

# NextG Wireless R&D Gap Identification

## Stakeholder Working Group

The National Institute of Standards and Technology (NIST), the National Science Foundation (NSF), and the Department of Defense (DOD) is convening a joint working group to identify next generation wireless research and development (R&D) gaps. This effort intends to produce specific, actionable investment recommendations for entities to consider that support the US research community's sustained innovation of wireless communications systems. This project acknowledges the meaningful R&D and planning activities currently occurring in this space, such as the [IEEE Future Networks Roadmap](#), [ATIS NextG Working Group](#), NIST's [NextG Channel Model Alliance](#), and the NSF [RINGS Grant Program](#), and seeks to complement these efforts by analyzing longer-term, transformational technology capabilities rather than incremental progress. The project will prioritize technical needs that align with the following criteria:

- 1 R&D shortfalls** – These are issues that industry, academia, and standards bodies are not already researching or research issues that could benefit from additional resources.
- 2 Long-term** – Addressing identified gaps scales to a 10-20 year time horizon.
- 3 Accelerates the convergence of the wireless industry** – Technical capabilities may be leveraged by traditional and new entrant wireless hardware, software, and network providers.
- 4 Alignment with Federal R&D capabilities** – Represents a gap that is high-risk / high-reward, lacks immediate profit incentive or feasibility and is therefore best suited for government research.

This project will build on the Future Generation Wireless R&D Gap Analysis published by NIST in 2018 NIST ([NIST SP1219](#)) to identify and describe several of the most significant gaps within various components of the post-5G wireless industry. Through stakeholder interviews, survey instruments, and facilitated virtual discussions, our team will assess recent research advancements and characterize critical-path technology gaps currently going unaddressed by actors in the wireless industry. This working group will source recommendations from stakeholder participants representing diverse research backgrounds and technical areas of expertise.

The gap analysis process will begin by reviewing existing literature and conducting market research related to future generation wireless R&D to better understand the recently completed and planned activities in this space. Initial research will inform a series of one-on-one stakeholder interviews with different sectors of the wireless industry to identify a topic list to consider for virtual workshops. These interviews will help baseline the planning team and begin to define technical areas in need of Federal R&D support. Our team will then design and facilitate virtual workshops to characterize the highest priority long-term research needs within each topic. Finally, our team will summarize these findings to update NIST SP 1219 or publish the findings as standalone reports.

## APPROACH



- 1** Identify and recruit stakeholders who bring technical credibility to the workshop topic area
- 2** Baseline participants on current /completed activities in the space. Present important concepts within the topic
- 3** Distribute a questionnaire to workshop participants asking them to identify and describe specific technical gaps within the workshop topic area
- 4** Analyze stakeholder input to develop discussion questions and themes for stakeholders to challenge, validate, and expand on during each workshop
- 5** Facilitate the virtual workshop. Capture non-attributable stakeholder input
- 6** Summarize the technical gaps and recommendations discussed during workshops in a published report shared with the R&D community

## INTENDED OUTPUTS

Published workshop reports will describe new opportunities for R&D organizations to strengthen their long-term, competitive position. Leveraging the collective expertise of industry, academic, and government stakeholders will deliver a relevant, highly-credible knowledge product to guide next-generation communications R&D investments and inform policy decisions.

## WORKSHOP TOPICS

Virtual workshops hosted in 2022 will solicit expert input to characterize expected R&D opportunities in greater detail. Possible workshop topics may include:



Hardware (intelligent surfaces, filters, amps, antennas, circuits)



Joint Communications & Sensing



Higher Frequencies (i.e. THz challenges)



Sustainable, Energy Efficient Networks



Machine Learning and AI in NextG



Spectrum Management Technologies



End-to-End Security and Resilience Functions



OpenRAN architecture, New Network Topologies

If you or your colleagues are interested in participating in this effort, please contact Marc Leh ([mleh@corneralliance.com](mailto:mleh@corneralliance.com)) or Miller Higgins ([mhiggins@corneralliance.com](mailto:mhiggins@corneralliance.com)).