International Research Network Connections (IRNC)

PROGRAM SOLICITATION
NSF 14-554

REPLACES DOCUMENT(S):
NSF 09-564

National Science Foundation

Directorate for Computer & Information Science & Engineering
Division of Advanced Cyberinfrastructure

Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):

July 07, 2014

IMPORTANT INFORMATION AND REVISION NOTES

Four program areas are new in this solicitation:

Infrastructure and Innovation of U.S. R&E Open Exchange Points (IRNC: RXP); centralized facility for NOC operations and innovation (IRNC: NOC); Advanced Network Measurement Infrastructure (IRNC: AMI); and Global R&E network engineering community engagement and coordination (IRNC: ENgage).

The Special Projects area is removed, as well as a separate experimental networking area.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

International Research Network Connections (IRNC)

Synopsis of Program:

The International Research Network Connections (IRNC) program supports high performance network connectivity required by international science and engineering research and education collaborations involving the NSF research community. NSF expects to make a set of awards to: (1) link U.S. research networks with peer networks in other parts of the world and leverage existing international network connectivity; (2) support U.S. infrastructure and innovation of open network exchange points; (3) drive innovation and state-of-the-art capabilities for Research and Education (R&E) Network Operation Centers (NOC); (4) stimulate the development, application and use of advanced network measurement capabilities and services across international network paths; and (5) support community engagement in training and human and network capacity building, and coordination in advanced network engineering. High performance network connections funded by this program are intended to support science and engineering research and education applications, and preference will be given to solutions which provide the best economy of scale and demonstrate the ability to support the largest communities of interest with the broadest services. Funded projects will assist the U.S. research and education community by enabling state-of-the-art international network services and access to increased collaboration and data services. Through extended international network connections, additional research and production network services will be enabled, complementing those currently offered or planned by domestic research networks.

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

- Kevin Thompson, telephone: (703) 292-4220, email: kthompso@nsf.gov
- William Y. B. Chang, telephone: (703) 292-7239, email: wychang@nsf.gov

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.070 --- Computer and Information Science and Engineering

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant or Cooperative Agreement.

Estimated Number of Awards: 8 to 11

The estimated number of awards is 8-11. Because of the nature and geographic extent of the efforts involved, interested parties are encouraged to form consortia of organizations that can work together to provide the needed services. Consortia may consist of any number of U.S. and foreign, profit and not-for-profit entities. All awards resulting from responses to this solicitation will be made to U.S. organizations as cooperative agreements, standard or continuing grants. IRNC:Backbone awards will be for a maximum of five years. All other awards will be of three to five-year duration.

Anticipated Funding Amount: $25,000,000

The anticipated funding amount is $25,000,000 total for this solicitation, pending availability of funds. Number of awards and average award size/duration are subject to the availability of funds; however NSF expects to make approximately 2-3 IRNC:Backbone awards, each at up to $1.2M/year for a maximum of 5 years, and a total of 6 to 8 awards for other award areas funded at a level of $250K to $1M per year over 3-5 years, depending on the program area.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in, the US acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization: 2

Organizational limit of 2 applies to IRNC: Backbone proposals ONLY.

There is no organizational limit for the other categories.

Limit on Number of Proposals per PI or Co-PI: 3

An individual may be the PI or co-PI in no more than three proposals submitted in response to this solicitation. These three proposals may be any combination of categories. These eligibility constraints will be strictly enforced in order to treat everyone fairly and consistently. In the event that an individual exceeds the three-proposal limit for this solicitation, proposals received within the limit will be accepted based on earliest date and time of proposal submission (i.e., the first three proposals received will be accepted and the remainder will be returned without review). No exceptions will be made. There is no limit on the number of proposals with which an individual may be associated as senior personnel to provide specific expertise.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required
- **Preliminary Proposal Submission:** Not required
- **Full Proposals:**
  - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.
  - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide).

B. Budgetary Information

- **Cost Sharing Requirements:** Inclusion of voluntary committed cost sharing is prohibited.
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Not Applicable

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

  July 07, 2014

Proposal Review Information Criteria

Merit Review Criteria: National Science Board approved criteria. Additional merit review considerations apply. Please see the full text of this solicitation for further information.

Award Administration Information

Award Conditions: Additional award conditions apply. Please see the full text of this solicitation for further information.

Reporting Requirements: Standard NSF reporting requirements apply.

TABLE OF CONTENTS

I. INTRODUCTION

The United States research and education community communicates, cooperates, and collaborates with colleagues in the global community. Members of this community access remote instruments, data, and computational resources located throughout the world, often as part of international collaborations. Similarly, major NSF investments in large-scale science and engineering facilities located both inside and outside the United States are utilized by multi-national research and education collaborations. To support such activities, NSF solicits proposals for International Research Network Connections (IRNC).

NSF expects to make a set of awards to: (1) link U.S. research networks with peer networks in other parts of the world and leverage existing international network connectivity; (2) support U.S. infrastructure and innovation of open network exchange points; (3) drive innovation and state-of-the-art capabilities for R&E Network Operation Centers (NOC); (4) stimulate the development, application and use of advanced network measurement capabilities and services across international network paths; and (5) support community engagement and coordination in advanced network engineering. High performance network connections funded by this program are intended to support science and engineering research and education applications, and preference will be given to solutions that provide the best economies of scale and demonstrate the ability to support the largest communities of interest with the broadest services. Funded projects will assist the U.S. research and education community by enabling state-of-the-art international network services and access to increased collaboration and data services. Through extended international network connections, additional research and production network services will be enabled, complementing those currently offered or planned by domestic research networks.

This program supports international research network connections across five areas: Production network connections and services (IRNC:Backbone); Infrastructure and Innovation of U.S. R&E Open Exchange Points (IRNC: RXP); a centralized facility for NOC operations and innovation (IRNC: NOC); Advanced Network Measurement Infrastructure (IRNC: AMI); and Global R&E network engineering community engagement and coordination (IRNC: ENgage:).

Each proposal should clearly identify and justify the single focus area to which it is being submitted.

II. PROGRAM DESCRIPTION

The program is divided into five distinct but related areas: (1) IRNC:Backbone - Production network connections and services; (2) IRNC:RXP - Infrastructure and Innovation of U.S. R&E Open Exchange Points; (3) IRNC:NOC - Centralized facility for NOC operations and innovation; (4) IRNC: AMI- Advanced Network Measurement Infrastructure; and (5) IRNC: ENgage - Global R&E network engineering community engagement and coordination.

In 2012 NSF began an effort called the International Research and Education Network Initiative (IREN) to globally develop and coordinate future strategy in international research and education networking. An early result of these efforts in 2013 was a short

document, co-developed with the European Commission, that provided a concise set of guiding principles for international networking. The full document can be found at: http://fasterdata.es.net/nsf-iren/. These principles, paraphrased below, apply in full to this program - while all aspects and award activities resulting from this solicitation are expected to adhere to these principles, section (F) below of the program description that addresses engagement activities especially applies to these principles.

> *Coordination Statement: Support global research and education communities by funding globally interoperable networked infrastructures, coordinated innovative services and human network community building. This will be achieved through global coordination, planning, execution, and governance through appropriate coordination of governance bodies, and coordinated investments*.
>
> *Guiding Principles*:
>
> - *Open exchange points: "policy-light" operation of open exchange points allowing for bi-lateral peering at all layers*.
> - *Open shared transit: utilization of the appropriated network capacity will be open to the largest R&E communities possible, including for transit*.
> - *End-to-end interoperability: end-to-end visibility & interoperability across network links and paths, and extended to end systems, is encouraged*.
> - *Close partnership with R&E Networks: close coordination and engagement with the community of R&E Networks*.
> - *Resilience: network resources will be configured and engineered in a way limiting or eliminating single point of failure and ensuring physical and logical path and route diversity*.
> - *Regional development: commitment to the concept of aggregation of demand at the regional level*
> - *Technology agnostic: operators of international R&E network infrastructure are open to different technology architectures*.
> - *Open innovation: coordinated development and adoption of advanced services at intra-domain, inter-domain and user levels*.

A. General Information

The infrastructure and associated services proposed in response to this solicitation must address U.S. research and education needs with respect to international collaboration and communication that advance science and engineering. The science that will be enabled by the proposal should be detailed. Plans for meeting the evolving service needs of the research and education community should also be described.

The Project Description for all proposals, which can be up to 15 pages, should include discussions of the criteria detailed in the following section for each of the five programs described below in addition to addressing the science impact of the project. There must also be a discussion of risk mitigation and post-award management. The number of support letters from third parties is limited to eight. Inclusion of additional supplementary materials (appendixes, etc.) will be allowed only after discussion with an IRNC program officer.

A.1. General Organization Description

Because of the nature and geographic extent of the efforts involved, interested parties may choose to form consortia that can work together to provide the needed services. Consortia may consist of any number of U.S. and foreign, profit and not-for-profit entities. Awards resulting from this solicitation will be made to the eligible lead U.S. organizations.

Proposals in any of the five areas should describe the organizations that are involved including:

- Identification of the lead U.S. organization;
- Experience and qualifications applicable to the provisioning, operation, and management of the proposed projects and, for the lead organizations, evidence of effective project management experience including management of sub-awards (if any);
- Experience the consortia members have had working together in similar projects;
- Planned organization and governance of the proposing consortium;
- A description of each organization's proposed facilities (in appropriate amount of detail to reflect the relative role of each organization); and
- Documentation of technical and managerial qualifications of key personnel, including those who are part of any sub-awards.

Each proposal should clearly identify and justify the single IRNC program area to which it is being submitted.

B. IRNC Program Area 1: Production Network Connections and Services (IRNC: Backbone)

The highest priority is enabling and enhancing communication and collaboration between the U.S. and international science and engineering research and education communities. A key ingredient of networked global scientific collaboration continues to be high capacity high performance network links between the US and other regions of the world. The availability of limited resources means that preference will be given to solutions providing the most efficient economies of scale and demonstrating the ability to link the largest communities of interest with the broadest services. Proposals should describe how this will be accomplished over a five-year period.

NSF is also interested in innovative and forward-looking approaches to promote the development of a rational global network architecture. In this regard, proposals should address the question of how their international links will become an integral component of the global science and engineering research and education network environment and how they will fit into a rational global network architecture. For example, solutions which offer partnering and engineering incentives to foreign connection points to share circuits or encourage the establishment of national or regional distributed exchange points might be considered.

Leveraging existing infrastructure is encouraged. Successful proposals will address how their activities blend consistently into, and enhance, the existing end-to-end domestic and international network infrastructure and emerging services and best practices. NSF positions these high capacity high performance international network links as consistent with the vision of establishing a global network backbone with multiple 10Gbps/40Gbps/100Gbps links to meet the aggregated needs of international research and education. This Global Network Backbone and Exchange Point architecture is designed in full cooperation with experienced operational National Research and Education Networks (NRENs).

Proposals submitted to this area must address high capacity R&E network connectivity between the U.S and one of two regions: (1) Asia Pacific, or (2) Central and South America. NSF support for R&E network connectivity with Europe and Africa will be addressed in a future solicitation and such proposals are not in scope for this solicitation. As described below, NOC and advanced measurement services will be funded and provided separately.

B.1 IRNC: Backbone Services and System Design

Proposals should describe the services to be provided, the technologies (including protocols) that provide a reliable, leading-edge service for research and education. For example, some of the links to key continents must support individual sessions at end-to-end data transfer rates approaching 10 Gbps in an uncongested use mode. The system design should provide this capability consistent with high-capacity and long-distance delay products. Proposed technologies must also be compatible with the research networks of the countries that are to be connected, and with their plans (where available) for the introduction of new technologies.

Proposals should describe relevance of dynamic circuit networking capabilities to domain science communities, projects, and users, and their approach to supporting dynamic circuits in combination with shared IP services. For proposals with services that include the explicit operation of a layer 3 (shared IP) service, and which therefore involve the management of router equipment, support for the current Internet Protocol (IPv4), the next generation Internet Protocol (IPv6), and IP multicast is required. Service provisioning will require management and operations at multiple protocol levels.

Proposals should describe the overall system design including: connection plans on both ends of the international links; the networks to be connected, and the technical characteristics of the IRNC links; supported layer 1-3 technologies; routing and switching strategies; security mechanisms and privacy policies; and relevant timelines for technology deployment and service activation. Alternate designs, each separately priced, for providing reliable services may also be provided.

In addition to the description of the initial technologies and equipment to be employed, proposals should outline how the proposed IRNC should evolve and specify the plans for introducing new networking technologies, equipment, and services. Proposals should assess the risks and benefits of adopting such new technologies including plans to assure high quality services during the transition to any proposed future deployments. NSF recognizes that proposed activities in this area, as well as all other areas in the solicitation, offer opportunities for innovation and support for network-level experimentation in the community. Proposals are encouraged to consider how to best support Software Defined Networking (SDN) and how to move from an experimental and developmental phase to potential production support over a five-year time horizon. Proposals are encouraged to weigh current network traffic demand against future estimated needs and to consider the potential move to 100Gbps circuits in the next 0 to 5 years, depending on geography, availability, and demand.

Links funded by this program are intended to support science and engineering research and education applications. Therefore, the networks they connect must also be primarily for these purposes. These networks typically have appropriate use policies and those policies shall govern traffic flow over the IRNC links. Known or expected usage policies, along with processes for enforcing or implementing the policies, should be described. A proposal in this area must identify a physical and logical landing point in the continental Unites States for any circuit proposed. Gathering of metrics should be included, especially the definition of metrics used to judge the project's impact and success. Where appropriate, compatibility with emerging best practice international research and education should be addressed. Connection points may enforce their own routing policies. Proposers should describe their proposed U.S. and international connection policies. NSF will give preference to proposals conveying open policies (e.g., free R&E transit) and collaboration. NSF will give preference to proposals leveraging open exchange points as physical and logical endpoints to international circuits.

Sharing infrastructure and services can improve the economics for users and institutions. This includes not only use of research network resources provided by others, but also the use of network resources for non-research use. If services of infrastructure are shared, measures must be taken to ensure that IRNC communities are provided with their fair share of capacity, priority, and reliability subscribed under IRNC awards, and on terms that are at least as favorable as those received by any other customer of the service provider. Discussion of capacity allocation and performance monitoring to ensure fair sharing should be clearly presented.

NOC services should not be included in IRNC: Backbone proposals. NSF plans to support those services through a primary award in section (D) of this solicitation. Advanced network measurement services, beyond capabilities required to address impact metrics and normative Simple Network Management Protocol (SNMP)-based passive measurement, should not be included in IRNC: Backbone: proposals. NSF plans to support those services through one or more awards in section (E) of this solicitation. Proposals should describe their SNMP-based measurements and approach to disseminate and report on SNMP-based data - proposals should include the granularity of their utilization measurements.

Letters of commitment, submitted as a **supplementary document**, should be included for all international partners in a proposal, and are encouraged to include the partners' view of the relationship with, and value of, the proposed project, and the nature of their interactions.

B.2. IRNC: Backbone Budget Narrative -

For the IRNC: Backbone proposals, each year's budget narrative must contain information about the specific services proposed and explain the significant costs associated with each service/facility provided. This pricing information must include a quantifiable basis for determining the reasonableness of the proposed price to be funded by NSF. Examples of supporting information include:

- Quotes for leased circuits;
- Documented estimates of the value, or current market price, of the proposed services;
- Measurable criteria such as, price per unit of bandwidth made available to the U.S. research community;
- Service metrics and/or quality-of-service parameters of this solicitation and their relation to proposed pricing;
- Market value of special supplies, over and above the service provider's standard equipment, needed to provide the required services; and
- Port fees, cross-connect fees, and other costs associated with, and passed along by, the U.S. open exchange point connectivity.

Applicants are strongly encouraged to document the nature of the collaborative relationship with international partners.

NSF expects to make 2-3 awards in this area at up to $1.2M per year for up to 5 years, pending availability of funds. Proposals in this area require titles that begin with: "IRNC: Backbone:" then the title of your project.

C. IRNC Program Area 2: Infrastructure and Innovation of U.S. R&E Open Exchange Points (IRNC: RXP)

Network exchange points for research and education flows have served a pivotal role over the last 20 years in extending network connectivity internationally, providing regional R&E networking leadership, and supporting experimental networking. Through years of operational experience combined with international peering relationships, engineering activities, and international networking forums, a set of guiding principles have emerged for successful approaches to an open exchange point.

Proposals submitted to this area should address the enhancements needed for exchange points in the United States to become platforms of network innovation supporting the research and education needs of global scientific collaborations led by or including US researchers and educators. While proposals are expected to come from entities currently operating international R&E exchange

points, proposals may also come from institutions proposing to create a new exchange point.

Proposals should address in their proposed activities support for, and optionally direct participation in, network innovation, trials, and ongoing experimentation. Industry participation and teaming and collaboration with partners capable of contributing to advances in network engineering and technology are encouraged. Proposals should address support for jumbo frames. Proposals are encouraged to consider how to support current and future Software Defined Networking (SDN)/Openflow based experimental deployments.

NSF is interested in supporting the continued research, development, experimental deployment and trialing of multi-domain SDN at a national and international scale. While not required, proposals in this area have an opportunity to propose the design and operation of a Software Defined Exchange (SDX) serving to interconnect SDN peers and connecting customers to these inter-connecting SDNs. In the context of this IRNC solicitation, one or more connected SDN peers must be domains outside the United States. Proposals including the establishment of an experimental SDX are expected to include in the funding request sufficient resources and planned activities required to actively participate and play a leadership role in the planning, instantiation, coordination, and prototyping support of global-scale SDN exchanges. Proposals may optionally request funding for network equipment and associated costs to only host SDN experimentation activities performed by other US researchers and engineers, such as 1U up to a full rack and standard dual 30 amp A&B power.

Proposals must demonstrate a commitment to operation of an open exchange point, specifically agreeing to: support for homing of multiple international links; high capacity connectivity to Internet2 and ESNet; providing maximum flexibility in connectivity and peering, for example providing layer 1-3 connectivity services with policies supporting bi-lateral peering at layers 2-3; automated, dynamic switching network services; and, in the best interests of the end users - the researchers, educators, and students in the U.S., a demonstrated commitment to a productive partnership and collaboration with Internet2, the primary National R&E Network (NREN) for the NSF community. Proposals must describe their exchange point architecture and justify any core equipment purchase requests. Proposals must address measurement and monitoring for any equipment and infrastructure that is part of the proposal. Proposals must address their scalability and growth constraints of their facilities in terms of overall floor space, power budget, and other physical restrictions. Proposals must include a security plan for their facility, included as a **supplementary document**.

NSF expects to make 2-4 awards in this area at up to $750k per year for 3-5 years, pending availability of funds. Proposals in this area require titles that begin with: "IRNC: RXP:" then the title of your project.

D. IRNC Program Area 3: Centralized facility for NOC operations and innovation (IRNC: NOC)

All production networking activities supported by the IRNC program will leverage a single, centralized Network Operations Center, or "NOC", facility and set of associated services. This program area focuses on those NOC services and activities.

Proposals submitted to this area should address advanced state-of-the-art network monitoring and associated support for a 24x7 NOC service supporting the international network links and equipment supported under this program. Normative commercial-grade NOC services such as SNMP-based event monitoring and logging, including alerts, router status, and interface byte and packet counts, and problem resolution, should be described. Proposals should address active and passive performance testing capabilities, and how those capabilities interoperate with PerfSonar, as part of an overall strategy to verify and monitor continuous health on IRNC networks. Proposals should address how the NOC will communicate with the Research and Education Networking Information Sharing and Analysis Center (REN-ISAC), and (if allowed), actively participate in the REN-ISAC community. Proposals are expected to include a discussion on leveraging RouteViews to provide global international R&E routing visibility and monitoring. Proposals are encouraged to address innovative and new NOC capabilities, such as new forms of network visualization and monitoring, and NOC functions applied to SDN-based production networks. Proposals are expected to discuss plans for sharing monitoring data with peer international NOC entities, the potential for having their tools and capabilities interoperate, and the potential for making data publicly available. This information may be included as part of the required data management plan. NSF recognizes that some technical details may not be possible to define until other awards are made in this program as described in the earlier sections. Advanced measurement, in the forms described in Section (E) below, should not be part of a proposal submitted to this area. But, as a centralized function spanning the IRNC program, the IRNC NOC will be expected to work with award activities in advanced measurement, at a minimum as a potential consumer of data.

Any and all software developed under funded award activities in this area must be done using an open source license, preferably one approved and recognized by the Open Source Initiative (http://opensource.org/).

NSF expects to make a single award in this area at up to $1M per year for up to 5 years, pending availability of funds. Proposals in this area require titles that begin with: "IRNC: NOC:" then the title of your project.

E. IRNC Program Area 4: Advanced Network Measurement Infrastructure (IRNC: AMI)

Proposals in this area target the provision and availability of advanced measurement services focused on advanced passive traffic measurement with flow granularity. Specifically, proposals should describe line-rate measurement capabilities using an architecture and platform that has no impact on user performance through any traffic, usage, or misconfiguration scenario. These capabilities include the ability to do flow-level network usage capture, analysis and reporting. Proposals should address system capabilities to provide insights into NSF community impact through aggregate and summary flow reporting at different levels of granularity, including: protocol usage; AS-level source/destination matrix; and NSF project-level summaries (which may equate to traffic summaries from defined 1-n prefixes a priori-mapped to known and permission-granting NSF projects). Proposals must support IPv4-based network flow reporting, and are encouraged to include IPv6 and SDN-based reporting where possible. Proposals should discuss how data produced in this activity will be made available to, and interface with, the centralized IRNC NOC awardee in section (D) above. This information may be included as part of the required data management plan. For the purposes of this activity, proposals should assume an initial set of two (2) 40 Gbps links and six (6) 10 Gbps links to continuously measure for traffic reporting. NSF recognizes the importance of user privacy and a priority of the IRNC program is preserving privacy; as such, proposals must address how their architecture, system design, and implementation prevent release of any Personally Identifiable Information (PII). Obviously, funded activities in this area must be carefully coordinated with award activities made in sections (B-D) above; NSF will work closely with the awardee(s) in this area to ensure close coordination and cooperation necessary to perform these activities. Note that any given IRNC network link will be measured by this service only after explicit approval for such measurements by relevant international partners.

Proposals may, as an option, include additional forms of passive and active measurements to be applied across IRNC connections.

Any and all software developed under funded award activities in this area must be done using an open source license, preferably one approved and recognized by the Open Source Initiative (http://www.opensource.org/).

NSF expects to make 1 award in this area at $500,000 to $1M per year for up to 5 years, pending availability of funds. Proposals in this area require titles that begin with:"IRNC: AMI:" then the title of your project.

F. IRNC Program Area 5. Global R&E network engineering community engagement and coordination (IRNC: ENgage:)

Coincident with the broadening global participation in scientific research, the international networking research and education community continues to expand, with increasing complexity in engineering issues and opportunities for greater engineering engagement and coordination. There are two types of engagement proposals: (1) for training and human and network capacity building; and (2) for international coordination. These are described in detail below.

F.1 IRNC: ENgage: Engagement for Training and Human and Network Capacity Building

Proposals in this area should address training opportunities, contributions to NREN development, collaboration with international R&E communities and industry, and overall infrastructure for human and network capacity building internationally. The focus here is on local and regional engagements at the network engineering and design level, especially in areas of the world where research and education network connectivity remains a challenge to collaborations with U.S. scientists and educators.

F.2 IRNC: ENgage: Engagement for Global Coordination

Proposals in this area should address the role of engagement and coordination with the global network engineering community. This role involves close coordination with relevant entities in the U.S.: NSF, all elements of the IRNC program, network exchange points, regional operational networks (RONs), and NRENS (i.e. Internet2). Activities center on enabling the U.S. R&E networking community to most effectively participate on the global stage through coordinating events, meetings, and consensus-driven approaches to network interoperability and high performance. NSF, through its International Research and Education Networking (IREN) initiative, has co-developed with the European Commission the set of guiding principles listed above. Proposals should strive to remain consistent with these guiding principles. The coordinating entity funded under this area is expected to garner community consensus and work in the best interests of the NSF research and education community and their networking needs in enabling global collaboration.

The entity or team funded under this area will be in a position to represent NSF science community interests in global R&E networking community events, discussions, and activities. This role may not be exclusive of other U.S. representation and efforts - for example, NSF recognizes the national and global network engineering leadership of DOE's ESNet. As such, activities funded in this area are expected to work in full coordination with ESNet and other relevant parties while representing the best interests of the NSF community.

F.3 Guidance for all IRNC:ENgage Proposals

Proposals should outline and describe a 3 year plan of effort, identifying goals, key issues and opportunities in network engineering coordination, and plan to address those challenges. Proposals should include event coordination and travel costs to accomplish the proposed activities. Proposals should address the team's role in terms of past position and experience in the community. Key priority areas for consideration include: infrastructure building consistent with the guiding principles stated above; coordinating globally interconnected testbed facilities; and human network community building through development of a strategy addressing community growth in network engineering experts, student exchange, and training. Finally, engagement activities should consider plans and approaches in working with the NSF science, engineering, and education communities and support of their international collaborations.

NSF expects to make a single award in each area of IRNC:ENgage as described above, at $250,000 to $750,000 per year for 3-5 years, pending availability of funds.

Proposals in this area require titles that begin with: "IRNC: ENgage:" then the title of your project.

If applicable, any proposal may include the following Supplementary Documents:

- Letters of commitment from individuals who are from organizations other than the proposing organization or proposed sub-awardees and who are described in the Project Description as involved in the project in a senior capacity, or from authorized representatives of institutions or organizations collaborating with the lead institution.
- The number of support letters from third parties is limited to eight. Inclusion of additional supplementary materials (appendixes, etc) will be allowed only after discussion with a relevant program officer.

III. AWARD INFORMATION

The estimated program budget is a total of $25,000,000 for this solicitation, pending availability of funds. Number of awards and average award size/duration are subject to the availability of funds; however NSF expects to make approximately 2-3 IRNC:Backbone awards, each at up to $1.2M/year for a maximum of 5 years, and a total of 6 to 8 awards for other award areas funded at a level of $250K to $1M per year over 3-5 years, depending on the program area.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in, the US acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization: 2

Organizational limit of 2 applies to IRNC: Backbone proposals ONLY.

There is no organizational limit for the other categories.

Limit on Number of Proposals per PI or Co-PI: 3

An individual may be the PI or co-PI in no more than three proposals submitted in response to this solicitation. These three proposals may be any combination of categories. These eligibility constraints will be strictly enforced in order to treat everyone fairly and consistently. In the event that an individual exceeds the three-proposal limit for this solicitation, proposals received within the limit will be accepted based on earliest date and time of proposal submission (i.e., the first three proposals received will be accepted and the remainder will be returned without review). No exceptions will be made. There is no limit on the number of proposals with which an individual may be associated as senior personnel to provide specific expertise.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.4 of the Grant Proposal Guide provides additional information on collaborative proposals.

Important Proposal Preparation Information: FastLane will check for required sections of the full proposal, in accordance with *Grant Proposal Guide* (GPG) instructions described in Chapter II.C.2. The GPG requires submission of: Project Summary; Project Description; References Cited; Biographical Sketch(es); Budget; Budget Justification; Current and Pending Support; Facilities, Equipment & Other Resources; Data Management Plan; and Postdoctoral Mentoring Plan, if applicable. If a required section is missing, **FastLane will not accept the proposal.**

Please note that the proposal preparation instructions provided in this program solicitation may deviate from the GPG instructions. If the solicitation instructions do not require a GPG-required section to be included in the proposal, insert text or upload a document in that section of the proposal that states, "Not Applicable for this Program Solicitation." Doing so will enable FastLane to accept your proposal.

Please note that per guidance in the GPG, the Project Description must contain, as a separate section within the narrative, a discussion of the broader impacts of the proposed activities. Unless otherwise specified in this solicitation, you can decide where to include this section within the Project Description.

Refer to Section II, Program Description, for specific proposal preparation information and instructions.

B. Budgetary Information

Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited.

Budget Preparation Instructions:
Budgets should include travel funds for the project principal investigators and other team members as appropriate from all collaborating institutions to attend one Principal Investigators' meeting.

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

  July 07, 2014

D. FastLane / Grants.gov Requirements

For Proposals Submitted Via FastLane:

To prepare and submit a proposal via FastLane, see detailed technical instructions available at: https://www.fastlane.nsf.gov/a1/newstan.htm. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

For Proposals Submitted Via Grants.gov:

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: http://www.grants.gov/web/grants/applicants.html. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

Proposers that submitted via FastLane are strongly encouraged to use FastLane to verify the status of their submission to NSF. For proposers that submitted via Grants.gov, until an application has been received and validated by NSF, the Authorized Organizational Representative may check the status of an application on Grants.gov. After proposers have received an e-mail notification from NSF, Research.gov should be used to check the status of an application.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in the GPG as Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: http://nsf.gov/bfa/dias/policy/merit_review/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Investing in Science, Engineering, and Education for the Nation's Future: NSF Strategic Plan for 2014-2018*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the strategic objectives in support of NSF's mission is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions must recruit, train, and prepare a diverse STEM workforce to advance the frontiers of science and participate in the U.S. technology-based economy. NSF's contribution to the national innovation ecosystem is to provide cutting-edge research under the guidance of the Nation's most creative scientists and engineers. NSF also supports development of a strong science, technology, engineering, and mathematics (STEM) workforce by investing in building the knowledge that informs improvements in STEM teaching and learning.

NSF's mission calls for the broadening of opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.

- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (GPG Chapter II.C.2.d.i. contains additional information for use by proposers in development of the Project Description section of the proposal.) Reviewers are strongly encouraged to review the criteria, including GPG Chapter II.C.2.d.i., prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
    a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
    b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

Additional Solicitation Specific Review Criteria

All IRNC projects will be evaluated with careful attention to the following:

- The expected impact of the proposed international networking activities, either directly or indirectly, across the NSF community;
- The expected level of production quality in resulting capabilities made available to the NSF community; and
- The experience and record of the PI team in delivering reliable, robust, dependable, and state-of-the-art capabilities in international R&E networking.

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review.

Reviewers will be asked to evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will be completed and submitted by each reviewer. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF strives to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new awardees may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

After programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications. After an administrative review has occurred, Grants and Agreements Officers perform the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process).

B. Award Conditions

An NSF award consists of: (1) the award notice, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award notice; (4) the applicable award conditions, such as Grant General Conditions (GC-1)*; or Research Terms and Conditions* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award notice. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

Special Award Conditions:

The awardee is responsible for security of all equipment and information systems funded directly or indirectly by this award. The awardee may be required to present to the cognizant NSF Program Officer and Grants and Agreements Officer an IT security plan addressing policies and procedures for review and approval within 60 days of award. The plan should include evaluation criteria that will measure the successful implementation and deployment of the plans, policies and procedures.

Awards with significant software development or application interactions will be subject to the following conditions:

* identification within the 1st year of award the software's open source license to be used.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer at least 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). Within 90 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report, will delay NSF review and processing of any future funding increments as well as any pending proposals for all identified PIs and co-PIs on a given award. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through Research.gov, for preparation and submission of annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

More comprehensive information on NSF Reporting Requirements and other important information on the administration of NSF awards is contained in the NSF *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

VIII. AGENCY CONTACTS

Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.

General inquiries regarding this program should be made to:

- Kevin Thompson, telephone: (703) 292-4220, email: kthompso@nsf.gov
- William Y. B. Chang, telephone: (703) 292-7239, email: wychang@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

IX. OTHER INFORMATION

The NSF website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this website by potential proposers is strongly encouraged. In addition, "NSF Update" is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Grants Conferences. Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on NSF's website at https://public.govdelivery.com/accounts/USNSF/subscriber/new?topic_id=USNSF_179.

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this new mechanism. Further information on Grants.gov may be obtained at http://www.grants.gov.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 55,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Arctic and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at http://www.nsf.gov

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information** (NSF Information Center)**:** (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**

  Send an e-mail to: nsfpubs@nsf.gov

  or telephone: (703) 292-7827

- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and NSF-51, "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
Reports Clearance Officer
Office of the General Counsel
National Science Foundation
Arlington, VA 22230