NIST facilitates first-ever spectrum sharing between military and public wireless users

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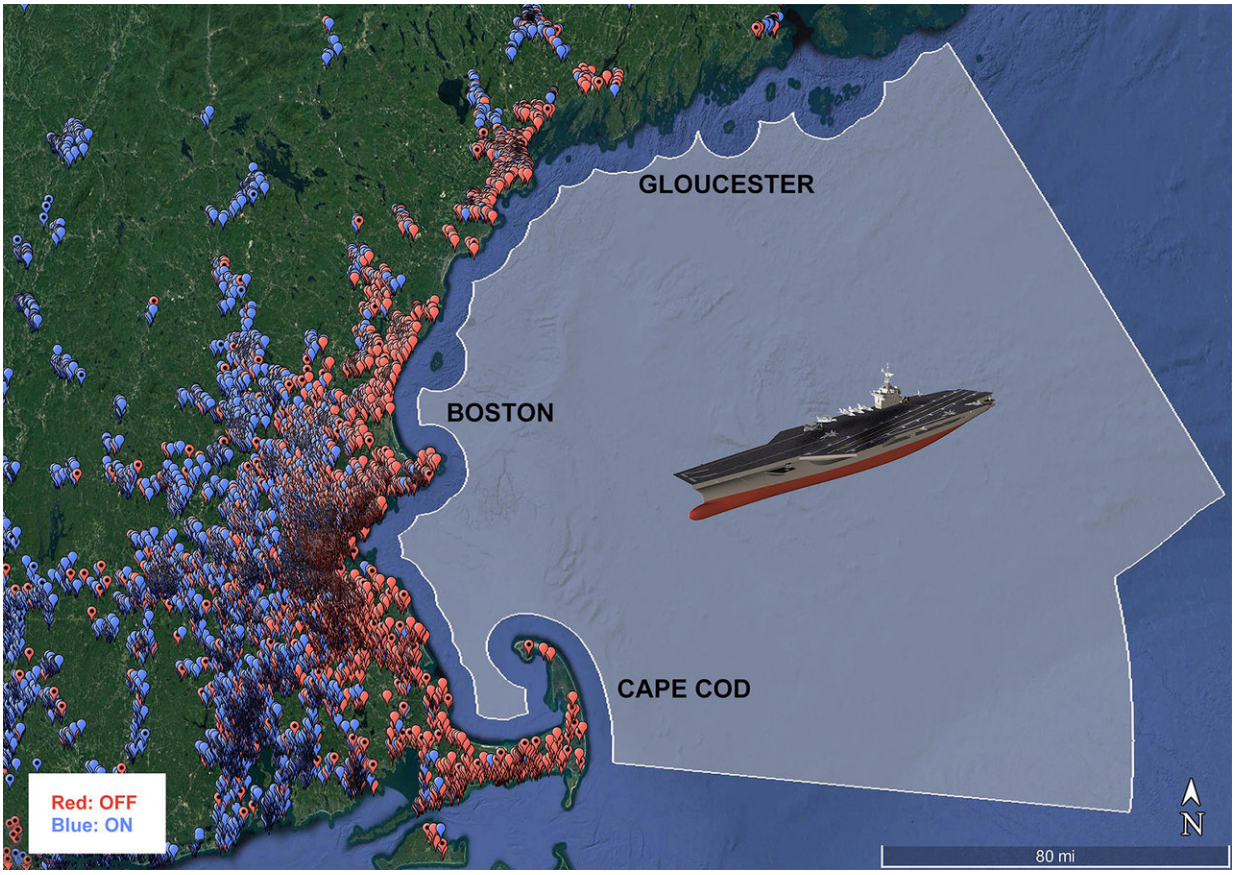

NIST simulation showing wireless users of shared radiofrequency (RF) spectrum in the Boston to Cape Cod, Massachusetts, region. Colored markers identify users that can continue operating (blue) or must be shut off (red) to accommodate priority need for wireless band by naval vessel within offshore "designated protection area" (gray). Credit: Michael Souryal/NIST (using Google Earth map of Massachusetts coast)

For the past three years, an important broker has had its eyes on a prime piece of property that it wants to allocate to multiple tenants to ensure maximum use. However, the "For Lease" sign isn't on some quiet suburban street, along a beachfront vista, or any physical location at all. It's posted in front of a small portion of the radiofrequency (RF) spectrum that the broker wants two "renters"—the military and the private sector—to jointly occupy for both of their wireless broadband needs.

The broker is the Federal Communications Commission (FCC), and with help from the National Institute of Standards and Technology (NIST) and other agencies, the FCC will soon make it possible for a 150-megahertz (MHz)-wide section of the RF spectrum to be shared.

"This will be the first time that commercial broadband users share spectrum dynamically with government users, and if it works, the FCC may allocate other currently protected RF bands for shared use," said Michael Souryal, lead for the spectrum sharing support project within NIST's Communications Technology Laboratory. "More spectrum sharing could provide less-congested wireless channels for densely populated areas and more reliable connections for advanced communications needs such as 5G wireless and internet of things applications."

Since 2015, FCC rules have been in place that pave the way for commercial wireless users to employ the commonly called "3.5 Gigahertz ("3.5 GHz") Band," or "Innovation Band," when not needed for its current primary use, offshore radar operations by the U.S. Navy. LTE (long-term evolution) equipment vendors and service providers such as AT&T, Google, Nokia, Qualcomm, Sony and Verizon have been eager to access this band (between 3550 and 3700 MHz) because it will expand product markets and give end users better coverage and higher data rate speeds in a variety of environments where service is

traditionally weak.

Under the rules of the FCC-regulated 3.5 GHz Citizens Broadband Radio Service (CBRS), the Navy maintains first right to the band and private use only occurs during its downtimes. Providers and other organizations will be granted access using a three-tier priority allocation structure: (1) incumbent users such as the U.S. Navy, (2) LTE providers and other organizations that pay license fees for the right to share, and (3) general users.

NIST has played a major role in the development of standards, test procedures and certification tools that will allow service providers and other potential users to prove that they can operate in the 3.5 GHz Band under FCC regulations and assure the Navy that the band can be successfully shared without RF interference. Recently, the Wireless Innovation Forum Spectrum Sharing Committee (WINNF SSC) the public-private standards body for the CBRS, approved 10 standards for operating the service, including the algorithm for protecting military incumbent users. A NIST-designed computer reference model of that algorithm will be an integral part of the certification process.

One example of the NIST model simulates 45,000 LTE smaller-size networks (known as small cells) using the 3.5 GHz Band in the northeastern United States. In response to a simulated need for the band by an offshore Navy vessel, the model calculates which small cells must be shut down and which can continue transmitting. These simulations, along with others modeling wireless networks in other U.S. coastal regions, will allow the FCC to test and evaluate how effectively a commercial LTE provider can share the band with the Navy.

"Dynamic spectrum sharing is poised to revolutionize the industry by unleashing wireless capabilities and performance that have not been possible in conventional licensed or unlicensed spectrum bands," said

Kurt Schaubach, chief technology officer for Federated Wireless. "The efforts of our company, NIST and the other members of the WINNF SSC to establish standards, testing and certification for spectrum sharing are setting the stage for improving wireless service indoors, expanding broadband services to rural areas, and providing private wireless capabilities for industrial users. It's an outstanding example of public-private collaboration," he said.

More information: www.nist.gov/programs-projects … adband-radio-service

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