U.S. Intelligent Transportation Systems: Contents

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U.S. Intelligent Transportation Systems: Summary Observations

• Automated electric transportation systems are going to be the future of ITS in the USA; automotive & ICT interests are converging – e.g., Apple & Tesla.

• Individual needs, whether due to age, comfort or independence, underscore the importance of some degree of personal transportation in the USA – e.g., personal rapid transit (PRT) systems.

• Getting beyond the currently available emerging mobile decision tools, social media apps and service request apps, a unified, seamless platform for handling all modes of transactional and personal transportation is needed.

• A key obstacle is getting proprietary interests together.

• Tekes' macro cluster-building approach that is based upon a single platform appears to have promise as the ITS technology lifecycle progresses.
Europe is moving toward banning cars in urban centers, and one might conclude this may become a trend in the USA as well.

*SAAR = Seasonally Adjusted Annual Average

Source: The Times, 15 July 2013

Source: Wards Auto, 3 March 2014

Source: Business Insider, 3 April 2013

No place for cars’ in cities of the future.
But public transportation does not address the conventional individual needs of many in the U.S. driving public, especially in light of the aging population, and high automobile density in the USA appears to be here to stay for the time being.

*It would be easier to get commuters on board with support for public transportation without the dreaded “first- and last-mile problem”: the extra time and hassle commuters face when they’re going from home to a transit station and then from the station at the other end of the trip to a final destination.*

Source: UTNE, 10.2009

![Projected U.S. Vehicles Per Household](source.png)
A continuance of high automobile usage presents major challenges to the U.S. surface transportation industry:

- **Safety**: According to the U.S. National Highway Traffic Safety Administration, there were 5.4 million crashes, 2.24 million injuries and 32,885 deaths in 2010.

- **Mobility**: According to the Texas Transportation Institute, U.S. highway users wasted 4.8 billion hours stuck in traffic in 2010—nearly one full work week (or vacation week) for every traveler.

- **Environment**: According to the Texas Transportation Institute, the total amount of wasted fuel topped 1.9 billion gallons in 2010.

*Source: U.S. Department of Transportation*
U.S. Intelligent Transportation Systems: Introduction

U.S. Department of Transportation (DOT) sees Intelligent Transportation Systems (ITS) as a solution; the market is excited.

18th World Congress on ITS Orlando, Florida*

Left Click, below, and Right Click Open Hyperlink and expand screen:
https://www.youtube.com/watch?v=UT52U0bhdHo

*Link to 21st WCITS in Detroit (9.2014):
U.S. Intelligent Transportation Systems: Introduction

Intelligent Transportation Systems America (*ITS America*) is the USA’s largest public & private sector membership organization dedicated to finding ITS solutions.

<table>
<thead>
<tr>
<th>Leading <em>ITS America</em> Members</th>
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<tbody>
<tr>
<td>Arizona Department of Transportation</td>
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<td>California PATH, University of CA, Berkeley</td>
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<td>California Department of Transportation</td>
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<tr>
<td>Capital Metropolitan Transportation Authority</td>
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<td>Carnegie Mellon University</td>
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<td>Contra Costa Transportation Authority</td>
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<td>Cubic Transportation Systems</td>
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<td>Deutsche Telekom</td>
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<td>Econolite Group, Inc.</td>
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<td>Florida Department of Transportation</td>
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<td>HELP, Inc.</td>
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<td>Image Sensing Systems</td>
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<td>Iteris, Inc.</td>
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<td>Kapsch TrafficCom</td>
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<td>Massachusetts Bay Transit Authority</td>
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<td>Meritor WABCO</td>
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<td>Metropolitan Transportation Commission</td>
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<td>Michigan Department of Transportation</td>
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<td>National Renewable Energy Laboratory</td>
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<td>Qualcomm</td>
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<td>Siemens Industry, Inc.</td>
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<td>Southwest Research Institute</td>
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<tr>
<td>Texas A&amp;M Transportation Institute</td>
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<td>Texas Department of Transportation</td>
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<tr>
<td>TransCore Holdings, Inc.</td>
</tr>
<tr>
<td>University of Michigan Transportation Research Institute</td>
</tr>
<tr>
<td>University of Maryland, CATT Lab</td>
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<tr>
<td>Verizon Communications</td>
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<tr>
<td>Virginia Tech Transportation Institute</td>
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<tr>
<td>Xerox State &amp; Local Solutions</td>
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</table>
U.S. Intelligent Transportation Systems: Vehicle-to-Vehicle (V2V) Applications

DSRC is the first step in actualizing the DOT vision.

- DSRC (Dedicated Short Range Communications) is a two-way short- to- medium-range wireless communications capability that permits very high data transmission critical in communications-based active safety applications – i.e., vehicle-to vehicle (V2V) and vehicle-to infrastructure (V2I).

Left Click, below, and Right Click Open Hyperlink and expand screen:
https://www.youtube.com/watch?v=POcQUtOvZs
U.S. Intelligent Transportation Systems: Vehicle-to-Infrastructure (V2I) Applications

DSRC technology makes it possible to automate data collection about traffic and roadway conditions, and it presents a 21st-century challenge to implement it just as in past transportation revolutions.

Vehicle-to-Infrastructure (V2I) Technology Landscape

DSRC Traffic Management

Bill Ford’s V2I Challenge

Left Click, below, and Right Click Open Hyperlink and expand screen:

https://www.youtube.com/watch?v=hMc1XiwDEUY&feature=player_embedded

Left Click, below, and Right Click Open Hyperlink and expand screen:

https://www.youtube.com/watch?v=ypKyyU8418&feature=player_detailpage
University of Michigan Transportation Research Institute and DOT conducted a Safety Pilot Model Deployment (SPMD) in Ann Arbor, Michigan, from 8.2012 to 8.2013, using DSRC-enabled equipment in a real world environment, resulting in a major national decision.

- 2,836 vehicles (cars, trucks & buses)
- 21 signalized intersections, 3 curve locations & 5 freeway sites

For pilot details see: [http://www.safetypilot.us/](http://www.safetypilot.us/)
# U.S. Intelligent Transportation Systems: Important Pilots / Demonstrations

## SPMD Value Chain

<table>
<thead>
<tr>
<th>Automakers</th>
<th>Roadside Equipment</th>
<th>Vehicle Awareness</th>
<th>Aftermarket Safety Devices</th>
<th>Device Certification</th>
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</thead>
<tbody>
<tr>
<td>Ford</td>
<td>Arada Systems</td>
<td>Arada Systems</td>
<td>Kapsch TrafficCom</td>
<td>Booz Allen Hamilton</td>
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<td>General Motors</td>
<td>Kapsch TrafficCom</td>
<td>AutoTalks, Ltd.</td>
<td>Cohda Wireless &amp; Delphi as Subcontractor</td>
<td>OmniAir</td>
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<td>Honda</td>
<td>ITRI (Taiwan)</td>
<td>ITRI (Taiwan)</td>
<td>Cohda Wireles &amp; Visteon as Subcontractor</td>
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<td>Hyundai-Kia</td>
<td>Cohda Wireless &amp; Cisco Systems</td>
<td>Cohda Wireless</td>
<td>Denso</td>
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<td>Mercedes-Benz</td>
<td>Savai Networks</td>
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<td>Volkswagen</td>
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Future Watch Report
U.S. Intelligent Transportation Systems: Important Pilots / Demonstrations

In February 2014, DOT announced it would push toward mandating V2V technology in the USA for all light vehicles based on SPMD.*

U.S. Intelligent Transportation Systems: Important Pilots / Demonstrations

SPMD results prompts ‘first mover’ technology initiatives

- **Telecom Company AT&T Drive**
  - AT&T’s modular, global solution, allowing automakers choices on services and capabilities in order to differentiate their solutions for the marketplace
  - Ford, GM & Tesla connected by 2015
  - Technology Partners:
    - Ericsson – Global applications delivery network
    - VoiceBox – Natural language to vehicles
    - Synchronoss – Cloud platform solution, enabling seamless network activation
    - Accenture – V2V services & solutions, including telematics & big data analytics
    - Amdocs – Customized billing solutions
  - See link for details and relevant videos: [http://about.att.com/newsroom/connected_car.html](http://about.att.com/newsroom/connected_car.html)

- **Open Automotive Alliance (OAA)**
  - Goal is to bring Android platform to connected cars by late-2014
  - Accelerates innovation in the car with an approach that offers openness, customization and scale
  - Member Companies:
    - Google
    - Nvidia – Visual computing Technology
    - Audi
    - General Motors
    - Honda
    - Hyundai
  - See: [http://www.openautoalliance.net](http://www.openautoalliance.net)
U.S. Intelligent Transportation Systems: Important Pilots / Demonstrations

Named by *The Guardian* as one of the top five city innovations in August 2013, the SFpark pilot, launched in 2011 by the San Francisco Municipal Transportation Agency (SFMTA), uses new technology and policies to improve parking in San Francisco.*

- **Project Goals**
  - Reduce congestion
  - Improve speed & reliability of transit
  - Improve air quality
  - Improve customer satisfaction

- **Pilot Status**
  - SFMTA & U.S. DOT are analyzing data, with next steps to be released in Spring/Summer 2014.

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**Conceptual Overview**

- Left Click, below, and Right Click Open Hyperlink and expand screen:
  - [http://vimeo.com/13867453](http://vimeo.com/13867453)

**Application in Practice**

- Left Click, below, and Right Click Open Hyperlink and expand screen:
  - [http://vimeo.com/23656665](http://vimeo.com/23656665)

*See: [http://sfpark.org/](http://sfpark.org/)*

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*See: [http://sfpark.org/](http://sfpark.org/)*
U.S. Intelligent Transportation Systems: Important Pilots / Demonstrations

New York City Department of Transportation (NYCDOT) instituted the Midtown In Motion (MIM) project in July 2011 to promote multimodal mobility in the Midtown Core of Manhattan.*

- **Project Profile**
  - First Phase - Network of 100 microwave sensors, 32 traffic video cameras and E-ZPass readers installed at 23 intersections in NYC midtown to get NYC traffic moving faster by adjusting traffic signal patterns, unplugging bottlenecks and smoothing the flow of traffic.

- **Project Status**
  - First phase resulted in an overall 10% improvement in travel speeds; ITS America & ITS-NY 2012 awards
  - System expanded to more than 270 square blocks, including an additional 110 microwave sensors, 24 traffic video cameras, and 36 E-ZPass readers.*

*Web link for further details including cost:
**U.S. Intelligent Transportation Systems: Important Pilots / Demonstrations**

NYC’s *Midtown in Motion* system serves as a model for other metropolitans deploying smart traffic systems

<table>
<thead>
<tr>
<th>Company</th>
<th>Offering</th>
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<tbody>
<tr>
<td>TransCore</td>
<td>TransSuite® advanced traffic management system (ATMS) and the integration Encompass® radio frequency identification (RFID) readers to read local toll tags</td>
</tr>
<tr>
<td>Peek Traffic Corporation</td>
<td>ATC CBD Controller® - advanced traffic controller</td>
</tr>
<tr>
<td>Econolite/CBH)</td>
<td>Non-intrusive radar detection systems – remote traffic microwave sensor (RTMS) technology</td>
</tr>
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*Note: *Midtown in Motion* is connected to New York City Wireless Network (NYCWiN). See: [http://www.gdc4s.com/Documents/NotInNavDocs/NewYorkCityWirelessNetwork.pdf](http://www.gdc4s.com/Documents/NotInNavDocs/NewYorkCityWirelessNetwork.pdf)
Real-time Midtown in Motion traffic information is available on NYCDOT’s website, on smartphones and tablets, allowing the public to select the best mode of physical mobility in the city.

Just as important, Midtown in Motion traffic information is made accessible by applications developers.

Web link to real-time NYC traffic map: http://flowmap.nyctmc.org/weaborb4/ezpass_midtown/ezpass_midtown.html

New companies have seized upon the opportunities in NYC for smart transportation application development.

- **NYC-Based Roadify Example**
  
  NYC-based HotSpot offers door-to-door transit, walking, biking, and taxi directions and real-time location alerts on mobile devices.

  - **Crowdsourcing Traffic & Parking APP**

  - **NYC Public Support for Company**
    - See: [https://www.hopstop.com/](https://www.hopstop.com/)

  Left Click, below, and Right Click Open Hyperlink and expand screen:
  
  - [https://www.youtube.com/watch?v=bjZXDX4VxyE&feature=player_embedded](https://www.youtube.com/watch?v=bjZXDX4VxyE&feature=player_embedded)

  - [https://www.youtube.com/watch?v=PKrTaUfTx7s&feature=player_detailpage](https://www.youtube.com/watch?v=PKrTaUfTx7s&feature=player_detailpage)
U.S. Intelligent Transportation Systems: Emerging Transportation Revolution

A continuance in the ownership & operation of personal vehicles in the USA has its pressures & pleasures.

- The desire to go where we want whenever we want has been a powerful market force for centuries… But mobility is increasingly expensive and inefficient…[e.g.,] the total cost of vehicle ownership…[for] a machine that sits unused on average, almost 22 hours out of every day.

Source: Self Driving Cars, KPMG, 2013

*See: https://www.citycarshare.org/

Source: The Economist, 22.9.2012
U.S. Intelligent Transportation Systems: Emerging Transportation Revolution

European ideas on vehicle use have been imported*. But more profound interests seem to be on the horizon.

According to [a Summer 2013 Intel] survey, 44% of U.S. respondents said they would like to live in a city, where cars, buses and trains operate autonomously. Forty percent said they thought driverless vehicles would cut down the number of traffic accidents, while 38% said it would decrease traffic congestion and 34% said it would reduce carbon emissions.

Source: Computer World, 18.2.2014

*See: http://www.zipcar.com/ & City Car Share video at https://www.citycarshare.org/

https://www.youtube.com/watch?v=BNhQYXChFBM&feature=player_detailpage
Nevada became the first state in the USA to allow driverless vehicles to operate on roadways starting in March 2012. And Google obtained the first license to operate an autonomous vehicle in Nevada in May 2012.

Google Autonomous Vehicle R&D

Left Click, below, and Right Click Open Hyperlink and expand screen:

https://www.youtube.com/watch?feature=player_detailpage&v=OCaf7Gz4Es
Several U.S. States have followed Nevada’s lead, legalizing testing on public roads: Florida (4.2012), California (9.2012), Michigan (12.2013). And autonomous vehicles have been the big story at recent Consumer Electronics Shows (CES) in Las Vegas.

Audi’s A7 Demonstration

Left Click, below, and Right Click Open Hyperlink and expand screen:

https://www.youtube.com/watch?v=H8KeM6jPq18&feature=player_detailpage

Source: MIT Technology Review, 22.10.2013
Autonomous vehicle commercialization may provide a new mobility aspect to the longtime efforts to develop personal rapid transit (PRT) in the U.S. urban environment.

**NASA-SkyTran PRT System***

Left Click, below, and Right Click Open Hyperlink and expand screen:

https://www.youtube.com/watch?v=OEMOpCRktm4&feature=player_embedded

See: http://www.skytran.net/

**CyberTran PRT System***

Left Click, below, and Right Click Open Hyperlink and expand screen:

https://www.youtube.com/watch?feature=player_detailpage&v=dd-uzo2DdP0

See: http://cybertran.com/

*Note: PRT-like system started in Morgantown, West Virginia, in 1970, and more recent applications in the UK & Dubai.
An automated U.S. electric transportation system is the future.

By challenging conventional wisdoms, it may be possible to “leapfrog” existing innovation pathways that provide incremental improvements in favor of a bold New mobility pathway that employs disruptive technologies.

Automated Electric Transportation
U.S. Oakridge National Laboratory (ORNL)
Existing cloud network control technology and intelligent personal assistant & knowledge navigator apps may make highly mobile personal rapid transit a reality in the not too distant future.


*NOTE: Tesla Motors confirmed 2014 talks with Apple; earlier Tesla CEO stated autonomous Tesla vehicles will be in production by 2016.
Related to future advanced PRT systems is another technological revolution – wireless energy transfer to moving vehicles.*

*Note: Korean & Swedish pilots/demonstrations are recognized.

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Stanford University’s Magnetic Resonance Coupling

Qualcomm’s Halo Wireless Electric Vehicle Charging

NC State University’s “Proof of Concept”
Dynamic Inductive Power Transfer


*Note: Korean & Swedish pilots/demonstrations are recognized.
U.S. Intelligent Transportation Systems: Forecasting the Market

ITS prospects appear promising; however, most remain in the early stages of the smart city technologies lifecycle.

**Hype Cycle of Smart City Technologies**

**ITS Market Forecast & Status**
- Global market is expected to reach USD 30.2 billion by 2019, at a CAGR of 11.1% from 2013.
- North America accounted for 42.2% of revenue in 2012.*

*Source: Transparency Market Research*

**Autonomous Vehicle Forecast**
- Tesla says production by 2016.
- ABI predicts truly technical reality by 2020; Navigant Research & IEEE forecast 75% market share by 2035 & 2040, respectively.

*Note DOT V2V 2014 decision.*
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Lovejoy-McAuley & Company