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School Connectivity Initiative Implementation and Operating Plan

School Connectivity Team
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Introduction

This report outlines a detailed plan for the implementation of a pre-K12 Education Network for the State of North Carolina. The plan is based on the direction of the School Connectivity Initiative assumptions and drivers for development of a pre-K12 Education Network from the Joint report on Information Technology-Presented to the 2007 Session of the General Assembly, e-Learning commission reports I and II, the 2005 and 2006 Business Education Technology Alliance (BETA) reports and the e-NC Building Regional Education Networks feasibility study. Specifically, The Joint Report on Information Technology – Presented to the 2007 Session of the General Assembly, January 2007, outlines 4 essential elements for future-ready schools in North Carolina as being necessary to reach the North Carolina State Board of Education’s priority and goals for 21st century students achieving 21st century outcomes – specifically, the Joint Report defines:

Essential Element 1: 21st Century curriculum, instruction, assessments, and accountability

Essential Element 2: Technology tools in the classrooms

Essential Element 3: Personnel and professional development

Essential Element 4: Connectivity, networks and accountability

BETA, The School Technology Commission, and the Joint Legislative Oversight Committee on Information Technology jointly support the Joint Report. The Joint Report is the culmination of several years work to assess the needs of public schools and the role of the state in supporting those needs through technology.

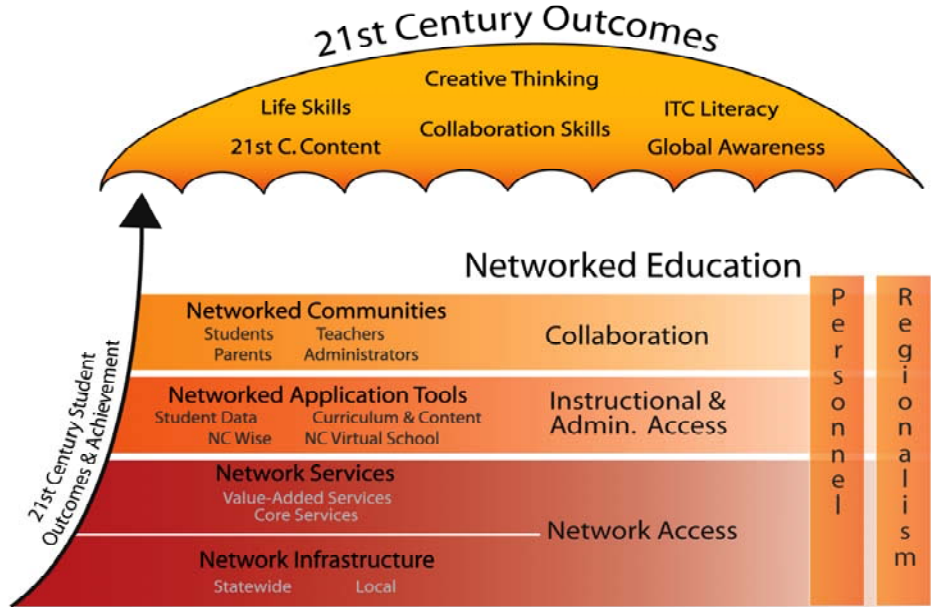


Figure 1 Essential Elements for Future-ready Schools

Figure 1¹ illustrates the relationships of the four essential elements as they relate to achieving 21st Century Outcomes as measured by Student Achievement. In future-ready schools (both brick and mortar and “virtual”) networked communities of educators, students and parents collaborate to achieve commonly shared 21st century outcomes. These networked communities collaborate using a set of instructional and administrative tools delivered as online (web) services. The School Connectivity Initiative is primarily focused on network access, and the personnel that provide for engineering and support of the infrastructure and service elements related to network connectivity. Specifically, through a common statewide network and supporting services the goal of achieving consistent and deterministic access to 21st century curriculum and instruction across all zip codes in North Carolina is attained.

Background

The *Developing Regional Education Networks* BETA report, May 2006, provides background for the development and funding of a statewide education network supporting preK-12 public schools. The report recommends specific actions including:

- Provide a common network backbone
- Establish the NC Education Network
- Plan a 3-year Implementation Timeline

¹ Adapted from Education Networks of America, ena, (<http://www.ena.com/>) presentation materials.

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For Fiscal Year 2007, the NC General Assembly appropriated \$6M in Senate Bill 1741 to fund School Connectivity as an initial investment aimed at addressing the recommendations presented in the report. Pursuant to the SB1741 School Connectivity legislation the State Board of Education, the Lieutenant Governor's Office and the Office of the Governor initiated a School Connectivity Planning Project. The Office of Information and Technology Services approved the School Connectivity Planning Project, DPI0739, in January 2007. DPI0739 deliverables include, "*A plan documenting a business framework and operational model, governance and advisory structure, e-Rate consortium plan and financials.*" In compliance with that deliverable commitment we offer this "School Connectivity Initiative Implementation and Operating Plan."

In developing this plan the School Connectivity Initiative project team based its work on the criteria established by the School Connectivity Advisory Group. The team conducted site surveys with nearly 40 North Carolina Local Education Agencies (LEAs), interviewed representatives from existing K-12 statewide networks, discussed E-rate consortium possibilities with peer state and FCC leaders, and initiated four connectivity demonstration projects (pilots). Through this due diligence process we explored connectivity-related considerations, including:

- A range of representative network architectures
- Opportunity to leverage public-private partnerships
- Best practice operating principles of sustained statewide education networks
- Support for educational consortia
- Applications and services enabled by connectivity
- E-rate support considerations
- LEA support models
- Organizational models

Informed by our comprehensive planning and diligence process, we offer an operating and execution plan in the sections that follow. The remainder of the plan includes an Executive Summary followed by a detailed description of the five primary operating strategies. Appendices provide supporting data and findings collected during the development of the plan.

School Connectivity Initiative Executive Summary

The *2007-2009 Governor's Recommended Budget*, 2007 House Bill H174 and Senate Bill S135 all recommend recurring funds for the *School Connectivity Initiative*. In short, "The purpose of the initiative is to connect all local school administrative units into a statewide network that ensures broadband connectivity to all schools and classrooms." Said another way, the School Connectivity Initiative funds the development and sustained operation of the NC Education Network (NC EdNET). The NC EdNET comprises a common statewide backbone for education and supporting services to ensure sustainable long-term equity of access.

The common NC EdNET backbone connects NC educators and learners to instructional content regardless of the source of the content or the location of the user. The NC

EdNET provides for deterministic performance in access to instructional content ensuring that all NC learners will have optimized access to existing and emerging rich and interactive content from all North Carolina public schools.

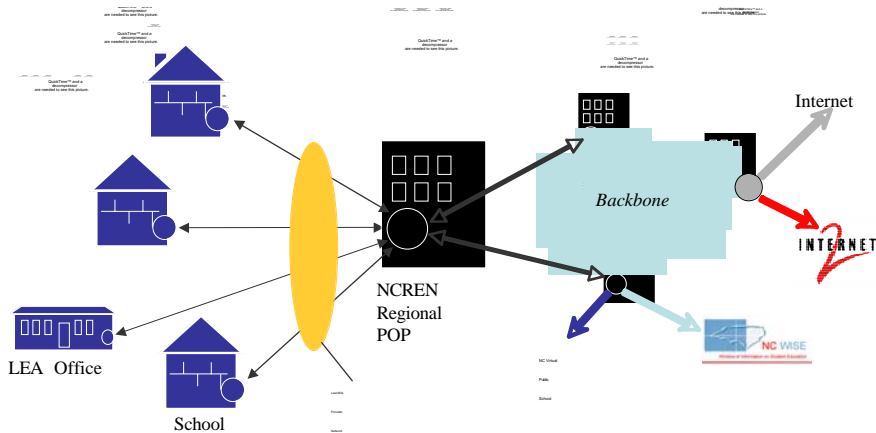


Figure 2 NC EdNET Connectivity Blueprint

Figure 2 illustrates a blueprint for the NC EdNET connectivity model. This connectivity Blueprint accomplishes the goal of providing reliable and secure very high bandwidth services to all LEA's in the state. Currently, very high bandwidth connectivity is confined to certain areas of the state and is either not available or cost prohibitive particularly for rural LEA's.

As a core element to the blueprint the NC EdNET provides for a shared backbone that interconnects all K12 schools to each other, to the Internet, to administrative systems like NC WISE, to emerging online course content like that provided through the NC Virtual Public School and to the higher education institutions in NC.

We recommend launching EdNET utilizing the existing NC Research and Education Network (NCREN) and NC ITS network and data center facilities as the core network. Using these NCREN and NCITS represents an efficient and cost effective model for core connectivity because it extends use of existing, "cutting edge" infrastructure. To add to the cost efficiency, the NCREN Operator has offered the possibility of fronting the capital costs to extend the NCREN network for the K12 connectivity project from its own resources.

Last mile providers, including some of North Carolina's most valued corporate citizens such as AT&T, Embarq, and Time Warner Cable interconnect the schools of a Local Education Agency (LEA) into a LEA specific private wide area network (WAN). These last mile providers also provide connectivity from the LEA WAN to the NC EdNET backbone at a regional point of presence (POP). These last mile providers have expressed support for this EdNet connectivity plan.

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In general, federal telecommunications discounts through the E-rate program administered through the Universal Services Access Corporation (USAC) are leveraged for all last mile provider services and for Internet access services. The interconnection of the regional Points of Presence (POPs) in the backbone may be eligible for E-rate discounts though implementation flexibility gained by sharing the backbone across the entire range of K-20 facilities and virtual learning portals in North Carolina likely proves more effective and efficient without USAC/E-Rate interactions.

Network access is supported atop this shared connectivity model with centrally managed services. An initial set of core services is to include at minimum an E-rate function and a network engineering function. The E-rate function provides support to LEAs for managing the processes associated with requesting and bidding for services, and filing for E-rate discounts. The network engineering function provides network consulting resources to LEAs to support network design, deployment, monitoring, troubleshooting, and the like based on the instructional and administrative needs of the LEAs, the schools and the classrooms. Value-added services that leverage the shared NC EdNET infrastructure and support model will bring added efficiencies to LEAs by enabling and facilitating sharing of resources on a regional and/or statewide basis. In the remainder of this section we address guiding assumptions, overall goals, supporting strategies, implementation roadmap, and a funding summary.

Assumptions

The connectivity plan was based on, but not limited to, the following list of assumptions:

- Leverage existing state investments (e.g., invests in MCNC/NCREN, NC ITS, e-NC) to create a statewide education network that provides for sustainable broadband connectivity between all public schools, community colleges, and universities in North Carolina
- Deliver connectivity via Fiber-based metropolitan Ethernet services where available. High bandwidth alternatives will be considered only when fiber-based metro Ethernet is not available or feasible.
- Migrating LEAs/schools to fiber-based metro Ethernet services will be scheduled over a 3-5 year period based on need, existing LEA contract obligations and local access provider build-out schedules.
- NC EdNET will be based on an opt-in model. While most LEA's surveyed have stated they would opt-in, choice is an important aspect of this model.
- Site surveys will be completed in Q3 Calendar Year 2007 to provide comprehensive baseline LEA connectivity data.
- Local access providers will recognize the value of the NC EdNET and will support it appropriately.

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- Backbone connectivity and service support models will be developed to optimize overall effectiveness and efficiency in the context of a K-20 service delivery platform – as such E-rate discount eligibility for backbone connectivity and support is optional.
- LEA last mile connectivity (WAN) and ISP service models will leverage the federal E-rate discount program to the greatest extent possible and practical as defined by availability and cost of competitive services.
- Other sources of LEA funding from the State will not be negatively impacted by the availability of connectivity funds.

Other Factors

The connectivity plan also considers the following factors being addressed in the 2007 session of the General Assembly:

- Implementation of the NC Virtual Public School (NCVPS);
- Development of Learn and Earn On-Line to provide college level courses to high schools via distance learning in the Universities and Community Colleges;
- Development of the NC Virtual (NCV) at the Education Cabinet to coordinate e-learning for PreK-20;
- Funding for connectivity for the Community Colleges and Universities;
- UNC-online which provides degrees and other certification programs online

Goals

This operating plan is focused on six primary goals. These have been selected from a long potential list of “things to accomplish” through the connectivity network equity of access mission described in the earlier Introduction section of this Plan. These goals are supported by subsequent strategies, vetted by the team and community.

1. Provide “equity of access” for all K12 schools
 - Deliver services that support classroom and online instruction Support 21st century skills, classrooms, schools, educators, workforce
 - Provide a common shared network (backbone and local loop)
2. Optimize E-rate process and support statewide
3. Enable and foster public-private partnerships
4. Develop a sustainable funding model
5. Organize to operate
 - Centrally coordinated
 - Leverage existing resources and organizations where possible

- Funded for efficiency and effectiveness
6. Achieve steady-state within 3 years

Strategies

The School Connectivity Initiative operating plan comprises five manageable strategies. These key strategies reflect significant review by the Connectivity Team and vetting process with many stakeholders including the LEAs, DPI, Government Education and Technology staff, other state peer network and e-Rate leaders aligned with the State Vision as reviewed in the introduction. These lists of five narrows the strategies to a manageable list, but the detailed programs and actions that support them are comprehensive and not neatly packaged into five buckets. To meet and exceed the K12 goals, NC EdNet will:

1. Establish a shared education backbone that provides for K-12 **connectivity**. In the initial or year one phase, the backbone will consist of making use of existing core networks that service the State's education community (NCREN) and state government administration (NC-ITS). Core members of the School Connectivity advisory group (NCDPI/SBE, ITS, MCNC, NC State Friday Institute, and LEA Representatives) will make determination regarding connectivity for each LEA that maximizes efficiency and achieves equity of access. LEAs and schools selected for phase one will be determined by the State Board of Education.
 - Transition all LEAs to fiber-based wide area network solutions such as metro-Ethernet where feasible
 - Interconnect local (last mile) service providers and regional Internet Service Providers (ISPs)
 - Establish common service level agreements with last mile service providers
2. Provide an opt-in **services** model that includes:
 - A comprehensive set of core services supporting reliable, high-bandwidth connectivity including central E-rate and engineering services
 - Value-added network services offered to improve operational efficiency within and among LEAs
3. Implement a community-driven **collaboration** model
4. Develop an effective and efficient operating **organization** that best fits the needs of service delivery and accountability.
5. Sustain the operation leveraging myriad **funding** resources including state, federal, local, and private sector.

Implementation Plan Summary

Based on the stated goals and strategies to achieve those goals we propose a three-year NC EdNET program implementation period during which we will implement projects and programs with a scope of work that includes the following.

- All 2400+ school buildings connected via fiber (or closest practical approximation) to the NC EdNET backbone

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- All 2400+ school connections instrumented for remote measurement and monitoring
- Comprehensive set of ‘Core’ services supporting reliable, high-bandwidth connectivity
- Set of value-added services offered to improve operational efficiencies (potentially fee based service)
- Statewide contracts created with Service Providers
- Realize Operational Efficiencies by leveraging regional alliances for common delivery of common services
- Effective governance and advisory groups representing all stakeholders

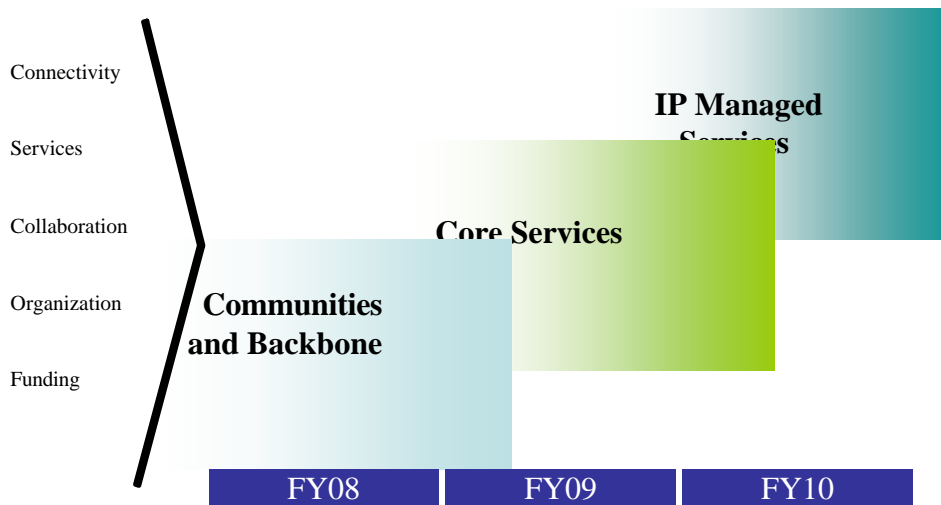


Figure 3 NC EdNET Implementation Roadmap

Figure 3 provides an overview of the general focus of each of the five strategies – during each of the initial three years of the NC EdNET. In year one, the focus is on building the NC EdNET community and interconnecting last mile service providers to the NC EdNET backbone. Year one provides for a transition from entirely local LEA supported connectivity to a hybrid model with recurring state support. In order to support newly funded initiatives such as the NC Virtual Public School, Learn & Earn Online, and one-to-one computing programs the NC EdNET will be deployed as a transitional hybrid organization. The transitional organization will include the NCDPI/SBE, Friday Institute, MCNC, and NC ITS. In year two, E-rate optimizations are gained by

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leveraging regional cooperatives and consortia. In year three with the regionalized network access in place managed IP services are deployed – providing for improved efficiency within and among LEAs. The following table provides a detailed summary of roadmap actions for each of the first three years of NC EdNET operation for each of the five strategic plan areas.

Table 1 Three-Year Implementation Roadmap

Connectivity		
Year 1	Year 2	Year 3
<ul style="list-style-type: none"> • Complete data gathering and analysis • Complete a multi-year LEA/schools connect plan with priorities • Develop a multi-year local loop connect plan to backbone and standard vendor contracts/terms • Develop/Execute prioritization plan for connectivity upgrade based on funding and data gathering • Develop/Execute plan to interconnect local providers with NC EdNET backbone • Identify initial LEAs to transitions to NC EdNET for ISP services • Perform LEA LAN Health assessments as appropriate • Negotiate with Major Providers to create a standard statewide Metro-Ethernet offering • Standardize CPE hardware and configurations • Negotiate statewide pricing – RFP process 	<ul style="list-style-type: none"> • Continue NC EdNET backbone build-out • Expand to complete underserved LEAs/schools • Complete contracts to establish NC EdNET as ISP • Continue prioritized build-out of fiber network • Continue NC EdNET Backbone expansion • Transition LEA Internet access to NC EdNET where prudent 	<ul style="list-style-type: none"> • Finalize NC EdNET backbone and connectivity upgrades • Upgrade backbone capacity to support load

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Services		
Year 1	Year2	Year 3
<ul style="list-style-type: none"> • Establish an E-rate Service Bureau • Develop a support organization to meet process requirements • Support LEAs with subject matter expertise • Develop consortium plan • Establish a network engineering service bureau • Prioritize Core services <ul style="list-style-type: none"> ○ Network consulting ○ Operations ○ Collaborative services 	<ul style="list-style-type: none"> • Expand E-rate service bureau beyond support • Develop consortium plan and start 1st phase • Potential statewide 470 filing • Network Engineering Service Bureau • Build value added services on Core service menu, as needed • Regional/centralized network and application services • Coordinate local service providers and ISPs • Evolve Operations to monitoring, trouble shooting, training • Provide Regional/Centralized Network and Application Services • Services identified by working groups 	<ul style="list-style-type: none"> • Add managed services as defined by LEAs and coordinate with Regional capabilities • Fully operational operations center • In place set of Core services to reliable connectivity • In place set of advanced services for improved operational efficiencies
Collaboration		
Year 1	Year 2	Year 3
<ul style="list-style-type: none"> • Engage existing K12 technology working group structures • Develop community advisory structure(s) and process • Facilitate service definition through advisory structures • Initiate methods and mechanisms for continuous communications 	<ul style="list-style-type: none"> • Facilitate formalization of regional consortia as co-ops in the NC EdNET • Identify Regional Resources to provide service • Extend reach by adding service focused working group structures • Initiate and integrate training and community events 	<ul style="list-style-type: none"> • Integrate working group and advisory structures across K-20 where appropriate
Organization		

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Year 1	Year 2	Year 3
<ul style="list-style-type: none"> • Properly design and implement a responsive organization leveraging existing resources • Investigate optimal organization to support K20 Education Network 	<ul style="list-style-type: none"> • With funding flow, reporting, governance in place, more fully evolve NC EdNET organizational structure • Meet all requirements of stakeholders via governance, reporting and advisory processes 	<ul style="list-style-type: none"> • Implement preferred and optimal “end game” of a K20 network organization • Optimize governance, advisory, accounting, reporting for K12, CC, and Universities. • Optimize State Virtual Education organization
Funding		
Year 1	Year 2	Year 3
<ul style="list-style-type: none"> • Establish contracts between SBE (DPI) and MCNC • Establish contracts with support organizations including The Friday Institute and e-NC • Establish LEA connectivity funding and/or expense reimbursement process and procedures 	<ul style="list-style-type: none"> • Add E-rate process requirements for consortium filing • Use metrics for effective and efficient demonstration of NC EdNET value 	<ul style="list-style-type: none"> • Ongoing (recurring) model in place at steady state and predictable costs • Includes partnerships • Establish fee-based pricing models for select value-added services • Optimized E-Rate model (consortium likely) • Flow of funds is effective and accountable to all stakeholders

Funding Summary

The annual steady state (year 3 forward) cost of K12 connectivity specified in the *Developing Regional Education Networks* report is \$56M per year. As depicted in the waterfall diagram shown in Figure 4, payments to last mile service providers (e.g., AT&T, Embarq, and Time Warner Cable) for telecommunications circuits comprise \$48M of the \$56M total. The balance of annual expenses covers education network backbone operations; core network services support (including E-rate services), administrative and operational expenses, and related network equipment costs.

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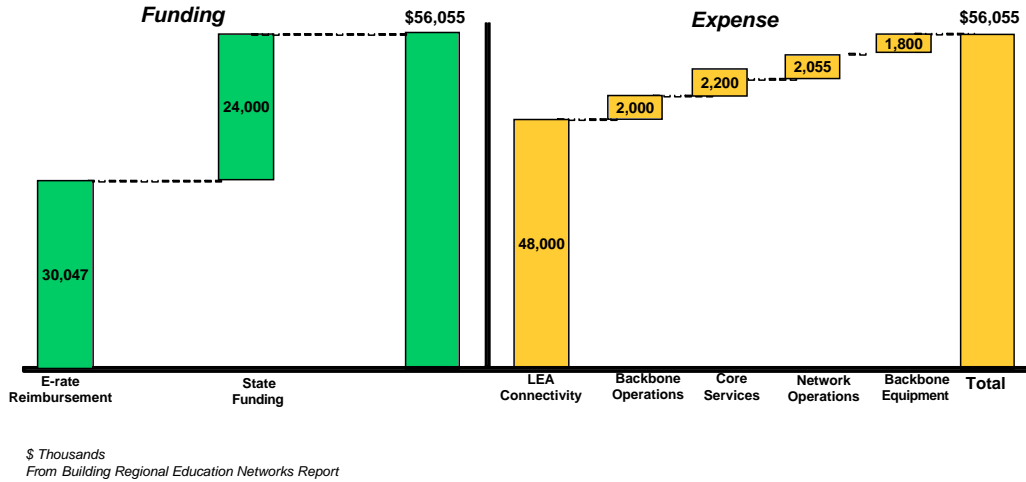


Figure 4 Steady State Financials

In this plan we categorize expenses around operational strategies – specifically, connectivity, services, collaboration, and organization. Further, the last category is the sum of collaboration and organization expenses. Table 2 provides a summary of the total expenses across connectivity, services, and collaboration and organization².

Table 2 School Connectivity 3-Year Cost Summary

	Year 1	Year 2	Year 3
Connectivity	44,529,194	42,912,245	49,837,849
Services	2,722,898	3,924,000	3,924,000
Collaboration and organization	1,538,700	1,025,975	1,022,900
Totals	48,835,792	47,862,220	54,784,749

After applying E-rate discount credits and Golden Leaf grant funding (totaling \$24M in years one and two and \$30M in year 3) to connectivity expenses we see a summary representation of expenses to be funded by state appropriation that totals \$24M (rounded) per year as indicated in Table 3.

Table 3 School Connectivity 3-year Cost After Credits

	Year 1	Year 2	Year 3
Connectivity	20,213,874	19,156,493	19,148,558
Services	2,722,898	3,924,000	3,924,000

² Totals in this cost summary vary slightly from the *Developing Regional Education Networks* report as we have added Golden Leaf funding and re-allocated some expenses due to the non-recurring appropriation under which the School Connectivity Initiative planning project is funded.

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Collaboration and organization	1,538,700	1,025,975	1,022,900
Totals	24,520,472	24,106,468	24,095,458

Figure 5 shows year-3 distribution of expenses after E-rate and Golden Leaf connectivity credits. That is, the distribution of state appropriated monies across connectivity, services, and collaboration and organization line items. This represents a highly efficient organization with low overhead costs (4%). Note that year one collaboration and organization costs are somewhat higher (\$1,538,700 versus \$1,022,900) as there are start-up costs – though in year 1 the total contribution of these administrative costs is still only 7% (of \$24M).

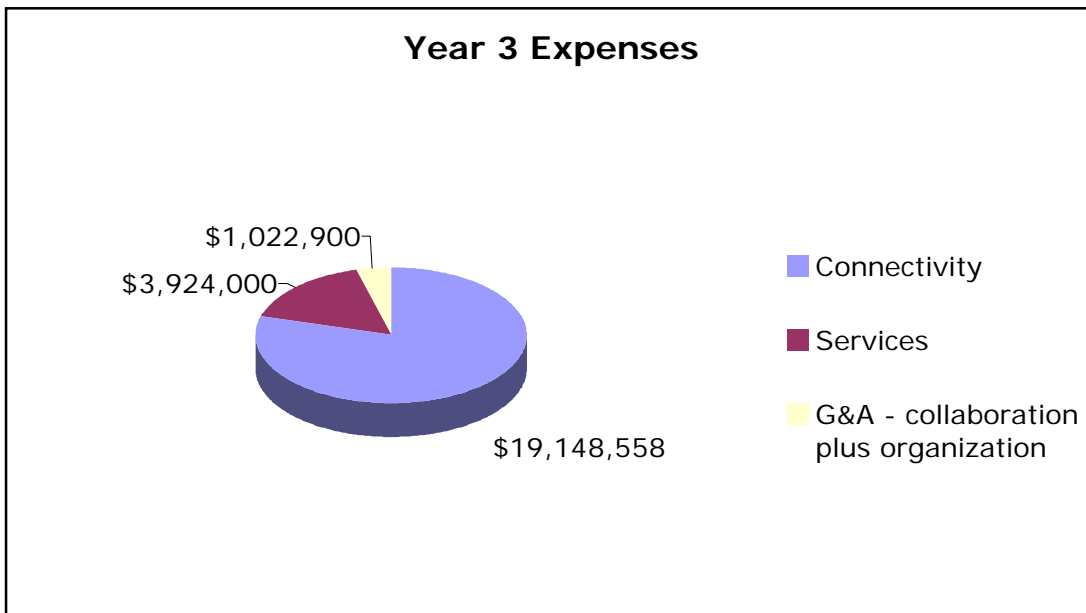


Figure 5 Steady State Cost Distribution

Detailed budget projections are included in the appendices and are also broken out in summary form in each strategy section in the detailed plans that follow this Executive Summary section.

Strategy 1: Connectivity

MCNC operates the North Carolina Research and Education Network (NCREN). NCREN serves as the backbone to higher education in NC. NC ITS operates a network backbone that supports state agencies. In the short term (year 1) MCNC and NC ITS facilities and infrastructure will be extended to serve as the backbone to K-12 and for the NC EdNET. It is therefore the responsibility of MCNC and NC ITS to coordinate relationships with service providers that serve to connect LEAs and schools to the Internet and to the NC EdNET backbone. Specifically, based on a plan approved by the SBE, MCNC and NC ITS shall:

- Proceed and provide the initial seed capital to upgrade the NC EdNET backbone to support added K12 traffic –
- Establish consistent interconnection agreements with “last mile providers” by 6/30/08. These interconnection agreements will include service level metrics and will provide for reliable and deterministic exchange of content between LEA networks, last-mile service provider networks, and the NCREN backbone.
- Develop a Backbone and Internet Gateway charging model for K12 and gain approval from the FCC by 1/1/08. Specifically, MCNC and NC ITS shall provide for an accounting of the measure of K-12 traffic as it relates to the total traffic carried across the NC EdNET backbone and as it relates to the total traffic carried across NC EdNET connections to Tier one Internet providers.
- Develop process and procedures as necessary to support federal E-rate discount programs.

Efforts over the past two years by the NC Rural Economic Development Center and e-NC Authority, in collaboration with others in the North Carolina education community, have contributed significantly to the increase in K-12 schools with broadband connectivity. Despite these efforts however, approximately 15% of the 115 LEAs remain with minimal broadband connectivity. In addition, many schools with broadband connectivity are still challenged to access content reliably and with predictable performance. This is due in large part to the large number of local providers operating in North Carolina and the lack of an effective interconnection strategy for these providers. This plan effectively overcomes these challenges by leveraging an existing, high bandwidth, secure and reliable network and expanding its reach to K12 with no degradation of service to the networks existing institutional clients.

This section of the Plan focuses on migrating underserved LEAs/schools to broadband connectivity and establishing an effective backbone network to facilitate carrier interconnection.

“Core Services”, covered in a later section, addresses the need to support LEAs with the operational services necessary to sustain and effectively leverage the broadband connectivity.

Objectives

The connectivity strategy has the following major objectives:

- Negotiate statewide contracts with local loop providers that reflect the providers underlying economic and technical realities. For example, the provider's tiered bandwidth pricing should reflect the fact that they incur negligible incremental expense when providing fiber-based metro Ethernet service at 100 Mbps versus 10 Mbps. The contracts must address local and backbone access and include comprehensible service level agreements (SLAs).
- Migrate underserved LEAs/schools to fiber-based metro Ethernet service, or an alternative broadband service, where feasible
- Create L2/L3 peering relationships between NCREN (MCNC), NC ITS, and the LEA local loop providers and residential ISPs
- Develop and deploy a sustainable measurement process for meaningful and repeatable performance analysis of school connectivity

Deliverables

Specific year-by-year deliverables for the connectivity plan are contingent on the outcome of the LEA data collection and analysis effort. In addition, local connectivity upgrade schedules must reconcile with the E-rate process. Since the E-rate funding operates a July 1 to June 30 year, the initial phase of local connectivity upgrades will be effective for the 2008-2009 school year though E-rate filings for the 2008-2009 school year must be initiated prior to January 2008.

Year 1

- Complete data gathering and analysis. Conduct remaining site surveys as necessary. The data analysis includes identifying underserved LEAs/schools and their current/potential local providers, and prioritizing local provider interconnection.
- Develop multi-year plan to address local connectivity needs for underserved LEAs/schools.
- Develop multi-year plan to connect local service providers and residential ISPs to the NC EdNET backbone.
- Negotiate statewide contracts with primary local service providers for standardized services, pricing, and service levels for local services and interconnection.
- Work with LEAs to meet E-Rate process requirements for E-Rate support for 2008-2009 school year local connectivity upgrades. (Preliminary analysis indicates

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approximately six LEAs will be candidates for local connectivity upgrades for the 2008-2009 school year.)

- Augment NCREN and NC ITS networks as necessary to connect with primary local service providers and residential ISPs.
- Coordinate backbone interconnection with primary local service providers and residential ISPs
- Migrate eligible LEAs to NC EdNET backbone.
- Develop and deploy a sustainable measurement process for meaningful and repeatable performance analysis of school connectivity
- Create end-to-end network performance baselines.
- Perform capacity planning and NCREN and NC ITS backbone upgrades as necessary.
- Work with the State Board of Education to align with existing LEA based initiatives in the State that could benefit from enhanced connectivity and prioritize these districts (Learn and Earn schools, New Schools Project schools, “Bringing it all Together” initiative; Northeast initiative).

Year 2

- Negotiate statewide contracts with secondary local service providers for standardized services, pricing, and service levels for local services and interconnection.
- Work with LEAs to meet E-rate process requirements for E-Rate support for 2009-2010 school year connectivity upgrades. This includes any additional schools identified through the ongoing performance measurement and analysis process.
- Augment NC EdNET backbone as necessary to connect with secondary local service providers and residential ISPs.
- Coordinate backbone interconnection with secondary local service providers and residential ISPs
- Migrate eligible LEAs to NC EdNET backbone
- Perform capacity planning and NC EdNET backbone upgrades as necessary.

Year 3

- Work with remaining LEAs to meet E-Rate process requirements for E-Rate support for 2010-2011 school year connectivity upgrades. This includes any additional

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schools identified through the ongoing performance measurement and analysis process.

- Perform capacity planning and NC EdNET backbone upgrades as necessary.

Risks

Achieving the connectivity plan objectives will be contingent on mitigating the following risks and challenges:

LEA School connectivity - geographically dispersed sites, multiple carriers, lack of carrier interest, long-term contract commitments

Backbone Connectivity - economically connecting 30+ local access providers geographically dispersed through out North Carolina to the NC EdNET backbone

LEA Motivation/Cooperation – fostering collaboration between LEA personnel and NC EdNET team members to facilitate the connectivity upgrades

Navigate and manage political influences and the many State agencies and organizations involved in K-12 education and/or IT services.

Metrics

Specific metrics will be developed and reported against based on the outcome of the LEA data collection and analysis effort. Possible metrics include, but are not limited to, the following:

- School broadband connectivity - # connected schools
- Backbone connectivity - # local providers connected to the NCREN backbone
- Local provider service and interconnection contracts - # contracts
- End-to-end network performance – # schools included in performance measurement process
- End-to-end network performance – latency/response time and throughput

Budget

The NC EdNET defines network blueprints that specify the characteristics of last-mile provider network connectivity to schools and the characteristics of internal school local area networks. NC EdNET legislative funding supports the recurring costs of the last-mile provider network connectivity.

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Connectivity Strategy Expenses	FY2006-07	FY2007-08	FY2008-09	FY2009-10
Operational Expenses:				
Staff				
Contracted Services				
Network Health Check [AT&T IBM]		\$ (1,000,000)		
Backbone Operations [MCNC]		\$ (1,000,000)	\$ (1,500,000)	\$ (2,000,000)
Supplies and Materials				
Travel				
Current Services				
Existing Connectivity [AT&T et al.]		\$ (16,155,997)	\$ (8,077,999)	
New Connectivity [AT&T et al.]		\$ (16,667,123)	\$ (33,334,246)	\$ (47,837,849)
Total Op Ex			\$ (42,912,245)	\$ (49,837,849)
Capital (and other one-time) Expenses:				
NCREN Backbone Upgrades		\$ (5,300,000)		
Connectivity Pilots [4]	\$ (963,000)			
LEA equipment & wiring		\$ (4,406,073)		
Total Cap Ex		\$ (9,706,073)		
Totals	\$ (963,000)	\$ (44,529,194)	\$ (42,912,245)	\$ (49,837,849)

Strategy 2: Services

Services in the context of this Plan are comprised of Core and Value-Add services. Core services are required for sustained operation of highly reliable, high bandwidth backbone and local access networks. Value-Add services are offered to improve the operational efficiency within and among LEAs. Value-Add services will often leverage regional alliances to offer the consolidated delivery of common services to multiple LEAs

The list of services identified below is the culmination of multiple efforts. They include the LEA Site Surveys and interviews with LEA Tech Directors, conversations and meetings with peer states providing similar backbone service to K-12, and conversations with others having experience supporting highly reliable backbone networks.

Core services will be made available to all LEAs and will be provided on an opt-in basis. NC EdNET will be responsible for managing the development and delivery of the Core services. LEAs will assist in identifying and prioritizing the delivery of Core services. Value-Add services will also be made available to all LEAs and be provided on an opt-in basis. However, working groups comprised primarily of LEA representatives will be responsible for managing the development and delivery of these services. NC EdNET personnel will be responsible for facilitating the working group model and providing technical resources as necessary. These services may be deployed regionally or centrally. The working group concept is discussed further in the Organization and Collaboration Strategies.

Objectives:

Identify, prioritize and deploy the base set of Core Services that are required within the first year of backbone operation or at other significant milestones over the upcoming 3 years.

Create a list of candidates of Value-Add Services that will be offered to the LEA Advisory group for discussion and feedback. Deployment will begin later in year one and will continue as the LEA requirements dictate.

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Explore landscape of approaches to deliver services in most effective and efficient manner possible. Use Advisory group to define both scope of service and desired outcomes.

Create a set of optional Value-Add services that each LEA Tech director can select based on the specific needs of their respective LEA.

Assumptions:

- Backbone provider will be NCREN
- Funding available for developing and supporting Core and Value-Add services
- Active participation in LEA Advisory groups
- Funding available to staff Network and E-rate Service bureaus
- Local Loop providers commitment to support our vision

Core Services

The following are the major categories of Core Services that may be provided by the NC EdNET organization. The actual availability of these services will be determined by the backbone provider and based on the specific needs of their customer base.

E-rate Service Bureau

School Connectivity Initiative support staff members will manage the filings and interactions with the federal E-rate program administered by the School and Libraries Division (SLD) of the Universal Service Access Corporation (USAC). Specifically, NC EdNET staff will support consortium filing at the state level for priority one (telecommunications and Internet access) services; provide training to LEAs for priority 2 (internal connections and maintenance) services; perform E-rate Program Integrity Insurance (PIA) review and assistance. The E-rate service bureau function provides centrally managed support to LEAs that ultimately provides for:

- more effective statewide E-rate filing;
- consistent access to E-rate discounts for all LEAs;
- consolidation of a set of processes now supported by LEAs independently;
- freeing local LEA resources to concentrate on instructional technology;
- eliminating inequities in E-rate access;
- minimizing (or eliminating all together) fees paid to external E-rate consultants.

Network Engineering

The NC EdNET also provides a centrally managed network engineering design and consulting service function. The role of this network engineering service bureau is to provide on-demand network connectivity expertise to LEAs. Specifically, NC EdNET network engineers support LEA network health assessments and troubleshooting to ensure that NC EdNET access is consistently provided down to the user (not simply to the edge of the school).

Operations

- WAN Network Performance monitoring
- WAN Problem Reporting/Troubleshooting
- Training for network appliances, tools and diagnostics
- Management of Vendors, Local Loop Providers and contracts

Collaboration Services

- Coordinate Regional Activities
 - Training
 - Sharing of best practices
- Moderated user groups
- Region specific services

Value-Add Services

The actual services to be provided will be determined with input from the LEA Advisory group beginning later in year 1. The following list is intended to provide a view of the type of services that can and may be offered and is not to be considered complete.

It is understood that a centralized model may be most cost effective to supply these services however it is recognized that certain services may be best delivered locally. In those cases a regional delivery model will be defined and implemented.

- **Network Engineering**
 - LAN Design and support
 - Co-location and Hosting
 - Application Testing
 - Managed Services
 - Firewall
 - Virus/Spam protection
 - Data Backups
 - Content Filtering
 - Storage Area Network (SAN)
 - Email
 - VPN-Telecommuting
- **Operations**
 - Application level Performance monitoring
 - Proactive Network Monitoring
 - Availability
 - LAN Problem Reporting/Troubleshooting
 - Training for new/emerging technologies
 - Network Tuning
 - Fault Isolation
 - Configuration Management
 - Change Management
- **Collaboration**
 - Host and Support

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- Voice, Calendaring, Instant Messaging
- Newsgroups
- Conferencing
- E-Learning Portals

Deliverables

- Comprehensive set of ‘Core’ services to support reliable high bandwidth connectivity provided in year one.
- Set of ‘Advanced’ services offered to improve operational efficiencies (potentially fee based service)
- Realize Operational Efficiencies by leveraging alliances for common services
- Effective Advisory Groups represented by all stakeholders

Risks

- LEA Pushback on services definition
- Skilled resources not available to staff service bureaus

Budget

NC EdNET legislative funding supports the recurring costs associated with supporting services.

Services Strategy Expenses	FY2006-07	FY2007-08	FY2008-09	FY2009-10
Operational Expenses:				
<u>Staff</u>				
E-rate Staff [up to 7 FTE's]	\$ (477,978)		\$ (713,400)	\$ (713,400)
Engineering Staff [up to 7 FTE's]	\$ (619,920)		\$ (885,600)	\$ (885,600)
<u>Contracted Services</u>				
State Technology Plan [Gartner]	\$ (400,000)			
NC EdNet Operations Support	\$ (1,100,000)		\$ (2,200,000)	\$ (2,200,000)
<u>Supplies and Materials</u>				
<u>Travel</u>				
Administrative	\$ (25,000)		\$ (25,000)	\$ (25,000)
Outreach	\$ (100,000)		\$ (100,000)	\$ (100,000)
<u>Current Services</u>				
Total Op Ex		\$ (2,722,898)	\$ (3,924,000)	\$ (3,924,000)
Capital (and other one-time) Expenses:				
Total Cap Ex				
Totals	\$ -	\$ (2,722,898)	\$ (3,924,000)	\$ (3,924,000)

Strategy 3: Collaboration

From the initial Regional Report through this year’s more thorough review of successful education networks, a crucial element of this plan is community engagement, involvement and participation in every aspect of the NC K12 Connectivity Initiative Networked Education vision. Although easily said, this strategy requires significant

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recurring process development and execution in order to gain and retain full community support, and participation without which the K12 network will not fully succeed. “Easy to say, hard to do.”

1. State/LEA/Region partnerships
 - a. Community engagement
 - b. Cooperative operating model
 - c. Distributed support model
2. Customer relationship management
3. LEA advisory and working groups
 - a. Identify LEA priorities
 - b. Develop list of core and advanced services
 - c. Fund distribution to LEAs
 - d. Identify “Regional Resources”
4. Identify and build “Networked Communities” as in the Networked Education concept chart.
 - a. Link communities with application tools and Network Access
 - i. Bridge the technology gap between tools/applications and network services/network infrastructure
 - ii. Identify and prioritize services, tools and applications
5. Coordinate with the services strategy, ranging from core services requiring little recurring support to optional consultative services that might be very regional in nature and highly dependent on community development.
 - a. Realize operational efficiencies by leveraging Regional Alliances for common services
 - b. Effective Advisory Groups represented by all stakeholders

Deliverables

Year 1:

- Continue LEA Focus Group Sessions
- Expand to representative work groups
- Build Advisory process and memberships
- Expand Connectivity website and determine “best home”
- Develop and sustain informed community and engagement

Year 2:

- Support Regional Services strategy through LEA defined requirements
 - Regular working group process
 - Regular regional community forums
- Evolve from Network Access to include discussions of Instructional and Administrative Access through advisory process and broader educational community stakeholder participation

Year 3:

- Build and support Regionalism, as IP Managed Services evolve in the network

Risks

None identified thus far.

Budget

Collaboration budget.

Collaboration Strategy Expenses	FY2006-07	FY2007-08	FY2008-09	FY2009-10
Operational Expenses:				
Staff				
Contracted Services				
Connectivity planning [Friday Institute]	\$ (430,927)			
Supplies and Materials				
Travel				
Outreach		\$ (100,000)	\$ (100,000)	\$ (100,000)
Current Services				
Total Op Ex		\$ (100,000)		
Capital (and other one-time) Expenses:				
Establish NCV	\$ (300,000)			
Total Cap Ex		\$ (300,000)		
Totals	\$ (430,927)	\$ (400,000)	\$ (100,000)	\$ (100,000)

Strategy 4: Organization

In order to build the most effective and efficient operating organization that supports the goals of the project we recommend that the NC EdNET operate under a 501c(3) not for profit umbrella Corporation. The organization and governance of the NC EdNET must:

1. Be sensitive to the NC public sector landscape and relevant NC statutes
2. Maintain acceptable relationships with service providers and customers in compliance with FCC E-rate guidelines
3. Support evolution towards an optimal model during the 3-year deployment period
4. Support LEA "local control"
5. Provide for closed loop accountability

Figure 6 illustrates a year one organizational framework that supports the goals of the School Connectivity Initiative while meeting the practical requirements listed above. MCNC provides a not for profit operating corporation that has provided network services to higher education in the state of North Carolina for over 20 years. MCNC manages relationships with last mile service providers that connect universities and colleges in the state to a common backbone operated as the NC Research and Education Network. MCNC also manages contracts with tier one national level Internet Service Providers in service to all of higher education and all of state government (NC ITS) in North Carolina.

The collective recommendation of the study groups is that MCNC administer the NC EdNET projects and programs based on the implementation and operating principles specified in this document. The State Board of Education serves as contract administrator with MCNC and provides a reporting interface between the NC EdNET and legislative oversight committees. NC Information Technology Services provides project management oversight for statewide contracts where appropriate. The NC EdNET engages the Department of Public Instruction (DPI) and NC State University’s Friday Institute for K12 technology project and program support.

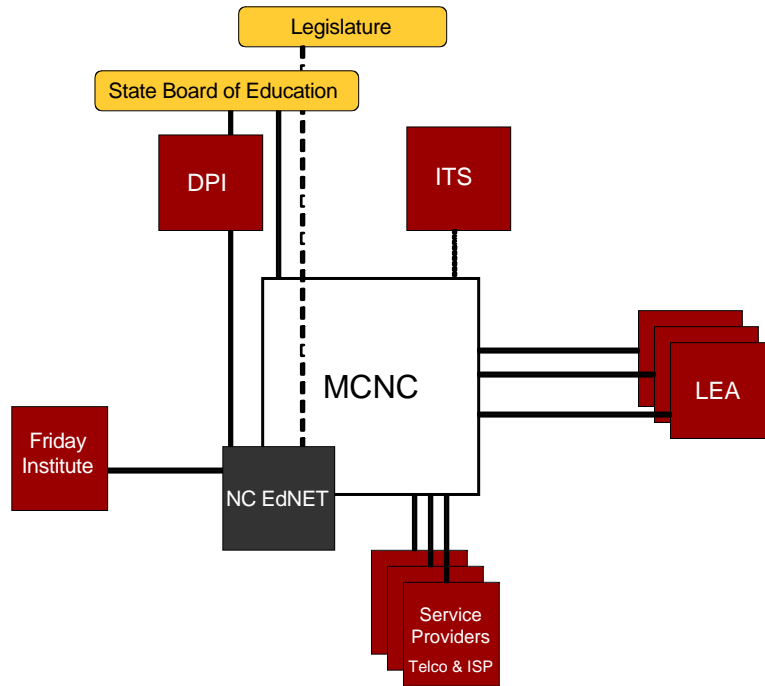


Figure 6 Year One Operating Model

The NC EdNET organization comprises a K12 connectivity project leader with administrative, engineering, E-rate, operations and outreach resources. Resources may include MCNC permanent or contract staff, contract staff from other state organizations (e.g., the Friday Institute), outsource service providers or consultants.

In the short-term (read ‘year one’), it will be important to establish a liaison with relevant programs and commissions – for instance, with the E-Learning Commission, Learn and Earn Online, and 21st Century T&L Programs.

NC EdNET services are community-driven as facilitated through advisory groups. Advisory groups include:

- **Advisory Council** Goal: to engage the education constituencies and stakeholders served by the NC EdNET. Council members include senior staff in stakeholder organizations.
- **Technology Council** Goal: to engage representatives of the constituency at the planning and execution level. Council members include LEA technology directors, DPI technologists, program (e.g., NCVPS) technology decision makers and planners.
- **Application Council** Goal: to collaborate with those defining administrative and instructional applications for the 21st century. Council members include

educators and program representatives from NCVPS, Learn and Earn Online, DPI NCWISE and on-line testing.

Deliverables

The State Board of Education shall identify a Project Leader to coordinate the development of the NC EdNET organization and services. The Project Leader shall:

- Establish contracts between DPI and the NC EdNET
- Establish a contract with MCNC to provide general and administrative services (e.g., purchasing, accounts payable, accounts receivable, human resources) to the NC EdNET organization
- Create an E-rate service center
- Create a network engineering service bureau
- Formalize and develop advisory interfaces (e.g., to BETA)
- Initiate and develop LEA councils and advisory structures
- Establish transitional governance through the Education Cabinet, and recommend a Board of Director structure and membership.
- Establish the mechanism for transitioning responsibility of connectivity funding (WAN payments) from the LEAs to the NC EdNET
- Establish training for LEA technicians
- Establish assessment program

The Project Leader shall coordinate the transitional work required to establish the NC EdNET as a platform for K-12 access. Specifically, the Project Leader shall direct transitional tasks as follows.

- Develop a new and comprehensive state technology plan aligned with the Joint Report, BETA reports, and e-Learning commission reports and SBE goals
- Execute network health assessments for all NC public schools by 6/30/08 against the Network Blueprint – including implementing best practice requirements and network tuning [AT&T and IBM are potential partners here]
- Write RFPs for last mile connectivity and related support services and file as E-rate 470 proposals no later than 12/1/07

Risks

Deliberations of stakeholder delays prompt action.

Budget

Organization budget – includes collaboration and organization costs.

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Organization Strategy Expenses	FY2006-07	FY2007-08	FY2008-09	FY2009-10
Operational Expenses:				
Staff				
Project Leader (Friday Institute)		\$ (221,400)	\$ (221,400)	\$ (221,400)
Administrative Assistant		\$ (61,500)	\$ (64,575)	\$ (61,500)
Contracted Services				
General and Administrative [MCNC]		\$ (400,000)	\$ (600,000)	\$ (600,000)
Supplies and Materials				
Staff computing equipment		\$ (60,800)		
Miscellaneous		\$ (15,000)	\$ (15,000)	\$ (15,000)
Travel				
Administrative		\$ (25,000)	\$ (25,000)	\$ (25,000)
Current Services				
Total Op Ex		\$ (783,700)	\$ (925,975)	\$ (922,900)
Capital (and other one-time) Expenses:				
Total Cap Ex				
Totals	\$ -	\$ (783,700)	\$ (925,975)	\$ (922,900)

Strategy 5: Funding

The strategy to achieve sustainable funding through state, federal, private sector, and receipts-based sources, balanced against the defined NC EdNET connectivity and services will result in a sustainable K12 education network model. Key goals include:

- State funding for K12 connectivity will complement but not supplant LEA technology investments and programs
- Develop and implement partnerships that leverage public and private interests, expertise and resources
- Build a Sustainable model for funding and costs
- Demonstrate fiscal responsibility by balancing funding, costs and functionality, for optimal effectiveness and efficiency
- Leverage existing resources to minimize duplication and utilize resources for optimal productivity
- Coordinate with key Implementation Plan cost components of Connectivity, Services, and Organization Strategies.
- Minimize e-Rate float exposure

As summarized in Figure 2 NC EdNET Connectivity Blueprint on page14, this detailed budget presentation reflects current estimates from prior year work and the 2007 Connectivity Initiative Team study results to date. More current and complete detail will be addressed in the next few months as an interim project is initiated.

In this plan we categorize expenses around operational strategies – specifically, connectivity, services, collaboration, and organization. Further, the last category is the sum of collaboration and organization expenses. Table 4 provides a summary of the total expenses across connectivity, services, and collaboration and organization³.

³ Totals in this cost summary vary slightly from the *Developing Regional Education Networks* report as we have added Golden Leaf funding and re-allocated some expenses due to the non-recurring appropriation under which the School Connectivity Initiative planning project is funded.

Table 4 School Connectivity 3-Year Cost Summary

	Year 1	Year 2	Year 3
Connectivity	44,529,194	42,912,245	49,837,849
Services	2,722,898	3,924,000	3,924,000
Collaboration and organization	1,538,700	1,025,975	1,022,900
Totals	48,835,792	47,862,220	54,784,749

After applying E-rate discount credits and Golden Leaf grant funding (totaling \$24M in years one and two and \$30M in year 3) to connectivity expenses we see a summary representation of expenses to be funded by state appropriation that totals \$24M (rounded) per year as indicated in Table 5.

Table 5 School Connectivity 3-year Cost After Credits

	Year 1	Year 2	Year 3
Connectivity	20,213,874	19,156,493	19,148,558
Services	2,722,898	3,924,000	3,924,000
Collaboration and organization	1,538,700	1,025,975	1,022,900
Totals	24,520,472	24,106,468	24,095,458

Figure 5 shows year-3 distribution of expenses after E-rate and Golden Leaf connectivity credits. That is, the distribution of state appropriated monies across connectivity, services, and collaboration and organization line items. This represents a highly efficient organization with low overhead costs (4%). Note that year one collaboration and organization costs are somewhat higher (\$1,538,700 versus \$1,022,900) as there are start-up costs – though in year 1 the total contribution of these administrative costs is still only 7% (of \$24M).

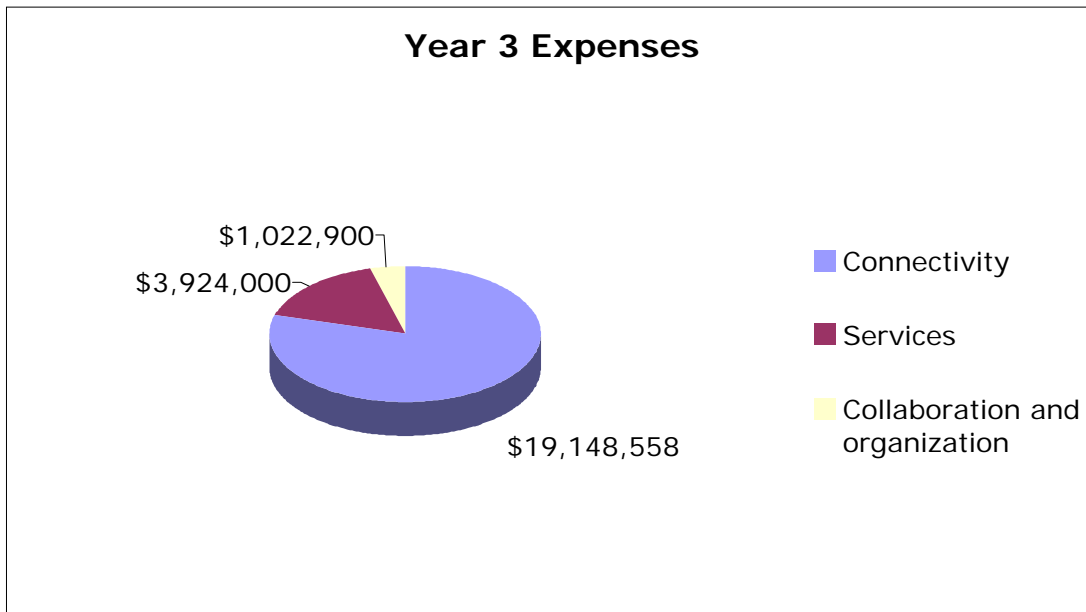


Figure 7 Steady State Cost Distribution

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Deliverables

Risks

E-rate changes or goes away.
 State funding changes or goes away.

Budget

The draft budget presented here reflects the full plan as specified in this document.

K-12 School Connectivity Pro Forma, Fully Funded 3-Year View
 (all numbers rounded to the nearest thousand)

	FY2006-07	FY2007-08	FY2008-09	FY2009-10
Funding:				
e-Rate Reimbursements		\$ 19,309,246	\$ 23,355,752	\$ 30,289,291
GoldenLeaf Grant		\$ 400,000	\$ 400,000	\$ 400,000
School Connectivity Carryover		\$ 4,606,073		
Cisco Fellow Grant	\$ 200,000	\$ 200,000		
MCNC Backbone upgrade in-kind				
Non-recurring Appropriation	\$ 6,000,000			
Recurring Appropriation		\$ 24,000,000	\$ 24,000,000	\$ 24,000,000
Total Funding		\$ 48,515,319	\$ 47,755,752	\$ 54,689,291
Operational Expenses:				
<u>Staff</u>				
Project Leader (Friday Institute)		\$ (221,400)	\$ (221,400)	\$ (221,400)
Administrative Assistant		\$ (61,500)	\$ (64,575)	\$ (61,500)
E-rate Staff [up to 7 FTE's]		\$ (477,978)	\$ (713,400)	\$ (713,400)
Engineering Staff [up to 7 FTE's]		\$ (619,920)	\$ (885,600)	\$ (885,600)
<u>Contracted Services</u>				
Connectivity planning [Friday Institute]	\$ (430,927)			
Project Management	\$ (200,000)	\$ (200,000)		
General and Administrative [MCNC]		\$ (400,000)	\$ (600,000)	\$ (600,000)
State Technology Plan [Gartner]		\$ (400,000)		
Network Health Check [AT&T IBM]		\$ (1,000,000)		
NC EdNet Operations Support		\$ (1,100,000)	\$ (2,200,000)	\$ (2,200,000)
Backbone Operations [MCNC]		\$ (1,000,000)	\$ (1,500,000)	\$ (2,000,000)
<u>Supplies and Materials</u>				
Staff computing equipment		\$ (60,800)		
Miscellaneous		\$ (15,000)	\$ (15,000)	\$ (15,000)
<u>Travel</u>				
Administrative		\$ (25,000)	\$ (25,000)	\$ (25,000)
Outreach		\$ (100,000)	\$ (100,000)	\$ (100,000)
<u>Current Services</u>				
Existing Connectivity [AT&T et al.]		\$ (16,155,997)	\$ (8,077,999)	
New Connectivity [AT&T et al.]		\$ (16,667,123)	\$ (33,334,246)	\$ (47,837,849)
Total Op Ex		\$ (38,504,719)	\$ (47,737,220)	\$ (54,659,749)
Capital (and other one-time) Expenses:				
NCREN Backbone Upgrades		\$ (5,300,000)		
Connectivity Pilots [4]	\$ (963,000)			
Establish NCV		\$ (300,000)		
LEA equipment & wiring		\$ (4,406,073)		
Total Cap Ex		\$ (10,006,073)		
Net Income (Loss)	\$ 4,606,073	\$ 4,528	\$ 18,532	\$ 29,542

Appendices

Appendix A – Pilot Project Summaries

Roanoke River Valley Consortium	Warren County, North Hampton County, Weldon City, Halifax County, Bertie County, Hertford County
Project Summary	Network engineering, project management, internal wiring, network routing equipment
Connectivity project lead	John Bass, Centennial Networking Lab, NCSU
Recommended Pilot Support Commitment	\$12,000 for internal wiring and routing equipment
Partners	USDA, ITS, DPI, Embarq, e-NC, Golden Leaf Foundation, Friday Institute, MCNC
Instructional Outputs	The video conferencing solution will be used to support sharing of instructors across LEAs, to access live content (e.g., sourced by the NC School of Science and Math), and for online professional development
Funding Summary	Pilot: \$12,000 [NR] Connectivity: Covered by Golden Leaf through FY2009-2010 to a maximum of \$2M

WinstonNet Consortium	Davidson County, Davie County, Elkin City, Lexington City, Mount Airy City, Stokes County, Surry County, Thomasville City, Yadkin County
Project Summary	Shared computing services, virtual computing, thin client
Connectivity project lead	Phil Emer, Friday Institute, NCSU
Recommended Pilot Support Commitment	Up to \$200,000 for virtual computing cluster demonstration site
Partners	WinstonNet, IBM, NCSU Virtual Computing Lab (VCL), Time Warner Cable, Wake Forest University, Golden Leaf Foundation, Friday Institute, MCNC
Instructional Outputs	Regional sharing of compute, storage, application, software licensing, and human resources – particularly in support of instructional software and tools
Funding Summary	Pilot: \$200,000 [NR]

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	Connectivity: \$97,000 [R]
Wilson County One-to-One	Wilson County
Project Summary	Network engineering, wireless local area network infrastructure, internal wiring
Connectivity project lead	Todd Broucksou, MCNC
Recommended Pilot Support Commitment	\$130,000 for wireless LAN equipment and internal wiring ⁴
Partners	SAS, Cisco, Time Warner Cable, Friday Institute, MCNC
Instructional Outputs	Large scale delivery of online content universally – leveraging a managed 1-to-1 computing paradigm. Also developing distinct “computer images” and curriculum to support emerging Hunt HS “academies” (and project-based learning.
Funding Summary	Pilot: \$130,000 [NR] Connectivity: \$88,000 [R]
WNC EdNET Consortium	Cherokee County, Cherokee Central Tribal, Clay County, Graham County, Jackson County, Macon County, Swain County
Project Summary	Network engineering, wide area network fiber connectivity
Connectivity project lead	Charlie Pittman, e-NC Authority
Recommended Pilot Support Commitment	\$621,000 for fiber IRUs to connect remaining Cherokee County Schools
Partners	Golden Leaf Foundation, e-NC Authority, Cherokee Preservation Foundation, Balsam West FiberNet, Blue Ridge Mountain EMC, Appalachian Regional Commission, MCNC
Instructional Outputs	Regional delivery of high definition rich media content. Tight coupling of K-12, community college, and university (WCU) as regional collaborators and content providers to an education enterprise. Virtual presence as a realistic interactive delivery model.
Funding Summary	Pilot: \$621,000 [NR] Connectivity: TBD [R]

⁴ Cisco may provide an equipment grant that would cover up to \$100K of this amount.

Appendix B. State Education Network Peer Review

“Consumer Report” table (Awaiting Dave Frye’s updated spreadsheet of populated information)

Peers versus similarities to North Carolina Requirements
Scale 1 to 10 (1 is not similar; 10 is almost identical)

State Education Network Peer Review Comments and Recommendations:

State	Connectivity			Customers			Funding			Organization		Demographics		
	BB	Local Loop	Univ	K-12	Lib	CC	State Govt	State funding	Fee Based	Entity	Governance	School districts	No. of schools	No. of students
NC	X	X		X				Yes	TBD	501c(3)	BOD	115	2302	1.4m
MO	BB to LEA CO	NA	X	X	X	X	X	Yes	Yes	Univ Dept	Advisory Board	532	2383	905k
MI	BB to Regional Pops	NA	X	X	X		X	No	Yes	501c(3)	BOD	835	4155	1.7m
UT	X	X	X	Secondary only			X	Yes	No	Univ Entity	Steering Committee	84	950	504k
WI	Provides layer 3 services over Badgernet BB		X	X	X	X		No	Yes	Coop	Advisory Board	461	2309	865k
CA	BB to LEA CO	NA	X	X		X		Yes	Yes	501c(3)	Board + advisory council	1140	9851	6.4m
TN	X	X		X				Yes	Yes	ENA contractor to LEA Consortium	LEA Consortium	136	1726	941k
KS	BB to LEA CO	NA	X	X	X		X	Yes	Yes	State agency	Univ	309	1429	469k

Top level peer recommendation:

“The best end result is an evolutionary process resulting in an effective and efficient steady state K-20 Network.”

Assumption: 50% of the final Network will be unique to North Carolina—influences and circumstances (political, economic and other specifics), while the other 50% can be mapped with other state best practices and models

Key supporting elements contributing to a preferred steady state K20 network:

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1. Collaboration with the broad community—consistent and engaging at every level and phase—results in the optimum network. Practices recommended include:

- Empower and develop evangelists e.g., working groups
- Leverage every opportunity and potential interaction between Higher Ed & K12.
- Engage and involve all State agencies
- Governance (Board of Directors) representation should reflect the customer base and financial model
- Broad based Advisory process is required to represent, reflect constituents.
- Carriers –friendly alliances, state wide and locally are essential to success
- Proactive Customer Relationship Management principles are essential.
“Connecting people/connecting strategies”

2. Organizational solution

- Accelerated start – infrastructure, Services
- Leverage existing organization strengths, particularly those trusted and with solid reputation.
- NCEdNet should be a K-20 educational network, not commercial network
- K12 should be connected to NCREN
- NCEdNet should be a not for profit corporation

4. SLA for K12 system incremental approach

5. Funding

- Consider a funding model with all having – “skin in the game.”
 - Fees should not be usage based (disincentive)
 - Fees for value-add services
 - Define a sustainable model for introducing fees: use advisory process to steady state
 - Not usage based
 - De-emphasize E-rate in defining sustainable model.
 - Ignore recouping backbone expenses thru E-rate
- Frontload capital expenditures early in NC EdNET’s life because state political commitment may wane.
- Matching dollar phenomena: Partner with other sources. Example: Fiber deployment in last mile for “have nots” – leverage Golden Leaf, NC K-12 connectivity, county & carrier money
- Don’t let funding drive the plan

6. Steady state model

- Incremental process; plan accordingly
- Find areas for quick wins early
- Crisp definition & delivery timelines of core versus value services
- Validate “networked education chart” – as network access matures, natural migration is to move toward tools, content, applications (up the stack)

7. Leadership

The Executive Director position is extremely important

- Define qualifications & requirements - balance leadership vs operational skills
- Fill position early and with qualified candidate

Appendix C. State Network e-Rate leadership peer review

Participants:

- Gary Rawson, Mississippi E-Rate Coordinator and SECA Leader
- Tom Bayersdorfer, Tennessee Consortium Coordinator
- Greg Weisiger, Virginia, E-Rate Coordinator
- Dan Farslow, Ohio, E-Rate Coordinator
- Win Himsworth, E-Rate Central, NY contract provider
- George McDonald, E-Rate Central, DC, contract provider

State Peers	State coordinator/staff	State or other consortium	State filing: 470, 471, none	Training and support to LEAs		
Mississippi	Coordinator	State	Yes	Yes		
Tennessee	No	Consortium	Yes	Yes		
Virginia	Coordinator	LEAs	None	Yes		
Ohio	Coordinator & team	State	Yes	Yes		
New York	Contracted Coord.	LEAs	No	Yes		

Recommendations and best practices from guest experts:

1. Leaders have a single, knowledgeable statewide resource. However, there is vulnerability without a backup.
2. Assuming #1, then the more centralized, the higher the quality of filing results.
 - a. Results in higher yield
 - b. Provides better training
 - c. Creates better carrier confidence and leads to willingness to carry the float.
3. Outsourcing is a legitimate option.
 - a. Provides subject matter expertise
 - b. Provides full time focus
 - c. Provides broader knowledge base
4. The group prefers consortiums.
5. The group helped define and refine a procedure to leverage MCNC without compromising e-Rate monies

Appendix D. Findings

LEA site surveys

Data Analysis

Connectivity

E-Rate

Services offerings: Gathered from LEA site surveys, other State Education Networks, Connectivity Team

Set of core and optional services

Services	Core	Value Added
Engineering:	<ul style="list-style-type: none"> • Technical consulting <ul style="list-style-type: none"> ○ WAN Design ○ Guidance and consulting ○ Network security ○ WAN/LAN Health Assessments (i.e. NDT like tools) 	<ul style="list-style-type: none"> • LAN design and Support • Co-location Hosting • Applications Testing • Technical Consulting <ul style="list-style-type: none"> ○ Network service-LAN ○ Application testing ○ Trouble shooting • Managed Application and Web Services <ul style="list-style-type: none"> ○ Firewall ○ Virus protection/spam ○ Content filtering ○ Data Backups ○ Storage Area Networking ○ Email ○ Video conferencing ○ Internet access (optional) ○ VPN-telecommuting
Operations	<ul style="list-style-type: none"> • WAN Network performance monitoring and measuring • WAN Problem Reporting (trouble shooting) • Training-use of: <ul style="list-style-type: none"> ○ Network appliances & tools ○ Diagnostics • Management of: <ul style="list-style-type: none"> ○ Vendors and Local Loop Providers ○ Contracts 	<ul style="list-style-type: none"> • Application level Performance Monitoring • Proactive Performance Monitoring <ul style="list-style-type: none"> ○ Availability • LAN Problem Reporting/Troubleshooting • Training for new/emerging technologies • Network Tuning • Fault Isolation • Configuration Management • Change Management

DRAFT PENDING APPROVAL

E-Rate	<ul style="list-style-type: none"> • Data gathering • Consortium filing at state level for LEAs P1 • Support and training to LEAs for P2 • PIA review and assistance 	<ul style="list-style-type: none"> •
Collaboration	<ul style="list-style-type: none"> • Coordinate Regional activities <ul style="list-style-type: none"> ○ Training ○ Sharing of best practices) • Moderated User Groups • Region Specific Services 	<ul style="list-style-type: none"> • Host and Support <ul style="list-style-type: none"> ○ Voice, Video, Calendaring and Instant Messaging ○ Newsgroups ○ Conferencing Tools ○ E-Learning tools (portals)

K-12 School Connectivity Pro Forma, \$12M Funding 2-Year View

(all numbers rounded to the nearest thousand)

	FY2007-08		FY2008-09	
Funding:				
e-Rate Reimbursements	\$	19,309,246	\$	23,355,752
GoldenLeaf Grant	\$	400,000	\$	400,000
Cisco Fellow Grant	\$	200,000	\$	-
MCNC Backbone upgrade in-kind	\$	5,300,000	\$	-
Recurring Appropriation	\$	12,000,000	\$	12,000,000
Total Funding		\$ 37,209,246		\$ 35,755,752
Operational Expenses:				
<u>Staff</u>		\$ (799,500)		\$ (799,500)
E-rate Staff [up to 4 FTE's]	\$	(356,700)	\$	(356,700)
Engineering Staff [up to 4 FTE's]	\$	(442,800)	\$	(442,800)
<u>Contracted Services</u>		\$ (1,521,400)		\$ (2,721,400)
Project Management [Friday Institute]	\$	(221,400)	\$	(221,400)
Cisco Fellow	\$	(200,000)	\$	-
General and Administrative [MCNC]	\$	(200,000)	\$	(200,000)
Backbone Operations [MCNC/ITS]	\$	(900,000)	\$	(1,500,000)
NC EdNET Operations Support [e.g., AT&T, en@, ITS, MCNC]	\$	-	\$	(800,000)
<u>Supplies and Materials</u>		\$ (34,000)		\$ (15,000)
Staff computing equipment	\$	(24,000)	\$	-
Miscellaneous	\$	(10,000)	\$	(15,000)
<u>Travel</u>		\$ (30,000)		\$ (125,000)
Administrative	\$	(15,000)	\$	(25,000)
Outreach	\$	(15,000)	\$	(100,000)
<u>Current Services**</u>		\$ (29,223,121)		\$ (32,052,160)
Existing Connectivity [AT&T, Embarq, Timewarner Cable via state contracts]	\$	(14,355,997)	\$	-
New Connectivity [AT&T, Embarq, Timewarner Cable via state contracts]	\$	(14,867,123)	\$	(32,052,160)
Total Operating Expenses		\$ (31,608,021)		\$ (35,713,060)
Capital (and other one-time) Expenses:				
NCREN Backbone Upgrades	\$	(5,300,000)	\$	-
Establish NCV	\$	(300,000)	\$	-
Total Capital Expenses		\$ (5,600,000)		\$ -
Net Income (Loss)		\$ 1,226		\$ 42,692

** Note that total LEA connectivity costs are \$33M and \$41M for Years 1 and 2, respectively.

In this budget we cannot pay 100% of LEA connectivity costs (after E-rate) as specified in the \$24M plan - rather we can pay 89% in year one and 77% in year two.

School Connectivity Funds for 2007-08

The following plan is recommended by the School Connectivity Advisory Group to begin implementation of the School Connectivity Initiative as developed by the Phil Emer and the School Connectivity Project team. The full plan is based on an annual allocation of 24 million recurring funds based on a 60% e-rate reimbursement. Since the General Assembly is allocating 12m rather than 24 m, it became necessary to modify the plan to support that level of funding.

YEAR 1 Transition Plan. In order to facilitate the implementation of the School Connectivity Initiative for 07-08, the following steps will take place.

A. Prioritized LEAS. LEAs to be connected will be prioritized by the State Board of Education based on those identified for Low Performing or Manning Schools, Easley Schools, Learn and Earn on line, and NCVPS. (see attached list) The list includes the results of testing by the Connectivity team to determine connectivity and infrastructure readiness. A final list of recommendation has not yet been determined.

B. MCNC/ITS. Leadership from NC Information Technology Services (ITS) and Microelectronics Center for N C (MCNC) will work together to begin connecting LEA's to the North Carolina Research and Education Network (NCREN) which currently provides Network and connectivity to the University of North Carolina's sixteen campuses.

ITS/MCNC will work from their existing points of presence (POPS) using whichever one is the closest to the prioritized LEAs approved by the SBE. The providers (AT&T, Time Warner, Embarq, etc) have already been contacted and have agreed to use state negotiated pricing for either MCNC or ITS POPS.

C. Services. There are three primary services that are needed- Project management, E-rate and Engineering.

- In year one, the Engineering Services will be contracted or provided through the existing team working on the connectivity initiative, ITS or MCNC. The engineers will go into each school and assess its current infrastructure and provide a report of what is needed to successfully connect each school to the statewide network so that they can take advantage of the resources available to them through the network such as Learn and Earn on Line and NCVPS.
- E-rate services for the transition year will also be contracted using existing LEA or state level staff that work successfully with e-rate. Providing these services should free up some of the time that regional instructional

technology staff have provided allowing them to focus on instructional technology as well as provide support directly to the schools since the engineers will have to work directly inside the schools assessing and upgrading infrastructures.

- Project management is also needed and should be provided using the existing arrangement with the Friday Institute until a permanent organizational structure can be established.

Due to the urgency to get schools upgraded and connected and the time needed to establish positions, contracting for services is recommended so work can continue while positions are being created. By the end of year one, an operational structure will be in place to sustain the continued implementation of the school connectivity initiative.

Budget

1. Funding. The funding section of the attached budget includes the estimated federal e-rate reimbursement which will be coming back into the state to offset costs for the school connectivity. It includes current GoldenLeaf Grants in the western and northeastern part of the state to support connectivity, the Cisco Fellow Grant of two on loan engineers who have worked with the school connectivity pilot, MCNC's in kind upgrade to the backbone so that it can accommodate the addition of the schools, and the 12 million recurring appropriation of which the majority goes to provide connectivity charges for the schools.

2. Operational Expenses. This section includes staffing needs reduced to reflect the 12 million appropriations. The Project management includes compensation for a project manager, administrative assistant and program manager. Also included is the Cisco Fellow and general costs for MCNC administration and in kind from MCNC and ITS for the backbone operations. Supplies and materials are self explanatory and travel will cover travel expenses to and from the schools being assessed and connected. The current services reflect the cost for each LEA's existing connectivity charges and the New Connectivity covers the charges for connecting approximately 793 schools to the statewide network. The new connection will afford all schools equal access and the necessary bandwidth for them to take advantage of the resources such as NCVPS, Learn and Earn on line, multi media and resources available via the statewide network. By having the state pay for the existing connectivity for all districts LEAs will have resources to begin upgrading their internal infrastructures based on the assessments completed by the engineers during year one so that they are ready to connect to the network in year 2.

3. Capital and other one time Expenses: Upgrade to the backbone is a necessary one time expense that MCNC has chosen to provide of out of its existing resources. The establishment of the NCVirtual at the Education Cabinet level is to help facilitate the coordination of all of e-learning across all of education, ensure optimal use of state investments and establish one stop portal that will direct all citizens to learning opportunities in NC.

July 20, 2007

LEA	Students	Low Per	L&E HS	LEO	1:1			
EDGECOMBE COUNTY	7,301	B	X	X	X	Priority 1A: Low Performing Schools With High Connectivity Requirements		
WAKE COUNTY	127,280	B	X	X	X			
NASH-ROCKY MOUNT	17,757	C	X	X	X			
WILSON COUNTY	12,230	C		X	X		<i>Students:</i>	171,726 12.42%
HOKE COUNTY	7,158	B	X		X			
GREENE COUNTY	3,238		X	X	X	Priority 1B: Schools With High Connectivity Requirements		
MACON COUNTY	4,183		X	X	X			
MOORESVILLE CITY	5,236		X	X	X		<i>Students:</i>	22,530 1.63%
RUTHERFORD COUNTY	9,873		X	X	X			
CUMBERLAND COUNTY	52,087	A	X	X		Priority 2A: Low Performing Schools With Multiple Connectivity Requirements		
DURHAM COUNTY	31,264	A	X	X				
FORSYTH COUNTY	49,987	A	X	X				
GUILFORD COUNTY	69,512	A	X	X			<i>Students:</i>	389,279 28.15%
MECKLENBURG COUNTY	127,382	A	X	X				
COLUMBUS COUNTY	6,863	B	X	X				
BRUNSWICK COUNTY	11,464	C	X	X				
LEE COUNTY	9,191	C	X	X				
ROBESON COUNTY	23,517	C	X	X				
SAMPSON COUNTY	8,012	C	X	X				
BERTIE COUNTY	3,071	A		X			Priority 2B: Low Performing Schools With Additional Connectivity Requirements	
HERTFORD COUNTY	3,341	A		X				
NORTHAMPTON COUNTY	2,880	A		X				
WAYNE COUNTY	19,122	A		X		<i>Students:</i>		190,355 13.77%
DUPLIN COUNTY	8,736	B		X				
GASTON COUNTY	31,861	B		X				
HARNETT COUNTY	17,735	B		X				
JOHNSTON COUNTY	28,908	B		X				
ROCKINGHAM COUNTY	14,086	B		X				
BLADEN COUNTY	5,332	C		X				
CASWELL COUNTY	3,201	C		X				
FRANKLIN COUNTY	8,146	C		X				
JACKSON COUNTY	3,614	C		X				
JONES COUNTY	1,274	C		X				
MONTGOMERY COUNTY	4,393	C		X				
PERQUIMANS COUNTY	1,715	C		X				
RICHMOND COUNTY	7,917	C		X				
HALIFAX COUNTY	4,708	A	X					
DAVIDSON COUNTY	20,315	B	X					
WASHINGTON COUNTY	2,072	A				Priority 3: Low Performing Schools With Some Connectivity Requirements		
ALAMANCE-BURLINGTON	22,079	B						
PASQUOTANK COUNTY	6,049	B						
BEAUFORT COUNTY	6,998	C					<i>Students:</i>	81,617 5.90%
LENOIR COUNTY	9,584	C						

MARTIN COUNTY	4,113	C		
ROWAN-SALISBURY	20,503	C		
VANCE COUNTY	7,663	C		
WHITEVILLE CITY	2,556	C		
ANSON COUNTY	4,037		X	X
ASHEVILLE CITY	3,691		X	X
CALDWELL COUNTY	12,927		X	X
CATAWBA COUNTY	17,205		X	X
GRANVILLE COUNTY	8,649		X	X
IREDELL-STATESVILLE	20,687		X	X
NEW HANOVER COUNTY	23,606		X	X
RANDOLPH COUNTY	18,602		X	X
ROANOKE RAPIDS CITY	2,901		X	X
SCOTLAND COUNTY	6,655		X	X
STANLY COUNTY	9,526		X	X
SURRY COUNTY	8,550		X	X
SWAIN COUNTY	1,797		X	X
UNION COUNTY	34,312		X	X
ASHE COUNTY	3,219			X
ASHEBORO CITY	4,348			X
AVERY COUNTY	2,260			X
CHATHAM COUNTY	7,542			X
CLAY COUNTY	1,336			X
CURRITUCK COUNTY	4,019			X
DAVIE COUNTY	6,511			X
EDENTON/CHOWAN	2,465			X
GRAHAM COUNTY	1,186			X
HENDERSON COUNTY	12,650			X
LINCOLN COUNTY	11,993			X
MITCHELL COUNTY	2,173			X
PAMLICO COUNTY	1,489			X
PERSON COUNTY	5,600			X
POLK COUNTY	2,381			X
THOMASVILLE CITY	2,531			X
TRANSYLVANIA COUNTY	3,705			X
WATAUGA COUNTY	4,484			X
YADKIN COUNTY	6,088			X
BUNCOMBE COUNTY	25,255		X	
CAMDEN COUNTY	1,857		X	
CARTERET COUNTY	7,987		X	
CHEROKEE COUNTY	3,576		X	
CRAVEN COUNTY	14,416		X	
DARE COUNTY	4,808		X	
HAYWOOD COUNTY	7,707		X	

Priority 4A: Schools With Multiple Connectivity Requirements

Students: 173,145 12.52%

Priority 4B: Schools With Some Connectivity Requirements

Students: 168,711 12.20%

MCDOWELL COUNTY	6,588	X
NEWTON-CONOVER	2,867	X
PENDER COUNTY	7,670	X
ALEXANDER COUNTY	5,613	
ALLEGHANY COUNTY	1,554	
BURKE COUNTY	13,949	
CABARRUS COUNTY	25,606	
CHAPEL HILL-CARRBORO	11,067	
CLEVELAND COUNTY	16,622	
CLINTON CITY	3,125	
ELKIN CITY	1,212	
GATES COUNTY	2,008	
HICKORY CITY	4,440	
HYDE COUNTY	632	
KANNAPOLIS CITY	4,727	
LEXINGTON CITY	3,054	
MADISON COUNTY	2,580	
MOORE COUNTY	12,104	
MOUNT AIRY CITY	1,680	
ONslow COUNTY	22,621	
ORANGE COUNTY	6,742	
PITT COUNTY	22,057	
STOKES COUNTY	7,177	
TYRRELL COUNTY	593	
WARREN COUNTY	2,767	
WELDON CITY	1,004	
WILKES COUNTY	9,893	
YANCEY COUNTY	2,515	

1,382,705

Priority 5: Schools Not Participating In Statewide Initiatives With Connectivity Requirements

Students: 185,342 13.40%

Priority 1 Students:	194,256	14.05%
Priority 2 Students:	579,634	41.92%
Priority 3 Students:	81,617	5.90%
Priority 4 Students:	341,856	24.72%
Priority 5 Students:	185,342	13.40%

Performance Codes:

- A** LEA With A School >55% (Manning)
- B** LEA With A School >60%
- C** LEA With A Turn Around High School

Other Acronyms:

- L&E HS** LEA With An Learn & Earn Early College High School
- LEO** LEA Participating in Learn and Earn Online
- 1:1** LEA With A 1 to 1 Laptop Initiative