

# Research Recap

## Cost-Effective Designs of Smart City Technologies for Vehicular Communications

**Purpose:** The long-term goal of this research is to provide results that inform decisions about technologies and public policies for smart cities and connected vehicles. During this project, the research team made particular progress on spectrum management issues, on policy processes, and in assessing the impact of wireless technologies on performance of wireless vehicular networks and the applications that they enable.

**Approach:** The researchers developed tools to conduct simulation studies of Vehicle-to-Everything (V2X) communications. One set of tools was used to study safety-critical latency-sensitive V2X traffic, and another set for the rest of V2X traffic. In both cases, researchers collected data from large connected vehicle deployments in the U.S. and Europe, created software to realistically simulate moving cars as well as moving V2X packets, and engineering-economic models to estimate the cost impact of design decisions. Researchers also participated actively in regulatory proceedings regarding policies for connected vehicles, and developed an alternative approach to the current policy process.

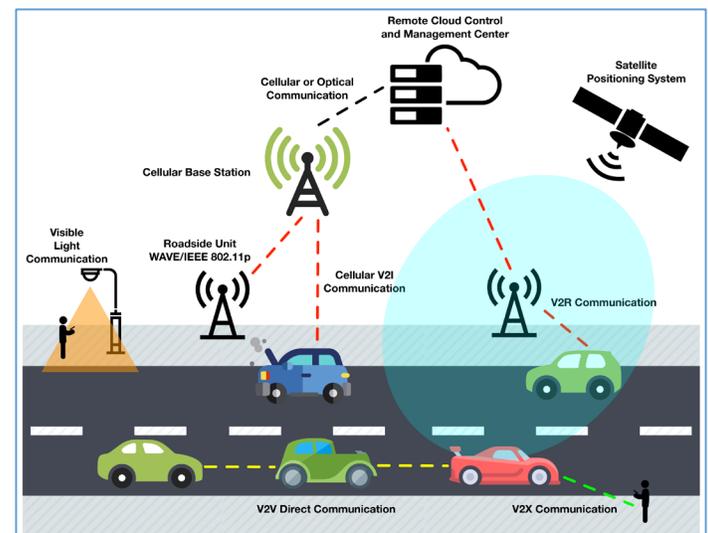
### Key Findings:

- ✓ Allowing V2X traffic that is either non-safety-critical or non-latency-sensitive to share spectrum with Wi-Fi devices is more efficient than allocating some spectrum exclusively for Intelligent Transportation Systems (ITS) and some for unlicensed devices.
- ✓ Performance of V2X traffic that is both safety-critical and latency-sensitive should be measured and compared at the application layer.
- ✓ It is important to improve the current policy process for establishing the U.S. vision for connected vehicle technology, infrastructure, and spectrum management.

### Conclusion:

The researchers recommend that the FCC allow sharing of the spectrum used for V2X, which may include allowing unlicensed devices to access ITS spectrum, as well as allowing V2X devices to access unlicensed spectrum.

The researchers also recommend creation of an interagency federal task force that would work with state and local governments, the automobile and telecom industries, consumer and privacy public interest groups, and experts to establish a new and broadly shared vision for connected vehicles in the U.S.



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### Project Record:

- <https://ppms.cit.cmu.edu/projects/detail/274>

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