

Nebraska Information Technology Commission

Project Proposal Form

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

FY2007-2009 Biennium

Project Title	Final DTV Transmitter Conversion 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	Final DTV Transmitter Conversion Project
Agency (or entity)	Educational Telecommunications 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.

NET has met DTV conversion deadlines established by the FCC and now simulcasts in both legacy analog NTSC and in DTV. Federal regulations demand that analog transmission ceases at the end of the simulcast period in February 2009. This requirement for NET to shut down its analog broadcasts will mean changing or replacing some transmitters, antenna systems, and associated equipment not covered by prior state appropriations.

For each transmission site, NET has selected one of the two current simulcast channels for digital-only broadcast by February of 2009, with the other channel then being abandoned to the FCC. At some sites the final selection will be the present DTV channel, requiring less upfront cost, while most will retain the present analog channel number. Long-term savings will result in the latter cases due to the reduced electrical power needed to broadcast at the lower channel frequencies now associated with analog. In each case, however, capitol costs will be associated with analog shut-down. NET will incur these expenses in FY 2007-2008 and 2008-2009, with the removal of obsolete transmitters and antennas occurring in FY's 2009-2010 and 2010-2011.

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

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

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- Expected outcomes.

The project includes essentially 4 steps. First, NETC will need to upgrade 7 of its 14 TV translators so that they can be quickly converted to digital with a simple parts swap. Second, the transmitters at most sites will need an upgrade. NETC placed upgradeable transmitters in place already as part of the previously funded DTV project. The costs depicted in this project are to actually complete the upgrade. Once these are done and NETC is no longer transmitting an analog (NTSC) signal, the transmitters that are no longer in use will need to be repositioned to take the greatest advantage of them as back-up systems where possible and as spare parts when they cannot be used as a redundant system. Finally, abandoned antennas and transmission lines that are currently installed on the towers will need to be removed. This will lower the weight and wind load on the towers, extending their lives. Towers are very expensive and need to last for decades.

At the end of the project NETC will accomplish the following:

- Upgrade 9 TV stations and 14 TV translators to DTV-only operation
- Move some of the existing DTV transmitters to new locations to act in a back-up capacity
- Salvage as many parts as possible of the transmitters that cannot act as back up to help with future maintenance
- Remove all unused antennas and transmission lines from all towers
- Replace several antennas in the system that are not DTV capable or are problematic and beyond life-cycle

Beneficiaries include:

- The citizens of Nebraska who will continue to receive valuable educational service through digital broadcast television at no cost over the air.
- Teachers in Nebraska who will continue to receive valuable educational services that can enhance their teaching resources in the classroom.
- Students in Nebraska who will benefit from educational content delivered both in the classroom and to their home.
- The State of Nebraska because the FCC will continue to grant the license authority for the service.

Expected outcomes include:

- All NTSC services will cease
- NETC will meet the FCC deadline for turning back its vacated channels
- All hardware systems will be reused as much as possible or act as shelf spares
- Strain on tower structures will be reduced, extending their life cycle
- Some electrical and maintenance costs will be reduced
- HVAC (Heating, Ventilation and Air Conditioning) loads will be reduced
- Digital services will have the same or better coverage area as the current NTSC service

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

Electrical and HVAC systems are already metered. It will be an easy process to make direct comparisons both through the metering system and through monthly billing statements.

Once each analog channel is broadcasting in digital, NETC has a comprehensive diagnostic system that is able to measure all aspects of the signal at various distances from the tower out to the edge of the predicted coverage area. This process was done over several months once the simulcast system was in

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place. NETC will take a fresh round of measurements in the same way once NTSC is off and the permanent channels are transmitting.

NETC subscribes to several market research tools that give an understanding of how much use Nebraskans are making of the services of over-the-air broadcast. The reports after Feb. 2009 can be compared to those prior to then to see the effect on viewership.

After extensive tower projects, NETC receives tower analysis reports from the structural engineers of the manufacturers of the tower. Among other things, these reports show tension on the guy wires that keep the tower vertical. The reports after removal of antennas and transmission lines can be compared to earlier reports.

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

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:

- Compliance with FCC requirements and retention of broadcast licenses
- Lower electrical and HVAC costs
- Lower maintenance costs
- Increased availability of shelf spares which will cause shorter outage times
- Increased system redundancy which will cause shorter outage times
- Engineering workload can be better distributed
- Older, more problematic equipment can be removed

Some of the intangible benefits include:

- As citizens gain technology to receive the DTV signal they will be able to take advantage of more channels of educational video.
- As citizens gain technology to receive the DTV signal they can have the ability to receive data files such as program-related websites or computer-based educational activities for children.
- As schools gain the technology to receive the DTV signal they can have the ability to receive data files such as teacher guides or grade-specific “learning objects” for use in the classroom.
- As state agencies gain the technology to receive the DTV signal they can have the ability to receive data files such as bulk file transfers from agency heads in Lincoln for updated information on their local servers.
- As public agencies gain the technology to receive a digital signal they will have a low-cost solution to receive data over a statewide wireless network. This includes Telehealth agencies, law enforcement agencies, emergency management agencies, weather alerts etc.

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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 went through an extensive process at selecting the technology to simulcast both NTSC and DTV. This process was coupled with detailed state purchasing bid processes to select vendors and specific systems. Since that process has already taken place and the system has been operating since early 2003, there really is no other technology to be considered. If any other technology were considered it would involve wholesale replacement of existing systems instead of upgrade. The original purchase process for transmissions technology of DTV cost more than \$15 million. Upgrading is far more cost effective. Upgrade of existing systems means that the same manufacturer who supplied the original transmitter must also supply the upgrade. For all these reasons no other technology has been considered.

Doing nothing would mean that most of the licenses held by the State of Nebraska to operate NET Television would be taken away by the FCC, denying much of the state's population access to and reception of the services of NET Television.

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

United States Telecommunications Act of 1996 requiring implementation of DTV
FCC Final DTV Channel Election Process of January 2005 setting final channel assignments
United States Telecommunications Act of 2006 setting shut off date of NTSC to February 17, 2009.

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.

This project eliminates analog NTSC television broadcast signals in the NET Television network. It will digitize final channel assignments around the state. KUON in Lincoln is a good representation of how the technology will be implemented. The NTSC channel is 12. The DTV channel is 40. The final DTV channel assignment is 12. NETC will turn off channel 40 DTV and upgrade channel 12 to DTV. The channel 40 transmitter will be parted out to benefit maintenance needs around the state at various transmitter sites. Channel 12 uses and will continue to use an antenna at the top of the tower so that antenna and transmission line will stay intact. The channel 40 antenna is mounted on the side of the tower, and lower down than channel 12. They will be taken down from the tower and no longer used.

No new software or communications requirements are needed for this project.

What makes this plan strong is that NETC will be able to take advantage of existing systems to minimize the amount of new purchases. The main transmitters to be used will stay intact. Only periphery equipment requires replacement. The devices within the transmitter that process analog signals feeding the transmitter will be changed out for digital devices. A DTV mask filter will be added after the transmitter. This is a tuned section of signal conduit. This device keeps the signal within the limits set by the FCC.

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A weakness may be that some equipment will ultimately become salvage. All of the equipment was installed by April 2003 and will be taken out of service in February 2009 if nothing changes in the federal plan. Most of what will not be used includes NTSC filters, modulators, antennas and transmission lines. The most valuable of these are the antennas and transmission lines. NETC may be able to trade or sell some of these, but this cannot be counted on. Foreseeing this, NETC purchased transmission line that has a 10-year life cycle to keep the original cost down and get the actual use as close to predicted life as possible.

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.

TV transmission equipment is large and operates at high power levels. In a world of technology that has a predicted life of 3 years or so, transmission equipment is the exception. The equipment in question has a life cycle of 15 to 20 years. Transmitters are controlled by computer systems, but the network setup by NETC is not accessible to outside users. Transmitters are single purpose devices and are not thought of as commodity technology so there is no attraction for those with malicious intent.

There are no applicable NITC technical standards in this case. The implementation plan involves technology that is well defined and federally regulated. Through the bid process NETC purchased high quality systems that have robust and solid performance. NETC also has a detailed monitor and control system that keeps all aspects of the transmission within the requirements set by the FCC. In fact NETC monitors many more parameters than those required by the FCC.

The infrastructure proposed is simply an upgrade to the statewide existing transmissions systems. All support infrastructure such as monitor and control bandwidth through Network Nebraska, content delivery through the satellite system and a large receiver base around the state will stay the same. Homes and schools that have analog-only receivers will need to purchase DTV receivers. These are commonly available now for about \$100 at many consumer electronics stores.

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 will first upgrade its translators that have not yet been upgraded. These are low power transmitters that are much less expensive. The upgrade will initially be to replace them with units that can be changed to DTV with a simple card swap and low cost filter installation. Next, all the major transmitters that need upgrade will be addressed. Coordination of this part of the plan is dependent on FCC schedule allowance, but will have to happen over a period of months. As each transmitter is upgraded, the translators that are specifically associated with that transmitter will also have to be converted. After all the conversions have happened, the shut down transmitters will be optimized in the system to make the most use of them. Finally antennas and transmission lines will come down.

NETC is the project sponsor as directed by the federal government. The State of Nebraska is the major stake holder as the holder of all but one of the licenses in question. The Board of Regents of the

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University of Nebraska is another stake holder since KUON-TV is licensed to them. The charter of the NETC defines the responsibilities charged to them by the State. A memorandum of understanding exists between the Board of Regents and the NETC that defines the responsibilities of the NETC to operate KUON on behalf of the Board.

The team included Michael Beach as the Chief Technology Officer who will oversee all fiscal activities of the project. Mr. Beach has 19 years of experience as a communications and network engineer. Roger Book is Engineering Director of Transmissions and will lead the technical team in ordering, tracking, installing and testing all the new systems. He will also lead the salvage efforts. Mr. Book has more than 35 years experience as a radio systems engineering. The rest of the team involves many people with regional responsibilities for transmitters around the state. These include Field Maintenance Supervisors, Field Maintenance Technicians and Transmissions Site Managers. This layered and regional staffing system will permit NETC to work on many of these projects in parallel to get them done as quickly as possible.

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

Fall / Winter 2007	Purchase and receive replacement translators for 7 sites
Spring / Summer 2008	Install and test new translators Purchase transmitter upgrades
Fall / Winter 2008	Install and test transmitter upgrades
Winter 2008 / Spring 2009	Convert all 14 translators
Summer 2009 to Summer 2010	Move or disassemble shut down transmitters
Spring 2010	Purchase service contracts for removal of antennas and transmission lines
Summer / Fall 2010	Remove and salvage antennas and transmission lines
Spring / Summer 2011	Complete removal and salvage of antennas and transmission lines

11. Describe the training and staff development requirements.

Since this project is an upgrade of systems already operated by NETC, the training needs will be minimal. All of the upgrades will be done by factory engineers and by NETC engineers. Training is integral to the installation process and defined in the purchase. Once the systems are installed and the initial training is complete, NETC has routine meetings for Transmissions personnel to share information. All of the current Transmissions engineers have already attended formal schools provided by the manufacturer on the transmitters in question.

12. Describe the ongoing support requirements.

NETC has a Transmissions support staff and budgets to keep these systems up and running. Because these are upgrades to existing systems there is no increased support requirement beyond what already exists.

Support includes routine maintenance and as-needed repairs. It also means maintaining support systems such as back up power generators monitor and control systems, satellite distribution systems and terrestrial connectivity. All of this requirement currently exists and will continue.

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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 has budgetary support of these systems on an annual maintenance basis. The NebSat Cash Fund also includes some capital support. NETC can apply to the Federal Government for grants, though this source is questionable. If enough funding is not in place in time to meet the federal deadline, broadcast licenses are at stake. If the antennas and transmission lines are left on the towers, life expectancy of the towers will decrease. Replacement cost on towers is currently about \$1.2 million per tower.

Although the FCC has set a date for the NTSC service to end, there is no specific schedule published for networks such as NET Television. It would be impossible for NET to convert all its transmitters at the same time. Several professional organizations are working with the FCC to develop this plan, but currently there is no indication as to how early the process may start or how long it may take.

NETC is not alone in needing to get this project done with the February 2009 deadline. All TV broadcasters in the nation are faced with this same issue. The manufacturers of these systems are few in number. Factory technicians will have to help with the installations. This will mean that NETC will be one of many clients vying for parts delivery and installation crews nationally.

Currently, NETC has transmissions personnel to maintain these systems. The field of engineering in question is known as RF or radio frequency engineering. It is getting increasingly difficult to fill open positions with qualified RF engineers. Fewer people are choosing these fields as more are going into computing and networking. This will mean that NETC will need to look more to automation if qualified engineers cannot be found to maintain the systems in the future.

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

NETC has been in consultation with the manufacturers for the past several years on these issues of timing and systems delivery. National groups such as the National Association of Broadcasters and the Association for Maximum Service Television have been developing proposals for consideration by the FCC. NETC closely follows these developments. Part of how NETC might mitigate the issue of installation crews is by training its own engineers. This has been happening by sending these staff engineers to formal manufacturers' schools so that more of the work can be done by staff already at NETC. This will lessen dependence on manufacturer installation crews.

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Section 8: Financial Analysis and Budget (20 Points)

15. Financial Information

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

- (1) If the information is available in some other format, either cut and paste the information into this document or transmit the information with this form; or
- (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\MBeach\Mike

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

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.

No new FTEs are required for this project.

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

NETC received a federal Rural Utility Service grant from the USDA to replace the seven TV translators that still have older analog systems that cannot be converted to DTV. The grant amount was \$294,950 to replace translators as follows:

K46FG Falls City, NE FY2006/2007
K33AC Pawnee City, NE FY2006/2007
K44FN Culbertson, NE FY2006/2007
K33FO Benkelman, NE FY2007/2008
K06KR Crawford, NE FY2007/2008
K08LN Harrison, NE FY2007/2008
K10JW Verdigre, NE FY2007/2008

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NETC seeks federal capital funds routinely. The federal government has granted funds for similar projects to NETC in the past. If the Federal Government reauthorizes the Public Telecommunications Facilities Program (PTFP) in its 2007 budget, NET intends to apply for funding in support of the digital transmitters and tower modifications. PTFP has matched 40 to 50% of project costs in prior years. At present, the House version of the Federal budget contains no PTFP funding. The outcome will not be know until the House and Senate negotiate a final budget.

NETC uses funds awarded by the state for projects such as this as matching funds when applying for federal grants. Since this is a four-year project NETC will use the Phase 1 state resources granted for this project as matching funds to lower the costs of the project. Since these funds are not currently in hand it is impossible to predict what additional grants NETC might receive or their likely fiscal impact.

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-1 Final DTV Transmitter Conversion Project – New Request."

It is also listed in "Report 5 – Capital Construction New Requests" as line item CC-1.

This can be found in the:

Capitol Construction Project Request – Building Level – 60
Agency 47 Educational Telecommunications Commission
Program 922 "Final DTV Transmitter Conversion"
Pages 7-12

Capitol Expenditure Projects Draft Budgets

Analog Shutdown

	Item	FY06-07	FY07-08	FY08-09	FY09-10	FY10-11	Project Total
KHNE Hastings	Upgrade chnl 29 transmitter to digital				\$120,000		
KLNE Lexington	Remove chnl 3 antenna & transmission line					\$50,000	
KMNE Bassett	Convert Harris Platinum from NTSC to DTV			\$120,000			
	Chnl 7 DTV filter			\$35,000			
	Remove chnl 15 antenna & transmission line					\$50,000	
KPNE North Platte	Convert Harris Platinum from NTSC to DTV			\$120,000			
	Chnl 9 DTV filter			\$35,000			
	Remove chnl 16 antenna & transmission line					\$50,000	
Culbertson Translator	Translator replacement	\$56,100					
	DTV mask filter	\$3,500					
Max/Benkelman Translator	Translator replacement		\$56,100				
	DTV mask filter		\$3,500				
Wauneta Translator	Digital exciter		\$1,000				
	DTV mask filter		\$3,500				
KRNE Merriman	Convert Harris Platinum from NTSC to DTV			\$120,000			
	Chnl 12 DTV filter			\$35,000			
	Detailed tower analysis			\$20,000			
	Top-mount chnl 12 antenna			\$250,000			
	1100 ft of 4 inch transmission line			\$180,000			
	Install antenna & transmission line			\$150,000			
	Remove chnl 17 antenna & transmission line					\$50,000	
KTNE Angora	Convert Harris Platinum from NTSC to DTV			\$120,000			
	Chnl 13 DTV filter			\$35,000			
	Remove chnl 24 antenna & transmission line					\$50,000	
Chadron Translator	Digital exciter		\$1,000				
	DTV mask filter		\$3,500				
Crawford Translator	Translator replacement		\$15,500				
	DTV mask filter		\$3,500				
Harrison Translator	Translator replacement		\$15,500				
	DTV mask filter		\$3,500				
KUON Lincoln	Convert Harris Platinum from NTSC to DTV			\$120,000			
	Chnl 12 DTV filter			\$35,000			
	Remove chnl 40 antenna & transmission line					\$50,000	
Beatrice Translator	Digital exciter		\$1,000				
	DTV mask filter		\$3,500				
Blair Translator	Digital exciter		\$1,000				
	DTV mask filter		\$3,500				
Falls City Translator	Translator replacement	\$56,100					
	DTV mask filter	\$3,500					
Pawnee City Translator	Translator replacement	\$56,100					
	DTV mask filter	\$3,500					
KXNE Norfolk	Tune chnl 16 exciters to chnl 19			\$5,000			
	Chnl 19 DTV filter			\$35,000			

Capitol Expenditure Projects Draft Budgets

	Item	FY06-07	FY07-08	FY08-09	FY09-10	FY10-11	Project Total
	Upgrade chnl 19 transmitter to digital				\$60,000		
	Remove chnl 16 antenna & transmission line					\$50,000	
Decatur Translator	Digital exciter		\$1,000				
	DTV mask filter		\$3,500				
Neligh Translator	Digital exciter		\$1,000				
	DTV mask filter		\$3,500				
Niobrara Translator	Digital exciter		\$1,000				
	DTV mask filter		\$3,500				
Vertigre Translator	Translator replacement		\$15,050				
	DTV mask filter		\$3,500				
KYNE Omaha	Detailed tower analysis				\$20,000		
	Top-mount chnl 17 antenna				\$250,000		
	Antenna installation				\$100,000		
	FY Totals	\$ 178,800.00	\$147,650	\$1,415,000	\$550,000	\$350,000	\$2,641,450
	USDA Federal Grant	\$ 178,800.00	\$ 116,150.00				
	FY Totals with grant applied		\$ 31,500.00	\$ 1,415,000.00	\$ 550,000.00	\$ 350,000.00	\$ 2,346,500.00