ENA's Summary of Track Record

ENA has the qualifications and experience to deliver the services to implement the infrastructure described in this application. We have a strong history of providing superior, scalable and cost-effective statewide and district-wide network solutions to state and local agencies as outlined below:

- **Tennessee Statewide K-12 Network** - In 1996, ENA created one of the first statewide K-12 networks in the country connecting all schools and school districts in the State of Tennessee—making Tennessee a model for the nation. Since 1996, the ENA network in Tennessee has continued to grow and now serves 112 school districts in the State. Managed Internet services are extended to the individual school sites in addition to providing service at the district level.

- **Massachusetts Statewide Services** - In 2000, ENA began providing the Massachusetts Community Network, a public agency of the Commonwealth of Massachusetts, with caching, filtering, Web hosting, Web-based e-mail, virus scanning and Help Desk services for 220 public entities including schools, libraries, and local and state government offices statewide. After providing these ancillary services, the State asked ENA to take over the project as a prime contractor during the time they were transitioning the project. ENA was able to immediately and effectively assume the prime contractor responsibilities and transition the project seamlessly. This project involved ancillary services that demonstrate ENA's ability to seamlessly transition these services.

- **Indiana Statewide K-12 Network** - In 2005, ENA was selected as the Managed Internet Service Provider for the K-12 school corporations (districts) across the State of Indiana. This contract required a transition of approximately 580 existing circuits (ranging from single and multiple T1s to 45 MB DS3s per location) at over 300 school district sites across the State of Indiana prior to the start of the 2005-2006 school year. The network transition was completed successfully in a three-month period with the school corporations experiencing virtually no downtime. Similar to our experience in other geographies, we now have a dedicated account team working with each of the school corporations to understand and plan for their higher bandwidth needs. We are also working with local fiber providers to secure and deploy cost-effective alternatives to upgrade the network over time and in support of Indiana's statewide educational technology initiatives such as 1:1 computing and statewide online assessments.

- **Indiana Statewide Library Network** - In 2006, due to the success of its work with the Indiana Department of Education, ENA was awarded another statewide contract by the Indiana State Library to provide Managed Internet Services to over 150 public libraries across the State of Indiana. This contract required a transition of approximately 200 existing circuits at 170 sites. The network transition for the libraries was also completed successfully in a three-month period with the local libraries experiencing no down-time. ENA also worked with the State Library to implement a statewide content filtering solution to enable many of the libraries to comply with CIPA regulations and thus take advantage of E-Rate funding that was previously not available to them.

- **Florida - Orange County Public Schools Large District Wide Area Network** - In 2007, ENA secured the Managed Broadband Internet Access (MBIA) contract with Orange County Public Schools, the eleventh-largest district in the nation. The contract called for a completely overhauled network serving over 215 sites and delivering a minimum of 10 Mbps to 1 Gbps connectivity throughout their schools and a significantly increased pipeline to the Internet (800 Mbps scalable to 10 Gbps). The project was successfully completed on schedule (within four months) and delivered a nearly six-fold increase in district-wide bandwidth. The district also documented **saving more than $5.1 million over the five-year term of the contract**.

- **Tennessee Large District Wide Area Network and Telephony Services** - In 2008, ENA was awarded two Memphis City Schools (MCS) contracts. MCS has more than 119,000 students, and employs more than 16,500 people and is the second-largest employer in the city of Memphis. The two contracts are outlined below:

    - High-Speed Wide Area Network (WAN) Services – MCS sought an experienced service provider for the implementation and project management of a managed high-speed IP Wide Area Network infrastructure to support Internet access and a Centralized Data Center for their 200 campuses throughout the district. Their goals for the Managed High-Speed WAN Service were: reliability, flexibility, scalability, increased service capacity, partnerships with other service agencies and reduced lease charges for telecommunications infrastructure. ENA is in the beginning stages of implementing this contract.

    - Telephony Services – MCS sought a qualified service provider for the implementation of a new telephone system that would be consistent with the most current design practices and be highly reliable and scalable. The telephony service requires the support of 18,000 phones, half of which are used in the classrooms and half used administratively. The district required the new system to support the current technologies and applications as well as new applications planned for the future. ENA is in the beginning stages of implementing this contract. The services of this contract demonstrate the comprehensive nature of the additional communication services ENA can provide.

In addition to its statewide and district-wide efforts listed above, ENA has secured and managed various connectivity and communication service contracts in Idaho and Texas and are in the midst of a statewide high-speed broadband network deployment in Idaho.

ENA's Senior Management Team Resumes:

David M. Pierce **Chairman of the Board, CEO and President** ENA's Chief Executive Officer (CEO) is responsible for setting the strategic objectives for the company and managing the day-to-day operations.		
Education & Certifications	**M.B.A.,** *Finance***,** University of Missouri **B.S.B.A.,** *Business Administration***,** University of Missouri	
Employment	**Chairman of the Board, CEO and President**, *ENA*, Nashville, TN	2002-Present
	Senior Vice President, **Global Markets**, *Vastera, Inc.*, Dulles, VA	2000-2002
	Vice President, Software Sales and Marketing, **Software & e-Business**, *International Business Machines Corporation*	1996-1999
	Various Customer Relationship Management Positions, *International Business Machines Corporation*	1984-1996
	Account Manager, *International Business Machines Corporation*	1979-1984
Experience	Mr. Pierce joined ENA in 2002, assuming day-to-day management of the company. With 24 years of successful management experience, Mr. Pierce was responsible for operations with over $3 billion in revenues as a Vice President at IBM. At Vastera Corporation, a provider of managed services to global Fortune 2000 clients, he was responsible for client acquisition, service and satisfaction as Senior Vice President, Worldwide Field Operations.	

Lenny Simpson
Senior Vice President

ENA's Senior Vice President of Implementation is responsible for overseeing the implementation of new contracts and services, including deployment and ongoing management of all technology and services throughout ENA. The Senior Vice President focuses on enabling customers to maximize the value of their relationship with ENA through superior service and strong customer and supplier relationships.

Education & Certifications	**Executive M.B.A.**, Washington University *Engineering and General Studies*, University of Michigan, (three years completed towards degree)	
Employment	**Senior Vice President**, *ENA, Inc.*, Nashville, TN	2007-Present
	Vice President, Services Integration, *International Business Machines Corporation*, Detroit, MI	2005-2007
	Director, Service Delivery, *International Business Machines Corporation*, US and Canada	1999-2005
	Manager, Infrastructure and Architecture, *International Business Machines Corporation*, St. Louis, MO	1996-1999
	Various Positions, *International Business Machines Corporation*, St. Louis, MO, Tampa, FL, and New York, NY; held multiple positions in **technical support, technical sales, marketing and project management.**	1973-1996
Experience	Mr. Simpson joined ENA in 2007 as Senior Vice President after a 33 year career at IBM, where he served most recently as Vice President, Services Integration for a large multi-vendor services outsourcing agreement, In that role, he was responsible for oversight of over $1 billion in IT services. His IT management experiences span multiple disciplines from sales and marketing through services and support, and across all industry sectors.	

Bob Collie
Chief Technology Officer, Senior Vice President of Technology

ENA's Chief Technical Officer (CTO) is responsible for setting the company's technical standards. Responsible for both solution development and ongoing management oversight of all technology and services throughout ENA, he works closely with the Director of Network Strategy and the Director of Network Operations to ensure ENA's connectivity and communication solutions are designed for the unique needs of education and libraries.

Education & Certifications	*Economics*, Vanderbilt University, Nashville, TN	
Employment	**Chief Technology Officer**, Senior Vice President of Technology, *ENA*, Inc., Nashville, TN	2000-Present
	Integration Project Manager, *PSINet Corp.*, Nashville, TN	1999-2000
	Chief Technology Officer/Partner, *Telalink Corporation*, Nashville, TN	1995-1999
Experience	Mr. Collie joined the ENA team in March 2000. He has significant experience both integrating new technologies and solutions into existing networks, making them faster and more reliable, and with aggressive technology deployments. Prior to joining ENA, he served as Chief Technical Officer for Telalink Corporation, a regional Internet service provider, and then as Integration Project Manager for PSINet.	

Rex Miller
Chief Financial Officer

ENA's Chief Financial Officer (CFO) is responsible for overseeing the company's financial management, including assisting customers with the E-Rate funding program.

Education & Certifications	**B.S.**, *Accounting*, University of Pennsylvania, Wharton School	
Employment	**Chief Financial Officer**, *ENA, Inc.,* Nashville, TN	1998-Present
	Director of Finance, *Coventry Healthcare*, Nashville, TN	1996-1998
	Controller, *CPS Corporation*, Nashville, TN	1994-1996
	Audit Manager, *Arthur Andersen*, Nashville, TN	1987-1994
Experience	Mr. Miller has been with ENA since August 1998. His 16 years of finance and accounting experience help ensure that ENA has the financial strength to serve its customers well into the future. He also has extensive experience in E-Rate funding. Prior to joining ENA, he served as Director of Finance of Coventry Corporation, a $1 billion managed health care company. Mr. Miller also spent seven years as an audit manager for Arthur Andersen, LLP. Mr. Miller oversees all financial operations, including E-Rate funding efforts.	

Lillian Kellogg
Vice President, Client Services

ENA's Vice President of Client Services is responsible for providing vision and management of ENA's Marketing and Research and Development departments and to facilitate new business development. Responsible to lead and coach the teams in the development and attainment of goals and objectives designed to increase ENA's customer satisfaction, branding, market penetration and positioning. Directs the R&D in creating new products and services, managing the lifecycle of existing products, and researching new technology solutions.

Education	**B.A.**, *History & Secondary Education*, Kean University	
Employment	**Vice President, Client Services**, *ENA, Inc.*, Nashville, TN	2004-Present
	Vice President, Strategic Relations, *Thinkronize*, Cincinnati, OH	2002-2004
	Managing Partner & Founder, *The Peak Group*, Los Altos, CA	1998-2002
	President, *Education Access, a Division of School Specialty Inc.*, Sunnyvale, CA	1998
	Executive Vice President, *Education Access, a Division of School Specialty Inc.*, Sunnyvale, CA	1997-1998
	President, *Computer Plus*, Sunnyvale, CA	1984-1997
	Vice President, *Computer Plus*, Sunnyvale, CA	1982-1984
	Vice President, *United Components Inc.*, Sunnyvale, CA	1978-1982
	Sales Representative, *Texas Instruments*, San Francisco, CA	1974-1978

Experience	Ms. Kellogg has dedicated her career to education and technology and has more than 20 years of experience in working with school districts and libraries in the field of educational technology. Before joining ENA, she served as Vice President of Strategic Relations for netTrekker, the trusted search engine for schools. Prior to netTrekker, she founded The Peak Group, an industry-leading consultancy that published industry analysis reports on emerging technologies in education such as virtual schools and wireless technologies. She started her career as a high school teacher and has held national positions with education and library market leaders such as Encyclopedia Britannica.

Merle Gruesser **Director of Customer Services** Job Description: ENA's State Director of Customer Services Director is responsible for statewide strategic planning, business relationship and overall growth and retention of customers for ENA in Indiana.		
Education & Certifications	**B.A.**, Liberal Arts, Michigan State University	
Employment	**Director of Customer Services Director**, *ENA, Inc.*, Indianapolis, IN (or HQ TN)	2005-Present
	Sun Microsystems, Inc. – Midwest, Milwaukee, WI	1999-2005
	Sales Manager, Small and Medium, *Lotus Development Corporation*, Chicago, IL	1999-1996
	Major Account Sales, *Entex Corporation*, Chicago, IL	1995-1996
	Vice President Sales, *Sayers Computer Source*, Chicago, IL	1993-1995
	Public Sector and K-12 Education Sales, *IBM Corporation*, Indianapolis, IN	1989-1993
	Regional Manager, *General Micro, Inc.*, Fort Wayne, IN	1981-1989
Experience	Mrs. Gruesser joined ENA's Management Team in 2005. She has years of sales and sales management experience in the technology industry; both in the public and sector. This includes managing a number of new business ventures and expansion of existing business and business relationships.	

ENA's Project Management and Member Team Resumes:

I. Technology

Michael McKerley **Senior Director of Technology and Innovation** ENA's Senior Director of Technology and Innovation is responsible for network backbone and voice system architecture and design as well as new product and service development. Identifies new solutions to bring to the marketplace based on customer and market research, coordinates the development of these new offerings, defines strategy for packaging and delivering both new and existing products. Works to ensure that ENA's core network and that company's overall family of solutions and services are highly scalable, usable and competitive.		
Education & Certifications	**B.A.,** *English*, Vanderbilt University **B.S.,** *Physics*, Vanderbilt University **M.F.A.,** *Creative Writing*, University of Montana	
Employment	**Director of Research and Development,** *ENA, Inc.*, Nashville, TN	2000-Present
	Systems Architect, *ech.com*, Nashville, TN	2000
	Director, Service Management System, *Aspect Communications, Inc.*, Brentwood, TN	2000-2002

	Unix Engineer, *Atlas Copco Computer*, Voorheesville, NY	1998-1999
	Network Consultant, *Tek Systems*, Madison, WI	1997-1998
Experience	Mr. McKerley began working with ENA in July of 2000. Prior to joining ENA, Mr. McKerley served as a consultant for the state of Wisconsin Department of Info-Tech Services, where he worked to provide managed network and technology services to over 25 different state agencies spread across the state. He has also worked as an engineer for Oracle, the software development company, and Atlas Copco, an international manufacturing conglomerate with offices throughout North America, Europe and Asia. He has considerable experience designing and deploying network-based services and products to serve the needs of distinct stakeholders.	

Cory Ayers
Director of Network Strategy

ENA's Director of Network Strategy is responsible for defining architecture design, strategy development, implementation and administration of core network technologies, services and standards. The Director reviews, plans, designs and evaluates network systems including network analysis, engineering, and network hardware configuration.

Education & Certifications	**Microsoft Certified Professional** (MCP), 1998 **Microsoft Certified Professional** (+ I/NT4), 1999 **Microsoft Certified Systems Engineer** (MCSE/NT4), 1999 **Cisco Certified Network Associate** (CCNA), 2000 **Cisco Certified Internetwork Professional** (CCIP), 2003 **Cisco Certified Network Professional** (CCNP), 2004 **Cisco Certified Internetwork Expert** (CCIE#16874), 2006	
Employment	**Director of Network Strategy**, *ENA, Inc.*, Nashville, TN	2008-Present
	Network Architect, *ENA, Inc.*, Nashville, TN	2005-2008
	Senior Network Architect, *ENA, Inc.*, Nashville, TN	2000-2005
	Administration/Technical Consultant, *InfoAdvantage*, Nashville, TN	1999-2000
	Technical Support Consultant, *TEK Systems*, Nashville, TN	1998-1999
	Systems Engineer, *Computer Wizards LLC*, Clarksville, TN	1998-2000
Experience	Cory Ayers has been working at Education Networks of America for nearly 10 years. He has held positions on the Helpdesk, Network Engineering, and now reports to the Technology team to help ENA define new services, keep abreast of emerging technologies, and provide the highest tier support. During his long tenure, he has acquired several certifications through self-motivated study, including Cisco's CCNA, CCIP, CCNP, and CCIE -- which is the highest Cisco accolade. Prior to employment at Education Networks of America, Mr. Ayers worked as a consultant to provide network and hardware support for several companies including Deloitte and Touche, during which time he acquired Microsoft's MCP+I and MCSE certifications. He also served in the United States Army for 8 years, where he worked on electrical and mechanical systems.	

Doug Gluntz
Network Engineer

ENA's Network Engineer supports the technical needs of both internal and external customers to maintain the highest levels of network availability, performance, and growth all with the utmost respect, professionalism and courtesy. Implement, support and maintain existing network architectures. Provide support for customer issues and coordinate third party vendor interaction to ensure prompt and professional resolution.

Education & Certifications	**B.S.,** Ohio State University, Columbus, OH **CCNA - Cisco Certified Network Administrator** **CTM - Certified ToastMaster** **Border Gateway Protocol (BGP) & Quality of Service (QoS)Training**	
Employment	**Network Engineer, CCNA,** *ENA, Inc.*, Indianapolis, IN	2005-Present
	Network Engineer, CCNA, *ENA, Inc.*, Nashville, TN	2001-2005
	Systems Integration Group	1992-2000
Experience	Mr. Gluntz spent the first eight of his 16 years in the technology industry as a Novell/Microsoft Systems Integrator for a consulting company that provided services for fortune 500 companies such as FedEx and Maybelline Cosmetics. During his tenure as a Systems Integrator he became a Master Certified Novell Engineer(MCNE), a Certified Groupwise Administrator, a Certified Citrix Administrator(CCA) and a Certified Cisco Network Administrator(CCNA). The most recent 8 years have been spent with Education Networks of America as a Network Engineer where he remains a CCNA and is pursuing his Cisco Certified Networking Professional (CCNP). Mr. Gluntz's efforts are key to the ongoing metamorphosis of the ENA Network.	

II. Finance

Ward Chaffin
Director of Finance

ENA's Director of Finance manages all corporate accounting, insurance, cash management, taxes and budget functions. Supports CFO in other areas as needed. Ensures compliance with all federal, state, and local income, payroll, sales, property, and franchise and excise taxes; works with outside tax accountants to prepare federal and state returns. Manages the development of the annual budget and coordinates audits.

Education & Certifications	**M.B.A.**, Finance and Operations**,** Owen Graduate School of Management, Vanderbilt University **B.B.A.,** Finance and Accounting, University of Notre Dame **C.P.A.,** Certified Public Accountant, TN (inactive)	
Employment	Director of Finance, ENA, Inc., Nashville, TN	2000-Present
	Corporate Controller, Women's Health Partners, Inc., Nashville, TN	1996-1999
	Audit Staff, Arthur Andersen, Nashville, TN	1992-1994
Experience	Mr. Chaffin joined ENA in 2000 as ENA's Director of Finance. Mr. Chaffin now has over 16 years of experience in accounting and finance which includes the primary responsibilities of cash management, budget development, financial reporting, audit coordination, securing insurance and overseeing tax requirements.	

III. Project Management, Implementation & Deployment

Terry Guilyard
Customer Project Manager

ENA's Customer Project Manager is responsible for successful deployment of ENA service offerings to individual customers with a focus on ENA's voice services. Provides overall project leadership, communication, and reporting. Works closely with Customer, Engineering, Sales, Support and R&D as appropriate to ensure all parties share consistent expectations and are prepared to execute their respective responsibilities in support of the project.

Education & Certifications	**A.S.,** *Electrical Engineering Technology*, Penn State University Various **Nortel PBX** certificates Registered Microsoft Partner	
Employment	**Customer Project** Manager, Implementation and Deployment, *ENA, Inc.*, Nashville, TN	2008-Present
	Owner/Principal, *TGA, Inc. Computer and Communications Consulting*, Franklin, TN	2006-2008
	Director, **Voice Systems & Engineering**, *HCA*, Nashville, TN	1995-2006
	Senior Telecom Engineer & Project Manager, Telecommunications, *Ashland Oil, Inc.*, Lexington, KY	1992-1995
	Staff Manager, Product Evaluation, *GTE TestMark Laboratories*, Lexington, KY	1989-1992
	Staff Engineer, Technical Design Standards, *GTE Corporation*, Lexington, KY	1987-1989
	Senior Engineer, Digital Systems Engineering, *GTE Midwestern Telephone Operations*, Fort Wayne, IN	1985-1987
	Engineer, PBX/Special Services, *General Telephone Company of Pennsylvania*, Erie, PA	1981-1985
Experience	A seasoned professional with 27 years in the Information Technology (IT) and Telecommunications industries, Mr. Guilyard has worked for several Fortune 100 companies in the telecommunications, petroleum, and healthcare industries. His experience includes voice engineering, product evaluation, and telecom management. Terry has worked with numerous voice technologies including IP telephony, interactive voice response, voice messaging, call centers, and wireless voice technologies, to name a few. Prior to joining ENA, Terry was Director of Voice Systems and Engineering at a very large healthcare company where he lead the development of the voice strategy for this very diverse enterprise with over 200,000 employees and over a thousand voice systems.	

Joe Temple
Implementation Project Manager

ENA's Implementation Project Manager is responsible for successful deployment of ENA circuit-based service offerings to individual customers from initial carrier cost inquiry to final installation. Performs scheduling, coordinating, tracking and reporting for all assigned implementation projects. Works closely with customers, suppliers and internal ENA teams to drive consistent, realistic expectations and ensure successful and timely task completion.

Education & Certifications	**M.S.,** *Information and Communication Sciences*, Ball State University, Muncie, IN **B.S.,** *Computer Technology*, Ball State University, Muncie, IN	
Employment	**Implementation Project Manager,** *ENA, Inc.*, Indianapolis, IN	2008-Present
	Telecom Project Manager, *ENA, Inc.*, Indianapolis, IN	Jan-Aug 2008
	Customer Support Engineer, *ENA, Inc.*, Orlando, FL	2007-2008
	Customer Support Engineer, *ENA, Inc.*, Indianapolis, IN	2006-2007

	Customer Support Engineer, *ENA, Inc.*, Nashville, TN,	2006
	Technical Support Consultant, *Ball State University*, Muncie, IN	2002-2005
	Owner/Consultant, *Xtreme PC Services*, Muncie, IN	2003
Experience	Mr. Temple joined ENA's Operations Team in 2006. Mr. Temple holds a Master's Degree in Information and Communication Sciences and has previously held the title of Customer Support Engineer and Telecom Project Manager at ENA. Currently, Mr. Temple is responsible for managing the successful deployment of ENA's circuit-based service offerings to individual customers from initial carrier cost inquiry to final installation.	

IV. Service Delivery and Support Leadership

Paul Brady
Director of Network Engineering

ENA's Director of Network Engineering manages a team of IT professionals in support of ENA's network and network infrastructure. Responsible for the overall performance and availability of the network. Ensures network problems are identified and addressed in a timely manner to customer expectations. Implements policies and procedures regarding how problems are identified, received, documented, distributed, and corrected.

Education & Certifications	*Computer Science***,** David Lipscomb University & Nashville State Technical College (3 years completed towards degree)	
Employment	**Director of Network Engineering,** *ENA, Inc.*, Nashville, TN	2008-Present
	Director of Field and Network Operations, *ENA, Inc.*, Nashville, TN	2003-2008
	Director of Field Operations, *ENA, Inc.*, Nashville, TN	2001-2003
	Director of Customer Support, Field Staff – Tier II Support, Field Engineer, *ENA, Inc.*, Nashville, TN	1999-2001
	Agent/Analyst, *21st Judicial Drug Task Force*, Franklin, TN	1996-1997
	Deputy Sheriff, *Williamson County Sheriff's Dept.*, Franklin, TN	1994-1996
	Police Officer, *Fairview Police Department*, Fairview, TN	1989-1994
Experience	Mr. Brady began working at ENA in August of 1999 and has significant experience designing, implementing and managing large, geographically disparate networks with aggressive technology deployments. He has a passion for service excellence and utilizes his extensive experience in working with customers, understanding requirements and developing a support team to attain the highest level of customer satisfaction. Mr. Brady is responsible for Engineering design and deployment activities and assists in day-to-day operations within the department. His 10-year career at ENA has involved directing four different departments while improving process and skill levels to enhance ENA's customer satisfaction. He continues to stay on the forefront of technology through self study and training. Mr. Brady currently holds Cisco CCNA and CCNP certifications and is member of the Technology Advisory Board for a university in Florida.	

Dana P. Briggs
Manager, Network Operations Center

The Network Operations Center manager supervises and coordinates the work efforts of the Network Operations Center (NOC) staff and ENA's overall incident resolution process. Actively engages in managing customer incidents throughout the organization through proactive problem identification, prescribed escalation procedures, notification procedures for incidents and problem management to prevent similar events. Focuses on continuous improvement of customer incident management processes and resources to increase customer satisfaction.

Education & Certifications	*Information Systems Management*, Dakota State University **A.S.,** *Business Administration*, National American University	
Employment	**Manager, Network Operations Center,** *ENA, Inc.*, Nashville, TN	2008-Present
	Manager, Technical Support & Customer Service, *PrairieWave Communications*, Sioux Falls, SD	1998-2008
Experience	Mr. Briggs has over 14 years of experience in customer support. His prior experience included a former Fortune 500 PC manufacturer, and just before joining ENA in 2008 he worked for one of the most profitable private telecoms in the country located in the Midwest. Mr. Briggs also served as the Manager of Technical Support and Customer Service with over 90 agents for PrairieWave Communications (now Knology, Inc.) located in South Dakota. Mr. Brigg's career has focused on Technical Support and Network Monitoring for residential, business and education-based customers.	

Travis Wales
Manager of Field Services

ENA's Manager of Field Services provides direction to a team of field engineers and support analysts who maintain and support data communication systems. Identifies issues and appropriate course of action. Works with Network Operations and other infrastructure support personnel to resolve customer service calls within SLA guidelines and department standards.

Education & Certifications	**B.S.,** *Computer Science*, Union University, Jackson, TN Continued Education via ENA, Inc., Improved technical & leadership skills. Completed CCND course through New Horizons	
Employment	**Manager of Field Services**, *ENA, Inc.*, Nashville, TN	2007-Present
	Field Engineer/Support Lead, *ENA, Inc.*, Nashville, TN	2004-2007
	Support Analyst, *ENA, Inc.*, Nashville, TN	2003-2004
	Field Service Engineer, *ENA, Inc.*, Nashville, TN	2002-2003
Experience	Mr. Wales comes to ENA directly from Union University with a B.S. in computer science. He boasts over seven years of experience in various positions as a field service engineer, customer support analyst, support lead field engineer and as manager of field services. Over the years, he has worked on some of ENA's largest projects delivering technical support services including installation, maintenance and repair, and network troubleshooting and analyses for ENA's Internet access and telecommunications service products to more than 5,000 ENA end sites.	

Q-26: Cost per Household

Cost per Household is not applicable to ENA's middle mile BTOP application submission.

Q-16: Census Block Coverage Waiver Request

ENA is not seeking a waiver for providing less than 100% coverage of a census block in this BTOP application.

Education Networks of America

Enhance. Engage. Educate.

How the 11th-Largest School District in the U.S. Ended Their Network Bottleneck and Successfully Implemented Scalable Broadband Connectivity

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Enhance.

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Education Networks of America

Executive Summary

How does a district network meet the ever-increasing instructional and administrative connectivity needs of over 175,000 students and 22,000 employees—and growing? Will the solution be fast, reliable, secure and scalable? Does the provider understand the unique needs of the K-12 education environment? Can the provider successfully and flawlessly execute and manage the transition to a new network?

As part of its 2006 Information Technology Blueprint, Orange County Public Schools (OCPS), the county that includes Orlando, FL, "charted a course to improve and reform the technical capabilities of OCPS and to support all aspects of the school district's vision, mission and goals." The blueprint detailed the major recommendations and highest priorities the district needed to focus on in order to accomplish its strategic objectives. One of the major recommendations was to evaluate the district's communications and network infrastructure with an eye toward ensuring that all users have adequate bandwidth to support new learning opportunities and administrative services, as well as take advantage of cost savings and new communication services such as VoIP and video conferencing. Resulting from this analysis, OCPS decided to significantly upgrade its district-wide network. This initiative, called the Managed Broadband Internet Access (MBIA) project, was one of the first steps that OCPS implemented to provide a foundation to support and enable their district goals.

Customer Profile: Orange County Public Schools, Florida

OCPS is the nation's 11th-largest school district with more than 175,000 students and is also one of the fastest growing. The fourth-largest school district in the state and the second-largest employer in the city of Orlando and Orange County, its students, teachers and employees reflect the rich cultural diversity of the Central Florida community.

In January of 2008, after a vigorous campaign of taking it to 12 town hall meetings and submitting it to both a staff survey and an Internet survey of the public, OCPS unveiled a new strategic plan for its schools. OCPS Superintendent Ronald Blocker likens the new strategic plan to "GPS ... [for] how to reach our final destination." The district's new vision is "to be the top producer of successful students in the nation" and, in the pursuit of that vision, OCPS will rely upon five market differentiators that position it for success:

- We lead in academic achievement and operational innovation, technology and capital improvement
- We offer broad educational & extracurricular opportunities
- We invest in our staff
- We prepare students for a real world environment, and
- We serve a diverse community

The district's major academic indicators have consistently improved over the past several years and the district is undergoing an aggressive building program that will ensure that all district facilities are modernized and can accommodate the region's rapid growth.

Provider Profile: Education Networks of America (ENA)

ENA is an education-focused Managed Network Service Provider (MNSP) and telecommunications company. In 1996, ENA's leadership team designed and deployed one of the first statewide K–12 networks in the U.S. in Tennessee. Since then, ENA has designed, deployed and managed large-scale networks in Florida, Idaho, Indiana and Tennessee, including statewide K–12 networks in Indiana and Tennessee and Indiana's statewide public library system network.

ENA's approach to meeting the needs of K–12 schools always begins with teachers and students. Technical solutions are designed to work for non-technical people who have limited access to technical support and no time to learn new and complicated procedures. Support services are designed with sensitivity to the importance of eliminating anything that could disrupt or reduce valuable time in the classroom.

ENA's turn-key converged network and telecommunications solutions have no hidden costs and are flexible, scalable and reliable. Besides best-of-breed technology solutions cost-effectively delivered and managed, ENA offers its customers a single point of accountability, comprehensive support services and E-Rate expertise for securing and maximizing federal funding. A focus on education and an insistence on exemplary customer service are the hallmarks of ENA.

OCPS at a Glance

- Is the nation's 11th-largest school district
- Is Florida's fourth-largest school district
- Enrolls more than 175,000 students
- Employs more than 22,000 employees
- Has more than 215 schools and administrative locations

The Situation and the Challenge

Preparing students for the increasingly competitive global marketplace of the 21st century is essential: indeed, it has become one of the focal points of American education.

Today, every student—whether he or she plans to go directly into the workforce, to trade school or to a four-year college—requires skills like problem-solving, collaboration, communications and innovation to succeed.

If they are to be effective in accomplishing 21st century learning, today's schools must rely upon robust, high-speed data networks to find and share knowledge, access rich educational resources, create communities of learning and manage student information. Schools are finding that more and more of the content that teachers and students use in their classes are no longer found in static textbooks, but online in dynamic multi-media resources. Moreover, full participation for schools in Internet2, National LambdaRail (NLR) and other valuable emerging research and education networks demands high-speed Internet connectivity capacity.

Networked education holds the power to transform how all students learn and every teacher teaches in a powerful, personalized, equitable, cost-effective way. High-speed access for schools and libraries is truly no longer a luxury, but rather an essential requirement.

By both design and necessity, Orange County Public Schools (OCPS) decided to upgrade to a world-class, high-capacity wide area network. Superintendent Ronald Blocker is vocal about his commitment to innovation. Determined to lead in academic and operational

improvement, to offer broad educational and extracurricular opportunities, and to prepare their diverse students for a real-world environment—all "market differentiators" highlighted in OCPS' latest strategic plan—the district decided to get help upgrading its aging network and initiated the MBIA project.

WHAT THEY HAD. Prior to awarding the MBIA contract to ENA, OCPS had 140 Mbps of Internet access that was, in turn, connected to schools via a legacy frame relay network comprised predominantly of 1.544 Mbps (T1) links with several larger schools receiving 3, 6 or 10 Mbps links. The network was a number of years old and not capable of cost-effectively scaling to the demanding requirements of a 21st century learning environment. The existing OCPS network posed four primary challenges:

1. Insufficient bandwidth and speed for day-to-day classroom use
2. Inadequate capacity to support important current and near-future pedagogical, student-management and professional-development projects
3. The district's current routers and equipment could not support predicted future needs such as VoIP
4. The district needed additional resources and expertise to help them conduct WAN connectivity upgrades at their sites.

As a consequence, OCPS students, teachers and administrators experienced latency, lethargic speeds, dropped pages, stalled applications and frustrating delays.

WHAT THEY WANTED. OCPS wanted a robust, reliable, scalable solution designed to securely support data, voice and video on a single network in the present but also able to meet the demands of the future. In fact, they wanted a gigantic leap in capacity: a much larger pipe to the Internet, Wide Area Ethernet connectivity deployed throughout the district and the ability to scale to 10 gigabits of connectivity and beyond.

> *"Over the past seven years, we have experienced greater than 50% average annual traffic growth on our backbone serving schools and libraries as our network members demand higher-capacity connections."*
>
> **Bob Collie**
> **SVP of Technology/CTO**
> **ENA**

Ideally, OCPS would find a provider with not only the requisite technical expertise, the right network design, and the implementation and management skills and experience, but also the insight and understanding garnered from extensive work in the education sector. Finally, they wanted it all at an affordable price.

With this in mind, the district engaged in a thorough RFP process. In the end, OCPS chose ENA.

The Solution and the Results in Brief

OCPS selected ENA for a three-year base contract, with two 1-year renewal options, to provide a new, state-of-the-art, fully managed high-speed broadband Internet connectivity access to OCPS' schools and administrative facilities. ENA was able to upgrade over 200 sites in four months from the start of project execution because of its expertise in selecting, deploying and managing the complexities of multiple carriers and their unique delivery requirements.

ENA at a Glance

- Currently serves over 450 school districts, 4,500 school and library locations and more than 2.2 million students, teachers and administrators
- Has helped customers receive over $250 million in E-Rate funding since the inception of the program
- Has been recognized by our customers as providing industry-leading reliability
- ENA's Network Operations Center proactively identifies customers' network problems and notifies them before the customer contacts ENA greater than 90 percent of the time
- For six consecutive years of annual surveys, 100% of ENA education customers have said they would recommend ENA's solutions to others

Administrators, teachers and students alike report that the difference in the new network versus the old was instant, transformative and welcome: increased speeds, enhanced traffic flow and fast response times from ENA, all exceeding OCPS' expectations. George Perreault, the district's director of Instructional Technology & Library Media Services, calls the new network proof positive of his district's serious commitment to being a national leader in educational technology and that it's "absolutely a model for other schools across the country."

VALUE DELIVERED

OCPS received more bandwidth to all of their schools at a significantly lower cost without incurring any one-time or ongoing equipment acquisition and maintenance costs or allocating extensive and valuable personnel resources for an extended period of time. **The Total Cost of Ownership Analysis section of this report details more fully the district's total cost savings of $5.1 million over the five-year contract life as compared to their pre-existing network.**

A LESSON ABOUT BIG BROADBAND

What Perreault and OCPS know, and what school districts around the country are discovering, is what many national education advocacy groups—such as The Partnership for 21st Century Skills (P21), ISTE (International Society for Technology in Education), CoSN (Consortium for School Networking), SETDA (State Educational Technology Directors Association), EDUCAUSE and many others—have become increasingly vocal about in recent years: Big broadband has become indispensable to today's educational endeavor. And when districts pair big broadband with the services of a managed network service provider such as ENA, educators and students are able to tap into incredibly powerful, horizon-pushing possibilities for 21st century teaching and learning.

In Summary ...

A POWERFULLY TRANSFORMED NETWORK

Installation began on July 1, 2007, and upon going live on October 21, 2007, the bottlenecks instantly vanished and the district began enjoying the benefits of a powerful, upgraded network capable of supporting all the academic and administrative objectives of the district:

- **MBIA was successfully completed on schedule and has increased district-wide bandwidth nearly sixfold from 140 to 800 Mbps through multiple, diverse links**
- **The pipeline to the Internet is over 2 Gbps with the ability to scale to 10 Gbps and beyond**
- **The solution replaced all end site routers with upgraded equipment capable of supporting VoIP, provided much-needed resiliency and is now delivering significantly increased connectivity with fiber-based links of 10 Mbps to every elementary school (126 sites), 100 Mbps to every middle school (47 sites), 1 Gbps to every high school (16 sites) and 5 Gbps between their two service aggregation locations—all for a lower cost per year**
- **The district is saving $5.1 million over the five-year life of contract**
- **Network uptime has improved to 99.901 percent**
- **Service requests have been reduced 54 percent**
- **The district is moving forward on strategic projects such as a implementing a new Learning Management System combining a student-data portal for teachers and parents, professional-development system and a library of digital assets; transitioning from print to digital instructional resources; and installing security and surveillance systems**
- **The district has achieved IP convergence, and among other things can begin utilizing video conferencing and deploying VoIP telephony**
- **True on-demand access to video and other media is now a reality in the classroom**
- **OCPS is the first district in Florida to have access to the Florida LambdaRail, Internet2 and National LambdaRail, as well as extensive peering and in-network content hosting**

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OCPS Service Requirements and the ENA Solution

OCPS Service Requirements

In December of 2006, OCPS released a Request for Proposal (RFP) that outlined the high-speed broadband connectivity goals the district envisioned as well as the scope of services the district required.

The district wanted a managed high-speed IP wide area network infrastructure to connect every campus to the Internet with a minimum of 10 Mbps to elementary schools and 100 Mbps to 1 Gbps of throughput capacity to the balance of their sites. The Internet access connections would have to be completely diverse in its paths, both physically and logically, to ensure high availability. The provider would deliver a turn-key network—including circuits, equipment, installation, configuration, testing, startup, service and maintenance of it—"at an all-inclusive, competitive price."

To plan the work was just the beginning; the provider also had to work the plan, just as the old business adage prescribes. OCPS had to be convinced not only of the provider's design, but the provider's ability to successfully and satisfactorily implement and manage it. The task of building a network for one of America's largest school systems demanded capability, experience and expertise. But there were other critical concerns that necessitated deft handling—what the RFP termed "creativity, flexibility, adaptability." Those included the following realities on the ground:

- **OCPS NEVER RESTS, SO NEITHER COULD THE NETWORK.** Of paramount importance, the provider would have to plan and implement a network upgrade and expansion that minimized disruption of services to the district's students, teachers and staff. OCPS would need detailed project plans, a system for approval and signoff, and detailed documentation.
- **OCPS IS TECHNOLOGICALLY COMPLEX AND INNOVATIVE,** so the network would have to be flexible and robust enough for current usage, works-in-progress and future applications. It would be incumbent upon the provider to work closely with staff throughout the district to understand current demands on the infrastructure—which would entail review of all necessary documentation such as the OCPS strategic plan, technology plan, facilities maps, network diagrams, network usage and monitoring reports, and a comprehensive and complete walk-through of the data center, end site demarcation locations, wiring closets, etc. Moreover, the provider would have to grasp each department's perspective on the horizon of Internet data, video and voice networking at OCPS.
- **OCPS IS GROWING,** and that means geographical expansion in addition to population increases. Fair and equitable access to the Internet would have to assured for every possible school and every possible student, no matter the location.
- **OCPS IS DEPENDENT UPON E-RATE PRIORITY 1 FUNDING,** so the network would have to be forward-thinking not only in terms of technology, but E-Rate eligibility.

ENA's Solution

As requested by the OCPS RFP, ENA proposed a managed solution providing all the connectivity, equipment, tools and services to deliver a full Priority 1 E-Rate-eligible solution for the breadth and scope of a new high-speed broadband Internet network. The solution is therefore dual in nature, comprised of a technical and a service component.

THE TECHNICAL APPROACH

ENA designed a flexible and scalable managed high-speed Internet network solution that connected every campus and administrative building within OCPS to the Internet. The solution proposed completely diverse Internet access by leveraging the district's previous Internet connectivity at a single site (the OCPS Education Leadership Center) and adding physically and logically diverse connectivity to two different Internet networks. ENA ensured reliable and scalable end site connectivity by aggregating traffic at physically diverse locations throughout Orange County.

ENA worked closely with AT&T (formerly BellSouth), Bright House Networks, Cisco, Coleman Technologies, Embarq, Florida LambdaRail (FLR) and Level 3 as well as other vendors, in providing its solution. The solution leveraged their combined strengths and infrastructure along with ENA's nationwide experience in managing multiple underlying service providers as a single solution and providing Internet access and WAN solutions for K–12 schools.

The telecommunications world is in constant flux and one of ENA's competitive advantages is that it works with various underlying service providers to deliver a comprehensive, cohesive network that can cross LATA lines and provider service territories while utilizing multiple transport technologies and providers (cable, utility, telephone, municipal, cellular/wireless) to achieve district-wide equity. ENA has provided hundreds of school districts throughout the nation a full-service option using best-of-class technologies at a competitive price, capitalizing on its ability to combine a mix of telecommunications vendors and technologies into a single effective solution. After reviewing its multiple options, OCPS was confident that ENA would be a partner who would grow with them and be able to easily scale their solutions to accommodate their growth.

ENA's technical solution can be subdivided into three major parts:

1. Connectivity to the Internet and research and education networks
2. Connectivity from each school to ENA's aggregation platforms
3. Equipment and provider fiber installation into each school

1. CONNECTIVITY TO THE INTERNET AND RESEARCH AND EDUCATION NETWORKS

Prior to the MBIA solution, OCPS had a single aggregation point at its Education Leadership Center (ELC) from which all services were delivered to schools. From that site, there was a single link of approximately 140 Mbps to the Florida Information Resource Network (FIRN) that was also shared with the Florida Virtual School. It was a single-provider, single-path, single-point-of-failure strategy that had maximized its installed capacity.

ENA's solution added a second aggregation point at another OCPS site (the OCPS Facilities Services location at 6501 Magic Way [Magic Way]) that serves as the district's secondary data center. ENA's proposed solution would allow OCPS to leverage their existing FIRN connectivity while complementing that single link with a 1 Gbps connection to the Embarq Internet service at the ELC. At Magic Way, ENA added a 1 Gbps connection to ENA's SuperPOP in Atlanta. Finally, ENA installed a multi-gigabit connection using multiple providers between the ELC and Magic Way. The result of ENA's proposal was three diverse, completely resilient paths with the capability of delivering over 2 Gbps of capacity, substantially increasing OCPS' installed bandwidth and network resiliency.

Additionally, through an agreement with FLR, ENA provides direct access to Florida's higher education institutions, Internet2 and NLR for their network customers in Florida. The primary goal of FLR is to operate a statewide high-performance fiber-optic network infrastructure linking Florida's research institutions in support of large-scale, public or private, research, education and outreach partnerships. As part of the ENA network, OCPS was the first school district in Florida to have access to FLR, Internet2 and NLR.

2. CONNECTIVITY FROM EACH SCHOOL TO ENA'S AGGREGATION PLATFORMS

Orange County is served by two incumbent, non-overlapping phone companies, AT&T (formerly BellSouth) throughout a large portion of the county and Embarq in the northwestern corner. Prior to the MBIA project, in order to link to all their schools, OCPS used AT&T up to the boundary meet point and Embarq thereon. In essence, OCPS was paying for two circuits to deliver service to one school (one to the boundary point with AT&T and then from the boundary point to the school with Embarq), creating yet another potential single point of failure, and was completely reliant upon AT&T's local infrastructure. Furthermore, OCPS wanted Wide Area Ethernet service deployed to all of its schools. The district had begun the work a few years before the MBIA project, but due to available resources, they decided to outsource the project.

ENA's WAN solution was to utilize multiple different carriers to serve the schools in Orange County. That tripled the number of Internet connections available to schools and better contained the risk of a service provider outage. Similar to the configuration provided on the Internet connectivity, ENA also spread service to the end sites across three different underlying providers. If any one carrier sustained major outages, only the schools using that path would be affected. And all end sites were linked to both ELC and Magic Way, giving each multiple paths to OCPS resources and the Internet.

Very importantly, the strategy of using three carriers also allowed ENA to take a "divide and conquer" approach to the Ethernet deployment. By using three carriers and therefore three installation crews (all under ENA's direction), the amount of work being done simultaneously was tripled. As a result, ENA completed the installation (over 200 sites) in four months from the start of project execution.

ENA configured and delivered their solutions so that even though the company managed the OCPS connection both outside and inside the firewall, they were two completely separate domains. Data could not go from one to the other without going through the firewall—neither was dependent upon the other. OCPS could suffer a complete failure at either of the ELC and Magic Way locations and, although overall capacity would be lessened, the connection to each school would not be down. This allowed all servers and equipment carried at ELC to be duplicated at Magic Way, providing the framework on which OCPS could build a resilient server infrastructure to furnish file, print and application support to all schools.

Before the MBIA implementation, most OCPS schools had T1 connections, some had 3 or 6 Mbps and very few had 10 Mbps. The ENA solution delivered 10 Mbps to every elementary school, 100 Mbps to every middle school and 1 Gbps to every high school.

As a result of the successful implementation of the MBIA project, OCPS was able to achieve key performance indicators (KPI) of increased capacity, reliability and resiliency. It is important to emphasize resiliency, not redundancy. Everything in the architecture is in use, designed to choose the best path and bypass any individual link failure, rather than building extra dormant links that would wait in the wings for an emergency.

3. EQUIPMENT AND PROVIDER FIBER INSTALLATION INTO EACH SCHOOL

In order to accommodate the district's current and future needs, specifically their desire to roll out VoIP, ENA upgraded the routers and other equipment in each school.

Before the MBIA implementation, about 30 OCPS schools used the centralized Cisco CallManager solution. The remainder of schools had local PBXs and local phones, therefore the district had limited interoperability such as no consolidated dialing and no common voice mail. ENA installed equipment that laid the foundation for expanding Cisco CallManager out to every school. The equipment included telephony cards and the capability to terminate telephone lines in the event of a WAN failure, thereby providing resiliency.

THE SERVICE APPROACH

ENA's approach to managed service means full service, with ENA becoming the customer's single point of contact and accountability.

It is an approach based on the education-focused Managed Network Service Provider (MNSP) model, and in ENA's experience it is a cost-effective and expeditious way to provide a cohesive, district-wide, education-centric network for meeting the requirements of broadband connectivity, service offerings and enterprise management such as those outlined in the OCPS RFP.

HOW THE EDUCATION-FOCUSED MNSP MODEL WORKS

An education-focused MNSP such as ENA views the network more as a mission-critical utility than a basic infrastructure. ENA's mission statement—to provide technology solutions that make reaching and using valuable information as easy and reliable as turning on the lights—reflects that concept.

Having an education-focused MNSP is similar to hiring a general contractor to build and maintain your house. It is the single entity accountable to you for making your networks and technology work together, but because of volume that entity can also negotiate multi-state special pricing and terms with multiple carriers and vendors. It leverages existing infrastructure and contracts, and capitalizes on the combined strengths of multiple technologies. Throughout design, implementation and management, the education-focused MNSP ensures seamless integration of all technology components including router maintenance and standardization, DNS services, IP address management, network security and comprehensive utilization reporting. This single point of contact eliminates the confusion and finger-pointing typically present when problems arise in any network. Education-focused MNSPs offer critical advantages in creating network infrastructures and are the optimal mechanism for the delivery of advanced education networking services. In most cases, the ability to "do more with less" becomes possible.

ENA provides OCPS complete network monitoring and support services which include:

- A single telephone number and e-mail address for all support issues
- A 24x7x365 Network Operations Center (NOC) with a dedicated staff of trained engineers to proactively monitor the network and track, troubleshoot and resolve network problems via phone or by remotely connecting to the device; the NOC operates with an emphasis on first-call resolution and more than 90 percent of the time notifies the customers on a service-affecting condition prior to their contacting ENA
- A Web-based trouble ticket and event notification system
- A customer support page at the ENA Web site designed to deliver around-the-clock, centralized product information, documentation and support (login-accessible to authorized OCPS personnel)
- A sophisticated network management system developed in-house that aggregates all data about the customers' systems for monitoring, creating policy-based rules for managing traffic, reporting and creating feedback loops for continuous improvement

> ***"With ENA managing the network, they know when something is going wrong. They take care of it right away with their partners and it's something we don't need to worry about."***
>
> **Hermes Mendez**
> **Director of Infrastructure**
> **Orange County Public Schools**

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Planning, Implementation and Project Management

In October of 2007, ENA completed the installation of OCPS' new, district-wide, high-speed Internet connectivity solution, MBIA. The overall project goal was architected by OCPS' Information, Communications and Technology Services division with an objective to transparently and completely upgrade the district's wide area network to provide a minimum of 10 Mbps of connectivity to each school—in order to increase productivity and enhance teaching and learning throughout OCPS schools.

Defining Project Scope and Timelines

OCPS set high expectations for service delivery to their sites. As part of its RFP response, ENA committed that the service dates for the sites would be initiated on July 1, 2007, and all campuses would be seamlessly transferred from their exiting service with minimum downtime and no additional service costs. The target completion date to transition over 200 sites was September 30, 2007. With mutually agreed-upon change orders to the original scope of the project, the entire transition was successfully completed by October 31, 2007, within OCPS' expectations and just four months after the start date.

ENA dedicated a project manager and project management team to OCPS and began with a thorough evaluation of needs and objectives. ENA then held kickoff meetings at the executive level during project initiation to set expectations and communications protocol. ENA also held weekly calls with each underlying vendor to track progress, proactively handle anomalies and initiate any necessary escalations. ENA managed all the scheduling with schools to facilitate site-based work on the part of the underlying vendors as well as ENA field resources. ENA also ensured all ENA and underlying vendor employees were compliant with the district's school safety regulations before beginning work on school property, making certain school sign-in protocols were well understood to avoid any potential issues.

The project implementation plan, depicted in the illustration on the following page, included a three-phase approach which included end site and service aggregation site preparation, end site service transition and Internet access upgrade, and service aggregation site preparation. The entire plan was designed to minimize any downtime or disruption of academic or administrative operations during the upgrade and transition, and also to reduce the involvement of district personnel in the process, freeing them up to focus on other district projects.

	ENA's Aggregation Platforms	End Sites currently not served by Wide Area Ethernet (150+)	End Sites currently served by Wide Area Ethernet (50)
PHASE I	• Site visit • Entrance and physical facility preparation • Rack, test and configure ENA aggregation equipment and install end site aggregation network • Integrate ENA aggregation equipment with OCPS existing network • Activate site in ENA Network Management platform and perform acceptance testing with OCPS • Install/upgrade carrier aggregation circuits and test	• Site visit • Entrance and physical facility preparation • Coordinate and install carrier circuits • Rack and test ENA service termination equipment	• Site visit • Coordinate service transition with existing carrier • Rack and test ENA service termination equipment
PHASE II	• Make configuration and routing changes to support site migrations to ENA infrastructure	• Configure and connect ENA service termination equipment to OCPS end site LAN • Activate end site in ENA Network Management platform and perform acceptance testing with OCPS	• Transition existing carrier circuit to ENA equipment • Configure and connect ENA service termination equipment to OCPS end site LAN • Activate end site in ENA Network Management platform and perform acceptance testing with OCPS
PHASE III	• Separate existing OCPS Cisco PIX ASA firewalls • Install and configure additional Internet connectivity • Perform acceptance testing of additional Internet connectivity with OCPS • Verify site fail-over configuration and test	• Verify service aggregation site fail-over configuration and test	• Verify service aggregation site fail-over configuration and test

Offering Vendor-Neutral Flexibility

OCPS required flexible solutions from a variety of vendors in order to support the diverse and ever-changing needs of their education environment. ENA's managed solution is vendor- and technology-neutral, and contracts are owned by ENA. Everything from contract management to vendor changes to bandwidth upgrades were handled by ENA for OCPS school administrators, eliminating the need to tie up valuable district resources on these activities. ENA served as the single point of contact, ensuring that the right technology was provided to each school based on individual site needs, not vendor or contract status.

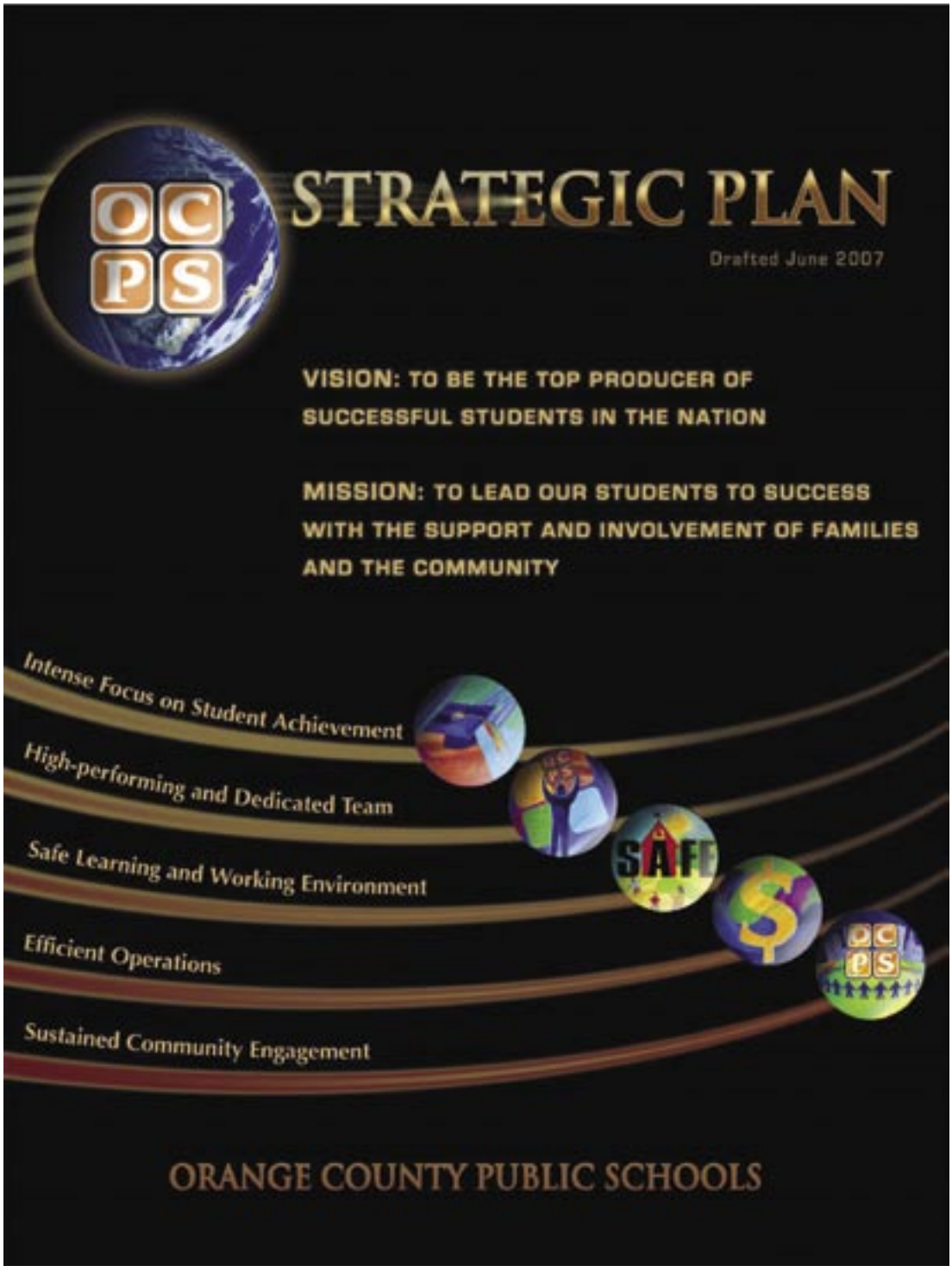
ENA's established relationships and engagement of complimentary business carriers was critical to OCPS' network success. ENA Senior Vice President of Implementation and Project Management Lenny Simpson stated, "We maintained constant communication and collaboration with our carrier partners and gave them every opportunity to succeed, and they did. Our partners know we have the highest expectations of service—and those standards are not optional. We only choose partners that can help us exceed customer expectations. If that isn't happening, we need to select new partners."

Engaging Stakeholders

OCPS began with the end in mind, knowing that achievement of the district's mission, vision and goals depend upon an aggressive vision for technology-enabled education as well as enhanced technical capabilities throughout the district. From top to bottom, OCPS staff understood the benefits a new state-of-the-art fiber infrastructure would bring, and they were engaged and excited about those possibilities from the project's inception.

ENA collaborated with the OCPS technology team to engage stakeholders throughout the district. Clear communication and anticipation of the network's benefits created broad project participation and buy-in from the schools. In particular, OCPS' decision to inform and involve principals from every school site would prove critically advantageous. The commitment to project timeliness from both ENA and OCPS staff was impressive, and it was honored by the Superintendent and CIO. The deep support of the MBIA project was evident across the district as implementation began, and that support was sustained through project completion, contributing substantially to the project's overall success.

The OCPS Vision, Mission and Goals



Communicating the Plan

In addition to continuously communicating the outcomes that OCPS planned to accomplish through the implementation of new a fiber network, ENA worked with OCPS to ensure accurate, and frequent, project status updates.

From project inception, OCPS and ENA collaborated to identify realistic and timely project goals that would meet the district's education objectives. As the new OCPS fiber network was an expedited project, continuous communications were essential to the project success. As part of the project management commitment, ENA conducted a project kickoff meeting as well as status meetings and executive meetings throughout the implementation. Usually conducted in person, the weekly executive project meetings focused on keeping the district apprised of the continually changing project status and any potential challenges that arose.

> *"The people, the process, the tools—everything that was necessary to make this project a success—they all came together."*
>
> **Myron Bryant**
> **Assistant Director of**
> **Network Services**
> **Orange County Public Schools**

The communication meetings provided a framework for informing, involving and obtaining buy-in from all participants throughout the duration of the project. The full clarity and transparency of all relevant information enabled early issue identification and resolution, an important element of the project's successful execution.

In addition to scheduled weekly meetings, ENA generated monthly project reports that tracked against the original project plan and provided details of tasks completed during the previous month, tasks scheduled for completion during the next month, and a summary of issue status and resolutions.

The district communicated the information from these weekly meetings with schools throughout OCPS. Principals and other appropriate school staff could view the status of the MBIA project including timelines and project completion details. This district-wide communication was essential to building district-wide project success.

ON THE FOLLOWING TWO PAGES IS A SAMPLE OF WEEKLY DASHBOARDS PROVIDED BY ENA TO OCPS, VIEWABLE ON THE DISTRICT'S INTRANET AT ANY GIVEN TIME OF THE DAY.

30 May 2007 Project Health Factors	Month	Resources	Schedule	Deliverables	Overall Project Health ★ Project Team Health
Project Planning	3	✔	✔	✔	OCPS ★ ENA ★
Project Change Process	3	✔	✔	✔	
Site Detail Finalization	3	✔	✔	✔	
Walk Through Teams Formed	3	✔	✔	✔	
Transport Media Orders	3	✔	✔	✔	
Service Mgmt Process in Place	5	✔	✔	✔	**Rating Required**
Site Walk-Throughs	4	✔	✔	✔	✔ **Complete** ★ **On Track** ⇨ **Behind (correction strategy in place)** ⇦ **Behind (no strategy in place)** ● **Trouble (escalation)**
Aggregation Sites Ready	4	✔	✔	✔	
Aggregation Sites Install/Test	5	★	★	★	
End Sites Ready	6	★	★	★	
I2 Connection	6	★	★	★	
Pre 7/1 Sites Install/Test	6	★	⇨	★	
Documentation/Training	7	★	★	★	
Fiber Install & Test	9	★	★	★	
End Sites Install/Test	9	★	★	★	

Issues & Risks

Site construction progress - 3 early sites to be revisited
Do not yet have all vendor circuit dates

Mitigation Actions

Ongoing weekly progress updates daily progress reviews; all have committed to make their dates and are progressing

Activities Underway

Site walkthrough - revisits
Finalize Service Management process
Finalize site permits through BCCO
Install aggregation equipment
Service Management process

Status

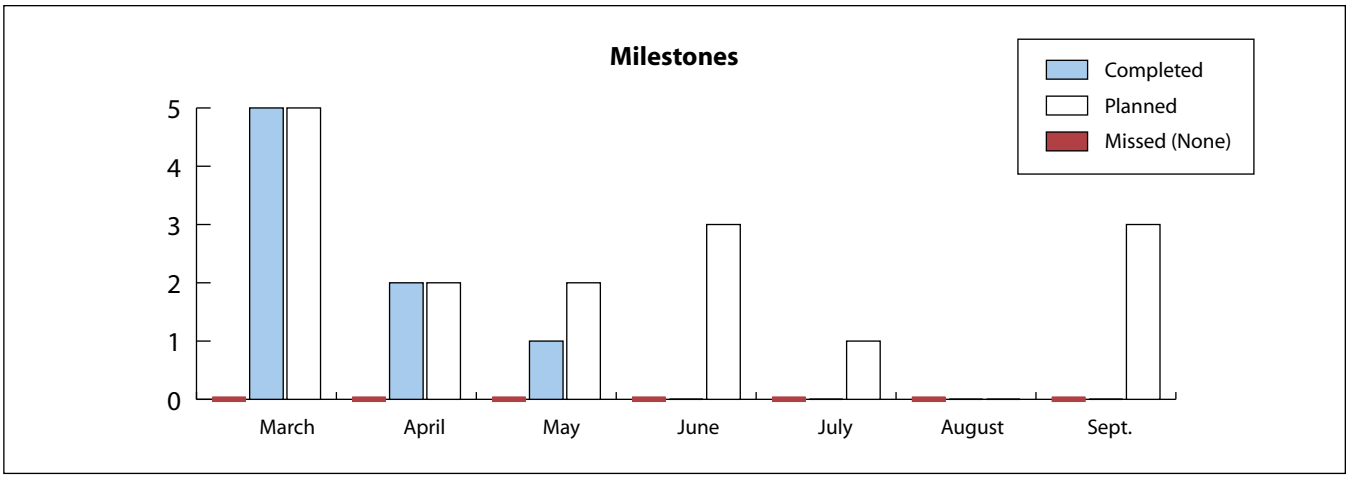
On schedule
Process defined - document to be distrib.
All applications to be submitted 5/31
Routers installed; firewalls to be in 5/31
Complete; included in welcome packet

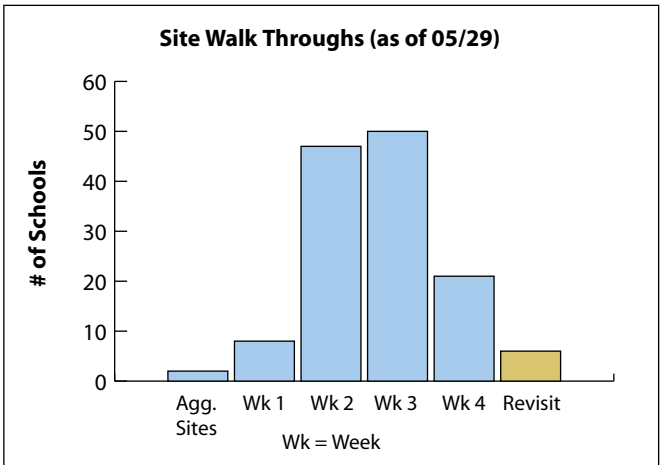
Upcoming Activity Highlights

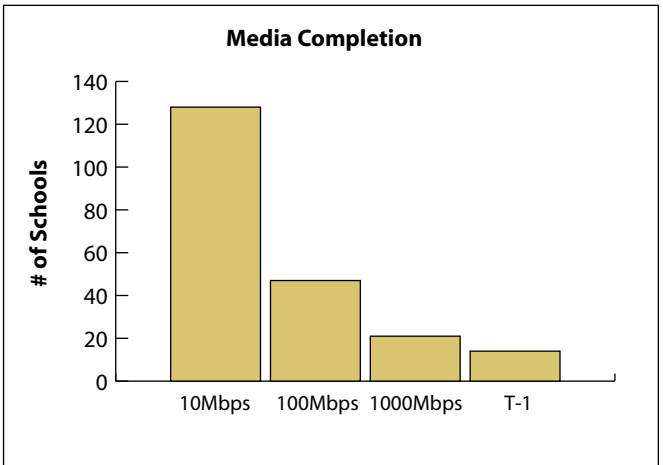
Continue site make-ready work
Finalize site installation schedules
Connect existing WAN routers to aggregation routers
Move FIRN internet connection to aggregation routers
Complete additional ingress and egress connections

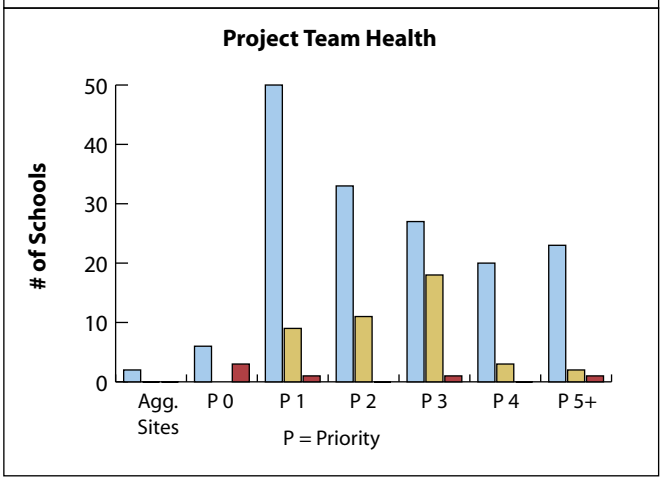
Assistance Required

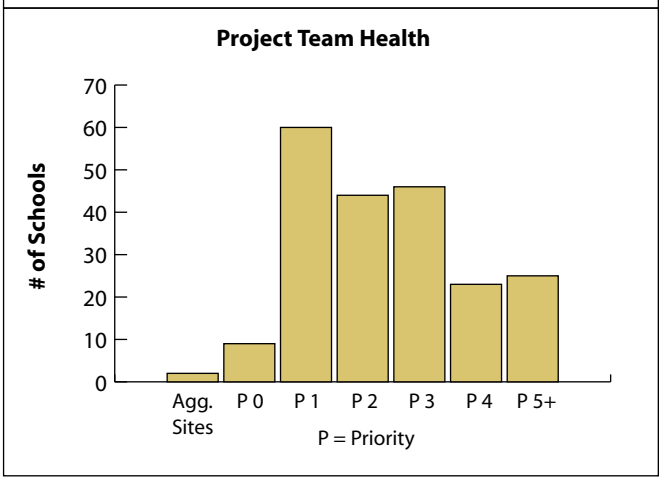
N/A at this time











Complete Remaining Revisit

Enabling Continuous Technology Improvement

Today's growing educational technology needs evolve constantly to meet growing 21st century learning demands. As technology enhancements are introduced, networks need to be able to take advantage of these enhancements. ENA's managed network solution addresses continuous technology improvement by providing the best-of-breed technology throughout the entire length of the OCPS contract.

ENA's solution reliability and flexibility requirements mean that ENA must purchase and maintain the best system components available, implementing new and emerging technologies as soon as they are available and reliable. As OCPS expands and changes, ENA will adjust equipment, tools and service needs quickly and at a fraction of typical district-managed costs. This scalable, best-of-breed approach means OCPS eliminates costs associated with capital purchases and disposal of obsolete equipment. Upgrades are much more affordable and less disruptive to the learning environment.

The safety and security needs of OCPS were top priorities. Managed firewall services and virus screening prevent hackers and viruses from paralyzing school networks. Student data is more secure. Deploying these features across the entire OCPS district makes students and school data safer, at a lower total cost to the individual school.

Results That Matter

The bottom line is that the MBIA project was delivered on time and on budget, meeting and exceeding the high level of expectations and requirements sought after by the MBIA project.

OCPS has not only enjoyed significant improvements in their level of connectivity throughout the district, but has also benefited by the improved service level and reliability of the network as well as enhanced customer service components of a managed service.

IMPROVED RELIABILITY – Prior to the network ENA installed, OCPS experienced ongoing downtimes and latency on their network. On average, ENA networks deliver upwards of 99.9 percent uptime. ENA has met 100 percent of its service level requirements in Indiana and Tennessee related to network service delivery.

Based on OCPS' own data as of July of 2008, the average total WAN network availability for the 2007-2008 school year was 99.901 percent, measured after the MBIA implementation, compared to 99.673 percent for the 2006-2007 school year. The total number of network service requests during the 2007-2008 school year was reduced 54 percent compared to the previous school year.

The increase in Internet and WAN bandwidth for the district came just in time. Internet utilization was consistently at the 140 Mbps maximum allocated by the state throughout the 2006-2007 school year. After implementing ENA's upgraded connectivity, during the 2007-2008 school year, Internet utilization peaked above 467 Mbps. Saturated T-1 circuits to campuses were relieved after they were upgraded to fiber-based Wide Area Ethernet connectivity.

These three improved key performance indicators (KPI) represents a huge value to OCPS:

- Increased capacity
- Increased reliability
- Increased resiliency

According to Myron Bryant, assistant director of Network Services at OCPS, "The WAN and Internet infrastructure services provide by ENA enables OCPS to scale our converged network to support the growing number of bandwidth-intensive and real-time applications. We are

centralizing systems that provide educational applications, multimedia, student information, business systems, etc., as well as application in the IP communications arena such as IP Telephony/VoIP, SIP trunks, video conferencing, energy management, alarm monitoring and surveillance, enabling more efficient operations."

ENHANCED CUSTOMER SERVICE – ENA provides full-service, end-to-end support to OCPS. ENA assumed primary responsibility for the design, installation and management of the network, down to the last mile. Support calls are answered quickly with a live person with experience in supporting education; there were no long waits or phone trees. Full-service 24x7x365 network monitoring through a dedicated NOC allows most problems to be detected and fixed before school personnel even notice anything amiss.

"The amount of calls that I receive now has been reduced to pretty much zero."

Myron Bryant
Assistant Director of Network Services
Orange County Public Schools

The MBIA Project Implementation at a Glance

START DATE: Deployment of end sites began July 1, 2007. Planning, ordering, scheduling, make-ready and installation of the two aggregation sites began in June.

END DATE: October 31, 2007

NUMBER OF SITES TRANSITIONED: 210

AVERAGE NUMBER OF SITES TRANSITIONED PER WEEK: 14

NETWORK UPTIME: Improved from 99.673% to 99.901% in first year of service

SERVICE REQUESTS: Reduced by 54%

INCREASED CAPACITY: Increased district-wide bandwidth from 140 to 800 mbps through multiple, diverse links. Internet pipeline is over 2 Gbps, scalable to 10 Gbps. End site upgrades to 10 Mbps (elementary schools), 100 Mbps (middle schools), 1 Gbps (high schools) and 5 Gbps (service aggregation points).

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Benefits of the MBIA Project

OCPS is already experiencing return on the investment in MBIA. Today, students and teachers are enjoying vastly increased Internet capacity and thus benefiting from important classroom applications and rich online resources that previously were unavailable to them due to insufficient online access.

No More Bottlenecks

High-speed broadband access and connectivity are vital for economic growth, global competitiveness, education, innovation and creativity. Ensuring high-speed access for all students is a critical national issue, especially as related to preparing students for work and life in the 21st century.

Even in schools that are sufficiently connected with Internet access, bandwidth demand is quickly exceeding capacity as they utilize advanced technology tools. Simply having connectivity is not enough. Without measurable upgrades in bandwidths to allow for greater speeds—or even to maintain current speeds as demand grows—teachers and students will be severely limited in the technology applications they can use.

Prior to the MBIA project implementation, OCPS did not have the amount of bandwidth necessary to support district projects. "The network we used to have, there was a bottleneck at the door of the school," explains George Perreault, OCPS director of Instructional Technology & Library Media Services. "Even if we had a very robust network inside the school, once it hit the door, the connection from it to downtown and out to the Internet was a very, very small pipe." Web-based reading projects were not possible because the district did not have the amount of bandwidth needed for many simultaneous users to get out to the Internet and back. "It was too frustrating for the kids to use any of these type of resources," Perreault says.

Before ENA's implementation, the bandwidth leaving the district out to the Internet was about 140 megabits. Today it is 800 megabits, almost six times greater. Hermes Mendez, OCPS director of Infrastructure, is both pleased and impressed. "We are pleased with the service and the speeds, and we have seen an increase in traffic that has exceeded our current expectations. Already we are benefiting from better response times and the manageability of the network. We have heard from staff that the speed and response times have been excellent. Plus, some very important recent classroom management projects—such as the implementation of SMS [Chancery Student Management Solutions, a student-information system software] and ProgressBook [a Web-based grade book application]—would not have been successful without the ENA managed network."

In addition, OCPS is continuing to roll out video conferencing for both instructional and administrative staff, saving time and reducing expenses on travel between sites.

OCPS' new fiber-based network is now highly scalable and capable of securely supporting data, voice and video on a single network. It is also able to meet the growing needs of OCPS' diverse and rapidly growing student population.

OCPS Receives an "A" From the State of Florida

OCPS received an A grade from the state of Florida's Department of Education in 2008, up from a B the year before. OCPS Superintendent Ronald Blocker said, "This achievement is the result of hard work by faculty, staff and students. In addition, the support from the community has helped tremendously. We have 126 schools that are high-performing according to state standards, up from 115 A and B schools last year." Among 18 high schools, four are rated A. All of the districts' schools rated in the F range raised their grades from the year before.

The increase in students' FCAT scores throughout the district is the result of many things—above all, the hard work of students and teachers. Clearly, OCPS is deeply committed to its avowed mission. The Managed Broadband Internet Access (MBIA) project is another essential piece of that strategic endeavor, and has already contributed to the advancement of the district's vision and all five facets of its market differentiation.

More Student Engagement

In order for students, teachers, administrators and parents to effectively use technology tools and resources, schools need a robust, reliable network. Connectivity alone isn't enough. Insufficient connectivity is almost as bad as no connectivity at all. Many OCPS schools lacked the network capacity to handle current emerging technology applications that demand ever-increasing bandwidth, such as online interactive learning and video streaming.

It's rather a self-evident principle, but it's worth emphasizing: you can't teach 21st century skills with slow, unreliable technology. On January 22, 2008, members of ENA's team and local media were invited to the district to see for themselves the new broadband network in action. They observed a Web-based literacy and learning class known as BLASTT, an acronym for Building Literacy and Skills Through Technology, at Westridge Middle School. "If you have ever taught school," Perreault tells an interviewer during the class, "you know that if you have too much down time, that's when you have problems in the classroom. There's a definite engagement factor that's happened here as a result of the kind of network speed [that we now have with MBIA] that makes learning fun for these kids."

Gesturing to the classroom of students scrutinizing their laptop screens, he continues: "They are reading here, and they're much more engaged than they would be if we threw a textbook in front of them. They're actually finding their own information, going out to the Internet, and from here they're going to build presentations using their computers rather than doing a traditional report-type activity. And best yet, there's no more wasted downtime."

The BLASTT initiative is one OCPS program that's been given a big boost by the new network. In the BLASTT classroom, students develop their reading, writing, research, presentation and technical skills while working on projects in a variety of core subject areas. Instead of utilizing lectures, textbooks and worksheets, the curriculum incorporates word processing, spreadsheet and presentation software, databases and laptop computers wirelessly connected to the Internet to delve deeper into content as well as build 21st century skills.

The new program has had a large impact on student learning. Prior to BLASTT, the students did not like working in groups; in fact, they would not work in groups. Now they have no problem seeking out other students for help, especially if those students have a certain skill. OCPS Technology Integration Specialist Denise Cruz, a BLASTT teacher, also sees students taking increased responsibility and ownership for their work, being unwilling to settle for mediocrity. Their work on the Internet has matured. The students have learned that not all sites are created equal. "They're thinking it through," explains Cruz, "asking, 'Where do I need to go? Is this good information?' They're checking Internet sites for validity, things that tell me they're taking a true responsibility for their learning. They now evaluate themselves harder, I think, than even I do." To Cruz, all of these are a huge sign that the students are really learning and growing.

BLASTT Is an Unmistakable Success

"The progress of the BLASTT class is unmistakable. We keep stringent data on each student throughout the year and, without a doubt, the BLASST class has shown outstanding growth—the most of any students on our campus. FCAT test results confirm it. The first year BLASTT students improved their scores by 86 percent. The second-year students posted outstanding increases in the 70 percent range, and that's slightly lower only because we've introduced increasingly lower-lever readers to the program because our confidence in its effectiveness has increased."

Nelson Pinder
Principal
Westridge Middle School
Orange County Public Schools

Enhanced Professional Development Opportunities

The mission of the Professional Development Services (PDS) Department at OCPS is to support the district's vision, mission and goals by building capacity and developing leadership potential through professional development (PD) opportunities for all employees from the novice to the veteran.

John Lien is senior administrator of technology for PDS. He provides professional development services for over 20,000 educators and administrators in the OCPS school system, focusing on technology. He is working on several technology-focused PD services, but there are three projects he feels have especially benefited from the implementation of the MBIA Project:

1. Teacher Web Pages
2. PDS Online
3. ITARI

1. TEACHER WEB PAGES

One of the most exciting new programs at OCPS is the Teacher Web Pages project. Presence on the Web has long been a big motivator for students, and now it is for the district's teachers as well. Thanks to the PDS Department, there are over 3,000 teachers who are now using teacher Web pages to share curriculum ideas and teaching strategies, and reliable, high-speed Internet access is paramount to the success of this program. With the help of PDS, teachers can now create their own Web pages with text, graphics and sound to share school reports, field trips, homework assignments and class activities. In addition, the program allows teachers to share videos, music, stories, student projects and other content through podcasting. The Teacher Web Pages project is a great communication tool as it is a perfect way for teachers to reach out beyond the classroom walls and create a link with students and parents.

2. PDS ONLINE

Teachers and administrators need ongoing quality professional development services in order to stay informed about new pedagogical skills as well as to effectively use current and new technologies. However, the reality is that teachers and administrators simply do not have the time to break away from their classrooms or daily work schedules to engage in face-to-face professional development services. PDS Online was developed to meet that challenge by delivering high-quality 21st century teaching skills and technology-application training online.

Training includes how to create teacher Web pages, how to use the Microsoft Office suite of applications and how to integrate technology into instruction. Online classes are both synchronous and asynchronous with some including embedded video. This multi-media solution would just not be possible without the new network infrastructure that provides increased bandwidth to all OCPS schools.

OCPS is dedicated to high-quality online professional development and creating a robust online professional learning community. With the MBIA implementation complete, the PDS Online project has set a goal of providing all technology training online by the end of June 2009.

3. ITARI

Thanks to an Enhancing Education Through Technology (EETT) Competitive State Grant, OCPS has been able to implement a new reading initiative called ITARI, which stands for Integrating Technology and Reading Initiative. As described by OCPS Senior Director of PDS Christopher Bernier, "The initiative is an outgrowth of OCPS' League for Educational Excellence [an initiative designed to create a framework for best practices that will benefit all students]. It combines reading, rigor and relevance with tools necessary to engage the 21st century learner."

The ITARI project is a collaborative effort between the Curriculum Services and PDS departments and involves eight high schools throughout the district. Teachers infuse technology into curriculum targeted at helping their students with reading and literacy skills. Students engage in creative activities using advanced media such as digital graphics, Web publishing, animation and video/audio editing—all of which require high-speed bandwidth to do. "This was an opportunity to support teachers in their professional development and then put the tools in the hands of the students to see the products they can turn out," says Bernier. The students provide a demonstration of their progress and showcase their learning through projects. Improved reading skills have been the primary outcome of this initiative focusing on professional development and engaging 21st century skills. John Lien is very proud of the outcome of this initiative, pointing out, "This initiative was not a competition, but about change and a celebration of growth, and these students definitely demonstrated growth."

Network Operational Performance and Reliability

With a backbone entirely delivered and managed by an education-focused solutions provider, teachers and students receive bandwidth delivery that is customized, fast and reliable. OCPS' network availability in the first year of the MBIA deployment was 99.901 percent, an improvement over the year before with another vendor, and service requests were reduced 54 percent. Moreover, Web sites are peered for faster, more dependable connections. Educational software applications can be customized to improve performance throughout the network. ENA optimizes bandwidth so that a commonly accessed download that might ordinarily take 12 minutes only takes 12 seconds. The approach not only improved speed and reliability for OCPS, it also created important cost savings for the district. The purchase of bandwidth will be scaled to meet the district's expanding needs more cost-effectively.

ENA's solution also brings together advanced technologies and reputable carriers and manages the entire backbone with a NOC that provides quality and control. ENA's NOC has been rated as "excellent" by 98 percent of customers over the last five years. Furthermore, ENA provides peering partnerships with the leading K–12 educational resources, giving teachers instant access to unlimited higher-education resources using our Internet2 backbone. Already in the past year, OCPS staff has utilized the ENA Internet2 connection to avail themselves of valuable engineering information from technical colleges as far away as Washington State.

The efficiency of a managed solution reduces instructional downtime in the classroom and can have a dramatic effect on distant learning or multimedia delivery which is essential in today's 21st century classroom.

"The Managed Broadband Internet Access project has significantly increased access to Web-based resources and applications for the classroom. Prior to the network, it was simply not possible for an entire classroom of students to effectively access a Web site simultaneously. Our goal is fostering constant innovation and utilizing educational technology to prepare our students for the 21st century, and this increased bandwidth to all our schools enables us to make that a reality. Before the MBIA implementation, the bandwidth leaving the district out to the Internet was about 140 Mbps. Today it is 800 Mbps, nearly six times greater."

George Perreault
Director of Instructional Technology &
Library Media Services
Orange County Public Schools

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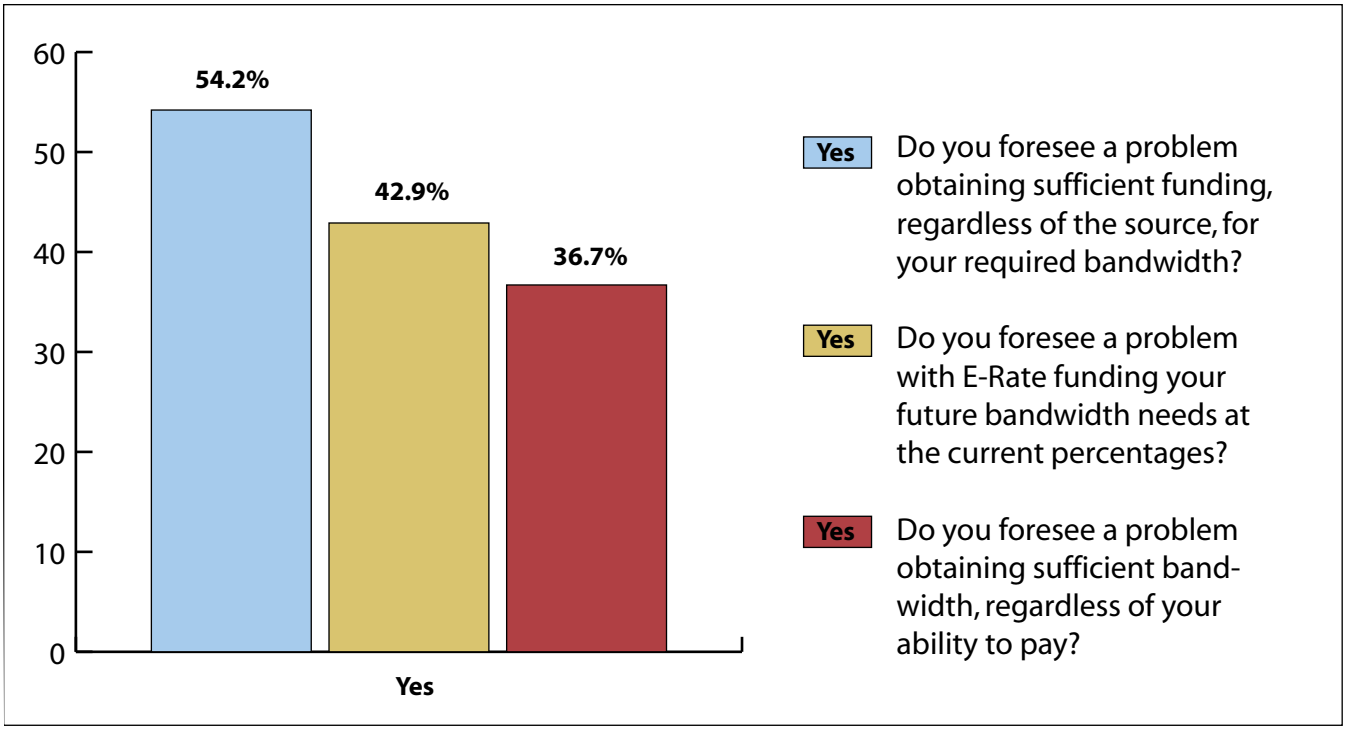
Total Cost of Ownership (TCO) Analysis

Making the Case for Doing More with Less

Regardless of local circumstances, every school district is faced with funding challenges especially in light of the increased demand for bandwidth and connectivity and communication services. The reality is that funding is flat or falling and internal district resources are stretched to the limit while complexity, demand and usage of connectivity services are rising exponentially. School districts are simply forced to seek out new and innovative solutions that allow them to maximize their current funding sources and "do more with less."

In the recent *America's Digital Schools 2008* (ADS2008) report published by The Greaves Group, the authors asked respondents a series of questions relating to Internet bandwidth. One of the questions they posed to technology directors from school districts was: "Do you foresee problems with bandwidth funding?" The chart below demonstrates the challenges that school districts face.

More than 54 percent of the respondents foresee a problem with obtaining funding for their required bandwidth regardless of the funding source. Almost 43 percent think that E-Rate will not fund their future bandwidth needs and almost 37 percent foresee problems getting sufficient bandwidth even if they had sufficient funding. Clearly, school districts are challenged to do more with less and in some cases cannot even get desired high-speed broadband service regardless of funding. School districts will have to become more efficient with E-Rate funding in order to cover more of their rising costs and evaluate new and more effective approaches to wide area networks for their schools.



The Solution for Doing More With Less at Orange County Public Schools

At the time that this white paper was published (August 2008), OCPS was already in the process of executing their comprehensive district Information Technology Blueprint. One of the major objectives of the plan, which is highlighted by this white paper, was to significantly increase speed to the Internet from each school in order to enable current and future administrative and instructional projects. Originally OCPS set out to make enhancements and upgrades to their network themselves. After trying to implement upgrades to their schools, they decided to outsource the project and conducted a competitive bid to evaluate Managed Broadband Internet Access alternatives. OCPS selected ENA to provide a fully managed service that cost-effectively met all of their project and RFP requirements.

> *"By increasing the bandwidth anywhere from 10 Mbps to 4 Gbps, we're giving the schools and offices the ability to collapse the distance of the school district."*
>
> **Roland Moore**
> **CIO and Senior Executive Director**
> **Orange County Public Schools**

OCPS received their intended results. Not only were they able to upgrade all their schools to their desired high-speed bandwidth requirements while experiencing better customer service and overall reliability, but they were also able to identify over $5.1 million in savings for the school district over the service contract life.

By making the change to a managed

1. SIGNIFICANTLY INCREASE SERVICE WHILE REDUCING OVERALL COSTS BY OVER 20 PERCENT.

- A nearly sixfold increase in Internet bandwidth to the district going from 140 Mbps to 800 Mbps.
- A significant increase in bandwidth to the individual schools. Instead of simply providing 10 Mbps to every school, ENA was able to deliver 10 Mbps to every elementary school (126 sites), 100 Mbps to every middle school (47 sites), 1 Gbps to every high school (16 sites) and 4 Gbps to the two service aggregation locations—all for a lower cost per year.

2. REDUCE OVERALL COSTS BY OVER $1M ANNUALLY AND REALIZE AN INITIAL COST AVOIDANCE OF $2.75M.

- Estimated annual savings of approximately $400/month/site or >$1.0 million per year.
- After E-Rate discount, these savings result in approximately $200/month/site or over $500 thousand per year (29 percent savings after E-Rate).
- The cost avoidance of $2.75 million includes eliminating estimated capital expenditures to purchase new network equipment as well as internal project management costs as these services are provided as part of a managed service approach from ENA.
- New voice-enabled network equipment installed at each school including maintenance of that equipment for the life of the contract. The expansion of the MBIA network to support voice services is expected to drive incremental savings.

solution, OCPS was able to accomplish the following financial objectives:

3. USE PRIORITY 1 E-RATE FUNDING MORE EFFICIENTLY THROUGH THE USE OF ENA-PROVIDED INTERNET-ACCESS EQUIPMENT, MAINTENANCE AND MONITORING PREVIOUSLY PROVIDED THROUGH INTERNAL STAFFING (NOT E-RATE-ELIGIBLE) AND DIRECT EQUIPMENT PURCHASES (ONLY ELIGIBLE UNDER PRIORITY 2 TO DISTRICTS WITH HIGH DISCOUNT RATES).

- OCPS' E-Rate discount rate of 68 percent excludes many sites from being eligible for E-Rate funding on equipment purchases and maintenance.
- Other services such as Network Operations Center, proactive network monitoring and field service are not eligible for E-Rate reimbursement when not bundled as a single service or when provided with internal staff.

4. STABILIZE OVERALL SERVICES COSTS AS ENA IS RESPONSIBLE FOR ANY WAN AND EQUIPMENT ISSUES.

- No surprise costs due to equipment issues.
- ENA personnel responsible for all dispatches and extensive on-site and remote technical support.
- Real-time maintenance and repairs by ENA staff versus equipment swap that could take at least 24 hours under separately purchased equipment maintenance agreements (i.e., Cisco SmartNet).
- Ability to reallocate valuable district technical personnel resources to focus on higher-priority projects. Managed Broadband Internet Access service did not result in a reduction in force within OCPS, but did allow those resources to focus on other necessary education needs.

5. RECEIVE GREATER RELIABILITY AND RESILIENCY AS ENA IS RESPONSIBLE FOR DELIVERING SERVICE AND MEETING UPTIME GUARANTEES.

- ENA ensures service is working by monitoring and proactively maintaining the solution through a 24x7x365 Help Desk and Network Operation Center.
- ENA concentrates on entire service, not just the circuit or the equipment. This approach lowers the cost by reducing the requirement for district personnel involvement in troubleshooting among several connectivity and equipment service providers.

6. ENHANCE EDUCATIONAL OPPORTUNITIES ENABLED BY ENA'S MANAGED SERVICES.

- The increased capacity and reliability of the network virtually eliminated downtime and bottlenecks resulting in increased instructional time and the ability to access new and innovative learning applications and tools for all OCPS students and teachers.
- Direct access to the rich educational resources available on Internet2 and National LambdaRail (NLR) through ENA's partnership with Florida LambdaRail.
- ENA's network is optimized to reach K–12 and other content more quickly through peering and hosting relationships.

OCPS Technical Cost Analysis

The following information will provide specific insight into OCPS' cost-savings and cost avoidance analysis outlined in this section. These comparisons are based on OCPS' pre-existing network costs.

OCPS – Managed Network Cost Analysis – information provided on a per unit per month basis		
Network Service	**2006 Costs Prior to ENA**	**2007 Costs With ENA**
Service Speeds	T-1 to 10 Mbps	10 Mb to 5 Gbps
NOC/Monitoring	8:00 a.m. – 5:00 p.m.	24x7x365
Equipment Maintenance Cost Responsibility	OCPS	ENA
Circuits	$1,865	
OCPS Equipment Maintenance and Personnel Costs*	$107	$0
Managed Service – circuits, CPE, maintenance, NOC		$1,564
Total Monthly Network Costs	$1,972	$1,564
Per Site Monthly Savings		$408
Number of Sites		208
Annual Savings		**$1,017,944**

***Ineligible for E-Rate funding**

Annual Cost Savings			
Network Services	**2006 Costs Prior to ENA**	**2007 Costs With ENA**	**Monthly Savings**
Before E-Rate:	$1,972 Cost Per Site	$1,564	$407.83 **District Savings: $1,017,944/Year**
After E-Rate: Cost Per Site	$704	$500	$204 **District Savings: $508,086/Year**

Cost Avoidance – Services Included With ENA Managed Service			
	2006 Costs Prior to ENA	**2007 Costs With ENA**	**Cost Avoidance**
Purchase New IP Routers	$2,400.000	Included	$2,400,000*
Project Management Implementation	$350,000	Included	$350,000
Total Cost	$2,750,000	Included	**$2,750,000**

***Estimated cost to purchase new routers for each site**

OVERALL COST REDUCTION (Cost Savings + Cost Avoidance)		
	Before E-Rate: 5-Year Cost Savings	**After E-Rate: 5-Year Cost Savings**
Network Services	$5,089,718	$2,540,430
Cost Avoidance	$2,750,000	$2,750,000
Total Cost Reduction	**$7,839,718**	**$5,290,430**

Leveraging and Maximizing E-Rate

ENA's Managed Network Services are designed and delivered as a Priority 1 service under the Internet Access and Telecommunications categories and, as such, all components of the service, including circuits, network hardware, maintenance, monitoring and support, are eligible for Priority 1 funding. ENA is an eligible telecom provider through ENA Services. ENA's service-delivery model has been recognized by the FCC as one of the most efficient and effective ways to utilize E-Rate funds.

ENA is the leading vendor recipient of E-Rate funding in the Internet Access category over the ten-year life of the E-Rate program. ENA has extensive knowledge and successful experience with all parts of the E-Rate process. In addition to an internal team of E-Rate specialists, ENA has a team of experienced outside advisors including E-Rate legal specialists based in Washington, DC.

ENA understands its role to provide guidance and encouragement to its customers in the E-Rate Program. These services include reinforcing the importance of compliance with all E-Rate Program rules, providing guidance about ENA's specific services, reminding its customers of key E-Rate deadlines and assisting with customer education. ENA has worked with its customers in a proactive manner on these areas over the history of the E-Rate Program. ENA goes beyond what other providers do to assist customers in getting all the E-Rate they deserve, not just the portion that is paid to ENA.

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Future Plans

High-speed access for schools is truly no longer a luxury, but rather a requirement.

Constant Innovation and Growth

Crafting a culture of constant innovation and growth is one of the secrets to OCPS' success. With an infinitely scalable network in place, OCPS has accomplished one of its critical 2006 Information Technology Blueprint strategies and now has the foundation to fully implement all of the remaining strategies to effectively support academic achievement, streamline administrative processes and empower data-driven decision-making.

ENA sees many drivers of change and bandwidth usage in schools—communications, online applications and resources, online courses, distance learning, content, video conferencing, Web 2.0, social networking, games and simulations, professional development, assessment and data management are just a few. While there are several drivers of change and bandwidth usage, the bottom line is that America's schools are going digital at a prodigious pace and OCPS is no exception.

The new network advanced many current and future high-priority OCPS district projects such as:

- Implementing a Learning Management System that would include a student data portal, a professional development portal and a library of digital assets.
- Creating a single assessment portal for teachers and administrators to access student data
- Continuing to deploy centralized applications such as a curriculum management system for curriculum and instructional support and a student information data warehouse
- Providing equitable access, use, support, and critical mass to ensure that all students, teachers and parents have access to district technology resources
- Providing on-demand access to digital teaching and learning resources such as streaming-video-based instructional content
- Advancing online learning opportunities for students and teachers, enabling them to become more independent learners
- Effectively utilizing IP convergence technologies such as video conferencing for school-based and administrative personnel
- Developing an online, interactive employee professional learning system
- Transitioning from print to digital instructional resources
- Enabling security and surveillance traffic transport
- Transitioning to VoIP-based telephony

Like OCPS, many school districts realize that access to high-speed broadband through district-wide networks is fundamental to success in education and preparing our students to compete in a 21st century global economy. Because access to high-speed scalable broadband is becoming so important to the education process, more and more school districts and state education agencies are re-evaluating their strategic approach to wide area networks. The OCPS Managed Broadband Internet Access project is a best practice model that promises and has already delivered far-reaching benefits for the district. ENA offers a similar approach to statewide networks with comparable overall benefits and value.

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About OCPS & ENA

About OCPS

Orange County Public Schools (OCPS) is the nation's 11th-largest school district with more than 175,000 students. OCPS is the fourth-largest school district in the state of Florida. The school district employs 22,000 people and is the second largest employer in Orange County, Florida. OCPS has 180 schools, which are divided into six area learning communities. An ongoing aggressive building program will ensure that all district facilities are modernized and accommodate the region's rapid growth. OCPS reflects the rich cultural diversity of the Central Florida community. The district's major academic indicators have consistently improved over the past several years.

For more information about Orange County Public Schools, please visit:
www.ocps.net

About ENA

ENA is a leading managed network service provider in the design, deployment and management of network and telecommunication services for school systems, libraries and governments. In 1996, ENA created one of the first statewide K-12 networks in the U.S. and has earned a reputation as experts in distributed networks and voice solutions. Today, ENA manages multiple statewide and district-wide education and library networks, successfully serving over 450 school districts, 2 million students, educators and administrators, and over 300 libraries.

For more information, please visit:
www.ena.com

E-mail ENA at:
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Call ENA at:
(866) 615-1101

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Networked for Life & Learning

Success Stories on Improving Indiana Schools, Libraries and Communities Through Technology September 2009

Taking the **Internet**—and **Web-based School Resources**—to the Streets in Avon, IN

"If coffee shops can offer wireless Internet access for free, then why can't public buildings?" asks Michael Taylor, the director of technology for Avon Community School Corporation outside Indianapolis. "Our municipalities should be able to figure this one out."

When he says "our," he means everyone's. As in the entire country.

Such talk might sound idle or overblown, except it's not. Taylor and his school corporation have made some substantial headway with a program to take Internet access, along with the school systems' web-based resources and applications, beyond school walls. Conversely, the corporation has also embarked on programs to draw the community into the schools. Taken together, these initiatives are intended to erase the boundaries between the town and schools.

ENA makes a win-win proposition

Very soon any student or parent of a student that walks into Avon Township Library will be able to sit down at a computer cluster provided by the school corporation and use educational resources such as Discovery Education *streaming* (online educational video) or Destination Success (online software for instruction and assessment). Situated a mere half mile from one of the school corporation's elementary schools, the library is even piggybacking on the corporation's high-speed fiber connectivity.

Tim Walker, ENA account service manager for Avon's schools and library, was the first to propose the idea. He had one customer, the library, that desperately needed more bandwidth and another, the school corporation, with bandwidth to spare. Why couldn't they share? To make the idea even more tenable, the corporation's bandwidth usage peaked every day around noon or one o'clock in the afternoon, while the library's needs didn't top out until well after school had closed for the day. Walker was sure that ENA could configure a shared connection that would keep the costs for each customer about the same. He was right. Today, the library and the school corporation are using the same pipe and each is enjoying plenty of bandwidth without extra costs for the library. As a way of saying thanks, the library has invited the corporation to install a computer lab with the school corporation's curriculum software in their building so that students have another Internet-access option for studying, practicing and doing homework when school's out.

"I can't commend Tim and ENA enough," says Taylor. "If he had not told us to not worry about the billing, and had ENA not honored that promise, this would have never happened. It's a win-win for everyone."

Going where some fear to tread

Like many school systems across the country, Avon is moving more and more of its educational and administrative applications online. Increasingly, big bandwidth is the delivery model and computers are the access points necessary for teachers to plan and grade and students to study and test. Lugging an attaché stuffed with papers or a backpack full of textbooks to and from school is fast becoming a ritual of the past. If a family doesn't have Internet access at home, says Taylor, it soon shall be more than an inconvenience. It will be a critical misfortune as their child begins to miss the bus to a 21st century education.

In effect, by giving students access to web-based school resources outside of school, Taylor and his school corporation are working to head off this very crisis. "Putting school computers in the library is not the end," says Taylor. "It's just the beginning." Dr. Timothy Ogle, Avon Community School Corporation's superintendent, has made communication and cooperation with the community a priority, propelling the corporation "to go where some fear to tread," says Taylor.

Computer and Internet access isn't just for the classroom any more. Avon Community School Corporation believes so much in everywhere, anytime access that the corporation is pursuing plans to put computers and web-based resources in local libraries and retail "hangouts" such as book stores and coffee shops.

Taking school to the community and the community to the school

The corporation has several irons in the fire for making education a community-wide endeavor:

- **Laptops and hot spots**. The school corporation plans to put more and more laptops with wireless capability into the hands of students. Moreover, Taylor has a three-year plan to install wireless access "hot spots" and even school computer kiosks around town in bookstores and eateries where young people and parents hang out: Barnes and Noble, Borders, Panera Bread, McDonald's and Starbucks, just to name a few.
- **Open to the community.** Once a month, the corporation opens the doors to its libraries and computer labs to anyone in the community that needs Internet access. Volunteers provide technical assistance.

Two elementary-aged boys use laptops in the Avon Corporation's Digital Learning Center, a classroom for training teachers on technology use that moonlights on select evenings as a computer and Internet lounge open to the community. Many immigrant families come to practice English on Rosetta Stone software.

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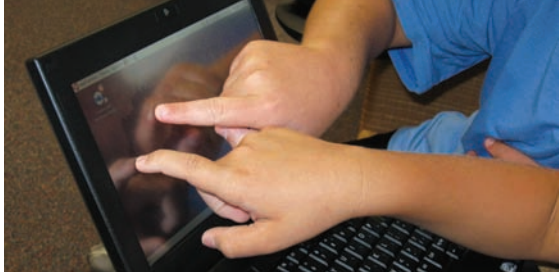

The technology department recently opened the Digital Learning Center, a "casual, coffee shop-like space," to ESL (English as a Second Language) families so that they can bolster their language skills with Rosetta Stone software. Taylor says this will be a huge benefit to a community that's home to ethnic groups speaking 36 primary languages including Chinese, Punjabi and Tagalog.

- **Parent Partnership.** To give a voice to parents about academics and foster better parent-school relations, the Avon Parent Partnership Committee was formed. The parents of each school elect two representatives from amongst themselves to represent them and advise the administration on issues related to curriculum and instruction in order to ensure that their children's' learning needs are being met.

- **A truly interactive website.** In this case, it's interactive in the original meaning of the word and not just a reference to dynamic multi-media (which it has, too). With blogs, digital dropboxes, RSS feeds, a parent e-mailing list for urgent information and other tools for generating up-to-the-minute dialogue between the community and the corporation, Taylor says their corporation website "connects families to resources." He says most schools make the mistake of creating non-interactive websites that are "like talking to a billboard." Avon is the first school district in which he's worked (he's taught and served in technical roles in several) where parents call him with suggestions.

- **The human touch.** With all their emphasis on technology, Avon hasn't forgotten the value of real human interaction. In fact, the corporation has a policy that all incoming calls will be answered by a person. The staff tries very hard to ensure that callers speak to the person they want to talk to; when that's not feasible, someone will take the message and deliver it to the intended recipient personally. "We want the personal touch," says Taylor.

Sharing cheap talk and the ramp to the information highway

Taylor anticipates the reaction of "Sure, these are great ideas, but not all school districts can afford these programs." His first piece of advice is practical, which is to look into the American Recovery and Reinvestment Act of 2009 stimulus money. Many schools will qualify for federal grants to expand their broadband connectivity.

His second piece of advice is even more practical. "You need to do this anyway," he says. "And eventually you will." Much like Avon's schools and public library sharing connectivity, he urges schools and communities across the country to begin searching for and finding synergies and economies of scale by working together. Taylor picks a common metaphor, that of the Internet as an information highway. "Every community needs an entrance ramp onto highway that everyone can use. It doesn't make sense for individual entities to be building their own, tiny ramps onto the highway." What's good for schools is good for the community at large and vice versa—so why not share the ramp?

> ***"If coffee shops can offer wireless Internet access for free, then why can't public buildings?"***
>
> ***—Michael Taylor, Director of Technology for Avon Community School Corporation outside Indianapolis.***

To get started, school administrators and community leaders should get together and simply begin talking, says Taylor, who in his spare time is working on a doctorate in educational administration from the Department of Educational Leadership, Administration and Foundations at Indiana State University. "Like the saying goes, talk is cheap," says Taylor. "So do it."

An offer they couldn't refuse, but did

A story on what not to do illustrates his point. He knows of a school district that recently approached its local government with what he describes as an amazing offer. The district has 96 strands of fiber connectivity, but only using 24 strands of it. Much like the Avon library, this particular municipality could greatly benefit from more bandwidth for running its police and fire departments, utilities, parks and recreation department, etc. The school district told the municipality that it could share the district's bandwidth for free, which besides the monthly billing savings would abrogate the necessity of one day paying the $100,000 fee to install more lines over or under a local railroad line. Instead of jumping at the bargain, the municipality demanded a service guarantee, killing the deal before it ever got off the ground.

Taylor still marvels at the municipality's short-sightedness. "The school system isn't an Internet service provider, so they were in no position to make guarantees. They just wanted to save the municipality money and help them get better service. Besides, they'd be in it together, and the school district wants their Internet up and running every bit as badly as a local government does."

That, he says, is the kind of thinking that gets you nowhere. Certainly not up the ramp onto the 21st century's information highway.

Avon Corporation Director of Technology Michael Taylor instructs elementary students on how to carry and care for the Dell netbooks from the mobile station they are about to use. The district's ambition is to have 1:1 computing for all students in a few years.

High-Speed Broadband Access for All Kids: Breaking Through the Barriers

June 2008

2008 Stakeholder Advisory Committee and Roundtable Participants

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Davis Brock, Elmore School District, Alabama
Nancy Carey, Maryland
Tera Daniels, SETDA
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Executive Summary

High-speed broadband access and connectivity are vital for economic growth, global competitiveness, education, innovation, and creativity. Ensuring high-speed broadband access for all students has become a critical national issue especially when considering preparing our students for work and life in the 21st century. SETDA members and the greater educational community recognize that robust high-speed broadband access in all of our nation's schools will accelerate our teachers' ability to teach and our students' ability to learn. SETDA identifies the key issues facing the educational community relating to robust connectivity and recommends how states and districts can successfully implement high-speed broadband in their schools as well as recommends what stakeholders and policymakers can do to support bringing this critical issue to a national policy level.

Key Issues

- Schools need high-speed broadband access to effectively create rigorous, technology-infused learning environments
- Students need affordable, high-speed broadband access at home to extend learning 24/7
- Teachers need guaranteed, long-term access to high-speed broadband to enrich the curriculum to include technology applications such as videoconferencing and distance learning
- Teachers need high-speed broadband access for professional development, and engaging in professional learning communities as well as accessing new educational resources such as curriculum cadres and education portals
- Administrators need high-speed broadband access to conduct online assessments and to access data for effective decision making
- Students need high-speed broadband access in their schools to take advantage of a wide range of new and rich educational tools and resources available for anytime, anywhere learning
- Students need high-speed broadband access to overcome the digital divide in rural and low socio-economic areas

Table of Contents

Key Recommendations

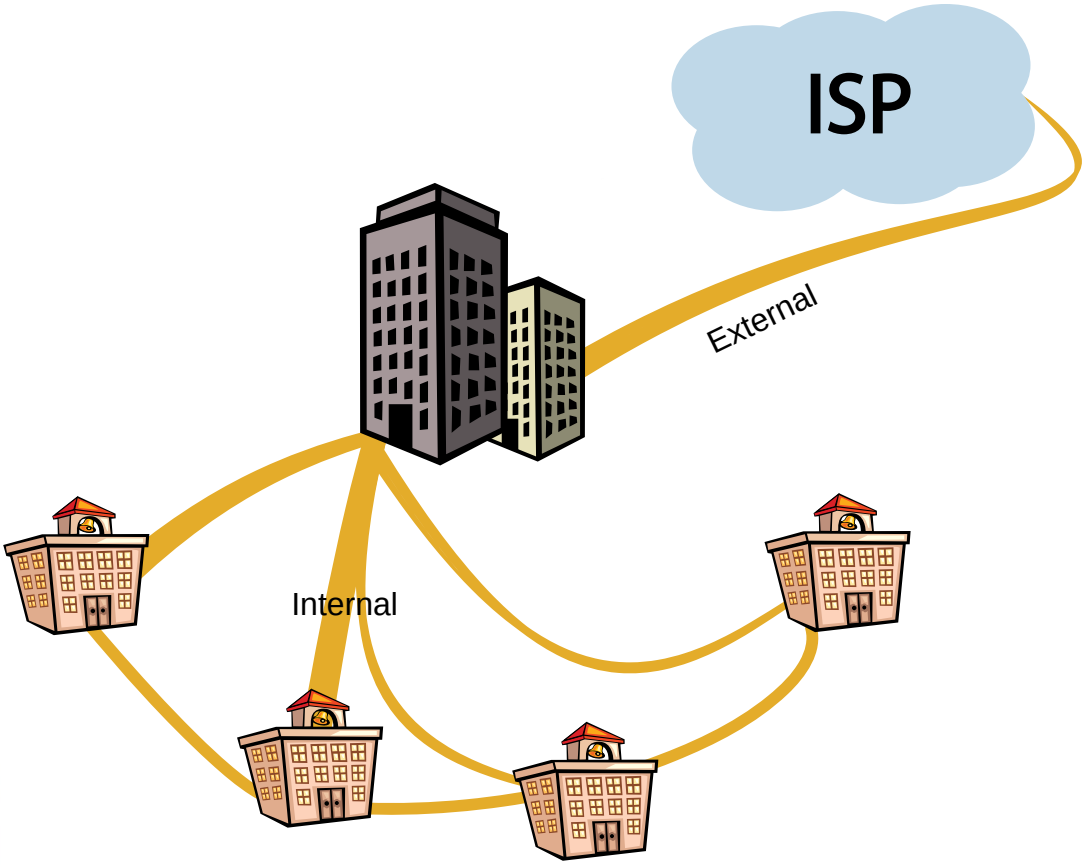
High-Speed Broadband Requirements

In a technology-rich learning environment for the next 2-3 years, SETDA recommends:

- An external Internet connection to the Internet Service Provider of at least 10 Mbps per 1,000 students/staff
- Internal wide area network connections from the district to each school and between schools of at least 100 Mbps per 1,000 students/staff

In a technology-rich learning environment for the next 5-7 years, SETDA recommends:

- An external Internet connection to the Internet Service Provider of at least 100 Mbps per 1,000 students/staff
- Internal wide area network connections from the district to each school and between schools of at least 1 Gbps per 1,000 students/staff



Implementation Tips

To help school districts implement high-speed broadband in schools, districts should consider successful district, community, and statewide models as resources

Broadband is critical to providing Bering Strait School District (Alaska) students with the same high quality educational opportunities as non-rural communities.

Policy Tips

When developing policies supporting the implementation of broadband, school districts should:

- Develop a coordinated planning effort with state and local government, the community and private sector
- Include appropriate stakeholders in the process and obtain stakeholder commitment

Strong leadership from key executives is critical for implementing high-speed broadband access.

Funding Tips

SETDA recommends that states and/or school districts:

- Leverage E-Rate and other federal, state, and local funding sources
- Partner with others in the state and community to aggregate demand and create economies of scale
- Negotiate on-demand fee structures with broadband providers

*High-speed broadband access is similar to a utility - it is **essential** for operations.*

E-Rate Recommendations

- Keep E-Rate as part of the universal service fund
- Advocate that policymakers update the universal service program to increase available funding
- Provide administrative funds to states
- Encourage states to have a State Level E-Rate Coordinator
- Simplify and streamline the E-Rate application and approval process

What Is Broadband?

Broadband is defined as high-speed Internet access, leading to the immediate questions: "what is high-speed?" and "why is it important?" The Federal Communications Commission (FCC) defines speed in terms of the maximum download time and recently updated its definition of basic broadband from 200Kbps in any one direction to a range of 768Kbps to 1.5Mbps.[1] Speed is important because it determines what applications and functionality is possible through the Internet connection. For educational purposes, broadband speed at this definition is still much too slow to facilitate a robust, interactive learning environment necessary to improve student achievement and create tomorrow's innovators. Such a connection could not accommodate many technology applications that have been found to save money and improve teacher effectiveness such as high-definition videoconferencing and online learning. The constraints that inadequate broadband connections pose are vast when considering the trend towards online high stakes testing, database management, school Web presence and communication with parents, collaborative research projects, and video streaming. In fact, between 2003 and 2008 the average size of a web page has grown 233% and the number of objects on the average web page has doubled.[2]

Update the Definition of Broadband to Truly Reflect High-Speed Access

Many industry leaders believe that the definition of broadband needs to be increased significantly in the next few years. Most believe that the definition of high-speed broadband should be at least 10 Mbps by 2010.[3] Others support creating big broadband networks of at least 100Mbps[4]. Some countries have already established goals of 100 Mbps, while other countries have established goals of 10 Gbps.[5] In contrast, the National Academy of Sciences does not define broadband with a fixed speed – instead it defines broadband as the ability to access service that enables the creation of necessary applications and content.

Current State of Broadband

Access versus Adoption

- *Access is the physical availability of high-speed broadband services*
- *Adoption is the subscription to and use of high-speed broadband services*

Access

In 2004, President Bush called for a national *goal* of affordable access to broadband for all by 2007.[6] Unfortunately, we have not yet achieved these goals with broadband services available to only 80-92% of households at speeds both above and below the current FCC definition of broadband.[7] Rural areas often have more limited access to broadband than other areas in the country. Often times, high-speed broadband access is not available for that "last mile" and in order to have any access at all, rural households have to pay more for slower speeds of broadband service.

High-speed broadband access in rural communities can provide distance learning opportunities that would otherwise be unavailable to those students.

Adoption

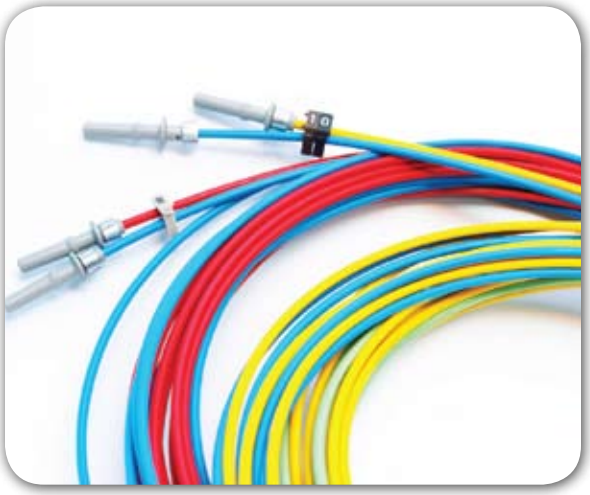
In addition to access, there are issues of broadband adoption. The U.S. is ranked 16th in the world in broadband adoption.[8] Ninety-one percent of the variation in broadband adoption rates among individual states is attributable to economic and demographic conditions, such as household income, education, and income inequality.[9] Affordability of high-speed broadband is a critical factor in adoption. For example, higher income households are more likely to adopt broadband services, with 62% of households with incomes over $100,000 subscribing to broadband compared to 11% of households with incomes less than $100,000.[10] Clearly the digital divide remains a significant obstacle to overcome.

Create a National Policy?

The U.S. does not have a national policy addressing high-speed broadband; however, several national organizations such as EDUCAUSE, the Alliance for Public Technology (APT), and Speed Matters believe that in order to achieve affordable access for all, the U.S. needs to develop a comprehensive national policy that addresses the issues surrounding deployment, affordability, adoption and speed, especially as capacity and consumption expands. In fact, most economically developed nations have created national policies to promote high-speed broadband development and adoption. For example, Japan has a national initiative to build fiber networks to every home and business.[11] In the United Kingdom, through regulatory and funding initiatives created by the government, broadband services are available to 99.7% of households.[12] In Korea, the government built a national Internet backbone for broadband, including the provision of broadband services to all public schools.[13]

In order to provide students with an interactive learning environment necessary to build the high level skills essential to compete in the global economy, we need to ensure that our children have access to high-speed broadband both at school and at home – with access that is affordable for all households.

Current State of Broadband In Our Educational System



In order for administrators, teachers, students, and parents to effectively use technology tools and resources, schools need high-speed broadband access. According to statistics compiled from the E-Rate program, 98 percent of schools have *basic* Internet access. However, for many of these schools, access is often limited and at low speeds. For example, access may mean that a school is considered "connected" when it only has one computer dedicated to administrators use for email purposes. In addition, in many school districts Internet access is not even baseline broadband and thus, is insufficient to handle current and emerging technology applications that demand ever increasing bandwidth, such as video streaming, video conferencing, and online interactive learning.

Based upon our observations, most schools in the country are at T1 (1.54 Mbps) connection speeds between the school buildings with some having additional capacity.[14] With these bandwidth speeds, schools are trying to accommodate the technology needs of many concurrent users. Compared to the average household with broadband access of at least 5 Mbps[15], with just a few users, bandwidth in many schools is significantly lower with many more concurrent users. Broadband connection speeds in schools are already behind average households, and in the next few years as bandwidth needs expand, schools will need to *significantly* upgrade their high-speed broadband capabilities to try to keep pace with what children are accustomed to at home. Even in schools that are sufficiently connected with broadband, bandwidth demand is quickly exceeding capacity as they utilize advanced technology tools. Simply having connectivity is not enough: without measurable upgrades in bandwidths to allow for greater speeds – or even to maintain current speeds as demand grows, teachers and students will be severely limited in the technology applications they can utilize.

Why Broadband Is Important For the Educational Community

Our education system needs high-speed broadband access for all to ensure that our administrators, teachers, and children have access to the technology resources available so that our children are competitive in the 21st century. There are many proven technology solutions that are scalable, flexible, reliable, and have the ability to cost-effectively transform education for ALL students. In order to utilize these technology tools and resources to enhance teaching and learning, our administrators, teachers and students need high-speed broadband access for:

- Online Assessments, Data, and Other Administrative Uses
- Online and Distance Learning
- Special Education Learning
- Web 2.0 Technology Tools
- Professional Development Opportunities

Online Assessments, Data, and Other Administrative Uses

High-speed broadband access for all enables administrators to utilize online assessments, which may be formative, diagnostic, or summative. Online assessments are used principally to measure what students have learned. Online assessments may also be used prior to teaching a concept to determine a students' current knowledge. Several states, such as Virginia are utilizing online assessments. High-speed broadband access also enables the use of data for administrators and teachers. Using data empowers teachers and school leaders to improve teaching practices and individualize instruction for all students. Data can also be used for reporting and analyzing to determine alternative assessments and student performance measurements.

Online and Distance Learning

High-speed broadband access also enables students to engage in online and distance learning. For example, Louisiana has successfully implemented the Algebra I Online Project, which provides Louisiana students with a certified and qualified Algebra I instructor, and a high quality Algebra I curriculum, through a year-long web-based course. The program continues to positively impact student achievement and instructional strategies of teachers seeking mathematics certification. In Alabama, the ACCESS Distance Learning program provides opportunities for Alabama public high school students to engage in Advanced Placement (AP), elective, and other courses via the Internet to which they may not otherwise have access.

Special Education Learning

Technology can make learning and participation possible for the over 2 million American children who have a disability. For print disabled students using screen readers and blind students reading the same textbook with refreshable Braille, assistive technology can provide access to the general curriculum and higher achievement. High-speed broadband provides access to the world through virtual field trips. Imagine taking a group of severely autistic students to visit the museums of New York City, London, or Nairobi via web cams and simulations. Special education personnel, too, benefit from the potential of high-speed broadband. Networked data management systems for developing and tracking Individualized Education Plans increase productivity and compliance within a district.

Web 2.0 Technology Tools

Some technology tools requiring high-speed broadband that are currently used in school districts around the country include Web 2.0 tools such as blogs, chats, podcasts, video, and wikis. Technology is providing the platform for on-going and real communication and collaboration among students and teachers with writing, research, publishing, and debating on topics in all subject areas.

For example, in a Tennessee high school in Henry County, the ninth grade journalism students use a blog to publish high school news daily, whereas in the past when they were publishing a printed hard copy, they only had the budget to publish once or twice per school year. Now the journalism class is able to produce more publications with modern tools of the trade.
See: www.henryk12.net/hchsnews and www.henryk12.net/spirit.

Students at Jamestown Elementary School in Arlington, Virginia are heavily engaged in learning through the use of technology in the form of podcasts. Students at all grade levels create podcasts in different academic content areas covering topics such as mathematics story problems, school current events, silly sentences, classroom core values and mission statements, and responses to books read.
See: http://slapcast.com/users/Jamestown?1554Nav=|&NodeID=1086.

A consortium of small rural districts in Arizona utilizes two-way interactive television to bring the outside world into their classrooms. These districts are geographically isolated and use videoconferencing to access hard to obtain educational resources such as virtual field trips and dual enrollment classes. See http://www.ade.az.gov/technology/CurrentEETT/07-09/pinal-itv-consortium.asp and http://www.pinalitv.org/Home/tabid/358/Default.aspx.

Curriculum drives bandwidth needs – Indiana's ACCESS program (one-to-one computing in high school) has shown that teachers will not revise curriculum until they have guaranteed, long-term access to technology and the Internet. Technology applications such as Moodle and Ifolder require access to high-speed broadband.

Professional Development Opportunities

High-speed broadband access for all is also essential in providing professional development opportunities for our teachers. Education portals, curriculum cadres, and online courseware are just a few examples of professional development strategies requiring high-speed broadband access.

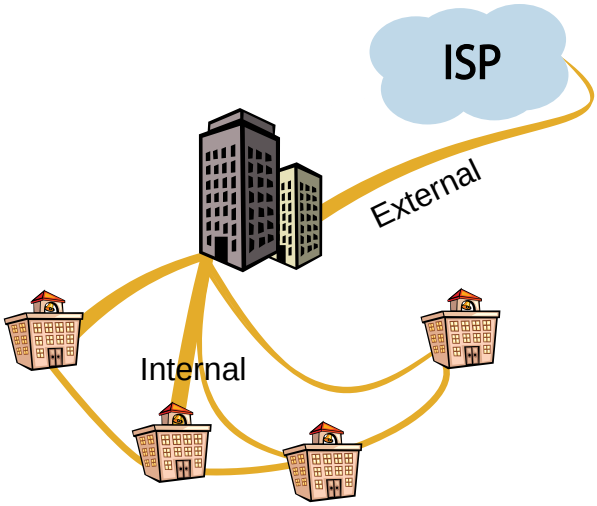
- **Education Portals –** In Arizona, IDEAL is a web portal for Arizona educators to access educational resources and services with the ultimate goal to increase the academic achievement of all Arizona students and to support school improvement efforts throughout the state. Through a single sign-on, educators enter a web environment and can access a vast array of online resources. A portal allows educators to quickly search for lesson plans or other resources by content standard, grade level, and/or topic. www.ideal.azed.gov
- **Curriculum Cadres** – The Alabama Best Practices Center designed a two-year professional development program that engages educators from participating schools in powerful conversations about 21st century learning. The Center established a virtual learning community built around an online curriculum called "Keeping Up with the Net Generation." http://www.bestpracticescenter.org/21stcentury.htm
- **Online Courseware –** In eTech Ohio has implemented a program to provide online professional development courses for all Ohio PK-20 educators and professionals. These are anywhere, anytime, asynchronous courses with eTech Ohio certified facilitators. Facilitators are online on a daily basis to respond rapidly to the needs of participants. In many cases, graduate credit is obtainable by teachers who take the courses. http://etech.ohio.gov/programs/elearning/

Recommendations

Most school districts and schools in the country are connected -- the challenge is getting adequate high-speed broadband to the school districts and schools so that they can utilize the technology tools available to enhance instruction. To help states and school districts implement high-speed broadband access in education, SETDA has recommendations in the following areas:

- Benchmarks/Goals
- Implementation Tips
- Policy Tips
- Funding Tips
- E-Rate

Benchmarks/Goals



High-Speed Broadband Requirements

In a technology-rich learning environment for the next 2-3 years, SETDA recommends:

- An external Internet connection to the Internet Service Provider of at least 10 Mbps per 1,000 students/staff
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In a technology-rich learning environment for the next 5-7 years, SETDA recommends:

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- Internal wide area network connections from the district to each school and between schools of at least 1 Gbps per 1,000 students/staff

In a powerful technology environment, supply also creates demand. It is critical to build scalability and flexibility in the network to ensure continuous improvement.

SETDA recommends that school districts consider the following questions when updating their broadband access:

- How many students use your network?
- How many teachers and administrators use your network?
- How many computers are connected to the Internet in your school district?
- Based upon the number of students, teachers, administrators, and computers, how many concurrent users are on the network at any given time?
- What technology applications do you use?
- What technology applications are planned for the future?
- How much bandwidth is required for each technology application?
- How can you build scalability and flexibility in the network to ensure continuous improvement?

Typical Bandwidth per User
Email and Web Browsing (50kbps)
VoIP (Voice over IP) (50kbps)
Online Learning (100kbps)
Audio Streaming (100kbps)
Online Assessment for each Student (100kbps)
Student-created Content (150kbps)
School Portals (150kbps)
Virtual Field Trips (250kbps)
TV-Quality Video Streaming to a Desktop (250kbps)
Interactive Video at a Desktop (300kbps)
Source: School 2.0 Bandwidth Calculator

Based upon the answers to these questions, school districts can determine approximate bandwidth usage, and then use this information to scale the bandwidth required to meet anticipated technology needs in the next three to five years. In a powerful technology environment, supply also creates demand – as schools see the benefits of utilizing technology applications, they will want to use even more technology tools and resources. School districts should consider this concept when projecting necessary bandwidth requirements over the next few years.

States and/or districts can also access the School 2.0 Bandwidth calculator to determine the amount of bandwidth needed to run your current and/or future applications at http://etoolkit.org/etoolkit/bandwidth_calculator/index.

Approaches to Exemplary High-Speed Broadband Access

While the vast majority of schools and school districts do not have the high-speed bandwidth required to create modern learning and administrative environments, there are several exemplary examples of education agencies that have been able to implement a vision for ubiquitous high-speed bandwidth connectivity. This section highlights these model approaches for implementing high-speed broadband access in our schools:

- District Models
- Community Models
- Statewide Models

District Models

Charles County Public Schools, Orange County Public Schools, and Bering Strait School District are examples of exemplary district models used for implementing high-speed broadband in our schools.

Charles County Public Schools

Five years ago, Charles County Public Schools (CCPS) in Maryland initiated a program to provide broadband access to all 37 schools in the district. CCPS utilizes Network Maryland, a statewide high speed network that provides basic network connectivity for all public entities in the state, including government, courts, libraries, and schools. Network Maryland was created to provide economies of scale for public agencies throughout the state and to help communities gain access to broadband. CCPS currently receives 40 Mbps of internet bandwidth to the students and staff of approximately 30,000. CCPS manages the external 40 Mbps Internet bandwidth by paying for services based upon current demand. CCPS monitors demand, so that administrators, teachers, and students are not overtaxing the system with excessive use of non educational content. Internally, CCPS maintains a 2 Gbps connection between all school sites to provide access to applications and content.

> *"The bottom line for all of these technologies is that if they're not used for the purposes of instruction, it's all a waste of money"*
> —Bijaya Devkota, CIO for Charles County Public Schools

> *"Key to successful implementation was the leadership and vision from the district superintendent of education working in partnership with the CIO"*
> —Charles County Public Schools

In addition, CCPS has built out a voice, data, and video network infrastructure providing universal access to instructional and administrative resources. CCPS has also implemented universal wireless access throughout the school district, further enhancing the capabilities of teachers and administrators to access information anytime, anywhere. The overall cost of implementation was $6 million, which was financed through loans. When implementing the wireless networks, CCPS experienced some school infrastructure issues, such as cinderblock walls blocking signals, creating the need for additional wireless hotspots. Additionally, CCPS discovered that they needed to upgrade the power and electrical outlets in the schools to accommodate the new, more robust, network capabilities.

> *"We try to use the technology and tools to initiate enthusiasm from teachers and students"*
> —Bijaya Devkota, CIO for Charles County Public Schools

Learning Environment

CCPS believes that high speed broadband access for every school in the district is necessary to meet instructional requirements, including distance learning. CCPS recently started digitizing the core subject areas and mapping

it to state curriculum. After professional development training, teachers were able to create lesson plans in hours instead of days, and easily use streaming technology to provide voice, data, and video to the classroom environment. With wireless networks, CCPS created an on-demand, anytime, anywhere instructional model -- teachers can conduct lessons anywhere in the school. As these applications are utilized by teachers, students, parents and administrators, it is important for school leaders to look forward and anticipate the growing capacity needs. Taking this notion another step, CCPS is considering the broadband needs relating to data warehousing as online assessment programs are planned for the future.

Orange County Public Schools

In October of 2007, Florida's Orange County (Orlando) Public Schools (OCPS) completed its new, district-wide, high-speed Internet connectivity solution, known as the Managed Broadband Internet Access (MBIA) project. The project was architected by the Information Technology Department with an objective to completely upgrade the district's wide area network to provide a minimum of 10 Mbps of connectivity to each school – to increase productivity and enhance teaching and learning throughout OCPS schools. The highly scalable network is not only capable of securely supporting data, voice and video on a single network but is also able to meet the growing needs of their diverse and rapidly expanding student population that numbers over 176,000. The long term vision is to reach a goal of increased Internet service capacity with a high speed network designed to scale to 10 Gbps of connectivity and beyond.

"The long-term goal is to provide a robust, reliable and monitored network that we can easily expand as our needs and requirements increase. We also want to provide a network that allows us to centralize services at the district office in order to alleviate some of the technology administrative needs at the sites"

– Hermes Mendez, Director of Customer Support Services, Orange County Public Schools

"The Managed Broadband Internet Access project has significantly increased access to Web-based resources and applications for the classroom. Prior to the new network, it was simply not possible for an entire classroom of students to effectively access a website simultaneously. Our goal is fostering constant innovation and utilizing educational technology to prepare our students for the 21st century, and this increased bandwidth to all our schools enables us to make that a reality." Before MBIA implementation, the bandwidth leaving the district out to the Internet was about 150 Mbps. Today it is 950 Mbps, nearly six and half times greater."

– George Perault, Director, Instructional Technology & Library Media Curriculum Services, Orange County Public Schools

Learning Environment

OCPS' is already an experiencing a return on the investment in MBIA. Today, students and teachers are enjoying vastly increased Internet capacity and thus benefiting from important classroom applications and rich online resources that previously were unavailable to them due to insufficient online access.

Building Literacy and Skills through Technology, BLASST is a reading program that's been given an enormous boost by the new super-charged MBIA network. In the BLASTT classroom, students develop their reading, writing, research, presentation and technical skills while working on projects in a variety of core subject areas. Instead of utilizing lectures, textbooks and worksheets, the curriculum incorporates word processing, spreadsheet and presentation software, databases and laptop computers wirelessly connected to the Internet to delve deeper into content as well as build 21st Century skills.

"The progress of the BLASTT class is unmistakable. We keep stringent data on each student's growth throughout the year, and without a doubt, the BLASST class has shown outstanding growth – the most of any students on our campus. FCAT test results confirm it - the first-year BLASTT students improved their scores by 86 percent and the second-year students posted increases in the 70-percent range. It's an outstanding opportunity for me to offer something like BLASTT and this wirelessly connected classroom to my students. Especially to a school of this nature, a Title 1 school, where kids don't often get the opportunity to be exposed to these kinds of technologies."

– Nelson Pinder, Westridge Middle School Principal

Bering Strait School District

Broadband is critical to providing Bering Strait School District (Alaska) students with the same high quality education opportunities as non-rural communities. BSSD is located in coastal northwest Alaska covering an area of approximately 80,000 square miles (about the size of Great Britain), with fifteen schools and about 1,800 students. BSSD utilized SchoolAccess, a high speed satellite network that provides basic connectivity, managed services, and videoconferencing. SchoolAccess was created to allow rural communities to access broadband connections over satellite through E-Rate funding. Today, BSSD has 3 Mbps connections from each school to the district office in Unalakleet that are heavily relied upon to create a coherent sense of community throughout the district, provide educational opportunities to students, and allow teachers and administrators to meet without having to fly between communities.

With the addition of new applications and uses, flexible bandwidth has been a key to success.

Learning Environment

BSSD uses high speed broadband access for every aspect of their school day; it is integrated into instruction and is a key to the district's standards based education model. BSSD has used a number of open source technologies to provide support for the unique demands of their rural district. BSSD has implemented an instruction management tool that allows tracking and reporting of learner progress based on goal areas, helping teachers to plan instruction based on their students' areas of content strength and weakness. BSSD uses a wiki-based system for collaborative writing and curriculum enrichment across the district. Moodle online learning environments are used for instruction and learning management, as well as portfolio creation and tracking. With videoconferencing, BSSD delivers classes in Algebra and Spanish to students across the district and applies learning standards in flexible ways so students create new media products by videoconference, podcast, vodcast, and wiki for an authentic audience. The BSSD has been a key leader in having students broadcast the iDitaProject connecting mushers on the Iditarod Trail with schools across the country, with BSSD students producing, managing and distributing all content. Broadband is critical to providing BSSD's students with the same high quality education opportunities non-rural communities can more easily take advantage. In addition, the BSSD Student Broadcast Team with sponsorship from GCI SchoolAccess broadcasts sporting events which allow communities all over the state of Alaska to view these live events such as state and regional basketball and volleyball tournaments via video conference and streaming to individual village sites.

> *"District connectivity has changed the level of technology integrated into our education system over the years"*
> —John Concilus, Technology Coordinator for BSSD

Community Models

OneCommunity, Lemon Grove Lemon Link, and DeltaNet are examples of exemplary community models used for implementing high-speed broadband in the schools and community.

OneCommunity

OneCommunity, serving Northeast Ohio, is an example of a successful community model bringing broadband access to the local community and school districts. OneCommunity is a nonprofit organization connecting nonprofit and public organizations to a fiber-optic network. OneCommunity will soon connect more than 1,500 sites in 22 counties, including schools, libraries, higher education institutions, hospitals, governments, and arts and

OneCommunity Founding Members

NorTech
Cuyahoga Community College
Cleveland State University
Greater Cleveland Regional Transit Authority
Cleveland Municipal School District
ideastream (the local PBS and NPR affiliate)
Cuyahoga County Public Library

cultural organizations. OneCommunity started in 2002 when Lev Gonick, CIO at Case Western Reserve University, developed a vision to connect nonprofit institutions together into a common community network. The vision expanded to include the public and private sector, with Cleveland's Mayor as a key supporter of the vision.

Highlights

- OneClassroom was created to motivate students, enhance educational experiences, and increase the adoption of technology
- Cleveland Mayor Jane Campbell embraced the project as a one of the key transformational efforts for the community.

Learning Environment

OneCommunity launched OneClassroom, a shared community platform for teachers to access educational resources and offer distance learning to their students. OneClassroom utilizes a broadband network in a secure Web-based environment. Some of the resources available through OneClassroom are:

- Digital Resource Library
- Free Content
- Professional development resources

More than 115 public schools in Cleveland are connected to the OneCommunity broadband network. Teachers are able to integrate technology into the curriculum that engages students through the use of the network. For example, through its partnership with Cleveland Clinic, OneClassroom teachers use curriculum developed by the clinic to connect students to researchers and surgeons at the clinic. Students are able to watch and interact with surgeons during a live webcast of surgery. Cleveland students also benefit from distance learning programs provided by arts and cultural institutions in the OneCommunity network.

OneCommunity has received funding from a variety of sources. Cleveland Clinic provided a $2 million grant to bring technology to 1,500 schools over four years. Businesses have donated refurbished computers to the schools, and telecommunications and utility companies have donated more than 500 miles of fiber-optic rings throughout the region. OneCommunity has also received millions of dollars in in-kind donations of network and advanced computing resources.

"..all of a sudden Cleveland did a leap-frog over other urban districts."
(Cleveland historically lagged other large districts when it came technology.)
—Dan Burns, chief operating officer of the Cleveland schools

Lemon LINK - Lemon Grove School District

Lemon Grove School District, east of San Diego, California is a successful community model bringing high-speed broadband access to the school district and the community. Lemon Grove School District created a Connected Learning Community, Lemon LINK, to connect all schools and the city via an infrastructure that includes microwave, fiber-optic and laser technologies. The community network reaches all schools and city government facilities, including city hall, fire stations, public works, recreation, and community centers.

Highlights

- Business partnerships that provide hardware, software, and telecommunications services have been essential for the project's success
- The school district's Director of Information Systems, Darryl LaGace provides the leadership and vision for this project
- The community network supports connections from 100Mbps to 1Gbps for each location in the community

In Lemon Grove, the school district serves as the communication hub for the whole community, with a common portal linking the city to the educational system. Every classroom in the school district is connected to the network, and all computers in the classroom are connected to the Internet. Through a partnership with a local broadband provider, Lemon Grove provides high-speed *Intranet* connectivity between the students' homes and the school district. The Intranet enables parents, teachers, and the community to correspond and interact on a regular basis.

Learning Environment

With sufficient numbers of computers (2:1 students to computer ratio) in the classroom and access to high-speed broadband at far above average speeds, teachers report that they are integrating technology in the curriculum at every grade level. Teachers are developing web-based instructional units, and students are able to regularly access the Internet throughout the day. Student achievement has increased in both math and reading for 3rd grade through 6th grade. In 2001, three of the four district's Title I schools received state awards for "High Achieving Title I Schools."

DeltaNet - School Districts in the Yukon Kuskokwim Delta Area

DeltaNet is a successful community model bringing low latency, high-speed broadband access to school districts, health clinics, and the communities of the Yukon Kuskokwim Delta area in Southwestern Alaska. DeltaNet created the equivalent of a terrestrial broadband network, connecting remote communities together via an infrastructure that include microwave and fiber technology. The network reaches all 30 schools in 5 districts schools and districts, over 50 health clinics, government facilities, and residences through 42 communities.

Highlights

- E-Rate provides critical subsidies to provide broadband connections essential for successful distance learning.
- The DeltaNet supports connections up to 10 Mbps for each community

In Bethel, the regional and communications hub of the Yukon Kuskokwim Delta, the DeltaNet is connected via satellite to the Internet backbone. Every classroom in the city is connected to the network, and all computers in the classroom are connected to the Internet.

Learning Environment

Based on the geographic remoteness and rural nature of the region, school districts within the Delta rely on interactive videoconferencing to provide students with access to highly qualified educators. Teachers augment in-class education with the creation of instructional materials which students can access through the Internet day. Student achievement has increased in both math and reading for 3rd grade through 6th grade.

Statewide Models

Tennessee's K-12 Network and ConnectKentucky's broadband initiatives are examples of exemplary statewide models used for implementing broadband in the schools and community.

Benefits of a Statewide Network

- Provide equitable and reliable high-speed connectivity for all schools
- Support 21st century collaborative learning environments
- Enable increased educational outcomes
- Deploy mission-critical applications in a cohesive manner
- Facilitate education initiatives
- Leverage existing infrastructure
- Maximize E-Rate funding
- Create significant cost savings and efficiencies
- Enable network-based safety and security features
- Establish single point of accountability for service and support

Tennessee K-12 Network

One of the first statewide K-12 networks in the United States was started in Tennessee in 1996. The original vision of the network was to provide ubiquitous and equitable Internet access to every school in the state. That vision has been expanded to not only provide flexible, high-speed connectivity at speeds of at least 10 Mbps to every school in the state, but also to deliver services that meet the unique needs of K-12 education. Today's demands on network services, reliability and bandwidth growth are tremendous. It is becoming increasingly difficult for individual school districts to cost-effectively provide the support services and scalability required to support a 21st century education system.

The availability of a strong statewide K-12 centric network accessible to all districts and reaching to the end school site has fueled the ability to deliver high-value resources and tools to every classroom such as *Unitedstreaming*, netTrekker, interactive weblogs and podcasts, as well as enabling many

exciting new technologies and education-delivery systems such as video conferencing and distance learning. With this level of robust infrastructure, the playing field is leveled. Schools and districts can share the same tools and resources regardless of a school's size or geographic location, enabling every student access to a 21st century learning environment.

Most schools and school districts in Tennessee receive network and Internet access through a wide variety of transport methods including fiber, Wide Area Ethernet, wireless and T-1 through DS3 connections. The connections themselves are provided by over 40 different underlying service providers, each with specific regional strengths, but the overall network structure, accountability and services are provided by one managed internet service provider—Education Networks of America (ENA). Through multiple statewide and district wide contracts ENA connects over 4,500 school and library sites serving 450 school districts, 230 libraries, over 2.2 million students, teachers and administrators and more than 6.2 million librarians and patrons in four states.

Creating a Big Broadband Vision for K-12

"High-speed access for schools and libraries is truly no longer a luxury, but rather a requirement. Over the past seven years, we have experienced between 45 and 75% annual traffic growth on our backbone as our network members demand higher-capacity connections. Clearly, it's time for a new definition."

—Bob Collie, ENA, SVP of Technology/CTO

ConnectKentucky

ConnectKentucky is a statewide public/private partnership created to "accelerate the growth of technology in support of community and economic development, improved healthcare, enhanced education, and more effective government."[16] ConnectKentucky is an effort to ensure that every household has a form of broadband access. The *Prescription for Innovation* comprehensive plan includes the following goals:

- Full broadband deployment
- Dramatically improved use of computers and the Internet by all Kentuckians
- Online presence for all Kentucky communities
- eCommunity Leadership Teams in every county[17]

Highlights

- Since the start of this plan, statewide broadband availability has increased 53% and adoption has increased 73%.
- ConnectKentucky's NCLO initiative has provided approximately 2,000 home computers to students.
- 95% of Kentucky households can access broadband Internet up from 60% only three years ago. The percentage of citizens using broadband has increased by 100%

ConnectKentucky, a non-profit organization, works with state and local governments, and private providers to achieve their mission. ConnectKentucky addresses both adoption (demand) and deployment (supply of broadband infrastructure). ConnectKentucky works with all broadband providers (cable, DSL, wireless, satellite, and cellular) to determine underserved areas and how many households are in those areas.

Project Sponsors

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Duke Energy Corporation
Environmental and Public Protection Cabinet
The Appalachian Regional Commission
University of Louisville
Morehead State University

Learning Environment

No Child Left Offline (NCLO) is a public/private partnership created as part of ConnectKentucky to address the lack of computers in underprivileged households. NCLO leveraged financial resources exceeding $2.2 million to refurbish and distribute computers to middle school students in poor counties in Eastern Kentucky. NCLO also provides printers and software, including Internet security suites and educational applications for these students. NCLO has expanded the program to provide new computers to a larger segment of disadvantaged students throughout the state. As a result of the NCLO program, entire households have the opportunity to utilize technology that they would not normally have access.

"Kids need to have access to learning 24/7 – inside and outside of school. Computers can be used to expand educational opportunities. When kids have computers at home, it allows them to get more practice and learn more experientially."

—Kentucky resident and teacher, Pete Hawfield

Implementation Tips

This paper presents district, community, and statewide models as references to help school districts implement high-speed broadband in our schools. School districts should choose a model (or a combination of models) that best matches and meets their situation and needs, keeping in mind current broadband use as well as planned future use.

SETDA recommends that school districts consider the following questions when choosing an implementation model:

- Does your school district have a technology plan?
  - If so, does the technology plan provide for the expansion of Internet access to meet minimum broadband standards (see Benchmark/Goals section)?
- Is your technology plan linked with your educational or instructional plan?
- Are there existing statewide models that school districts can access?
- Are there community models that will work in your area?
- Are there district models that will work for your district?
- Does your superintendent support integrating technology systemically?
- Do stakeholders (administrators, teachers, students, parents) support a technology infused learning environment?
- Does your community support public/private partnerships?

Policy Tips

One of the pitfalls of implementing a model for high-speed broadband access is that school districts are often just trying to keep up with current technology applications and use. Often times, policymakers and leaders have not provided the vision for developing a long term strategic plan specifically addressing broadband needs in school districts. High-speed broadband access enables administrators, teachers, and students to use the technology resources available to help achieve educational goals. When developing policies supporting the implementation of broadband, school districts should be strategic in their plans and include appropriate stakeholders in the process. SETDA recommends that states and/or school districts:

- Develop a coordinated planning effort with state and local governments, community, and/or the private sector
- Develop a long-term (3-5 year) technology plan that specifically addresses high-speed broadband requirements
  - Utilize Benchmark/Goals checklist to determine broadband needs
- Encourage the local school superintendent and other administrative leaders to be advocates for implementing high-speed broadband in the schools
- Encourage local school leaders to meet with legislators to advocate for funding to implement high-speed broadband in schools
- Encourage the local school superintendent to meet with the State school superintendent to promote high-speed broadband access in schools throughout the state
- Create a Steering Committee to oversee the implementation of high-speed broadband in schools
  - Include administrators, principals, teachers and key instructional people on the committee
  - Listen to the needs of the individuals utilizing the system
    - What do administrators, parents, teachers, and students need?
    - What types of technology tools will administrators, teachers and students be using?
    - What are the bottlenecks in the system?
  - Hold bi-monthly meetings with Steering Committee to update members and to hear concerns
- Obtain stakeholder commitment

Funding Tips

When considering funding options supporting the implementation of high-speed broadband in schools, SETDA recommends that states and/or school districts consider both funding needs for the initial implementation to provide high-speed broadband access and the on-going costs to maintain and continuously improve the network.

The first step in funding high-speed broadband in schools is to develop a 3-5 year budget plan that specifically addresses current and future high-speed broadband needs, including the cost of Internet service, connections, hardware, software, maintenance, and staff time for the network.

Implementation Funding

- Leverage E-Rate and other federal, state, and local funding sources
- Utilize existing statewide high speed networks that provide connectivity (MD, WA, UT, TN, and IN are some of the many statewide networks serving education)
- Partner with other local school districts and/or the community to aggregate demand and create economies of scale
- Act as anchor tenants by purchasing enough statewide service to create the demand required for the private sector to develop infrastructure in underserved areas
- Develop a community model and share the costs among state/local government and nonprofit groups
- Create a public/private partnership to share the funding of the network
- Solicit in-kind donations

On-Going Costs

- Recognize that high-speed broadband is similar to a utility (electricity, gas, water) that is essential for operations
- High-speed broadband is not a one-time cost, but an on-going expense
- Include funding for high-speed broadband in the operating budget
- Negotiate on-demand fee structures with broadband providers - minimum usage fees with additional fees based upon increased demand

E-Rate

E-Rate is a part of the universal service program, a support mechanism designed in the 1930s to ensure that rural consumers had affordable phone service. The E-Rate program, authorized under the Telecommunications Act of 1996, represents an extension of universal service. E-Rate is structured based upon a priority system favoring the most disadvantaged applicants and provides public and private schools and libraries with discounts of 20%-90% for:

- Telecommunications services
- Internet access
- Internal connections
- Maintenance of internal connections

Over the last 10 years, funding has remained fixed at $2.25 billion without any adjustments for inflation. Demand for the program often exceeds available funding. For the 2008 E-Rate funding year, nearly 40,000 applications were filed requesting $4.3 billion in funding– $2 billion more than was available. Forty-three percent of school districts report that E-Rate funding will be insufficient in the near future.[18]

SETDA Recommendations for E-Rate

- Keep E-Rate as part of the universal service fund
- Advocate that policymakers increase the total size of the pool for E-Rate funds to meet current and future high-speed broadband needs
- Advocate that policymakers, at a minimum, adjust the E-Rate pool of $2.25 billion for inflation
- Advocate that policymakers update the universal service program funding structure, so that all providers of broadband contribute (not just phone companies)
  - Assess fees based on a broad base of contributors
- Advocate that policymakers update the E-Rate program to provide administrative funding for states
  - States assist local school districts with applications and appeals process
- States should have a federally funded State Level E-Rate Coordinator
  - Especially in states that utilize a significant portion of E-Rate funds to provide broadband
  - State Level E-Rate Coordinators assist local school districts with the application process
- Simplify and streamline E-Rate application and approval process
  - Allow schools and school districts and libraries to focus resources on providing funding for high-speed broadband connectivity, not unnecessarily bureaucratic processes
  - Simplify the application process for multi-year contracts

Additional Resources

1) CoSN Broadband Knowledge Center - http://www.cosn.org/broadband/index.php?option=com_frontpage&Itemid=1
2) School 2.0 Bandwidth Calculator - http://etoolkit.org/etoolkit/bandwidth_calculator/index
3) Speed Matters: High Speed Internet for All - http://www.speedmatters.org
4) U.S. Internet Industry Association (USIIA) - http://www.usiia.org/
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6) America's Digital Schools 2008

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16 ConnectKentucky, Mission Statement, http://www.connectkentucky.org/about_us/
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Executive Summary

(Left) Two United States Distance Learning Association (USDLA) board members flank Scott County distance learning Algebra teacher Tony Duncan as he poses with his Platinum Award for Excellence in Distance Learning Teaching from the USDLA. (Center) ENA President David Pierce was present when Scott County Technology Coordinator Mike Lay accepted the Computerworld Honors Program Laureate Medal on behalf of his school district. (Right) Mike Davis is presented the Computerworld Honors Program Laureate Medal.

As the American educator considers the prospect of creating 21st century learning environments, he or she can feel a little like the traveler gazing out across an expanse of rugged, arduous terrain. One can see clearly the destination in the distance—a technology-infused environment designed to foster problem-solving, collaboration, instantaneous communication, innovation and equity of opportunity—as well as the best possible route there—robust broadband connectivity and well-managed networks. But with budget shortfalls, mounting priorities, the necessity of professional development and lack of access to broadband connectivity services, getting there can prove to be quite difficult.

Scott County School System (SCSS), TN, has achieved it. The district has realized full IP-convergence and is utilizing big broadband and small-district ingenuity to stream video, power its telecommunication voice system and erase distance with videoconferencing, distance learning and more. This is an ambitious endeavor to take learning to disenfranchised students—whether they be socio-economically disadvantaged, geographically isolated or have special needs.

Small, Rural District Earns Gigantic National Recognition

In fact, the small district has garnered gigantic recognition in the last couple of years, including three prestigious national awards in educational technology: a Computerworld Honors Program Laureate Medal, a Platinum Award for Excellence in Distance Learning Teaching by the United States Distance Learning Association and a National Title I Distinguished School Award.

While no small feat for any school district, it becomes perhaps an extraordinary achievement when one considers that Scott is an Appalachian county located in the Cumberland Plateau region of east Tennessee with 85 percent of its students qualifying for free or reduced lunch—which translates essentially to living at or below the poverty line as defined by the federal government.

A Burchfield Elementary School student practices his math skills using the web-based software CompassLearning Odyssey.

Customer Profile: Scott County School System, Tennessee

Scott County is situated atop the Cumberland Plateau, in the western foothills of the Appalachian Mountains. The county is bordered by the Cumberland Mountains to the east and the rugged Big South Fork National River and Recreation Area to the west, with mostly level-to-rolling plateau land in its center. The county seat is Huntsville.

As of 2000, the county population was 21,127, the per capita income for the county was $12,927 and the median income per household was $24,093. Seven schools and more than 2,600 students make up the Scott County School System (SCSS). Another school, Oneida High School, constitutes the Oneida Special School District. Eighty-five percent of SCSS students qualify for free or reduced lunch, a number roughly twice the national average.

"If Scott County Can Do It, Anyone Can"

"Basically," explains Michael Lay, the district's technology coordinator, "we are a classic small, rural school district. Yet we try to ignore that and our intent over the past few years has been to transition from a local LAN-based setup to a centralized, state-of-the-art, IP-based delivery system. Obviously, our success has been the result of a lot of things, not the least of which is the hard work of our teachers and students. But I attribute much of it to network-delivered education: CompassLearning Odyssey, Renaissance Place and our distance learning initiatives. We are committed to giving our students the future they deserve, and our technology investments reflect it." Lay is fond of saying that if Scott County can do it, anyone can.

This white paper will explore how SCSS, in partnership with ENA, achieved educational equity through utilizing networked education technology and delivered 21st century education to its students. We will examine the four areas of technological improvement on which SCSS has primarily focused in the last several years:

1. Upgrading the network infrastructure
2. Migration of applications and curriculum from software- and LAN-based to centralized WAN-based delivery
3. Implementation of IP telephony throughout the district
4. Deployment of distance learning systems

Establishing Value Through Cost Efficiencies and Improved Outcomes

The results for education in Scott County have been dramatic. Through the implementation of education technologies, SCSS has:

- Improved student performance
- Enhanced learning opportunities
- Created technology and network efficiencies
- Documented significant cost savings

Technology Meets The Need: SCSS Requirements & Solutions

(Top) Huntsville Middle School students learn with PCs donated by a U.S. Dept. of Agriculture program. (Center) Holocaust survivor Frances Cutler speaks to Huntsville Middle School students via distance learning technology. Thanks to distance learning technology and the Vanderbilt University Virtual School, teachers and students are able to plug into powerful, first-person learning experiences that would not be otherwise possible. (Bottom) A Civil War historian speaks to Tony Zachary's high school class studying the war.

Upgrading the Network Infrastructure

Under Michael Lay's leadership and vision, SCSS has created a technology-rich learning environment. The district has added substantial functionality in terms of applications and hardware, and as a matter of course its network has had to evolve to keep up. Lay offers a metaphor in his characteristically folksy style: "Sometimes all your bus needs is some new tires. But sometimes you need a new bus."

For a few years, the district managed to stay ahead of bandwidth usage by adding T1, then DS3, lines. Before 2008, their network consisted of multiple lines at each of the six school sites, a wireless solution to connect the schools to the Central Office for backup purposes, a mixture of Windows 2000 and 2003 servers, and a Novell server at each school location. The district utilized, and still utilizes, IPCop for firewall protection.

In 2008, the district made some major changes. SCSS installed:

- A fiber WAN (bandwidth between school sites now runs from 20 to 100 Mbps, with 30 and soon to be 40 Mbps in egress). This better-than-broadband access was made possible by ENA.
- Dell PowerEdge servers
- VMWare licenses for each server
- HDP and DNS (which, combined with VMWare, allow the district's servers to do, in addition to backup, a significant amount of routing)
- Enterasys PoE (Power over Ethernet) switches (PoE technology transfers electrical power along with data to devices over a standard cable in the network; this capability allows the district, for instance, to "drop"

IP phones in classrooms without any other infrastructure needs beyond the PoE cable—a cost-savings and disaster-continuation advantage)

About his network infrastructure, Lay says in sum: "Our network is looking great, and it's getting better all the time because we're still fine-tuning it. And with managed network services such as ENA provides, we've got unlimited scalability and obsolescence has been eliminated."

Migration to Web-based Applications and Curriculum

Enabled by a steadily improving network and frustrated with the disadvantages of desktop- and site-delivered curriculum and services, Scott County's technology department has been intent over the past few years to, in the words of Lay, "transform itself from a school-level to a district-level operation. We've gone from a local LAN-based setup to an IP-based delivery system."

From 'potpourri' of apps to one centralized, efficient system

As recently as two years ago, SCSS was running a Novell server at each of its school locations. To cite one challenge of this network setup, the district's ILS (integrated learning system) was client server-based. In addition to requiring the server at each school, it necessitated loading a client on each machine—which in turn meant mapping each client back to the server, creating a unique log-in for each machine and requiring a technician to return to the machine each time there was a problem or an upgrade. Another challenge of the site-server network: teachers and students throughout the district were using Accelerated Reader, inevitably leaving computers on and restarting them while the database was open, thereby corrupting it. More than once a month on average, Lay's team was running Data Doctor Recovery. When the opportunity came to merge their entire network into one server at the central office, rendering many of the district's critical applications web-accessible, SCSS jumped on it.

Mike Lay, Scott County School System technology director, stands and delivers during a presentation. Since spearheading a nationally recognized program in a rural Appalachian school district in Tennessee, Lay has become a busy advocate of distance learning.

"Our software applications are no longer a pot-pourri. Our solutions are now truly district-wide and that's great news for both the user and the support staff. It's wonderfully more efficient."
—Michael Lay, Scott County Schools
Technology Director

Today, students and teachers utilize district-wide, web-based solutions that not only enhance educational opportunities and increase productivity, but also have proven to boost student performance while saving the district money.

The Benefits of Web-based Applications

There are a multitude of reasons why web-based applications are superior to their desktop-based equivalents, and once a school district tests the waters with their first web-based replacement, there typically is no going back. The net sum of benefits proves especially persuasive for technology departments that are leanly staffed, like SCSS. The district's ever-increasing reliance upon web-based applications means:

- **Lighter burden of support and maintenance.** Gone is the time-consuming necessity of a technician to "touch" every machine in the district for loading software, mapping it back to the server, facilitating log-in, troubleshooting problems, etc.
- **Increased buy-in from teachers.** Using web applications generally offer faster implementation, therefore prompt greater use by teachers.
- **Updates are seamless.** Instead of having to patch each and every individual user, the patches/upgrades are applied to the server and each user received the updated version the next time they log in.
- **No legacy.** This is a big issue for traditional software vendors. Users who purchase previous versions of a software almost always will result in legacy versions lying around which need support (which is costly).
- **No admin rights required.** The network administrator is not bothered to approve the installation of software for every user.
- **More availability.** The same way that people access their e-mail from any browser, web applications are exactly the same.
- **Less environmental conflicts.** Generally there are fewer bugs in web-based software, due to the fact that it is not dependent upon any of the hardware or environment settings in the operating system that could cause a problem.
- **Enables social possibilities.** Many web applications are creating chat facilities and the ability to share work in real time.
- **Users' data is kept safe in hosting environment.** Although this is not always true, web applications often ensure their users that their data is safer than on their desktop.
- **Fewer viruses.** No installation translates into a decreased possibility of infection.
- **Lower-price entry point.** There are many benefits to providers as well, meaning that their products oftentimes offer a far greater value than their desktop equivalents.
- **Access to the powerful assets of the web.** By virtue of being wired into the Internet, web applications are able to integrate seamlessly into APIs, widgets, messaging, etc., and are more customizable than traditional applications.
- **Mobility.** Web applications are ready-made for mobile devices and that's not the case for desktop applications.

A screen capture from Scott County Schools' content server represents what the district's Algebra I distance learning students see on their screens during class. Algebra teacher Tony Duncan occupies the largest frame. The seven smaller frames are feeds from the five classes to whom he's lecturing, the central office where the videoconference is monitored and the recording message from the server.

Implementation of IP Telephony

Faced with an aging PBX (Private Branch Exchange) phone system, and like most school districts increasingly concerned about safety and security, SCSS installed an Avaya VoIP (Voice Over Internet Protocol) system in 2005. SCSS qualified for $239,000 in E-rate Priority 2 Internal Connections funding to pay for the new system.* Because some of the equipment (like the phones) is not E-rate eligible, Scott County invested an additional $100,000 in local funds to provide the required ineligible equipment and fund the 10-percent E-Rate local portion match on the eligible PBX equipment.

In addition to finding themselves better equipped for continuity and disaster recovery, the district is also enjoying the other benefits associated with the convergence of voice and data: the cost-effectiveness of VOIP; phone-in-every-classroom affordability and scalability; enhanced communicative capabilities thanks to state-of-the-art features such as call forwarding, conferencing, hunt groups, visual voicemail and forwarding to e-mail just to name a few; and the increased flexibility and mobility that keeps traveling and remote staff connected.

At the same time, the district replaced its aging intercom systems with state-of-the art paging units connected to the new VoIP system. As a result, the district converted many old POTS (Plain Old Telephone Service) lines into virtual or DID (Direct Inward Dial) numbers and dramatically reduced its phone bill. The district was also able to drop many of its analog lines, keeping only what was necessary to maintain fax machines, fire alarms and the security systems.

The Benefits of IP Telephony

- Phones in every classroom (with the ability to make outside calls and have outside calls routed directly to the classroom; long-distance is blocked)
- Internal four-digit extension dialing
- Dozens of time-saving and convenient features such as caller ID, voicemail, conference calling and call forwarding
- Enhanced call capacity
- No more premises-based equipment to purchase, manage or continually upgrade
- Reduced long-distance costs
- Increased campus safety and security because of mobility, reliability and redundancy
- E-rate-eligible maintenance and 24/7 monitoring
- The ability to place an IP phone in any location on the data network with nothing other than Power Over Ethernet (PoE) switches (which simplifies and reduces the costs of expansion and building programs)

*Scott County has a 90-percent E-Rate discount rate and, subsequently, typically qualifies for Priority 2 Internal Connections E-Rate funding. In the latest E-Rate funding year, districts were denied Internal Connections E-Rate funding at less than 87-percent E-Rate discount rate. Therefore, many districts would not be eligible for E-Rate funding on an in-house PBX system similar to the one purchased by Scott County.

QoS ensures "open lanes" for voice traffic

In order to experience quality VoIP, organizations must have adequate bandwidth. This is one of the greatest challenges in networks today: how to achieve good voice quality, along with the uninterrupted transmission of other data, with limited and often shared bandwidth. This is where Quality of Service (QoS) such as that offered by ENA comes into play. If a customer requires superb VoIP quality, even if this means sacrificing other data types, then ENA and/or the customer can tweak QoS settings such that voice data is reserved "open lanes" along the network's bandwidth highway.

Deployment of Distance Learning Systems

In July of 2004, the SCSS's director of schools asked Lay to trade his teaching responsibilities for those of the recently vacated technology coordinator position. Lay accepted and was instructed that his first priority was to create a distance learning program.

The Algebra I class commute didn't add up

Lacking the resources to attract, hire and retain advanced-level teachers, the district was forced to bus many eighth-grade Algebra I students to a single facility for a class that's both required for graduation and essential curriculum for the county's accelerated, college-aspiring students. This meant that these students lost, on average, 45 minutes of instructional time every day. Videoconferencing seemed the natural solution. There was one enormous hurdle, of course: affording it.

Lay began researching and found that Scott County's demographics exactly matched the requisites of a U.S. Department of Agriculture Rural Development Agency (USDA) distance learning grant. Lay submitted the SCSS's application in 2005 and learned in the spring of 2006 that the district had won the $500,000 grant. Besides the county being economically disadvantaged and lying within the USDA's rural empowerment zone, the district's proposal was distinguished by two other critical points: it offered a 15-percent match in funds and was unique in its inclusion of the Scott County History Museum. In addition to its application for Algebra I distance learning, the new videoconferencing equipment would allow students to host virtual tours of the county's history museum. Housed in two log homes built by the high school's building trades class from donated kits, the museum is student-managed and its exhibits are student-developed.

(Left) The Scott County History Museum is housed in two log homes outside the high school. The museum is student-managed, and the exhibits are student-developed. Here, student guides are dressed in character. (Center) The museum has a website, which is also student-created. Soon, the website will offer dynamic, multi-media presentations. (Right) Visitors to the museum listen to one of the student-guides explain an exhibit.

Mike Lay presents the school system's first-ever national award, the Computerworld Honors Program Laureate Medal, to Jake Sharp, chairman of the Scott County Board of Education in July 2007. The framed medal now hangs on the school board's conference room wall.

"Every morning for Algebra I distance learning class, we automatically connect at 8:05 a.m. We have never missed a single class because of technical difficulties."
—Tony Duncan, Scott County Schools math teacher and recipient of the 2008 Platinum Award for Excellence in Distance Learning Teaching: Pre-K–12 Video Conferencing from the United States Distance Learning Association

From videoconferencing novices to experts

Now that the district had the funding, the IT department had to plan, buy and build the system. A self-proclaimed "total videoconferencing novice" at the time, Lay attended a TANDBERG-sponsored workshop to learn more. There he met Smiley Clapp, executive director of IT Engineering Services, Office of Informational Technology, University of Tennessee, and picked his brain about videoconferencing's possibilities.

Lay next consulted with ENA to evaluate the bandwidth requirements to run IP-enabled video equipment. Lay and ENA decided to implement three additional T1 connections at the high school and one at an elementary school, as well as an 12-Mbps egress to the Board of Education Central Office and the public Internet (today, SCCS enjoys fiber and much greater bandwidth between sites and in egress). ENA's Quality of Service was also added to prioritize traffic, guaranteeing sufficient bandwidth videoconferencing at high quality. SCSS chose TANDBERG's visual communications hardware to deploy throughout the district.

"Unimaginable" educational opportunities

Today, five years after first receiving the directive to bring distance learning to Scott County's students, Lay is "blown away by the success of it, both the smoothness of operation and, more, the educational opportunities it's presented us that before were simply unimaginable. I don't think anything has had a bigger impact on the staff and students of Scott County in the past five years than the implementation of the USDA Rural Utilities Services Grant," Lay continues.

"Thanks to the WAN that ENA installed for us, the QoS from ENA that makes sure this information superhighway we've got runs right and TANDBERG's great equipment and software, there's been no glitches, no problems," says Lay.

The Value Analysis: Assessing the Advantages & Computing the Cost Savings

Determining the worth of educational networks and technologies is often, ultimately, a two-fold calculation, one of straightforward accounting through cost analysis and the other a more relativistic reckoning. The first—what networks and their applications can do always better, always faster, always on-demand, compared to operating without them—can be measured in dollars and cents, which is outlined in this chapter. However, the second—the results of networked education such as improved student achievement, expanded educational opportunities, staff time traded from petty tasks to high-grade projects—are high-value educational benefits that are difficult to quantify monetarily but are the ultimate Return on Investment (ROI) measurement in education. We will begin by outlining the high-value educational benefits.

The Incalculable Value: Educational and Community ROI

Raising student achievement is the ultimate goal and it is not easy; it requires a tremendous amount of strategy, discipline and effort from educators and pupils alike. Increasingly in the 21st century, success in education also demands the ability to connect people and foster collaboration, deliver rich content and curriculum, and effectively and efficiently manage administrative processes and applications that can only be achieved through the deployment of powerful and well-managed networks. Something ENA terms "networked education."

The students, teachers and administrators of SCSS have clearly employed all of the above in recent years—from old-fashioned hard work and innovative technologies—and the payoff is apparent in rising performance indicators and a growing collection of prestigious national awards.

In 2005 Scott County won a $500,000 grant from the U.S. Department of Agriculture Rural Development Agency for distance learning equipment. Lay became the district's technology director the year before and, after discovering that the district's demographics exactly matched the requisites of the grant (among others, the district's federal E-Rate discount was 90 percent), spent a year with the TANDBERG grant writing team preparing the grant proposal.

Moreover, through network-delivered distance learning and virtual field trips, the students of this extremely rural, economically disadvantaged county nestled in the foothills of the Appalachian Mountains are getting quality instruction, insights and experiences that simply would be out of reach without the aid of technology. In the words of Michael Lay, the district's technology coordinator, "Finally, the promise of technology and 21st century teaching and learning fulfilled."

There is another important benefit that must not be overlooked. That is the better-than-broadband access that ENA has brought to rural, remote Scott County, TN. By leveraging its relationships with telecommunication carriers and negotiating for competitively priced service, for an "anchor tenant" such as SCSS, ENA brings con-

nectivity opportunities to communities that would not otherwise exist.

The following represent the value thus far derived from the SCSS network and educational technologies.

Improved Student Performance

- **STATE REPORT CARD.** In 2006, Scott County's Report Card from the Tennessee Department of Education was the best it had ever been and has increased each year since. The district has met state-assigned AYP (Adequate Yearly Progress) for five consecutive years.
- **STATE GATEWAY ALGEBRA EXAMINATION.** Of the 128 students that have completed the first two years of Tony Duncan's Algebra I distance learning course (2006-07 and 2007-08), 75 percent scored an Advanced rating on the math section of the state-mandated Gateway examination. The remaining 25 percent scored a Proficient rating, a passing score, and all of them within a few points of the Advanced rating. "We hit a homerun," says Lay.
- **STATE TCAP WRITING TEST.** In 2007, the first year of the district's implementation of the web-based application Writing Criterion, Scott County High School juniors taking the Tennessee Comprehensive Assessment Program (TCAP) Writing Test raised their scores by almost 20 percent, the first increase in four years. The increase has been maintained since.

Enhanced Learning Opportunities

- **DUAL HIGH SCHOOL-COLLEGE CREDITS.** SCSS students have the opportunity to earn dual credits (both high school and college) in Art Appreciation, Art History, Western Civilizations and Intro to Sociology through classes with Roane State Community College (RSCC). Some classes are offered on-site at Scott County High, others are delivered through distance learning from the RSCC campus in Knoxville, TN. In the last two and a half years, 49 SCSS students have each earned a three-hour credit through distance learning. With tuition at $300 per three-hour credit for classes taken on campus, that's a $14,300 value. The SCSS program has been so successful, in fact, that Roane State President Dr. Gary Goff made it a priority to provide the same service to other high schools in their ten-county service delivery area.
- **VIRTUAL FIELD TRIPS (VFTS).** Thanks to Interactive Video Conferencing (IVC) that provides a live, synchronous, two-way and interactive means of viewing and communicating, SCSS students have being doing what would have been impossible just a few years ago: observing autopsies, listening to a Holocaust survivor's story, increasing their cultural awareness by communicating with people in Costa Rica, Brazil, Iraq, Egypt and China, and much more.

  Through a 2008 Perkins Reserve grant and a 2006 Rural Utilities Service grant, SCSS partners with content providers Center for Interactive Learning and Collaboration (CILC) and Vanderbilt Virtual School (VVS). On average, SCSS schedules 25 VFTs a year, costing the district roughly $2500. The same field trips done traditionally would cost the district five to ten times as much, depending on the destination, in transportation and payroll costs. What's more, the students would lose the instruction time that the travel would require and their families would be expected to cover food and lodging costs, which would be unfeasible for many Scott County families. The estimated value the VFT program represents over actually travelling on the field trip, to say nothing of the value of the experiences themselves and the saved instructional time: $50,000 per annum.

- **TEACHER PROFESSIONAL DEVELOPMENT OVER DISTANCE LEARNING.** Like the field trips that SCSS students get to experience virtually, teachers and other staff now have access to training and speakers through distance learning that they would not otherwise have the opportunity to attend. Since these are "bonus"—simply part of the dividends paid out by the technology and not cost-effective substitutes for traditional programs—they can not be regarded as a savings. An example: When distance-learning technology was introduced to all SCSS teachers in an in-service session at Scott High's Little Theater in August 2006, renowned distance-learning expert Lance Ford connected with them from Oklahoma. Bringing him to them would have cost the district $1,000 in travel expenses alone. Because he was able to do it from the comfort of his office, it cost the district nothing. In another example, over 70 SCSS staff members have received free graduate course credits in technology implementation from Tennessee Technological University, with distance learning a component of the delivery.
- **STUDENTS TEACHING STUDENTS.** The Scott County History Museum is broadcasting "virtual field trips" to other schools and organizations around the world. These videos incorporate the students' own research, storytelling and dramatizations. Students, in complete costume, also guide tours of the museum when they have visitors, and the museum plans to develop multimedia content very soon for its website. Wise to the effectiveness of distance learning, Scott County students are themselves taking virtual field trips to faraway places.

  Because of their success with videoconferencing, the Scott County History Museum staff (including students) was invited by The National WWII Museum in New Orleans to participate in their conference on online exhibits. Gary Sexton, Scott County teacher and History Museum curator, presented on visual communications by videoconference to audiences across the country as an acknowledged expert.
- **PARENT AND COMMUNITY CONNECTIONS.** The school district is using videoconferencing to reach out to parents and the community at large. Parents can now engage in school activities without actually being there and the entire community can watch graduation ceremonies via streaming video on the district's website.
- **THE PRODUCTIVE EXCHANGE OF IDEAS.** Since making headlines, Lay has presented at dozens of events and gets e-mails weekly from teachers from all over the country interested in his videoconferencing advice. "Getting exposure, bouncing ideas off one another, working off other peoples' energies, pointing to their successes, that's how amazing things like our program can get started for others," says Lay.

Referencing the title of the bestselling book by Thomas L. Friedman on the digital revolution, *The World Is Flat*, Lay sums up his district's distance learning experience so far: "The world, indeed, is now flat. Technology has leveled the playing field, and we're proof that it brings equity to all schools."

Former Director of Scott County Schools Mike Davis talks to parents on parent night about "back to school" preparations and activities over videoconferencing equipment.

Peace of Mind

The speeds, efficiencies and capacities that the ENA-managed network and new hardware bring to the operations of the technology department can be interpreted in concrete fiscal numbers (as outlined below). But the full significance, Lay says it's inestimable. "It is impossible to put a cost on keeping your network in peak performance. Our network runs like a dream. That's peace of mind. I have confidence in ENA's Network Operations Center (NOC) because most of the time they notify me about problems on my network before I know it about it myself and they're already busy getting it fixed. How do you put a price on peace of mind?"

All told, the technologies at the district's disposal today bring peace of mind in many forms:

- The confidence that the network is running at peak performance and is monitored 24x7x365 by ENA
- The security that comes with a phone in every classroom
- The assurance that the district will almost certainly have communicative access to the outside world, even in the direst of circumstances, thanks to redundancy built into the network and to the unique ability of IP telephony to "plug in and dial out" anywhere

New Opportunities for Better-Than-Broadband Services in the Community

By bringing the most advanced connectivity and voice services to the Scott County School System, ENA also brought it the to the community at large. ENA leverages the connectivity available in the area and works with the incumbent local phone, cable and utility carriers to install new equipment and bring new services to the community. The unique manner in which ENA provides services to schools and libraries allows it to become the "anchor tenant" for competitive, advanced, better-than-broadband services, justifying investment by these carriers to provide even more connectivity service offerings to residences and businesses in the local area. As the largest consumer for better-than-broadband access in Scott County, ENA is now a critical partner in bringing competitively priced broadband access to the entire local area—access that not only drives 21st century learning, but job growth, economic development and enhanced quality of life.

(Left) Teacher Tony Zachary and his class watch a "virtual field trip" on Civil War spies over distance learning equipment. Each year, Zachary's Civil War class participates in reenactments in Kentucky and at the Scott County Museum's Fall Heritage Festival. (Center) Local business leaders, government officials, higher education representatives and Tennessee Scholars Program Director Ruth Woodall (second from left) presented via videoconferencing equipment to Scott County eighth graders before they registered for classes to encourage them to take more rigorous curriculum in order to one day meet the criteria for the Tennessee Scholars Diploma. (Right) A meteorologist waves goodbye to Rachel West's high school class after finishing his "virtual field trip" discussion.

Quantifying the Cost Savings

Network Efficiencies

ENTERASYS SWITCHES AND SOFTWARE.
The Enterasys package of advanced switches and management software that SCSS adopted last year gives the district's network administrator the critical new ability to monitor and troubleshoot remotely. According to Greg Bond, SCSS network administrator: "The fully managed switches from Enterasys provide the ability to control and monitor every bit of data on our network, saving our department an enormous amount of time and headaches. This ability provides a measure of control in our network that we didn't even believe to be possible before the Enterasys guys stopped by for a demonstration."

The cost savings with this equipment extends from:

- Decreased downtime
- Instant notification of failures
- Ability to pinpoint where those failures are located
- Ability to track the location of equipment (workstations, laptops, servers, IP phones, etc.)
- Ability to shutdown rogue devices which may be causing network performance problems (local, district, global)
- Ability to stop the spread of worms, viruses and other self-propagating malware which would cost numerous man hours to repair

VMWARE VIRTUALIZATION TECHNOLOGY AND DELL POWEREDGE SERVERS.
With the advent of "virtualization" software and incredible leaps in computer hardware, it is now possible for multiple operating systems to run hundreds of individual programs on a single piece of computer hardware, dramatically improving the efficiency and availability of resources and applications.

"Instead of four or five servers in a room consuming power, requiring maintenance and generating so much noise you can't hear yourself think," explains Bond, "you can have just server with VMWare. The servers are 'there,' but they're virtual. With VMWare, each server is backed up on every other server, so our redundancy is tremendous. Need more hard drive space for a particular server? With a few keystrokes and the click of a mouse, you instantly have that space. Need more memory? You do the same."

Lay illustrates the time-saving possibilities of VMWare with an example, that of upgrading a server: A recent mail server upgrade—usually a daunting proposition requiring days of software reconfiguration, backups, restorations and settings recreation on each individual machine—was a simple "drag and drop" procedure with WMWare. In forty-five minutes, the mail server was up and functioning at 100 percent with a terrific speed boost. "The amount of time and energy this single server task saved is mind-boggling," says Lay. "Now multiply that by ten (so far), and you see a small fraction of the savings we have experienced since moving to virtualization."

Concludes Lay: "When you are as small as Scott County is and you have as much work to do as most other districts, anything you can do to maximize staffing resources is critical. Not only is there no money for more people, it is often impossible to find anyone qualified in your area with the ability to do the work needed. All the equipment resources we now have, combined with our fiber WAN and management services from ENA, make it possible to do what we need to do, even with limited human resources to do it with. The Enterasys equipment and VMWare literally stands in for an additional half-time network technician at least. Combined with reduced headaches and hassles of our centralized curriculum app delivery and the value of ENA's managed solutions, it makes for a full-time position."

Delivering Algebra I Via Interactive Video Conferencing (IVC)

It is difficult to overstate the impact of the USDA Rural Utilities Service Distance Learning & Telemedicine grant that has made the district's Algebra I and other distance learning initiatives possible.

Because of it, students from all over the district have been able to get the instruction they need for graduation and for building further mathematical instruction without bussing.

From a practical dollars-and-cents perspective, SCSS has documented savings of over $45,000 annually in transportation and personnel costs by utilizing this technology. Gone too is the carbon footprint of daily transporting students to a bricks-and-mortar classroom.

According to Lay, "Nothing has had a bigger impact on the staff and students of Scott County than the implementation of this grant. Finally, the promise of technology and 21st century teaching and learning fulfilled."

Estimated Cost Savings per Annum	
Over hiring a full-time technician	**$40,000**
Estimated cost savings of purchasing **VMWare** licenses for each new Dell server over purchasing individual servers that could perform a comparable amount of work	**$219,000***

Estimated Cost Savings per Annum	
Estimated savings of **Algebra I via distance learning** over bussing students to class	**$45,000**

*Nine Dell PowerEdge Servers ($63,000) plus nine VMWare Licenses ($23,000) equals $96,000. Nine VMWare-powered Dell Servers ($96,000) are equivalent of 45 traditional servers ($315,000). $96,000 subtracted from $315,000 equals $219,000, the amount of money the district saved by using the VMWare-Dell PowerEdge Server combination.

Streamlined Professional Development

With the advent of distance learning at SCSS and savings realized through decreased transportation costs and the ability to reach more staff simultaneously, the district endeavors to provide most professional development training to its staff people via interactive videoconferencing equipment. One of the largest professional development sessions thus far came in the fall of 2007 when the district contracted with Renaissance Learning to send a consultant to help them transition their Acceleration Reader from local servers to one web-based host.

The speaker broadcast to teachers at five locations, and the training included a PowerPoint presentation, made use of the district's Elmo document camera to display hard copies of documents and was completely interactive (the equipment offers an image of the video feed at each location, plus additional screens of PowerPoint, website demonstrations, etc.). Normally, this one-day training totaling $2300 would have been repeated at each location, costing an additional $9200.

On average, SCSS delivers four to five similar professional development sessions each year.

Estimated Cost Savings per Annum	
Estimated cost savings on delivering **Professional Development via IVC** versus traditional in-person training	**$20,000**

Cutting Costs With VoIP (Voice Over Internet Protocol)

In addition to enjoying the powerful new features and worry-free maintenance of VoIP, Scott County realized a substantial savings in their monthly bills from the local telephone cooperative. Some of these savings were realized by dropping POTS lines that cost over $30 per month. Many of the incoming lines were also switched over (ported) to DID numbers, dramatically reducing the cost of maintenance because it is a virtual number rather than a physical line. SCSS also purchased an additional 100 DID numbers for outside calls that cost pennies per month.

As a result of switching from POTS lines to virtual numbers, Scott County was able to drop 41 of the physical analog telephone lines coming into the school and re-route an additional 13 to ported virtual numbers, while keeping the existing phone number for outsiders to call into through the local telco's dedicated T1 line (it was necessary for SCSS to retain some POTS line for fax machines, fire alarms and the property security systems). As a result, an average yearly communications cost of $36,000 dropped to an average of $24,000 per year for long distance, POTS and virtual numbers.

Estimated Cost Savings per Annum	
Estimated cost savings of **VoIP Telephony** over the aging PBX and analog system	**$12,000**

(Left) Scott County High School students are introduced to the culture, history and geography of Costa Rica via a "virtual field trip" there. (Center) Scott County High School teacher Nita Chambers passes out handouts following a "virtual field trip" provided by COSI (Center of Science and Industry) in which her nursing students viewed an actual autopsy. (Right) Former Tennessee Governor Lamar Alexander speaks at the ceremony in which the USDA awards Rhea County Public Schools with a substantial distance learning grant. As a previous grant recipient Scott County School System offered Rhea County help throughout their proposal process.

Total Cost Savings and Avoidance Summary

All totaled, SCSS has been able to calculate significant annual cost savings and cost avoidance	
Cost Savings:	
• Personnel Costs	**$40,000**
• Distance Learning	**$45,000**
• Streamlined Professional Development	**$20,000**
• VoIP	**$12,000**
Total Cost Savings	**$117,000**
Cost Avoidance:	
• Servers	**$219,000**
Total Combined Cost Savings & Avoidance	**$336,000**

For this small, rural school district, $117,000 per year cost savings equates to $45.00 per student that can be re-invested to continue to improve student achievement.

Add to that the one-time cost avoidance of $219,000 and one can see how quickly networked education creates significant and long-term financial benefits.

Future Plans

THROUGH 2012

Scott County is in the process of creating its Three-Year Technology Plan for 2009-2012. Having just undergone a major revamping of their network with new Enterasys switches and Dell servers, the next planned phase of infrastructure for SCSS is to investigate installing wireless access points inside each school. The timing will coincide with new building programs at two of the district's elementary schools. During the construction phase at the two elementary schools, E-rate will help SCSS fund the data cabling that must be strung through each building. With its VoIP phone system, the technology department will be able to provide a dial tone to any classroom by simply plugging an IP phone into one of the new Enterasys Power over Internet (PoE) switches.

Because of a lack of lab space, it is often necessary to take computers to the students at Scott High in the form of "Rolling Thunder," a wheeled lab with 25 wireless laptops. With plans to add more Rolling Thunders and in an effort to accommodate the educational use of cell phones, personal digital devices and personal laptops by students and staff, the district plans to apply for E-rate funds in 2010 and place Enterasys wireless access points across each campus. "That way," says Lay, "we can separate, for security purposes, any wireless traffic from our normal LAN while still providing an IP for users to still be able to surf with under the CIPA-compliant umbrella. By giving users access to our protected networks, we can circumvent any attempts to bypass filtering requirements while still providing broadband." Finally, the district plans to install state-of-the-art security systems and cameras complete with motion detectors that activate hard-drive recording to monitor all critical zones. Network-wired and IP-accessible cameras means administrators will be able to log on from anywhere and see school premises whenever an alarm goes off. Motion detectors will activate hard-drive recording.

Scott County High School students use laptops from "Rolling Thunder," the nickname of a wheeled lab with 25 wireless laptops.

2012 AND BEYOND

Since Scott County Technology Coordinator Mike Lay is retiring after the 2008-09 school year, he asked Scott County High senior and part-time Technology Department employee Billy Overton to offer his view of where technology will take the district, and education in general, in the next ten years.

"Technology during the last ten years has already enhanced education, but the limits have not been reached. According to Moore's law, computing performance will double every eighteen months, and there is no indication that this is incorrect. The amount of progress that technology has already provided will be nothing in comparison to the near future.

It is most likely that technology will become as ubiquitous in the classroom as telephones have become in the everyday world. Teachers, students and classrooms will

become interconnected on a currently unimaginable scale. Children from half a world apart will be able to speak to each other as easily as if they were in the same room. Text will fade away to video. Distance learning has already given us a glimpse at this, but it is likely to become less cumbersome and more easily accessible. With this ability, the potential for collaboration is limitless. The transfer of massive amounts of information from teacher to student will soon be possible as the students are brought into an ever more digitized world. Picture a student entering a classroom with the sum of all human knowledge on that subject accessible at any time. While this is technically possible now through the Internet, the next ten years will lead to easier access that the stand-alone web pages of today lack. With technology progressing at such a dazzling rate, predictions for even five years from now are tricky at best, but what is a very safe bet is that the next ten years are going to be an exciting time for education."

Relatives and members of the community that can not physically attend Scott County High School graduations can watch them remotely at the district's website, www.scottcounty.net.

Provider Profile: Education Networks of America (ENA)

ENA is a leading managed network service provider in the design, deployment and management of network and telecommunications services for schools and libraries. ENA's experience in providing for the Internet access needs of K–12 public education is unique and unmatched. In 1996, ENA's created one of the first statewide K–12 networks in the U.S. and has earned a reputation as experts in distributed networks Today, ENA manages multiple statewide and district-wide education and library networks in Florida, Idaho, Indiana and Tennessee.

ENA's approach to meeting the needs of K–12 schools always begins with teachers and students. Our technical solutions are designed to work for non-technical people who have limited access to technical support and no time to learn new and complicated procedures. Our support services are designed with sensitivity to the importance of eliminating anything that could disrupt or reduce valuable time in the classroom.

ENA's turn-key converged network and telecommunications solutions have no hidden costs and are as innovative, flexible and scalable as they are fast, robust and reliable. Besides best-of-breed technology solutions cost-effectively delivered and managed, ENA offers its customers a single point of accountability, comprehensive support services, industry-leading reliability, and E-Rate expertise for securing and maximizing federal funding. A focus on education and an insistence on exemplary customer service are the hallmarks of ENA, and there is no better partner for creating and managing the networks that are critical for 21st century learning.

Education Networks of America

www.ena.com

ENA at a Glance

- Currently serves over 450 school districts, 4,500 school and library locations and more than 2.2 million students, teachers and administrators in Tennessee, Indiana and Florida
- Soon will begin deploying and managing a statewide high-speed broadband communications education network in Idaho, called the Idaho Education Network (IEN), adding more than 115 school districts, 500 public schools, 140 public libraries and over 300,000 students, teachers and administrators to the ENA network
- Has helped customers receive over $250 million in E-Rate funding since the inception of the program
- Has been recognized by our customers as providing industry-leading reliability
- ENA's Network Operations Center proactively identifies customers' network problems and notifies them before the customer contacts ENA greater than 90 percent of the time
- For six consecutive years of annual surveys, 100 percent of ENA education customers have said they would recommend ENA's solutions to another school district

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(*last name, first name, MI*):

N/A

11. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less that $10,000 and not more than $100,000 for each such failure.

Signature: 
Print Name: David Pierce
Title: President & CEO
Telephone No.: 615-312-6009 Date: 8-11-09

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Standard Form LLL (Rev. 7-97)

Budget						
	Loan Request	Grant Request	Equity	Debt	Bonds	Other Funding
Network & Access (switching, routing, transport, access)	$ -	$ 1,424,117	$ 50,000	$ 356,029	$ -	$ -
Outside Plant (cables, conduits, ducts, poles, towers, repeaters, etc.)	-	9,256,761	-	2,314,190	-	-
Buildings and Land – (new construction, improvements, renovations, lease)	-	-	-	-	-	-
Customer Premise Equipment (modems, set-top boxes, inside wiring, etc.)	-	-	480,000	-	-	-
Billing and Operational Support Systems (IT systems, software, etc.)	-	-	-	-	-	-
Operating Equipment (vehicles, office equipment, other)	-	-	-	-	-	-
Professional Services (engineering design, project management, consulting,	-	2,136,176	-	534,044	-	-
Testing (network elements, IT system elements, user devices, test generators, lab furnishings, servers/computers, etc.)	-	712,059	-	178,015	-	-
Site Preparation	-	712,059	-	178,015	-	-
Other	-	16,000	4,000	-	-	-
Total Broadband System	$ -	$ 14,257,171	$ 534,000	$ 3,560,293	$ -	$ -
		$ 18,351,464		$ 4,094,293		
				22%		

BRADLEY ARANT BOULT CUMMINGS LLP

August 7, 2009

Administrator, Rural Utilities Service
U. S. Department of Agriculture
Washington, D. C. 20250-1500

Assistant Secretary, National Telecommunications
and Information Administration
U.S. Department of Commerce
Washington, D.C. 20230

Re: Education Networks of America, Inc. BTOP Grant Application for Broadband Access and Equity for Indiana Community Anchor Institutions

Dear Sir or Madam:

We are general counsel for Education Networks of America, Inc. (the "Applicant"). In such capacity, we acted as counsel to the Applicant in connection with its ability to apply to the Broadband Technology Opportunities Program and in the review of the grant agreement, as referenced in the Notice of Funds Availability.

For purposes of rendering our opinion set forth herein, we have examined copies of Applicant's Certificate of Incorporation and Bylaws. Other than those documents and the grant agreement, we have examined no other documents and made no factual investigation whatsoever in connection with the issuance of this opinion letter.

Subject to and based on the foregoing, we are of the opinion that:

(a) the Applicant is a duly organized and existing corporation under the laws of the State of Delaware;

(b) the Applicant has corporate power: (1) to execute and deliver the grant agreement; and (2) to perform all acts required to be done by it under said agreement; and

(c) to our actual knowledge, no legal proceedings have been instituted or are pending against the Applicant, the outcome of which would adversely affect the Applicant's ability to perform the duties under the grant agreement, and there are no judgments against the Applicant which would adversely affect the Applicant's ability to perform the duties under the grant agreement. The term 'actual knowledge' means conscious awareness at the time this letter is delivered on the date it bears by the following Bradley Arant Boult Cummings LLP lawyers: John Gillmor and Chris Sloan.

BRADLEY ARANT BOULT CUMMINGS LLP

Bradley Arant Boult Cummings LLP

Roundabout Plaza 1600 Division Street, Suite 700 Nashville, TN 37203 PHONE: 615.244.2582 FAX: 615.252.6380 BABC.COM

Statement of Cash Flows

As a for profit company, ENA's submission is based on project level financials consistent with expected information subject to audit.

Therefore, there is no historical information presented here. See Item 47 for ENA's consolidated audited financial statements.

Key Timing Assumption: All projects completed in a 1 year time frame; All broadband revenue begins on day 1 of Year 2.

	Historical		Forecast Period				
			Year 1	Year 2	Year 3	Year 4	Year 5
Beginning Cash	$ -	$ -	$ -	$ -	$ 727,637	$ 1,455,273	$ 2,182,514
CASH FLOWS FROM OPERATING ACTIVITIES							
Net Income	$ -	$ -	$ -	$ 550,637	$ 550,637	$ 551,241	$ 657,545
Adjustments to Reconcile Net Income to Net Cash Provided By Operating Acivities							
Add: Depreciation	$ -	$ -	$ -	$ 177,000	$ 177,000	$ 176,000	$ -
Add: Amortization	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Changes in Current Assets and Liabilities:							
Marketable Securities	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Accounts Receivable	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Inventory	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Prepayments	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other Current Assets	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Accounts Payable	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other Current Liabilities	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Net Cash Provided (Used) by Operations	$ -	$ -	$ -	$ 727,637	$ 727,637	$ 727,241	$ 657,545
CASH FLOWS FROM FINANCING ACTIVITIES							
Notes Receivable	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Notes Payable	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Principal Payments	$ -	$ -	$ -	$ -	$ -	$ -	$ -
New Borrowing	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Additional Paid-in Capital	$ -	$ -	$ 530,000	$ -	$ -	$ -	$ -
Additions to Patronage Capital Credits	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Payment of Dividends	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Net Cash Provided by Financing Activities	$ -	$ -	$ 530,000	$ -	$ -	$ -	$ -

CASH FLOWS FROM INVESTING ACTIVITIES							
Capital Expenditures	$ -	$ -	$ (530,000)	$ -	$ -	$ -	$ -
Amortizable Asset (Net of Amortization)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Long-Term Investments	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Net Cash Used by Investing Activities	$ -	$ -	$ (530,000)	$ -	$ -	$ -	$ -
Net Increase (Decrease) in Cash	$ -	$ -	$ -	$ 727,637	$ 727,637	$ 727,241	$ 657,545
Ending Cash	$ -	$ -	$ -	$ 727,637	$ 1,455,273	$ 2,182,514	$ 2,840,058

Support: Attachments K, L & M

- Revenue and expenses - see Revenue and expense spreadsheet
- Assume repay of 20% loan is not P&L but is loan repay
- Property tax - 0.5%
- Depreciation - $530k of property over 3 years - $177k per year
- A/R - 1.5 months revenue

Balance Sheet

As a for profit company, ENA's submission is based on project level financials consistent with expected information subject to audit.

Therefore, there is no historical information presented here. See Item 47 for ENA's consolidated audited financial statements.

Key Timing Assumption: All projects completed in a 1 year time frame; All broadband revenue begins on day 1 of Year 2.

Assumption: As this is a report only of project level financials, there is no starting working capital required.

Assumption: No A/P - all billed and paid during month.

	Historical		Forecast Period				
			Year 1	Year 2	Year 3	Year 4	Year 5
Assets							
Current Assets							
Cash	$ -	$ -	$ -	$ 727,637	$ 1,455,273	$ 2,182,514	$ 2,840,058
Marketable Securities	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Accounts Receivable	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Notes Receivable	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Inventory	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Prepayments	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other Current Assets	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Current Assets	$ -	$ -	$ -	$ 727,637	$ 1,455,273	$ 2,182,514	$ 2,840,058
Non-Current Assets							
Long-Term Investments	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Amortizable Asset (Net of Amortization)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Plant in Service	$ -	$ -	$ 530,000	$ 530,000	$ 530,000	$ 530,000	$ 530,000
Less: Accumulated Depreciation	$ -	$ -	$ -	$ (177,000)	$ (354,000)	$ (530,000)	$ (530,000)
Net Plant	$ -	$ -	$ 530,000	$ 353,000	$ 176,000	$ -	$ -
Other	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Non-Current Assets	$ -	$ -	$ 530,000	$ 353,000	$ 176,000	$ -	$ -
Total Assets	$ -	$ -	$ 530,000	$ 1,080,637	$ 1,631,273	$ 2,182,514	$ 2,840,058

Liabilities and Owners' Equity			**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Liabilities							
Current Liabilities							
Current Liabilities	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Accounts Payable	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Notes Payable	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Current Portion - Total RUS Debt	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Current Portion - Other Debt	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other Current Liabilities	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Current Liabilities	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Long-Term Liabilities							
Existing RUS Debt	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Proposed RUS Debt	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Existing non-RUS Debt	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Long-Term Liabilities	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Liabilities	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Owners' Equity							
Capital Stock	$ -	$ -	$ 1	$ 1	$ 1	$ 1	$ 1
Additional Paid-In Capital	$ -	$ -	$ 529,999	$ 529,999	$ 529,999	$ 529,999	$ 529,999
Patronage Capital Credits	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Retained Earnings	$ -	$ -	$ -	$ 550,637	$ 1,101,273	$ 1,652,514	$ 2,310,058
Total Equity	$ -	$ -	$ 530,000	$ 1,080,637	$ 1,631,273	$ 2,182,514	$ 2,840,058
Total Liabilities and Owners' Equity	$ -	$ -	$ 530,000	$ 1,080,637	$ 1,631,273	$ 2,182,514	$ 2,840,058
	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Support: Attachments K, L & M

- Revenue and expenses - see Revenue and expense spreadsheet
- Assume repay of 20% loan is not P&L but is loan repay
- Property tax - 0.5%
- Depreciation - $530k of property over 3 years - $177k per year
- A/R - 1.5 months revenue

Income Statement

As a for profit company, ENA's submission is based on project level financials consistent with expected information subject to audit.

Therefore, there is no historical information presented here. See Item 47 for ENA's consolidated audited financial statements.

Key Timing Assumption - All projects completed in a 1 year time frame; All broadband revenue begins on day 1 of Year 2.

Assumption: As this is a report only of project level financials, only incremental costs are included.

	Historical		Forecast Period				
			Year 1	Year 2	Year 3	Year 4	Year 5
Revenues							
Network Services Revenues:	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Local Voice Service	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Broadband Data	$ -	$ -	$ -	$ 4,014,208	$ 4,014,208	$ 4,014,208	$ 4,014,208
Video Services	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Network Access Service Revenues	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Universal Service Fund	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Toll Service/Long Distance Voice	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Installation Revenues	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other Operating Revenues	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other Revenues	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Uncollectible Revenues	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Revenues	$ -	$ -	$ -	$ 4,014,208	$ 4,014,208	$ 4,014,208	$ 4,014,208
Expenses							
Backhaul	$ -	$ -	$ -	$ 1,196,764	$ 1,196,764	$ 1,196,764	$ 1,196,764
Network Maintenance/Monitoring	$ -	$ -	$ -	$ 1,711,144	$ 1,711,144	$ 1,711,144	$ 1,711,144
Utilities	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Leasing	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sales/Marketing	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Customer Care	$ -	$ -	$ -	$ 10,000	$ 10,000	$ 10,000	$ 10,000
Billing	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Corporate G&A	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other Operating Expense	$ -	$ -	$ -	$ 5,000	$ 5,000	$ 5,000	$ 5,000
Total	$ -	$ -	$ -	$ 2,922,908	$ 2,922,908	$ 2,922,908	$ 2,922,908
EBITDA	$ -	$ -	$ -	$ 1,091,300	$ 1,091,300	$ 1,091,300	$ 1,091,300
Depreciation	$ -	$ -	$ -	$ 177,000	$ 177,000	$ 176,000	$ -
Amortization	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Earnings Before Interest and Taxes	$ -	$ -	$ -	$ 914,300	$ 914,300	$ 915,300	$ 1,091,300

Interest Expense - New RUS Debt	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Interest Expense - Existing RUS Debt	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Interest Expense - Other	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Income Before Taxes	$ -	$ -	$ -	$ 914,300	$ 914,300	$ 915,300	$ 1,091,300
Property Tax	$ -	$ -	$ -	$ 2,650	$ 2,650	$ 2,650	$ 2,650
Income Taxes	$ -	$ -	$ -	$ 361,013	$ 361,013	$ 361,409	$ 431,105
Net Income	$ -	$ -	$ -	$ 550,637	$ 550,637	$ 551,241	$ 657,545

Support: Attachments K, L & M

- Revenue and expenses - see Revenue and expense spreadsheet
- Assume repay of 20% loan is not P&L but is loan repay
- Property tax - 0.5%
- Depreciation - $530k of property over 3 years - $177k per year
- A/R - 1.5 months revenue

Broadband Infrastructure Application
Submission to RUS (BIP) and NTIA (BTOP)

Certification Requirements BTOP

U.S. Department of Commerce
Broadband Technology Opportunities Program

(i) I certify that I am authorized to submit this grant application on behalf of the eligible entity(ies) listed on this application, that I have examined this application, that all of the information and responses in this application, including certifications, and forms submitted, all of which are part of this grant application, are material representations of fact and true and correct to the best of my knowledge, that the entity(ies) that is requesting grant funding pursuant to this application and any subgrantees and subcontractors will comply with the terms, conditions, purposes, and federal requirements of the grant program; that no kickbacks were paid to anyone; and that a false, fictitious, or fraudulent statements or claims on this application are grounds for denial or termination of a grant award, and/or possible punishment by a fine or imprisonment as provided in 18 U.S.C. § 1001 and civil violations of the False Claims Act.

(ii) I certify that the entity(ies) I represent have and will comply with all applicable federal, state, and local laws, rules, regulations, ordinances, codes, orders and programmatic rules and requirements relating to the project. I acknowledge that failure to do so may result in rejection or deobligation of the grant or loan award. I acknowledge that failure to comply with all federal and program rules could result in civil or criminal prosecution by the appropriate law enforcement authorities.

(iii) If requesting BTOP funding, I certify that the entity(ies) I represent has and will comply with all applicable administrative and federal statutory, regulatory, and policy requirements set forth in the DOC Pre-Award Notification, published in the Federal Register on February 11, 2008 (73 FR 7696), as amended; DOC Financial Assistance Standard Terms and Conditions (Mar. 8, 2009); DOC American Recovery and Reinvestment Act Award Terms (April 9, 2009); and any Special Award Terms and Conditions that are included by the Grants Officer in the award."

08-11-2009
(Date)


(Authorized Representative's Signature)

David Pierce
Name:

President & CEO
Title:

FORM **CD-512**
(REV 12-04)

U.S. DEPARTMENT OF COMMERCE

CERTIFICATION REGARDING LOBBYING
LOWER TIER COVERED TRANSACTIONS

Applicants should review the instructions for certification included in the regulations before completing this form. Signature on this form provides for compliance with certification requirements under 15 CFR Part 28, "New Restrictions on Lobbying."

LOBBYING

As required by Section 1352, Title 31 of the U.S. Code, and implemented at 15 CFR Part 28, for persons entering into a grant, cooperative agreement or contract over $100,000 or a loan or loan guarantee over $150,000 as defined at 15 CFR Part 28, Sections 28.105 and 28.110, the applicant certifies that to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure occurring on or before October 23, 1996, and of not less than $11,000 and not more than $110,000 for each such failure occurring after October 23, 1996.

Statement for Loan Guarantees and Loan Insurance

The undersigned states, to the best of his or her knowledge and belief, that:

In any funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this commitment providing for the United States to insure or guarantee a loan, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

Submission of this statement is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required statement shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure occurring on or before October 23, 1996, and of not less than $11,000 and not more than $110,000 for each such failure occurring after October 23, 1996.

As the duly authorized representative of the applicant, I hereby certify that the applicant will comply with the above applicable certification.

NAME OF APPLICANT	AWARD NUMBER AND/OR PROJECT NAME
Education Networks of America, Inc. (ENA,Inc.)	Broadband Access & Equity for In Community Anch
PRINTED NAME AND TITLE OF AUTHORIZED REPRESENTATIVE	
David Pierce, President & CEO	
SIGNATURE 	DATE 8-11-2009

FORM CD-511
(REV 1-05)

U.S. DEPARTMENT OF COMMERCE

CERTIFICATION REGARDING LOBBYING

Applicants should also review the instructions for certification included in the regulations before completing this form. Signature on this form provides for compliance with certification requirements under 15 CFR Part 28, "New Restrictions on Lobbying." The certifications shall be treated as a material representation of fact upon which reliance will be placed when the Department of Commerce determines to award the covered transaction, grant, or cooperative agreement.

LOBBYING

As required by Section 1352, Title 31 of the U.S. Code, and implemented at 15 CFR Part 28, for persons entering into a grant, cooperative agreement or contract over $100,000 or a loan or loan guarantee over $150,000 as defined at 15 CFR Part 28, Sections 28.105 and 28.110, the applicant certifies that to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress in conncection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying." in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure occurring on or before October 23, 1996, and of not less than $11,000 and not more than $110,000 for each such failure occurring after October 23, 1996.

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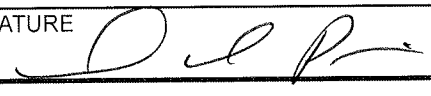
In any funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this commitment providing for the United States to insure or guarantee a loan, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

Submission of this statement is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required statement shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure occurring on or before October 23, 1996, and of not less than $11,000 and not more than $110,000 for each such failure occurring after October 23, 1996.

As the duly authorized representative of the applicant, I hereby certify that the applicant will comply with the above applicable certification.

NAME OF APPLICANT	AWARD NUMBER AND/OR PROJECT NAME
Education Networks of America, Inc. (ENA, Inc.)	Broadband Access & Equity for IN Community Anch
PRINTED NAME AND TITLE OF AUTHORIZED REPRESENTATIVE	
David Pierce, President & CEO	
SIGNATURE 	DATE 8-11-2009

27. Affordability: Explain why the pricing for your broadband service offerings are affordable in comparison to the pricing of existing broadband services in proposed funded service area. If there are no existing broadband services in the proposed funded service area, please explain why the proposed pricing is appropriate for the area (provide supporting data for the proposal).

There are no existing broadband services capable of delivering cost-effective 100mbps connectivity for the schools and libraries in the proposed funded service area. This grant will allow ENA to facilitate and manage the build-out of high-speed, middle-mile grade broadband capacity to these anchor institution locations and provide ongoing service using the constructed facilities at rates consistent with other users in similar locations in neighboring states.

ENA's ongoing broadband services will be affordable as the proposed ongoing pricing will be consistent with pricing offered under ENA's competitively bid contracts in the State of Indiana. Without the grant funding and due to high construction costs, ENA has been unable to offer high bandwidth fiber service to the locations covered by this application at the pricing consistent with other well-served areas in the State. This grant will allow all locations covered by the grant to have access to higher level bandwidth consistent with well-served areas in the State and at similar pricing levels. Additionally, all ongoing services for the anchor locations will use E-Rate funding to assist in payment for the monthly recurring cost of these services. The ability of schools and libraries to use E-Rate funds to pay for the ongoing monthly service charges is the key sustainability factor supporting this grant application. The anchor location users will be required to comply with all aspects of the Federal E-Rate program, including competitive bid requirements that will help ensure that the service selected is cost-effective and affordable.

Typical pricing for fully managed, fiber-based 100mbps Ethernet services range from $1,125 per month to $2,500 per month in areas where facilities currently exist. However, in the areas targeted in this grant, we have found that we cannot offer service at costs below $5,000 per month and that is completely unaffordable to our customers. This grant will change that circumstance and enable us to offer pricing that is more consistent with fiber-rich territories and ultimately encourage fiber construction into areas that currently do not make economic sense. Once constructed, the entire community benefits from access to higher speed service at competitive costs.