

Commercial Vehicle Infrastructure Integration (CVII) Program



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Office of Modal Safety & Security Services

New York State Department of Transportation



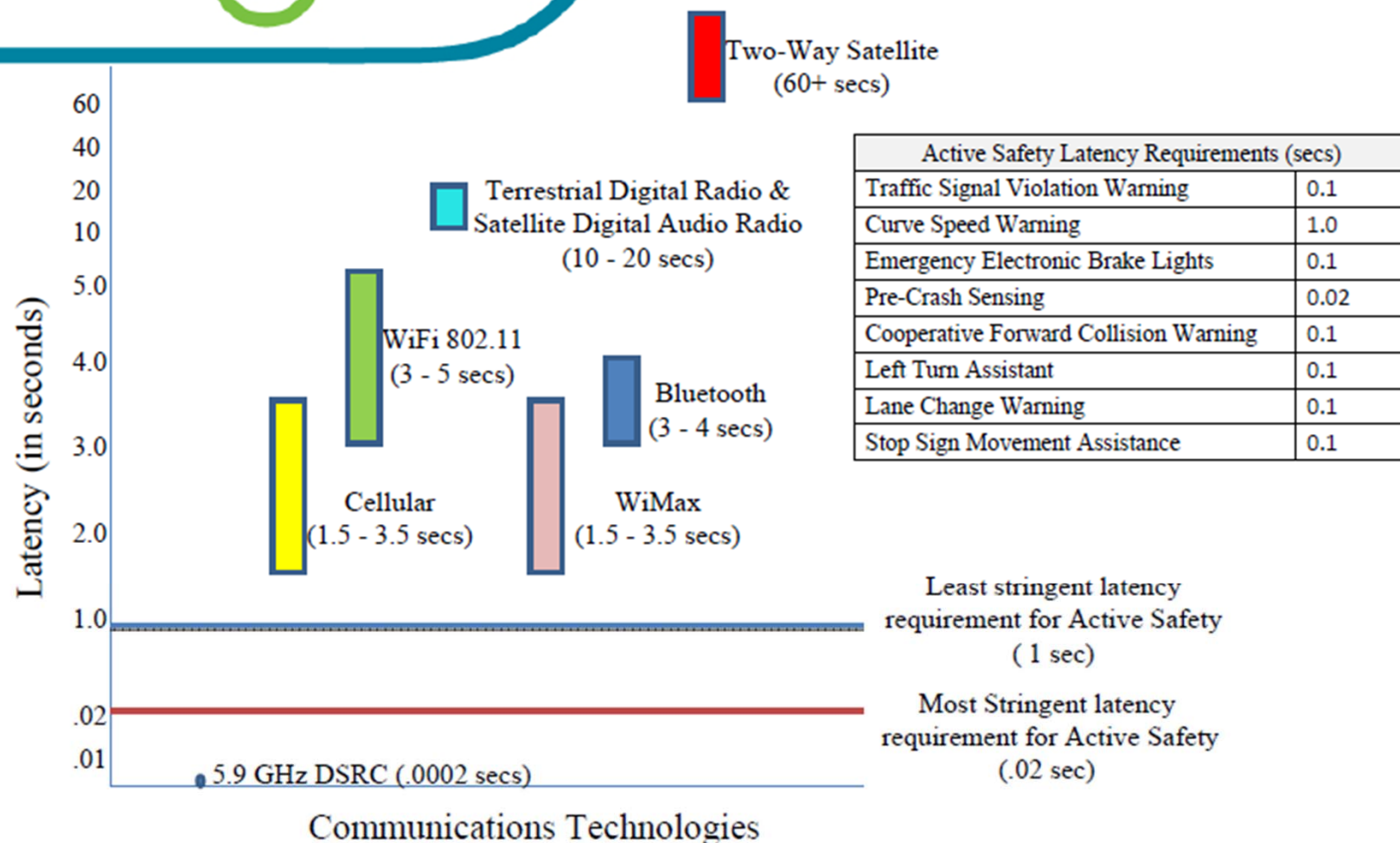


Connected Vehicle/CVII Background

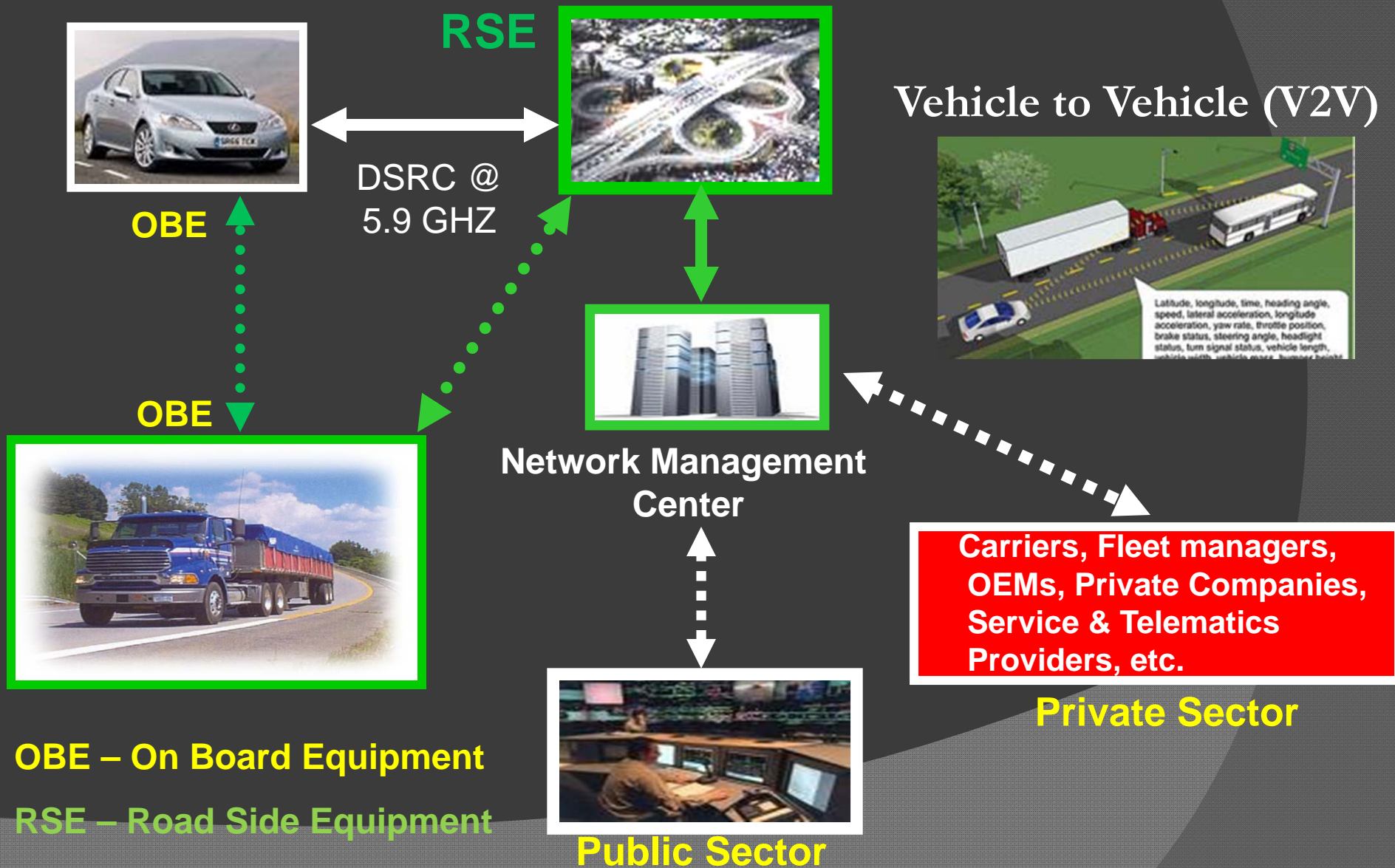


- ◉ Dedicated Short Range Communication
- ◉ 5.9 GHz (FCC)
- ◉ Extremely high speed, high capacity, low latency, highly secure data transmission
- ◉ “Smart vehicles, smart highways”
- ◉ “Internet” model for the highway/transportation system
- ◉ Vehicle crash avoidance capabilities
- ◉ NHSTA Rulemaking 2013





Concept of VII W/**CVII**!





CVII Program Background



- **Funded by I-95 Corridor Coalition**
- **Integrate heavy vehicles w/past 5.9 GHz DSRC research & development for passenger vehicles**
- **Started program May, 2009**
- **3 Year Schedule (Phase I & II)**
- **\$1.45 Million (I-95 CC)**
- **Additional \$500K possibly available for Phase III**

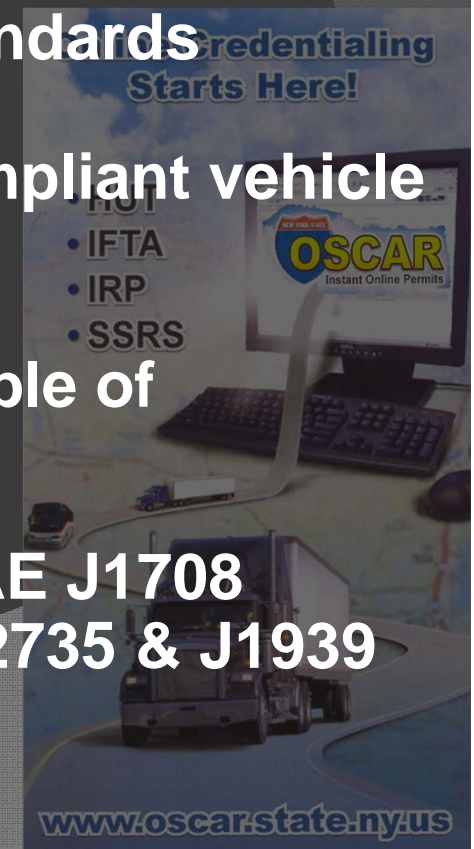


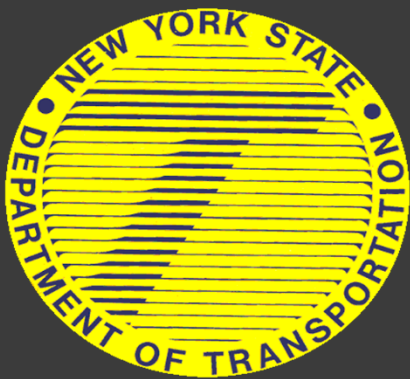


CVII Program Requirements



- Complete system interoperability!
- Compliant with existing and emerging standards
- Communicate with *any 5.9 GHz DSRC* compliant vehicle or infrastructure
- Non-proprietary core system design capable of duplication/scalable!
- Integrate VII communications device w/SAE J1708 commercial vehicle databus using SAE J2735 & J1939





CVII Project Team



CVII team led by
Volvo Technology of America



Booz | Allen | Hamilton



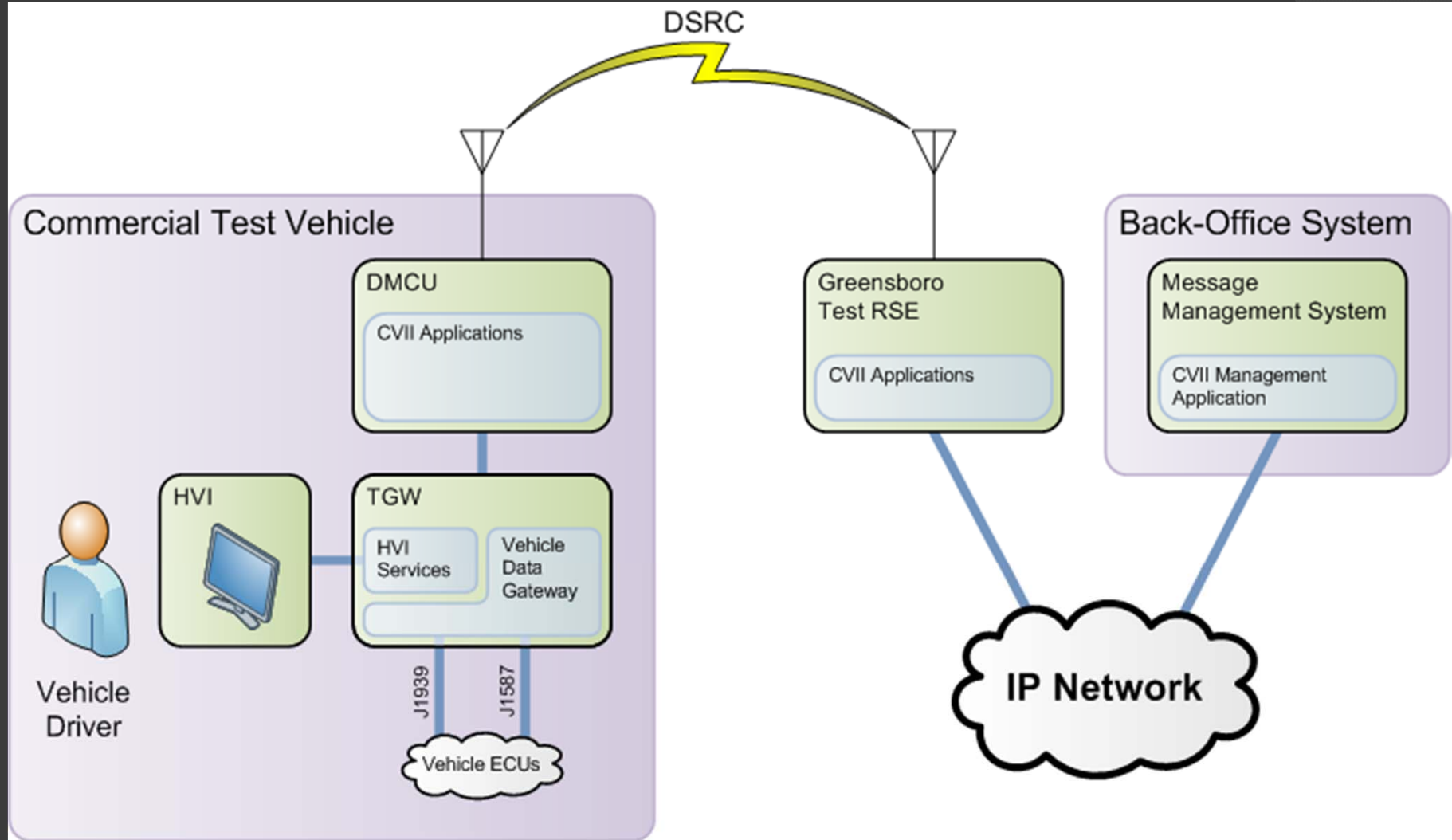


CVII Program Advisory Team



- I-95 Corridor Coalition
- FHWA
- ITS JPO/RITA
- FMCSA
- NYS Thruway Authority
- NYS Bridge Authority
- Washington State DOT
- Commercial Vehicle Safety Alliance
- AASHTO
- NYS Energy Research and Development Authority
- NYS Motor Truck Association
- American Transportation Research Institute
- VII Consortium (Auto OEM)
- Michigan DOT
- Intelligent Transportation Systems of America
- U. of North Carolina Highway Systems Research Center
- American Trucking Association

CVII Architecture





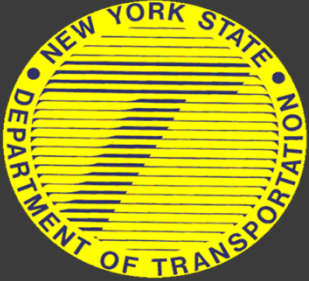
CVII Program



I-95 CORRIDOR
COALITION



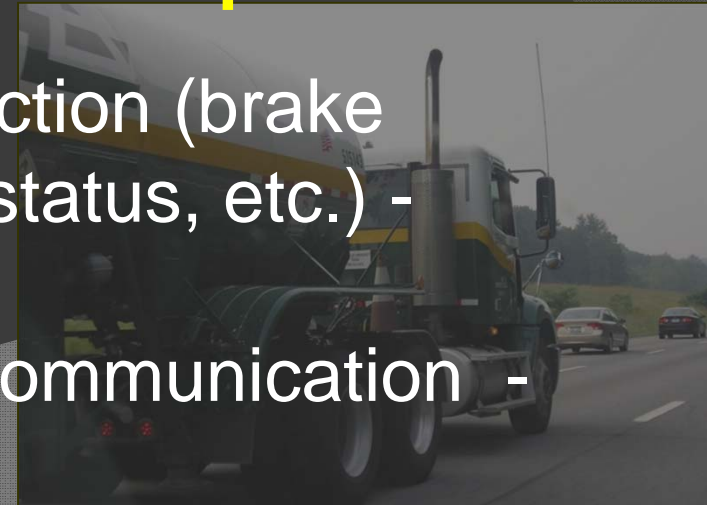
Commercial Vehicle Data Bus



CVII Program Status



- Develop/Install/Test CV VII compliant 5.9 GHz DSRC OBE system including driver interface w/ in-vehicle signage & traveler info. - **Complete**
- Develop/Test CVII DSRC applications:
 - ☞ CV driver I.D and verification - **Complete**
 - ☞ Wireless vehicle safety inspection (brake condition, tire pressure, light status, etc.) - **Complete**
 - ☞ CV to maintenance vehicles communication - **Complete**



CVII Program



Volvo Truck Interior with Card Reader



Vehicle to Infrastructure (V2I)



Task #3 - Wireless Driver Identification & Verification

- Driver inputs ID information; sent to roadside device
- Roadside sends message to driver indicating CDL is valid, inactive, revoked, or suspended
- Driver unable to start vehicle if driver's CDL is inactive, revoked, or suspended
- Driver ID integrated with existing e-screening information (weight, credentials, etc.) for expanded 5.9 GHz DSRC screening
- Coordinated with FMCSA's WRI program





Vehicle to Infrastructure (V2I)



Task #4 – Vehicle Safety Data from Databus

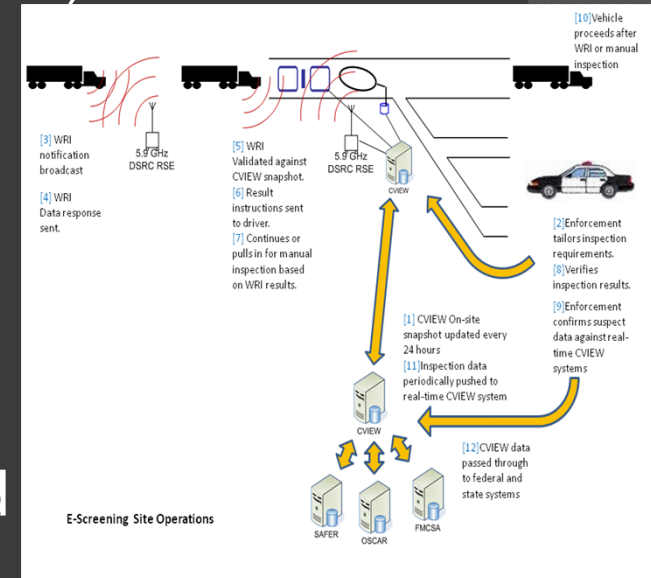
- Vehicle Safety Data – from databus via 5.9 GHz DSRC
- Includes brake, lights and tire data
- Data integrated with existing e-screening information (weight, credentials, etc.) for expanded 5.9 GHz DSRC screening
- Coordinated with FMCSA's WRI program



CVII Program

Wireless Roadside Inspection Operation

- Enhances existing screening information (weight, credentials, etc.) with driver and vehicle level data
- WRI requested by roadside device (RSE)
- Vehicle sends data to RSE
- Validated against network information (NYS CVIEW/SAFER)
- Results sent to driver & enforcement
- Driver follows in-cab instructions based on screening results (pull in/by pass)
- Inspections results sent to carrier, state and federal backhaul systems as appropriate





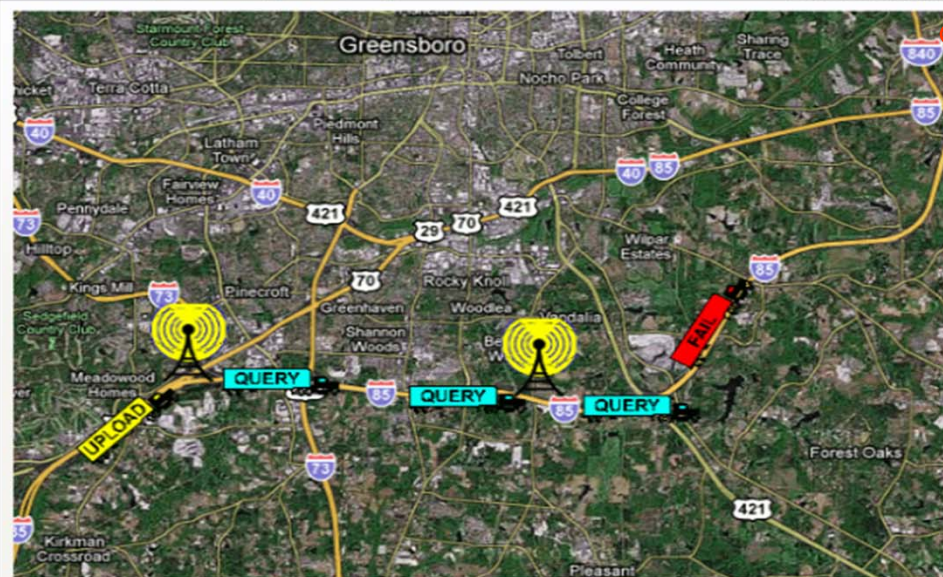
Commercial Vehicle Infrastructure Integration

New York State
Department of Transportation

Roads&Satellite Satellite Only Roads Only

Live Data Feed

Verification Details Inspection Advisories

Detailed OBE/MMC Information
(click on events or truck icons for info)**FAIL!!**

Identification Information

Carrier Name Volvo Truck - North America, Inc.
 USDOT# 335611
 Address 7900 National Service Road
 City, State, Zip Greensboro, NC 27409-9416
 Phone Number 336-393-2000

Screening ID X123
 Location New York, I-495, Exit 51

VIN 1VINZ99Z9VIN12345
 License Plate NC/LX9999
 Veh. Make/Model/Color VOLVO/VHD/BLUE

Screening Result **Fail**

Vehicle Status

Out-of-Service Order	Pass	GVW	Fail
IRP	Pass	Axle Weight	Pass
OS/OW Permit	Pass	Brake Lining	Pass
Off-Route	Pass	Brake Stroke	Pass

Carrier Status

Out-of-Service Order	Pass	Unsafe Driving	Pass
IFTA	Fail	Fatigued Driving	Pass
ISS-2	Pass	Driver Fitness	Pass
PRIMS	Pass	Controlled Substance	Pass
URC	Pass	Vehicle Maintenance	Pass
		Improper Loading	Pass
		Crash Indicator	Pass

Driver Status

CDL Status	Pass
Seat Belt User	Fail
Driver Safety Screening	Pass

(Click red hyperlinks for more detailed information)

OBE Events

Event ID	Date	Event Type	OBE/Driver ID	Status Info
1	3-12-10, 9:00:00AM	Upload WRI	OBE_ID_1	Upload received
2	3-12-10, 9:01:05AM	Query Status	OBE_ID_1	Verification request received
3	3-12-10, 9:02:15AM	Query Status	OBE_ID_1	Verification processing
4	3-12-10, 9:03:20AM	Query Status	OBE_ID_1	Waiting for GSCS response
5	3-12-10, 9:04:07AM	Query Status	OBE_ID_1	Verification failed - see details at right

GSCS Events

Event ID	Date	Event Type	OBE/Driver ID	Status Info
1	3-12-10, 9:00:10AM	Request verification	OBE_ID_1	Data sent to GSCS for processing
2	3-12-10, 9:00:51AM	Query verification	OBE_ID_1	No data received
3	3-12-10, 9:02:10AM	Query verification	OBE_ID_1	No data received
4	3-12-10, 9:03:45AM	Query verification	OBE_ID_1	Verification failure received



CVII Program



Task #5 – Maintenance Vehicle to Commercial Vehicle Communications (V2V)

- A moving maintenance vehicle (snow plow) broadcasts a heartbeat-like message with its vehicle type, position and heading
- Vehicles following the snow plow receive and display a warning to the driver about the snow plow operations ahead
- Broadcasts work zone operations to approaching vehicles
- 4 retrofitted maintenance plowtrucks



CVII Program

Vehicle to Vehicle (V2V) Communication



Prototype Design



CVII Program

Additional Scope Items

- Phase 2 – **Underway**
- Complete December, 2011
- Heavy Vehicle to Light Vehicle Driver Safety Warnings
- Grade Crossing Driver Warnings



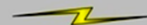


CVII Program

Light Vehicle to Heavy Vehicle

Phase 2 - V2V Active Safety Driver Warnings

- Passenger vehicles/CV exchange heartbeat messages
- Warning scenarios:
 - Potential Blind Spot Warnings
 - Hard Braking Events (multiple vehicles ahead)
 - Tailgate Warning
 - Unsafe to Pass/Unsafe to Merge

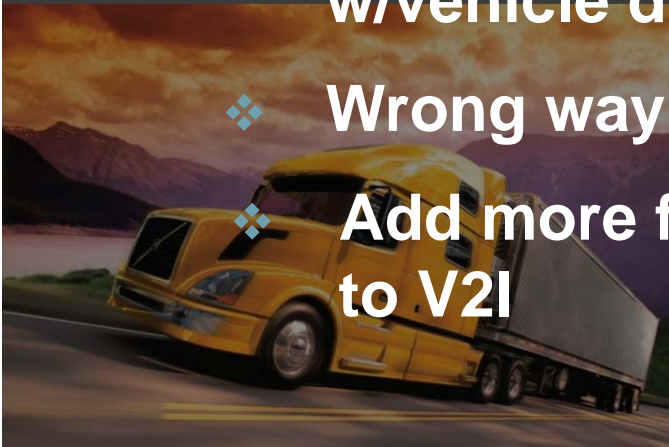




CVII Program Phase III



- ⦿ Phase III – ~~Funding Obtained/Start 2012~~
- ⦿ Potential Scope Items
 - ❖ Integrate EOBR hours of service w/wireless roadside inspection message set
 - ❖ Add buses to Phase I & II applications
 - ❖ Routing information & restriction warnings w/vehicle disabling
 - ❖ Wrong way driver warnings w/vehicle disabling
 - ❖ Add more fleet management/Clarus/AERIS data to V2I



CVII Program

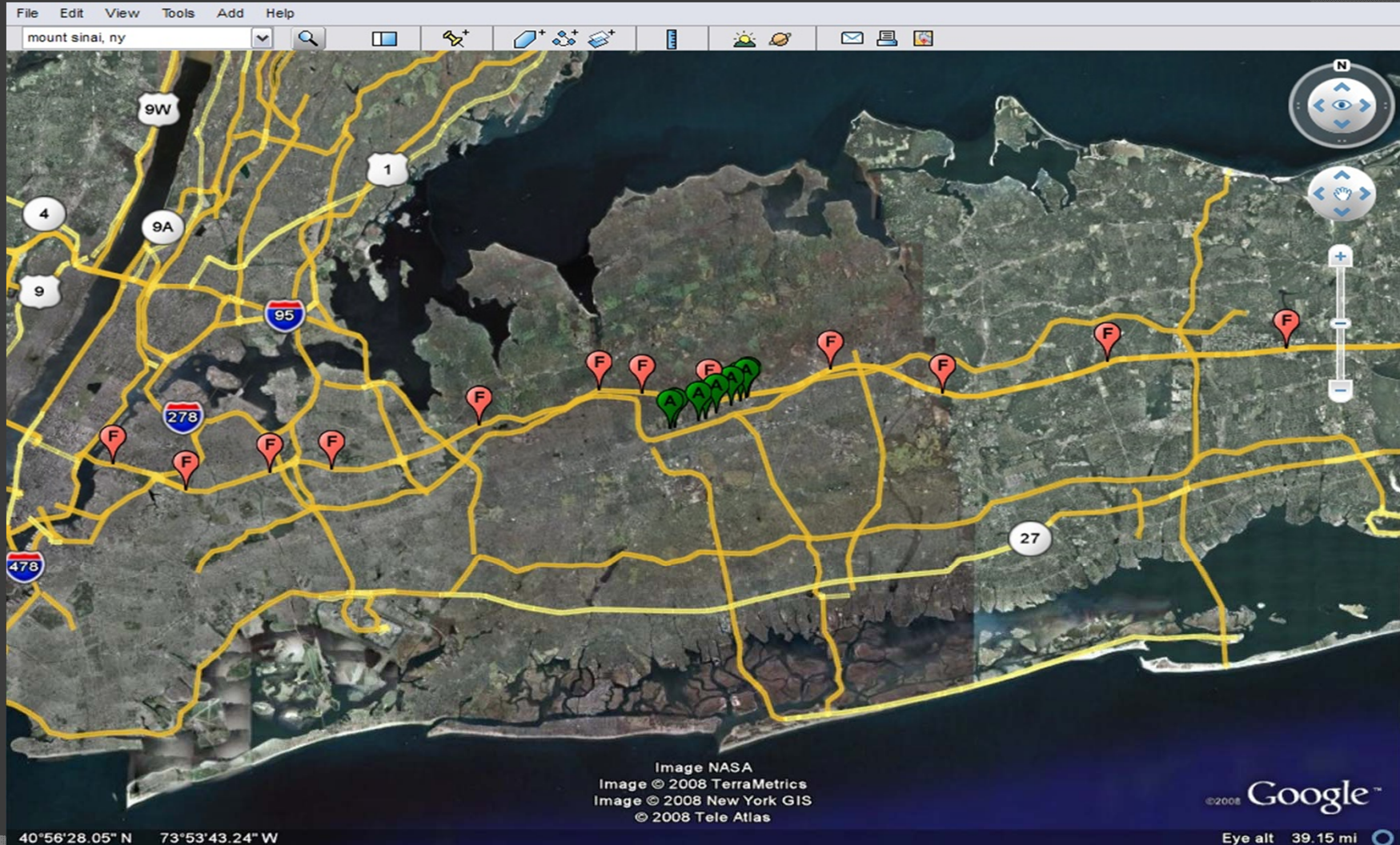


RSEs can be installed at vehicle depots, parking facilities, etc. for fleet management

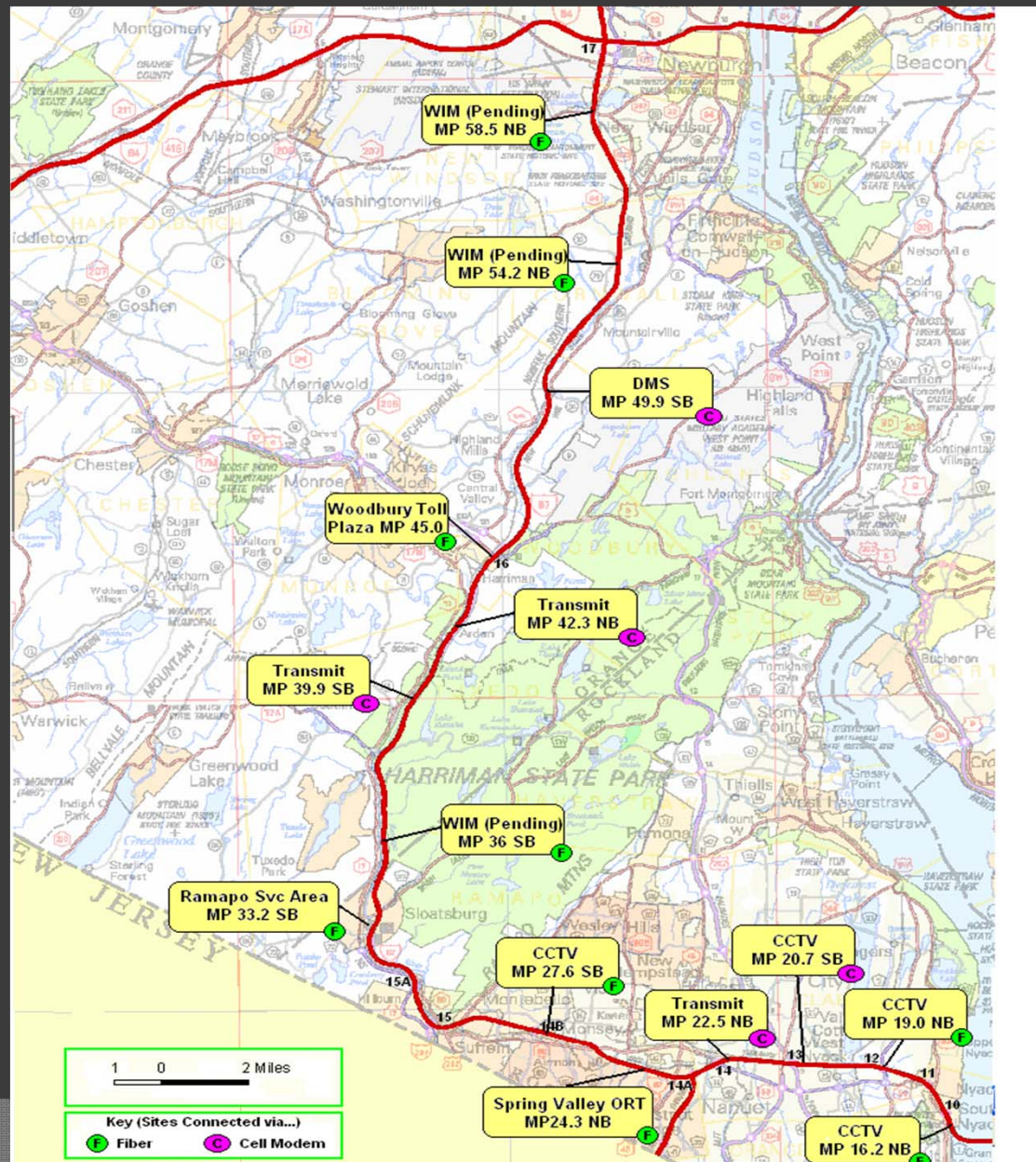


NYSDOT *INFORM* I-495

CVII Test Bed

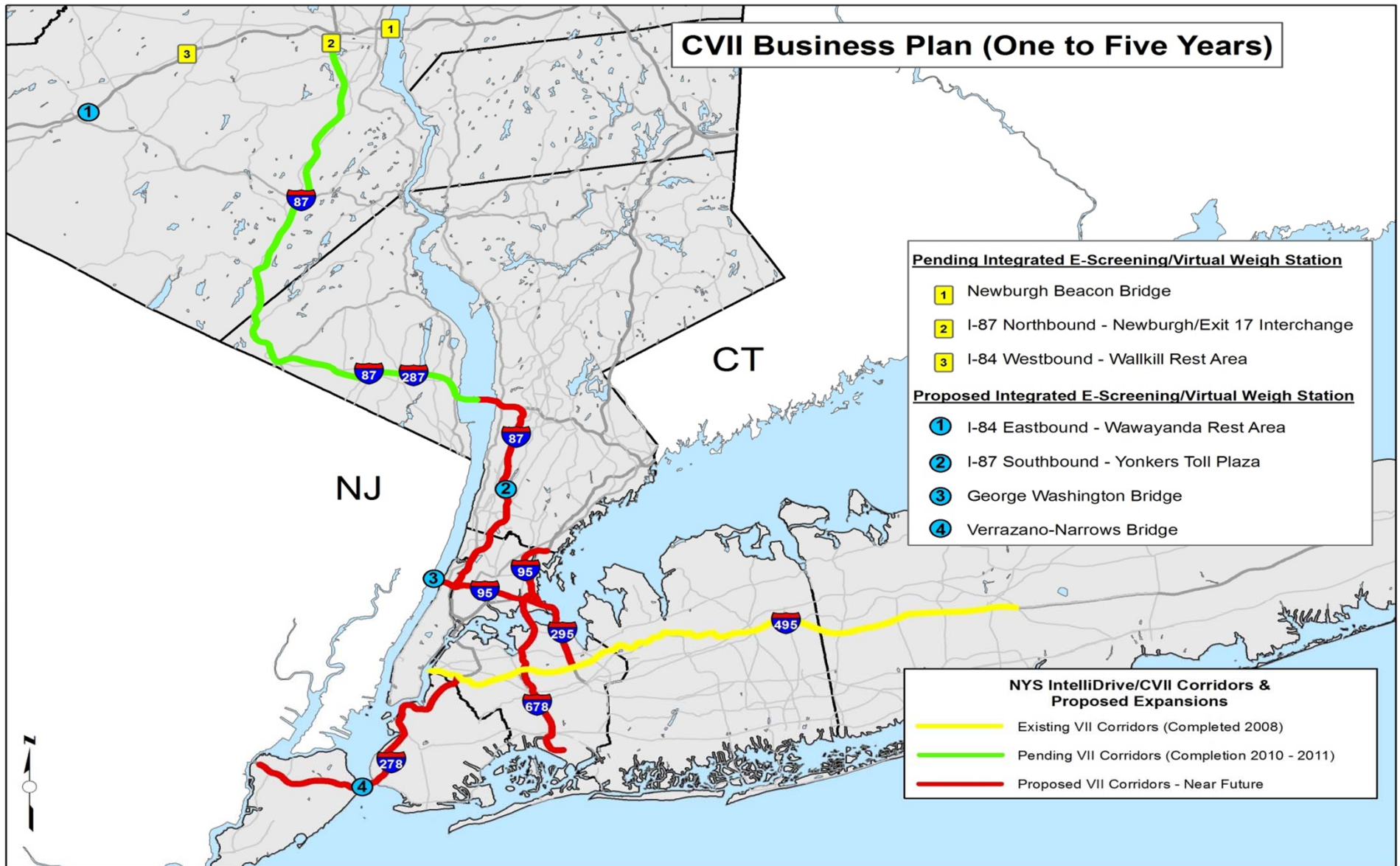


NYS Thruway RSE Sites



CVII Corridors - NYC/Long Island

CVII Business Plan (One to Five Years)

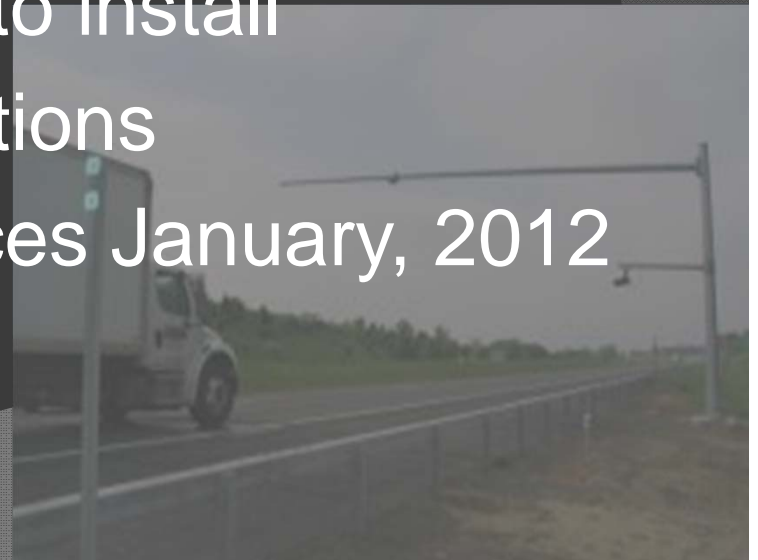


Affiliated Interoperable Test Beds



NYSERDA/Kapsch Aftermarket Device Development Project

- NYS Energy Research & Development Authority funded
- Kapsch to develop/commercialize aftermarket OBE
- Relatively low cost, simple to install
- Use CVII V2I & I2V applications
- NYSDOT receives 20 devices January, 2012
- \$2.3 million project



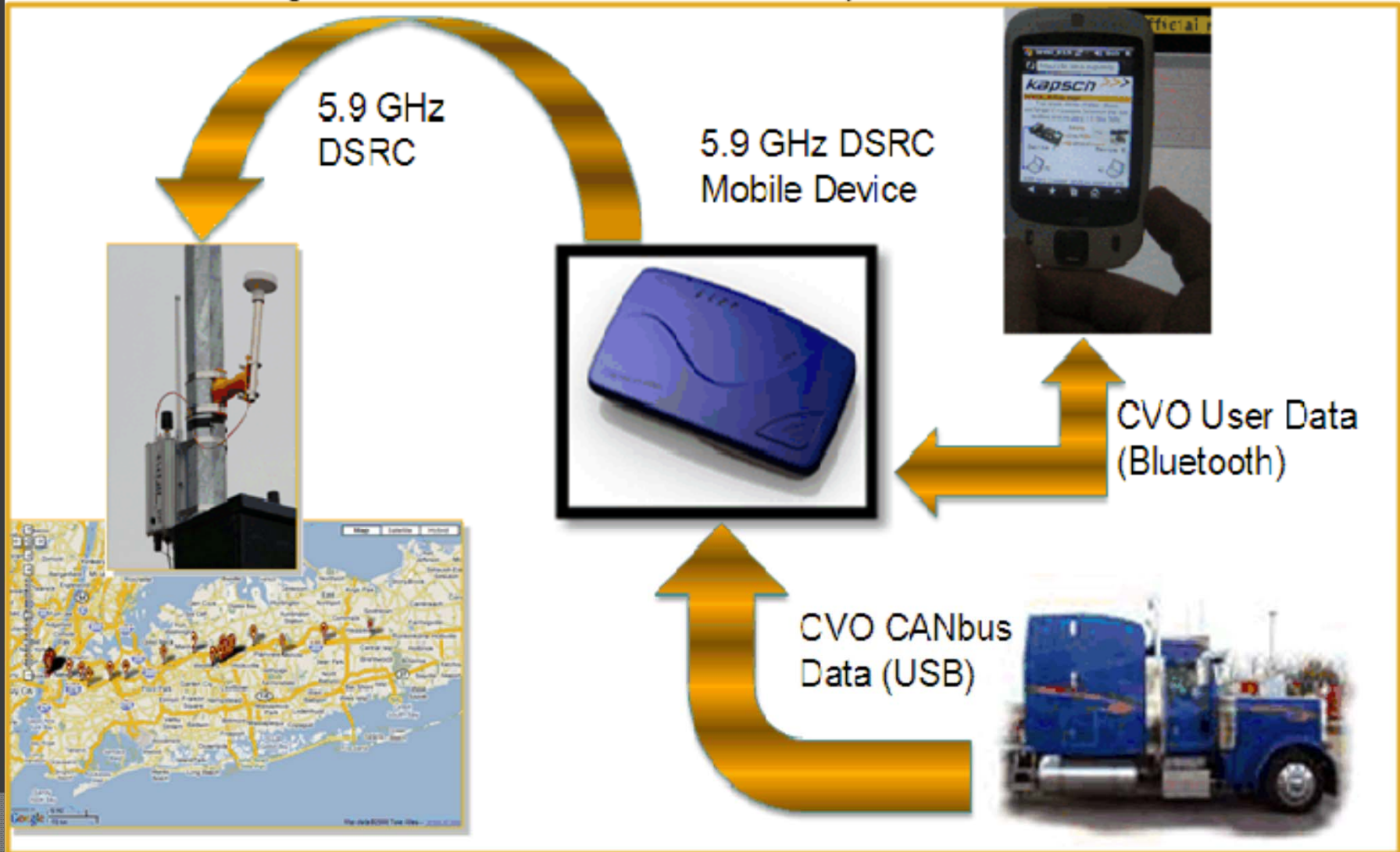
NYSERDA/Kapsch Aftermarket Device Development Project

- Deploy in vehicles that use CVII corridors:
 - NYSDOT/NYSTA vehicles
 - Trucking company
 - Buses (School, Transit, For Hire)
- NYSDOT provides device and installation
- NYSDOT partnership with operators to evaluate technology
- Operators provide unique opportunity to develop useful applications for both partners

Aftermarket System Concept

Task # X.

Develop Aftermarket 5.9 GHz DSRC In-Vehicle Systems with Vehicle Databus Integration
Using Smart Phones for Driver Communication (Human Machine Interface)



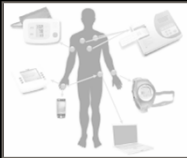
Looking Ahead: Interconnected Communication Layers

SERVICES

In-Vehicle
Navigation



Driver
Health
Checks



Electric
Fueling
Stations



Vehicle
Diagnostic &
Performance



Gate Access
& ePayment
Solutions



Interconnected World



Cellular
(1-2 miles / 2-3km range)

DSRC 5.9 Ghz
(200-300m range)

RSE

ZigBee
(20-30m range)

Interconnected communication layers will enable the private sector & public interests to co-exist and flourish

18th ITS World Congress, Orlando, Florida

October 16th – 20th, 2011

Connected **Commercial** Vehicles

VISIT THE SAFETY VILLAGE FOR A DEMO!

Commercial Vehicle Infrastructure Integration

Smart Commercial Vehicles

ITS Technologies
Wireless Communications

Smart Infrastructure

Enhancing Safety, Mobility and Operations

**Very high speed transactions among vehicles,
and between vehicles and infrastructure components**



To learn more about National Connected Vehicle Program, visit:

http://www.its.dot.gov/connected_vehicle/technology_testbed2.htm



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Connected Vehicle

Vehicle-to-Vehicle and Vehicle-to-Infrastructure Technology Test Bed - Test Bed 2.0

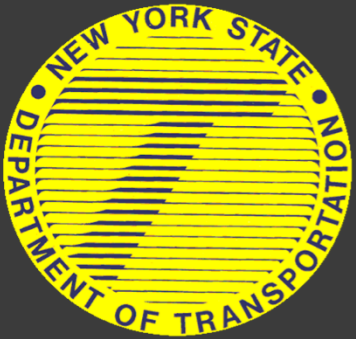
Research Overview

Vehicle-to-Vehicle and Vehicle-to-Infrastructure Technology Test Bed environments are real-world, operational test beds that offer the supporting vehicles, infrastructure, and equipment to serve the needs of public and private sector testing and certification activities.

The vision for the Test Environment research is to establish a minimum of one test bed that can support continued research, testing, and demonstration of connected vehicle concepts, standards, applications, and innovative products. Test environments will also serve as a precursor or foundation for State and local deployments using connected vehicles technologies.

The research will result in the establishment of an accessible V2V and V2I Technology environments (Test Bed) for the public and private sectors to pursue research, testing, and demonstrations of innovative, next-generation ITS technologies. The Test Bed will help establish requirements for future test beds that will provide the State and local foundation for connected vehicle deployment.

- [Events of Interest](#)



Thank You!



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