



The Council of State Governments
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2010 Innovations Awards Application

Deadline: March 1, 2010

ID # (assigned by CSG): **10-MW-35SD**

Please provide the following information, adding space as necessary:

State: South Dakota

Assign Program Category (applicant): Government Operations and Technology (Use list at end of application)

1. Program Name **Research, Education & Economic Development Network (REED)**
2. Administering Agency **Bureau of Information & Telecommunications**
3. Contact Person (Name and Title) **Jim Edman**
Deputy Commissioner
4. Address **700 Governors Drive**
Pierre, SD 57501
5. Telephone Number **605.773.7277**
6. FAX Number **605.773.3741**
7. E-mail Address **jim.edman@state.sd.us**
8. Web site Address **<http://sd.gov/>**
9. Please provide a two-sentence description of the program.
The REED Network provides very high-speed network access (10Gbps) to universities, state government and the private sector.
10. How long has this program been operational (month and year)? Note: the program must be between 9 months and 5 years old on March 1, 2010 to be considered.

The first sites were implemented on August 1, 2008 with the implementation period being completed in January 2009.

11. Why was the program created? What problem[s] or issue[s] was it designed to address?

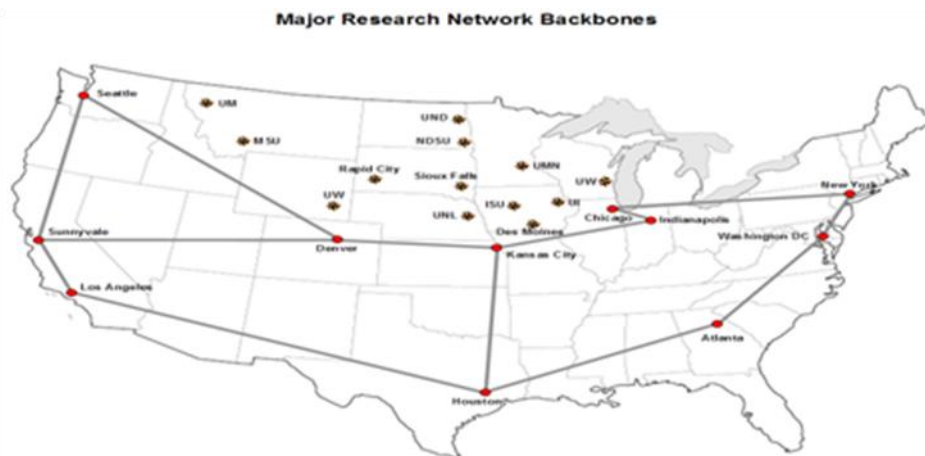
In 2003, there were no national research networks spanning the northern tier of the United States. Connectivity to research networks at nationally-acceptable speeds was not available. To compete for 21st century research activity, the research community had to have leading edge connectivity to accelerate collaboration and transmission of data.

Historically, South Dakota universities utilized an asynchronous transfer mode-based (ATM) wide area network using DS3 and OC3 technology. Within these ATM circuits, the dedicated research connections ranged in speeds between 5 and 15Mbps. A single institution had a 1Gbps dedicated research circuit. The speeds of these research connections were hindering the research, recruitment, and grant application activities of these institutions. The lack of success in these activities was a contributing factor to the research communities' requests for a 10Gbps network.

Further complicating the problem were the efforts of converting an abandoned gold mine into a world-class neutrino research center. The National Science Foundation was hesitant to commit significant grant investments into a state with research facilities limited in part by the lack of a high-speed research network.

Problem summarization

- No high-speed research out-of-state connections
- Limited research connections in-state
- Missed grant opportunities
- Research challenges based on inadequate networking facilities



The goal of the university community in the northern tier of the country was to build a backbone network from Washington, through Idaho, Montana, North Dakota, and into Minnesota. Upon completion, South Dakota could connect to this backbone, and provide the opportunity for South Dakota to make a regional, more affordable connection to a national backbone.

12. Describe the specific activities and operations of the program in chronological order.

January 2004 – Formation of Northern Tier Network Consortium (www.ntnc.org)

March 2006 – Consultant for advanced networking hired

November 2006 – Report from networking consultant submitted

December 2006 – Grant awarded

March 2007 – Ongoing funding approved

March 2007 – Request for Information (RFI) released

June 2007 – RFI responses received

June - November 2007 – Architecture discussions and solution negotiations

November 2007 – Vendor chosen

December 2007 – Construction begins

January 2008 - July 2008 – Specific technical discussions regarding network configuration, campus configurations.

March 2008 – Project teams formed:

- i) REED network
- ii) Campus network
- iii) Data center technology
- iv) Data center infrastructure

March 2008 - May 2008 – Network equipment evaluations

June 2008 – Equipment procurement

August 2008 – Network implementation at 4 sites plus our eastern core location

October 2008 – Network implementation at 2 sites

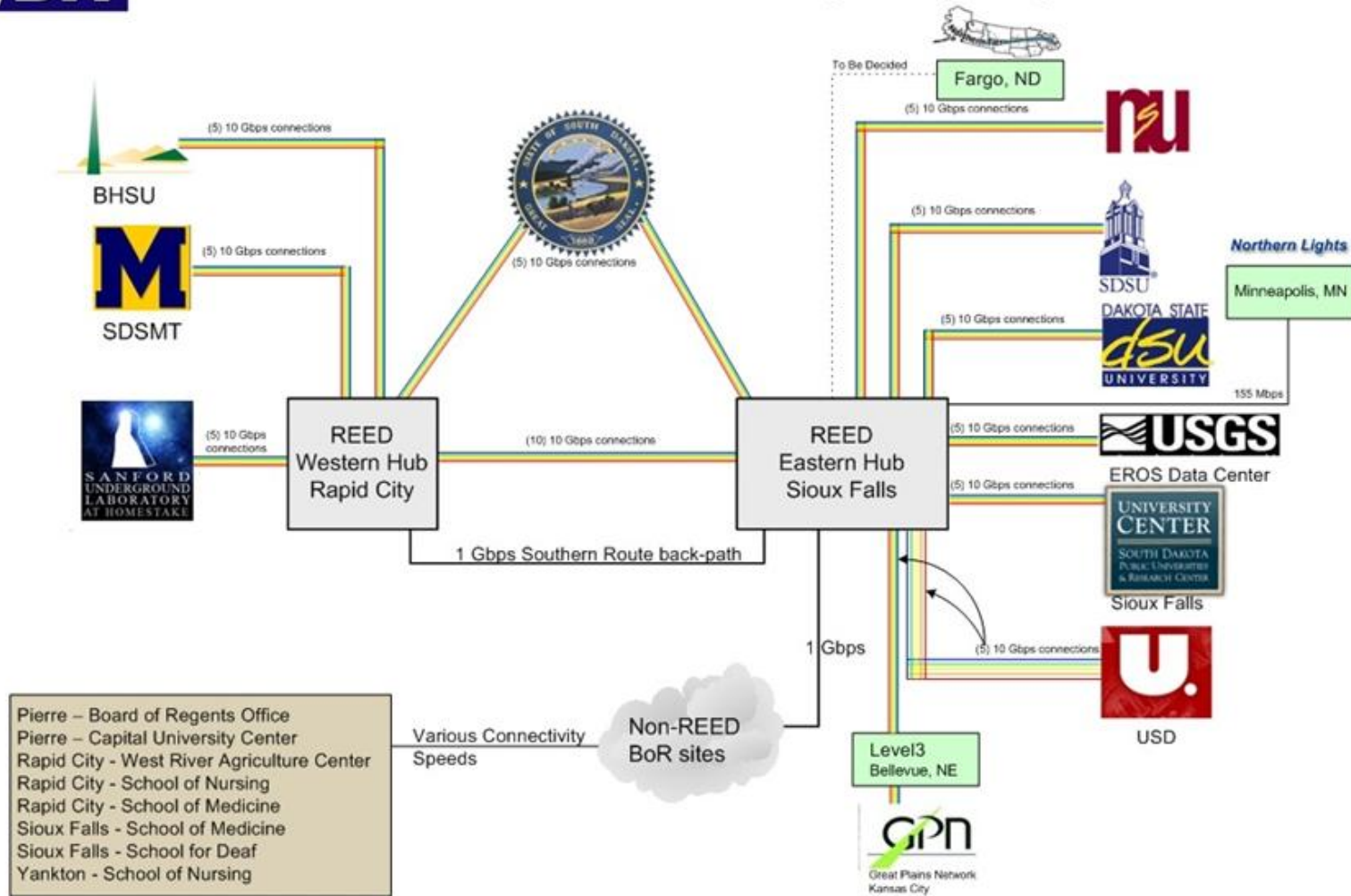
December 2008 – Network implementation at 1 site plus our western core location

January 2009 – Network implementation at 4 sites

January 2009 – All 12 REED sites operational. 10 client locations and 2 network core locations.



Research, Education & Economic Development (REED) Network



13. Why is the program a new and creative approach or method?

The solution is unique across the country for research networks. All other university research networks are dark-fiber based, 100% owned and controlled by universities. This allows the universities to control access to the network, but also typically creates significant excess capacity that sits idle.

The REED is a public-private partnership that guarantees the universities whatever capacity they want. Currently, each university has 50 Gbps of capacity available with current average usage of approximately 1 Gbps. The network is owned by the private sector and we are currently allocated 5% of the total capacity. If we need more, we can obtain it. Yet – the remaining 95% of the network capacity is available for the private sector to purchase. This creates significant economic development opportunity while expanding public and private broadband access statewide.

Some of the considerations of the capacity of this network:

- Everyone in the USA could be on a phone call simultaneously from each site;
- Transmit all state e-mail for a weekday in under 20 seconds;
- Transmit all work files in the state in less than 15 minutes.

If this program was implemented as other research networks across the country, public money would have been used to overbuild facilities that would be very much underutilized. With our approach, researchers have more capacity than is expected to be needed for the next 5 years (at a minimum) but the other portion of the network is being used by the private sector generating taxes, jobs, broadband availability and other positive contributions to the state's economy.

14. What were the program's start-up costs? (Provide details about specific purchases for this program, staffing needs and other financial expenditures, as well as existing materials, technology and staff already in place.)

Network Installation:	\$6,727,500
Network Equipment:	\$3,997,179
Miscellaneous Costs:	<u>\$2,249,766</u>
	\$12,974,445

The network provider owns the "network", meaning the fiber optics and electronics that connect to it. Equipment was purchased for the universities to upgrade their campus facilities to the newer speeds. Routers, switches, firewalls and other technologies were upgraded to meet the capabilities of the new system. Existing staff was utilized to architect, design and implement the services.

15. What are the program's annual operational costs?

\$2.2M.

16. How is the program funded?

One-time grant provided \$8M in funding
One-time general fund appropriation of ~\$3M.
General Funds appropriated for the recurring program.

17. Did this program require the passage of legislation, executive order or regulations? If YES, please indicate the citation number.

A Memorandum of Understanding was signed between the Governor and the Board of Regents. The Legislature approved the general fund appropriations.

18. What equipment, technology and software are used to operate and administer this program?

Over 2,000 miles of fiber optic cabling was installed across the state.

Electronics to “light” the fiber were installed.

Routers provide and manage network routing.

Firewalls and intrusion prevention devices provide network security.

Intrusion detection systems monitor security concerns.

Security management systems aggregate and analyze logs and events.

Network management is provided 7x24x365 to monitor, alarm, and report on ~500 network interfaces.

19. To the best of your knowledge, did this program originate in your state? If YES, please indicate the innovator’s name, present address, telephone number and e-mail address.

We are not aware of any other state that operates a research and university system network in this manner and connects all state public universities to the major US research networks.

20. Are you aware of similar programs in other states? If YES, which ones and how does this program differ?

All states have research networks. We have yet to identify another state that offers a “dim” network solution with such a significant private – public partnership that not only enables the researchers and meets their needs but presents endless opportunities for the private sector and economic development in general.

21. Has the program been fully implemented? If NO, what actions remain to be taken?

The network was fully operational in January 2009. We can expand the network to other research entities and private universities if they are interested.

22. Briefly evaluate (pro and con) the program’s effectiveness in addressing the defined problem[s] or issue[s]. Provide tangible examples.

The program was 100% effective in meeting the needs of researchers. Virtually unlimited network capacity and very high-speed access to national research networks was achieved. In fact, even though South Dakota was the last member of the Northern Tier group to receive start-up funding, we were the first to make network services operational to the universities and to out-of-state locations.

Thus far, only 40% of network resources have even been enabled on an individual campus basis.

Typically, the wide area network is a limiting factor in network communications. This has turned that model upside-down. The wide-area network operates at a minimum of 10 Gbps with potential up to 50 Gbps. The campus networks currently do not exceed 1 Gbps. Far more traffic can be delivered than can be presently generated. This also creates the opportunity for the Regental system to consolidate many distributed systems into a centralized environment.

Prior to the REED network, a researcher at South Dakota State University would export imagery data and analysis to a tape and have the tape driven 30 miles to the Earth Resources Observation and Science (EROS) Data Center. This data is satellite imagery and research between EROS and SDSU is constant. It was quicker to drive the data back and forth the 30 miles rather than use the networking facilities of the two institutions. Now, instead of driving the data – it can be transferred in a matter of seconds.

Furthermore, we were able to eliminate the previous research and production networks and combine them

into a single statewide network saving the taxpayers approximately \$1.4M a year. This savings was put into the new network and ultimately only required an increase of \$800,000 to serve the new network.

A downside to the program was that one of the original goals was a high-speed connection to our neighbors in North Dakota and a direct connection into the Northern Tier network. Funding obstacles have prevented that from occurring but we continue with high-speed connections into the Great Plains Network and redundant network connectivity into the Northern Lights network.

23. How has the program grown and/or changed since its inception?

The network itself has not fundamentally changed. The original 12 sites are operational. Network traffic continues to increase from research, Internet, distance learning, student information systems and other technology applications.

24. What limitations or obstacles might other states expect to encounter if they attempt to adopt this program?

The political hurdles are significant. It is doubtful any other state would be able to establish the partnership between state government – higher education and the private sector. We were successful because we had precedent to support our position. Financial and technical concerns were far less important. As research was done in planning the network, multiple consultants and academia said it would not be achievable.

Technology can be implemented anywhere. The political hurdles conquered in this project have not been overcome in other states.

CSG reserves the right to use or publish in other CSG products the information provided in this application. If your agency objects to this policy, please advise us in a separate attachment.



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Program Categories and Subcategories

Use these as guidelines to determine the appropriate *Program Category* for your state's submission and list that program category on page one of this application. Choose only one.

Infrastructure and Economic Development

Business/Commerce

Economic Development

Transportation

Government Operations and Technology

Administration

Elections

Information Systems

Public Information

Revenue

Telecommunications

Health & Human Services

Aging

Children & Families

Health Services

Housing

Human Services

Human Resources/Education

Education

Labor

Management

Personnel

Training and Development

Workforce Development

Natural Resources

Agriculture
Energy
Environment
Environmental Protection
Natural Resources
Parks & Recreation
Water Resources

Public Safety/Corrections

Corrections
Courts
Criminal Justice
Drugs
Emergency Management
Public Safety

Save in .doc or rtf. Return completed application electronically to innovations@csg.org or mail to:

CSG Innovations Awards 2010
The Council of State Governments
2760 Research Park Drive, P.O. Box 11910
Lexington, KY 40578-1910

Contact:

Nancy J. Vickers, National Program Administrator
Phone: 859.244.8105
Fax: 859.244.8001 – Attn: Innovations Awards Program
The Council of State Governments
E-mail: nvickers@csg.org

This application is also available at www.csg.org.