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# Telecommunications and Networking Services

*A Unit of Information Technology Services*

2006-2007

Annual Report

July 1, 2006 to June 30, 2007

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*Penn State's Telecommunications and Networking Services (TNS), a unit of Information Technology Services (ITS) is responsible for developing, designing, installing, and maintaining comprehensive telecommunications services within and among University locations and outside networks to accommodate the communications needs of the University's students, faculty, and staff.*

- I. Summary ..... 3
- II. Voice & Video Initiatives ..... 3
- III. Infrastructure Upgrades ..... 6
- IV. Network Enhancements ..... 7
- V. Student-Focused Issues ..... 12
- VI. Continuous Quality Improvement . 12
- VII. Closing ..... 15

**Acknowledgments:**

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A copy is available at <http://tns.its.psu.edu>, under "About TNS"

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**At a Glance**  
*The Numbers*

**Integrated Backbone (IB)**

*Penn State has three National Network connections at Three Rivers Optical Exchange (3ROX) in Pittsburgh:*

*Commodity Internet*

<i>Bandwidth.....</i>	<i>1 Gbps</i>
<i>Internet2 .....</i>	<i>1 Gbps</i>
<i>NLR.....</i>	<i>10 Gbps</i>
<i>IB connections designed.....</i>	<i>98</i>
<i>Total IB connections to date.....</i>	<i>1018</i>
<i>Breakdown as follows:</i>	
<i>Gigabit.....</i>	<i>192</i>
<i>100 MB.....</i>	<i>819</i>
<i>10 MB.....</i>	<i>7</i>

**Local Area Networks (LAN)**

<i>LANs Installed .....</i>	<i>58</i>
<i>Total TNS-Installed &amp; Supported</i>	
<i>LANs.....</i>	<i>502</i>
<i>Switches supported.....</i>	<i>1784</i>
<i>Firewalls supported .....</i>	<i>98</i>

**Residence Hall Ports Activated-Peak Period**

<i>University Park .....</i>	<i>16,237</i>
<i>Penn State Campuses .....</i>	<i>5,532</i>
<i>Total.....</i>	<i>21,769</i>

**Voice over IP Transition**

<i>Total IP Phone Sets at</i>	
<i>University Park .....</i>	<i>11,377</i>
<i>In 160 buildings and/or departments</i>	

**Voice Mail Subscribers**

<i>Voice over IP Unity Service at</i>	
<i>University Park .....</i>	<i>8,059</i>

# Annual Report 2006-2007

## Telecommunications and Networking Services

### I. Summary

This report summarizes the achievements and activities of the Telecommunications and Networking Services (TNS) unit of Information Technology Services (ITS) from July 1, 2006, through June 30, 2007.

It was a year of various forms of contrast. A mid-year change in leadership at the Vice Provost level, and subsequent identification of four ITS-wide themes focused attention upon those elements, and upon making information discoverable. The focus during 2006 upon expansion of Voice-over-Internet-Protocol (VoIP) technology changed after the 10,000th such phone was installed in mid-year, to instead refocus available resources upon further development of VoIP and other networking technologies. Likewise, with the mid-year selection of an internal candidate as Director of Network Planning and Integration, subsequent organizational and procedural changes were made to capitalize upon the opportunities presented. Similarly, use of the network to support the long-expected and now exploding use of interactive video applications on the desktop, to incorporate new services emerging as a result of national network initiatives, and to afford savings and options for disaster preparedness associated with the Hershey campus and in the wake of the tragedy at Virginia Tech, emphasized the varying nature of activities during the year.

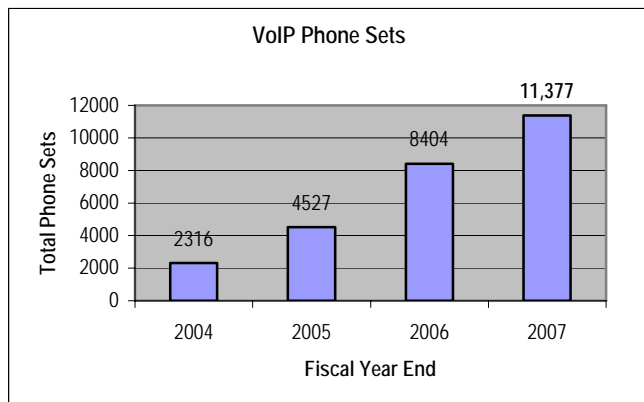
### II. Voice & Video Initiatives

#### Voice over IP Technology

The University's use of Voice over Internet Protocol (VoIP) phone technology—a technology that enables users to converse via the use of IP and the Internet—continues to be the largest VoIP deployment within CIC institutions. The Committee on Institutional Cooperation (CIC) is a consortium of 12 research universities, comprised of the 11 members of the Big Ten Conference and the University of Chicago.

The effort to shift approximately 15,000 total legacy telephone sets at the University Park campus to VoIP continued on a more aggressive path this reporting year, with approximately 10,000 phones converted by 2007, and an additional 1000 since then. To accomplish this, several staff from various units in ITS were convened into a team in 2006 to assist organizational units at University Park in adopting the use of VoIP. To augment that effort, changes were made to the established work flow processes to reduce lead

times and assure inventory was sufficient to accommodate unpredictable need, and afford other customer service enhancements. Frequent team meetings, coupled with a more aggressive conversion approach resulted in a substantial conversion rate during 2006. The 11,000 phones converted thus far span 160 buildings and/or departments on the University Park campus, with over 70% of the phones having voice mail services activated.



The introduction of support by the ITS helpdesk during this reporting year will further aid the use of and support for VoIP. In November, VoIP Helpdesk support was implemented within ITS for users that have "How to" questions and do not have immediate access to their "Customer Contact". While many of these types of questions are still handled by TNS, this support is provided using full-time employees who now utilize VoIP on a daily basis, with all calls entered into a tracking database, similar to the manner in which calls made to the Network Operations Center are handled. In this case, the primary advertised numbers for VoIP Support are 863-HELP and 865-HELP. Both numbers offer a voice response menu entry for "VoIP Help" which directs the call to a number currently appearing at the Helpdesk support group location in Shields Building. The call is answered as "VoIP Help", with any associated system problems internally redirected to the Network Operations Center (NOC).

The email alias "voiphelp@psu.edu" was also made operational during this reporting period and is tracked in the same manner as the "VoIP Help" line. The committee also implemented a VoIP "Frequently Asked Questions (FAQ)" Web page on the ITS Knowledgebase. Links to this page have been placed on the TNS VoIP Web page and the ITS FAQ Web page. Both TNS and the VoIP Helpdesk personnel provide updates to the FAQ.

To facilitate confidence in the associated technology, the 1 year warranty period for those telephone instruments provided and currently supported by ITS was also extended. With the warranty extension, until the model reaches its End of Service (EOS) date, the failed unit is retrieved for disposition by TNS, and a new instrument provided as replacement.

In response to direction from the President's Council, the music provided during "hold" periods was removed in May. The "silence" replacing it utilized a recurring trio of soft beeps, inherent to the VoIP system, to indicate to the caller that a "hold" condition exists and that the call was not disconnected. This subsequently was also found unacceptable, and a CD-based arrangement was developed, using a specified beep pattern applied to CD on short notice by another ITS unit, as the "silent" sound in place at year's end. As a step toward accommodating multiple inputs of this nature, an evaluation is underway by a user of automated call distribution (ACD), to enable them to have the option of providing alternative sounds through use of the VoIP-based ACD service.

A new feature added to the VoIP system this reporting year enables VoIP users to access the latest Penn State News, Weather and Alerts through their telephone sets. With this Web-based feature, VoIP subscribers can utilize the Services button on their IP phone set and browse through regularly updated text summaries of Penn State Newswire and Digital Collegian headlines, view current weather data, and access ITS Alerts and News excerpts on their telephone's display area. The VoIP news feed is a service feature normally provided through the use of the "services" button on any VoIP phone model, except models 7910 and 7935/7936. In addition to an up-to-date news feed, access to special technical telephone support information pertinent to the VoIP telephone instrument is also provided.

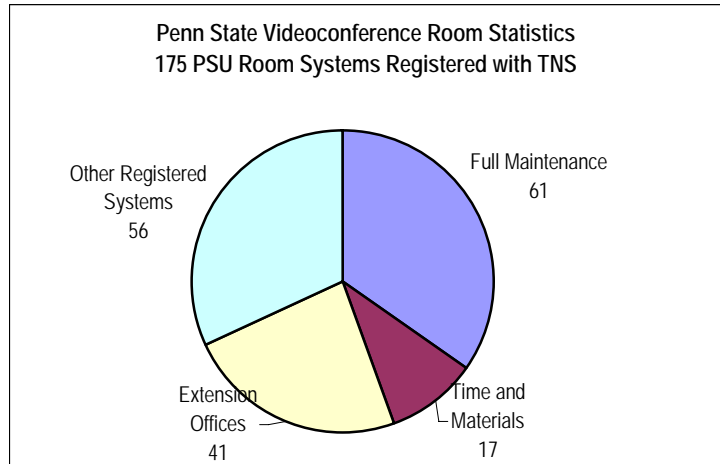
With a substantial percentage of phones at University Park now converted, the ITS VoIP Project Team has disbanded, and TNS resources have again focused upon the further development of VoIP based services, including expansion of capabilities related to use of Session Initiation Protocol (SIP), interconnection with an externally managed VoIP service utilized at the Carlisle campus, and the use of an open source VoIP support product.

## Videoconferencing

Currently, there are 175 Penn State videoconferencing room systems registered with TNS. Of those, 99 are open to the University public and 76 are for departmental use only.

Recognizing the increasing reliance on room based video systems, often for instructional delivery, TNS enhanced this service this year for those systems under their Full Maintenance agreements to now employ Quality-of-Service features. These features guarantee that, should the Integrated Backbone links serving those video systems become congested, the video traffic originating from those local networks will receive preferential treatment for forwarding before other, best-effort data traffic.

Videoconferencing users can improve setup and operation of their videoconference by following the practices illustrated in the newly available instructional videos produced by TNS personnel. The self-help videos, which run for about five minutes or less, help to quickly familiarize videoconferencing users with the setup of a typical Penn State videoconference room, how to place a videoconferencing call, and practices, techniques and tips.

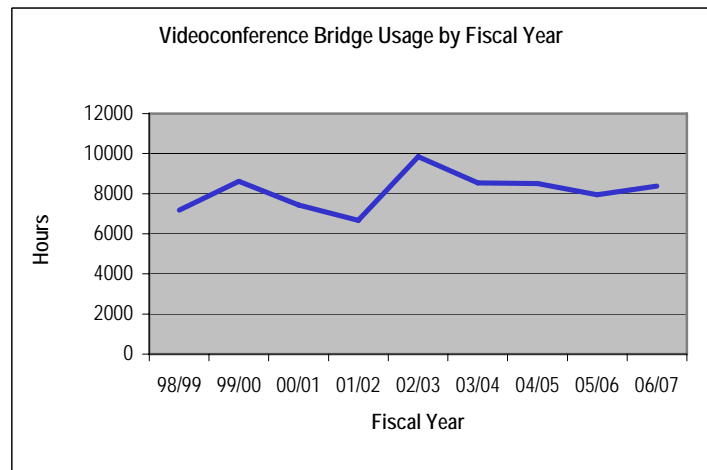


Online map of public videoconference rooms  
<http://tns.its.psu.edu/Services/vidconf/countyMap/countyMap.html>



In addition to the currently offered cathode ray tube (CRT) television-tube-type monitors, new 32" and 37" high-definition liquid crystal display (LCD) flat-panel monitors, along with a 50" high-definition plasma-type flat-panel monitor, were made available as options to use in videoconference rooms. These new Dell flat panel monitors have been added to the list of equipment offered through the Videoconferencing Room Design Service provided by TNS. They come with a five year, next day, on site, replacement warranty.

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The Penn State Video Bridge continues to be utilized by the Penn State community. A new feature on the Bridge provides a visual indication that is displayed on a participant's videoconference system. This is in addition to an audio indication when a participant joins or leaves the conference and at the conference end. The visual indication is helpful to a host site that may want to keep track of the identification and the number of sites connected.

As the result of a new 3-year contract reached with the equipment maintenance service provider, current customers under TNS video conferencing equipment maintenance saw a 10-30% reduction in their monthly maintenance rate depending on the model of the unit and maintenance type. The rate reductions were applied to both maintenance variants; Full System Maintenance or Codec Only Full Maintenance.

### III. Telecommunications Infrastructure Upgrade

Several buildings have been rewired and/or have had single mode fiber extended to them, as part of an ongoing plan to upgrade telecommunications infrastructure. The plan encompasses University Park as well as most other campus locations, and is funded centrally as part of the University's funding model for telecommunications services. Specific projects completed during the year are listed below. In total, 11 buildings were rewired and fiber was extended to 20 buildings, at 8 different campuses.

#### Projects at University Park Campus

**New Fiber** was installed in the following buildings:

- Wagner, ARL West, Spray Fields, Findlay/Johnston Hall, Hallowell Building, Water Tunnel, Research West, Walker, Applied Science, Research Centers A, B, C, and D, Research Office, Materials Research Lab, Land and Water Research, Central Biological Lab, Rider II and James.

A significant project was completed to add a redundant conduit entrance and fiber to Shields Building, providing improvements to network reliability for administrative systems in that building.

Designs were also completed to add fiber to the Airport Facility, Hospital Facility and all residence halls in East, West and Pollock Halls, totaling 34 additional buildings.

Buildings that were **completely re-wired** included:

- Wiley Lab, Laundry and Jordan Center

#### Major Construction Projects at University Park Campus

New construction projects consume a significant amount of time and effort from TNS staff as part of the planning, design and construction process. Each new building requires extensive planning and design to coordinate the fiber- and copper-based services to the building, the building wiring system itself, and ultimately to activate appropriate data, voice and video services requested within each office, classroom, lab and other specialty spaces. Major projects completed this past year include:

- Complete renovation of Ford Building, (formerly, BAB1)
- Complete renovation of Rider 1 Building
- Ongoing renovations to Whitmore Lab and Chandlee Lab

Although not completed, activities at the new Dickinson School of Law and Health Services Buildings are well underway. The Dickinson School of Law Building activity also involved considerable utility upgrades and relocations to accommodate development of the new building site.

### **Network Reliability**

As part of the on-going effort to maintain or improve network reliability, aging UPS systems were replaced at the Penn Stater and Pollock Commons IB hub sites at the University Park campus.

### **Projects at Other Penn State Campus Locations**

Telecommunications Infrastructure Upgrades have also taken place at other Penn State campus locations. Several buildings were re-wired as part of the Telecommunications Infrastructure Program at those Penn State campuses.

Buildings that received a **complete re-wire** included:

- Dubois: Rewire of the Smeal, Hiller and Multi-Purpose Buildings
- Fayette: Rewire of the Library
- Harrisburg: Completed design for rewire of the Educational Activities Building and relocated duct bank and cable and fiber to clear the way for the new Baseball field
- McKeesport: Rewire of the Kelly Library and Main Buildings
- Shenango: Rewire of Sharon Hall

Other projects at Penn State Campus locations included:

- Mont Alto: Repairs and upgrades to site cables and Housing facilities
- Wilkes-Barre: Modifications to site utilities and upgrades to the main switch room

### **Air Conditioning, Electrical and UPS Upgrades**

As network use and equipment continue to grow and expand, the heat and electrical loads in existing telecommunications rooms has become more problematic. Past efforts to engage support through facility-oriented avenues has been unsuccessful, so TNS has begun to address these issues directly, using funds stemming from central allocations. During this year, air conditioning and electrical services were upgraded in three existing telecommunications rooms at University Park, and four telecommunications rooms at other Penn State locations.

## **IV. Network Enhancements**

### **Integrated Backbone (IB) Services**

The IB is the IP network that enables the efficient transmission of voice, video and data among students, faculty and staff—not only within University Park—but with 22 other Penn State campus locations across the state, and to the Internet. The IB supports interconnectivity of over 1000 Local Area Networks (LANs) at Penn State, as well as providing access to Penn State computing resources and information available at Penn State and via the Internet. During this reporting year, 98 IB connections were designed, bringing the total number of IB connections to 1018, an increase of over 50 connections from the previous reporting year.

## Three Rivers Optical Exchange (3ROX)

Three Rivers Optical Exchange (3ROX) in Pittsburgh provides connectivity to the national data networks: the Commodity Internet (Internet1), Internet2 and National LambdaRail. Enhancements this year include:

- Improving the link capacity of the University's connection to 3ROX for Commodity Internet from an OC-12 (622Mbps) to a Gigabit (1000Mbps) Ethernet.
- Establishing an alternate, redundant path to 3ROX via the University's "dark fiber" path using dense wave division multiplexing (DWDM). Exploiting this path provides full 1 Gbps Internet2 connectivity, plus affording redundancy for the 1 Gbps Internet1 circuit.

## National LambdaRail (NLR) Network

In mid-2006, Penn State launched a connection to National LambdaRail (NLR), a research and higher education network offering robust bandwidth and resources for unprecedented access to networking and research technologies. Penn State's fiber connection to the Three Rivers Optical Exchange in Pittsburgh is utilized to make the connection to NLR's PacketNet Service, connecting the University to an ever increasing number of universities throughout the country. During the first week following activation, Penn State's use of NLR averaged approximately 5-10 Mbps over the 10,000 Mbps. With the new connection, researchers at the University now have the ability to use virtually unlimited bandwidth for data acquisition and collaboration by simply connecting to the Integrated Backbone.

This enabled the College of Arts and Architecture to capitalize on this new capability by using the Integrated Backbone connection in The Stuckeman Family Building to demonstrate joint collaborative education initiatives with Carleton University in Canada, at data rates and performances that were heretofore unavailable.

The NLR network is a national consortium that provides users unprecedented control over its next-generation network infrastructure, offering up to forty individual fiber "light paths", each of which can transmit data at 10Gbps. The rapidly expanding NLR infrastructure is the result of over three years of work and nearly \$100 million in funding by its member businesses and institutions, of which Penn State is one through auspices of the CIC. Penn State was the first of those institutions within the CIC to utilize NLR services.

## Campus Upgrades

Several activities were completed to position the Integrated Backbone Inter-Campus Network for the future. They included:

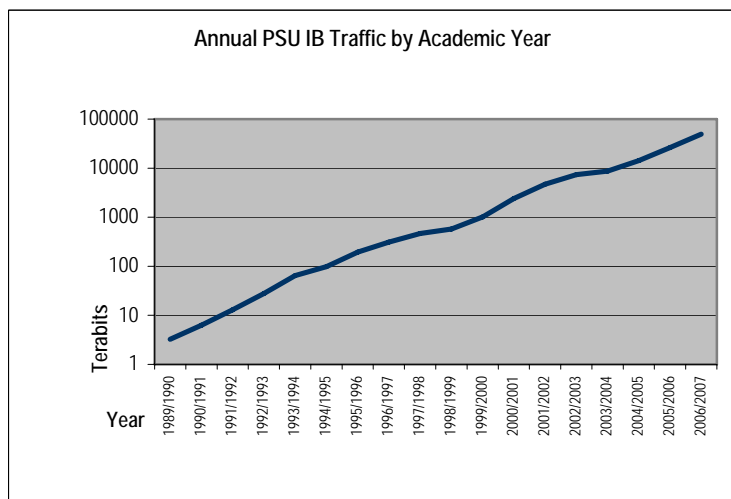
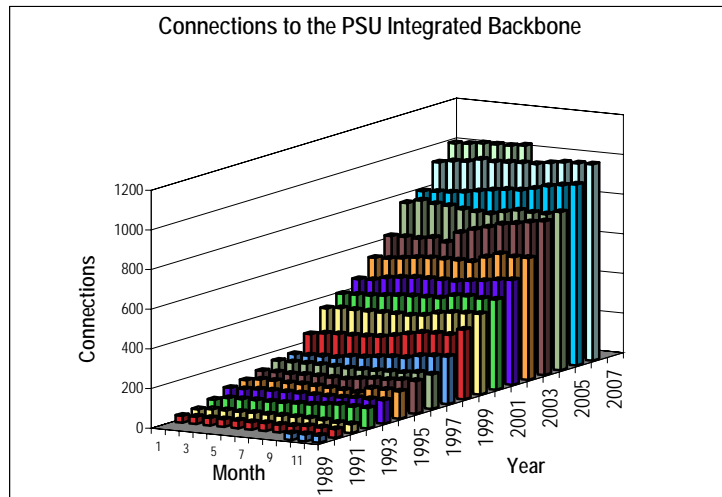
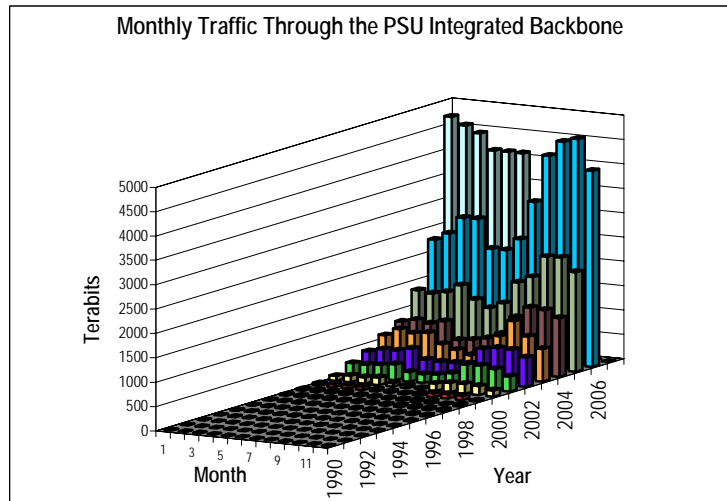
- Behrend and Hershey each received new routers capable of providing cost effective Gigabit LAN interfaces.
- The link between Berks and the Abington campus was upgraded from a 45 Mbps DS-3 to 100 Mbps Ethernet.
- Router software upgrades were performed at the following campus locations: Wilkes-Barre, Schuylkill, Scranton, Lehigh Valley, Delaware, Great Valley, Mont Alto, Fayette, Beaver, New Kensington, and Shenango Valley.
- The Intercampus Redundancy network between University Park and Harrisburg was improved from 512 Kbps to 3 Mbps.

## Gigabit Networking Technology

In order to take advantage of advances in networked services, leverage use of University networking resources, and continue to promote the use of forward-looking technologies, the use of Gigabit LAN technology is encouraged. To facilitate an orderly transition to that technology from 100 Mbps (mega bits per second) technology, all requests for new IB connections at University Park will be based upon Gigabit or higher network speeds after July 1, 2007. While there is no similar end-of-sale date yet planned for 100 Mbps connections at other campuses, it is anticipated that replacement of 100 Mbps LANs and their associated IB connections, with Gigabit technology, should be well underway at all campuses by 2009, as a normal part of the life-cycle replacement process of LAN technology. As such, ITS support for 100 Mbps IB connections and associated LAN technology, which by then will be over 5 years old, will cease at all locations, after June 30, 2009. Penn State's Gigabit connection speed requirement will help network managers keep ahead of the demand for bandwidth while realizing a better ratio of performance to price. TNS plans to continually evaluate campus network connection speed offerings and promote forward-looking technologies for students, faculty and staff, as the bandwidth-related opportunities arise.

### 5 Gigabit Customer Connection Offering

In addition to the 100 Mbps and 1 Gigabit IB service connection options, a new 5 Gbps (gigabits per second) LAN connection offering was developed. This



connection option provides a 5 times jump in bandwidth which enables network intensive applications to run at even higher speeds. Multi-Gigabit speeds, like the 5 Gbps service connection, facilitate research in areas of High Performance Computing, which use computer power to help solve highly complex problems, perform research critical analysis, or run computationally intensive workloads. This 5 Gbps Service is offered over a 10 Gigabit Ethernet physical connection type.

As new technologies and applications requiring ever increasing amounts of bandwidth evolve, the Penn State network is positioned to keep up with the demands for research and data performance needs.

#### IB Transfer Policy Clarification

The IB ownership transfer policy was re-clarified to allow the "transfers" of an IB connection by one organization directly to another at "no cost" if certain criteria are met, specifically:

- Two "no cost" Telecommunications Service Requisitions (TSRs) must be submitted, one from the unit giving up the backbone and one from the unit receiving the backbone.
- The "no cost" IB transfer option is only applicable to an IB connection in its "as-is" state. If additional material or equipment is required to meet the requirements of the unit taking over the IB or as a result of a design/service change, then the "new" IB connection process will be followed.

In addition, in order to decrease security risks and remain compliant with University policy AD-20, the individuals managing the transfer must assure that records (such as IP address assignments and other aspects) are kept accurate.

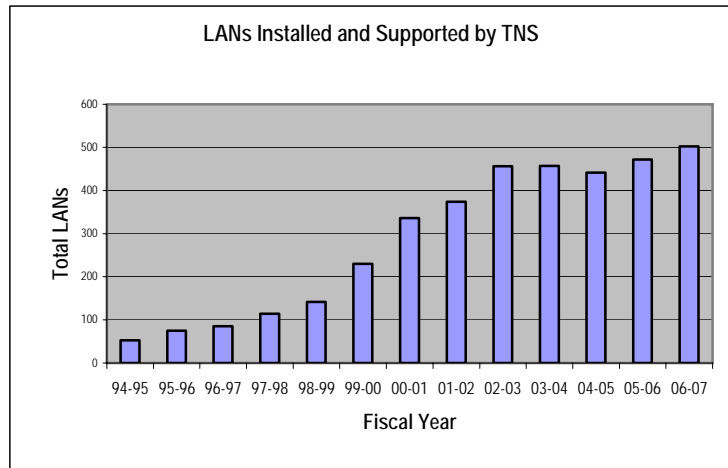
#### Private Fiber Rate Exception

A rate exception was implemented to the cost to use private fiber connections in March. Private fiber connections, dedicated point-to-point links between two buildings, are used to support independent, non-ITS managed college or administrative unit networks. An example of a private fiber link is the connection of a departmental LAN in one building to another departmental LAN in another building. The new rate exception grants a pre-approved waiver to normal private fiber costs as long as two conditions exist: (1) the fiber link is limited to the current distribution hubs (Pattee, Willard, Telecommunications Buildings, Computer Building, Pollock Commons and the Penn Stater, and (2) additional fiber is available on the University's fiber network. The use of private fiber allows additional options for local network design. The current private fiber policy has been instrumental in helping Penn State develop a solid and reliable core and edge networking architecture, encouraging the deployment of standards based networks with sufficient capacity to meet demands. The policy was also necessitated by limited fiber resources. Over the 10 years this policy has been in effect, the networking landscape has changed significantly. The use of network resources is now seen as a key component of efficient academic, research and administrative tasks, common networking standards and strategies are widely accepted and used, and fiber resources are now more plentiful than in the past.

#### Local Area Network (LAN) Services

Currently, The University encompasses 1,018 installed backbone connections on 74 different routers. TNS supports 1,784 switches and 98 firewalls on Local Area Networks on 502 of these backbone connections. During this reporting period, over 50 LANs were installed. Each TNS-supported LAN is serviced through an IB connection.

Additional maintenance options were added to the LAN design, installation and maintenance service. As a result of the enhancement, TNS will continue to offer both "Full" and "Hub-Only" forms of installation and maintenance. To meet requests to include both design and installation of patch cables while excluding their maintenance in situations for which "Hub-Only" maintenance is desired, a new service variant was created, called "Full LAN installation/Hub-only Maintenance". This affords an additional approach to installation and maintenance options, by separating choices as applied to qualified networking electronics, and to patch cables.



A firewall option was also added to the LAN design, installation and maintenance service. With the option, a customer can maintain their own firewall and have TNS support the qualified LAN behind their firewall if specific criteria are met.

#### ITS Firewall Service Improvements

Changes to hardware equipment offerings available via the ITS Firewall service were made during this reporting period. The new devices replace discontinued models and provide improved data throughput of combined inbound and outbound communications by achieving even higher firewall data transfer speeds than originally offered by the ITS Firewall service options. There are several options for the ITS firewall hardware device, each with increasing data throughput and total IP address capacity. The ITS Firewall service is available for all ITS maintained backbones, including those with customer maintained LANs behind the firewall and offers options for large, medium and small networks.

#### Next Generation ITS Wireless Service

A TNS staff member is chairing a committee of ITS staff who has been tasked with investigating and proposing changes to enhance the existing ITS wireless service and oversee the implementation of those changes. The committee is also in the process of establishing requirements for the next generation of ITS wireless service, which entails selecting components for the new service and developing a plan for transitioning from the existing system to the next generation ITS Wireless system. The committee authored and released a Request For Proposal (RFP) for the required components. A suitable vendor was identified and a contract was awarded to 3Com last year. Operational trial sites of the 3Com components have been implemented in the Computer Building and the Telecommunications Building at the University Park campus. A wireless aggregation trial was implemented in buildings at the Shortlidge Mall location (a pedestrian walkway between Pollock Road and Curtin Road consisting of the Thomas Building, Chemistry, and Life Sciences on the University Park campus) in order to improve coverage and performance. TNS has initiated the process to add aggregation to the production wireless service in Business, Food Sciences and Forestry Buildings as a second part of that trial.

#### Penn State Wireless Networking Initiatives

A significant effort was made in the past year to address requests for additional wireless areas. Wireless designs and installations were performed for the following campus locations:

- Abington: Completed coverage in Woodland and Sutherland Buildings
- Beaver: Almost entire campus; coverage in Harmony Hall, Administration, Baker, GCB, Library, LCB, SLC, Multipurpose and Food Service Buildings, and the entire campus “quad”
- Dickinson: Advantica Building
- Shenango: Coverage Sharon, Forker, McDowell, Black & Bashore, and Chadderton Buildings
- Wilkes-Barre: Coverage in Hayfield House and TechCenter
- University Park: Food Sciences, Pond Lab, Ihlseng Cottage, Beam, Business Administration, Hamer-Heinz, Wagner Annex, and common areas in ten Housing Buildings; Atherton, Beaver, Findlay, Johnston, Pollock, Simmons, McElwain, Holmes, Leete, Warnock, & McKee Halls



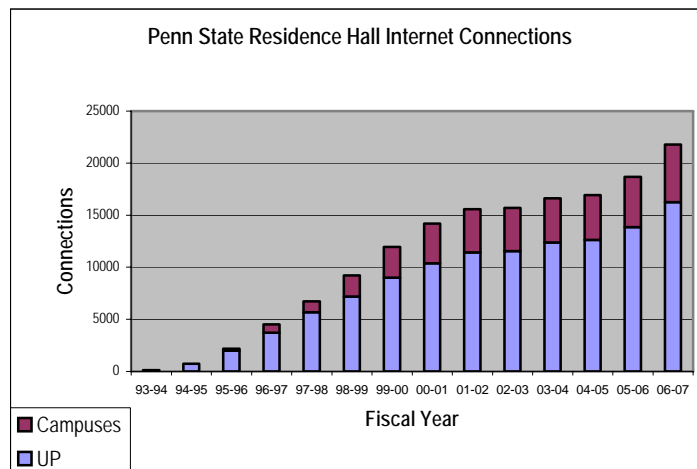
*Penn State Wireless signs have been posted in the Residence Halls to indicate newly installed wireless coverage areas in those buildings*

## V. Student-Focused Issues

### Residence Hall Internet Services

Approximately 8000 new freshman arrived at the University Park campus for fall semester—a substantial increase from the previous year. In order to accommodate networking needs of such a large freshman class, additional Ethernet outlets were installed in the residence halls. Over 21,000 students activated their residence hall Internet connection.

As of fall semester, Penn State residence hall students were afforded a 33 percent increase in their weekly individual internet traffic allotment, now set at 2.0 Gbytes. Perhaps as a result, the number of residence hall students exceeding the allowance decreased somewhat. Students continued to be able to check their current download levels and learn more about residence hall computing at <http://www.rescom.psu.edu/>.



## VI. Continuous Quality Improvement

### New FAX Number for TSR Submissions

A dedicated fax number was established for the submission of Telecommunications Service Requisitions (TSR). The new fax number, 814-867-0190, will be used solely to expedite faxed transmissions of TSR requests. The University's TSR form is required to request a new service,

make a change to an existing service, or cancel a service from Telecommunications and Networking Services (TNS).

#### Focus on Service Delivery

The ordering and delivery of services was improved this year by the re-structuring of the Network Planning and Integration group. Multiple email addresses, inquiry phone numbers and web pages were replaced by single instances of each. The design process was further streamlined so most design services can now be delivered by a single engineer. The intention here is to improve communication between customers and those who deliver the service so that expectations are met with less chance of miscommunication.

#### Cost Savings/Cost Avoidance

TNS closely monitors the costs of delivering its cost recovery individual good services and continues to identify opportunities to reduce the overall costs of providing these services to the University. These services include voice telecommunications services, departmental network services, videoconferencing services amongst others. Through a number of service enhancements, contract negotiations, rate reductions, and efficiency gains, the cost to the University for these TNS individual good services declined by approximately 10% - 15% from FY 2005/2006 to FY 2006/2007. This amounts to a nominal reduction by approximately \$1.0 - \$1.5 million in University expenses from the prior fiscal year. For example, the impact from migrating to VoIP technology at the University Park campus coupled with diligent contract management and service delivery, the cost of providing overall telecommunication services (e.g, legacy telephone services and VoIP services, including voice mail) decreased by approximately \$560,000 or 12%. Additionally, the general administrative and service support expenses decreased by approximately \$120,000 or ~10%. These savings are generally passed to those paying for the service, in the form of lowered rates for the associated individual (cost-recovered) services.

#### Timely Notification of Telecommunications Work and Deadlines

As in previous years, notices of deadlines were distributed well in advance, for work to be billed during the remainder of the fiscal year, and for work to be completed during the summer months. Timely notifications provide a tremendous overall benefit for the University community by enabling contacts to complete the required Telecommunications Service Requisition form prior to the deadlines, so that work can be scheduled and completed in an orderly fashion. This eliminates many of the disruptions stemming from high-priority, last-minute requests. The practice also minimizes the amount of extra-cost overtime needed to accommodate these efforts, leading to overall savings to the University, as well as to individual Colleges and departments.

#### THON

The annual event needs of THON relative to networking and telecommunications services were again supported, making this at least the tenth year of consecutive support of such needs. This year, ITS, WPSU, and the College of Communications collaborated with THON personnel to provide, for the third consecutive year, a live videocast, which occurred during February 16, 17, and 18. The partnership made video from THON available via a high-bandwidth multicast transmission throughout the Penn State and Internet2 networks—providing an opportunity for students, faculty, and staff to view and participate in the event in ways that wouldn't have otherwise been possible. The videocast was available via low-bandwidth Webcasts (which can be viewed almost anywhere on the Internet) and through WPSU's live video feed on channel 9 of the campus cable system at University Park.

## Emergency Preparedness

Continuing the arrangement established in 2006, TNS continued to work with others in ITS and elsewhere to address issues related to the continuity of operations and the recover in event of a disaster. TNS was instrumental in terms of assisting in the University's identification of those services deemed critical, several of which are ITS-centric, and some which involve TNS. Exclusive of that work, TNS also conceived and has proposed a plan to further leverage the "dark fiber" path between University Park, Altoona, and Pittsburgh, and Altoona-based ITS disaster recovery initiatives, to increase overall University resiliency to a network-centered problem, such as could occur at University Park. Discussions are ongoing relative to whether the initiative can be funded. In addition, along with an annual update to TNS' Continuity Of Operations Plan (COOP) in November, an evacuation plan was developed for TNS personnel in both USB2 and the Telecommunications Building, and attributes shared with the other ITS units having personnel located in USB2, should the units wish to mimic them.

Subsequent to the tragedy at Virginia Tech, brainstorming sessions within TNS yielded a number of initiatives, several which are currently in various stages of progress, to assist in alarm notification, communication, and other University-level processes which may be employed in event of a disaster. Among those are the use of the campus CATV system to enable video information to be displayed on all channels of that system, use of VoIP technology to provide alert sounds or information to be distributed to those using VoIP phones, and the future use of Session Initiation Protocol (SIP)-based connections with others, to afford additional communication capacity. Suggestions were also offered during discussions led by ITS Consulting and Support Services (CSS) with companies providing wireless (cellular) services.

In order to support the utilization of the University's communications dispatch center now designated for the Eisenhower parking deck, an emergency circuit was installed to handle the increased volume of emergency communications to that facility that likely will result. Information was also provided to a professional risk consultant retained by the University's risk management organization, during late 2006.

## ITS Event & Computer Store Expo

Again this year, TNS personnel participated in the ITS Event/Expo, assisting with program and content development, network provisioning, and staffing during the event itself.

## Presentations

At the national level, a presentation was given during the annual Net@Edu membership meeting in February, entitled "Lessons Learned; VoIP at Penn State."

Within the Networking group of Committee on Institutional Cooperation (CIC), informal presentations were made on topics including wireless services, on interactive video, telephony, and high speed networking plans, and on organizational structure. Of particular note is the key role afforded by TNS personnel during a follow-up meeting at the University of Michigan, to a past-year meeting at University Park which focused upon the members' use of VoIP technology. Similarly, ongoing support within the subgroup developed to focus upon wireless continues, with periodic meetings and other interactions among representatives of member institutions.



*ITS Forum series presentation*



As part of the ITS Forum series, presentations entitled "Network Performance Measurement on the Integrated Backbone" and "An Update on Penn State's Integrated Backbone Plans" were provided during this reporting period.

Augmenting these interactions within the higher education community, were structured and unstructured presentations of varying nature as part of partnership development with executives of AT&T, Cisco, GetWireless, Level3, 3Com, Verizon, and other

corporations, with representatives of the Commonwealth, and with others having interaction with the University, with ITS, and/or with TNS.

## VII. Closing

As exemplified by the particular achievements and activities cited above, TNS continues its mission to develop, design, install, and maintain comprehensive telecommunications and networking services, within and among University locations and outside networks, to accommodate University communication needs. To that end, we look forward to embarking upon another year of continued accomplishments and advances of the services offered.