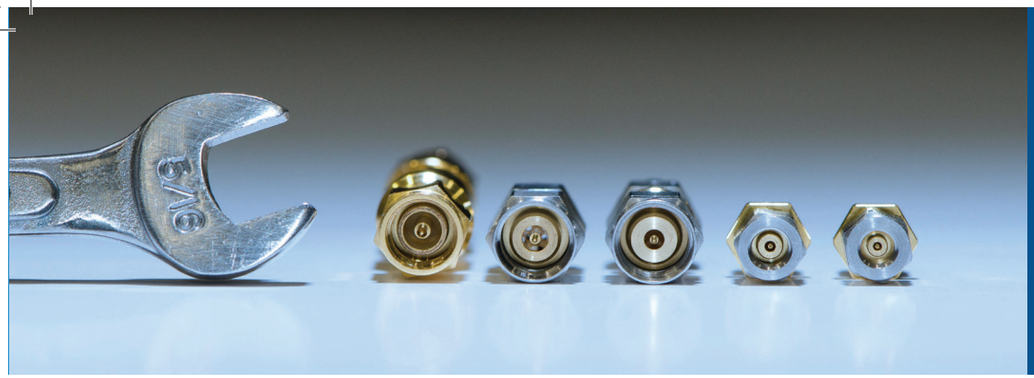

STAKEHOLDER **ENGAGEMENT**

Our diverse portfolio of work is possible thanks to an extensive collaboration network in the form of key partnerships within NIST and across industry, government, and academia.

These include the verification and uncertainty analysis of channel sounders through engagement with the 5G mmWave Channel Model Alliance and with ITS, development of coexistence test procedures through ANSI C63.27, development of standardization for certification tests of cellular-enabled Internet-of-Things (IoT) devices with the cellular industry association (CTIA), and support of various measurement campaigns through NASCTN.

We also learn of our stakeholder's evolving needs by providing measurement services for fundamental quantities used in the test of mmWave communications systems, including RF power, scattering parameters, antenna parameters, and broadband waveform measurements, and by talking with industry members through outreach such as the NIST/ARFTG RF measurements short course and IEEE 5G hardware road mapping efforts.

IMPACT

Research outcomes include contributions to documentary standards (including IEEE 802, 3GPP, ANSI, and CTIA), over 160 conference papers, 140 journal articles, 13 NIST Tech Notes, and several patents or patent applications.

Examples of recent impactful programs in the RF Technology Division include the development of innovative robotic and machine vision systems for accurate and precise positioning when making antenna parameter measurements, reducing the measurement time from weeks to hours. Advanced statistical methods developed in collaboration with the Information Technology Laboratory, include the NIST Microwave Uncertainty Framework (MUF), which was developed to track time/frequency correlations and uncertainties in modulated signal measurements, and are used extensively in new measurements development at NIST and elsewhere. Also, recent test efforts investigated the potential for heterogeneous wireless systems to cohabitate in the RF spectrum; the quantification of a systems potential for coexistence presents regulators with a novel metric in their adjudication process of spectrum entrants.

NIST
National Institute of Standards and Technology
U.S. Department of Commerce

325 Broadway
Boulder, CO 80305-3337
Tel: (303) 497-4088
e: paul.hale@nist.gov

NIST's mission is to promote U.S. innovation by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life.

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https://www.nist.gov/communications-technology-laboratory/rf-technology-division

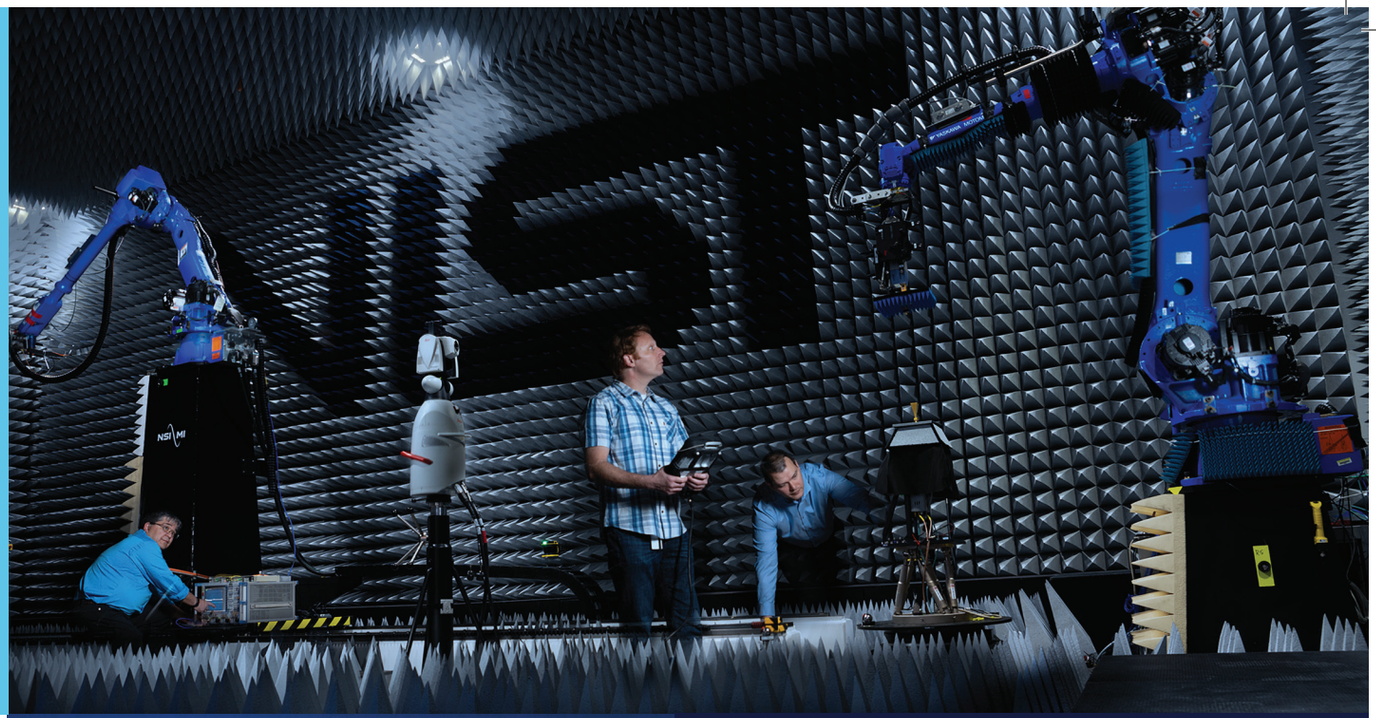
MEASUREMENT **SCIENCE FOR ADVANCED COMMUNICATIONS**

Radio Frequency Technology Division

NIST

RADIO FREQUENCY TECHNOLOGY DIVISION

NIST CTL's Radio Frequency (RF) Technology Division develops theory, metrology and standards for the technologies upon which the future of wireless communications depends.



Our work spans characterization of the integrated circuits that generate, receive and process signals, the testing of antennas that send and receive them, and the coexistence of two or more wireless systems. We tackle fundamental measurements that are applicable to a wide range of industry and government problems, at frequencies from megahertz to terahertz.

OUR MISSION

The RF Technology Division promotes development and deployment of advanced communication technologies through the conduct and dissemination of leading-edge measurement science and the understanding of physical phenomena, materials and device capabilities, and complex systems relevant to advanced communications.

RESEARCH AREAS

The RF Technology Division conducts research in various technology areas to support advanced communications:

- Spectrum sharing
- Channel measurements and modeling
- Mm-wave electronics (power, s-parameters, waveform metrology, materials, and nonlinear device properties)
- MIMO antennas and beam forming
- Over-the-air test
- IoT
- 5G and beyond

NIST