Project #	Agency	Project Title
47-01	Educational Telecommunications Commission	Satellite Reconfiguration Project

SUMMARY OF REQUEST (Executive Summary from the Proposal)
[Full text of all proposals are posted at: http://www.nitc.state.ne.us/nitc/documents/fy2007-09/index.html]

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.

FUNDING SUMMARY

(Revise dates as necessary for your request.)

	Estimated Prior Expended	Request for FY2007-08 (Year 1)	Request for FY2008-09 (Year 2)	FY2009-10 (Year 3)	FY2010-011 (Year 4)	Future	Total
1. Personnel Costs							$ -
2. Contractual Services							
2.1 Design							$ -
2.2 Programming							$ -
2.3 Project Management							$ -
2.4 Other							$ -
3. Supplies and Materials		$ 187,500.00	$ 222,500.00	$ 338,500.00	$ 411,000.00		$ 1,159,500.00
4. Telecommunications							$ -
5. Training		$ 10,000.00					$ 10,000.00
6. Travel							$ -
7. Other Operating Costs							$ -
8. Capital Expenditures							
8.1 Hardware							$ -
8.2 Software		$ 50,000.00		$ 40,000.00			$ 90,000.00
8.3 Network							$ -
8.4 Other							$ -
TOTAL COSTS	$ -	$ 247,500.00	$ 222,500.00	$ 378,500.00	$ 411,000.00	$ -	$ 1,259,500.00
General Funds							$

	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

PROJECT SCORE

Section	Reviewer 1	Reviewer 2	Reviewer 3	**Mean**	Maximum Possible
3: Goals, Objectives, and Projected Outcomes	11	9	14	11.3	15
4: Project Justification / Business Case	18	10	24	17.3	25
5: Technical Impact	16	12	19	15.7	20
6: Preliminary Plan for Implementation	10	9	8	9.0	10
7: Risk Assessment	7	5	9	7.0	10
8: Financial Analysis and Budget	17	13	19	16.3	20
			TOTAL	**77**	100

REVIEWER COMMENTS

Section	Strengths	Weaknesses
3: Goals, Objectives, and Projected Outcomes	- Move to IP network. Building on past expenditures. Ability to pass traffic other than video/audio, i.e. just data. Common Ticket system - The project, as described, would bring great benefit to Nebraska education as well as other sectors.	- I think there needs to be more testing or a pilot to determine the true usefulness of the technology. I don't think the State Agencies will be able to use this technology. Network Nebraska Design could mean just 3-4 sites across the state for 2 way. - Beneficiaries are somewhat vague "current and future users". No documented need for switching to IP. What does this project solve as there is no identified problem. - The goals and objectives fail to mention the potential usage of delivering rich media content to many locations around the State without incurring terrestrial transport bandwidth.
4: Project Justification / Business Case	- Greater integration with Network Nebraska. IP network support. Trying to meet the requirements of the NITC for IP video support. Will need to do something to continue supporting video network.	- Probably won't be used in the common State and University data networks. Pilot of the actual usefulness would be helpful Yet to be determined how to integrate in to the Network Nebraska network.

Section	Strengths	Weaknesses
	Could be useful if there were a lot static content to be delivered - Would meet the standard for Synchronous Distance Learning and Videoconferencing but other solutions might meet this also. - The business case and project justification is well constructed. The cost/benefit ratio is favorable and would allow Nebraska more integrated options for its IP traffic.	- What are the future bandwidth costs they are defraying? For the amount of money being requested there is not a good economic return on investment outlined. Who are the specific customers that are asking for this. Hard to understand what the definable benefits are to the State of Nebraska.
5: Technical Impact	- Moves NET network to support video standards set by the NITC. Satellite's have been reliable for their video networks - Project is described well. - The technical advantage of IP over satellite needs to happen; it's only a question of when. With satellite transponder leases through 2012, the sooner the conversion, the sooner that this bandwidth can be employed for utilitarian or specialized purposes. The increased interoperability with Network Nebraska is advantageous.	- If purpose is to increase IP bandwidth, number of sites may be able to be reduced to a much lower number, due to design of Network Nebraska. System will have limited IP bandwidth. - Latency delays not addressed. Not much detail given for security or reliability.
6: Preliminary Plan for Implementation	- Plan can be accomplished as listed. - Implementation plan is reasonable. - With the LB 1208 implementation and upgrade of over 300 education entities by August 2009, this satellite digitization upgrade plan will match the timeline for the terrestrial upgrade.	- Concern over number of sites that need upgraded. - Would it not be possible to accelerate the Phase 2 Net 2 upgrade timeline so that more post-conversion use will be gained before the transponder lease expires?
7: Risk Assessment	- Converting from an RF skill set to IP skill set will assist in the availability of support and maintenance functions for the satellite network.	- Concern over actual use of system in real applications, including one way data. - Does not address any risk specific to this project. These are general technical risks for any project.
8: Financial Analysis and Budget	- The four-year implementation and budget plan is doable.	- Costs listed as "supplies and materials". In actual breakout, it doesn't give quantity, so it is difficult to determine. - Do not see any on-going maintenance costs. Return on investment to the State are not clearly defined. - Funding stretches over 3 biennial budgets.

TECHNICAL PANEL COMMENTS

Technical Panel Checklist	Yes	No	UNK	Technical Panel Comment
1. The project is technically feasible.	✓			
2. The proposed technology is appropriate for the project.	✓			
3. The technical elements can be accomplished within the proposed timeframe and budget.	✓			

STATE GOVERNMENT COUNCIL COMMENTS

- The State Government Council recommends this project be categorized as [Tier 3].

NITC COMMENTS

- Tier 3 (Other. Significant strategic importance to the agency and/or the state; but, in general, has an overall lower priority than the Tier 1 and Tier 2 projects.)

APPENDIX

AGENCY RESPONSE TO REVIEWER COMMENTS

NET Response to Weaknesses for Satellite Reconfiguration NITC Project # 47-01

Section 3 - Goals, Objectives, and Projected Outcomes

"- I think there needs to be more testing or a pilot to determine the true usefulness of the technology. I don't think the State Agencies will be able to use this technology. Network Nebraska Design could mean just 3-4 sites across the state for 2 way."

We are currently using this technology in NET's Datacasting Project and University of Nebraska at Kearney in the Network 3. We have requested DOC (Heath Hollenbeck) to validate the usefulness and reliability of this technology. To date Heath has not completed his testing.

The Nebraska Department of Roads and Health and Human Services Agency have expressed interest. We have requested NDoR (Kevin Briggs and Jaimie Huber)) to validate the usefulness and reliability of this technology. To date NDoR has not completed their testing.

The assumption regarding 2 way connectivity is correct. However, the 3-4 locations do not have current access to reasonably priced High Speed Connectivity.

"- Beneficiaries are somewhat vague "current and future users". No documented need for switching to IP. What does this project solve as there is no identified problem?"

Current users are the Department of Education and the NETCHE Education Consortium in the Datacasting model. Future users are the Nebraska Department of Roads and Health and Human Services.

The need to switch to IP is explained in the Executive Summary:
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.

The Division of Communications is having difficulty providing a reasonably priced High Speed Connectivity to South Sioux City, Chadron and Valentine Nebraska.

"- The goals and objectives fail to mention the potential usage of delivering rich media content to many locations around the State without incurring terrestrial transport bandwidth."

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 and the potential usage of

delivering rich media content to many locations around the State without incurring terrestrial transport bandwidth.

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.

Section 4 - Project Justification / Business Case

*"- Probably won't be used in the common State and University data networks.
Pilot of the actual usefulness would be helpful. Yet to be determined how to integrate in to the Network Nebraska network."*

Wayne State College has expressed a strong interest in this program.

Currently NET is using this technology to deliver Datacasting to the K-16 system at ESU 10, ESU 6, ESU 13 and to the 14 College / University NETCHE Consortium through Wayne State College.

The integration of this technology will be a combined effort with Division of Communications and NET. With the use of IP Satellite Routers (provided by NET, DMD 20 Radyne) and Enterprise management (provided by DOC) under served areas can be accommodated.

"- What are the future bandwidth costs they are defraying? For the amount of money being requested there is not a good economic return on investment outlined. Who are the specific customers that are asking for this? Hard to understand what the definable benefits are to the State of Nebraska."

Currently DOC is paying about 15% higher then anticipated per month for DS3 connectivity for Chadron. However, implementing Satellite connectivity the service provider would have incentive to maintain reasonable cost structures.

If the current pricing for a DS3 (the effective bandwidth of a Satellite Transponder) in an underserved area is used for comparison the return on investment is good. Current pricing is $ 5,000 per month or $ 60,000 per year then; $ 1,259,500 will be paid for in just over five (5) years.

Division of Communications, State Colleges, Nebraska Department of Roads and Health and Human Services have expressed interest in using this service.

Some of the tangible benefits to the state of Nebraska 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

Section 5 - Technical Impact

"- If purpose is to increase IP bandwidth, number of sites may be able to be reduced to a much lower number, due to design of Network Nebraska.
System will have limited IP bandwidth."

The purpose is to convert from a Video/Audio only system to an IP based system that accommodates IP based Video/Audio and IP traffic.

Satellite encoding technology is constantly improving allowing for increasing bandwidth. The equipment specified has upgrade capabilities.

"- Latency delays not addressed. Not much detail given for security or reliability."

Satellite technology has about one half of a second of latency.

The security of Satellite encoding technology has built-in security due to the nature of the system. It is requires expensive infrastructure (which already exists), very specialized encryption technology. The highest security risk is within the LAN or WAN. The reliability of Satellite technology is .9999. Two (2) times a year the Satellite system suffers 'Solar Outage', five (5) minutes for five (5) days.

Section 6 - Preliminary Plan for Implementation

"- Concern over number of sites that need upgraded."

The entire system would need to be upgraded. NET currently has 20 Network 3 & 350 Network 2 clients. NET believes all existing clients need to maintain existing services and allow additional services during idle time.

"- Would it not be possible to accelerate the Phase 2 Net 2 upgrade timeline so that more post-conversion use will be gained before the transponder lease expires?"

Phase 2 could be accelerated. However, the financial impact was extended over an entire Bi-Annual Budget.

Section 7 - Risk Assessment

"- Concern over actual use of system in real applications, including one way data."

Currently NET is using this technology to deliver Datacasting to the K-16 system at ESU 10, ESU 6, ESU 13 and 14 College / University NETCHE Consortium through Wayne State College. Datacasting is only one way.

"- Does not address any risk specific to this project. These are general technical risks for any project."

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.
Section 8 - Financial Analysis and Budget

"- Costs listed as "supplies and materials". In actual breakout, it doesn't give quantity, so it is difficult to determine."

Network 3

Equipment Description	Unit Price	Quantity	FY 07-08	Quantity	FY 08-09	Total
Modem (DMD 20 Radyne)	$ 5,500.00	6	$ 33,000.00	36	$198,000.00	$231,000.00
IP Switch (Cisco 3750)	$ 6,000.00	1	$ 6,000.00	1	$ 6,000.00	$ 12,000.00
Packeer Packet Shaper	$ 5,500.00	1	$ 5,500.00	1	$ 5,500.00	$ 11,000.00
Firewall (Cisco PIX 525)	$ 13,000.00	1	$ 13,000.00	1	$ 13,000.00	$ 26,000.00
Video Conference Bridge Upgrade	$ 95,000.00	1	$ 95,000.00		$ -	$ 95,000.00
Multiplexer (2010 Motorola)	$ 35,000.00	1	$ 35,000.00		$ -	$ 35,000.00
Management System (Radyne-ILC)	$ 50,000.00	1	$ 50,000.00		$ -	$ 50,000.00
Training	$ 10,000.00	1	$ 10,000.00	1	$ 10,000.00	$ 20,000.00
						$ -
			$247,500.00		$232,500.00	$480,000.00

Network 2

Equipment Description	Unit Price	Quantity	FY 09-10	Quantity	FY 10-11	Total
Encoders SE 4000	$20,000.00	6	$120,000.00		$ -	$ 120,000.00
Server DELL 2850	$ 5,000.00	1	$ 5,000.00		$ -	$ 5,000.00
Multiplexer TMX 2010	$35,000.00	1	$ 35,000.00		$ -	$ 35,000.00
DVB Modulator Miteq DVM 100	$ 8,500.00	1	$ 8,500.00	1	$ 8,500.00	$ 17,000.00
Software	$40,000.00	1	$ 40,000.00		$ -	$ 40,000.00
Satellite Receive Systems (DOC)	$ 7,000.00	2	$ 14,000.00	3	$ 21,000.00	$ 35,000.00
ATSC Receive Systems (DOC)	$ 500.00	12	$ 6,000.00	13	$ 6,500.00	$ 12,500.00
Receiver	$ 1,500.00	100	$150,000.00	250	$ 375,000.00	$ 525,000.00
Total			$378,500.00		$ 411,000.00	$ 789,500.00

"- Do not see any on-going maintenance costs. Return on investment to the State are not clearly defined."

An annual maintenance budget for Network 2 and Network 3 is in place. The upgrade equipment will use this existing maintenance budget.

If the current pricing for a DS3 (the effective bandwidth of a Satellite Transponder) in an underserved area is used for comparison the return on investment is good. Current pricing is $ 5,000 per month or $ 60,000 per year then; $ 1,259,500 will be paid for in just over five (5) years.

"- Funding stretches over 3 biennial budgets."

The budget is for four (4) years. Two (2) years in two (2) biennial budgets.