

Of Gladiators, and Bandwidth Realities

So, how long have we got?" He asked me this half-joking, half-serious, as we walked back from a campus lecture series that had featured a speaker from Google. My colleague was not asking me some philosophical question about the meaning of life, nor was he asking a mundane question about the time we had left for lunch before our next respective meetings. Rather, he was asking a fairly straightforward, work-related question. He is, you see, a network technician for our IT department, which services a university comprising more than 21,000 students, faculty, and staff in Ohio. He was asking me, in a somewhat exasperated manner, how much longer I thought he and his coworkers would be involved in the Great Bandwidth Arms Race.

What is the Great Bandwidth Arms Race? Simply put, it is the sole reason my colleague gets up and goes to work each day. It is perhaps the single most important aspect of his job—the one issue that is always on his mind, from the moment he pulls into the campus parking lot in the morning to the moment he pulls into his driveway at home at night. In an odd way, the Great Bandwidth Arms Race is the exact opposite of the “Prime Directive” from *Star Trek*: rather than a mandate of *noninterference*, it is one of complete and intentional *interference*. In short, my colleague’s job is to effectively manage bandwidth consumption at our university. He is a technological gladiator, and the Great Bandwidth Arms Race is his arena, his coliseum in which he regularly battles conspicuous bandwidth consumption.

Often, his opponents are amateurs:

lightweight *World of Warcraft* addicts who stubbornly insist that their tuition dollars are paying for their right to online gaming. He sweeps them and their *Halo*-driven desires aside easily, often within the comfort of his office, without seeing these students or even being acutely aware they exist. He does the same with “the Collectors,” a demographic he describes as obsessively and often seemingly arbitrarily trying to improve their audio and video libraries by way of illegal, peer-to-peer file-sharing. “Our network can’t handle that volume of traffic,” he tells me, almost dismissively. “Anyway, it’s illegal—and who really needs all those Tom Cruise movies? *The Last Samurai* maybe, but *Days of Thunder*? Please.”

Over the past few years, however, my colleague has been getting tired—and worried. He feels as though he’s in the arena all the time now, and he can’t get a rest. Meanwhile, his opponents are massing again, armed with bandwidth-hogging YouTube videos, Skype calls, audio and video podcasts, purchased content from the iTunes Store, and reams of other media. His weapons of choice against these invaders have always been to use packet-shaping and to buy more bandwidth. Now, these solutions seem to him increasingly like placing Band-Aids on the symptoms of a greater problem: increasingly legitimate needs for more and more bandwidth usage on campus, driven by Web 2.0 services.

When he asked me how long we’ve got, I believe that what he meant was: How much longer can colleges and universities continue to rely on packet-shaping as the fundamental way of dealing with bandwidth-intensive applications? From a

purely technical point of view, the answer is, of course: Indefinitely. Throttling down bandwidth for certain types of network activity (e.g., online gaming in the residence halls) in order to allow for greater bandwidth for other types of network activity (e.g., e-mail, course management portals) is quite simple to do, and buying or licensing packet-shaping products is fairly inexpensive. But my colleague was not asking me about the technological feasibility of this strategy. He had steadily become concerned with the *ethical* implications of packet-shaping.

Packet-shaping—that tried-and-true method of prioritizing classes of network traffic and giving some classes essentially preferential treatment at the expense of others—has been used and relied on by IT departments for years. It has seemingly become *the* answer to most bandwidth issues on campuses, ours included. Yet what choice do we have? We simply must give priority to e-mail, Web, and course-management network traffic. If that means knocking VoIP and BitTorrent bandwidth back to the functional equivalent of an analog modem from 1998, then so be it. Bandwidth doesn’t grow on trees, and it is not cheap. In the past few years here at BGSU, we have regularly purchased bandwidth upgrades at a cost of thousands of dollars per upgrade, with no end in sight.

Hard-core geeks are most likely painfully aware that over the past decade, higher education IT jobs have gotten more difficult—regardless of whether we are network administrators, technology-support specialists, faculty in technology-related disciplines, program-

The standard rationalization that packet-shaping is used mainly for “non-educational” computing won’t hold water here.

mers, IT trainers, residential computing consultants, or any of the numerous other titles associated with higher education technology administration. Certainly, these jobs have gotten more difficult as the rate of technological change associated with these fields has sped up dramatically. There appears to be no end to the years-long deluge of computer viruses, worms, trojans, spyware, adware, bloatware, “craplets” (quoting, out of context, a senior Microsoft official), spam, spim, and the related electronic garbage that attempts to bog down institutional IT infrastructures, 24x7. It is a contest that IT administrators at most state institutions seem almost destined to eventually lose, given the shrinking state support these institutions have been granted.

Yet this is not the only factor leading to a seemingly perpetual-upgrade cycle of servers and services provided by higher education IT offices, typically along with a proportionate ramping up in staff. The technological needs—or, perhaps I should say, technological assumptions—of the students using the various institutional services have also changed dramatically in recent years.

If you were a student a mere ten to fifteen years ago, it was mind-blowingly cool to have an ethernet jack in your dorm room. Now, students simply expect this, along with campus-wide wireless, access to their grades and class registration online 24x7, electronic paychecks viewable online, streaming audio and streaming video, MySpace, BitTorrent, and any of the other host of always-on, multitasking technologies available to them. If one such service suddenly becomes unavailable on campus, these students will be relentless. They will hound and chase IT staff until their needs are met, one way or the other, so that they can resume creating YouTube videos, downloading Linux distributions, editing wikis, buying music from the iTunes Store, accessing RSS feeds, uploading podcasts, and writing blogs. They have simply become accustomed to dynamic, rich-media learning environments.

My colleague groans when he thinks about faculty and students signing up for

any of the numerous free Web-based services such as Veoh, BitTorrent, Democracy Player, and Joost and Web-based applications such as Google Docs & Spreadsheets (soon to feature, apparently, a presentation module), ajaxWrite, and ajaxSketch. His groan is louder when he thinks of how Joost is only a beta right now.

There are now even Web-based video-editing applications, such as Eyespot and Adobe Remix, and Adobe plans to soon offer a Web-based and Web-hosted version of Photoshop. Let me just say that again: there will soon be an online version of Photoshop. Try to imagine the tidal wave of bandwidth that might be required to edit a video or a high-resolution JPEG, TIFF, or RAW image online. If all or even some of these services are available for free, perhaps by way of ad-supported mechanisms, I have little doubt that students will eventually flock to them—from their dorm rooms, the campus computer labs, and wireless zones around campus.

From the perspective of Adobe and the above-mentioned companies, developing Web-based applications that mimic some of the functionality of traditional, desktop-shackled applications is a no-brainer. The technology is there, the means to monetize the technology is likely there, and the bandwidth to support the technology is also likely there. However, the cost of supporting this bandwidth is less likely to be borne by Adobe and is instead more likely to be borne at the “last mile” of connectivity. In the case of higher education institutions, this means that their IT infrastructures will be doing most of the heavy lifting. If institutions can’t afford this heavy lifting, many will fall back on packet-shaping.

But Photoshop isn’t Limewire, and Google Talk and Joost aren’t *Halo* and *Final Fantasy*. The standard rationalization that packet-shaping is used mainly for “non-educational” computing won’t hold water here. Try telling students that they can’t edit a video for a class project using a free Web-based tool or that they can’t access a *National Geographic* documentary for a class by using a free Web-based video service that has legally licensed and

made such content accessible 24x7. Try telling students that they can’t use the soon-to-be-available Web-based version of Photoshop to edit an image and they should instead buy their own version of Photoshop or rely on crowded campus labs, all because the campus may not have the necessary bandwidth to support such use. It’ll be a hard sell at that point.

This isn’t to say that students will stop buying and using the “regular” version of Photoshop. This and similar applications will continue to be relied on by students who are majoring in specific fields. However, for casual users—non-technology majors who might need to do some light editing for class projects—the demand for Web-based applications could boom. This is, of course, assuming that institutions are prepared to meet the likely bandwidth needs of these applications. If not, can colleges and universities simply fall back on packet-shaping, essentially rendering these applications and services unusable on campus? It may be tempting to write off this scenario as hypothetical or as economically unfeasible, but this very scenario is coming—soon.

Web 2.0 offers tremendous opportunities for higher education, for institutions, and for departments. Students can and are participating online in ways that couldn’t even have been imagined just a handful of years ago. How colleges and universities deal with these opportunities—technologically, administratively, legally, and financially—represents an ongoing series of challenges and, in all likelihood, headaches for the foreseeable future. In each case, those of us in higher education IT will need to balance Web 2.0 needs with bandwidth realities. If we fail to do this, if we refuse to formulate the necessary series of technology policies and compromises regarding what we, our students, and the faculty can and cannot do on our networks and if we instead continue to battle the needs of students and faculty by falling back on packet-shaping as the solution to all our bandwidth problems, we will have to ask ourselves: “So, how long have we got?”



Paul Cesarini is Assistant Professor in the College of Technology at Bowling Green State University.