

Nebraska Information Technology Commission

Project Proposal Form

**New or Additional State Funding Requests
for Information Technology Projects**

FY2007-2009 Biennium

Project Title	Satellite Reconfiguration Project
Agency/Entity	47 / Educational Telecommunications Commission

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Notes about this form:

1. **USE.** 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.” Neb. Rev. Stat. §86-516(8) 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.
2. **WHAT TECHNOLOGY BUDGET REQUESTS REQUIRE A PROJECT PROPOSAL FORM?** See the document entitled “Guidance on Information Technology Related Budget Requests” available at <http://www.nitc.state.ne.us/forms/>.
3. **DOWNLOADABLE FORM.** A Word version of this form is available at <http://www.nitc.state.ne.us/forms/>.
4. **SUBMITTING THE FORM.** Completed project proposal forms should be submitted as an e-mail attachment to rick.becker@nitc.ne.gov.
5. **DEADLINE.** Completed forms must be submitted by September 15, 2006 (the same date budget requests are required to be submitted to the DAS Budget Division).
6. **QUESTIONS.** Contact the Office of the CIO/NITC at (402) 471-7984 or rick.becker@nitc.ne.gov

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Section 1: General Information

Project Title	Satellite Reconfiguration Project
Agency (or entity)	47 / Nebraska Educational Commission

Contact Information for this Project:

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Section 2: Executive Summary

Provide a one or two paragraph summary of the proposed project. This summary will be used in other externally distributed documents and should therefore clearly and succinctly describe the project and the information technology required.

For the past 16 years, satellite systems established by the Nebraska Educational Telecommunications Commission (NETC) have delivered distance learning across the state. Nebraska, with its large geographic size (77,354 square miles) and low population density (1,747,214 residents) has been well served by this satellite network. From bringing classes to remote corners of the state to making possible a wide range of two-way communication, Networks 1, 2 and 3 have helped transform the educational landscape of Nebraska. While current technology in Networks 2 and 3 efficiently delivers video and audio signals, technology upgrades to these systems would add even greater value to the State's investment.

The proposed satellite reconfiguration would upgrade Networks 2 and 3 from audio/video-based channels to Internet Protocol (IP). This reconfiguration would also provide improved integration with Network Nebraska and would comply with NITC-adopted statewide standards for communications and for video and audio requirements. This will enable NET to directly connect with Education and Telehealth videoconferencing networks and with Network Nebraska, maximizing the State's investment in satellite transponders and relieving traffic in the Network Nebraska system. There are locations in the state where Network Nebraska has difficulty supplying sizable bandwidth cost effectively. Coordinating with the State Division of Communications and the University of Nebraska, specific locations (identified by bandwidth need) will be able to access existing satellite bandwidth passing IP data just as they would through the terrestrial portion of Network Nebraska. State agencies need to move a great deal of non-Internet data files every day that are not immediately time sensitive. IP connectivity through the satellite would allow delivery of these files reducing traffic over the terrestrial connection. This would allow Internet and non-Internet data to move faster where the terrestrial path is insufficient.

NET proposes to upgrade Network 3 (two-way), in FY 2007-08 and FY 2008-09 (Phase 1), with Network 2 (one-way) undergoing a technology upgrade in FY 2009-2010 and FY 2010-2011 (Phase 2). This project is being done in consultation with the Division of Communications and the partners managing of Network Nebraska.

Section 3: Goals, Objectives, and Projected Outcomes (15 Points)

1. Describe the project, including:
 - Specific goals and objectives;

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- Expected beneficiaries of the project; and
- Expected outcomes.

Specific Goals and Objectives:

Reconfiguring the Satellite encoding scheme will allow IP traffic to be delivered over the satellite. This means the bandwidth could pass traffic that is not specifically video and audio.

This would accomplish several things:

- More efficient use of current satellite bandwidth through newer compression algorithms and protocols.
- Traffic would pass through the satellite bandwidth even when classes are not in session so the state will get more use from the expense.
- By better integrating with Network Nebraska, difficult to reach locations may be better served.
- NETC will use technology that is compliant with current state technical standards.

Beneficiaries include:

- Current and future users of NETC's networks since access to the bandwidth would increase
- Current and future users of Network Nebraska since network congestion would be decreased
- Nebraska tax payers since bandwidth they are already paying for will be used more efficiently, deferring the cost of additional bandwidth
- Current and future users of the video conference systems in the state because using the same technology on all systems would create less downtime and fewer technical interoperability problems

Expected outcomes include:

- Users will be unaware how their data is flowing because all networks will be seamlessly integrated.
- Terrestrial and satellite network routes will be equally full on a percentage basis, creating a balance so that network congestion will be lessened.
- Complete integration with Network Nebraska would allow for better sharing of information amongst the many communities of interest sharing the bandwidth.

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

NETC and Network Nebraska can work together to develop traffic measurement reports as deemed best by the operations managers. Using data from traffic management software and from the statewide scheduling system being purchased per LB1208 some examples might include:

- Occupied bandwidth
- Total data throughput
- Number of classes/meetings
- Number of students/participants
- Router port availability
- Mean-time-between-failure of routes

Trouble logging and tracking by NETC and the partners in Network Nebraska is currently accomplished using common software. Other users of Network Nebraska also track incoming trouble calls. Using this data, many indications of the success of the integration might be determined as well.

3. Describe the project's relationship to your agency comprehensive information technology plan.

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This project first appears on page 7 of the NETC Agency Comprehensive Information Technology Plan in section 2.3 Projects Planned to be Started in FY2007-08. It also goes to the general philosophy described in section 4.2 Other on page 14.

“In general NETC will continue to shift analog systems toward digitization. NETC is constantly examining the state-of-the-art and best practices in technology and will continue to do so. As processes, techniques and technology changes permit, NETC will examine how these advances might change current activities and future plans for the better.”

Section 4: 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).

Some of the tangible benefits include:

- Improved integration with Network Nebraska
- Direct connectivity with Education and Telehealth videoconferencing networks
- Compliance with NITC-adopted statewide standards for communications and for video and audio
- Maximizing the State's investment in satellite transponders (passing data even if there are no video conferences going on)

Some of the intangible benefits include:

- Relief of some traffic congestion in the Network Nebraska system
- Defraying future terrestrial bandwidth costs
- Alleviating need for overnight data push by state agencies
- Using the latest encoding equipment to allow for more videoconference sessions to pass in the same amount of bandwidth

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.

NETC evaluated the addition of a Protocol Converter and IP Router at Network 3 sites. This would allow continued use of existing equipment and take advantage of our existing knowledge and backup equipment of the current satellite encoding equipment.

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Unfortunately the cost would not be all that different from the proposed solution in this document. Placing conversion equipment also adds to system latency which will more noticeably slow network traffic. Likewise, when there are more links in the chain, there are more opportunities for failure. Since this approach would interface with aging equipment, there is no benefit of technology refresh. NETC would need to replace the MODEM equipment as it fails from age in any case, so the cost would actually be higher in the long run.

If nothing is done, several things will happen. As more locations have and will convert to the NITC technical standards there will be less interoperability with the existing satellite system. This is likely to lead to decreased use of the satellite bandwidth and a lower return on investment on the satellite contract and the NET Distance Learning System. The State will pay on this contract until 2010 and will have use of the bandwidth until 2012. The cost-benefit is greatly enhanced with this proposed upgrade.

Doing nothing also means places in Nebraska difficult or expensive to reach with terrestrial bandwidth will be under served, and it will be costlier to offer the benefits of new technology. These same locations often also have the greatest need for courses that are not available locally.

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

IP Communication Protocol Standard for Synchronous Distance Learning and Videoconferencing adopted by the NITC October 8, 2003

Video and Audio Compression Standard for Synchronous Distance Learning and Videoconferencing adopted by the NITC July 13, 2004

Section 5: 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 upgrade of Network 3 (2-way) includes replacement of MODEMs at each of 18 uplink locations throughout the state and at NETC. These locations are generally located at state and community college locations, as well as University of Nebraska campus locations. Also, the conference bridge at NETC (Accord MGC-100) would have serial data cards removed and replaced with IP port cards.

The bridge and MODEM upgrades allow for IP ports in place of various types of serial data interfaces. This is the H.323 portion of the network upgrade. NETC has already replaced its CODECs. The newer devices in place have serial ports and IP ports as well as the video and audio encoding to H.263/H.264 and G.722/G.728/G.729 per the state standards.

The upgrade of Network 2 (1-way) replaces equipment that receives a data stream currently and outputs only analog video and audio to one that does the same, but also has an IP-out port. Though this port IP data can be passed onto an internal network or directly to a desktop or server at the receive site. The files transferred in this way can be saved to hard drive or transferred to media as best serves the local need.

The upgrade at NETC would allow for a number of encoding schemes, so if the standard does change in the future the equipment would not likely need changing. For example if the state later chose to move to Windows Media 9 or QuickTime for video conferences, software modules could be added to the new equipment without changing out equipment all over the state. With the proposed implementation, encoded media of these protocols could be transferred right away with no further upgrade.

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The weakness is that some of the existing satellite receive equipment is only a few years old, so NETC would not have gotten the full value of its use by retiring it before predicted end-of-life. This is true in Network 2, but not true in Network 3.

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.
- Address conformity with applicable NITC technical standards and guidelines (available at <http://www.nitc.state.ne.us/standards/>) and generally accepted industry standards.
- Address the compatibility with existing institutional and/or statewide infrastructure.

The current satellite systems have been extremely reliable for many years. The new equipment that is specific to satellite is made by the same companies, so NETC has confidence in the continued excellence of their products. Some of the new equipment is not specific to the satellite industry. CODECs used and routing equipment proposed is the same as on many terrestrial networks worldwide including sensitive national government applications. The large proliferation of this equipment points to reliability as well.

By using IP-based systems NETC will be able to take advantage of the latest encryption techniques available. This is important for some of the applications used by users such as Telehealth consultation, teacher evaluation interviews, legal depositions or closed session government meetings.

The system is completely scalable because it will use off-the-shelf WAN technology. IP-based systems may be as small as an intra-office shared printing application and as large as the World Wide Web or Internet 2.

As noted in section 6 above, this proposal will help NETC become compliant with 2 current technical standards adopted by the NITC.

Because the satellite system will upgrade to the same technology used by Network Nebraska, this proposal will cause the two to be less unique. Currently interactivity between the two systems happens only at NET in Lincoln through an encode/decode process. In the future the 2 networks will act more as layers in the same network through direct connection and without transcoding or risk of data corruption by eliminating encode/decode concatenation.

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Section 6: 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.

NETC proposes to upgrade Network 3 (two-way), in FY 2007-08 and FY 2008-09 (Phase 1), with Network 2 (one-way) undergoing a technology upgrade in FY 2009-2010 and FY 2010-2011 (Phase 2). This will be done in Lincoln through periods of lower network activity and taking advantage of system redundancies where possible. Upgrading educational sites will require coordination. NETC will need to work with each local site to look for windows of low or no use of the local system. All of the installation work will likely take place during the summer months.

NETC is the project sponsor and is in consultation with the Division of Communications and the partners managing Network Nebraska. The consultation is to ensure that equipment placement plans will best meet the needs of planners implementing infrastructure for Network Nebraska. NETC will also need to consult with the ESUs around the state to help best develop and carry out a training program to help local technical personnel and system users adapt to the changes in technology.

The project team manager is Bob Huber, with Mark Weakly and the NET Distance Learning staff (Kent Baker, Lathan Latimer and Tim Morrissey) providing field engineering and installation for phase 1 and phase 2. Bob Huber has worked at NET for ten (10) years in Distance Learning Services and Network Operations. Bob is the Director of Network Operations for NET. Mark Weakly has worked for NET for thirty years (30) in Engineering, Distance Learning Services and Network Operations. Mark is the Chief Engineer, Distance Learning Services. The other Distance Learning staff has work for NET with a combined experience of twenty-five (25) years.

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

Phase 1 (Network 3, two-way) would take place during 2007/2008 and 2008/2009. The Network 3 system has 17 remote satellite antenna locations with 24 total connections. The main hub (NETC – NOC) has a primary and backup satellite antenna with 18 total connections. The upgrade could be completed in two (2) years.

Fall/Winter 2007	Purchase all equipment needed at NETC's hub site. Work with Network Nebraska planners to decide on key locations for remote 2-way nodes.
Spring 2007	Implement portion of NETC hub site that can directly connect into terrestrial bandwidth in Lincoln. This connectivity between NET and Network Nebraska already exists.
Summer 2007	Implement portion of NETC hub site that connects to remote school sites via satellite (2-way).
Fall/Winter 2008	Purchase all equipment needed at remote 2-way sites. Revisit with Network Nebraska planners to confirm key locations for remote 2-way sites.
Summer 2008	Implement all remote 2-way sites.

Phase 2 (1-way systems) scheduling would follow this same pattern in the next biennium.

11. Describe the training and staff development requirements.

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It is the common practice of NETC to purchase formal training from manufacturers as a part of any large system purchase. In this way the NETC staff can gain the best insights into how to take advantage of the new systems. Much of the knowledge already exists at NETC because we interact with the proposed equipment that exists in other locations in Network Nebraska and in various other networks with which NETC interfaces.

Training users will require more coordination since there are many more people to be trained. NETC will work with ESUs to develop a training plan for educators and their technical staff. Venues such as the April NETA conference in Omaha and the June NDLA conference can also serve as valuable training outlets.

Since much of the final installations will be conducted by NETC staff, coordination is needed with local technical staff such that training may be a part of the installation. In fact, having local technical staff assist in the installation will better train them as well.

12. Describe the ongoing support requirements.

Since the networks in question already exist and we are simply discussing an upgrade to the systems, NETC will take advantage of the existing support structure. NETC operates a technical help desk and a maintenance division. Network Nebraska also operates a technical help desk. Most educational institutions using the networks belong to a group of like-minded users and often pool their resources for regional help desk and technical personnel. All of this will still be in place and will keep the same functions.

Within NETC's budget there are designated line items for maintenance of the current distance learning technical activities. These will continue to exist. By upgrading the system to newer equipment there will be a new warranty period that will lessen somewhat the immediate impact. Also with newer equipment, the life cycle will be extended out by essentially resetting the clock in terms of equipment wear and tear.

Section 7: Risk Assessment (10 Points)

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

The issues listed are in order of relative importance from the perspective of NETC. The first would be of highest importance, with the rest in descending order.

The obvious barrier would be to not receive funding. NETC only has budgetary support of these systems on an annual maintenance basis. Portions of the network might be updated more slowly than with these funds, but there are large portions of the network that have to be upgraded all at once or not at all.

As with all technology, life-cycle of technology is always a question. There is the life of the specific hardware purchased. NETC already has a maintenance budget in place for this issue. The other version of life-cycle refers to obsolescence. Once the system is in place, the protocols and encoding schemes will likely be quickly out of date. Since this is true for all technology the state should be slow to change standards to keep some reasonable life-cycle for networks. Leap-frogging (not upgrading until several generations of change have occurred) is a common strategy for minimizing this issue. NETC will be at the mercy of the state's standards process in regard to the long-term viability of this technical project as will all that use similar technology.

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Although there are regional technical departments and technical assistance with Network Nebraska, they may not be as much help with this particular upgrade since they are already sharing duties both for their local assignments and stepping up to increased responsibilities with the statewide terrestrial network.

Although audio and video technicians are currently available around the system, recruiting RF engineers is difficult. However, newer technical staff coming into the system often has a strong network and IP centric skill set. This could mean there would be less availability of technical personnel with video and audio specific skills. This may affect the long-term maintenance of all video conference systems in the state, not just this particular video conference system.

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

By going to more commodity off-the-shelf IP systems, upgrades and life-cycle will be more in the State's favor for the long-term.

The more generic the systems, the more people who are available with the proper skills to maintain the equipment.

Complying with state technical standards ensures increased likelihood of network use by endpoints. Increased use means actually achieving the goals of increased efficiency and return-on-investment.

Purchasing equipment "in bulk" makes the budget more solid and allows for minor unforeseen issues. It also allows for reaction to any "infant mortality" equipment failures without slowing the project down.

By having already replaced the system CODECs, NETC has minimized what is required to adhere to the standards and lowered the overall cost of the project.

Having the local technical personnel assist with installation will increase the likelihood of ongoing success.

Working with the ESUs to assist with training will decrease the load on help desks and will help raise awareness to newer users who have not used the satellite system much in the past if at all.

Section 8: Financial Analysis and Budget (20 Points)

15. Financial Information

Financial and budget information can be provided in either of the following ways:

(2) Provide the information by completing the spreadsheet provided below.

Instructions: Double click on the Microsoft Excel icon below. An imbedded Excel spreadsheet will be launched. Input the appropriate financial information. Close the spreadsheet. The information you entered will automatically be saved with this document. If you want to review or revise the financial information, repeat the process just described.



C:\Documents and Settings\dugas\My C

Financial information from the embedded spreadsheet appears at the end of this PDF version of the document.

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16. Provide a detailed description of the budget items listed above. Include:

- An itemized list of hardware and software.
- If new FTE positions are included in the request, please provide a breakdown by position, including separate totals for salary and fringe benefits.
- Provide any on-going operation and replacement costs not included above, including funding source if known.
- Provide a breakdown of all non-state funding sources and funds provided per source.

The specific list of hardware and software are listed in the Excel Spreadsheet above (Section 15) that depicts the budget. The tab labeled "Equipment Cost" lists all the planned systems for this project.

NETC does not see a need to add FTE for this project.

There would be ongoing replacement costs. NETC currently has a capital budget of \$100,000 annually in Program 901 that is planned through FY2009. The State will need to consider renewing this capital item or converting it to a permanent operational line item to keep the system maintained beyond that point.

There are no non-state funds specifically supporting this application. NETC seeks federal capital funds routinely that help keep the hub site running. NETC also has state permission to use "excess capacity" to raise funds to help mitigate operational expenses.

NETC has access to state funds in the NebSat Cash Fund. Pending Legislative approval, these funds could apply to this or other projects.

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

The project can be found in the document titled "FY 2008 & 2009 BIENNIAL BUDGET NARRATIVES." Within the section titled "New Capital Construction Projects" it is labeled as project "CC-2 Satellite Reconfiguration Project – New Request."

It is also listed in "Report 5 – Capital Construction New Requests" as line item CC-2.

This can be found in the:

Capitol Construction Project Request – Building Level – 60
Agency 47 Educational Telecommunications Commission
Program 920 "Satellite Reconfiguration"
Pages 13 - 20

	Item	FY 07-08	FY 08-09	FY 09-10	FY 10-11	Total
Phase 1	Modem (DMD 20 Radyne)	\$ 33,000.00	\$ 198,000.00			
Phase 1	IP Switch (Cisco 3750)	\$ 6,000.00	\$ 6,000.00			
Phase 1	Packeer Packet Shaper	\$ 5,500.00	\$ 5,500.00			
Phase 1	Firewall (Cisco PIX 525)	\$ 13,000.00	\$ 13,000.00			
Phase 1	Video Conference Bridge Upgrade	\$ 95,000.00	\$ -			
Phase 1	Multiplexer (TMX 2010 Motorola)	\$ 35,000.00	\$ -			
Phase 1	Management System (Radyne-ILC)	\$ 50,000.00	\$ -			
Phase 1	Training	\$ 10,000.00				

Phase 2	Encoders SE 4000			\$ 120,000.00	\$ -	
Phase 2	Server DELL 2850			\$ 5,000.00	\$ -	
Phase 2	Multiplexer (TMX 2010 Motorola)			\$ 35,000.00	\$ -	
Phase 2	DVB Modulator Miteq DVM 100			\$ 8,500.00	\$ 8,500.00	
Phase 2	Software			\$ 40,000.00	\$ -	
Phase 2	Satellite Receive Systems (DOC)			\$ 14,000.00	\$ 21,000.00	
Phase 2	ATSC Receive Systems (DOC)			\$ 6,000.00	\$ 6,500.00	
Phase 2	Receivers			\$ 150,000.00	\$ 375,000.00	

\$ 247,500.00 \$ 222,500.00 \$ 378,500.00 \$ 411,000.00 \$ 1,259,500.00