



A Utah-Wyoming Cyberinfrastructure  
Water Modeling Collaboration



# Cyberinfrastructure Facilities in Utah

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2013 CI-WATER Symposium

Natural History Museum of Utah, University of Utah

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## CI objectives

- Provide coordinated, high-performance information technology resources and services to CI-WATER team and other UT and WY EPSCoR researchers
- Support research data analysis, management, and curation; modeling; and simulation needs
- Tools: computing cycles, data storage, advanced networking, visualization environments, middleware, software libraries, software development, data centers



## CI strategies

- Leverage campus facilities and services – new Downtown Data Center in Salt Lake City
- Leverage Utah Education Network (UEN), Front Range Gigapop (FRGP), and Internet2 for advanced networking
- Leverage other public sector partners – e.g., UDOT, UTA
- Collaborate with regional HPC centers – new relationship with University of Wyoming and NWSC, USU, BYU
- Leverage national HPC activities – CASC, XSEDE, Open Science Grid, NSF OCI, Condo of Condos

# New Downtown Data Center



THE  
UNIVERSITY  
OF UTAH

- 74,000+ sq ft<sup>2</sup> former industrial building south of downtown SLC (~4 miles off-campus)
- Designing for enterprise & HPC (2.4 MW)
- Co-location by research groups & partners
- Low industrial electric power rates in Utah
- High desert climate: energy efficiency
- In production 3/2012; CHPC is moving now





**SALT LAKE CITY -  
THE  
(OPTICAL FIBER)  
CROSSROADS  
OF THE  
WEST**





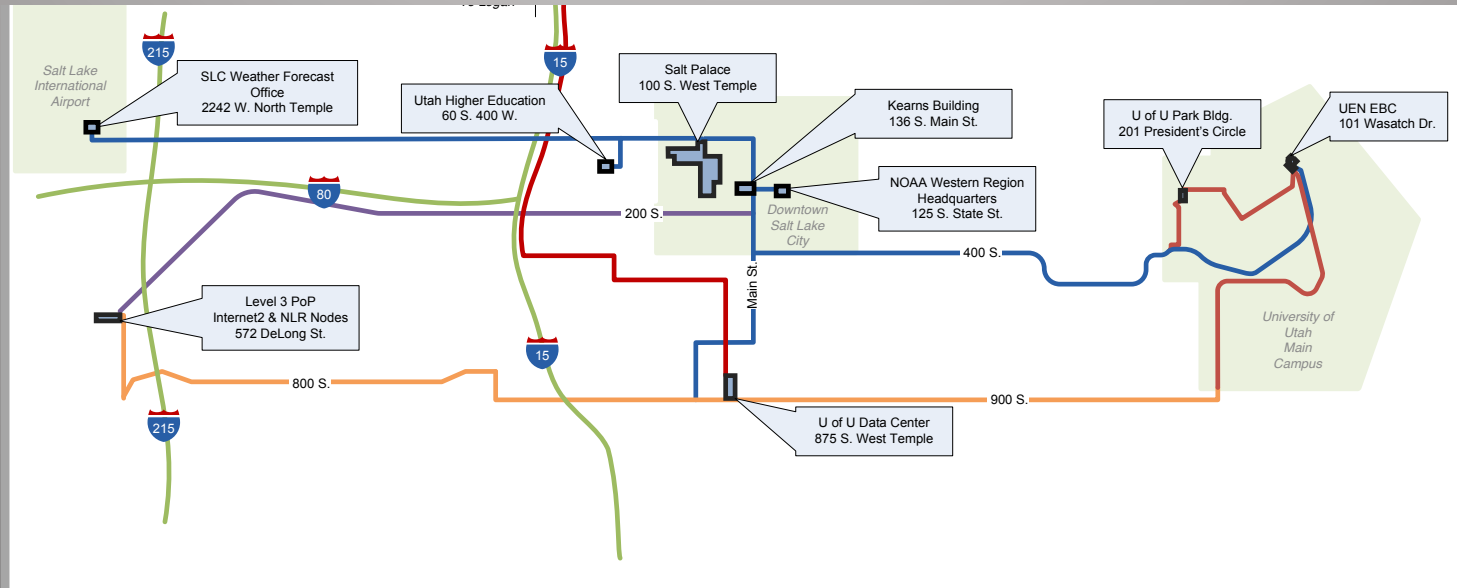
# RII Cyber Connectivity Award



THE  
UNIVERSITY  
OF UTAH

- Special EPSCoR program based on ARRA funding
- Collaboration partners: UofU, USU, BYU, and UEN
- Award: \$1.17M (9/1/2010 for three years)
  - One-year no-cost extension granted through 8/31/2013
  - Better coordination with Tracks -1 and -2 outreach efforts
- Leadership
  - S. Corbató (PI) and Jim Ehleringer, U. of Utah
  - Larry Baxter and Kelly McDonald, BYU
- Key partners
  - Eric Hawley and Robert Spall, USU
  - Jim Stewart and Laura Hunter, UEN

# Salt Lake City metro optical network



**Research@UEN: Salt Lake City Metro Optical Network**

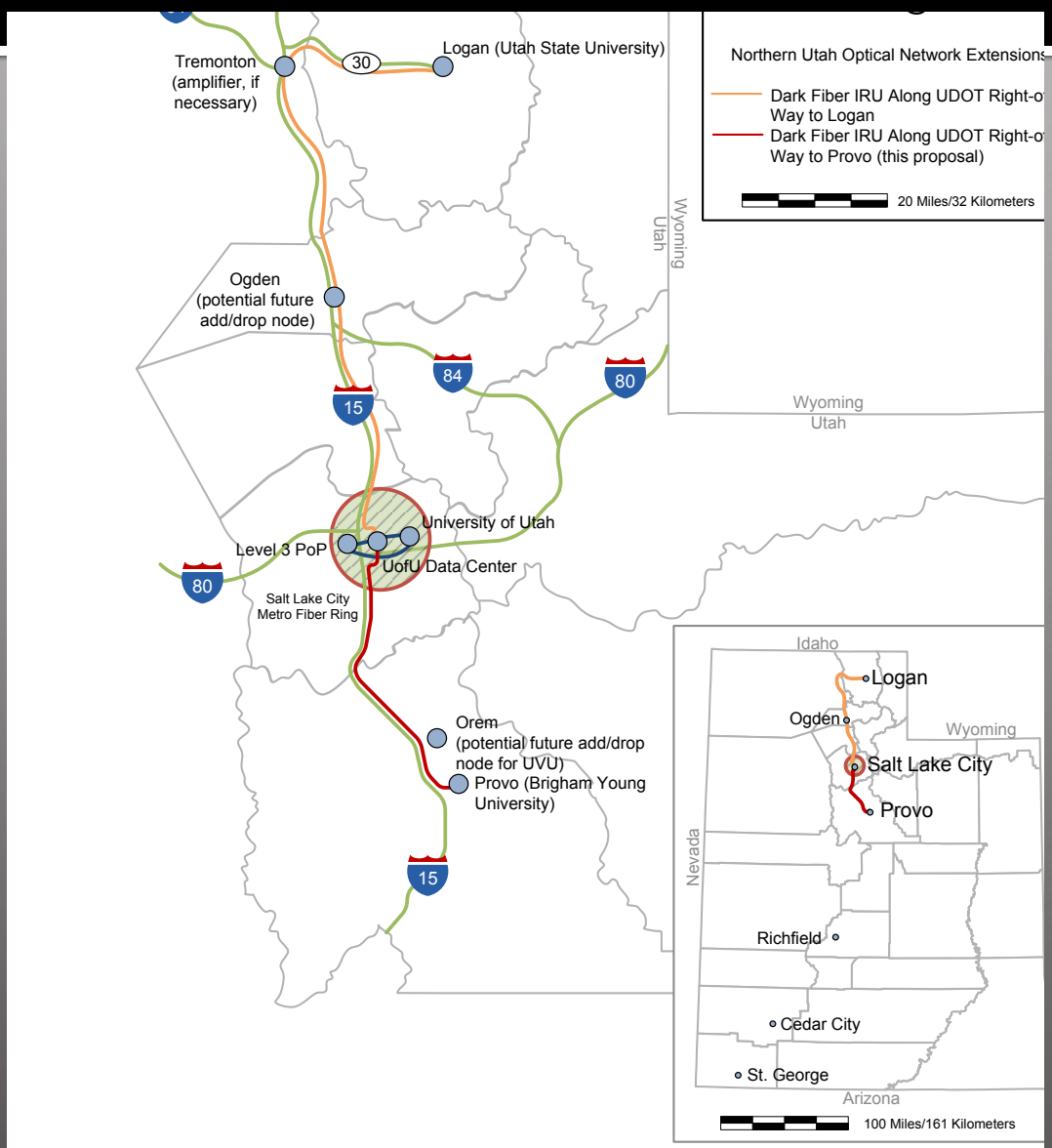
- U of U Campus Fiber
- UTA Light Rail Routes (proposed)
- CENIC/LLC Fiber IRU (through AFS)
- AFS Fiber IRU (proposed)
- Northern Utah Extension (proposed)

1 Mile

Carrier proprietary information included



# Extensions for USU and BYU





## CI-WATER data repository for Big Data – June 2013

- CHPC is moving away from previous file storage system due to software reliability and performance issues, so we went to bid again
- Close coordination with another campus Big Data project
  - Partnered with UofU Physics & Astronomy in its role as data management site for Sloan Digital Sky Survey 4 (SDSS-4) – 175 TB (separate space)
- Selection: 1 Petabyte usable space (\$230/TB – Dell) including Data Transfer Nodes (DTNs)





## CI-WATER data repository status

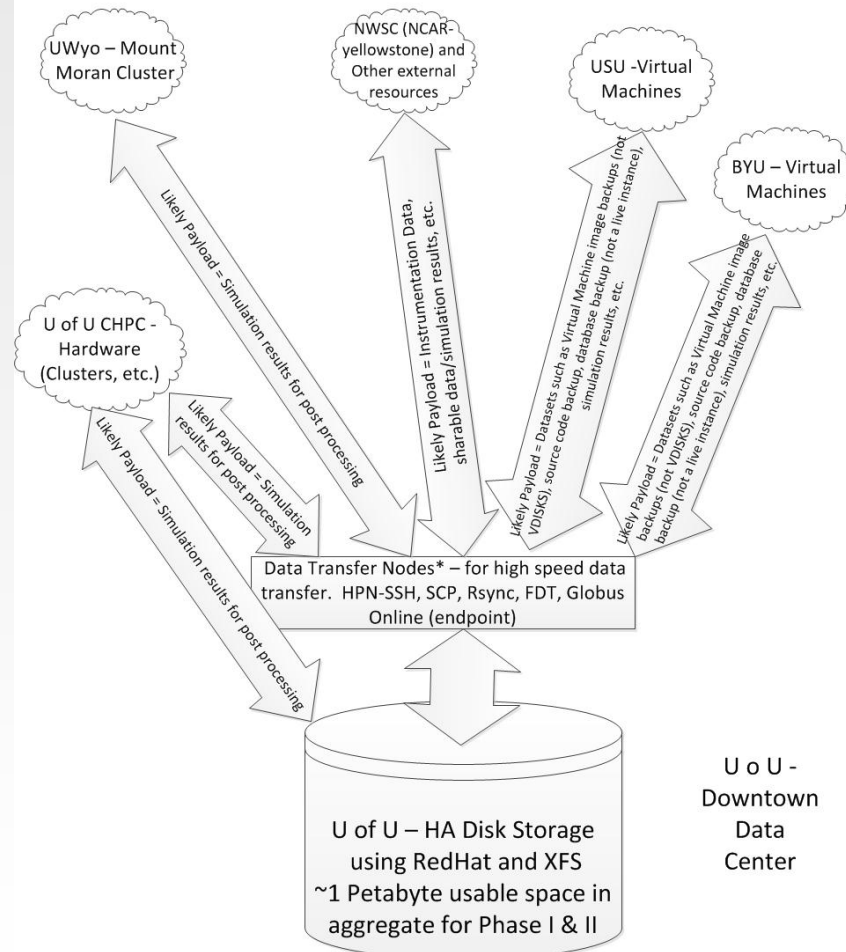
- Access: Open to all CI-WATER and iUTAH collaborators
  - DTN-DTN connections with U Wyoming and NWSC
  - Status: currently being installed and tested
    - 6/15 – friendly user mode
    - 7/15 – general collaboration use
- Next steps
  - Testing network performance with UWyo and NWSC
  - Provisioning virtual machines from CHPC VM farm
  - Linking USU and BYU resources
  - Developing data curation and external data access policies





- Shared data repository among CI-WATER and iUTAH institutions
- Supports both fast I/O computation and long-term data archiving
- Hosted at CHPC in UofU DDC
- Leverages high-speed, secure data transfer nodes (DTNs) as advocated by NERSC and ESnet

## CI-WATER STORE – EPSCoR Data Repository Data Access Schematic – 2/8/2013



U of U -  
Downtown  
Data  
Center

\* Data Transfer Nodes are utilized for “put & get” type of operations. The software stack typically offers fast transfer of data.





**SC12**  
Salt Lake City, Utah

November 10-16, 2012



- November 10-16, 2012 – Salt Palace
  - International conference and exhibition for HPC & computational science
  - Large Utah research and EPSCoR presence
- >10K attendees and >160K s.f. exhibit space
  - SCinet chair: Linda Winkler, Argonne National Lab
    - Jim Stewart & Kevin Quire, UEN
  - Exhibits: Mary Hall & Steve Corbató, Univ. of Utah

<http://sc12.supercomputing.org/>







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# Questions?

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