FROM THE PRESIDENT
BY: JOE FREDDOSO, PRESIDENT & CEO

"To discover, create, transmit and apply knowledge to address the needs of individuals and society."

"Every Public School Student will graduate from high school, globally competitive for work and postsecondary education and prepared for life in the 21st Century."

"Open the door to high quality, accessible educational opportunities that minimize barriers to post-secondary education, maximize student success, develop a globally and multi-cultural workforce and improve the lives and well-being of individuals."

MCNC has long been about achieving what Jerry Porras and James Collins coined as BHAGS in their business classic "Built to Last". BHAGS are better known as BIG HAIRY AUDACIOUS GOALS. Many of you have been involved from the organization’s inception in 1980 when state leaders had a vision of how to scale and support higher education in North Carolina by applying leading-edge technology for networking and information technology. Achieving BHAGS has been commonplace for MCNC and its partners, particularly its university partners. Just a few:

1985 The first broadcast quality, two-way interactive, multi-point video and audio system
in the United States for distance learning and research collaboration

1985  Establishing a data network for e-mail and file transfer almost a decade before the Internet, as we know it today, was developed. This work led to MCNC becoming North Carolina’s first, and one of the world’s first, Internet Service Providers.

1990  The first national gigabit testbed using an OC48 backbone. 3-D imaging computers at UNC Chapel Hill used supercomputing resources to enable medical researchers to simulate thousands of possible treatment options to find the optimal therapy for individual patients, targeting radiation in a much more precise way than was possible before.

1994  Enable North Carolina to become the first state to deploy high speed networking capability to every county

1997  World’s first “GigaPOP” developed – an extremely fast access point, or high-speed on ramp, to the next generation Internet. This network infrastructure became a model throughout the world and was used to test next-generation networking applications and systems, leading to the establishment of a national network testing laboratory in North Carolina. The GigaPOP became the gateway for all Internet service for all NCREN customers and state government.

2000  Combined video and data networks into a single network based on Internet technology, becoming the first in the nation to provide Internet-based, broadcast quality audio and video for distance learning.

I am proud to be joining this community and this long heritage of achieving great milestones.

But what do these three statements at the beginning of the column have to do with MCNC today? Many of you will recognize these statements, they are:

The core of the mission of the University of North Carolina System: “To discover, create, transmit and apply knowledge to address the needs of individuals and society.”

The North Carolina State Board of Education’s goal for 21st century students: “Every Public School Student will graduate from high school, globally competitive for work and postsecondary education and prepared for life in the 21st Century.”

The core of the mission of the North Carolina Community College System: “Open the door to high quality, accessible educational opportunities that minimize barriers to post-secondary education, maximize student success, develop a globally and multi-cultural workforce and improve the lives and well-being of individuals.”

MCNC has, from its roots, been focused on education and supporting the education community in North Carolina. So, in essence, these three mission and vision statements are part of MCNC’s mission. North Carolina possesses many tangible assets and brilliant minds that can help these three key elements of the state’s education enterprise meet these standards. A very high bandwidth, reliable, secure and scalable network like NCREN is only one key element in the path to achieving these missions. The network is a foundation that enables equal access throughout North Carolina to rich, thought provoking, mind enhancing content to all our students at every level of education in the State.

The power of the network has been demonstrated in projects like the Pharmacy School at Elizabeth City State University that enjoys “virtually shared instruction” over the NCREN backbone with UNC-Chapel Hill and, as featured in an article in this newsletter, the video feed that allows UNC-Asheville to distribute lateral entry teacher instruction to those interested in joining the teaching profession from other career paths.

We have only scratched the surface of using technology as an asset to provide equity of access and opportunity throughout the education enterprise in North Carolina. MCNC is dedicated to helping every student at every level of education in North Carolina achieve their hopes and dreams. I am firmly convinced that the way to expand this effort from a few random, yet compelling examples to a statewide effort is to partner.

MCNC must partner with research organizations in the University community and private sector to develop and implement technologies that speed the delivery of content to students while making maximum efficient use of existing and planned technology infrastructure; partner with educators to determine methods of delivery and positioning of content to maximize student outcomes; partner with peer technology service providers within state government and the private sector to develop and implement the most effective and efficient manners to deliver connectivity to every classroom in the state.

Our sense of urgency to achieve the goal of leveling the playing field for access to education for all North Carolina students should be high. I believe we want to achieve this goal not just because of some concern about United States and North Carolina global competitiveness, but because of the hopes, dreams and future achievements of our students in the modern world. Every citizen in North Carolina should be focused on delivering a superior educational experience to every student in the state so these students maximize their potential and their contribution to society. Education of
From the President  Cont.

our children is the very foundation of quality of life for our every North Carolinian and economic development for our communities. Scaling North Carolina’s world class technology infrastructure to enable equal education access for all students is part of the solution. Now that's a BHAG if I have ever seen one! All of us at MCNC are looking to forward to working with you to achieve this Big Hairy Audacious Goal as partners.

Joseph A. (Joe) Freddoso became CEO and president of MCNC on July 1. Freddoso most recently was Senior Director of Community Relations for Cisco. He served as Director of Cisco’s Research Triangle Park site operations for six years. During this period, Freddoso held several leadership roles with statewide and regional economic development, education and advocacy organizations including: Chair of the North Carolina Technology Association (2005); Chair of the North Carolina Business Committee for Education (2004-2005); Executive Committee of North Carolina Public School Forum; member of the Board of Advisors for the North Carolina New Schools Project; member of the Ad Hoc Committee on Principal Leadership for the North Carolina State Board of Education; member of the Ad Hoc Committee on Superintendent Leadership for the North Carolina State Board of Education and member of the North Carolina State University College of Management Board of Advisors. Prior to his work at Cisco, Freddoso served as CEO of the 1999 Special Olympics World Summer Games Organizing Committee. The Games were the largest sporting event in the world in 1999 and were held in the Triangle region.

UNC ASHEVILLE LATERAL ENTRY TEACHER PROGRAM MODEL FOR THE WESTERN REGION

According to the North Carolina State Board of Education, more than 10,000 new teachers will be needed each year over the next decade to fully staff positions at the 115 Local Education Agencies (school districts) in the State. Yet, less than 3,500 aspiring teachers graduate from North Carolina universities each year. To fill the “teacher gap” the state recruits educators from other states and countries. Also professionals from other careers are encouraged to become teachers through “lateral entry” programs. Lateral entry is a term given to teachers who have been hired in fields in which they hold college degrees but no education license. They become teachers by pursuing an alternative educational route to becoming licensed as a teacher in North Carolina.

There are several routes for lateral entry teachers to gain licensure, Teach for America®, NCTeach®, or Troops to Teachers® are just three of the paths. Lateral entry teachers who are not part of one of these programs can get licensure through the Regional Alternative Licensing Center in North Carolina. There are nine competencies that are required to gain licensure, four of which can be met through district professional development activities offered at the lateral entry teacher’s school.

The University of North Carolina at Asheville and Asheville-Buncombe Technical Community College, working together, have created a model to help lateral entry teachers in western North Carolina fulfill the other five requirements. These remaining five requirements are met through four 3-credit-hour courses designed by Asheville City School personnel, Asheville-Buncombe Technical Community College faculty and UNC Asheville faculty. The courses are taught at A-B Tech and UNC Asheville and teleconferenced to McDowell Technical Community College, Blue Ridge Community College, and Murphy High School Cyber Campus over the North Carolina Research and Education Network (NCREN).

“Through this model,” says Dr. Nancy Ruppert, Lateral Entry Coordinator for UNC Asheville, “lateral entry teachers are being taught as a specialized group. Most of these teachers have taken courses with undergraduate education majors. When they were brought together, they were surprised to find out that they were not the only ones occasionally feeling like a fish out of water, wondering how they will ever learn all the acronyms they hear, feeling somewhat disconnected from faculty who perceive them as ‘rookies’, and sometimes struggling to understanding the culture of schools.”

The UNC Asheville model offers courses via interactive video to help the lateral entry teachers meet the five requirements they do not get from their school districts. In the fall, they offer Teaching Reading in the Content Area to meet the competency of literacy/reading method; and Learning Theory to meet the competency of learning theory/learning style. Their spring courses are Educational Psychology to meet the competencies of understanding the learner and exception-alities/diversity; and Methods and Materials of Teaching to meet the competency of instructional methods. “The goal,” Nancy says “is to advocate for one another in higher education, especially for lateral entry teachers. Through this model we create a community of learning for these educators, a nest of support and mentorship. Unlike traditional education courses, these courses are designed specifically for the lateral entry teacher. The tools they learn in Tuesday evening’s class can be implemented the next day in their own classrooms. The faculty and administrators from Asheville City Schools, A-B Tech and UNC Asheville have worked together to develop this model for serving lateral entry teachers. We also worked very closely with the Regional Alternative Licensing Agency to ensure that all the courses meet the competencies as outlined by North Carolina.”
This year the UNC Asheville/A-B Tech program model had 60 students. NCREN Video Network Operator, Michael Pittman, provided the monitoring of the four connected sites. Monitored video allows for the switching between the various sites, enabling any individual speaking to be seen by all participating sites. “The UNC Asheville courses that we stream and monitor for Dr. Nancy Ruppert involve a great deal of switching between the sites and coordination between NCREN and the university video controller to ensure that PowerPoint presentations and DVD’s are seen by all, no matter which site they are presented from. We make every effort to treat all classes the same, we answer all the questions they have and help them in any way we can to make their class a success,” says Michael.

Getting Dr. Ruppert’s class out to her lateral entry teachers also required the attention of Greg Dillingham in the UNC Asheville Distance Learning department and his staff.

“Before Dr. Ruppert begins her class, we perform equipment set-up and testing with NCREN Network Control to make certain audio and video are functioning properly to ensure optimal communication. We also work directly with Dr. Ruppert and the other instructors and presenters to ensure their instructional media needs and/or administrative needs, like forwarding of test or class handouts, are met. Once the program starts, we work to ensure quality control with NCREN Network Control and the received sites,” says Greg Dillingham. “We strive to make certain that the technology does not become an impediment to the instructor and students. The instructor doesn’t need to understand the technology or how the equipment operates. That’s our job. Our goal is to ensure the instructors are confident that the technology works and that it is a useful tool for the success of their class. This is especially true for Dr. Ruppert’s classes. These classes tend to be more complex than normal interactive video classes because of her expectation of a high level interaction from the class. There are break out sessions between the remote sites that then report back to the instructor, this socialization aspect is greatly encouraged by Dr. Ruppert and is well received by the students.”

If you would like more information about the UNC Asheville/Buncombe Technical Community College Lateral Entry Teacher Program Model please contact Dr. Nancy Ruppert at (828)232-5025 (nruppert@unca.edu) or Dr. Elaine Fox at (828) 232-5122 (fox@unca.edu) or visit their website at www.unca.edu/distedu/ce/lateral.html.

Michael Pittman
Video Network Operator II

As a Video Network Operator, one of Mike’s jobs is to coordinate the interactive video courses at the universities with the campus video staff prior to the beginning of each session. Every campus has its own video equipment and it is Mike’s job to help get the participating sites connected to each other and to monitor the sessions for quality assurance.

One of Mike’s regular campus customers in Video Control is Dr. Nancy Ruppert at the University of North Carolina in Asheville. Mike is the operator on duty when Dr. Ruppert’s classes for lateral entry teachers are held. Working with UNC-A video staff and Dr. Ruppert, Mike coordinate the tasks required to get the session started and is responsible for switching the video between the four participating sites during the interactive video session.

According to Mike, “Dr. Ruppert’s classes require a great deal of attention because of the high level of interaction between her and the students. While it is our goal to provide the same high level of services to all our customers, I find Dr. Ruppert’s sessions particularly interesting to monitor because my mother was a teacher for over 33 years and these interactive video courses are helping to train new teachers.”

Mike is a native North Carolinian with certificates in Computer Engineering and Television Broadcasting. He has been with MCNC for two years and is, in his own words, a “music fanatic.” He has been playing the Bass for about six years. He says if he is forced to pick that jazz is his favorite type of music, and Tom Waits is his favorite musician, but says he really is a fan of all types of music. At the end of July Mike married Lori Owens. They are planning to live in Coats, NC.

THE e-NC AUTHORITY RECEIVES NATIONAL AWARD FOR TECHNOLOGY INNOVATION

In 2000, the N. C. General Assembly created and charged the e-NC Authority (then known as the Rural Internet Access Authority) to work with the public and private sectors to guide the expansion of high-speed Internet connectivity and the implementation of technology-based economic development in all of North Carolina counties, especially those in rural areas. With a similar mission to be a catalyst for technology-based economic development, MCNC provided a grant of $30 million to help accelerate the e-NC Authority’s success. From its inception, the e-NC Authority has devoted itself to...
The e-NC Authority Receives National Award for Technology Innovation  Cont.

connecting the people of North Carolina to the Internet and a better future.

One of the e-NC Authority's distinctive mandates from the N.C. General Assembly is to maintain information about high-speed Internet availability in all 100 counties, and keep this information available to the public through the organization's Web site. To keep the information current, the e-NC Authority developed a password-protected service provider update tool used by telecommunications companies to populate the system with information about their coverage areas and infrastructure expansion. This Web application improves efficiency and allows the e-NC Authority to have the most accurate information about broadband deployment in the state. The display of service provider data has also become an unexpected marketing tool for telecommunications providers, economic developers, county managers and elected officials in the recruitment, development and retention of commerce for North Carolina. Updating this aggregation of data from telecommunications service providers is a massive and ongoing project.

For this innovative Web-based tool, the e-NC Authority has been named one of six national recipients of the 2007 Techie Award, presented by Grassroots.org. The Techie Award is given each year to organizations that are pioneers in online application development work that enhances the capacity of technology in the nonprofit community. The mission of Grassroots.org is to serve as a catalyst for positive social change by leveraging modern technologies and business best practices. The Techie Award is granted to the e-NC Authority specifically for its development of the Web-based service provider update tool.

MCNC and the e-NC Authority share a technology kinship. MCNC provides network connectivity to education institutions and the e-NC Authority is a driving force behind Internet connectivity to homes and businesses in all North Carolina communities. These missions go hand-in-hand toward continued technology-based economic development of North Carolina.

Our state's economic foundation was created by manufacturing, agriculture and textiles. As vital as the sectors are to our past and present, the business landscape of the future is burgeoning with new data processing centers, technology clusters, customer service call centers, server farms, and specialized research campuses. Because of this, our transformation to a knowledge-based economy is impossible without broadband connectivity.

Since its inception, the e-NC Authority has embarked on an organized effort to ensure North Carolina keeps pace with changes in technology so the state will be economically competitive and able to protect and increase local jobs. The e-NC Authority has spearheaded efforts that have increased high-speed Internet access to encompass more than 82 percent of North Carolina households. They have been directly responsible for the creation of hundreds of jobs and trained more than 10,000 people to use the Internet and business-related computer programs.

MCNC Partners with Ruckus to Provide Cost-Saving Anti-Piracy Avenue to Universities

Since the Recording Industry Association of America (RIAA) renewed and strengthened its campus anti-piracy initiative in February of this year it has sent more than 2000 pre-litigation letters to almost 90 universities, informing the schools of forthcoming copyright infringement lawsuits against many of their students or staff. Praised by the RIAA as an innovative business model, Ruckus Network, Inc. is offering a service to the universities to help curb copyright infringement by offering free and legal music to any college student.

Three years ago the University of North Carolina General Administration introduced MCNC to Ruckus® and recommended a partnership that has saved the entire NCREN Community millions of dollars and made much more efficient use of available bandwidth since its inception.

Ruckus is a digital entertainment service for colleges and universities that offers more than 3 million licensed tracks of music for students to download for free using the service's player through a Ruckus server hosted by MCNC. This partnership is part of MCNC's commitment to keeping local traffic local. Since a Ruckus server is hosted at MCNC, when a student downloads a song from the Ruckus network over NCREN the song is stored on the Ruckus server at MCNC; the next time a student wants to download that song their Internet traffic never leaves NCREN, saving the universities the bandwidth and the costs associated with moving traffic over the commodity Internet.

“Our partnership with Ruckus has been highly successful from the start,” said John Killebrew, Director of NCREN at MCNC.
“Since we made the service available three years ago, students immediately began taking advantage of Ruckus’ free and legal media downloads, while our schools have seen both a dramatic increase in bandwidth efficiency and the associated decrease in costs. Without taking steps to localize this network traffic, additional NCREN and Internet gateway bandwidth would be used unnecessarily. These results speak volumes about these colleges and universities’ commitment to curbing piracy, as well as our students’ interest in new, safe and legal ways to download entertainment content.”

To date more than 50,000 North Carolina college and university students have downloaded approximately 17 million songs from Ruckus. Currently, Ruckus has launched its service at Appalachian State University, East Carolina University, Fayetteville State University, North Carolina State University, North Carolina A&T University, North Carolina Central University, UNC Chapel Hill, UNC Pembroke, UNC Wilmington, Western Carolina State University, Barton College, Campbell University, Duke University, Greensboro College and Johnson C. Smith University. They are planning to launch their service at Elon University, Wake Forest University and Lees-McRae College this fall. However, any student with a valid .edu email address can sign-up for Ruckus service.

“We are very excited to see students across the state of North Carolina and nationwide embrace the Ruckus service in such large numbers,” said Ed Cheely, Director of Campus Relations at Ruckus. “Providing a free and legal service for college students to discover new content, legally download digital media and further connect with their campus communities has always been our main goal. We are happy to see the students in North Carolina enjoy and share their Ruckus experience with others. We anticipate a lengthy and continually successful relationship with North Carolina colleges and universities and MCNC.”

**NC State University and MCNC Network Innovations Help Deliver High-Definition Distance Learning**

N.C. State University and MCNC are helping deliver and evaluate the effectiveness of high-definition broadcasts, or HDTV, for distance learning – while also collaborating with universities across North Carolina and the rest of the world to chart a course to develop the next generation of optical networking and high-performance computing.

In an experiment last spring, a distance learning class originating at Louisiana State University and taught by renowned computing expert Thomas Sterling included students at LSU, Louisiana Tech University, the University of Arkansas, and Masaryk University in the Czech Republic.

The technology used to deliver the class marked a milestone. It was the first distance learning class using 1.5 gigabits (Gbps) uncompressed high-definition video with teachers and students able to interact from more than two locations.

The connections to NC State were established using the N.C. Research and Education Network (NCREN) utilizing an optical testbed built by a team led by MCNC. During the HD distance learning sessions, two simultaneous classes were taught. The students enrolled in the classes studied high performance computing while NCSU students, researchers and technical staff evaluated the technology.

The evaluation was completed from two perspectives – the effectiveness of the use of high definition broadcasts for teaching and learning, and the effectiveness of the advanced networking technology used.

Next year, students from NC State will participate in the high performance computing portion of the class along with students at Duke University and the University of North Carolina at Chapel Hill. In addition, researchers at the Renaissance Computing Institute (RENCI) will be involved.

**High-Definition Teaching and Learning**

The growing sales of HDTV televisions is a testament to the appeal of watching television and movies in high definition broadcasts, but whether the added clarity of the images and sound helps students learn more effectively in distance learning environments is open for debate.

The intent was to simulate the learning environment as if the students and teachers are in the same classroom, not hundreds or thousands of miles away. With higher-quality images than conventional broadcasts, researchers were examining whether the ability to more clearly see non-verbal communication, such as facial expressions, gestures and posture, enhances learning using video-based distance learning.

Researchers found that while everyone was impressed with the quality of the video, less-than-perfect audio among the sites diminished the learning experience. Next spring, more emphasis will be placed on the audio quality, from the way it is managed over the network to the placement of microphones and speakers in the classrooms. “It was an experiment and good learning experience for all of us,” said Gigi Karmous-Edwards, principal scientist at MCNC, principal investiga-
NCSU and MCNC Network Innovations Help Deliver HD-Distance Learning  Cont.


**Experiment Enabled by Optical Networking Advancements**

While the delivery of high-definition broadcasts over a network is not new – automating the process among multiple sites, including sites in multiple continents, is a significant accomplishment.

MCNC’s collaboration with North Carolina universities for advanced networking experiments keeps NCREN and North Carolina on the leading edge of discovery and leads to innovation – the best of which are incorporated into NCREN to benefit all education partners.

NCREN continuously strives to provide the tools for collaboration and sharing resources over the network including computing resources, software applications, scientific research equipment and even people. For example, new learning tools and teaching methods that engage and inspire students can be shared among every classroom. Video-based distance learning enables expert teachers to give classes to students anywhere in the state, and new teachers in rural communities can enroll in certification classes at the state’s leading universities.

Through advanced networking research and pilot projects in collaboration with university partners, MCNC engages in a continuous cycle of technology evolution, evaluating new hardware and software in test beds and deploying leading-edge computing and networking services in the statewide network.

**Network Resources On Demand**

The HD class experiment is a prime example of collaborating to explore new technical areas. Conventional methods to establish the network connections to support such a class would have required establishing “fixed” network connections among the participating sites, a process that can typically require weeks or months. In addition, the network connections typically remain in place for months or years, preventing valuable network resources for being repurposed for other needs.

In the HD class experiment, networking students, engineers and researchers at NC State, in collaboration with MCNC, demonstrated how Grid computing “middleware” software technology from the Enlightened Computing project can establish and release network connections automatically, or on demand.

The duration of these on-demand connections is precisely the amount of time that is needed, and no more. With the growing demand by many bandwidth-intensive applications, including online learning and video-based distance learning, the automated connection and release of the network resources is critical for efficient use of optical networks.

The goal in developing next-generation optical networks is to extend the control of the network and resources to end-users and software applications. The intermediary controlling software uses what is called the “optical control plane” to control the network resources. The optical control plane controls the establishment, maintenance and release of connections in an optical network as well as algorithms for engineering an optimal path between resources.

“This type of application requires a big, fast network, but the class doesn’t run 24/7” said John Moore, principal engineer at MCNC. “Our ability to re-assign these dedicated connections elsewhere when not being used for the class is key to the appeal of this technology.”

**Worldwide Research Collaboration**

The network infrastructure bringing the video broadcasts from around the world to North Carolina is the National LambdaRail (NLR), a national research network infrastructure and the Enlightened Computing project testbed. The Enlightened Computing testbed is an example of this new breed of research network infrastructures in which an optical network is an integral part of the computational infrastructure and an example of international collaboration. Cisco has granted use of a 10 gigabit-per-second network connection from Raleigh on its share of the National LambdaRail infrastructure connecting through to Washington, Pittsburgh and terminating in Chicago at an international network hub called Star-Light.
Enlightened Computing project is a collaboration that includes National LambdaRail, N.C. State University, the Renaissance Computing Institute at UNC Chapel Hill, MCNC and the Center for Computational Technology at Louisiana State University. Private company research organizations include Cisco, IBM, AT&T Research and Calient Networks.

The work with uncompressed video signals and the control plane middleware tools will be demonstrated at the 7th Annual Global LambdaGrid Workshop in Prague, the capital city of the Czech Republic, in September as part of the GLIF Control Plane Working Group. It will be followed by a demonstration at Supercomputing 2007 (SC07) in November in Reno, NV. SC07 is an international conference to showcase how high-performance computing, networking, storage and analysis lead to advances in research, education and commerce. This year’s event is Nov. 10-16.

Similar to the HD class experiment, the Enlightened testbed and control plane middleware will help connect computing resources at LSU with computing resources in the UK as part of the Grid Enabled Neurosurgical Imaging Using Simulation (GENIUS). The goal of the project is to develop tools and policies to reserve and coordinate geographically dispersed network and computing resources, and develop an interface to enable doctors to control the resources and run the simulations. The simulation enables doctors to experiment with varying options of surgical treatment, exploring surgical treatments and therapy.

“The HD high-performance computing class and GENIUS simulation are two of many emerging applications requiring high-capacity network connections for short duration of time,” Karmous-Edwards said. “We are also working with N.C State University to integrate the control plane middleware with high-performance computing resources in the university’s Virtual Computing Lab, which can be used to benefit schools at all grade levels in North Carolina. The advanced networking research collaboration with our university partners to share resources over the network has the potential to have a profound influence on teaching and learning in college and K-12 classes.”

Please visit us at www.mcnc.org for the electronic version of this newsletter.