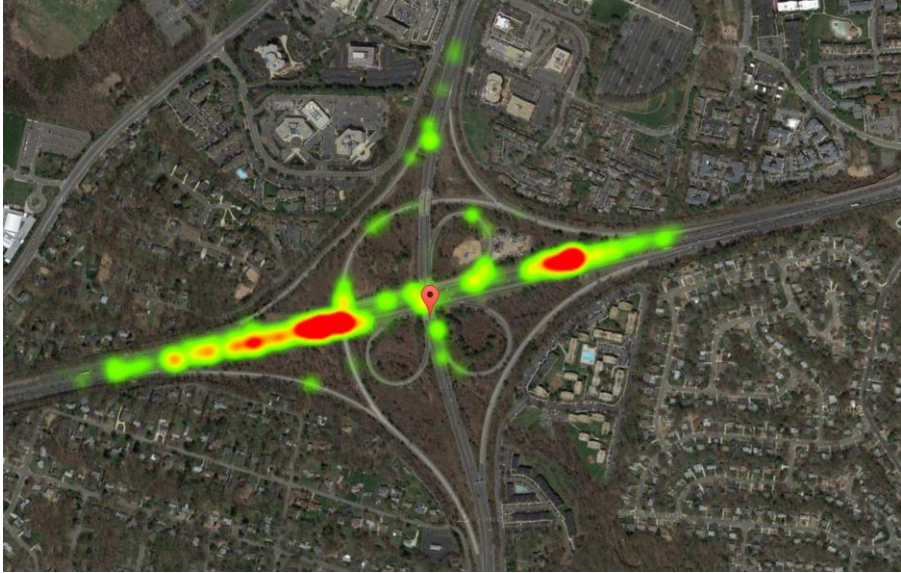
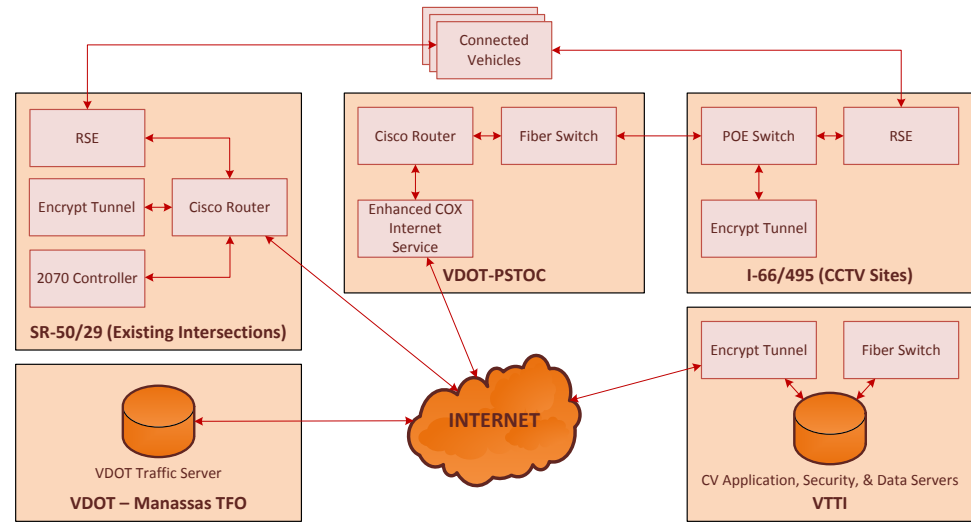


UTC Project Information	
Project Title	Connected Vehicle Virginia Test Bed System Performance
University	Virginia Tech Transportation Institute
Principal Investigator	Reg Viray Zac Doerzaph
PI Contact Information	rviray@vtti.vt.edu zdoerzaph@vtti.vt.edu
Funding Agencies	CVI-UTC (Tier 1 UTC)
Agency ID or Contract Number	RITA Grant Number: DTRT12-G-UTC20
Project Cost	\$149,951
Start and End Dates	11/17/2014 – 12/31/2015
Project Duration	13.5 Months
Brief Description of Research Project	<p>Network congestion may occur from a multitude of different sources, chiefly connected vehicle transmission density. Considering the physical traffic distribution along I-66 and arterials, a common occurrence is traffic jams. If all of the vehicles were instrumented with V2X technologies, localized spectrum congestion may occur. This is due to the number of vehicles transmitting messages OTA. In addition to spectral congestion, networked devices may also be put under extreme processing load and backhaul networks may reach bandwidth limitations, as each interconnected device that processes network data may become a bottleneck.</p> <p>In an effort to identify system limitations, the project will run experimental studies focusing on stressing the wireless and backhaul networks on the Connected Vehicle Virginia Test Bed. By understanding what links break between equipped vehicles, roadside equipment, and network infrastructure, limitations can be characterized and improvements can be made when feasible. Execution of the project plans to facilitate:</p> <ul style="list-style-type: none"> • Identification of Network Bottlenecks • Identification of Load Shedding Strategies (i.e. data suppressing, message sequencing, or formatting) • Understand Impact of RSSI, Packet Error Rate, Inter Packet Gap as a function of Range, Speed, Elevation, Heading under various test scenarios • Support USDOT NHTSA Affiliated Test Bed Research and Deployment Requirements

<p>Describe Implementation of Research Outcomes (or why not implemented)</p> <p>Place Any Photos Here</p>	<p>The outcomes of this study will support continued operation, planning and maintenance of the Virginia Connected Corridors from a network communications perspective. In particular several key outcomes from this analysis will provide the following:</p> <ul style="list-style-type: none">• Physical Vehicle to RSE Communications Performance<ul style="list-style-type: none">○ Identification of physical areas with poor RSE DSRC Receive signal coverage○ Factors contributing to poor RSE DSRC Receive signal coverage○ Identification of areas with multiple RSE signal coverage• RSE to Backhaul Network Communications Performance<ul style="list-style-type: none">○ Identification of IT Infrastructure components that are unable to scale to a large DSRC deployment <p>Based on the analysis methods developed, near-real time visualization capabilities will be implemented on the VCC Monitor to depict the physical vehicle to RSE communication performance on the test bed. The primary method to achieve this is a heat map overlay of specific communication metrics per RSE for a given period of time. Provided below is a screenshot exemplifying a heat map layer of locations where there are communication issues.</p>  <p>In addition to the physical communication performance, characterization of the IT infrastructure will be performed by simulating BSM traffic at the RSE to the backhaul network. This is achieved by development of a BSM generator application that will reside on the RSE where BSM transmission volume and velocity can be adjusted to levels simulating thousands of DSRC equipped vehicles. It is expected that this method will be able to identify the upper</p>

threshold of DSRC equipped vehicles that the current network implementation can effectively manage. Per the diagram below, identification of the network components that may become problematic will be identified by this research.



Impacts/Benefits of Implementation (actual, not anticipated)

This study is still in progress, actual impacts and benefits of implementation will be determined in December 2015 when the study is completed. This page will be resubmitted in the next round of reporting to state these actual impacts and benefits.

Web Links

- Reports
- Project Website