True Partnerships:  
The Key to Technology Infrastructure Challenges

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Rider University  
Lawrenceville, New Jersey  
Comprehensive, Private University  
Total Enrollment: 5,200  Total FTE: 3,800  
Undergraduate: 2,800  Residential: 1,800

Colleges and universities must build and maintain a robust, comprehensive technology infrastructure to provide the foundation for services required today and into the next century. The reality is that significant financial, technical, and human resource challenges pose formidable obstacles, preventing many institutions from succeeding. Rider University solved the problem by forming a true partnership with Bell Atlantic Corporation, a leading communications vendor with extensive experience integrating advanced information technology into academic environments.

The collaboration produced a $4.0 million state-of-the-art campus-wide fiber-optic information and communication network offering an array of video, voice, and data services to all faculty, staff, and students at Rider. The partnership helped Rider devise a creative approach to fund the infrastructure with no capital investment. Rider’s close association with Bell Atlantic now provides the University with a broad range of services critical to the high-quality operation of the infrastructure. Bell’s presence enables Rider’s information technology organization to concentrate its resources on network applications, training programs, technical support functions, and other services that directly benefit the Rider community.

This paper describes Rider University’s success story, including how Rider developed and fostered a long-standing partnership with Bell Atlantic that maximizes benefits and minimizes problems.
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Introduction and Background

In 1993, Rider University recognized the necessity of making a substantial institutional commitment to information technology in order to achieve the following vital institutional strategic objectives: 1) strengthening the University’s competitive position; 2) becoming more distinctive as a teaching university; 3) making significant advances in the quality of teaching, learning, and research; 4) creating a dynamic campus environment; and 5) managing institutional resources more effectively. A university-wide task force formulated an Information Technology Strategic Plan based on these goals. All constituencies including faculty, staff, students, University executives, and the Board of Trustees endorsed the plan enthusiastically. Over $5 million was allocated for the pervasive deployment of information technology to support instruction, research, scholarly and creative activity, academic and administrative decision making, and seamless communications.

At the time of the funding commitment, Rider’s technology environment included a very limited and aging physical infrastructure that was not nearly sufficient for the University’s needs. Data services were based on a minimal optical fiber backbone connecting only 10 of the 39 buildings on the main campus, and none of the residence halls. The backbone contained just a few strands of fiber. Wiring within buildings proceeded according to no formal distribution systems. This wiring consisted of home-grown expanses of category 3 unshielded twisted pair copper that proved quite difficult to maintain.

The old data backbone connected only three or four individual local area networks, with data rates of 10 megabits per second (Mbps) using 10Base-T shared ethernet. A small minority of users had network-level connections at the desktop at 10Mbps. Most users had terminal-level connections to the backbone, with a data rate of only 9.6 kilobits/second. Moreover, the data network infrastructure included no empty conduit space for expansion. Voice services were also limited. A separate copper cabling plant supported the telephone system, served administrative and academic buildings only, and the plant was deteriorating. The University’s analog private branch exchange (PBX) was over 10 years old and well past its useful life. In addition there was no video capability or video network, and only basic audio-visual services were provided.

There was wide agreement that a completely new campus-wide information and communication infrastructure formed the top priority for the University’s information technology plan. A new, comprehensive infrastructure was viewed as the key to establish Rider as a leading, state-of-the-art interactive institution, and to allow the University to maintain that status into the future without rewiring the campus. For example, a new system was critical to extending voice, video, and data services to every student, faculty member, and administrator at Rider. The system was also essential to build the foundation necessary for implementing other goals defined in the University’s technology plan and new goals that would surely evolve over the next five to ten years.

Owing to the significant role envisioned for information technology at Rider, the requirements for a new physical infrastructure went well beyond the typical project. Specifically, the following considerations guided Rider’s initial project planning:

• The new infrastructure must be as robust and extensive as possible, integrating voice, video, and data services as much as feasible, and incorporating the latest technologies without becoming "bleeding edge."

• The new infrastructure must be as flexible and as open as possible to facilitate the incorporation of new technologies as appropriate over the next five to ten years to maintain the infrastructure’s “leading edge” capabilities.
• Once the infrastructure is installed, methods must be defined for assessing emerging technologies and for testing these technologies in a controlled environment to minimize technical risk and avoid potential service disruptions.

• Creative funding sources for infrastructure installation, maintenance, and enhancement must be identified to insure that constrained financial resources did not restrict desired capabilities and technical solutions.

• A core, highly skilled technical staff dedicated to infrastructure implementation and operation must be created within limited operating budgets to insure a successful installation and a high level of ongoing service.

These requirements posed significant technical, financial, and human resource challenges given institutional budgetary and staffing constraints. It, therefore, became clear early in the planning stages that the University required a long-term association with a top-flight networking and communications vendor. The vendor must be capable of not only installing a highly complex technology infrastructure, but also providing key services to support the infrastructure after the installation was complete. By building a lasting relationship with a single vendor of this type, the University expected to realize significant benefits including: 1) reducing and controlling infrastructure operational costs, 2) improving network performance, 3) receiving as-needed access to sophisticated technical expertise, 4) keeping pace with rapid technological change while controlling technical risks, and 5) freeing up internal technical staff and resources for core technology needs, applications, and services.

To succeed, the type of partnership envisioned by the University had to go well beyond the usual business arrangement. Rider was prepared to make significant commitments to an external partner, so that the vendor would not have to spend time seeking Rider’s business at each turn. In reciprocity, the University expected that the selected vendor would concentrate on understanding the University’s requirements and always strive to provide the best solution at a fair price. As discussed in the following section, Bell Atlantic provided Rider with a complete solution that met Rider’s vision for technology, infrastructure project requirements, and partnership goals.

Beginning the Rider - Bell Atlantic Partnership

Since finding an appropriate partner was an integral part of installing a new infrastructure, Rider elected to follow a different approach than normally associated with campus networking projects. The standard method typically involves the development of a lengthy Request for Proposal (RFP) that once completed is released for bids by interested vendors. The RFP is often based on extensive analysis and design work performed by university technical, administrative, and academic personnel, assisted by consultants experienced in networking and related technologies.

Rider’s approach was more open-ended and informal. First, a core project team was formed. The team consisted of members of the technology organization, facilities department, and key administrative and academic organizational units. An external consultant with a strong track record of successful infrastructure installations was also selected to join the team. Once formed, the project team concentrated on producing a general requirements statement for a new campus infrastructure. The statement was based on discussions with many members of the university that were designed to identify the needs of various constituencies and departments throughout the Rider community. The requirements statement also documented the nature and status of the aging infrastructure that was in place.

In addition, Rider’s project team engaged in a research effort to reduce the vast number of potential vendors in the market to a group of reasonable size. The goal was to target vendors who had significant experience integrating voice, video, and data networks, and applying advanced communication technologies to academic enterprises. It was also critical that a vendor offered a range of services that encompassed network installation, management, and maintenance. The project team also investigated the quality of a vendor’s management and technical personnel as well as the company’s financial strength. Customer references for projects of similar duration, complexity, and technical scope were obtained for each vendor and explored. In some cases, site visits were made to gain first-hand
knowledge of the work that was performed. Following the research phase, the targeted group of potential vendors were contacted about Rider’s impending infrastructure project, with each vendor invited to engage in a series of separate meetings and discussions with Rider’s project team.

From the project team’s perspective, a primary purpose of the initial series of meetings with each targeted vendor was to understand the vendor’s proposed solution for a new campus infrastructure. The requirements statement and the University’s partnership objective served as the starting points for the discussions. Rider’s project team insured that each vendor clearly understood the University’s expectations for the chosen partner. At the same time, by having separate dialogues with different vendors, the team was able to learn about different technical solutions, each with their own benefits. Ultimately, the project team used this knowledge to insure that different aspects of separate recommendations were incorporated in the final infrastructure solution, significantly improving the end product.

Since the infrastructure project was highly complex, the discussions between Rider’s project team and each vendor carried on at varying degrees of frequency over a period of six to nine months. Initially, several vendors contacted chose not to participate. Apparently, these vendors were reluctant to invest a significant amount of time in an open-ended and potentially lengthy process that did not guarantee any business at the completion. Other vendors began the process but withdrew along the way. From the standpoint of Rider’s project team, the extended interactions with different vendors that did participate provided an opportunity to assess the nature of each potential partnership. Several factors emerged during the interactions that proved helpful in the partnership assessment.

Some vendors showed a greater desire to understand customer needs, while others were more interested in selling particular products or “their solution.” Vendors that were customer-focused tended to be more responsive, accessible, and service-oriented. Vendors differed in the flexibility of their organization and in their ability to bring in the right people at the right time to help develop different parts of the overall solution. Vendors also differed in the flexibility of their technology strategies. The more flexible companies tended to propose technical solutions that met Rider’s current technology goals in ways that were consistent with the project team’s view about the future of technology in higher education.

By the end of the discussion phase, three vendors prepared and submitted detailed proposals for the University’s new campus-wide infrastructure. Rider’s project team carefully reviewed each proposal. The review process triggered a new series of discussions that led to proposal revisions. Ultimately, the proposal from Bell Atlantic was selected based on its superiority in three critical areas: 1) quality, clarity, and completeness of solution, 2) competitive pricing, and 3) partnership opportunities.

The excellence of the proposal resulted in large part from Bell Atlantic’s general ability to speak with a single voice when developing a customer’s solution, while having expertise diverse enough to address in depth all aspects of the solution. In order to deliver the optimal infrastructure in support of Rider’s vision, several Bell Atlantic companies contributed to the proposal and would be involved in its implementation. Bell Atlantic - New Jersey had primary responsibility for the networking portion and overall accountability for insuring all other Bell Atlantic entities satisfied or exceeded the University’s requirements. Bell Atlantic Network Integration (BANI) had primary responsibility for the information infrastructure including cabling and data network hardware as well as the video services portion. Bell Atlantic Meridian Systems (BAMS) had primary responsibility for the telecommunications or voice services portion.

Bell Atlantic’s proposed solution for Rider reflected the company’s extensive experience integrating advanced information technology into academic environments as well as a corporate vision to be the “world’s best communication, information, and entertainment company.” The proposal was based on many of the same company principles that were evident during the nine month discussion period between Rider and Bell including an emphasis on customer service and customer-designed solutions.

In retrospect, the frequent contact between Rider’s project team and Bell Atlantic representatives provided important benefits for infrastructure installation and beyond. During the nine-month proposal preparation period,
each group got to know each other, developed trust and confidence in each party’s abilities, and learned how to work together. From Rider’s standpoint, these steps were vital in seeing first hand the high level of technical expertise of Bell Atlantic representatives and their commitment to working with the customer to develop the optimum solution. Bell Atlantic staff had the opportunity to understand Rider’s needs in depth and the nature of the University’s organization prior to starting a large-scale implementation. Ultimately, this understanding was reflected in the extent to which the Bell infrastructure proposal met Rider’s short- and long-term project objectives. Moreover, the straightforward completion of the project contract provided an early sign of how well the partnership would work.

The Campus Infrastructure Project

The infrastructure project was a huge one - linking 39 buildings on a 353-acre campus at a total cost of approximately $4.0 million. All told, the network included approximately 10,000 connections: 4,000 data, 4,000 voice, and 2,000 video. The project proceeded in two phases. In the first phase, which took place from June to August of 1995, an optical fiber backbone was installed underground to interconnect residence halls and fraternity houses. Video, voice, and data services were then made available to all resident students in time for the Fall, 1995 semester. Off-campus connections to the data network were also put in place. The second phase of the installation connected all academic and administration buildings. This phase was completed between August and January 1996, while the campus was busy. The tight deadlines formed a big challenge for all involved in the project. Nevertheless, the project was completed without major or unexpected difficulties. Rider successfully cut over to the new network for all faculty and staff in early January 1996, right on schedule.

Full-time project management services provided by Bell Atlantic proved to be a key factor in the project’s success and keeping the project on track. The sense of teamwork that developed prior to completion of the project proposal carried over throughout the implementation. Staff from the Bell Atlantic companies and members of the Rider campus community worked in a total spirit of cooperation. Changes that are inevitable in a complex project were always discussed and performed if necessary, providing a level of flexibility in the implementation that is difficult to capture in a formal contract. Since staff from all Bell companies were already very familiar with Rider’s campus, work proceeded quickly and smoothly.

Bell Atlantic’s technical expertise insured that Rider’s goal of installing a state-of-the-art infrastructure was met. Fiber optic cable was chosen for the network backbone primarily for its nearly unlimited information-carrying capacity. The optical fiber cabling infrastructure provides Rider with enormous bandwidth to meet networking demands well into the future. Choosing fiber also kept the network design simple and the installation uncomplicated and swift. The backbone consists of cables containing 144 strands of 62.5/125 micron multimode fiber, and cables of 72 single-mode fibers. In the distribution portion of the network, composite cables of 18 multimode and six single-mode fibers connect the backbone to individual buildings. The network design is a dual star typology, with fiber connectivity to each building from two hubs.

Composite fiber of both multimode and single-mode fiber was used for present and future needs. With single-mode already installed, there is ample fiber in place to run video applications as new needs emerge.

Fiber was terminated in closets in each of the buildings. From those points, category 5 copper was installed to carry data to every end node, category 3 copper wiring was used for voice, and coaxial cable was installed for cable television. Every office, classroom, and conference room were connected to the voice and data networks. Video was installed everywhere except offices. In the residence halls, each of the approximately 1,800 students involved was provided with individual ethernet and voice connections in their rooms, along with a single video connection per room.

The data network was based on both FDDI and Asynchronous Transfer Mode (ATM) technologies, with data rates in the backbone as high as 155 Mbs. Nearly all users have network level connections at the desktop, with data rates of 10 Mbs from both shared and switched ethernet, and 100 Mbs from fast ethernet. In a few cases users have ATM speeds - 155 Mbs - at the desktop.
ATM was selected as the primary transport for Rider’s multimedia instructional network. It is used for the delivery of multimedia instructional materials prepared by faculty including images, audio, and video. The plan is to use ATM to send digitized materials stored on network servers to electronic lecture halls, selected public access labs, the library, and advanced technology centers throughout the campus. The ATM network will also be used for videoconferencing applications on- and off-campus.

A special feature of the new infrastructure is its fiber-distributed, digital private branch exchange (PBX) switch - the Northern Telecom Meridian 1 Option 81 PBX - supplied by Bell Atlantic Meridian Systems (BAMS) along with the Meridian Voice Mail System. In a traditional campus environment, a PBX is located in a central switch room, and voice service is distributed over a copper backbone. The Meridian system, however, took advantage of Rider’s fiber backbone to distribute voice service. Money was saved in infrastructure costs since a separate copper backbone for voice was not needed. And since the optical fiber backbone is immune to electromagnetic interference, the distributed PBX eliminated virtually all worry over communication disruptions due to electrical storms. This benefit was important since the Rider campus is situated in an area that is lightning prone, and in the past storms occasionally knocked out phone service.

In effect, the Meridian system moves Central Office technology to its PBX, and distributes PBX capability to points throughout a campus, creating the equivalent of a mini-telephone service area. At Rider, 14 Meridian Fiber Remote/Intelligent Equipment Modules were positioned on wall-mounted shelves in IDF closets. Each Fiber Remote delivers voice services to 256 telephone stations, using category 3 UTP in the buildings.

Video capabilities of the new infrastructure include a 50 channel system that delivers cable television channels around the campus including all residence halls. Off air channels, satellite downlinks, videoconferences, distance learning, and multimedia can be integrated into the system and distributed throughout campus as the University’s video applications require.

In addition to bringing technical expertise, Bell Atlantic assisted Rider in devising a creating funding approach for the project. With Bell’s guidance, Rider elected to fund the new infrastructure by means of a tax-exempt lease financing arrangement that provided the University with a low interest rate and favorable amortization schedule. Payments for the lease would come from two sources: 1) a moderate technology fee that was established and 2) revenue from local and long distance telephone usage by resident students. Technology fee and telephone revenue would also provide the ongoing source of funds for infrastructure maintenance and enhancement.

As a result of this approach, the University was able to reap the benefits of a new campus infrastructure with no capital investment. All capital funds designated for information technology, therefore, were available for equipment that makes use of the infrastructure. Following this strategy, the University has been able to deploy new student computing laboratories throughout the campus, create multimedia technology centers across academic disciplines, implement a new library information system, install electronic lecture halls in each college, and undertake other major technology initiatives to the benefit of all members of the campus community. The successful integration of technology throughout the University has transformed Rider’s academic programs, library services, campus life, and administrative operations. For example, the Middle States Association of Colleges and Schools evaluation team concluded in their May, 1996 re-accreditation report that Rider’s new library information system “is one of the most advanced and technologically sophisticated integrated library systems in the country. When linked with the new campus wide information technology infrastructure, these two systems provide one of the most powerful pedagogical tools available anywhere.”

Continuing the Rider - Bell Atlantic Partnership

Once the campus infrastructure was installed, the Rider - Bell Atlantic partnership continued through a broad range of services provided by Bell companies to the University. These services have proved essential to the success of Rider’s information technology program in a number of ways. Bell Atlantic takes care of most of the ongoing management and maintenance of the infrastructure, insuring high quality operation and uninterrupted service for
the University community. Three primary factors contribute to the success of this arrangement. First, Rider technical managers oversee the functions performed by Bell Atlantic personnel, insuring that the activities of both organizations are well integrated. Second, Bell Atlantic’s responsibilities are performed in accordance with detailed service-level agreements. The agreements specify the tasks to be accomplished as well as performance metrics, such as how fast network hardware repairs are to be done. And third, regular meetings between Rider and Bell personnel insure that services are always delivered in the most effective ways possible. Open communication channels at technical and management levels also enable both parties to work through inevitable problems, differences, and changes over time.

As a result of Bell’s presence, Rider’s information technology organization is able to concentrate a significant portion of its internal resources on maximizing the University’s investment in the infrastructure. In particular, Rider’s information technology staff is primarily concerned with activities that directly serve faculty, staff, and students including network applications, distributed computing resources, training programs, and technical support and help desk functions. Major services from Bell Atlantic that enable Rider’s staff to retain this focus are described as follows.

**Enterprise Network Management.** Rider’s data network is monitored remotely by Bell Atlantic Network Integration (BANI) from the Enterprise Support Center at BANI headquarters in Pennsylvania on a 24 hour, 7 day per week basis (24x7). Monitoring activities include fault management, device polling, diagnostic functions, and problem notification to designated Rider University technical staff. Similarly, Rider’s voice equipment is monitored remotely on a 24 hour basis by Bell Atlantic Meridian Systems (BAMS) from their eastern headquarters in Connecticut. A BAMS engineer responds within minutes once an alarm that cannot be corrected on a remote basis is detected.

**Enterprise Network Hardware Support.** Critical elements of the data network are covered under a comprehensive maintenance agreement with BANI. Some components are covered on a sixteen hour, five day per week, four hour response time basis (16x5x4), while others are covered on a next day repair basis. These services cover product failures as well as upgrades and updates that prove necessary. Voice equipment is covered under a comprehensive maintenance agreement with BAMS.

**On-Site Network Resource.** Rider has contracted with BANI to provide on-site network engineers to insure smooth and proper functioning of the data network, and with BAMS to provide an on-site technician to service the University’s voice equipment. Responsibilities of the BANI engineers include network monitoring, troubleshooting, adds/moves/changes, software/hardware upgrades, planning design, network tuning, network performance, and network security. BANI engineers and BAMS technicians work closely with Rider technical staff in carrying out all of these responsibilities.

**Technology Planning and Acquisition.** Technical and management staff from Rider and Bell Atlantic companies meet regularly to review status of the current operation and discuss new infrastructure requirements as well as emerging technologies that may be appropriate for Rider’s applications. When new data network equipment is acquired, BANI conducts equipment tests at BANI headquarters in a lab simulating Rider’s network prior to equipment installation at Rider’s site. This approach serves to minimize technical risk and potential service problems when new functions and capabilities are incorporated into the data network.

**Infrastructure Cabling.** Rider has arranged with BANI to install, test, and certify new network outlets for video, voice, and data services as new connections are required. Cabling work is closely coordinated with Rider technical staff and performed on a regularly scheduled basis to insure that prompt service is provided.

**On-Site Technical Support.** Rider has also arranged with BANI to have technical personnel beyond the field engineers previously mentioned provide on-site support during peak support times. For example, BANI staff were instrumental in connecting all faculty and staff desktop computers to the new network once installation of the new infrastructure was complete. Additionally, BANI support staff are often required at the start of each semester when there is a high number of requests by students to connect their computers to the network from residence hall rooms.
Summary

Rider University is exceptionally well positioned to meet the technological challenges confronting institutions of higher education in the 21st century. The Rider - Bell Atlantic partnership resulted in a recently installed comprehensive, state-of-the-art information and communication infrastructure that will enable the University to benefit from networked technologies now and in the years to come. Rider’s transformation is well underway; the infrastructure has already changed the institution’s academic programs, library services, campus life, and administrative operations extensively. The long-standing nature of the Rider - Bell partnership means that future progress will proceed at the same rapid pace. Rider and Bell Atlantic personnel look forward to continue working together, investigating new areas, developing new plans, and capitalizing on new technologies.