



NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230

NSF 17-016

Frequently Asked Questions (FAQs) for NSF 16-585, Platforms for Advanced Wireless Research (PAWR): Establishing the PAWR Project Office (PPO)

The following set of questions and answers refers to Frequently Asked Questions (FAQs) about the PPO solicitation (NSF 16-585). They are not intended to modify the program solicitation.

Before preparing PPO proposals, please read the PPO solicitation and refer to the general information about National Science Foundation (NSF) proposal submission including the *Grant Proposal Guide (GPG)* submission guidelines available at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.

FAQs about FastLane, the NSF website for submitting proposals, can be found at https://www.fastlane.nsf.gov/NSFHelp/flashhelp/fastlane/FastLane_Help/fastlane_help.htm#fastlane_faqs_introduction.htm.

QUESTIONS RELATING TO THE ESTABLISHMENT OF THE PAWR PROGRAM OFFICE (PPO)

1. With respect to related efforts - Open Access Research Testbed for Next-Generation Wireless Networks (ORBIT) and the Global Environment for Networking Innovations (GENI) - what lessons have been learned that may apply to this effort?
2. How is the PPO related to the GENI Project Office?

QUESTIONS RELATING TO THE REQUESTS FOR PROPOSALS THAT WILL BE RELEASED BY AN EVENTUAL PPO

3. What is the role of PPO in the design of the research platforms?
4. Can local corporate sponsors participate in the city-university research platform (design, development, and deployment) proposals? Can industry contribute to a proposal without being part of the Industry Consortium described in the solicitation?
5. Can Federally-Funded Research and Development Centers (FFRDCs) participate in the design, development, and deployment of the research platforms and/or in conducting experiments on the research platforms once they are operational? How about federal laboratories?
6. What is US Ignite, Inc.'s role once the PPO office has been established?
7. Has there been thought as to how to make the research platforms "living"/dynamically adaptable?
8. Will there be review criteria for the research platform proposals that go beyond the technical details of setting up the research platforms? For example, will the review process consider a given proposing team's capacity to provide local community services/impact?
9. In terms of team structure, whom do you anticipate leading the teams charged with designing, developing, and deploying the research platforms (e.g., cities or universities)?
10. Can projects be led by independent non-profit organizations, given the emphasis on commercialization?
11. Is cost sharing allowed and/or included in the review process?
12. Are letters of support from researchers interested in utilizing research platforms of value in response to research platform RFP?

QUESTIONS RELATING TO THE RESEARCH TO BE ENABLED BY THE RESEARCH PLATFORMS

13. Is it incumbent on potential users to learn how to use the research platform interfaces or will there be tutorials created/support provided?
14. Should we only think about short-term (three years or less until commercialization) projects to evaluate on the research platforms envisioned in the PAWR: PPO program solicitation?
15. Do you envision following an approach by which experiments to be run on the research platforms are vetted in some way to determine their suitability?
16. Is there a general sense of the geographic area to be covered by these research platforms (i.e., how large they should be)?

17. Are there any expectations as far as open interfaces for the research platforms?
18. Could some of the funding also support graduate student assistantships, for example, for applied research that can be deployed in cities?
19. Will implementation funding for designing, developing, and deploying the research platforms include funding for graduate students?
20. In what spectrum bands are the research platforms expected to operate, and will there be a need for licensing?
21. Can one do research on the design and development of the research platforms, or only as part of research projects to be enabled by the research platforms?
22. Are the research areas listed in the solicitation the only areas of research NSF is interested in funding for the research platforms?
23. Is there an expectation that the research conducted on the platforms will inherently lead to commercialization in the short term?
24. Is the PAWR program more engineering- or research-focused (e.g., GENI was more engineering-focused)?
25. The PAWR program was included as part of a set of the recent announcement of a national Advanced Wireless Research Initiative. Is the additional \$350 million noted in that announcement targeted specifically for research to be conducted on the research platforms? What is the funding breakdown for research areas vs. applications and services?
26. How will heterogeneity, security and privacy, and coexistence be addressed in these research platforms?
27. Shouldn't we test existing ideas first, rather than call for new ones?
28. How do you maintain mid- and long-term research projects while also accounting for public interest and the need to translate innovations to the marketplace quickly in order to justify local investment?
29. Can the PAWR Steering Council veto an NSF decision?
30. What happens if something goes wrong on a research platform?
31. Who owns what assets of the research platforms?
32. Can industry receive funding from NSF if collaborating on the research platform proposal?
33. Are international academic or industry collaborators able to be part of the PAWR program?
34. Please clarify the process of building the research platforms and hosting research.
35. How "small" is a small city? Is there any advantage to a rural area participating?
36. Can multiple universities form a team to apply for a research platform?
37. What is the timeline for the RFPs being released by the PPO?

QUESTIONS RELATING TO THE REQUESTS FOR PROPOSALS THAT WILL BE RELEASED BY AN EVENTUAL PPO

1. **With respect to related efforts — Open Access Research Testbed for Next-Generation Wireless Networks (ORBIT) and the Global Environment for Networking Innovations (GENI) — what lessons have been learned that may apply to this effort?**

NSF has a long history of providing the infrastructure necessary to enable fundamental research advances — and NSF's Directorate for Computer and Information Science and Engineering (CISE) has led such infrastructure in computing, including through GENI, [FutureGrid](#), [NSF Future Cloud](#), and other such resources. Important lessons learned from these efforts have included: the value of bringing together academic and industry partners to help inspire and shape research challenges; the mutual accountability that results through university-city teams; and the critical nature of nurturing a community of researchers and educators to drive forward progress in a particular area. In the case of the PAWR program especially, industry will have early input in design decisions that will help avoid pursuing technology directions that may otherwise imperil the long-term viability of the research platforms; and "bottom-up" design decisions and approaches will be promulgated.

2. **How is the PPO related to the GENI Project Office?**

GENI Project Office; there is no relationship between the two organizations.

QUESTIONS RELATING TO THE REQUESTS FOR PROPOSALS THAT WILL BE RELEASED BY AN EVENTUAL PPO

3. **What is the role of PPO in the design of the research platforms?**

The PPO will develop general design specifications (i.e., a framework for the design of the research platforms), with input from the community, and will share these as part of the Request for Proposals (RFP) process. The proposers will propose specific designs for the individual research platforms, utilizing that framework.

4. **Can local corporate sponsors participate in the city-university research platform (design, development, and deployment) proposals? Can industry contribute to a proposal without being part of the Industry Consortium described in the solicitation?**

Local for-profit and non-profit partners are welcomed (and in fact, encouraged) to the extent that they enhance the capabilities, reach, and sustainability of a proposed research platform. Industry Consortium members may not participate in platform proposals; other companies may choose to collaborate directly with the individual proposers. These companies are also encouraged to consider whether joining the Industry Consortium may provide more benefit in the long run (see [NSF 16-096](#) for additional details).

5. Can Federally-Funded Research and Development Centers (FFRDCs) participate in the design, development, and deployment of the research platforms and/or in conducting experiments on the research platforms once they are operational? How about federal laboratories?

The PPO lead is defined in the solicitation and may consist of universities and non-profit organizations only. It is anticipated that each subsequently-funded research platform will comprise a city-university team; this team may also involve corporate partners, FFRDCs, and federal labs. Similarly, FFRDCs and federal labs may participate in conducting experiments on the eventual research platforms. However, note that NSF funding to FFRDCs and federal labs is provided only under unique circumstances, as specified in NSF's *Grant Proposal Guide* (see https://www.nsf.gov/pubs/policydocs/pappguide/nsf16001/gpg_1.jsp#categories).

6. What is US Ignite, Inc.'s role once the PPO office has been established?

US Ignite, Inc. has helped form the Industry Consortium described in the PPO solicitation. However, the PPO is a distinct entity to be funded through the [NSF 16-585](#) and, upon awarding, the PPO will begin collaborating with the Industry Consortium.

7. Has there been thought as to how to make the research platforms "living"/dynamically adaptable?

Yes, staying current with rapidly evolving technologies will be essential to the long-term utility and success of the research platforms, including sustenance. Plans to address this requirement will be a key review criterion in the evaluation of future research platform proposals (to be submitted in response to RFPs issued by the eventual PPO). The goal of the Industry Consortium will be to help guide the process of evolution for these research platforms.

8. Will there be review criteria for the research platform proposals that go beyond the technical details of setting up the research platforms? For example, will the review process consider a given proposing team's capacity to provide local community services/impact?

Consideration will be given to the positive impacts of a given research platform on the community proposing to host it — not only in terms of potential pilot deployments of advanced technologies, but also with respect to jobs, workforce development, and economic competitiveness, for example. This consideration will take place in the context of the core focus of the research platforms, i.e., to support fundamental, pre-competitive research with the goal of quickly identifying technologies with potential commercialization opportunities; please note that provision of commercial-grade local community services is not an immediate goal of the PAWR effort.

9. In terms of team structure, whom do you anticipate leading the teams charged with designing, developing, and deploying the research platforms (e.g., cities or universities)?

Either a city or a university may lead a proposing team; each proposal must make the case that the lead is capable of following through on the design, development, and deployment of the proposed research platform.

10. Can projects be led by independent non-profit organizations, given the emphasis on commercialization?

Yes, non-profits are eligible to apply as leads for research platform proposals. As a reminder, project proposals must clearly demonstrate that the chosen lead is the most capable to follow through on the design, development, and deployment of the proposed research platform.

11. Is cost sharing allowed and/or included in the review process?

Voluntary committed cost sharing is prohibited.

12. Are letters of support from researchers interested in utilizing research platforms of value in response to research platform RFP?

Letters of support are not considered to be of value for purposes of evaluating a research platform proposal. Appropriate guidance will be provided in the research platform solicitation.

QUESTIONS RELATING TO THE RESEARCH TO BE ENABLED BY THE RESEARCH PLATFORMS

13. **Is it incumbent on potential users to learn how to use the research platform interfaces or will there be tutorials created/support provided?**

As with any system, there will be a learning curve — but it is anticipated that the research platforms will have staff and tutorials to assist users and mitigate this learning curve. Past efforts such as GENI and related CISE research infrastructure projects have demonstrated that providing active user support is critical to ensuring widespread user adoption.

14. **Should we only think about short-term (three years or less until commercialization) projects to evaluate on the research platforms envisioned in the PAWR: PPO program solicitation?**

Certainly not. The research platforms are meant to support fundamental, pre-competitive academic research, for which impacts may very well be realized 10 or more years into the future, i.e., well beyond the typical three-year duration of an NSF research grant.

15. **Do you envision following an approach by which experiments to be run on the research platforms are vetted in some way to determine their suitability?**

Yes. Proposals will be reviewed by a subcommittee of the PAWR Steering Council (of which the PPO is a member) to ensure research conducted on the platforms aligns with the goals of the PAWR program. Details of the criteria and process will be established by the awarded PPO in consultation with NSF, the Industry Consortium, and relevant academic/community stakeholders. Standards and governance will be worked out in more detail, with input from those stakeholders, once the PPO is established.

16. **Is there a general sense of the geographic area to be covered by these research platforms (i.e., how large they should be)?**

The answer to this question may vary depending on the goals and scope of each individual research platform. For a given research platform, the geographic area will be a function of the type of wireless networks that the research platform will feature, the scale of the networks, and the effort involved in setting up and maintaining a research platform of that scale.

17. **Are there any expectations as far as open interfaces for the research platforms?**

The intent is for the research platforms to feature both open hardware and open software interfaces, and to be reusable by others.

18. **Could some of the funding also support graduate student assistantships, for example, for applied research that can be deployed in cities?**

Funding for (basic/applied) research to be conducted on the research platforms can come from NSF, the PAWR Industry Consortium, or other sponsors. NSF funding for principal investigators will come through NSF research programs on wireless communications and networking, and the research conducted on the research platforms with assistance of graduate/undergraduate students is expected to be included in proposals submitted to these programs, rather than in the proposals for the platforms themselves.

19. **Will implementation funding for designing, developing, and deploying the research platforms include funding for graduate students?**

Funding for designing, developing, and deploying the research platforms is expected to include appropriate levels of student support to the extent that such effort is necessary for the completion of the research platforms. Guidelines about graduate student support are expected to be similar to what is provided for the CISE Research Infrastructure (CRI) program.

20. **In what spectrum bands are the research platforms expected to operate, and will there be a need for licensing?**

We expect the research platforms to use a diverse set of spectrum bands depending on the types of wireless networks to be supported. These can be anywhere between 300 MHz to 100 GHz. We expect the research platform proposers to be aware of the Federal Communication Commission's (FCC) spectrum policies: the FCC has created a new Program Experimental License that will allow for testing on a wide swath of frequencies. Proposers are expected to obtain such licenses and include these as part of their proposals to validate the feasibility of the proposed research

platforms to work in the bands to be supported. The FCC website for receiving applications to this new Experimental License is expected to be online by the time the proposals for platforms are due.

21. Can one do research on the design and development of the research platforms, or only as part of research projects to be enabled by the research platforms?

A mix of both is anticipated. These research platforms constitute research infrastructures for the wireless networking and communications research community (in alignment with the definition of the [CRI](#) program). As the research platforms mature over time, they will support less research in the design and development aspects and more research as a result of the availability of the infrastructure.

22. Are the research areas listed in the solicitation the only areas of research NSF is interested in funding for the research platforms?

Neither NSF nor the PPO will predefine the research foci for the research platforms. We have provided sample research areas, but these are meant to be only examples. We do expect the research platforms to cover a wide range of emerging research areas.

23. Is there an expectation that the research conducted on the platforms will inherently lead to commercialization in the short term?

PAWR is an open, pre-competitive, fundamental research effort. Both the PAWR Industry Consortium and NSF seek to explore a multitude of research concepts through these research platforms. There are no formal expectations of commercialization, but such outcomes would be encouraged as an end product.

24. Is the PAWR program more engineering- or research-focused (e.g., GENI was more engineering-focused)?

This first part of the PAWR program is constituted by building the research platforms, which will involve a mix of engineering as well as research in infrastructure. The second part of the program will entail support for fundamental and applied research to be conducted on the research platforms.

25. The PAWR program was included as part of a set of the recent announcement of a national Advanced Wireless Research Initiative. Is the additional \$350 million noted in that announcement targeted specifically for research to be conducted on the research platforms? What is the funding breakdown for research areas vs. applications and services?

NSF will provide \$50 million over the next 7 years toward designing, developing, deploying, and operating these research platforms, in addition to the cash and in-kind support from the PAWR Industry Consortium. Beyond the research platforms, NSF has a long history of supporting fundamental research in wireless networking and communications, and anticipates continuing this investment at a level of over \$50 million per year over the next 7 years. Such research has been supported through core and crosscutting programs, following merit review of competitive proposals. NSF anticipates that some of the investment over the next 7 years will go toward projects that will conduct research on the research platforms, once they are operational. Such research may be a combination of "infrastructure research", "protocol/algorithms research" and "applications/services research".

26. How will heterogeneity, security and privacy, and coexistence be addressed in these research platforms?

These are all critical questions that research in advanced networking should address. Proposers of the research platforms are encouraged to consider incorporating support for research on these vital questions as part of their design, development, and deployment.

27. Shouldn't we test existing ideas first, rather than call for new ones?

These do not need to be exclusive activities. The Advanced Wireless Research Initiative aims to explore research at scale in real-world settings outside of the laboratory. Existing ideas that have been successfully demonstrated in the laboratory environment will be able to use the envisioned research platforms to demonstrate viability at scale.

28. How do you maintain mid- and long-term research projects while also accounting for public interest and the need to translate innovations to the marketplace quickly in order to justify local investment?

These do not need to be exclusive activities. The Advanced Wireless Research Initiative aims to explore research at scale in real-world settings outside of the laboratory. Existing ideas that have been successfully demonstrated in the laboratory environment will be able to use the envisioned research platforms to demonstrate viability at scale.

29. Can the PAWR Steering Council veto an NSF decision?

The PAWR Steering Council will have representation corresponding to the levels of commitments of the various partners in the effort, including NSF. Precise governance structures will be decided and published once the PPO is established.

30. What happens if something goes wrong on a research platform?

The PPO will establish clear rules concerning safety, liabilities and other considerations that will be part of the RFPs for the research platforms.

31. Who owns what assets of the research platforms?

NSF will follow standard federal policies/procedures relating to grants and agreements. Ownership of testbed assets acquired/developed through NSF funds will be dictated by these policies. Contributions from the Industry Consortium, once deployed, will belong to the entity that owns the research platform. The proposers may, and are encouraged to, institute additional procedures to accommodate sharing, leasing, and loaning of equipment and resources, as necessary.

32. Can industry receive funding from NSF if collaborating on the research platform proposal?

NSF does not intend to provide funding to for-profit entities under the PAWR program. PAWR Industry Consortium members are not eligible to collaborate on any research platform proposal.

33. Are international academic or industry collaborators able to be part of the PAWR program?

We do have international companies involved in the Industry Consortium. Foreign universities and non-Consortium members can participate as collaborators in the development of the research platforms. International entities are not eligible to receive any funding from the PAWR program.

34. Please clarify the process of building the research platforms and hosting research.

This process is envisioned as a two-stage process — the research platforms themselves are initially constructed and subsequent research is hosted on top of those research platforms.

35. How "small" is a small city? Is there any advantage to a rural area participating?

There are several problems of interest to rural areas that a small city may consider tackling as part of a research platform. However, as a critical mass of individuals is needed to test the research platforms (specific user densities are required to validate any testing), small cities must demonstrate the presence of appropriate user densities that the follow-on research may require as part of the corresponding proposal. The emphasis is on city-scale, rather than "city size".

36. Can multiple universities form a team to apply for a research platform?

Yes, given the scale of these research platforms, we anticipate such teaming arrangements.

37. What is the timeline for the RFPs being released by the PPO?

We anticipate funding four research platforms, with one to two supported in the first year, starting in calendar year 2017, and the remaining research platforms funded by calendar year 2019.