

# 40G Campus Research and Science Network

## Objectives

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This project will design, implement and support a dedicated 40G Research and Science Network, with 10G bandwidth to 15 research locations, including Hyak (UW high-performance computing cluster), and data storage. Taking advantage of flexible architecture, software defined network protocols, and utilizing high-performance computing/storage clusters, the campus 40G network will then connect to the advanced 100G Pacific Northwest Gigapop and Internet2 fabric.

## Strategic Context

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The UW is a top-tier research university, with over \$1.5 billion in sponsored research funds. The ability to meet increased demand for network capacity is critical to supporting research and keeping the UW competitive. The following statements speak to the importance of this project in supporting research across the University.

“The advent of a high-speed research network will transform how data is analyzed and enable the Genome Sciences Genomic Resources Center to share this amazing wealth of data with other researchers at UW and throughout the United States.”

- Robert H. Waterston, *Genome Sciences*

“Increased research bandwidth is essential to driving our research forward.”

- Thomas P. Ackerman, *Atmospheric Sciences*

“This project will serve as an exemplar for the interoperability between UW resources and national resources, with the two forming a single, coherent, user-to-platform cyberinfrastructure.”

- Thomas R. Quinn, *Astronomy and Physics*

“The network upgrades described here benefit every element of our workflow. Improved bandwidth between the Science DMZ and external networks will improve our ability to download large data sets for analysis on Hyak as well as share the data produced locally.”

- Martin Savage, *Physics*

“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 of the campus backbone network and our connectivity to the Pacific Northwest Gigapop. 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, are changing rapidly. UW needs to keep pace.”

- Edward Lazowska, Computer Science & Engineering

## Key Benefits

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- Allow greater response to NSF, NIH, DOE and other federal grant requirements, creating a competitive edge when applying for grants
- Dramatically enhance the capabilities for a broad range of science programs involving faculty, postdoctoral fellows, research scientists, and graduate and undergraduate students
- Increase accessibility to key UW facilities and data for the research and science community regionally, nationally, and internationally
- Replace ad hoc approaches with sustainable, dedicated solutions that better meet the requirements of the research community.
- Remove the barrier to entry for data-driven discovery for the entire campus community

## Risks

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Not funding this effort might have any or all of the following serious negative impacts:

- Current network will not scale to “Big Data” research needs
- Intensive research activities in the network will disrupt other network traffic
- Important research grants will not be awarded due to the limits of infrastructure
- Ongoing loss of important research grants will jeopardize Tier 1 research institution status
- Ability to recruit and retain top research talent will be limited

## Budget Request

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Leveraging current NSF grants, UW-IT is requesting additional funding of \$1,400,000 beginning in fiscal year 2014 (FY 2014) to implement a phased approach to implementing a 40G campus Research and Science Network.

### FY 2013 and FY 2014

UW received two NSF grants totaling \$800,000 for FY 2013 and 2014. Out of this, \$350,000 will be used to purchase the dedicated research routers at the UW Tower and 4545 Building data centers that will connect the 40G campus network to the 100G R&E networks.

#### Phase 1– FY 2014 \$1,861,886

- Network backbone upgraded to 40G at the six campus aggregation routers
- Dedicated eScience/Research routers established at Tower and 4545 data centers connected at 100G to national high-speed R&E networks and to campus at 40G
- 100G L2 network installed and activated between Tower and 4545 data centers interfacing with HYAK, storage and research equipment
- Dedicated 10G capacity established to 15 research locations, specific labs, or aggregated buildings

#### Phase 2 – FY 2015 \$953,858

- 40G backbone upgraded to remaining four campus aggregation routers
- 40G backbone upgraded to two campus border routers

Description	Phase 1 FY 2014	Phase 2 FY 2015	Total
Capital Expense: Chassis and 40G Interface Boards	\$1,786,480	\$926,200	\$2,713,040
Operation Exp. Maintenance	<u>75,406</u>	<u>28,998</u>	<u>\$104,404</u>
<b>Total</b>	<b>\$1,861,886</b>	<b>\$953,858</b>	<b>2,817,444</b>

All labor provided by current staff in network and data systems.

#### Funding Requested via the Technology Recharge Fee – FY 2014 & FY 2015 \$1,400,000 Yr

Funds in FY 2016 and beyond will be used for equipment replacement, ongoing maintenance, and further expansion of the network to support research and science.