Streetline

STREETLINE SMART PARKING PROPOSAL

Oakland, CA August 2016

Introduction

Oakland, CA 2016

Oakland is a major West Coast port city in the U.S. state of California. Oakland is the third largest city in the San Francisco Bay Area, the eighth-largest city in California, with a population of 413,775 as of 2014. It serves as a trade center for the San Francisco Bay Area; its Port of Oakland is the busiest port for San Francisco Bay, all of Northern California, and fifth busiest in the United States. Incorporated in 1852, Oakland is the county seat of Alameda County. It is also the principal city of the Bay Area Region known as the East Bay. The city is situated directly across the bay, six miles east of San Francisco. The East Bay Economy continues to move forward and build on the economic expansion that has taken place in the post-recession era these last few years. With virtually every major economic indicator trending in the right direction, the region is poised for steady growth in 2015 as the local economic engine continues firing on all cylinders. From the job market to spending and real estate, the East Bay remains one of the bright spots in the state of California.

Streetline, 2016

Streetline has become the world's leader in capturing highly accurate parking data and developing applications that put this data to good use in the hands of Motorists, Merchants, and Oakland. Streetline has now dramatically reduced the cost of the Smart Parking solution by utilizing Streetline analytics, mobile devices, cameras, and Oakland data such as parking payment and LPR. Streetline is proud to announce the Hybrid Smart Parking Platform that reduces the cost of Smart Parking occupancy data by 80%. Streetline is also proud to announce programs that fund the remaining 20% via commercial markets. The result? Free Smart parking, across all of Oakland, at no cost to Oakland.

We are excited to partner with Oakland to solve the urban challenge of parking in Oakland.

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Overview

Occupancy data as the foundation of Smart Parking

10 years ago, it was necessary for Streetline to install sensors in every parking space to capture accurate parking data because there were no other data sources. Today however, Cities are actively generating a variety of parking and mobility data such as meter and mobile payments, license plate recognition readings, GPS probe, connected car events, security camera data and more. Each of these datasets provides some (but imperfect) insights into the City's curbside utilization. Each data source used stand-alone, offers an incomplete or inaccurate representation of actual occupancy and parking demand.

In 10 years of studying parking occupancy, Streetline's engineering team discovered the value and the ideal process of combining multiple datasets to create highly accurate parking occupancy data at a vastly reduced cost. Streetline analytics and historic data can now accurately determine parking occupancy of each block face with only one sensor in each block face. The Streetline Hybrid Platform can generate 90% accuracy in 60 days using only one sensor per block face and powerful analytics. This solution is made even more effective and less expensive by leveraging all Streetline sensing devices and multiple other data sources:
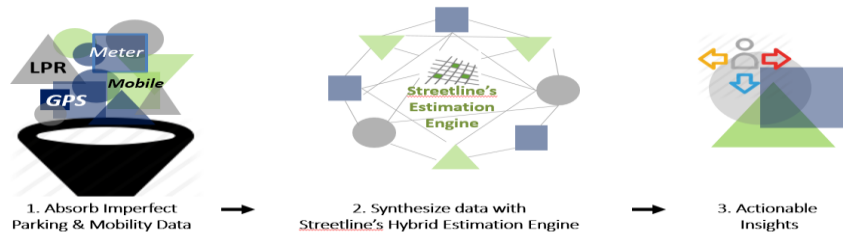
- Only Streetline has a portfolio of three sensing devices that generate primary data.
  - **Sensors** are now in their 5th generation, with batteries that last 8+ years, and generate 96% accurate occupancy data in real world installations.
  - **Streetline's cloud based camera service** can convert camera images from parking lots into parking occupancy with 97% accuracy. Existing cameras meeting our specifications add this functionality with no additional capital expenditure.
  - **Streetline's Software** Development Kit (SDK) can be added into any smart phone application and will capture parking arrivals and departures and thus make every smart phone a parking sensor. This captures accurate data at almost zero cost.

- Streetline also leverages other existing data as part of a total smart parking data system.
  - **Parking payment**[1] is as little as 11% accurate in correlation to parking occupancy. However, using Streetline's "sensor-per-space" installations, Streetline has confirmed the industry's most accurate correlations between parking payment and parking occupancy.
  - **LPR data** offers limited coverage & quality. While it is a non-essential, it can be valued as an additional data source. The value of this is highly dependent on the revisit rate, driving technique, and quality of the LPR camera.
  - **Off-street parking operations**. Streetline APIs absorb data out of existing access control equipment. Streetline's ParkEdge platform publishes location, hours, prices, inventory and real time occupancy. ParkEdge adds off-street parking to the motorist's parking search.

The result of this robust sensing portfolio is the foundation of Streetline's Hybrid Platform. This approach delivers Smart Parking occupancy data at a fraction of the investment of our legacy sensor per space system.

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[1] In http://docs.trb.org/prp/16-2490.pdf the authors refer to poor correlation of payment and occupancy in Oakland, Streetline's Estimation Engine (data fusion) solution leverages limited correlations that may exist on given block. To confirm the effects on consumer experience when using only payment information, Streetline measured consumer apps that claim real time parking guidance based on payment data in the city and found, over the course of 100 observations that only 11% of the blocks labeled as 'parking available' actually had space available.

The Hybrid Platform

The above sensing strategy is the foundation of a new approach to Smart Parking called The Hybrid Platform. The Hybrid Platform is comprised of the following three components: (1) Streetline Hybrid Smart Parking occupancy data capture (2) Streetline Estimation Engine (3) Mobile and web applications for the City, its Merchants, Residents and Visitors to access never-before available city-wide parking data and parking guidance on each integrated block.

1. Absorb Imperfect Parking & Mobility Data → 2. Synthesize data with Streetline's Hybrid Estimation Engine → 3. Actionable Insights

1) The Hybrid Smart Parking Occupancy Data Capture

To create the most accurate and most comprehensive parking occupancy data, Streetline first captures data with three Streetline sensing devices: in-pavement sensors, cameras overhead, and smart phone with Streetline software.   Streetline then expands the quality and quantity of total data by leveraging outside data sources including; non-streetline sensors, parking payment, LPR, gates and other data that is relevant to parking occupancy. Streetline also gathers all parking prices and policies as part of the solution installation.
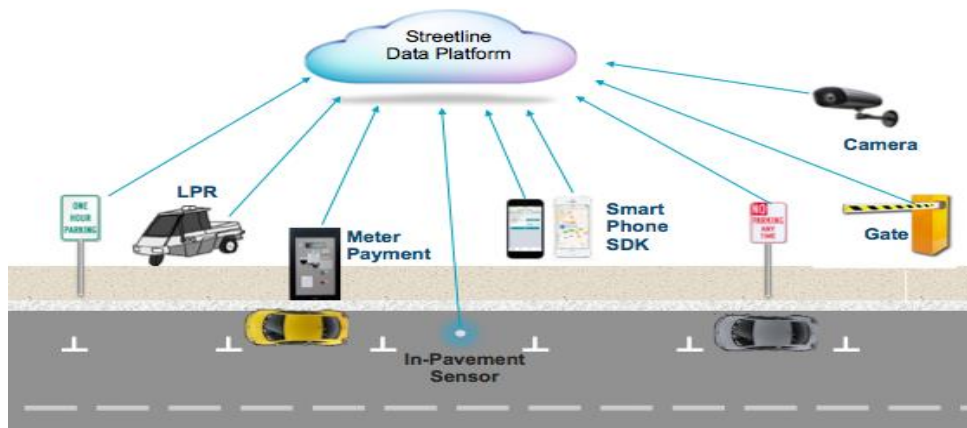
Streetline's Hybrid data capture strategy is the industry's most comprehensive and most flexible. Compared to a sensor-per-space installation, the Hybrid maintains virtually all data quality, expands the geographic coverage of parking occupancy data to the majority of the city, and dramatically decreases the cost. Cities can receive benefit from existing investments that can now contribute data to smart parking. Example, city surveillance cameras can be utilized to also contribute to parking occupancy with no additional capital expense.

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The Newest Addition to Occupancy Sensing! Software Development Kit (SDK)

Parking Inference Software Development Kit (SDK) is a code library that is part of Parker that can easily and quickly be embedded into any 3rd party iOS and/or Android mobile application. The Parking Inference SDK converts smartphones into mobile parking sensors using the motion sensors in the phone, providing the ability for apps to recognize that the user has parked or departed from a parking space. As part of this offer, Streetline is making the SDK freely available for use in city applications or other 3rd party apps.

What does it do?

- Every time a driver parks in a spot, the SDK detects the arrival and departure, with time and location
- These events create a notification event on the phone, available for use in 3rd party apps. Potential uses include:
  - Integration with your parking payment apps - 'would you like to start payment for your space?'
  - Integration with electronic city permitting apps – 'you have parked in an E permit zone and you do/do not have permission to have parked here'
  - Coupons/Special offers from downtown businesses – 'Looks like you parked near XYZ, show them this notification and get 10% off your purchase'
- Lastly, the anonymous arrival and departure information is then incorporated into parking guidance.

Why is the SDK Important?

The anonymous arrival and departure information is a critical component of parking guidance and analytics. As the proportion of this data relative to the overall parking activity increases, we are able to provide improved granularity in analytics and parking guidance. The SDK has two additional advantages. It provides parking occupancy data 24 hours a day and throughout the city, wherever motorists park.

Battery Consumption?

- Battery consumption is only ~1%
- *How do we keep battery consumption so low?* The Parking Inference SDK operates in the background to listen to motion events using the device's motion sensor. When the SDK infers an arrival or departure, only then will it activate the GPS to take a snapshot of the location.

Privacy?

The parking Inference SDK DOES NOT collect any personally identifiable information as the Parker app and SDK do not require user registration.

How much does this cost?

- It is already installed in the Parker app
- Free to the City & 3rd party app developers and only requires time and resources to complete the integration

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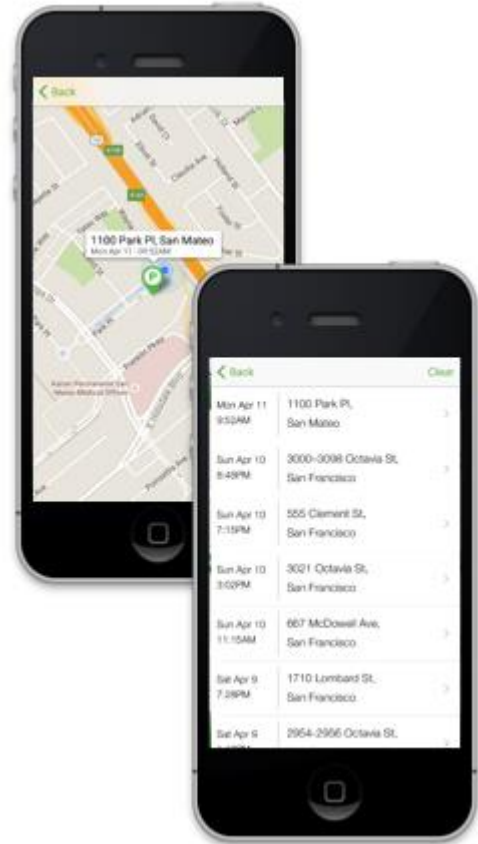
How does this help the City, its Residents and Visitors?

- Automatically remembers and displays to the driver where they parked
- Remind residents and visitors to pay their meter or that they've overstayed the time limit
- Alert residents and visitors that street sweeping hours are about to start

  And that's just the start!

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2) Streetline Estimation Engine

The Streetline Estimation Engine is a machine-learning analytics engine hosted on Streetline's secure server infrastructure that ingests and combines the above data sources to provide real time consumer guidance in addition to occupancy analytics. Streetline's use of the single sensor per block face provides the estimation engine with the ability to *continuously* adapt to the quality and prevalence of additional data sources, all the while providing best in class consumer guidance and analytics.

The Streetline Estimation Engine routinely achieves 90% accuracy. Occupancy analytics reports generated by the Hybrid Platform are within 5-10% average occupancies, over the same period, when compared with data captured by a full sensor-per-space deployment. This accuracy level is achieved with just the installation of one sensor per blockface. The integration of additional data sources, such as the City's meter/mobile payment data, will strengthen the accuracy over the first year.

The real-time parking guidance via our mobile guidance application and Guidance API also target a 90% accuracy level. This means that 9 out of 10 times that a user is informed that parking is available on a block, they will find parking. *Just think – no more circling for parking in your city.*

3) Mobile and Web applications

Utilizing the occupancy demand data generated by the Hybrid Platform, the city can access a range of mobile, web and API tools for the city to obtain a city-wide view of occupancy demand, optimize curbside utilization, make informed policy decisions and provide real-time guidance to available parking spaces. Our Basic Platform suite consists of quarterly analytics reports delivered to your inbox. We are offering access to advanced analytics on-demand via the <u>Premium</u> version of the product.

Products	
Parker™ – Mobile guidance	Parker is a free mobile application available for iPhone® and select Android™ devices that provides residents and visitors with a complete parking assistant in the palm of their hand. Parker provides motorists with detailed maps on capacity, availability, policies, and pricing.
ParkerMap™ – Online Parking Guidance	ParkerMap allows anyone to create a real-time parking map for free and embed it on their website. Whether you're a merchant trying to bring customers to your establishment, a university managing visitors for the big game, or a city looking to reduce congestion downtown, letting motorists know where to park is key.
ParkEdge™ – Off-street Publishing to Parker	Using ParkEdge, city and privately-owned garages can publish locations on Parker, along with occupancy, policy and pricing information. ParkEdge offers a complete motorist experience by making garage information available in Parker.

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Analytics Reports – Premium On-Demand 24/7/365 Offering

ParkSight ™

The premium advanced analytics offering includes the Occupancy, Demand, Duration and Turnover analytics in the basic tier with additional data extensions and access capabilities via ParkSight ™, our web portal.

ParkSight Analytics™ is offered on a Software-as-a-Service (SaaS) basis that can be accessed with a secure login credential via the web. It provides an easy-to use and intuitive data dashboard featuring a suite of zoomable maps, color-coded charts, graphs and tables.

Data Extensions:
- Hourly data from 12am through 11pm
- Day of Week extension to display data by each day of the week to include Weekends (Mondays, Tuesdays, etc)
- Custom Date Range - monthly, quarterly, or annually*
- Areas – Downtown, Midtown, etc.
- Demand report extension to display all blocks Above/Below the City's target occupancy range
- Duration report extension to display overstay violation trends

Access Extensions:
- 24/7 access to view, analyze and export data
- Export features include: PDFs, CSVs, Images

Areas
(All)

Blocks
(All)

Date Range
2/28/2016   4/2/2016

Hours
(All)

Days
Saturday

Sample Occupancy Report for Saturdays in March 2016 between 12am – 11pm

Project Management and Timeline

We have learned that project implementations are at their best when there is a collaborative effort with clear communication between the City and Streetline. The City must appoint a Person in Charge (POC) to partner with Streetline as we implement the system, onboard and train staff, and work together to build a smarter smart city.

We envision building, learning and growing over the next three years together.


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 + 1st year: Collaborate. Educate. Empower
 + 2nd year: Assess. Implement. Track
 + 3rd year: Assess. Implement. Track. Renew.
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The installation begins with a single sensor per blockface. The sensor serves as our eyes on the ground to validate and calibrate the disparate parking and mobility data sources that exist in your city today. We have refined our installation process to be able to install 80-100 blockfaces per day (refer to the FAQ for the detailed installation process). As these are put in place, we will simultaneously deploy our Field team to collect policy data for us to calibrate against the sensor. All this data will feed into the Hybrid Platform, running securely on our servers to learn and refine occupancy insights.

The Hybrid Installation Environment – What Works Well

- Demarcated Spaces
- Undemarcated Spaces (POC in progress; release expected soon)
- Metered Spaces
- Time Limited Spaces
- Pay-by-Space/Pay-by-Plate

The Hybrid Installation – Physical Architecture
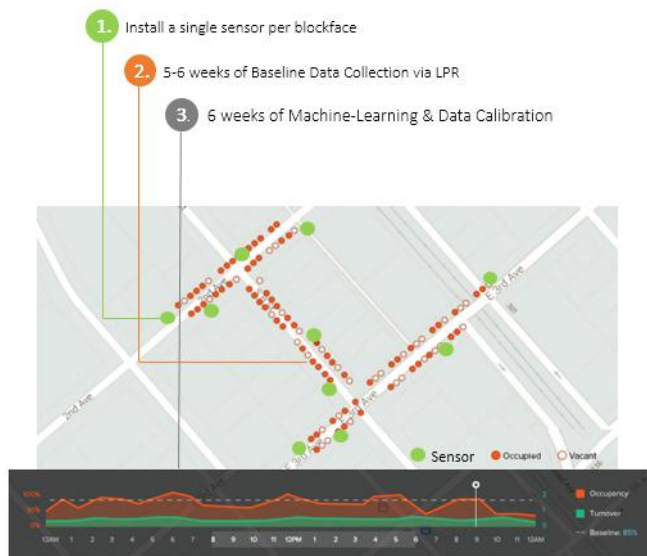
5-6 weeks of Baseline Policy Collection

Integrations

Parking Inference Software Development Kit (SDK)

The Parking Inference SDK is a library within Parker that runs in the background as a service and detects every Arrival and Departure. It can also be easily integrated into any 3rd party iOS or Android application. The Arrival and Departure events are automatically published to the cloud and incorporated into the Streetline Hybrid Platform to further improve the quality of parking guidance and analytics. Those same Arrival and Departure events automatically remember where the motorist parked.

Meter & Mobile Payments

Meter and Mobile Payment data can be posted to the Streetline Meter Payment API. Streetline has previously integrated with several major meter and mobile payment vendors (refer to FAQ for list of current integrations). Streetline can add additional 3rd party meter vendors at any time.

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LPR Readings

If the city or 3rd parties can provide LPR observations then Streetline can incorporate this into the initial data collection, calibration and learning period. LPR data provided to Streetline on an on-going basis can be incorporated into the Hybrid Platform for improved performance and accuracy.

Video/Camera Snapshots

In addition to vehicle sensors, Streetline has also developed a camera based parking detection system that detects Arrival and Departure events. These events can be used by the Hybrid Platform as another data source to improve parking guidance and analytics. Existing 3rd party cameras may also potentially be utilized to feed images into the Streetline Hybrid Platform.

Other Sensor Data

Data from Streetline sensors or non-Streetline sensor data can be incorporated into the Hybrid Platform by posting their Arrival and Departure events to the Streetline Parking Status API. Streetline Parking Status API is documented and Streetline will work with the city or 3rd party vendors to complete the integration.

Summary

We are offering Oakland a unique opportunity to utilize this Smart Parking system fully funded by external sources. The system includes occupancy demand data to understand curbside utilization and parking guidance on each block in your city. Cities that qualify for this funding are limited and the amount of time we can keep this offer open is limited. This offer is available to Oakland through 2016.

Terms & Services:
Coverage: up to 1,500 metered and unmetered block-faces

Services Included:
- ParkSight – On-Demand Access to Analytics
- Parker - Consumer Parking Guidance
- ParkerMap – Merchant Web tool
- ParkEdge – Off-Street Parking Management

Guided Enforcement - Additional Fee Applies
Program Duration: 3 years
Renewal: Streetline intention is to renew at the end of the term, under the same terms.
Cost: $0 including equipment, installation, operations, and maintenance
Value: $915,000
Data ownership: Streetline
City data rights: License for unlimited rights to use data in Streetline applications
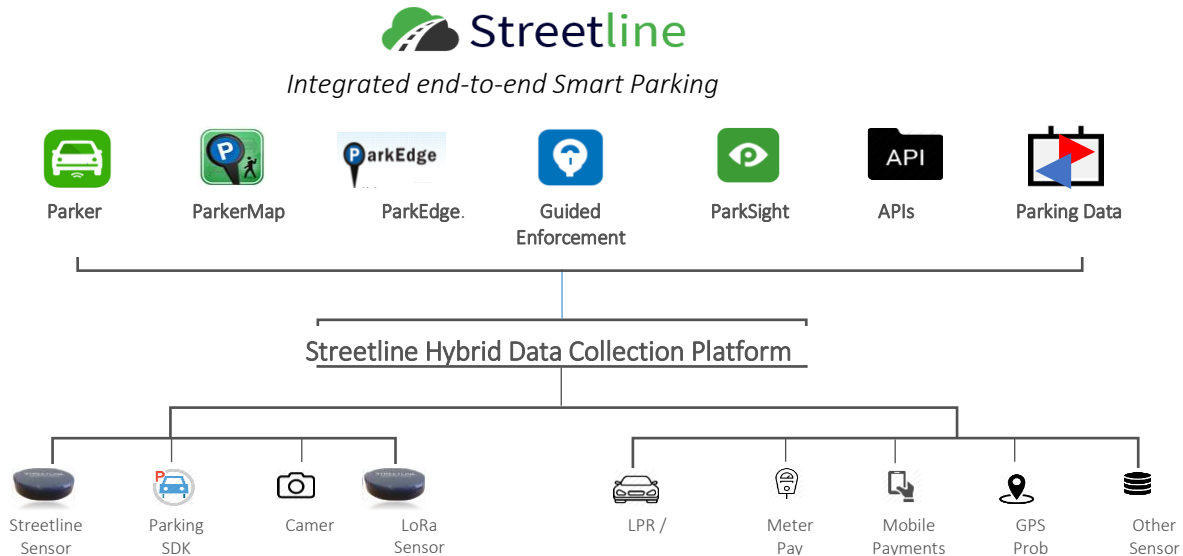**City data restrictions**: City may not license (sell/give) data to anyone, without Streetline approval.

Zero cost to the city. Because of the light infrastructure and new business model, Streetline can offer the Smart Parking Hybrid Platform to Oakland for 3 years at no cost to the city.

Non Exclusive. Oakland may work with any/all other vendor(s) during our contract.

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About Streetline

Streetline is a leader in the Smart Parking industry that has amassed almost 10 years of expertise and experience in providing fully integrated end-to-end Smart Parking Platform. Our solutions include parking occupancy detection, 24/7 curbside utilization monitoring and parking policy and demand analytics for cities to effectively facilitate sophisticated analyses, planning and implementation of parking management programs. Combining our patented sensing technology and half a billion collected parking events into our in-house machine-learning engine, we have developed a new Hybrid Smart Parking Platform that provides comprehensive, accurate and actionable occupancy data to empower you with a city-wide view of demand on each integrated block.

Integrated end-to-end Smart Parking

| Parker | ParkerMap | ParkEdge. | Guided Enforcement | ParkSight | APIs | Parking Data |

Streetline Hybrid Data Collection Platform

| Streetline Sensor | Parking SDK | Camer | LoRa Sensor | LPR / | Meter Pay | Mobile Payments | GPS Prob | Other Sensor |

Partners

Parking is the "last mile" challenge in automobile and multi-modal transportation. Streetline was acquired by Kapsch in 2015 with the goal of combining Kapsch and Streetline transportation products. Kapsch is a leader in traffic and incident response, road tolling, and many other solutions. Kapsch and Streetline products are synergistic and compatible for use by cities and DOTs. Kapsch will sell the combined solutions in over 40 countries.

Kapsch solutions overview:
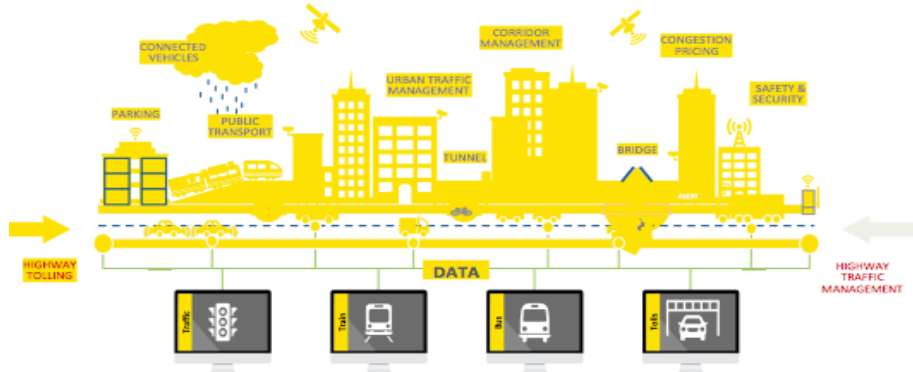
Let this 2016 journey begin...

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