

(3) PROPOSAL: 40G CAMPUS NETWORK UPGRADE

PROJECT DESCRIPTION

To support the escalating need for network capacity, driven in part by Big Data research activities, UW-IT proposes to increase the campus backbone network capacity from 10 gigabits per second (Gbps) to 40Gbps (40G).

As a Tier 1 research institution, the UW requires robust data network capabilities to support Big Data and big research grants. In addition to providing new on-campus capacity, a 40G backbone offers a unique opportunity to efficiently connect to the advanced 100G Pacific Northwest Gigapop and Internet2 Advanced Layer2 Services. With the increased campus capacity and high-throughput interconnect to regional, national and global advanced research network facilities, this project should provide 4-5 years' worth of functional capacity in support of Big Data transfers between research facilities, advanced compute clusters and data storage facilities both on campus (such as Hyak high performance computing cluster and lolo data storage) as well as between the UW and research facilities around the world. This new on-campus capability will allow our researchers to collaborate and connect with peer institutions over larger (100G) national and global advanced networks. In addition, this increased capacity will provide expanded utility for UW's advanced administration, teaching and learning applications.

TIMELINE

Estimated timeline: 18 -24 months

Estimated beginning date: Fall 2013

BUDGET

Project Cost	Estimated implementation cost: \$2,180,000
Contributed Effort	UW-IT: ~ 2,000 hours (<i>included in Project Cost above</i>)
Ongoing Cost	Estimate of annual ongoing cost at the completion of the project: ~ \$100,000/year

PRIORITIZATION CRITERIA

Mission, Strategy and Goals

The University's mission and values of excellence, collaboration and innovation requires a state-of-the-art network facility. With a 40G network, UW researchers, faculty and students will have the network flexibility and agility to go beyond the norm and innovate; they will have the network ability to go the extra mile in the midst of large-scale research projects requiring Big Data transfers from research facilities to the compute clusters, and ultimately to the discerning eyes of the researchers; and they will have the platform on which to use and invent the wide variety of applications that define the rich and unfettered social milieu that shapes how today's generation of millennials learn.

Exponential growth and on-demand network capacity is essential:

"To keep the University of Washington among the nation's leading research-intensive universities—to enable the cutting-edge discovery, learning and engagement that define us—the single most important thing that UW-IT can do is to keep UW at the leading edge of R&E (research and education) networking. It's essential, now, that we move forward with the proposed upgrade. Major projects such as the Ocean Observatories Initiative depend on it. But so do a broad range of data-driven research and education initiatives across the campus. The demand for networking, and the nature of networking, is changing rapidly. UW needs to keep pace."

— Dr. Ed Lazowska, Bill and Melinda Gates Chair of Computer Science and Engineering

Risk: Compliance, Financial or Strategic	<p>Attracting and retaining world-class researchers and grant funding requires the UW to have a modern, highly functional network facility. Without it, the University runs the following risks:</p> <ul style="list-style-type: none"> • Important research grants are not awarded due to the limits of infrastructure • Ongoing loss of important research grants could jeopardize Tier 1 research institution status • Ability to recruit and retain top research talent may be limited
Resilience and Operational Risk	<p>Not funding this effort may have serious negative impacts in any or a combination of the following:</p> <ul style="list-style-type: none"> • Current network will not scale to support “Big Data” research needs • Current network doesn’t provide a large bandwidth interconnect facility for UW researchers to connect to their partners located outside the UW • Intensive research activities in the network could disrupt performance of other traffic on the network <p>The alternative is to build unique solutions on an as-needed basis for researchers and departments. Building unique solutions for individual researchers creates a costly infrastructure that is difficult to maintain and operate.</p>
Improve Efficiency and Optimize Costs	<p>By leveraging funding available from two National Science Foundation (NSF) grants (CC-NIE and EAGER) awarded for 2013-2014, UW researchers are uniquely positioned to benefit from the 40G backbone network once it is installed. Researchers and research departments will more easily access on-site UW advanced storage and compute facilities such as lolo and Hyak, as well as facilities across the U.S. and beyond.</p>
Impact	<p>Researchers throughout the UW Seattle campus will now have the opportunity to use high-bandwidth resources from campus to partners throughout the region, the nation and the world:</p> <ul style="list-style-type: none"> • Research traffic may travel 100G paths from campus to Seattle and across the nation via Internet2’s new Advanced Layer2 Service. • This UW backbone network expansion to 40G will offer higher throughput to more UW researchers and reach out to more organizations, facilities and partners throughout the world. <p>The 40G network will:</p> <ul style="list-style-type: none"> • Allow greater response and provide a competitive edge to NSF, National Institutes of Health (NIH), Department of Energy (DOE) and other federal grant requirements. • Provide a dramatic enhancement to the capabilities for a broad range of science programs involving faculty, postdoctoral fellows, research scientists and graduate and undergraduate students. • Replace ad hoc approaches with sustainable dedicated solutions to better meet the requirements of the research community. • Remove the barrier to entry for data-driven discovery for the University community as a whole.
Pre-positioning Long-term (optional)	<p>This project will move the UW from a 10G campus network to a 40G network. By upgrading to this higher capacity, and by leveraging current grant funding to offer more immediate standardized access for researchers, UW-IT will avoid multiple disruptive upgrades at a higher cumulative cost in the future.</p>