



**MCNC**  
Connecting North Carolina's Future Today

## Introduction

This paper is intended as MCNC's proposal to U.S. UCAN to participate in the Affiliate Pilot Program. MCNC views the development of U.S. UCAN as a critical component in the support ecosystem envisioned for Community Anchor Institutions (CAI) in the FCC's National Broadband Plan and the NTIA's Broadband Technology Opportunities Program (BTOP).

## Aligning Mission and Goals

MCNC's role as the operator of the primary community anchor network in North Carolina strongly positions the organization to be the affiliate for the U.S. UCAN program in the state. MCNC operates the North Carolina Research and Education Network (NCREN) as a significant economic development resource for the state and is already, along with its' partners in the NCREN community, facilitating advanced and innovative applications for community anchor institutions. In addition, MCNC's strategic plan emphasizes its role as a convener for the communities it serves, which makes it a natural partner for organizing and engaging CAIs, as desired by U.S. UCAN in the pilot phase.

## History and partnerships

MCNC is a private non-profit organization founded in 1980 by the North Carolina General Assembly and the administration of then North Carolina Governor Jim Hunt. The North Carolina Board of Science and Technology, an advisory board to the Governor recommended the founding of MCNC to promote information technology based economic development in the State with a focus on the Research Triangle Park region. There was almost immediate success as General Electric decided to locate a chip manufacturing plant in RTP partly due to the presence of MCNC<sup>1</sup>.

MCNC had a successful run as a research based organization from 1980-2000, choosing a model where MCNC scientists would develop intellectual property, create a patent

---

<sup>1</sup> MCNC originally stood for the Microelectronics Center of North Carolina. This name was coined based on the original research focus of MCNC (silicon chips and advanced networking technologies). MCNC continues to use the acronym as its name.

portfolio, spin off companies, and pursue federal research grants. A patent portfolio numbering in the range of 125 patents and 7 spin-off companies resulted.

Between 1995-2000, the North Carolina General Assembly drew down all direct research funding to MCNC and recommended that MCNC's research mission be transferred to the public research universities and other research institutions in the Triangle.

In 1984, MCNC began, at the State's request, to create and operate a microwave network that connected the institutions in the University of North Carolina System. As technology evolved in the early 1990's, MCNC also was tasked with creation and operation of an Internet Protocol (IP) fiber-based network to serve the ongoing research and education needs of the UNC System and other select institutions. This network (NCREN) was developed as a private intranet allowing these institutions to communicate with one another on a low latency, high bandwidth network to conduct leading-edge research and to meet the increasing demand for digital content as part of student's education. NCREN also allowed the UNC System to share Internet bandwidth among all its' institutions and buy in bulk. This has kept Internet costs down particularly for rural institutions – which could procure Internet bandwidth through NCREN at prices that were 1/5<sup>th</sup> to 1/10<sup>th</sup> what they could buy on their own. This approach has saved these institutions millions of dollars over the last 20 years.

NCREN remains focused on serving the global research needs of the three R1 Universities in the State (Duke University, North Carolina State University and UNC-Chapel Hill) by providing a high speed, low latency network for intrastate communications, and connecting to Internet2 and National Lambda Rail for global direct connectivity to other research institutions.

In 2005, the General Assembly (led by then Lt. Governor Bev Perdue (now Governor Bev Perdue) and at the recommendation of the North Carolina Business Education Technology Alliance) recommended that all public education institutions be connected to NCREN to take advantage of this bulk purchasing and to allow, K12 School Districts and Charter Schools to build robust district networks that would scale to meet the rapidly increasing demand for bandwidth. Now in 2012, all 115 local school districts, all 58 community colleges, 26 charter schools, 24 non-profit hospitals, 27 four year independent colleges and universities, 57 public health agencies and the State of North Carolina all participate in and enjoy the advantages of the NCREN backbone.

NCREN has benefitted for-profit telecommunications and cable companies throughout North Carolina through increased spending on both last-mile circuits (to connect individual community anchor institutions to NCREN) and wholesale bandwidth. The value of this spending has increased from \$5.5M in 2007 to almost \$9M today—even in this rough economy. In addition, eRate grants to North Carolina K-12 school districts have doubled to almost \$105M in the last 5 years. The vast majority of these eRate funds are spent with for profit telecommunications and cable companies. The increase in eRate requests and grants has been driven, in large part, by the upgrades necessary to school district networks now connected to NCREN.

MCNC has developed peering relationships with TimeWarner Cable and CenturyLink—allowing, “on-net” like delivery of applications and tools to extend outside the private NCREN.

In 2007-08 an independent analysis by ONUG communications showed that MCNC faced a significant broadband capacity shortage in rural North Carolina. The institutions served by NCREN at the time and those that were being added were increasing their bandwidth use at a rate that doubled their demand every 2-3 years. Meetings between MCNC and private sector owners of fiber in rural North Carolina showed very few contiguous fiber assets and yielded an unwillingness to sell fiber to MCNC to serve the needs of NCREN customers. MCNC first offered market rates to procure fiber from the fiber owners (mainly private sector wholesale telecommunications entities) and offered to build more fiber and let the for-profit providers share the fiber assets to expand their services to rural customers. Both offers did not yield the return the for-profit sector was seeking.

As a result of the 2008 – 09 recession, both Presidential candidates offered recovery packages that included a heavy investment in broadband infrastructure. MCNC’s board decided to pursue these funds aggressively, putting up \$8M in its own funds and raising another \$32M in private matching funds (\$24M from the Golden LEAF Foundation) to obtain \$104M in Federal broadband recovery funds from the Broadband Technology Opportunities Program (BTOP) of the National Telecommunications and Information Administration.

Any entity – for profit/non-profit; government, commercial, private network operator – was eligible to apply for BTOP funds. MCNC won a highly competitive grant program to receive the award, without requiring any State of North Carolina investment in matching funds. MCNC has a for-profit partner (telecommunications company FRC) who put up \$4M to own half the strands on the first 420 miles of the build<sup>2</sup>.

MCNC was designated as the sole middle mile applicant in North Carolina by the Governor’s office of economic recovery. North Carolina’s entire Congressional delegation voiced strong support for both rounds of funding.

Since securing the BTOP funds, MCNC has made significant progress in engaging important new CAI partners:

- The North Carolina Highway Patrol, the largest public safety organization in the state, has taken a leadership role in developing many significant public safety communications systems. MCNC and the NCSHP are in negotiations to provide fiber backhaul service to NCSHP radio towers and NCREN service to NCSHP administrative locations.

---

<sup>2</sup> Details of the build can be found and tracked here: [www.mcnc.org/btop](http://www.mcnc.org/btop)

- MCNC bid for and won a contract to build the North Carolina Telehealth Network (NCTN). The network supports connectivity for 24 non-profit hospitals and 50 public health agencies and free clinics.

A matrix of services that MCNC provides to various CAI sectors is provided in Appendix A.

### **Working with U.S. UCAN**

The following are responses to specific questions posed in the Call for Participation:

***Are you willing to contribute to a repository of information on advanced applications, resources, processes, and reporting being developed by U.S. UCAN?***

MCNC would be willing to contribute to a repository of information on advanced applications, resources, processes and reporting being developed by U.S. UCAN. MCNC would also be willing to contribute during the formative stage of this repository of information.

***Describe the mechanisms you are using or will use to identify eligible CAIs, assist them in eliminating the network as a barrier, driving advanced applications and to integrate them into a community-driven, participatory networking model.***

Three principles guide MCNC in its outreach to the various CAI sectors. These principles serve as the foundation of MCNC’s outreach and education efforts. The principles are:

- 1) The founding of NCREN was based on providing leading edge, low latency high bandwidth connections to serve the research needs of various institutions (higher education, public sector and private non-profit) served by the network. The network will always provide “premium connectivity” and CAI sectors who connect to the network will, at some reasonable level, support this premium connectivity.
- 2) Connection to NCREN is “opt-in” – there is never a government or other mandate to connect. Connectors must see the value in connecting.
- 3) Connectors to NCREN have a voice in the governance of MCNC and the operation of the network – this includes:
  - a. A high level of financial transparency
  - b. A high level of network operations transparency
  - c. A voice in developing shared applications, tools and service offerings
  - d. Staging and organizing education events and professional development courses that encourage sharing of best practices, networking and collaborative community action

With this in mind, MCNC, through its constituent support organization is constantly educating existing and new sectors of CAI’s on the benefits of connecting to NCREN. A dedicated staff of seven community advocates and services marketing professionals interfaces daily with individual CAI’s and the central organizations that represent them.

In the last five years, the NCREN community has grown by almost 500% representing now over 2700 end points (If each K-12 school is counted as an end point) or almost 400 end points (if each school district is counted as an end point).

***Describe the value that U.S. UCAN can bring to your state.***

U.S. UCAN can help North Carolina by being the lead national advocate of the need for advanced network connectivity and innovative applications for all CAI sectors.

Many CAI sectors and individual institutions within those sectors, do not yet understand the position they hold in the broadband ecosystem. These sectors and individual institutions struggle to serve the needs of their constituents on a daily basis and have little vision for the future.

For the first time, the U.S. UCAN organization will provide a national voice and national organization that can display the benefits of enhanced connectivity in meeting the present and future needs of these sectors. Healthcare is a great example. Many rural hospitals, free clinics and public health agencies have nowhere near the infrastructure required to enter an age where electronic medical records transfer and other healthcare information exchange applications, services and tools are the norm. Advocacy at the national level with key healthcare information organizations will help educate these individual institutions on the necessity of improving their infrastructure.

In addition, and almost as important, U.S. UCAN will provide a plethora of services necessary for R1 and other research institutions to remain globally competitive in a world where geographically dispersed innovation and research is the norm. All one has to do is look at the Nobel prizes in key scientific disciplines the last 5 years to realize that research today is about grouping the right research minds with the right tools on a global basis—U.S. UCAN provides the US network and the global reach to afford scalability to the rapidly increasing demand for research bandwidth and advanced research network services, applications and tools. North Carolina, with three R1's and numerous research institutes of global note – will benefit greatly from U.S. UCAN affiliation.

***How will you interact with U.S. UCAN?***

MCNC currently houses U.S. UCAN Interim Executive Director Mark Johnson. MCNC has supported U.S. UCAN by covering Mark's salary during his interim role. This has provided MCNC with a direct view of U.S. UCAN development and heavy interaction with the organization.

During the pilot, MCNC intends to name a specific point of contact for the U.S. UCAN staff from the MCNC leadership team to coordinate U.S. UCAN activity with the Client Advocates in the Customer Support organization, who work directly with the CAIs on a daily basis, and focus on specific CAI verticals. MCNC anticipates that part of the pilot outcomes will be to more clearly define that role and make adjustments as needed.

### ***Information and tracking***

MCNC has invested in a suite of tools and applications that provide NCREN connectors with a detailed view of their use of the network. MCNC, through its Knowledge and Information Systems (KIS) team has a dedicated staff that is constantly reviewing and improving these tools, services and applications. At a base, NCREN connectors are provided with:

- A personalized portal that includes a summary of use, support ticket history, network diagrams, support escalation contacts, etc.
- Ability to inspect at a high level of granularity use of bandwidth, latency, detailed reasons for outages.

While NCREN has operated at or above 99.998% reliability for the last 5 years—even high reliability infrastructures require detailed reporting tools. MCNC has invested greatly in these reporting tools the last decade and now is considered at the leading edge in many reporting areas.

### **MCNC letters of support**

Due to the tight timeframe of this application, MCNC sought and received letters of support from the MCNC Advisory Council (MAC), which represents the lead technology contacts of several sectors of CAIs. These are attached in Appendix B.

## Appendix A - Services Matrix

<b>K12</b>	<b>Community Colleges</b>	<b>UNC and NCICU</b>	<b>Healthcare</b>	<b>Libraries and Other</b>
<b>All 115 North Carolina K12 Public School Districts</b>  <b>30 Charter Schools</b>  <b>5 Private Schools</b>	<b>All 58 North Carolina Community Colleges</b>	<b>All 17 Institutions of the University of North Carolina System</b>  <b>27 of 36 North Carolina Independent Colleges and Universities</b>	<b>24 Non Profit Hospitals</b>  <b>50 Public Health Agencies and Free Clinics</b>	<b>7 Public Libraries</b>  <b>5 Major Research Institutes</b> - RTI - NISS - NC Biotech - RTI - BW Fund
Connectivity	Connectivity	Connectivity	Connectivity	Connectivity
Transport/Access (no limit)	Transport/Access (no limit)	Transport/Access (no limit)	Transport and Access	Transport and Access
Internet	Internet	Video	Internet	Internet
Advanced Research	Advanced Research		Advanced Research	Advanced Research
Customer Support	Customer Support	Customer Support	Customer Support	Customer Support
CPE Equipment, Install, Refresh	CPE Equipment, Install, Refresh		CPE Equipment, Install, Refresh	
Reporting Tools, Portal	Reporting Tools, Portal	Reporting Tools, Portal	Reporting Tools, Portal	Reporting Tools and Portal
Communications & Governance	Communications and Governance	Communications and Governance	Communications and Governance	
RttT support for cloud	Hosting			
CNE	CNE			

## Service Definitions

Here are brief definitions for each service provided to CAIs:

- **Connectivity** – Last mile circuit from institution to nearest NCREN PoP. Mostly supplied by the private sector carriers.
- **Transport and Access** – Middle mile bandwidth-currently a mix of owned fiber and commercial lit service – moves to owned fiber at the end of BTOP.
- **Internet and Advanced Research Network** – Connections to network resources outside of NC. NCREN makes connection to these resources in Raleigh and Charlotte. These are metered connections – meaning that the more used the more paid. MCNC works to lower cost with commodity peers and QUILT buying.
- **Customer Support** – Advanced engineering team to implement connections and plan the future architecture; plus a 24/7/365 Network Operations Center (NOC)
- **CPE and CPE Install** – Customer premise equipment – this is the router that sits at the institution (K12 LEA central office or Community College) that carries the traffic to NCREN. Equipment purchase, maintenance, warranty and refresh is included in the K12 and Community College Contracts
- **Reporting Tools** – Individual customer portal that tracks tickets, shows use diagrams, etc. Well used by networking teams at institutions – not provided by commercial sector in the wide area yet.
- **Governance and Communications** – A say in how MCNC is run and how we invest in services for the future. CeCTO, Community Day, eLearning Commission all included
- **CNE** – Client Network Engineering Service provided by MCNC to K12 LEAs and Community Colleges. Perform Network Health Assessments, Minor Troubleshooting, Future Architecture Planning, Shared Services survey.
- **Race to the Top Cloud** – Specific MCNC CNE and Advanced Initiatives support provided to the RttT Cloud initiative for DPI. Includes Shared Services Survey, Shared Services Identification and Implementation, Identify and Access Management.
- **Hosting** – A full range of disaster recovery, hosting, data replication and data storage services offered through MCNC's data center.

## **Appendix B – Letters of Support**

See attached.