

SPECTRUM INNOVATION INITIATIVE (SII)

SII Funding		
(Dollars in Millions)		
FY 2021	FY 2022	FY 2023
Actual	(TBD)	Request
\$17.00	\$17.00	\$17.00

Overview

The electromagnetic spectrum and its management play a crucial role in many ways for the United States, including scientific investigation of the world around us, public safety and security, and the provision of a tremendous range of communication devices. The SII is a multidisciplinary, cross-Directorate, NSF-wide program to promote dynamic and agile electromagnetic spectrum utilization, while ensuring innovation and security for all users: both active spectrum applications such as those in advanced wireless and spectrum for passive scientific purposes such as radio astronomy and geospace sciences. The SII promotes United States leadership through basic research, infrastructure development, new collaborations, public outreach, education, and workforce development.

Goals

NSF's goal is to promote transformative use and management of the electromagnetic spectrum, resulting in profound benefits for science and engineering, industry, and other national interests. As demands for spectrum availability have increased, the need to use this limited natural resource more efficiently and robustly to meet multiple goals has also increased. Increasing demand for spectrum from applications such as 5G-and-beyond networks, national defense systems, and cutting-edge tools and facilities utilized by scientific research for atmospheric sensing, astronomy, and other purposes are major sources of demand for spectrum availability. Innovation is required to solve the challenge of achieving the most efficient spectrum utilization for these and other purposes. While NSF has supported successful spectrum research activities for many years, the SII represents an increased, coherent, and sustained commitment on a larger and more interdisciplinary scale. This initiative will result in increased industry, research, and societal capabilities through more efficient use of the electromagnetic spectrum, and development of a technologically sophisticated workforce. Enhancing efficient spectrum utilization and access is vital to the national interest, including the scientific enterprise, national defense, and emerging industries. NSF is working closely with the Federal Communications Commission and the National Telecommunications and Information Administration to ensure that NSF SII investments in spectrum research and development are in alignment with national spectrum regulatory and policy objectives, principles, and strategies.¹

The primary goals of the SII include the following:

1. Develop the concept and infrastructure for National Radio Dynamic Zones (NRDZ), which will be used for testing of next-generation, advanced dynamic spectrum utilization techniques within pilot test beds in unique geographic locations to minimize regulatory hurdles that slow innovation. The goal is improved spectrum efficiency/effectiveness through secure/autonomous spectrum decision making.

¹ www.fcc.gov/document/fcc-federal-partners-sign-spectrum-innovation-cooperation-agreement

2. Establish and sustain an interdisciplinary National Center for Wireless Spectrum Research (SII-Center) that will catalyze partnerships between government, industry, and academia, and bring teams of scientists, engineers, computer scientists, and social scientists together to innovate. The goal of the SII-Center is to develop new solutions that enable more efficient use of the electromagnetic spectrum.
3. Integrate NRDZ and the SII-Center with the frontier research currently being conducted through other NSF programs and facilities. Those programs include, for example, the NSF-industry partnership in Platforms for Advanced Wireless Research (PAWR), the Spectrum and Wireless Innovation enabled by Future Technologies (SWIFT) program, and NSF facilities performing cutting edge scientific research which require access to the electromagnetic spectrum such as the Green Bank Observatory, the National Radio Astronomy Observatory, and the National Center for Atmospheric Research.
4. Promote opportunities and develop the workforce needed, as a key national resource, to research and implement the dynamic and agile spectrum utilization techniques that will secure access to the spectrum for receive-only systems and enable the broadband applications of tomorrow.
5. Develop increased public awareness of the scarcity of the electromagnetic spectrum resource, and the challenges associated with its scarcity and its efficient use.

FY 2023 Investments

Investments in FY 2023 include the following:

National Radio Dynamic Zones (\$9.0 million)

This investment will continue work on spectrum sharing solutions, site studies and application studies for National Radio Dynamic Zones towards enhancement of active electromagnetic spectrum management efforts at NSF's major research facilities and platforms. The investment will also initiate work to understand social, behavioral, and economic issues that affect the deployment of radio dynamic zones.

National Center for Wireless Spectrum Research (\$5.0 million)

This investment will sustain activities of the interdisciplinary SII-Center program, which brings together diverse groups of researchers to develop, innovate, and sustain new solutions that enable more efficient use of the electromagnetic spectrum.

Integration Activities (\$2.0 million)

This investment will continue to integrate ongoing and increasing NSF activities, including SWIFT research, partnerships with EPSCoR to explore active radio frequency interference cancellation and build workforce capacity, and the support of national and international spectrum regulatory efforts, such as NSF's management of polar programs.

Workforce Development and Public Outreach (\$1.0 million)

To promote national leadership in spectrum innovation and enhance opportunities on both national and local levels, including for underserved communities, the investment in workforce development will include fellowships associated with the above efforts and research funded through SWIFT, PAWR, and the SII-Center, as well as Research Experiences for Undergraduates. The public outreach efforts will include supplements to existing awards that enable enhanced public awareness of the electromagnetic spectrum and the challenges associated with its scarcity and its efficient use.