Nebraska Information Technology Commission

Project Proposal Form

New or Additional State Funding Requests
for Information Technology Projects

FY2005-07 Biennium
(2006 Deficit Budget Requests)

Project Title	**Statewide K-12 Technology Infrastructure Upgrade to Flexible Use IP-based Network**
Agency/Entity	**Department of Education**

About this form…
The Nebraska Information Technology Commission ("NITC") is required by statute to "make recommendations on technology investments to the Governor and the Legislature, including a prioritized list of projects, reviewed by the technical panel, for which new or additional funding is requested." In order to perform this review, the NITC and DAS-Budget Division require agencies/entities to complete this form when requesting new or additional funding for technology projects. For more information, see the document entitled "Guidance on Information Technology Related Budget Requests" available at http://www.nitc.state.ne.us/forms/.

Electronic versions of this form are available at http://www.nitc.state.ne.us/forms/.

For questions or comments about this form, contact the Office of the CIO/NITC at:

Mail: Office of the CIO/NITC
521 S 14th Street, Suite 301
Lincoln, NE 68508
Phone: (402) 471-3560
Fax: (402) 471-4608
E-mail: info@cio.state.ne.us

Submission of Form
Completed forms must be submitted by the same date budget requests are required to be submitted to the DAS Budget Division. Completed project proposal forms must be submitted via e-mail to info@cio.state.ne.us. The project proposal form should be submitted as an attachment in one of these formats: Microsoft Word; WordPerfect; Adobe PDF; or Rich Text Format. Receipt of the form by the Office of the CIO will be confirmed by e-mail. If an agency is unable to submit the application as described, contact the Office of the CIO prior to the deadline, to make other arrangements for submitting a project proposal form.

Section I: General Information

Project Title	Statewide K-12 Technology Infrastructure Upgrade to Flexible Use IP-based Network
Agency (or entity)	Nebraska Department of Education

Contact Information for this Project:

Name	Dr. Doug Christensen
Address	301 Centennial Mall South, 6th Floor
City, State, Zip	Lincoln, NE 68509
Telephone	402-471-5020
E-mail Address	doug.christensen@nde.ne.gov

Section II: Executive Summary

Description:

Many of the schools are connected to their Distance Learning Consortium of schools with very large DS3 (45 megabit, high bandwidth) circuits that are dedicated solely to two-way audio and video use within the Consortium. Practically all schools have a dedicated T1 or 1.5 megabit circuit along side for Internet access. The proposed IP-based upgrade would not only update the obsolete equipment (switch/routers and co-decs) but would allow flexible use of the DS3 (high bandwidth) circuits for two-way audio and video use, increased bandwidth for internet use, and expansion for future technology applications. This upgrade would eliminate the need for the separate dedicated T1 circuit for Internet use and enable statewide connectivity between and among schools as a result of connecting to Network Nebraska.

Justification:

The Distance Learning equipment in many of the high schools is obsolete and no longer made or supported by the manufacturers. In addition, contracts between Nebraska schools and Telecommunications Service Providers are progressively nearing expiration of 10-year contract terms. The earliest Distance Learning contracts are due to expire in 2006 with other schools' contracts progressively expiring through 2012. There is a need to upgrade equipment and renew contracts with Telecommunications Providers.

On the educational side, the upgrade would enable schools connecting with Network Nebraska to have statewide connectivity allowing increased opportunities for distance learning course sharing as opposed to the current limitation of course sharing between schools in a regional area consortium. On the Internet side, the upgrade would enable schools connecting with Network Nebraska to have much needed additional bandwidth for access to enhanced learning resources (i.e. streaming digital media, etc.) as well as additional advanced connectivity services such as Internet 2.

Section III: Goals, Objectives, and Projected Outcomes (15 Points)

1. Describe the project, including:
   - Specific goals and objectives;
   - Expected beneficiaries of the project; and
   - Expected outcomes.

Goals

The overall goal of the Statewide K-12 Technology Infrastructure Upgrade to Flexible Use IP-based Network Project is to use technology to create equitable opportunities for an essential education for all students. The technology elements would concentrate on providing the necessary transport of curriculum, staffing, and support services essential for all Nebraska schools in the 21st Century.

The resulting K-12 technologies would support teaching and learning through hardware and software that: Transmit and access information and data, Integrate digital technologies into the teaching and learning process, Provide access to multiple technology platforms; and have physical facilities that adequately accommodate the school's technology systems, including distance learning.

The first objective of the project is to provide infrastructure and telecommunications support so that schools can purchase Internet access on an equitable per unit basis without regard to distance-sensitive transport costs. (See line 10 of Excel file embedded at Section VIII 15, Phase 1 of 3 yr plan)

The second objective of the project is to assist in the conversion of the present distance learning network to a high bandwidth, wide area, IP-based topology that allows educators to make maximum use of the flexibly provisioned circuits in order to provide for future emerging technology applications. The interactive video conferencing that results from this conversion would be much lower in bandwidth, addressable, and able to be interconnected with other systems both within and outside the State. (See lines 14, 17, and 18 of Excel file embedded at Section VIII 15, Phase 1 of 3 yr plan)

Beneficiaries

The expected beneficiaries of this project are the students, teachers and citizens of Nebraska. By enhancing our telecommunications potential, the state public school system and resulting educational opportunities will be an attractive economic development tool for Nebraska. More students will graduate better prepared for the workforce or a postsecondary education. Smaller rural schools will remain viable, thereby enhancing the quality of life and opportunities for agriculture and small business for greater Nebraska.

The successful implementation of this initiative would literally make possible an educational environment utilizing online applications where learning could occur at any time, at any place, through any path and at any pace. From the smallest rural school to the most challenged urban center, the technology would provide a conduit for equitable educational opportunities. Advanced placement classes, remediation for Limited English Proficiency students, college credit courses, alternative education modules for home-bound learners are all within the realm of these delivery mechanisms.

Outcomes

A. School districts, Educational Service Units, or data aggregation sites will be able to purchase Internet access at the same cost per unit, with an offset for transport fees in order to insure that distance does not preclude participation. (See lines 8, 9, 12, and 13 of Excel file embedded at Section VIII 15, Phase 1 of 3 yr plan)
B. Over 160 high school distance learning circuits will be converted from commercial video data services to IP-based, high bandwidth circuits, capable of delivering a variety of technology applications. (See line 8, 9, 12, and 13 of Excel file embedded at Section VIII 15, Phase 1 of 3 yr plan)
C. All JPEG-based distance-learning classrooms would be converted to H.26X video compression protocol and capable of interconnecting with every other IP-based video facility within and outside the State. (See lines 14, 17, and 18 of Excel file embedded at Section VIII 15, Phase 1 of 3 yr plan)
D. A statewide scheduling and asset management system would be created to monitor the usage of distance learning facilities and allow external users to identify open facilities and send a request to the local scheduler. (See line 15 of Excel file embedded at Section VIII 15, Phase 1 of 3 yr plan)
E. A web-based event clearinghouse would be created to promote and advertise educational programming and training opportunities. (See line 15 of Excel file embedded at Section VIII 15, Phase 1 of 3 yr plan)

2. Describe the measurement and assessment methods that will verify that the project outcomes have been achieved.

The strategic plans for Statewide K-12 Technology Infrastructure Upgrade to Flexible Use IP-based Network Initiative will provide accountability by tracking progress on each of the strategic outcomes. In addition, NDE will develop metrics and gather data to document the use and benefits of incorporating these technologies into the classroom. Ultimately, the increased number of educational opportunities and instructional resources will translate into increased student progress, achievement, and more equitable learning opportunities for students across the State. The resulting networking infrastructure should be sufficient to serve schools for the next seven years.

3. Describe the project's relationship to your agency comprehensive information technology plan.
   The Statewide K-12 Technology Infrastructure Upgrade to a Flexible Use IP-based Network initiative, although not mentioned specifically in the NDE Technology Plan, does serve the purposes and eventual applications listed in the Technology Plan. The Nebraska Student Records System and Redesign of the School Personnel and Curriculum System will rely heavily on robust, high-speed infrastructure to and from every school. NDE's continual training requirements and travel for its many divisions will be made manageable by using these online systems and IP-based videoconferencing sites as a result of increased bandwidth capacity.

Section IV: Project Justification / Business Case (25 Points)

4. Provide the project justification in terms of tangible benefits (i.e. economic return on investment) and/or intangible benefits (e.g. additional services for customers).

   Since 1992, various entities within the State of Nebraska have spent an estimated 20 million dollars on interactive video capture and display equipment, fiber connectivity, and engineering design charges to provide for distance learning and videoconferencing. Considered cutting edge technology in the early years of operation, this investment resulted in over 300 high-quality, videoconferencing classrooms using multiple, incompatible video protocols spread over numerous separate political subdivisions. These service regions were established when groups of school districts partnered together to set up inter-local agreements in order to receive grant funds, enter into contracts and hire staff to exchange high school and college classes. Other smaller videoconferencing networks were set up by other state agencies and hospitals but were not interoperable with the school and college sites.

   The technology in many of these distance-learning networks is obsolete and no longer supported by the manufacturer. Service contracts with telecommunications providers to support the technology will expire over the next two to eight years. The estimated cost to upgrade these systems and just maintain the existing distance learning functionality is $55 million. Without the network system upgrade, schools would be forced to revert back to pre-1996 infrastructure. The resulting bandwidth would be unable to support even the most minimal school-wide Internet access and would be unable to scale for future educational needs.

   The current distance learning networks utilize telecommunications circuits with very large bandwidth (DS3 or 45megabit connections) that are dedicated almost solely to video use. Data circuits for accessing the Internet are often limited to a single T-1 (1.5megabit) circuit. The proposed IP-based upgrade plan would greatly increase the efficiency of video transmissions and free up significant capacity for other uses, such as Internet1, Internet2, video on demand, web-based courses, web-based applications, and data transfer. The number and type of technology applications carried by the high bandwidth circuits would be determined by the education sector rather than the provider sector. Implemented statewide, this would put Nebraska's schools in the forefront of the nation in terms of high-speed access.

   Through aggregation of demand, adoption of common standards, and collaboration with network services and applications, participants can achieve many benefits, including:
   - Lower network costs;
   - Greater efficiency for participating entities;
   - Interoperability of systems providing video courses and conferencing;
   - Increased collaboration among all PreK-16 educational entities;
   - New educational opportunities;
   - Competitiveness with surrounding states; and

- Better use of public investments.

5. Describe other solutions that were evaluated, including their strengths and weaknesses, and why they were rejected. Explain the implications of doing nothing and why this option is not acceptable.

Each of the NITC Strategic Initiatives cited in this project proposal introduce technology options or educational advantages that would not be possible under the present system.

Networking

Old system: K-12 districts individually negotiate their own Internet and transport contracts. This approach was rejected for lack of efficiency and effectiveness.

Network Nebraska: K-12 districts and other public entities are able to purchase Internet and transport off the State contract, thereby reducing telecommunication costs.

Synchronous Video

Old system: 297 high schools, having spent millions of dollars for implementation and network buy-down costs, divided themselves up into 12 distance learning consortia, ranging in size from six to 70 schools, and using up to four different video standards, and were unable to exchange courses across different technologies. This approach was rejected because it lacked interconnectivity.

Statewide Synchronous Video: Any entity with an IP-based classroom or videoconferencing cart will be able to "dial-up" and connect to any other entity also using IP-based videoconferencing. This includes 95% of the high schools, most of the higher education entities, hospitals, and informal education entities, as well as colleges and schools on Internet2 across the United States.

6. If the project is the result of a state or federal mandate, please specify the mandate being addressed.

The State Board of Education passed the following resolution on December 5, 2003, calling for the establishment of requirements in order to accomplish an Essential Education.

WHEREAS, the State Board of Education:

- Recognizes that the State Board of Education, the Legislature, and the Governor have always held public education to be one of the highest priorities of this State.
- Believes that access to an essential education is a constitutional right of every child.
- Believes that providing an essential education for every child is the responsibility of the policymakers and citizens of Nebraska.
- Believes that schools should be defined, organized and financed so as to create the capacity to provide an essential education.

The State Board of Education goals also include: "Coordinate the promotion and support of appropriate uses of technology with educational service units (ESUs) and other providers to implement statewide training and professional development based on 21st Century vision for the appropriate uses of technology" and to "Support the implementation of a continuous transition for students, PreK-16".

Section V: Technical Impact (20 Points)

7. Describe how the project enhances, changes or replaces present technology systems, or implements a new technology system. Describe the technical elements of the project, including hardware, software, and communications requirements. Describe the strengths and weaknesses of the proposed solution.

The Statewide K-12 Technology Infrastructure Upgrade to a Flexible Use IP-based Network project**,** proposes to upgrade the existing Video/Data circuits to 164 high schools to flexible use, 45mbps circuits, capable of handling many different applications simultaneously in a high bandwidth, wide area networking topology. This will require installation of a router at every school as well as larger aggregation routers at central office provider facilities, serving regions of schools.

New CoDecs, capable of H.263 or H.264 video compression protocols, will replace the JPEG-series Codecs, no longer supported by the manufacturer.

The described technology implementation vastly improves the flexibility and availability of digital content resources for Nebraska students.

8. Address the following issues with respect to the proposed technology:
   - Describe the reliability, security and scalability (future needs for growth or adaptation) of the technology.

     The technology chosen conforms to all industry security specifications and provides a scalable platform for future enhancements to accommodate both additional numbers of learners as well as unanticipated technology applications. The wide area networking component is expected to serve education for seven years.

   - Address conformity with applicable NITC technical standards and guidelines (available at http://www.nitc.state.ne.us/standards/) and generally accepted industry standards.

     The technology chosen conforms with all applicable NITC technical standards and guidelines, especially the most recent Audio and Video Standards for Distance Learning and Videoconferencing.

   - Address the compatibility with existing institutional and/or statewide infrastructure.

     The technology chosen will be completely compatible with Network Nebraska and future Internet Protocol environments.

Section VI: Preliminary Plan for Implementation (10 Points)

9. Describe the preliminary plans for implementing the project. Identify project sponsor(s) and examine stakeholder acceptance. Describe the project team, including their roles, responsibilities, and experience.

   Network Nebraska. The general timeframe for implementation of Network Nebraska and its associated educational applications for PreK-12 depends upon the rate at which PreK-12 customers leave their existing Internet service providers for Network Nebraska. For example, aggregations of school districts and ESUs are in the middle of Internet1 service contracts with private providers and are generally not able to consider other contracts until their existing contract terms expire. The 2005-2006 Network Nebraska customer base is two major data aggregations of about 165 school districts (33%), including Lincoln Public Schools.

   Statewide Synchronous Video Network. The basic video and data transport contracts for the distance learning consortia begin to expire in July 2006 with 48 schools expiring the first year. Network upgrade costs and equipment just to maintain distance learning and Internet access for 164 schools are estimated at $55,000,000 over a seven-year contract which will be met in part through local ongoing costs, e-Rate project reimbursement, Federal grants, provider capital investments, and

the Nebraska Universal Service Fund. Additional funds will be needed to complete the network replacement. Later contract expirations will be accelerated to compress the implementation of the network and the retirement of the obsolete JPEG video equipment.

10. List the major milestones and/or deliverables and provide a timeline for completing each.

    Network Nebraska upgrades to local 45mbps circuits and associated hardware: The last half of Summer 2006 and Summer 2007

    Statewide Synchronous Video Upgrade to 164 high schools; The last half of Summer 2006 and Summer 2007

11. Describe the training and staff development requirements.

    The staff development needs will be met by ESU professional development personnel.

12. Describe the ongoing support requirements.

    The overall project will require ongoing telecommunications costs as well as many miscellaneous service contracts on the codecs, routers, and a scheduling system.

Section VII: Risk Assessment (10 Points)

13. Describe possible barriers and risks related to the project and the relative importance of each.

    Barriers and risks to this project include local constituent consensus, provider pricing of network services at an affordable level, and potential implementation delays due to equipment backorders and the capacity of the provider companies to make large-scale upgrades and equipment replacements during the summer when schools are not in session.

14. Identify strategies which have been developed to minimize risks.

    The Nebraska Information Technology Commission has conducted numerous stakeholder meetings and discussions and have conducted numerous work group and task groups to arrive at the aforementioned project components and support mechanisms. Nebraska Department of Education and NITC staff will be allocated to oversee implementation of the project components and to maintain accountability of every dollar invested.

Section VIII: Financial Analysis and Budget (20 Points)

15. Financial Information
    Click the Excel icon to open the financial information worksheet

Microsoft Excel Worksheet

16. Provide a detailed description of the budget items listed above. Include:
    - An itemized list of hardware and software.

      This information is detailed in the excel worksheet in 15.

    - If new FTE positions are included in the request, please provide a breakdown by position, including separate totals for salary and fringe benefits.

      Not applicable.

    - Provide any on-going operation and replacement costs not included above, including funding source if known.

      See item descriptions and annotated comments in Excel file embedded at Section VIII, 15.

    - Provide a breakdown of all non-state funding sources and funds provided per source.

17. Please indicate where the funding requested for this project can be found in the agency budget request, including program numbers.

    Forthcoming information.

Estimated Costs for Implementation of Distance Learning Enhancement (First Phase of 3 yr Plan)			
Itallics indicates possible LB 689 funding or less than the highest priority for funding. Underlined is highest priority.			
Schools in ESUs 13,15,16 area		**67 sites**	
Item	**FY06 (ends 6-30-06)**	**FY07 (7-1-06/6-30-07)**	**Comment**
1. High Capacity, scalable infrastructure			
Network Nebraska Backbone Transport	$0	$540,000	*Backbone transport from Scottsbluff to Lincoln
Regional Aggregation Circuit Costs	$0	$125,000	*OC-3s or OC-12s within Scottsbluff, North Platte
Buydown of Local Circuits ($25K/site)		$1,675,000	Contracts for regions
2. IP-based network for interconnection			
Regional Aggregation Routers		$639,600	**Regional Aggregation Routers for Scottsbluff, North Platte
Regional Network Operations Centers		$80,000	*RNOC facilities at Scottsbluff, North Platte
Building switch/routers		*$489,100*	*Switch/routers at 67 sites*
Scheduling Software		$702,000	**K-12 portion of statewide scheduling software
3. Upgrades of telecom equipment			
Building Codec Replacement		*$1,206,000*	*CoDec upgrades for 67 sites*
LAN Upgrades and video classroom eqpt		*$1,067,000*	*LAN upgrades and video classroom eqpt as needed*
High Priority State Investments sub total	**$0**	**$3,761,600**	
Possible LB 689 funding sub total	***$0***	*$2,762,100*	
Total Maximum Project Cost	**$0**	**$6,523,700**	
			*Ongoing costs
			**Includes some ongoing costs