

corporate utility business requires the development of new distributed network technologies in areas such as interoperability, authentication, privacy control, and multicast data aggregation in order to enhance the existing capabilities of utilities for real-time energy demand and supply management. In addition, the technologies and infrastructures that support energy consumers and utility providers may be leveraged to accommodate other service providers by providing access to services and resources over the NII. Grant applications are sought for the development and implementation of both wide area based and distributed network tools, technologies, and protocols that enable energy utilities to improve efficiency, conservation, billing and customer service, and promotes end user interaction and control over their use of energy. These tools, technologies, and protocols must be scalable and operable over both the Internet and NII. Applicants are expected to be familiar with the current state of the art in these areas, especially in regard to issues dealing with how the consumer interfaces and connects to both the utility and the National Information Infrastructure. These technologies may include, but are not limited to:

- distributed computing technologies to integrate residential information and energy appliances in addition to computer-based energy monitoring and control systems; to enable energy management in commercial public buildings; and to provide end users an interactive interface to delivery systems and to the Internet and NII through these delivery systems;
- distributed data handling and analysis tools for the compilation, interpretation and intelligent use of energy production and usage statistics;
- security systems to ensure customer privacy and prevent unauthorized access;
- demonstration or prototype projects to evaluate energy demand management applications over the Internet and the NII.

II. Wide Area Network (WAN) Based Hierarchical, Distributed Database and Data Storage Technologies and Techniques

The advances in high performance computing and communications, combined with the sophisticated demands of both Grand and National Challenge applications, have accelerated the need for distributed, fast, interoperable and scaleable technologies and techniques for storing,

manipulating, and querying large data sets to handle the increased amounts of information. As a result, query techniques that are independent of database structures have become more important. Grant applications are sought for the development and implementation of technologies and techniques for managing large datasets using WAN-based storage and database tools and protocols.

III. Wide Area Network (WAN) Based Collaboration Technology, Remote Facilities Usage, and Application Development

The need to efficiently share information and facilities remotely, in addition to the growing requirement for telepresence and telecommuting capabilities, requires enhanced collaborative technologies and techniques such as packetized video/audio streams and multimedia conferencing, shared whiteboards and concurrent editing/markup capabilities. Grant applications are sought for the development, implementation, and advanced uses of WAN-based technologies and techniques for providing real-time, interactive voice, video and data exchange across the Internet and other large distributed heterogeneous networks in addition to the demonstration of emerging technologies in an NII application context such as education, remote facility utilization, or environment applications.

IV. Wide Area Network Authentication and Security

The growth of networking, as evidenced by the increased usage of the Internet and the attention devoted to the National Information Infrastructure, will continue at its current rapid pace. The components of large interconnected networks, local networks, hosts, computers, information, data, applications and users, all require some level of security. As the number of individuals, businesses, schools and other entities using networks grows, so does the need for more sophisticated authentication and security tools. Conversely, as information technologies become ubiquitous via the NII, it is important to protect the privacy of the end users of the NII. Grant applications are sought for the development, implementation, or advanced integration of scalable, WAN-based security and privacy tools and protocols in the areas of application and user interfaces, information search and retrieval, and data storage and transmission that can operate across the

Internet and other large distributed, heterogeneous networks.

V. Gigabit Technology Research

Energy demand and supply management, heterogenous distributed computing and virtual collaborative environments will continue to drive high performance communications to meet both the aggregate and high end resource application requirements. Grant applications are sought for the development and/or demonstration of technologies to enable communications networks, such as the Energy Sciences network (ESnet), to support the aforementioned requirements for future information and data intensive network applications. These can include, but are not limited to: advanced collaborative audio/visual tools; management and control of heterogeneous traffic across local, metropolitan, and wide area ATM networks; and network evolution and management tools (e.g., for IPv6, IP over ATM, IPv4, multicast, and ATM to ATM).

In all the above areas, tools, technologies, protocols, services, and demonstration projects proposed should be scalable and interoperable with the heterogenous NII and Internet technologies and services at both the hardware level and at the software gateway levels. For example, a multiprotocol router gateway to residences/industrial buildings should also work over a wide variety of access media. Applicants are also expected to be familiar with the current state of the art in the area of their application submission.

Collaborative research and innovative partnering among investigators at industrial firms, universities and National Laboratories are encouraged. It is expected that grants will be awarded in the range of \$100,000 to \$500,000 for periods of one to three years.

The FY 1995 Federal program is summarized in "High Performance Computing and Communications" Technology for the National Information Infrastructure—a Supplement to the President's Fiscal Year 1995 Budget. This report can be requested by calling (301) 903-9958. A report, "The Information Infrastructure: Reaching Society's Goals—Report of the Information Infrastructure Task Force Committee on Applications and Technology," has been issued for public comment that addresses eight areas, including electrical power, in which NII applications can enhance the quality of life. This report is available by calling (301) 975-4529.

In evaluating the scientific merit of the applications submitted, the