

Rethinking Connected Vehicles for Spectrum Scarcity

Purpose: In May 2021, the Federal Communications Commission (FCC) voted to adopt new spectrum regulations for Intelligent Transportation Systems (ITS). These regulations specify that the spectrum allocated to ITS be reduced by half, from 75 MHz to 30 MHz to meet the needs of emerging Wi-Fi technologies. This research report provides updated information on the current state of the US Government's approach to regulating spectrum for a variety of communication network applications.

Approach: The researchers focused on ways that Cellular Vehicle to Everything (C-V2X) can share the spectrum band with unlicensed devices. This approach is able to meet the needs of both connected and autonomous vehicles, as well as unlicensed devices in achieving high levels of spectrum efficiency. This research is needed because the new form of Wi-Fi, Wi-Fi 6, is somewhat different than previous versions of Wi-Fi and as research shows, the two technologies do not share spectrum well.

Key Findings: The researchers redesigned core resource management algorithms for these technologies. They hypothesize that changing these algorithms will enable the technologies to work together seamlessly. The researchers will continue to test a variety of different real-world scenarios, including levels of population density, road type, vehicle mobility, connected vehicle penetration, type of cellular technology, as well as other variables. This will help them understand the impact of these variables on resource sharing capabilities.

Conclusion: Spectrum policy will need to continue to adapt in order to meet the emerging needs of connected vehicles. The researchers believe ITS applications will need spectrum beyond the current allocation of 30 MHz, and that the FCC should consider allowing unlicensed devices to share spectrum with ITS devices, which may be able to meet the needs of both connected and autonomous vehicles, as well as unlicensed devices. Additionally, the researchers recommend that the FCC adopt a policy that states for the next five years, any proposed change in spectrum regulation consider adoption of a harm claim threshold, which is a threshold that regulates interfering signal levels.



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Project Record:

- [https://ppms.cit.cmu.edu/media/project_files/355 - Final_Report.pdf](https://ppms.cit.cmu.edu/media/project_files/355-Final_Report.pdf)

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