ANTENNA TECHNOLOGY PROMOTES NATIONAL SECURITY

Consolidating multiple antennas lowers size, weight, power, and cost.

Issue/Challenge

Ships, satellites, aircraft, and ground systems use a variety of critical capabilities—from radar to communications—to adapt to evolving missions and threats. Many emerging platforms are size-constrained, yet require more and more computing capacity. This places greater emphasis on size, weight, power, and cost.

Motivated to protect U.S. interests and best serve the warfighter, MITRE invested our R&D to prototype the technology for a new class of wideband phased array antennas. The Frequency-scaled Ultra-wide Spectrum Element's (FUSE) lightweight, compact design is ideal for platforms where space and weight are at a premium—without compromising performance or reliability.

Impact

Today, the FUSE antenna can be found on communication and sensing platforms in the national security community and commercial sector. This patented, R&D World 100 Award-winning technology has become a force multiplier in the spectrum space, with different next-generation technologies being layered under FUSE to deliver even broader impact for the warfighter.

MITRE's Solution

FUSE, which was co-invented with the Naval Research Laboratory, meets challenging electronic system requirements for military and civilian use at a lower cost. One FUSE phased array can replace multiple individual antennas, enabling multi-band and multi-function systems—including communications, radar, and electronic warfare. The novel antenna aperture design can be 3D-printed, or additively manufactured, making it more cost efficient.

A large radome on a ship bridge takes considerable space. In contrast, the FUSE antenna has a compact, low-profile design.

MITRE

> We're pursuing the military audience, the space audience, and commercial customers. Everyone wants wideband comms—and FUSE can provide that capability.
>
> **JANOS OPRA,** OPTISYS CHIEF EXECUTIVE OFFICER AND FUSE LICENSEE

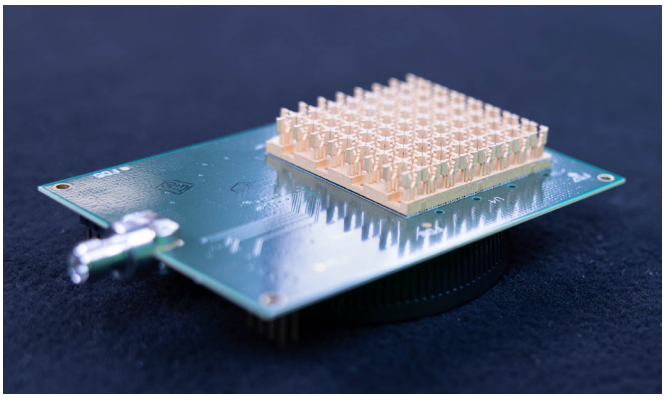
From Lab to Mission—Faster

Initially prototyped to meet a Defense Department need, FUSE technology is now part of multiple government missions—a prime example of how we expedite solutions to national challenges.

To shorten the time from the lab to the end user, we transfer our technology directly to the government. We also make it available for the commercial sector to license. This model gives our government sponsors access to critical technologies and fosters industry's ability to manufacture, customize, and scale them for public and private uses. The result: a faster, more robust ROI for the federal government.

Built into our mission is a responsibility to share our prototypes and technologies for public good. For FUSE, we have:

- Shared the technology's availability via 26 published papers.
- Issued 10 licenses to date—five to government contractors and five for commercial use.



A 7-32 gigahertz additively manufactured (3D-printed) FUSE-on-chip panel for satellite communication. FUSE's ability to move within the radio frequency spectrum boosts resilience.

For more information about FUSE, visit mitre.org/WorkWithUs.

Resources

Frequency-scaled Ultra-wide Spectrum Element (FUSE)

MITRE Innovation Leaves an Indelible Mark on Global Communications

Military + Aerospace Electronics Honors EWO Testbed with Technology Innovators Award

An Additively Manufactured, All-metallic Frequency-scaled Ultra-wide Spectrum Element (AM-FUSE) Active Electronically Scanned Array (AESA) for Space-borne Applications

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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.