

SHARING A FINITE CRITICAL RESOURCE: ELECTROMAGNETIC SPECTRUM ACCESS

Shaping radio frequency spectrum allocation and policy solutions to avert a national spectrum crisis.

Issue/Challenge

Wireless communication depends on the availability of and access to electromagnetic spectrum. But the growing number of applications that rely on spectrum—from satellites to smartphones—exacerbates a supply-demand imbalance of serious consequence. Lack of spectrum access grounds aircraft, delays first responders, impacts military operations and training, disconnects consumers from business and personal cellphone use, and more.

Looking at spectrum as the backbone of American life, we're developing innovative, efficient methods to allocate and manage this limited national resource. We bring an objective perspective and national interest mission to collaboration across government, industry, and academia to solve spectrum congestion.

Our goal: enable uninterrupted, secure spectrum access to meet critical government uses and public safety needs, fuel national economic prosperity and competitiveness, and support the American public. Among the many benefits of increased access: The U.S. cellular industry can innovate toward 6G and beyond.

MITRE's Approach

Spectrum today is managed with bands—or specific frequency ranges—reserved for specific sets of users and services. Dynamic spectrum sharing, a technology solution we've helped shape, identifies available frequencies as demand fluctuates. Think of a city park where different groups can use the same space at different times, with rules in place to prevent conflicts.

U.S. government systems that remain in their current spectrum allocation can

share the spectrum with commercial wireless systems. To do this, systems must be flexible regarding when, where, and how they use spectrum. Government systems weren't designed for flexibility, but cellular technology is designed to manage self-interference. This capability, paired with AI algorithms to more quickly mitigate interference, makes commercial cellular systems highly adaptable to government spectrum usage.





We're putting experimental spectrum sharing options to the test with MITRE and the National Science Foundation. Field trials in the National Radio Dynamic Zones program deliver innovative solutions to the spectrum shortage—from policy to 6G development.

TOMMASO MELODIA, DIRECTOR, NORTHEASTERN UNIVERSITY'S INSTITUTE FOR THE WIRELESS INTERNET OF THINGS



We are collaborating with industry to demonstrate that cellular systems can detect when and where the government is using spectrum and adapt their spectrum use to avoid impacting essential government operations.

With the National Science Foundation, Northeastern University, and a team of partners, we're designing large-scale spectrum sharing experiments. The goal: to determine viable options to meet the spectrum scarcity challenge. This first-of-its kind environment tests and scales solutions to increase spectrum availability—such as sharing between wireless communications networks and radio telescope facilities.

A Systems View

Our in-depth understanding of complex federal agency missions—from defense to aviation—gives us a unique vantage point. This systems view considers all stakeholders, technical realities, and economic needs to build a spectrum sharing approach that meets current and future connectivity demands.

Economic Impact

It is a critical national and economic security imperative that the U.S. set the global standard for how this limited, shared, global resource is managed. Dynamic spectrum sharing is a sustainable approach, generating solutions utilized globally to create opportunities for our nation to regain economic dominance in key industries—with the potential for billions of dollars of impact.

Long-term benefits of spectrum sharing include value gained from flexible use of spectrum, innovative models for revenue generation, greater efficiency, lower costs for consumers, economic growth in the U.S., and industry investment in infrastructure—all while protecting national security and public safety. MITRE's leadership in this effort maximizes these economic benefits, ensures access to meet growing demand, resolves conflicts among industry stakeholders, and informs beneficial national policy decisions.

MITRE's spectrum expertise spans dynamic spectrum sharing, spectrum management, economics, and repurposing. Visit mitre.org for more information—and connect with us at mitre.org/WorkWithUs.

Resources

[Innovating Spectrum Management for National Security and Economic Prosperity](#)

[National Spectrum Strategy 37 GHz Spectrum Sharing Report](#)

[MITRE-led Team to Develop Radio Dynamic Zone for Spectrum Sharing Research](#)

[National Radio Dynamic Zones](#)

[MITRE Catalyzes Next-Generation Solutions for Electromagnetic Spectrum Superiority](#)

[Advanced Dynamic Spectrum Sharing Demonstration in the National Spectrum Strategy](#)

[MITRE's Response to the OSTP RFI on Spectrum R&D](#)



As the not-for-profit operator of federally funded R&D centers, our work catalyzes industry's ability to meet critical national needs and fosters economic development. Learn more about our work in the public interest at mitre.org.