



# INOVAÇÃO NA INFRAESTRUTURA URBANA

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# Um Circulo virtuoso para as Cidades



# Cidades Inteligentes



Wi-Fi



Monitorament  
o  
Inteligente



Trafégo  
Inteligente



Iluminação  
Inteligente

## Connected Digital Platform

- Permite a automação de processos e flexibilidade de gerenciamento.
- Reduz custos de manutenção, operação e deslocamento (teletrabalho)
- Proporciona informações para o desenvolvimento urbanístico e meio ambiente
- Melhores serviços aos cidadãos
- Fator de Desenvolvimento Econômico

Parking

Smart  
Meter

Security

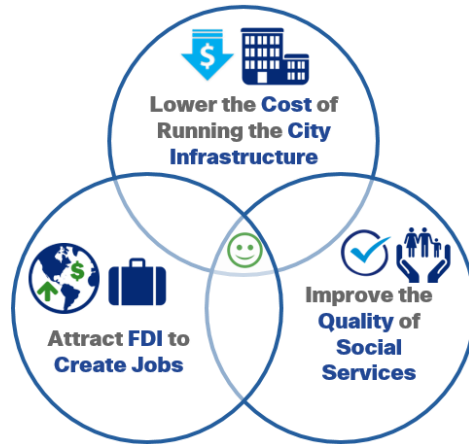
Traffic  
Mgt

# Smart Cities is a *Journey*, not a Destination



It is not about Technology, it is about the **People**, the **Citizens**

How do you deliver a better city to the **citizens**?



1 Initiative across all departments to get buy-in



2 Ecosystem



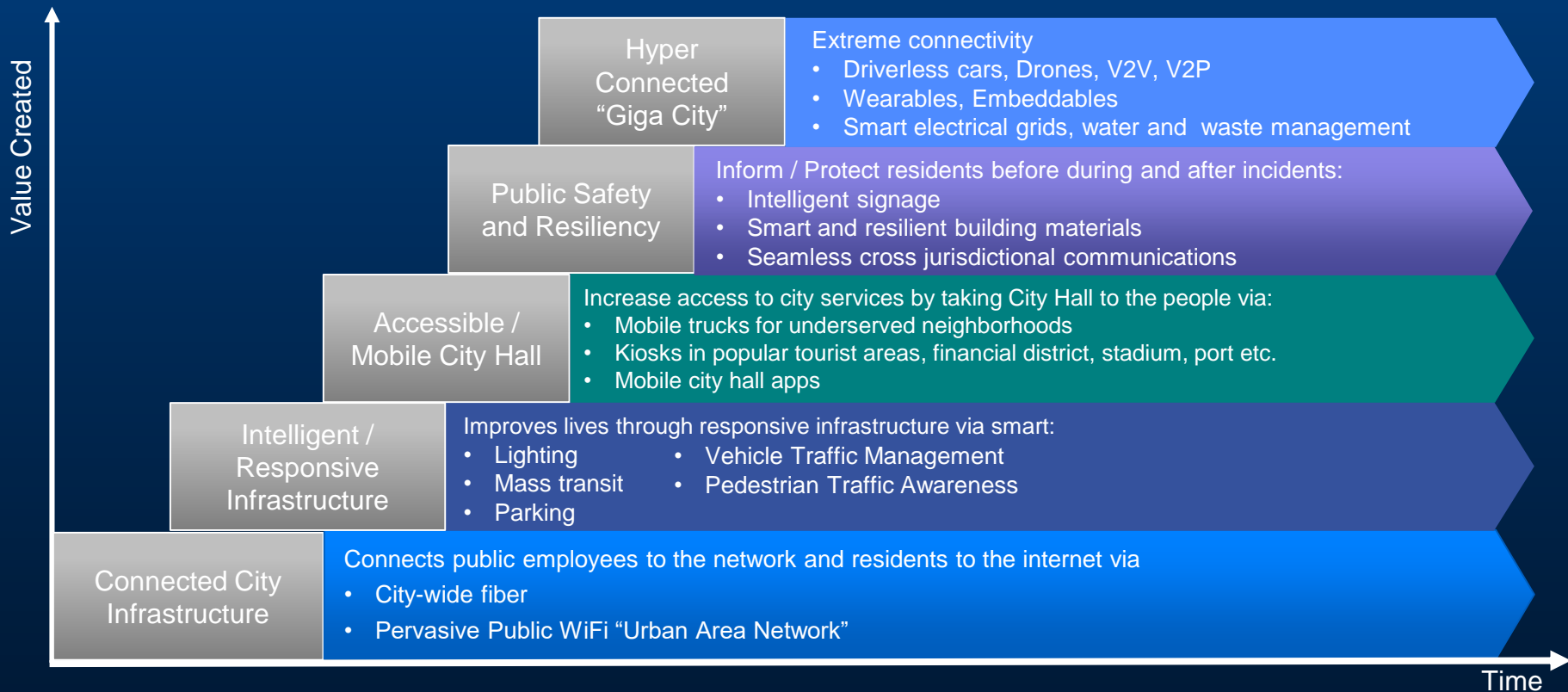
3 PPPP



4 Cross-Department Budget



# Digital City: The Journey





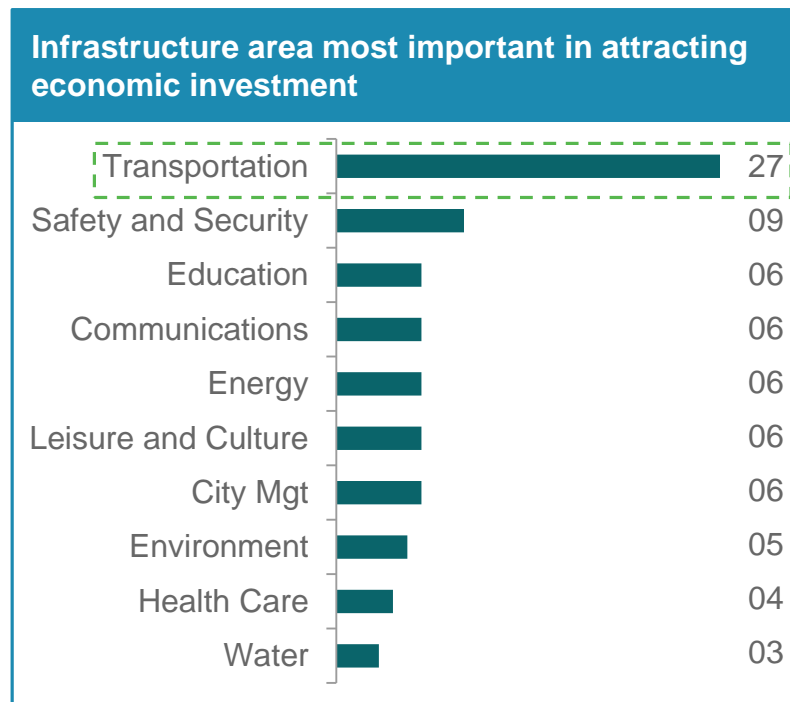
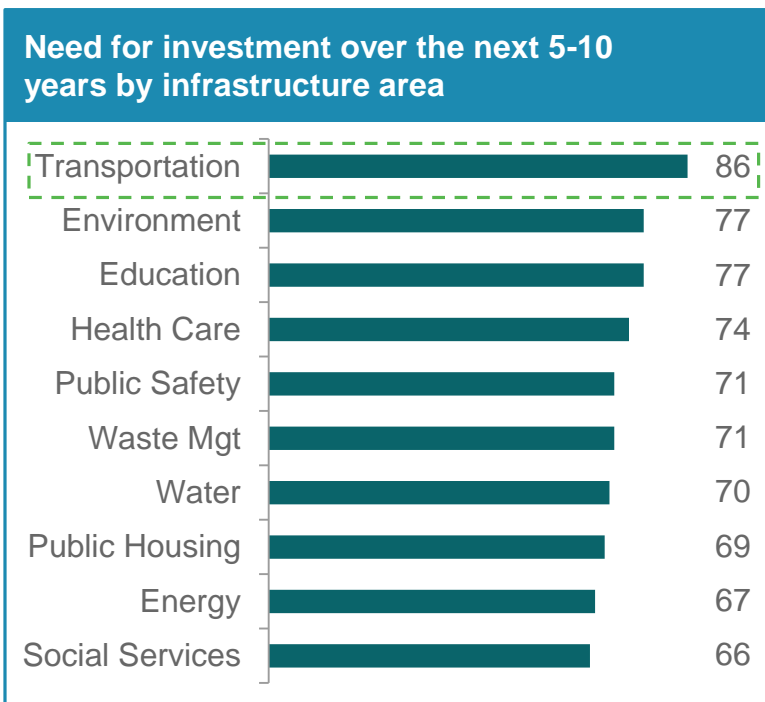


# Connected Roadways

Trends and Challenges

August 13<sup>th</sup> 2017

# Transportation: The Top Priority for Cities



Source: WEF 2009, Survey of public and private sector stakeholders across world's top 25 cities

# Global Trends Driving Changes in Transportation



## ● Technology

Increasing Connectivity

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Network Convergence

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IT in the Operational Domain

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## ● Socio Economic

Growing pressure to provide safer roads + mass transit

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New revenue opportunities for roadside/ station services

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Increased urbanization & congestion

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## ● Policy

Safety & Security Mandates

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Disparity between regions & countries

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Sustainability

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# Today's Transportation Challenges



## Safety



- More than a million people die each year on the world's roads.
- Over 33,000 highway deaths and 5.6 million crashes occur in the U.S. alone.
- Accidents on roadways are leading cause of death for ages 15-29.



## Mobility



- Now over one billion cars are on roads worldwide.
- Congestion causes 5.5 billion hours of travel delay.
- \$101 billion cost of urban congestion in U.S.
- Drivers in top ten congested cities in UK waste over 55 hours per year in traffic

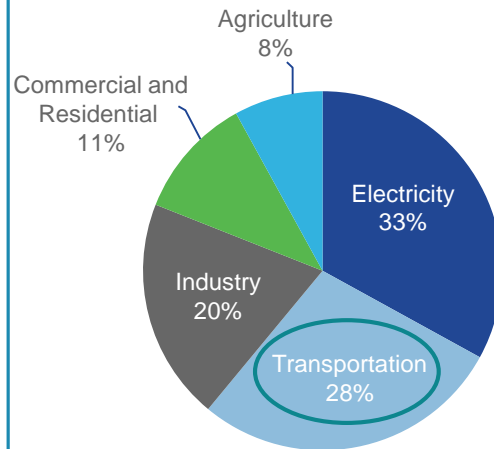


## Environment



- 2.9 billion extra gallons of wasted fuel in U.S. due to congestion
- Transportation creates nearly 1/3 of greenhouse gas emissions in the U.S.

Total Greenhouse Gas Emissions by Economic Sector in 2011



# São Paulo is driving the traffic modernization

## Doria deve lançar PPP para modernizar semáforos de SP

O objetivo é implantar uma nova tecnologia para que até 85% dos 6.400 semáforos da cidade possam ser operados remotamente

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# Transit Infrastructure as a driver for SMART CITIES



## Beyond Traffic: The Smart City Challenge

### Technology Elements *(Highest Priority)*



**Vision Element #1**  
Urban Automation



**Vision Element #2**  
Connected Vehicles



**Vision Element #3**  
Intelligent, Sensor-Based Infrastructure

### Innovative Approaches to Urban Transportation Elements *(High Priority)*



**Vision Element #4**  
User-Focused Mobility Services and Choices



**Vision Element #5**  
Urban Analytics



**Vision Element #6**  
Urban Delivery and Logistics



**Vision Element #7**  
Strategic Business Models & Partnering

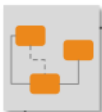


**Vision Element #8**  
Smart Grid, Roadway Electrification, & EVs



**Vision Element #9**  
Connected, Involved Citizens

### Smart City Elements *(Priority)*



**Vision Element #10**  
Architecture and Standards



**Vision Element #11**  
Low-Cost, Efficient, Secure, & Resilient ICT



**Vision Element #12**  
Smart Land Use



# Why Going “Digital” is Important For Transportation Now



# City Wide Network – Phase 1 – Foundation for Future Services



## CISCO VALIDATED DESIGN

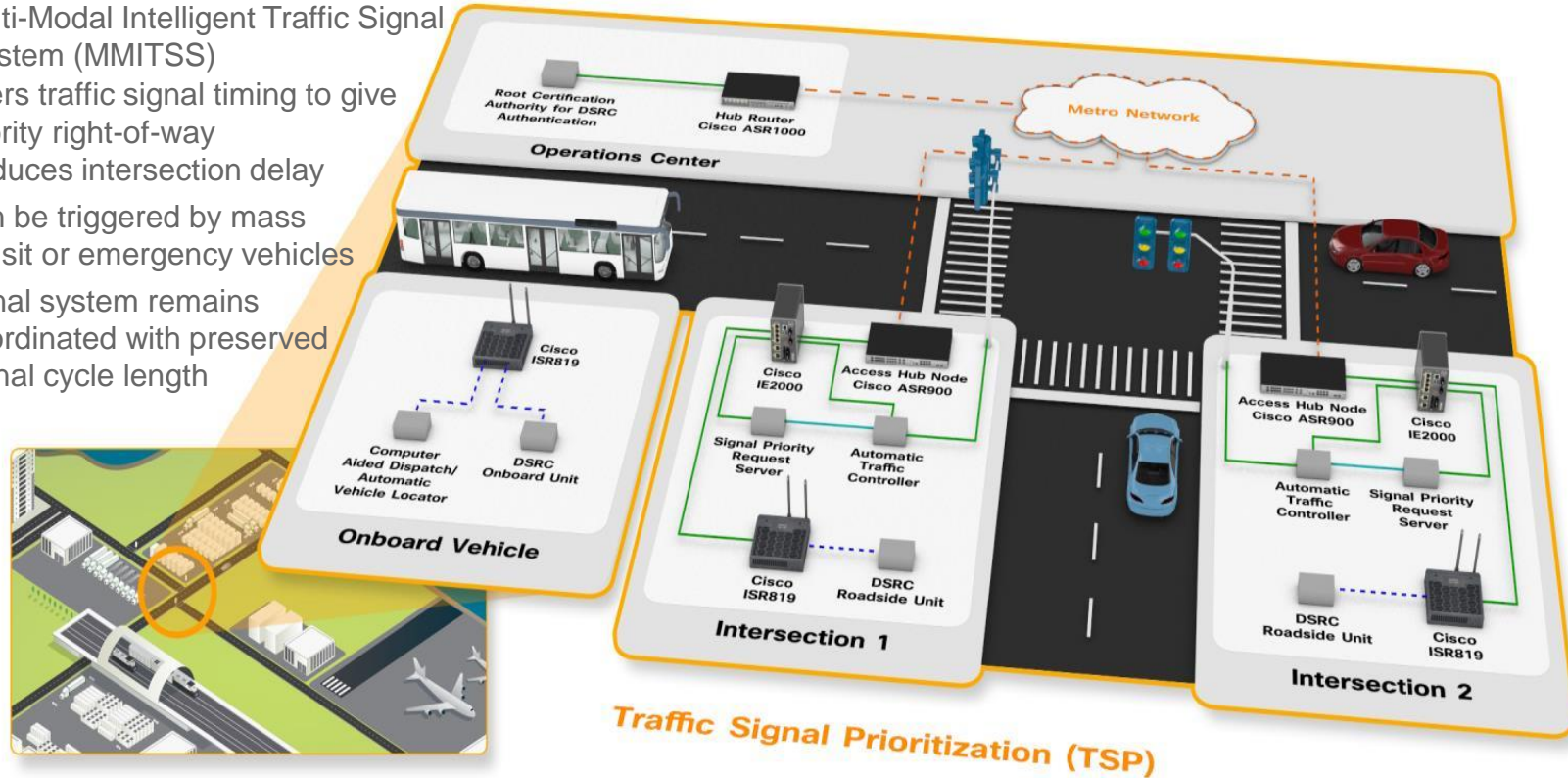


- (2) The 10-year infrastructure. Innovation...
- (3) Intelligent Transport Systems (ITS) are... services relating to different modes of transport and... coordinated and 'smarter' use of transport networks.
- (4) ITS integrate telecommunications, electronics and information technologies with... maintain and manage transport systems. The application of information and communication technology... interfaces with other modes of transport will make a significant contribution to improving environmental performance, energy efficiency, safety and security of road transport, including the transport of dangerous goods, public security and passenger...



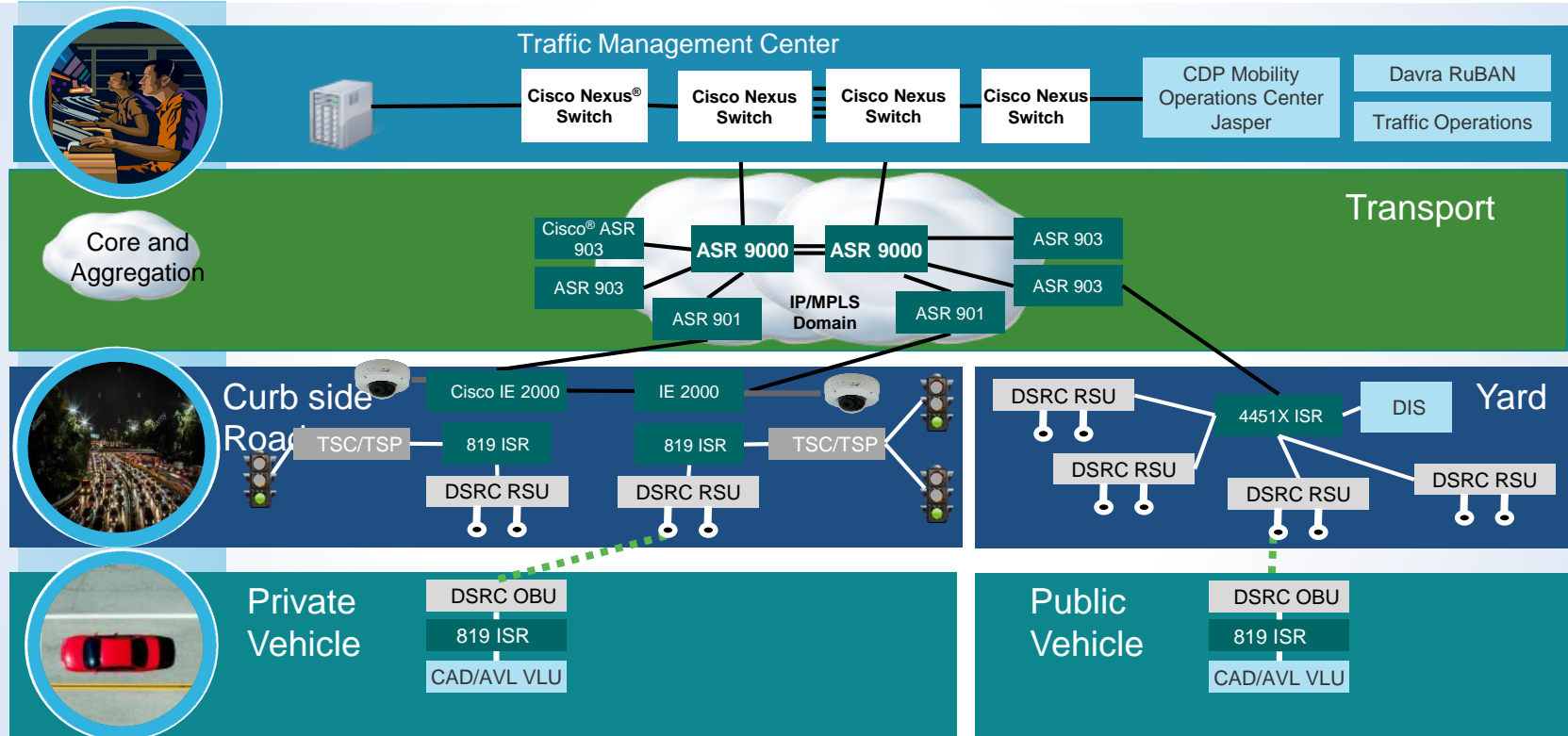
# Integrated Traffic Signal Prioritization (TSP) – Phase 2 – Integration & Coordination

- Multi-Modal Intelligent Traffic Signal System (MMITSS)
- Alters traffic signal timing to give priority right-of-way
- Reduces intersection delay
- Can be triggered by mass transit or emergency vehicles
- Signal system remains coordinated with preserved signal cycle length

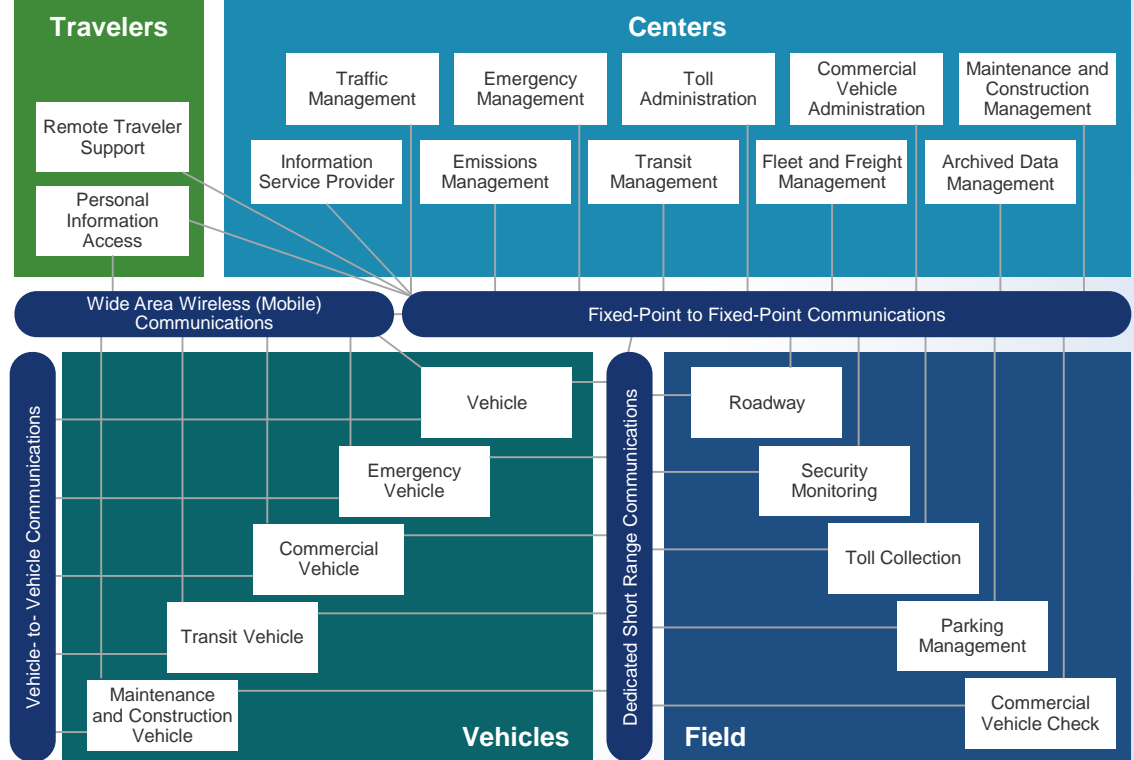
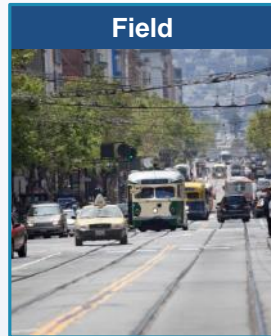
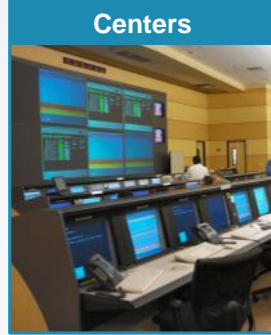




# Connected Vehicle Network – Phase 3 – Future Proof Infrastructure

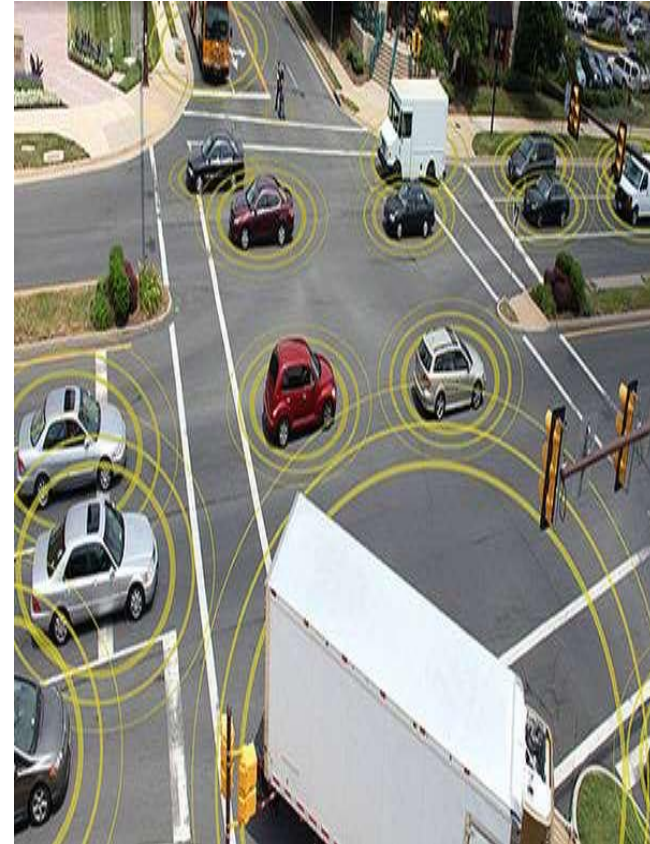


# Intelligent Transportation Architecture



# Dedicated Short Range Communication (DSRC)

- Two-way secure wireless communication system
  - short to medium range
- Standardization
  - IEEE802.11p used for DSRC. IEEE 1609 WG defines DSRC wireless communications standards for Wireless Access in Vehicular Environments (WAVE)
  - SAE J2735 defines the messaging schema implemented over DSRC to enable V2I and V2V data exchanges
  - SAE J2945 defines minimum performance requirements for DSRC systems
- Benefits
  - Designated License Bandwidth
  - Fast Network Acquisitions
  - Low Latency
  - High Reliability
  - Priority of safety application
  - Interoperability
  - Security and Privacy



# ITS Global Standards



**Center-to-Center**  
**IEEE 1512.x, TMDD**  
Emergency Management  
Traffic management



**Center-to-Field**  
**NTCIP**  
Traffic management

**Vehicle-to-Vehicle**  
**IEEE 802.11P, IEEE 1609.x, SAE J2735**  
Cooperative collision avoidance



**In-Vehicle**  
**SAE J1760, SAE J2366/x, SAE J2395**  
Data Collection  
Information display



**Vehicle-to-Infrastructure**  
**ASTM E2213, IEEE 802.11P,  
IEEE 1609.x, SAE J2735**  
Road hazard alerts  
Traveler information





# Reference Projects New York City

