

Campus Cyberinfrastructure – Infrastructure, Innovation and Engineering (CC*IIE) Program

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CC*IIE Synopsis

- ❖ CC*IIE is primarily a campus networking program, investing in improvements and re-engineering at the campus level to support a range of data transfers supporting computational science and computer networks and systems research. The program also supports Network Integration activities tied to achieving higher levels of network performance, reliability and predictability for science applications and distributed research projects.



(Post NSFnet) Brief History of NSF Investments in Network Infrastructure

- ❖ vBNS and High Performance Connections Program (HPNC) – 1995-2003
 - National backbone and connections
- ❖ International Networking (IRNC) – 1997 – present
 - Connecting US to the world
- ❖ Experimental Infrastructure Networking (EIN) - 2003
- ❖ “Academic Research Infrastructure Program – Recovery and Reinvestment” - 2009
 - Subset: Optical exchange, regional networking upgrades
- ❖ EPScOR – Research Infrastructure Improvement (RII) – 2011
 - Inter-campus, intra-campus connectivity
- ❖ STCI program (2011 – “100G Connectivity for Data-Intensive Computing at JHU”, Lead PI: Alex Szalay)
- ❖ CC-NIE 2012, CC-NIE 2013



ACCI Task Force on Campus Bridging

- ❖ *Strategic Recommendation to the NSF #3: The National Science Foundation should create a new program funding high-speed (currently 10 Gbps) connections from campuses to the nearest landing point for a national network backbone. The design of these connections must include support for dynamic network provisioning services and must be engineered to support rapid movement of large scientific data sets."* - pg. 6, National Science Foundation Advisory Committee for Cyberinfrastructure Task Force on Campus Bridging, Final Report, March 2011
- ❖ www.nsf.gov/cise/aci/taskforces/TaskForceReport_CampusBridging.pdf
- ❖ Also see Campus Bridging Technologies Workshop: Data and Networking Issues Workshop Report. G.T. Almes, D. Jent and C.A. Stewart, eds., 2011, <http://hdl.handle.net/2022/13200>



Campus Cyberinfrastructure – Infrastructure, Innovation and Engineering (CC*IIE) Program

- ❖ FY14 new solicitation is out, NSF 14-521
- ❖ Six areas defined, 4 of them are new this year
- ❖ **Proposals are due March 17, 2014**
- ❖ Estimated Number of Awards: 20 - 35
- ❖ Anticipated Funding Amount:
 - \$18,000,000 to \$20,000,000 will be available for this competition in FY 2014
 - Funding levels vary according to Program Area



Summary of Changes to FY14 Solicitation

- ❖ Program name slightly modified from Campus Cyberinfrastructure - Networking Infrastructure and Engineering (CC-NIE) to Campus Cyberinfrastructure - Infrastructure, Innovation, and Engineering (CC*IIE)
- ❖ Addition of area supporting Network Design and Implementation for Small Institutions
- ❖ Addition of area supporting Identity and Access Management Integration
- ❖ Addition of area supporting Campus CI Engineer resources
- ❖ Addition of area supporting Regional Coordination and Partnership in Advanced Networking
- ❖ Strengthened description of campus CI plan guidance



CC*IIE Program Areas

- ❖ Data Driven Networking Infrastructure for the Campus and Researcher
 - Up to \$500,000 for up to 2 years
- ❖ Network Design and Implementation for Small Institutions
 - Up to \$350,000 for up to 2 years
- ❖ Network Integration and Applied Innovation
 - Up to \$1,000,000 for up to 2 years
- ❖ Identity and Access Management Integration
 - Up to \$300,000 for up to 2 years
- ❖ Campus CI Engineer
 - Up to \$400,000 for up to 2 years
- ❖ Regional Coordination and Partnership in Advanced Networking
 - Up to \$150,000 for up to 2 years
- ❖ Note – the following slides describe all program in summary form only – **please refer to the solicitation for complete detail**



CC*IIE

- ❖ **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.
 - For program area#6 only: Regional Coordination and Partnership in Advanced Networking – 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



CC*IIE Program-wide Criteria – a Campus CI Plan

- ❖ All proposals into the CC*IIE program must include a Campus Cyberinfrastructure plan within which the proposed network infrastructure improvements are conceived, designed, and implemented in the context of a coherent campus-wide strategy and approach to CI
- ❖ This Campus CI plan is a maximum five-page supplementary document and should address:
 - Sustainability of proposed work in terms of ongoing operational and engineering costs
 - **Refer to solicitation** for guidance on technical areas to include such as IPv6, InCommon federation, and IP spoofing
- ❖ Equipment requests for storage or computing resources in this solicitation are allowed only as part of a scienceDMZ with appropriate justification
- ❖ **See example CI plans from existing awardees at <http://fasterdata.es.net/campusCIplanning/>**



CC*IIE Area#1 - Data Driven Networking Infrastructure for the Campus and Researcher

- ❖ Network infrastructure improvements at the campus level
- ❖ Network improvements include:
 - Network upgrades within a campus network to support a wide range of science data flows
 - Re-architecting a campus network to support large science data flows, for example by designing and building a "science DMZ" (see <http://fasterdata.es.net/science-dmz/> for more information on the "science DMZ" approach)
 - Network connection upgrade for the campus connection to a regional optical exchange or point-of-presence that connects to Internet2 or National Lambda Rail



Other Notes on Area#1

- ❖ Must address scientific and engineering project and application drivers
- ❖ **Must present project-specific end-to-end scenarios for data movement**, distributed computing, and other end-to-end services driving the networking upgrade
- ❖ Data movement scenarios are encouraged to describe end-to-end data transfers that include access to and use of wide area dynamic circuit networking services
- ❖ **Must document explicit partnerships or collaborations with the campus IT/networking organization, as well as one or more domain scientists, research groups, and educators in need of the new network capabilities**
- ❖ Partnership documentation from personnel not included in the proposal as PI, Co-PI, or Senior Personnel should be in the form of a letter of commitment located in the supplementary documents section of the proposal
- ❖ Should describe an approach to end-to-end network performance measurement based on the perfSonar framework with associated tool installation and use; proposals may describe an alternative approach to perfSonar with sufficient justification



CC*IIE Area#2 – Network Design and Implementation for Small Institutions

- ❖ Applicable to smaller institutions with fundamental challenges to address in networking infrastructure and resources
- ❖ Guidance is identical to Area#1 (including the importance of science use cases) with these differences:
 - Network design proposed may defer complete technical solutions and propose to develop solution in Year1 with implementation in Year2
 - Partnering in the proposal is strongly encouraged
 - Planning grants and requests for professional network staff support are also allowed in this area



CC-NIE Area#3 – Network Integration and Applied Innovation

- ❖ End-to-end network CI through integration of existing and new technologies and applied innovation
- ❖ Applying network research results, prototypes, and emerging innovations to enable (identified) research and education
- ❖ May leverage new and existing investments in network infrastructure, services, and tools by combining or extending capabilities to work as part of the CI environment used by scientific applications and users



Area#3 Examples of Relevant Activities

- ❖ Integration of networking protocols/technologies with application layer
- ❖ **Transitioning successful research prototypes in SDN, and activities supported by GENI and FIA programs, to distributed scientific environments and campus infrastructure**
- ❖ Innovative network solutions to problems driven by distributed computing and storage systems including cloud services
- ❖ Federation-based security solutions for dynamic network services extending end-to-end
- ❖ See solicitation text for others



Other Notes on Area#3

- ❖ **Must identify one or more supported science or engineering research projects or applications and describe how the proposed network integration activities will support those projects**, particularly in the context of addressing data movement, throughput, and predictable performance end-to-end
- ❖ Must include clear project goals and milestones
- ❖ Any software development must be made available under an open source license



CC*IIE Area#4 – Identity and Access Management (IAM) Integration

- ❖ Integration and adoption of IAM tools and technologies to facilitate distributed scientific research collaborations
- ❖ Proposals should address usability in Virtual Organizations via leveraging of federated IAM capabilities
- ❖ Proposals are encouraged to:
 - Leverage pre-existing and deployed open source solutions
 - Leverage InCommon federation
 - Leverage generalized IAM tools not restricted to a specific application
 - Involve more than one institution
 - Reflect support and involvement by campus IT organization



CC*IIE Area#5 – Campus CI Engineer

- ❖ Support for up to one campus cyberinfrastructure engineer for up to 2 years
- ❖ Proposals should describe institutional need and planned engagement on multiple science projects
- ❖ Preference to campus network engineering and high performance networking
- ❖ Proposals should address campus commitment long term and include a sustainability plan
- ❖ NSF sees potential to establish over time a national community of campus level CI engineering and participants will be expected to participate in community engagement and building events



CC*IIE Area#6 – Regional Coordination and Partnership in Advanced Networking

- ❖ This program area seeks to build regional centers for community building, coordination and partnership through leadership activities at institutions whose expertise and resources in advanced network engineering can be leveraged and applied to partnering with other local and regional institutions
- ❖ Proposals in this area should describe:
 - Their approach to providing a focused set of resources for regional support of advanced R&E networking
 - Their institutional capacity and expertise in campus networking; their planned outreach and engagement activities in their jurisdiction or region- especially to smaller colleges and universities
 - Interactions with other regions and national entities such as Internet2 and other institutional partners. These partners may, for example, be current and future proposers at smaller institutions and EPSCoR jurisdictions.
- ❖ Proposed activities may include
 - Workshops
 - Direct and ongoing engagement at the network engineering level for coordination and support on network design and implementation
 - Network performance measurement and analysis
- ❖ Planned activities should consider the dissemination of advanced networking techniques, building bridges to distributed science communities, and potential tailoring of advanced networking solutions to problems faced by science projects and communities
- ❖ Proposals should address deliverables and define their measures of success



Additional Review Criteria for CC*IIE proposals

- ❖ Expected impact on the deployed environment described in the proposal.
- ❖ Extent to which the value of the work is described in the context of a needed capability required by science and engineering, and potential impact across a broader segment of the NSF community
- ❖ Where applicable, how resource access control, federated identity management, and other cybersecurity related issues and community best practices are addressed
- ❖ A Campus Cyberinfrastructure Plan - How well does the cyberinfrastructure plan support and integrate with the institutions' science and technology plan? To what extent is the cyberinfrastructure plan likely to enhance capacity for discovery, innovation, and education in science and engineering? How well does the plan as presented position the proposing institution(s) for future cyberinfrastructure development? Are IPv6 deployment and In Common Federation addressed? Are the activities described in the proposal consistent with the institution's cyberinfrastructure plan?
- ❖ **Additionally for proposals in Data Driven Networking Infrastructure for the Campus and Researcher area:** a Project Plan addressing in its goals and milestones the end result of a working system in the target environment
- ❖ **Additionally for proposals in the Network Integration and Applied Innovation area:** (1) a Project Plan addressing in its goals and milestones the end result of a working system in the target environment; (2) Tangible metrics described to measure the success of the integrated systems and any associated software developed, and the steps necessary to take the systems from prototype status to production use



Wrap up

- ❖ These slides will be available at <http://www.nsf.gov/events/>
- ❖ Award abstracts available on fastlane.nsf.gov (try searching on the term "CC-NIE")
- ❖ April 30 - May 1, 2014: CC-NIE PI Meeting in Washington, DC
- ❖ Any comments/questions on CC-NIE:
 - kthompso@nsf.gov
 - jlyles@nsf.gov



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