



## **RUTGERS INSTALLS ENHANCED COMMUNICATION INFRASTRUCTURE SYSTEM WITH MOHAWK MEGALAN<sup>®</sup> CABLE**

Rutgers, The State University of New Jersey, welcomes over 50,000 students every year. It is one of the nation's leading universities with 7 campuses located in New Brunswick, Piscataway, Newark and Camden, New Jersey. The University's Mission provides instructional needs to New Jersey's citizens via undergraduate, graduate and continuing education programs. Rutgers offers 30 degree-granting units with over 100 majors. The mission also includes offering cutting-edge research that contributes to the well-being of the state's medical, environmental, social and cultural needs. In keeping with the University Mission, Rutgers recognized the need to improve its communication infrastructure and network capabilities. This article will examine Rutgers' plan to implement and install an improved communication infrastructure and how Mohawk MegaLAN cable assisted with the upgrade.

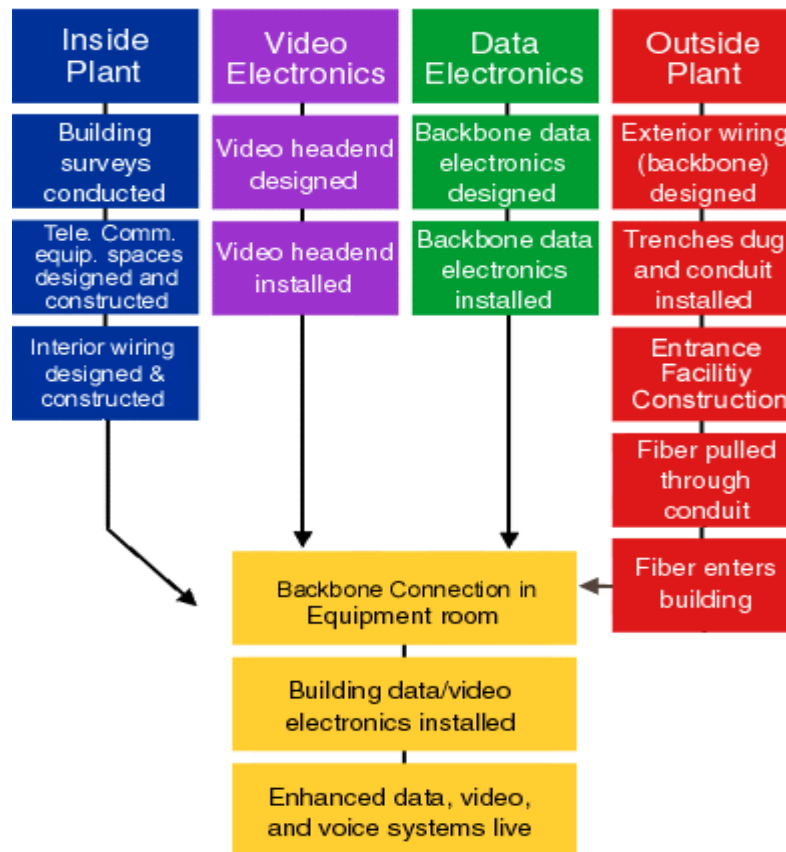
### **Project Overview**

The communication infrastructure improvement was necessary to support on and off campus students, faculty, local business/industrial partners and global research colleagues. This effort was led by Joseph Sanders, Project Director for Rutgers. Once the project was approved by the State Board of Governors, the University began with a mutual process utilizing the University faculty. The team identified and implemented a ten year strategic plan to become one of the top-ranked public research universities. This would be achieved by constructing a state of the art information infrastructure. The construction would improve network capabilities and create a successful computer system to meet University stakeholder requirements. The initial planning phase concluded with the creation of the RUNet system. The RUNet system would not only connect three extensive University campuses, it would include off-campus housing, global colleagues and global research partners.

Rutgers then formed an internal RUNet team to identify campus needs, map out each project stage, designate contractors, designate consultant support, assign internal work crews, and measure individual stage completion results. A standardized process was

created and implemented, and a four step process was created to install RUNet as illustrated below:

## Overview of Project Implementation



Source: Rutgers, The State University of New Jersey

The inside plant process included surveying buildings for equipment rooms, telecommunications closets, and the wiring pathways between closets/individual rooms. Final designs were coordinated with University departmental contacts.

Equipment rooms and telecommunications closets required construction prior to inside wiring installation. Data electronics design and installation would occur as both inside and outside plant construction.

The outside plant portion incorporated design and exterior cabling installation, trench excavation for conduit and manholes, entrance facilities construction for conduit into building, and running fiber-optic cable to an equipment room inside a building.

Rutgers University Computing Services (RUCS) was responsible for working with individual departments and connecting new infrastructure equipment. Selected video electronics were also required prior to RUNet activation.

## Team Members

To implement and facilitate the defined project, Rutgers established team members for project installation and implementation. Rutgers' internal staff consisted of nine installation and technical members. Jack Corso of Verizon Business (f/k/a Bell Atlantic Data Solutions Group) served as the Project Contractor. John Collichio, Regional Vice President for Mohawk, identified the Mohawk cable to meet project requirements, and Charlie Valente, of Metro Sales provided wire distribution support. Additional partners included Corning Fiber Systems, Cisco Systems, Pandiut, Graybar Electric and Local IBEW Unions.

## Mohawk Cable Utilized in Project



To meet the technical needs encompassed with the RUNet specifications, Mohawk's MegaLAN Category 5e+ cable was evaluated against all cable manufacturers involved in the bidding process. Rutgers' internal committee reviewed several bids and awarded Mohawk the contract based on the MegaLAN cable's enhanced performance parameters beyond TIA/EIA Cat 5e and overall Ethernet Gigabit performance.

The chart below illustrates the performance parameters of Mohawk's MegaLAN:

Parameter @ 100 MHz	5eLAN TIA/EIA Category 5e	Mohawk MegaLan 400	Performance Beyond Cat 5e
Insertion Loss	22.0	21.0	1.0
NEXT	35.3	40.3	5.0
PS – NEXT	32.3	38.3	6.0
ACR	13.3	21.3	8.0
PS- ACR	10.3	17.3	7.0
ELFEXT	23.8	27.8	4.0
PS- ELFEXT	20.8	24.8	4.0
Return Loss	20.1	20.1	
Skew	45	25	20
Maximum Frequency Listed	100 MHz	400 MHz	300%

For every 3db, MegaLAN offered enhanced performance above TIA/EIA 5e+ standards which doubled signal strength, ability to send and receive data, and eliminate cross talk. All electrical characteristics exceeded TIA/EIA 568-B Category 5e+ requirements including Near End Crosstalk (5.0 above standard), Insertion Loss (Attenuation 1.0 above standard) and Delay Skew (20.0 above standard). MegaLAN also exceeded TIA/EIA 568-B.2 Category 5e requirements of Power Sum NEXT (6.0 above standard), Far End Crosstalk ELFEXT (4.0 above standard) and PS-ELFEXT (4.0 above standard).

## **Installation Process**

The technical RUNet design provided a network plan implementing evolving technologies. The plan allowed Rutgers to implement RUNet in phases in conjunction with incremental funding.

After preliminary project work was completed and team members identified, the next multi-phase installation process was initiated.

The first installation step involved backbone construction. Jack Corso and his Bell Atlantic/Verizon team (including subcontractors) began the process and project managers worked on the trenching process campus by campus. Rutgers was responsible for all inside work including telecommunications equipment spaces construction and notification to building occupants for work schedules. Upon Rutgers completing its portion, Bell Atlantic/Verizon began primary work within each building with as many as 150 Bell Atlantic/Verizon subcontractors on Rutgers campuses for inside/outside plant responsibilities. The backbone completion phase included 340,000 feet of underground conduits, 150 manholes, and 50 aerial poles.



Communications rooms were constructed for over 260 buildings to accept the communications equipment. This was required to allow the interfacing between the building communications network and external fiber optic backbone cabling. Construction of equipment closets was then completed in existing buildings to hold voice, video and data communication distribution panels and equipment.

The internal building wiring installation consisted of horizontal and vertical cabling to serve voice, video, and data needs was installed with more than 20,000 wiring plans in 260 buildings.



Once all the buildings were internally wired, Data electronics equipment (primarily routers and switches) were integrated to administer local area networks, expand the backbone, and integrate new facilities with the existing backbone. The initial RUNet phase replaced and upgraded the Legacy backbone system along with high-speed system architecture in the horizontal to maintain a smooth integration. The physical network expanded with a standards-based, distributed client-server computing framework providing users a flexible and accessible connection with a variety of data resources.



Video electronics equipment was established to support new video transport and distribution capabilities. This focused on housing, selected classrooms, student centers, and libraries services. The video component supported digital video technology and traditional cable television to permit the university to take full advantage of video and multimedia communication and instructional tools. The voice network would then be improved for the University's faculty, students and administrators.

## **Project Results**

Rutgers not only completed the RUNet project on schedule, it came within the University's budget. Mohawk's quality product in conjunction with Rutgers' internal team, Jack Corso, John Collichio and Charlie Valente and many team members resulted in the successful and trouble-free installation of the data, video and voice communications network.

In addition to all Rutgers' residence halls, the RUNet system was connected to all campus academic buildings, libraries, sports arenas, campus centers, student centers and recreation centers. Mohawk's MegaLAN cable offered ease of installation and proven testing record which continues to perform today.

Since the advent of this project, Rutgers installed over 15 million feet of Mohawk MegaLAN Category 5e and GigaLAN Cat 6e products for subsequent projects.