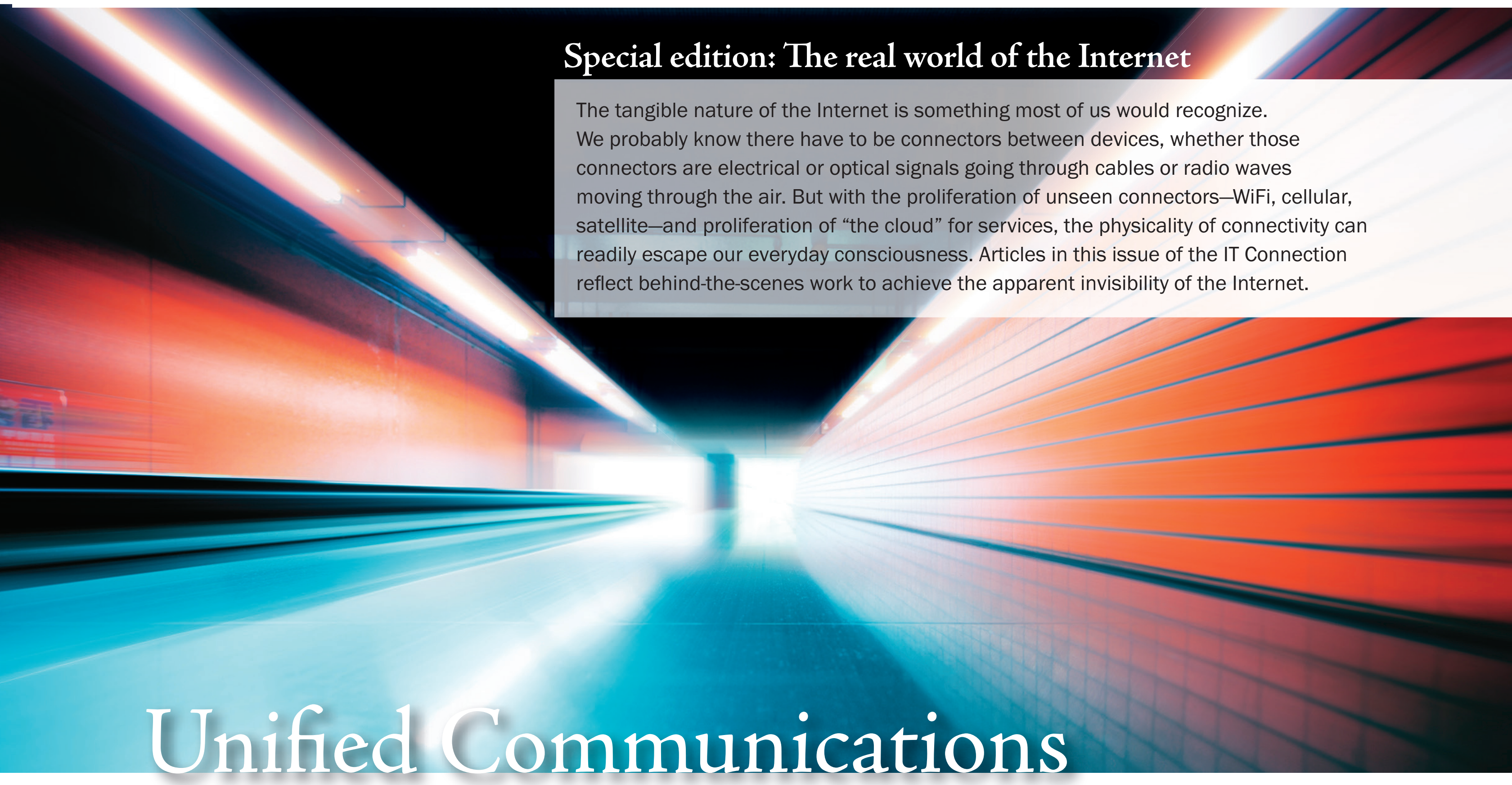
THE IT CONNECTION

From the Office of the Vice President for Information Technology | Spring ’14 • Issue 08



Special edition: The real world of the Internet

The tangible nature of the Internet is something most of us would recognize. We probably know there have to be connectors between devices, whether those connectors are electrical or optical signals going through cables or radio waves moving through the air. But with the proliferation of unseen connectors—WiFi, cellular, satellite—and proliferation of “the cloud” for services, the physicality of connectivity can readily escape our everyday consciousness. Articles in this issue of the IT Connection reflect behind-the-scenes work to achieve the apparent invisibility of the Internet.

Unified Communications

As we approach the two-thirds mark of migrating to the new Unified Communications (UC) system of voice, data, and video, most employees have seen something of the physical work needed. If you are in the two-thirds of completed work, crew members from Communications Network Services, a component of Network Infrastructure and Services, have made trips to your department and to your office to switch the telephone and to ensure that your desktop computer is connected to the newly converged network. Or you may have been in Burchard, Engel, Randolph, Smyth, or Hancock halls—or one of many other buildings where workers were redesigning and upgrading the cables that support the UC system. A smaller number of buildings have had new spaces for telecommunications equipment built or renovated, and a few more will undergo this work in the months to come.

The physical infrastructure of the telephone system is familiar; the physical infrastructure of the data network perhaps less so. With convergence—the merging of voice, data, and video traffic onto a common network—all three share the tangible network of cables and equipment. What’s new is that they also share the ability to operate in an integrated environment, not only on wired devices, but also on mobile devices.

Unified messaging permits voice mail to appear in your email, whether you are using a wired computer or a mobile device. You can also elect to receive a text message on your cell phone when you receive a voice mail at your university extension.

While on an active call on your desk phone, the Extend Call function allows you to move that call to your cell phone and seamlessly continue your conversation as though you were still on the university telephone network.

With the mobility package, calls will ring to both your desk phone and your cell phone. Either device can answer the call and appear as your Virginia Tech extension to the outside caller.

The schedule for the remaining UC work is available at www.nis.vt.edu/uc, along with other information about the services of the UC system.

Data gets a new way in and out of town

The beginning of March saw the lighting of a major new pathway from Virginia Tech to the Internet—new line to Atlanta that doubles the university's major link to research and operational global networks.

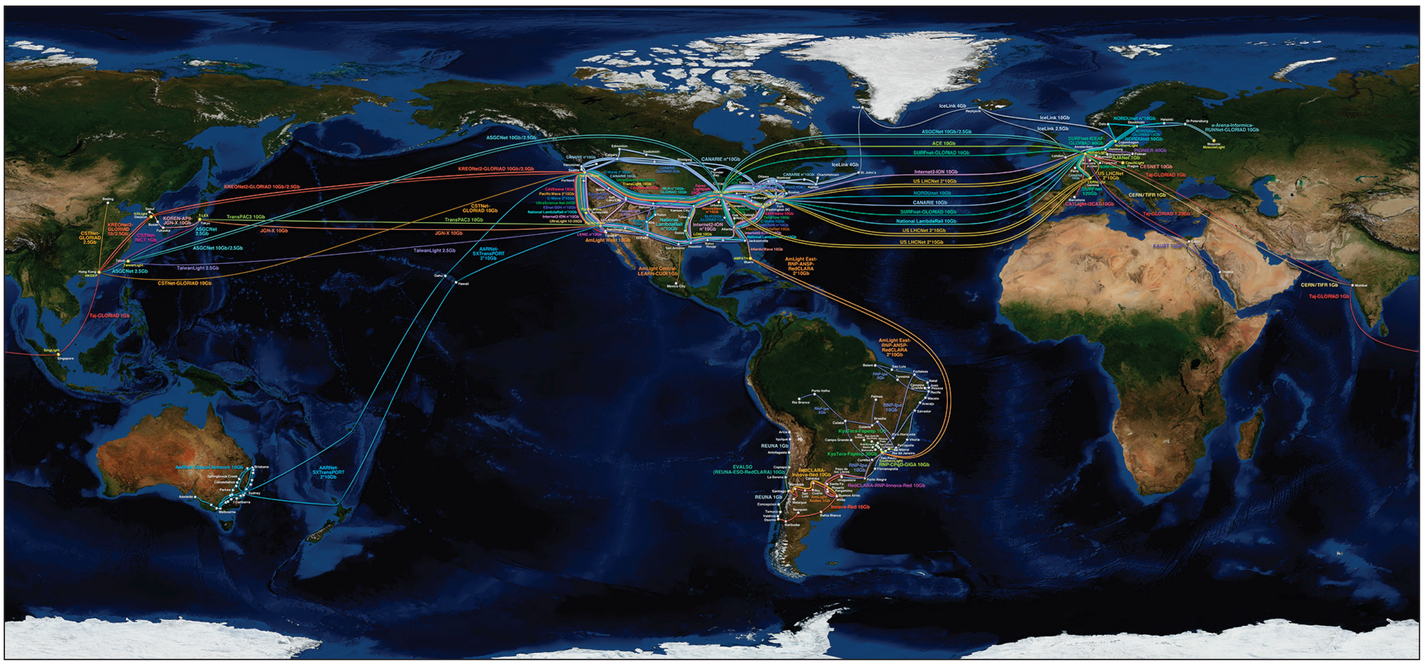
Previously, the link to the global network was through two locations in the Washington, D.C., area. Now, with both northern and southern routing options, Internet connections are more reliable. For instance, they will continue to operate if there is an outage affecting one link or the other. And outages can happen: Virginia Tech felt the impact of such an outage briefly last summer when a single accident severed connections to both D.C. connection locations. The industry jokingly refers to the problem of "fiber-seeking backhoes," a common threat to buried cables, but burrowing animals, mudslides, earthquakes, and vehicle accidents can also jeopardize service to email, Scholar, and research collaboration—all of the Internet-dependent tasks that constitute much of our daily work.

Before the pathway itself could be switched on, a connection center was completed at the Atlanta site at the end of 2013. Facilities in both Atlanta and D.C. employ technologies to make the data transmission more efficient, and to connect to major research networks like Internet2.

And before the connection center was enabled, network engineers and field technicians on the Blacksburg campus upgraded the telecommunications network to prepare for the increased speed and capacity that would be required by the new connections. The upgrade positioned the university to take full advantage of the increased performance made possible by the addition of the Atlanta pathway. By upgrading campus equipment and software, Network Infrastructure and Services also has been able to decrease the need to take network components off-line for maintenance, a change that also increases reliability.

These major, intersecting data systems significantly add to the resilience and capacity of the university's connectivity. Seamlessly merged with existing technologies, they have quietly become a part of the unseen infrastructure that supports work and life at our connected university.

The Global Lambda Integrated Facility (GLIF) Map 2011 visualization was created by Robert Patterson. See www.glif.is for complete source information. ▼



New options for distance learning

Asynchronous online courses extend educational opportunities without constraints of time or space, but until very recently, many of Virginia Tech's distance-learning classes were limited to classroom-based interactive video conferencing, meaning that a student needed to travel to a designated classroom at a prescribed time to participate in person or through a two-way audio and video exchange. Newer technologies bring together the convenience and accessibility of anywhere online instruction, delivering to a device, with the added engagement of interaction through audio and video.

The new interactive distance-learning classroom is the student's own home, office, hotel room, or other facility with sufficient network speed. Newer software takes advantage of the ubiquity of webcams to support students located nearly anywhere, interacting in real time with students and faculty in other settings. These tools can also support asynchronous interactions, with a learner scheduling their engagement with the class at a time that best fits their needs.

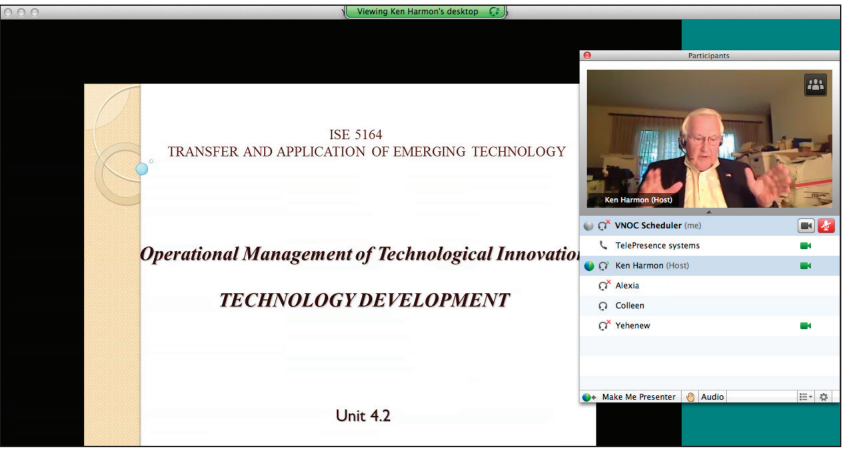
Technology-enhanced Learning and Online Strategies in Information Technology (TLOS) is supporting WebEx, Echo360, and LectureTools. WebEx enables online multimedia interaction, and can integrate with video transmissions. WebEx can connect multiple locations during live course sessions; help blend online and "seat time" experiences in a single course; and can record content for students to view later at their convenience.

Echo360 permits video capture of the classroom session for current or later viewing online. With this tool, instructors can tell if students are revisiting material again and again, possibly indicating difficulty with the material. Instructors can download Echo360 Personal Capture onto their computers to create online lectures. This option is a great tool for the classroom that flips lectures and homework, allowing lectures to be created once, saved, and potentially re-used. Students can view the lectures before class, so that class time can be devoted to collaborative workshops focused on exercises and applying class concepts.

With LectureTools, instructors can upload videos or text presentations so that students can follow along in class, seeing the same images on their own computers. Students have additional space to take notes or flag material for questions.

Professor Ken Harmon, director of the extended campus program in the Grado Department of Industrial and Systems Engineering, participated in the pilot offering of synchronous WebEx courses during the fall semester of 2013. His classes connected the in-person experience with both the statewide network of interactive video conferencing classrooms and the virtual classrooms of individual students' laptop computers. With the WebEx extended classroom, his students could continue their studies when they were posted overseas, took jobs in distant cities, or even encountered—as one student did—unusually bad traffic tie-ups.

The gateway website for these tools is https://webex.tlos.vt.edu/ and http://blogs.lt.vt.edu/echo360/. Networked Learning Initiatives offers workshops—see https://www.nli.tlos.vt.edu/.



Professor Harmon's desktop during a WebEx session, originating from a convenient location rather than a dedicated classroom

Improving cellular coverage and capacity

It's noon on the Blacksburg campus. Pat's in the office, waiting for the plumber to call; outside, Sally's uploading photos of spring flowers; and Gary's conference just broke for lunch, so he's calling back to his office—as are 60 other of his fellow conference participants. If they are attempting these communications from their cellular devices, it could be frustrating.

Today, it seems that everyone carries a mobile communications device, whether a smart phone or one of the many types of tablets, and they expect their devices to work everywhere. They expect them to work inside as well as outside, in both old buildings and new, and in both solitary spaces and crowds. And they expect them to work for data-intensive apps as well as for text messages and voice calls. But to meet these rising usage expectations, technologies have to overcome environmental challenges.

In the early years of cell phone use, most calls were outdoors, but today the majority originate or terminate indoors. Buildings can be unkind to cellular signals. Hokie Stone construction—involving concrete, rebars, limestone, and slate roofs in buildings old and new—is particularly difficult for cellular signals to penetrate. Energy saving low-e glass in newer and retrofit buildings is more difficult to penetrate than old glass.

Both indoors and outdoors, coverage and capacity are affected by radio frequency power emitted from macrocell base stations and by the placement of the cellular services infrastructure belonging to carriers in this region.

Even when access is available, there may not be enough capacity for bandwidth-hungry applications, particularly when 60 conferees—or, more likely, 60,000 football fans—are trying to use their devices simultaneously.

The Distributed Antenna System (DAS) project has made strides improving cellular reception by establishing a multicarrier system for enhancing signals on campus. The DAS is a system of antennas that propagates a commercial carrier's cellular signals. Installing antennas closer to the subscribers improves call coverage and data capacity. The antennas and connecting fiber cables are designed to be unobtrusive—in contrast to the specter of an unsightly cell tower in the middle of campus. The service is enhanced by an integrated facility for boosting signal strength, open to multiple cellular carriers as they are ready to join in the effort.

The first phase was available this past fall, with temporary construction for the required equipment near Lane Stadium. Permanent construction will be complete this spring. The initial carrier is Verizon Wireless, but work is underway to add other service providers to use this multicarrier platform. The stadium installation serves the security and safety of the thousands of spectators even as it adds capacity, possibly for thousands to send photos of that key play at the same time. In addition to adding more service providers, future phases of the DAS project will be extended to improve in-building capacity and coverage, particularly in the residence halls.

Under construction, the equipment shed for the DAS system, late winter 2014 ▶

Where is "the Cloud?"

"The cloud" has caught on as a descriptor of information technology services offered commercially. The convenience of services offered in the market place can save the university the expense of developing software, or of purchasing and maintaining hardware. When services reach the point of being a commodity available to everyone for a price—or sometimes even free—there may be little added benefit to the university in creating its own version.

The cloud seems easy, but there can be pitfalls. Will the services provided be available when needed? Will university data used or stored there be secure and then surrendered when we no longer work with that service?

A contract is the only means of protecting university processes and information, since the vendor providing the service is in control. Contract terms must be vetted by University General Counsel to ensure that Virginia Tech has reasonable assurance of process and data integrity and of means to enforce those agreements with the vendor.

Of course we know that this cloud isn't in the sky, but in computing centers of servers hosting the applications and the university data somewhere on the global network. These could be next door, in another state, or in another country. The location of the vendor's facilities matter. Some of the university's data is not permitted to be offshore, notably those data sets covered by export regulations.

Information Technology Acquisitions can help you with finding appropriate vendors through procurement processes and methods to evaluate the security and reliability of the vendor. Contact computerpurchasing@vt.edu.