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PITAC Review of the Next Generation Internet Program and Related Issues

(Updated December 2002)

The Next Generation Internet Research Act of 1998, requires the President's Information Technology (IT) Advisory Committee (PITAC) to review the implementation of the Next Generation Internet (NGI) initiative and report annually on:

- Advanced Networking Research: Progress in NGI-funded advanced networking research,
- NGI Testbeds: Progress in implementing high-performance network testbeds,
- NGI Applications: Progress in developing high-performance network applications,
- Geographic Reach: Addressing geographic penalties faced by rural institutions,
- Minority- and Small- College Reach: Addressing access by historically black and Hispanic-serving institutions and colleges and universities with fewer than 5,000 students,
- Technology Transfer: Flow of NGI ideas to industry,
- Agency Coordination: Effectiveness of coordination among the NGI agencies, and
- IT Leadership: The extent to which Federal research support will maintain U.S. IT leadership.

The Committee reviewed the NGI initiative with DARPA, DOE, NASA, NIH, NIST, and NSF. We recommend Congress continue funding the NGI program at the proposed level of $100 million in FY 2000.

Advanced networking research: The NGI program has initiated a broad networking research plan that addresses the need for critical technology. NGI research activities, especially the DARPA and NSF programs, implement a research agenda along the lines of the recommendations of the 1997 NGI Workshop hosted by the Computing Research Association, an association of academic, industry, and government IT research institutions. Most of the effort has been focused on getting awards in place for the research activities. DOE is currently evaluating NGI research proposals.

NGI Testbeds: NSF and DARPA are deploying two NGI testbeds. In FY 1999, NSF has committed to connecting 150 sites to a testbed providing a 100-fold increase in network performance, and DARPA is deploying a testbed with 1000-fold increased performance at over 20 sites to support networking research and applications development. Currently, the maximum end-to-end performance has been measured at about 80 million bits per second. Continued effort is expected to significantly improve this performance.

NGI Applications: The NGI agencies are exploring network applications that require NGI services and performance. NIH's National Library of Medicine, for example, has funded many promising application pre-proposals. Today, there are few applications that will use the low latency, quality of service, or high bandwidth that NGI will offer. Only 20 percent of NGI's FY 1999 funding is for applications, hence progress has been disappointing. We recommend increased emphasis on and investments in new applications that will use NGI-level capabilities. It is necessary to fund such applications explicitly.

Reach: The NGI initiative cannot directly address reach to rural, inner-city, minority, or small institutions. NGI is a research and development program to provide the technologies and applications required as foundations for the next generations of the Internet. It is a relatively small initiative that funds peer-reviewed research proposals. The announced NGI awards cover 150 of the nation's 2,200 four-year, college-level educational institutions. It cannot fund institutions where research is not emphasized and where there is little experience developing advanced networking or applications. The end of this report makes a specific recommendation to address this issue.

Geographic Reach: While the NGI initiative was not planned or directed to address reach in general, access for otherwise qualified universities with fundable research proposals must not be disadvantaged merely because of their location. NSF expanded the High Performance Connections program to cover all 50 states and has made 33 grants in 18 EPSCoR states. Eventually, NGI research on wireless, hybrid, and satellite technologies may reduce the cost and improve the services available to all users including those in geographically remote areas.

Minority- and Small- College Reach: The NGI was not funded to address Internet access for historically black, Hispanic-serving, Native American, or small colleges and universities. Based on its standard peer review process, NSF has awarded High Performance Connection grants to one historically black and five Hispanic-serving institutions.

Technology Transfer: Industry, universities, and Federal agencies collaborate on NGI research, testbeds, teams, and workshops. This creates substantial technology transfer opportunities.

Agency Coordination: NGI agencies coordinate their activities through the Large Scale Networking Working Group and it's specialized teams

that focus on the NGI goals. The Committee looks forward to seeing some coordinated projects in the coming year.

IT Leadership: The Committee's Report to the President, February 1999, concluded that Federal support for research in information technology is seriously inadequate. PITAC recommended the Federal government increase IT research funding by $1.4B per year by FY2004. The President's FY 2000 Budget includes an Information Technology for the 21st Century (IT2) initiative that begins to address this recommendation.

Recommendations

The Committee recommends continued funding for the NGI program at the proposed FY2000 funding level. Planning for follow-on activities should begin now. The follow-on activities and funding should build on the IT2 initiative. In particular, more applications should be funded that demonstrate the utility of the NGI's gigabit bandwidth to end-users, its increased security, and its expanded quality of service.

The Committee shares Congress' concern that no Federal program addresses the reach issue. We recommend Congress consider additional funding for a program where the NGI research institutions act as aggregators and mentors for nearby smaller or disadvantaged institutions. This is primarily infrastructure, not networking research and, hence, not part of the proposed IT2 program.

Jim Gray   Raj Reddy

NGI Review Panel Co-chairs