

Statement of Institutional Technology Capability - University of North Carolina at Greensboro

January 11, 2010

The UNCG main campus network communications infrastructure is a high performance, high availability design able to withstand the loss of one of the two campus data centers. All main campus network communications depend on a multi-million dollar fiber optic infrastructure, which interconnects a ring of two core and eight primary network distribution facilities. In all cases, there are multiple diverse network paths with no single points of failure. If one path is down, another path will become primary without service interruption. The core and distribution network utilize Multi-Protocol Label Switching (MPLS) in conjunction with VPN V4 Virtual Routing Forwarding (VRF), Firewall, and IPS technology to provide security segmentation across the enterprise. Remote access is provided through either IPSEC VPN, or SSL VPN, with traffic also protected by an IPS segment.

UNCG and NCAT jointly own significant fiber optic resources (144 single-mode strands) that extend high speed networking capabilities beyond the main campus borders via a metropolitan fiber loop. The southern leg connects UNCG and NCAT to the Gateway Research Park South Campus, while the northern leg connects the two Universities through a fiber route that traverses downtown Greensboro. This infrastructure loop provides high speed redundant connectivity to the North Carolina Research and Education Network (NCREN). NCREN is UNCG's Internet Service Provider. Through NCREN, UNCG has access to a 2 X 10G shared Internet2 connection. An OC48 based self-healing fiber optic ring connects UNCG redundantly to NCREN in Research Triangle Park.

The quality and capacity of our campus network has allowed UNCG to adopt an industry-standard high-availability model for delivery of critical enterprise applications. This model relies on redundant SAN systems architectures that are mirrored between two campus data centers, supporting highly available services with semi-transparent failover and high efficiency during peak loads. For both the enterprise Banner and Blackboard environments, UNCG has implemented Sun Microsystems' SUNcluster, which consists of separate clusters with multiple nodes that are spread across geographic locations. All Enterprise class services utilize load balancing technology to provide seamless service. Enterprise data transmitted between Storage Area Networks (SAN's) that is required by state and federal law to remain secure is transmitted exclusively over fiber paths that carry only SAN traffic, separate and distinct from other network traffic such as email and web browsing. The UNCG enterprise backup solution utilizes Symantec Netbackup with a 20 drive SUN L700 tape library, which includes online file storage for interim backup and off-site tape storage for long term backup.

For general file/print services, UNCG utilizes Microsoft Windows Active Directory delivered on top of a 16 node VMWare ESX environment with twin EMC CX340 Storage arrays with over 50 terabytes of storage. Enterprise Servers are virtualized and UNCG takes advantage of VMWare HA and DRS technologies. The 16 node VMWare ESX environment also supports over 200 Windows and Red Hat Linux servers to support administrative applications, Novell Netware, file and print, e-Directory, Microsoft Active Directory, IIS based web environment, and department applications. In addition this environment consists of a clustered Microsoft SQL environment for departmental applications. FLASH streaming media servers are available. UNCG also delivers an Academic Computing environment consisting of a SUN Solaris AFS based installation to host an Apache/PHP web, UNIX application hosting with file space and a research environment. Centrally-managed software available to all campus researchers includes a variety of statistical and mathematical analysis programs, such as SAS, SPSS, Stata, Matlab, Maple and Mathematica; and qualitative research packages including Atlas.ti and QSR Nvivo. Data and reference management tools such as Microsoft Access and EndNote are also available.

The enterprise technology infrastructure at UNCG is developed and maintained by a highly qualified team of certified systems, networks, database and infrastructure engineers. UNCG technology Infrastructure and services are monitored centrally by a Service Operations Center that is fully staffed 24x7x365. These staff utilize enterprise monitoring tools to

quickly understand root cause and respond to events with minimal impact to services. ITS also maintains a professionally staffed Service Desk that provides a vast array of critical technical support services to the University's faculty, staff and students, including an online, web-based Self-Service Portal where all members of the faculty, staff, and student community can access support for technical needs 24 hours per day/7 days per week.

UNCG has a large and fully equipped two-way interactive videoconferencing facility, the UNCG TeleLearning Center, which includes a 40+ seat Telelearning Classroom and a smaller Teleconference Room. UNCG has extensive video teleconferencing capabilities, as an "extension site" on the [North Carolina Research and Education Network](#) (NCREN). The NCREN Video Network is a multi-site, multi-channel, interactive network connecting more than nineteen universities, medical schools, and research organizations. UNCG reaches the NCREN via H.323 "video over IP," using a Sony Ipela PCS G50 Video Communications System, and a Polycom VS-4000 Videoconference Unit for standard definition quality. A Polycom HDX 9002 unit is utilized for high definition video conferencing. Each of these units deliver low-latency, broadcast-quality video over IP/Ethernet networks. The Center's services include video and teleconferencing with schools and organizations beyond the NCREN network, high-quality audio-only conferencing, webinars, and event recording.

In addition to resources housed on the UNCG campus, UNCG has established a partnership with North Carolina State University (NCSU) to provide High Performance Computing (HPC) services to UNCG researchers and classes. Through this partnership, UNCG HPC nodes are hosted as part of an 800+ node IBM Blade Center Linux Cluster managed by NCSU. UNCG faculty have access to a wide variety of scientific computing software on the Cluster, including both open source and popular commercial packages. UNCG has a collaborative arrangement with Appalachian State University which hosts hot backup site of our Banner databases.