Special Notice

Request for Information: Best Practices in Distributed General-Purpose Radio Frequency (RF) Signal Processing

DARPA-SN-26-90

June 10, 2026

Defense Advanced Research Projects Agency
Multi-X Office
675 North Randolph Street
Arlington, VA 22203-2114

Request for Information (RFI)
Special Notice DARPA-SN-26-90

Best Practices in Distributed General-Purpose Radio Frequency (RF) Signal Processing
Defense Advanced Research Projects Agency (DARPA)
Multi X Office (MXO)

OVERVIEW:
Posting Date: June 10, 2026
Responses Due: July 10, 2026, at 5:00 p.m. Eastern Time (ET)
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RFI DESCRIPTION:
The Defense Advanced Research Projects Agency (DARPA) Multi X Office (MXO) seeks information regarding best practices and innovative approaches for distributed general-purpose radio frequency (RF) signal processing. DARPA is exploring methods to standardize the control, scheduling, and processing of advanced RF systems to enhance performance, efficiency, and interoperability in complex operational environments. DARPA simultaneously wishes to reduce the cost of laboratory-scale prototype systems and the time required to port prototype systems to tactical platforms. The Department of War (DoW) typically operates in environments where advanced, adaptable RF systems dictate mission completion. This RFI aims to gather insights into leveraging existing standards, optimizing aperture use, and advancing distributed and heterogeneous computing for RF applications. Responses to this RFI may be used to inform future program development and interoperability for existing DARPA capabilities.

BACKGROUND:
Modern RF systems are increasingly complex, often featuring multi-purpose apertures and significant onboard processing capabilities. However, the lack of standardization in hardware control, resource management, and processing frameworks creates significant integration challenges and limits the ability to dynamically re-task assets in the field. Proprietary, stove-piped solutions are common, hindering interoperability and rapid capability deployment. To address these challenges, there is a need to explore architectures that treat the RF and computational elements in a distributed fabric. DARPA seeks to understand the interaction of these components—such as standards-based control algorithms, distributed computing architectures, and heterogeneous acceleration techniques—needed to enable highly adaptable RF systems.

REQUESTED INFORMATION:
DARPA seeks innovative insights into technologies and strategies that can enable robust and distributed architecture within the technical interests listed below. Responses are welcome from all capable sources including, but not limited to, private or public companies, individuals, universities, university-affiliated research centers, not-for-profit research institutions, Federally Funded Research Development Centers, and other National Laboratories. Responses should address one or more of the following areas. For each area addressed, respondents are highly encouraged to identify quantifiable metrics that define not only the current state-of-the-art, but also what revolutionary progress would look like, with supporting rationale for why those metrics capture meaningful progress.

1. Standardization of RF Hardware Control

DARPA seeks information on methods to standardize the control and abstraction of RF hardware components to enable interoperability and software-defined functionality. Topics of interest include, but are not limited to:

- Approaches to leverage existing standards, such as the Advanced Configuration and Power Interface (ACPI), to standardize the control of RF hardware (e.g., amplifiers, filters, switches).
- Novel frameworks or Application Programming Interface (API) designs for abstracting hardware properties and enabling platform-agnostic control.
- Strategies for managing real-time, time transfer, configuration and status reporting across diverse RF components.
- Exposing required interfaces via standard interfaces and into virtual machine containers while providing security guarantees.

2. Aperture Scheduling

In systems with multi-purpose and multi-element apertures, effective resource scheduling is critical for mission success. DARPA seeks information on advanced scheduling techniques, including:

- Aperture scheduling in multi-purpose apertures, covering algorithms and models for scheduling and de-conflicting tasks.
- Methods for dynamic, policy-based arbitration of aperture resources based on mission priority, signal environment, or other external factors.
- Performance metrics and simulation methodologies for evaluating the effectiveness of different aperture scheduling strategies.
- Techniques for graceful degradation of aperture and compute performance in resource-constrained or contested environments, ensuring the preservation of essential mission functions (e.g., thread mitigation, transition from accelerator to general-purpose).

3. Distributed Computing in RF Apertures

Modern RF systems incorporate significant computational power. DARPA is interested in architectures for effectively distributing processing tasks across available resources. Topics include:

- Distributed computing in RF apertures, detailing best practices for distributing computational workloads across both general-purpose compute resources and specialized field-programmable gate array (FPGA) fabrics.
- Software and hardware architectures that support seamless data flow and processing hand-offs between different computing elements.
- Techniques for managing latency, data coherency, time transfer, and resource allocation in a distributed RF computing environment.
- Exposing the distributed approach to programming languages and virtual machines on the system in a way that works for both local and distributed resources.
- User presentation of distributed computations.

4. Heterogeneous Acceleration of RF Processing

Accelerating key RF processing functions is essential for reducing latency and power consumption. DARPA seeks information on specialized processing solutions, including:

- Heterogeneous acceleration of RF processing tasks, utilizing a mix of processors for complex environments.
- Architectures for an RF signal detector that are highly performant yet usable and deployable to size, weight, power, and cost (SWaP-C) constrained clients.
- Case studies of heterogeneous systems where a combination of central processing units, graphic processing units, FPGAs, and application-specific integrated circuits are used efficiently for RF signal processing without compromising power budgets.

The following are *not* of interest to this RFI:

- System-level mission concepts or operational architectures without corresponding identification of the enabling hardware technologies or standards gaps that must be closed.
- Incremental improvements to existing hardware without a clear path to standardized interoperability.

WORKSHOP:
DARPA plans to hold a follow-up in-person workshop in August/September 2026 in Arlington, VA, for the purpose of reviewing and discussing current and future research relevant to these architectures, discussing the submissions received, developing new insights, and identifying challenges. The subject matter experts identified by DARPA will be invited to evaluate findings. Information discussed at this workshop may assist in the formulation of possible future areas of DARPA research and sharing standards and recommendations with the community. Topics and discussion will remain at the unclassified level. Workshop space is limited. Invitations to attend the workshop will be extended based on 1) the relevance of any submission to the requested information section above, and 2) relevance to DARPA's mission, and 3) expert parties identified by DARPA via other research. DARPA intends to provide further details on the workshop via email to the those invited for workshop attendance.

SUBMISSION INSTRUCTIONS:
Responses to this RFI should be submitted no later than the due date and time listed in the overview section.

Unclassified responses to this RFI should be submitted to DARPA-SN-26-90@darpa.mil. NO CLASSIFIED INFORMATION SHOULD BE SENT TO DARPA-SN-26-90@darpa.mil.

Classified responses should be coordinated with DARPA prior to submission. Respondents wishing to provide a classified response should send an e-mail to DARPA-SN-26-90@darpa.mil with the subject line "Classified Coordination Requested." Respondents should allow at least three (3) business days for processing requests. NO CLASSIFIED INFORMATION SHOULD BE SENT TO DARPA-SN-26-90@darpa.mil.

If proprietary information is submitted, it must be appropriately and specifically marked. It is the respondent's responsibility to clearly define to the Government what is considered proprietary data. Any proprietary information should be clearly labeled as "Proprietary." DARPA will disclose submission contents only for the purpose of review by DARPA staff, other Government agencies, or DARPA Support Contractors/SETAs.

NOTE: DARPA intends to conduct individual discussions with respondents as necessary to gain a full understanding of the technical and partnership models submitted. DARPA will contact respondents individually via e-mail.

FORMAT INSTRUCTIONS:
Responses to the RFI should be concise. Respondents should submit a single integrated response addressing the areas described above. DARPA will only review responses submitted as an unprotected Microsoft Word/PowerPoint document or PDF file. Technical responses are limited to no more than 2 pages per requested area using 11-point font and 1-inch margins on 8.5-inch by 11-inch page size. Submissions addressing all four requested areas are limited to a maximum of 8 pages total for the Technical Response Section. The Cover Page and Reference sections must maintain their respective page limits. Effective responses that can be provided in fewer pages are encouraged. Any submitted material in excess of these limits may or may not be reviewed without confirmation.

Responses should adhere to the following formatting instructions:

1. Cover page (1 page)
    a. Title
    b. Organization(s)
    c. Respondent's technical and administrative points of contact (names, addresses, phone and fax numbers, and email addresses)
2. Technical response (2 pages maximum per requested area addressed. No more than 8 pages if addressing all 4 technical areas.)
    a. A discussion of the capabilities/challenges addressed
    b. Theoretical and/or simulation discussion
    c. Development strategy (especially versus requested metrics)
    d. Identification of current data (if any)
    e. Estimated time to availability and risk assessment (technical and other)
3. References (2 pages maximum)
    a. All references to previously published work. If applicable, include a list of Government sponsors of previous or ongoing work and their contact information.
4. Summary slide
    a. One slide that summarizes the main idea and development strategy, visually and succinctly indicating new insights, main objectives, underlying technical mechanisms, fundamental assumptions and limitations, key innovations, expected impact, and/or other unique aspects of the response.

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Subscribe to DARPA MXO's newsletter for timely updates on research opportunities, upcoming events, ways to work with us, and more.

DARPACONNECT:
Entities who have not worked with DARPA before are encouraged to learn more about DARPAConnect, an initiative established to facilitate collaboration between DARPA and potential performers. The DARPAConnect team offers customized support, resources, and guidance on how to prepare your ideas for high-impact conversations with DARPA program managers. Please visit DARPAConnect.us to access a digital hub of online resources, including a curriculum for self-paced learning, personalized support, and in-person and virtual events. You can use the contact form at DARPAConnect.us or email the DARPAConnect team directly at darpaconnect@darpa.mil to request assistance.

ADMINISTRATIVE:
This announcement contains all information required to submit a response. No additional forms, kits, or other materials are needed. All administrative and technical questions should be directed to DARPA-SN-26-90@darpa.mil. Please refer to the Special Notice number (DARPA-SN-26-90) in all correspondence.

This RFI is issued solely for information and program planning purposes and does not constitute a formal solicitation for proposals or proposal abstracts; any so sent will be disregarded. In accordance with FAR 15.201(e), responses to this notice are not offers and cannot be accepted by the Government to form a binding contract. Submission of a response is strictly voluntary and is not required to propose to subsequent Announcements (if any) or Solicitations (if any) on this topic. DARPA will not provide reimbursement for costs incurred in responding to this RFI. Respondents are advised that DARPA is under no obligation to acknowledge receipt of the information received or provide feedback to respondents with respect to any information submitted under this RFI.