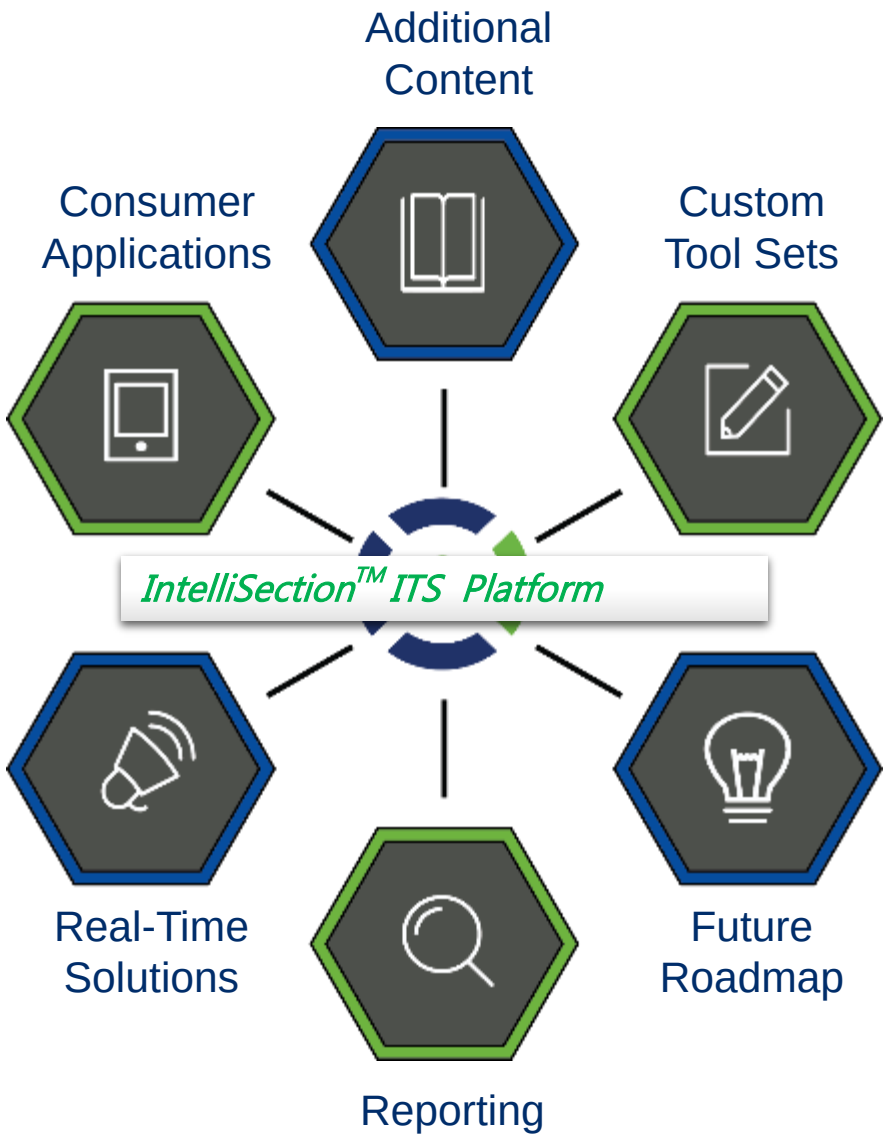
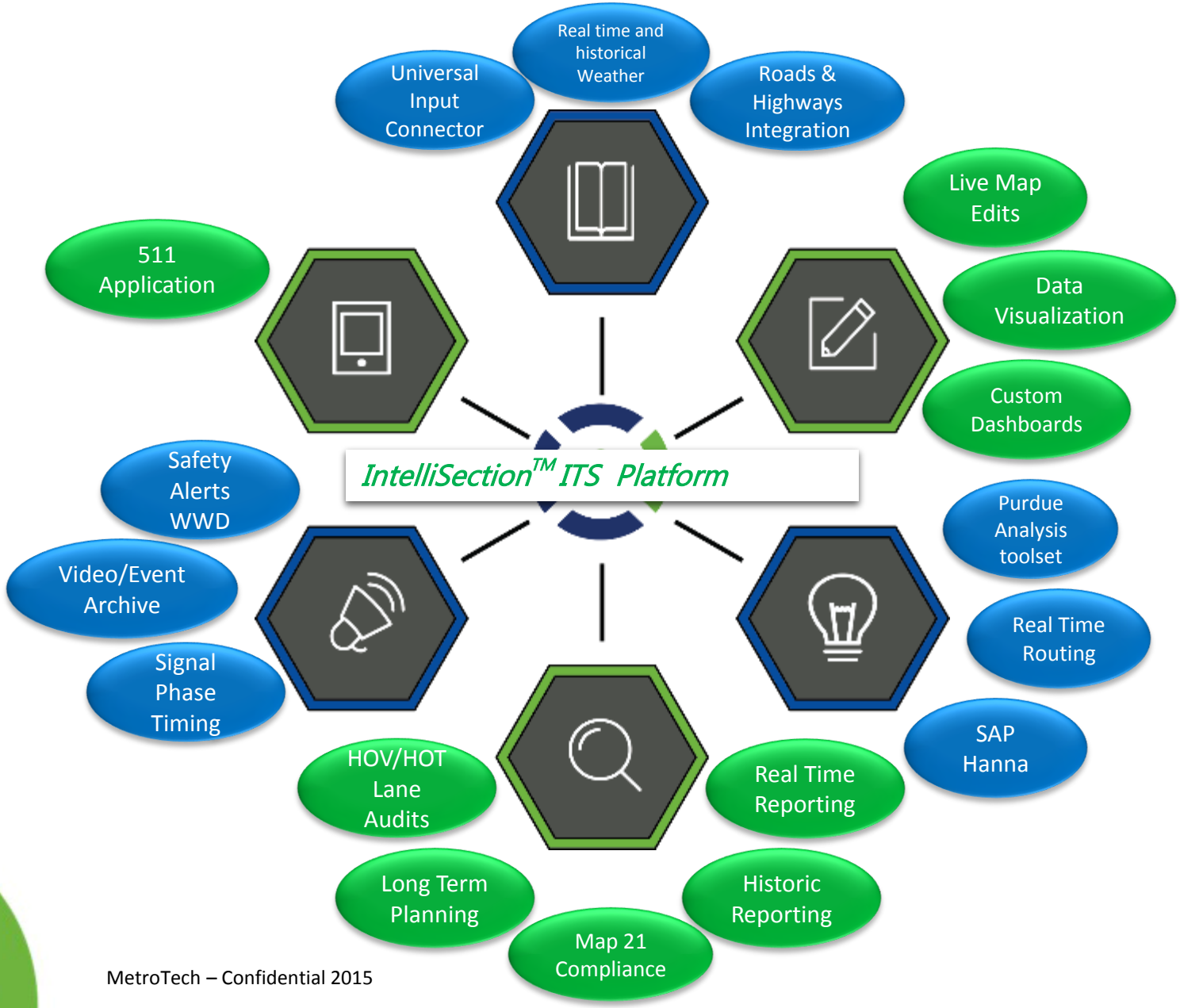
IntelliSection™ ITS Applications

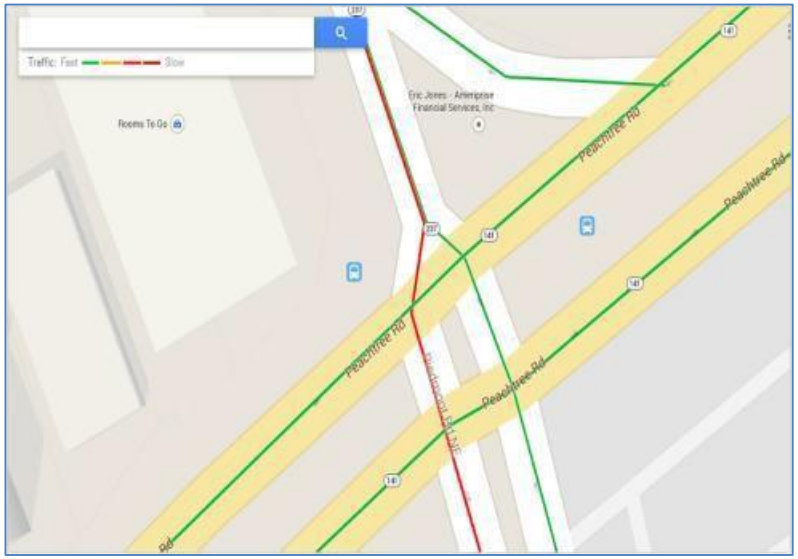


IntelliSection™ ITS Application Solution Set



Turn video streams into sensor data, apply analytics, and publish new data, delivering the next-generation of traffic analytics

Today:
data based on probes (smartphones)



- 5 Lanes of Travel = **5 Data Points**
- Arterial Accuracy: **38-50%**
- Tracking: **Approximate** Speed
- Latency: **15-40 minutes**

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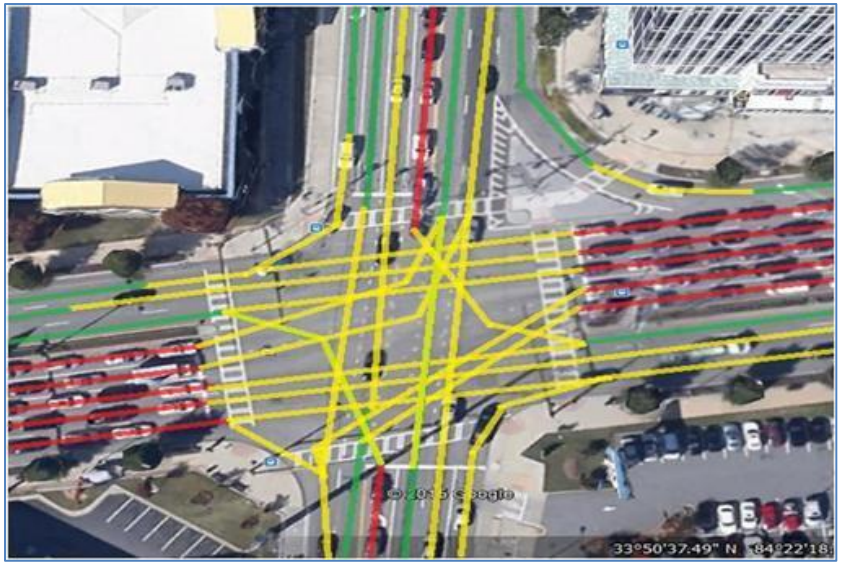
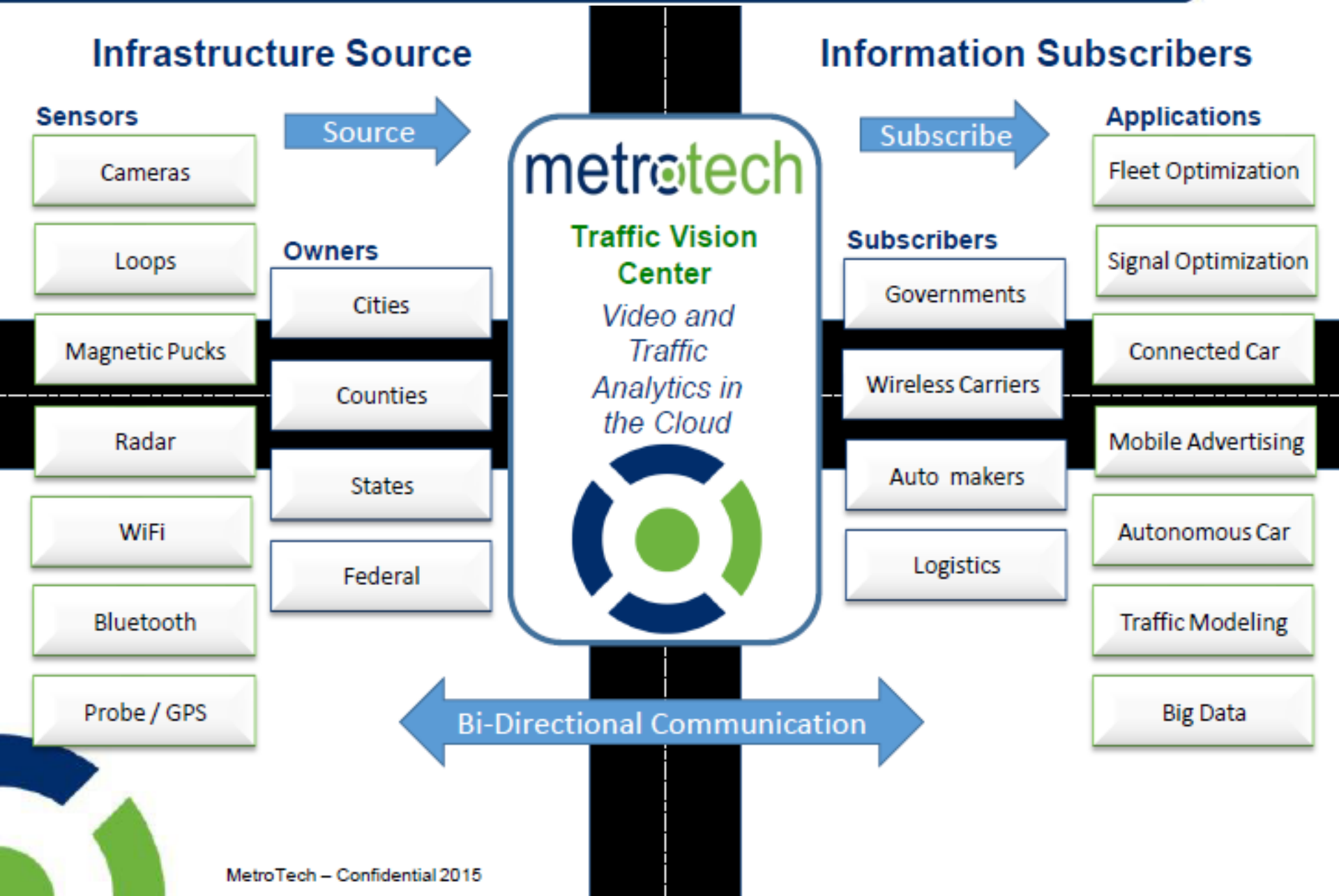
Data from infrastructure cameras



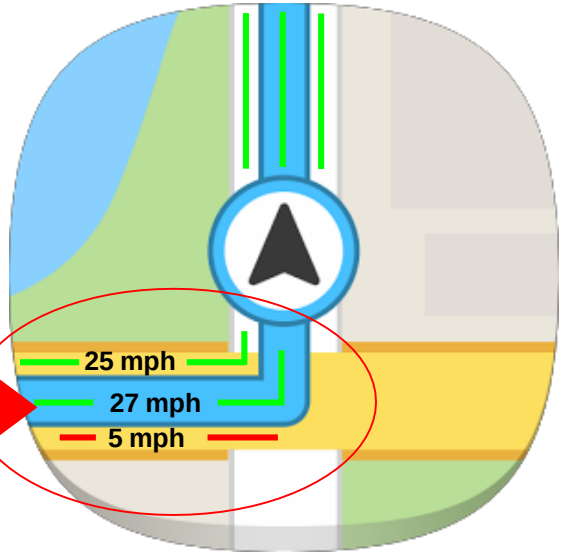
- 20 Lanes of Travel = **100 Data Points**
- Arterial Accuracy: **90+%**
- Tracking: ***Actual*** Speed/Volume/Headway/Flow/Capacity
- Latency: **< 1 minute**

DPI 5 DPI 1 DPI 3 DPI 1 DPI 5



MetroTech – Confidential 2015

>95% Accuracy



Current	+	metrotech	=	*Empowering New…*

- ***Probes***
- ***Road Sensors***
- ***CrowdSource*** *(Waze)*

- ***Lane*** *of travel*
- ***Lane*** *level counts*
- ***Speed*** *of each vehicle*
- ***Volume*** *of vehicles*
- ***Flow*** *continuous, broken stream, congested*

- ***Navigation***
- ***Maps***
- ***Routing***
- ***Scheduling***
- ***Big Data Analytics***

Real-Time Solutions

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Real-Time Wrong-Way Driver & Safety Alerts

With real-time safety alerts, drivers can be notified of incidents that have occurred and adjust their route accordingly to ensure the most efficient and safe trip. Accident responders will also be notified more quickly, giving them more time to report to accident locations. MetroTech's low latency (0-60 seconds) rivals all in the industry.

Geo-fencing provides consumers of traffic data (TMC, First Responders, and General Public) with alerts signaling a traffic incident within a specific radius of their location. Alerts are directly messaged to wireless service providers, TMCs, and first responders for immediate distribution and utilization with users.

These alerts encompass the following incidents:

- Wrong-Way Driver (primary)
- Incident Detection
- Crash Alerts
- Stopped Car
- Jam Tail

Signal Phase Timing

The **IntelliSection ™ ITS** platform can utilize historical and real-time data sets along with the most advanced and powerful analytics engines to provision Signal Phase Timing efforts.

Signal Phase Timing tools appropriately designed, operated, and maintained for traffic signals can:

- Reduce congestion and create smooth flowing traffic at defined speeds along streets and highways.
- Improve mobility by effectively managing the traffic-handling capacity of intersections through the use of appropriate layouts and control measures.
- Reduce vehicle stops and delays, thereby reducing emissions and fuel consumption.

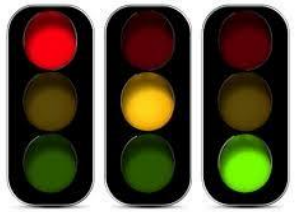
By using real-time and historical data to analyze data sets such as speed, headway, flow, and queue length for a given traffic corridor, our system will:

Phase 1

Provide aggregate data to TMC / DOT operators for analysis of the various data points for manual adjustment of traffic schemas.

Phase 2

Serve as a platform to develop algorithms to model traffic patterns and suggest specific traffic schemas to provide better flow of traffic



FUTURE: intake green signal phase directly from controller for highly accurate phase development

Real-Time Reporting

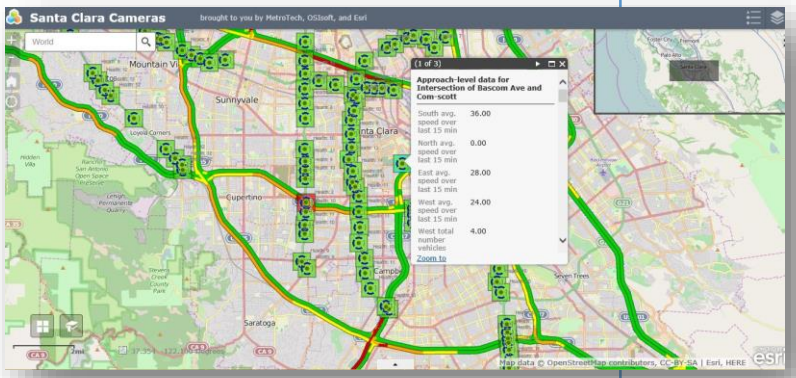
Deliver highly accurate, real-time traffic data to users (i.e.,TMC, First Responders, and General Public), allowing them to understand how traffic will impact their routes and options.

Critical data for TMCs/Dots and First Responders to respond as rapidly as possible and general public and commercial businesses can use to enhance navigational options.

LANE-LEVEL ACCURACY AND LOW LEVEL LATENCY

Level 1: Orchestration (TMCs & DOTs)

- Counts by lane/intersection/corridor
- Directional volumes of intersection and corridor
- Health of intersection
- Number of R and L turns by lane
- Average speed by lane/ intersection/corridor
- Capacity tool
- Headway



Level 2: Navigation (General Public & Commercial Users)

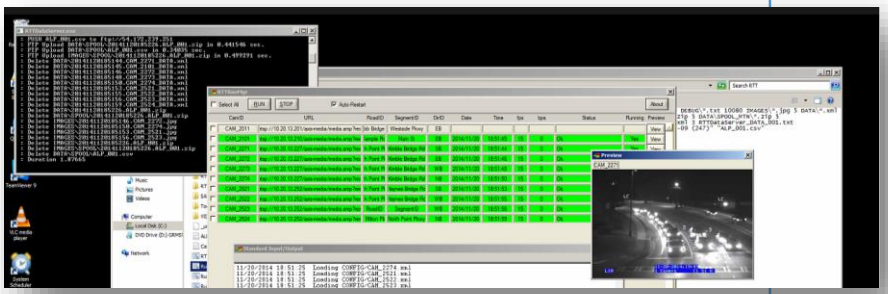
- TBD – Package information above in a manner meaningful to the general public (i.e., notification of “JAM TAIL” ahead, re-routing options)

Historic Reporting

By provide historical traffic data **on-demand** filtered by users, this enables TMCs/DOTs and large commercial fleet companies to manage and archive data for planning and trend prediction as well as feeding 3rd party modeling systems.

Level 1

- By day, week, month, year in any time slice / segment desired
- Number of R and L turns by lane
- Counts by lane/intersection/corridor
- Average speed by lane/intersection/corridor
- Capacity



Level 2

- Custom templates library for data studies

MAP-21

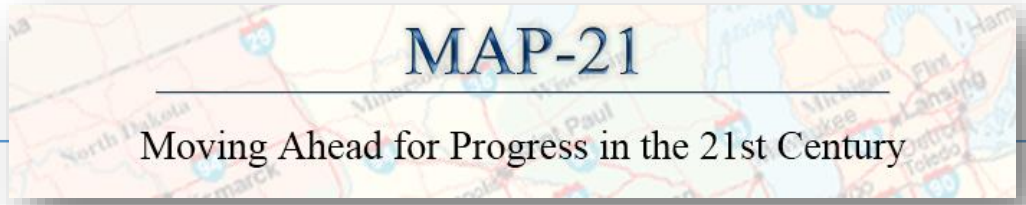
The MAP-21 App functions as the intelligent hub for MAP-21 **automatic** data collection, analysis and MAP-21 reporting in the specified format. Our App will be modeled on the TurboTax tax preparation software which will enable governments to easily incorporate data capture, archiving, review, analysis, exporting, governanace and reporting from a single, common platform.

The data sent (required by law) to the US DOT Office of Highway Policy Information feed a number of programs that were created or impacted by MAP-21:

- Certified Mileage
- Highway Performance Monitoring System (HPMS)
- Travel Monitoring and Analysis System (TMAS)
- Vehicle Travel Reporting and Information System (VTRIS)
- Motor Fuels
- State & Local Finance
- National Household Travel Survey (NHTS)
- Tax Evasion
- Motor Vehicles
- Licensed Drivers
- Toll Facilities

The MAP-21 programs driving these reviews include, but are not limited to:

- Performance Management,
- Enhanced National Highway System
- National Freight Network
- Truck Size & Weight Study
- Condition & Performance Reports
- Freight Condition & Performance



Long Term Planning - Traffic Analysis Tools

Long term planning enables users to employ, provision and visualize standard traffic analysis tools and their data sets in an on-demand environment. Numerous traffic analysis tools have been developed by public agencies, research organizations, and private vendors/consultants to predict and evaluate the outcome of various improvement plans. They have emerged as the most efficient and cost-effective methods to evaluate proposed transportation projects.

Traffic analysis tools can help practitioners:

- Improve the decision-making process
- Evaluate and prioritize planning/operational alternatives
- Improve design and evaluation time and costs
- Reduce disruptions to traffic

Traffic analysis tools can be grouped into the following categories:

Sketch-Planning Tools, Travel Demand, Analytical/Deterministic Tools (HCM-Based), Traffic Signal Optimization Tools, Macroscopic Simulation Models, Mesoscopic Simulation Models, Microscopic Simulation Models

FUTURE: 1. Templates and interfaces to enable common industry traffic analysis tools
2. Serve as a development platform for the creation of custom tool sets

IntelliSection™ ITS

Core Platform and Solution Apps

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