The Connectivity Lab is investigating impairments due to vehicular wireless channels and interference in high congestion vehicular ad-hoc networks. Our research explores a variety of solutions to these problems.

The automotive industry is currently exploring multi-vehicle safety applications in the Dedicated Short Range Communication (DSRC) band. These applications assume a robust, mobile, low-delay, high reliability wireless communication technology to create vehicular ad-hoc networks (VANETs). DSRC, once fully deployed, will be used in urban, suburban, and highway environments at a variety of speeds and degrees of congestion.

Our research team has developed a GPS enabled vehicle-to-vehicle measurement platform for collecting channel measurements in real world traffic conditions. Data collected over 200 locations in different scenarios has been used to develop channel models and identify delay spread and coherence time parameters. The proposed DSRC standard compensates appropriately in most cases but our analysis suggest that channel invariance over larger packets cannot be assumed.

Our continuing research applies knowledge of the channel to develop methods to improve DSRC communications such as coding techniques to combat the shortened coherence time of fast moving vehicles. Future work includes investigation into:

- advanced coding techniques
- urban multi-path angle of arrival
- interference mitigation
- multi-antenna beam forming
- optimized OFDM for vehicular communications

See our paper published in the 2008 International Conference on Communications entitled “Measurement and Analysis of Wireless Channel Impairments in DSRC Vehicular Communications.”