



South Dakota State Networking Update April 2009

**Internet2 Member Meeting April 28, 2009
Washington, D.C.
Claude Garelik
System IT Security and Networking Officer
South Dakota Board of Regents**

Who's Connected Today to Reed



- **6 public universities**
 - BHSU, DSU, NSU, SDSMT, SDSU, USD
 - 2 shared university centers (Sioux Falls, Rapid City)
- **EROS data Center (DOI)**
- **Deep Underground Science and Engineering Laboratory/Sanford Lab (DUSEL/SUSEL)**
- **Sanford Lab after T. Denny Sanford**
- **Bureau of Information and Telecommunication**

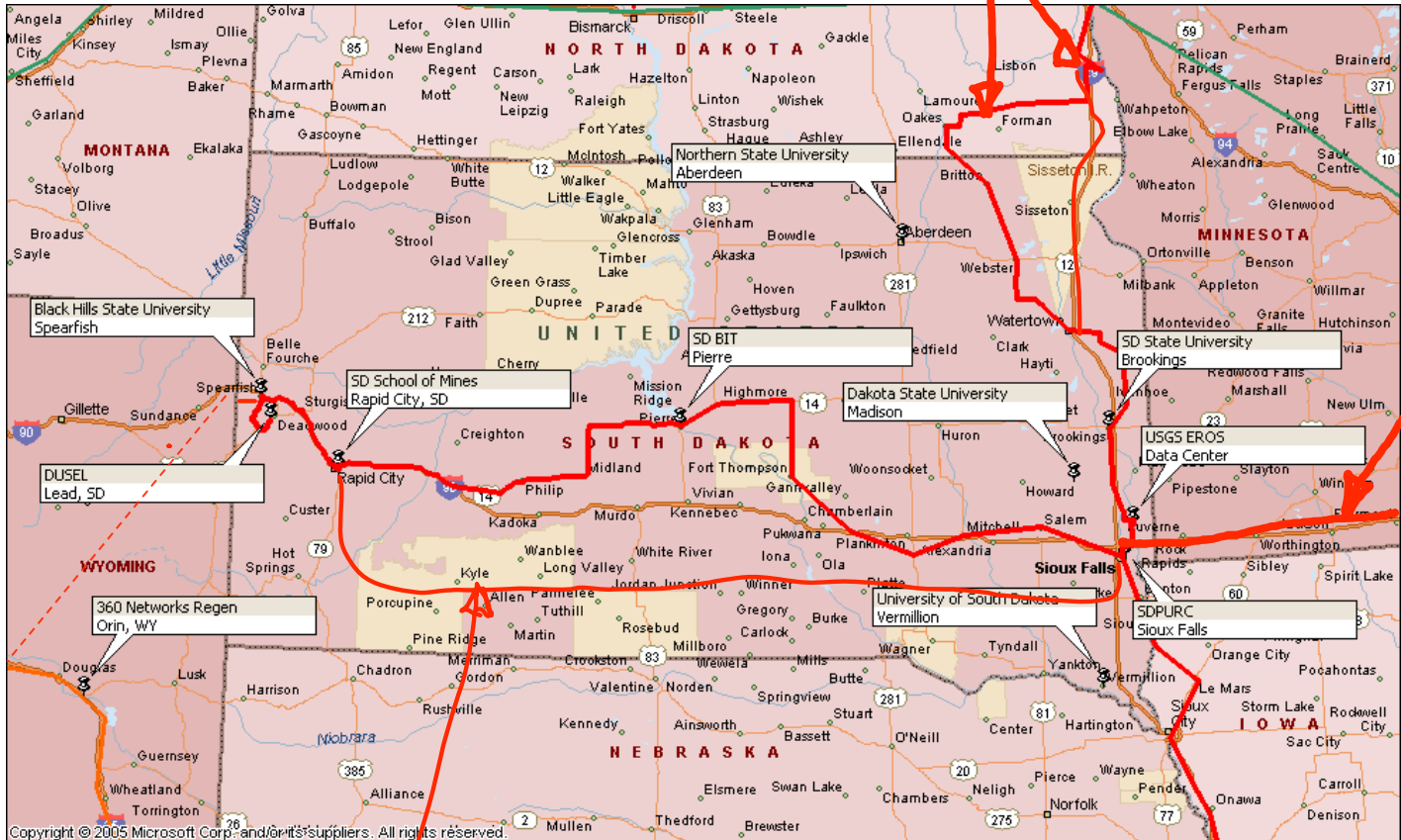
Show me the Money

- **\$8 Million grant from the Great Plains Foundation for network infrastructure**
- **Legislative appropriation for \$750,000 yearly above current spending**
- **Gov. Rounds names network REED (Research, Education and Economic Development)**
- **REED funding stays level for FY09-FY10**
No increases through FY10

SD Fiber Backbone



FUTURE TO ND



OC3 to N.L.

BACKUP 1 GE circuit

2-10GE to GPN

The Network

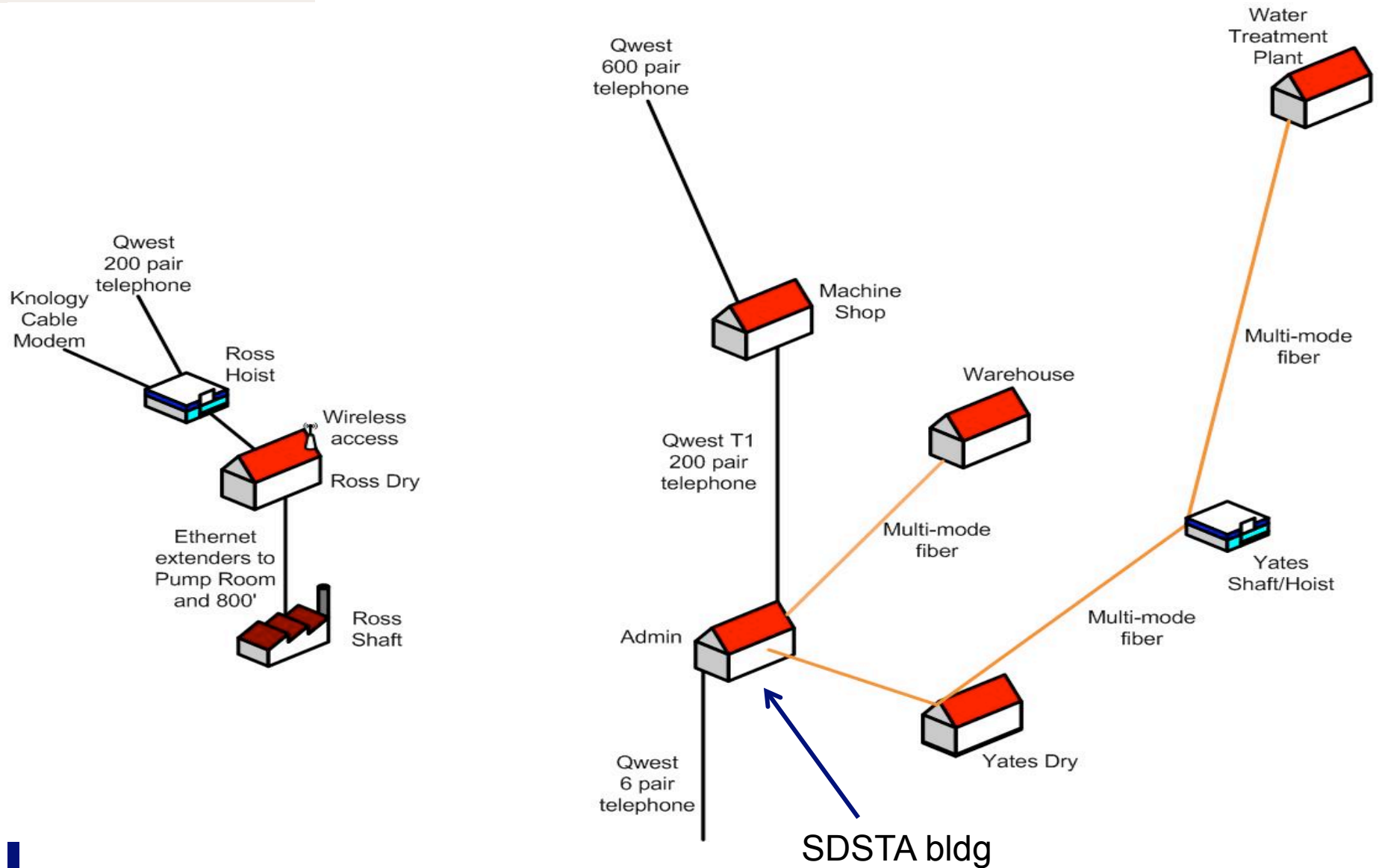
- **2-10GE to each site lit (3 left for growth)**
 - Infinera optical equipment at each site
 - Campus edge Juniper MX 480
 - Core Juniper MX960 and Cisco 7609
- **2-10GE to GPN in Kansas City (share with UNL)**
- **GE Redundant circuit between Rapid City and Sioux Falls**
- **OC3 Circuit to Northern Lights Gigapop**

Current Activities

- **Connection to ND (Northern Tier)**
- **Connection to ESnet in Kansas City**
 - Direct access to Lawrence Berkeley National Lab and others
- **Provisioning resources for researchers**
- **Researcher support assistance**
- **Planning for other research resources**
- **DUSEL/SUSEL collaborations with campuses**
- **Multicast, IPv6 provisioning**



Homestake Mine Original Network

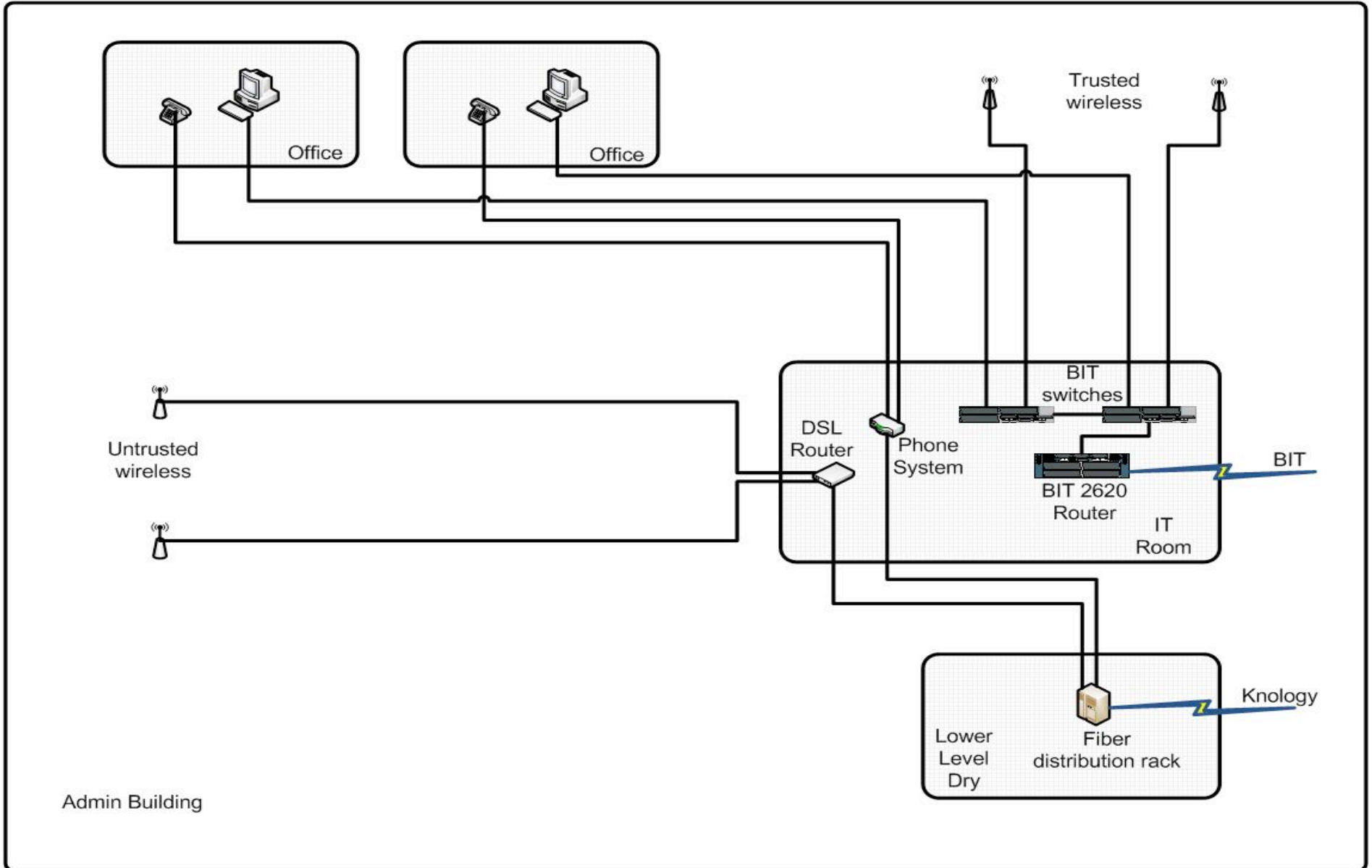




South Dakota Science and Technology Authority (SDSTA)

- **Original network supported by SD Bureau of Information Technology (BIT)**
- **Single T1 supported all WAN connectivity**
- **All applications, mail, database servers, DNS and Citrix access located at BIT along with admin support**
- **Fifteen year old multi-mode fiber connected campus buildings, only supporting 100 Mbits/sec due to distances**
 - Some buildings not connected which required multiple ISPs
- **Wireless supported by another, separate ISP connection**
- **Underground connections supported with Ethernet extenders utilizing twisted pair telephone cable**

Original Admin Network



Challenging Environment

- **Distances between buildings**
- **Terrain – Google Earth Lead SD**
- **Sanford Lab at 4850 feet**
- **Cable routing through the mine**
- **Fastening**
- **Temperature/Humidity**
- **Reliable power**



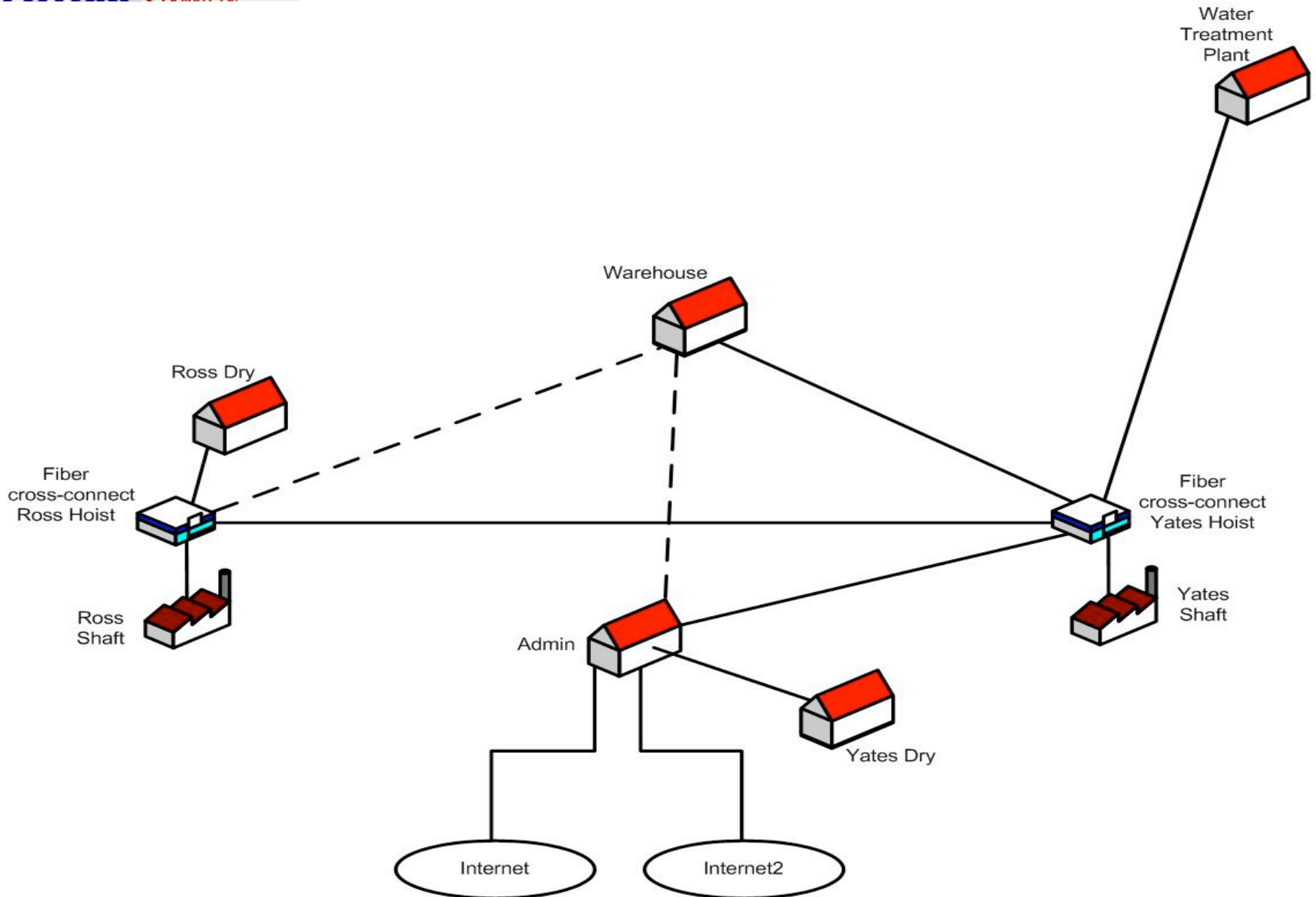
Current Sanford Lab Network

- **An integrated network topology connecting all surface and underground resources supporting 10/100/1000 and 10 Gigabit/sec Ethernet**
- **Current I2 connection to SD Research Engineering and Economic Development (REED) is 1 Gbit/sec. Can be upgraded to 5x10 Gbit/sec.**
- **Current I1 connection to Commodity ISP can support up to 1 Gigabit/sec.**
- **All applications, mail, database servers, DNS, VPN access locally managed**
- **All network, Linux and windows admin support provided locally**
- **Twenty five thousand feet of single mode fiber trunks provisioned on surface and in the underground lab**

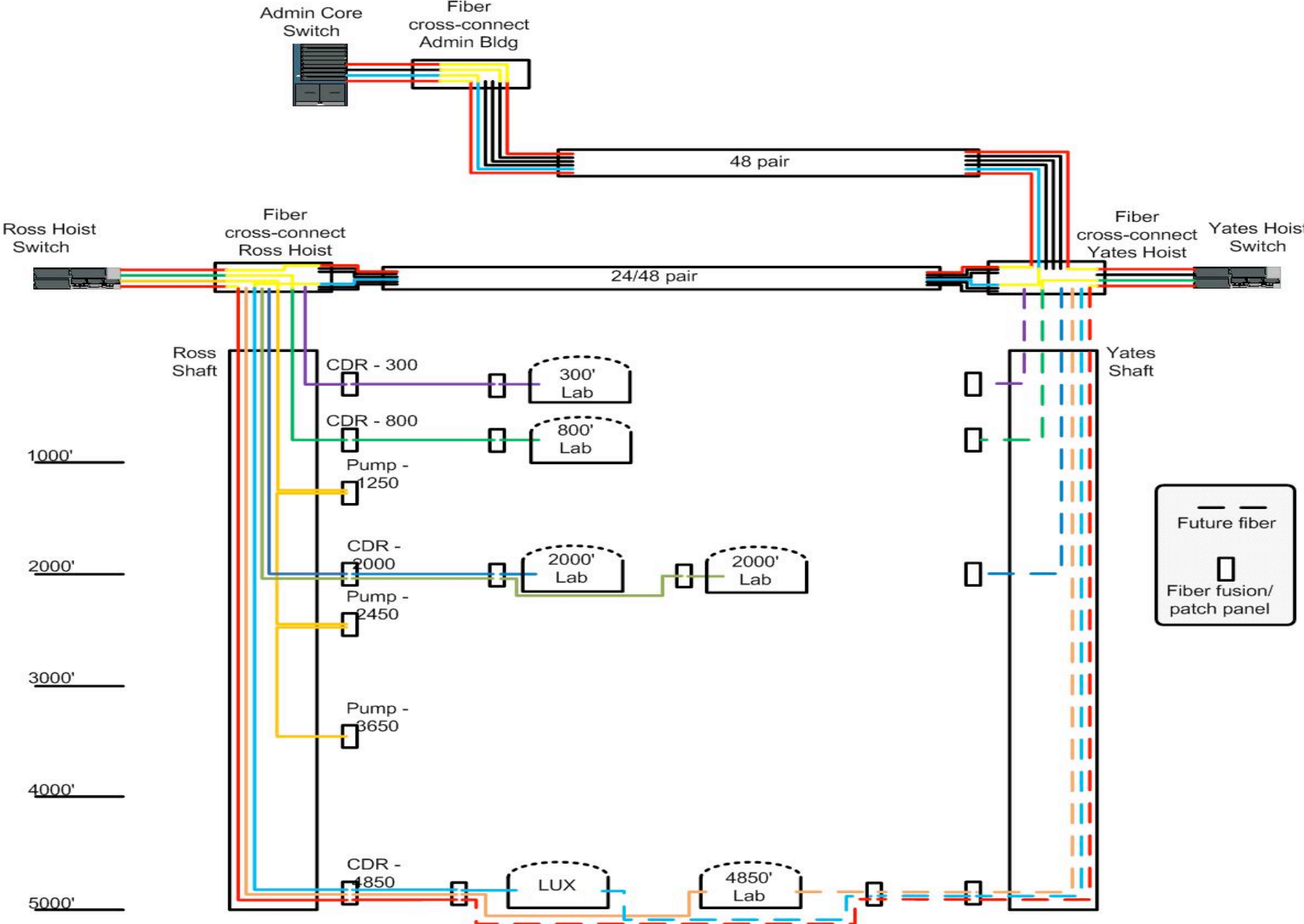
Current Sanford Lab (continued)

- **Ability to support 10/100/1000 & 10 Gbit/sec connections to underground lab**
- **A high-speed publicly accessible network for research activities**
- **Separate internal networks for Lab administration and for research use**
- **Voice over IP (VOIP) capabilities to any location**
- **Trusted and untrusted wireless networks**
- **High availability firewalls provide redundancy**
- **High capacity core switch technology (240 Gbits/sec and 400 Gbit/sec backplanes) providing up to forty 10 Gbit/sec ports**
- **Redundant VPN appliances for secure access**

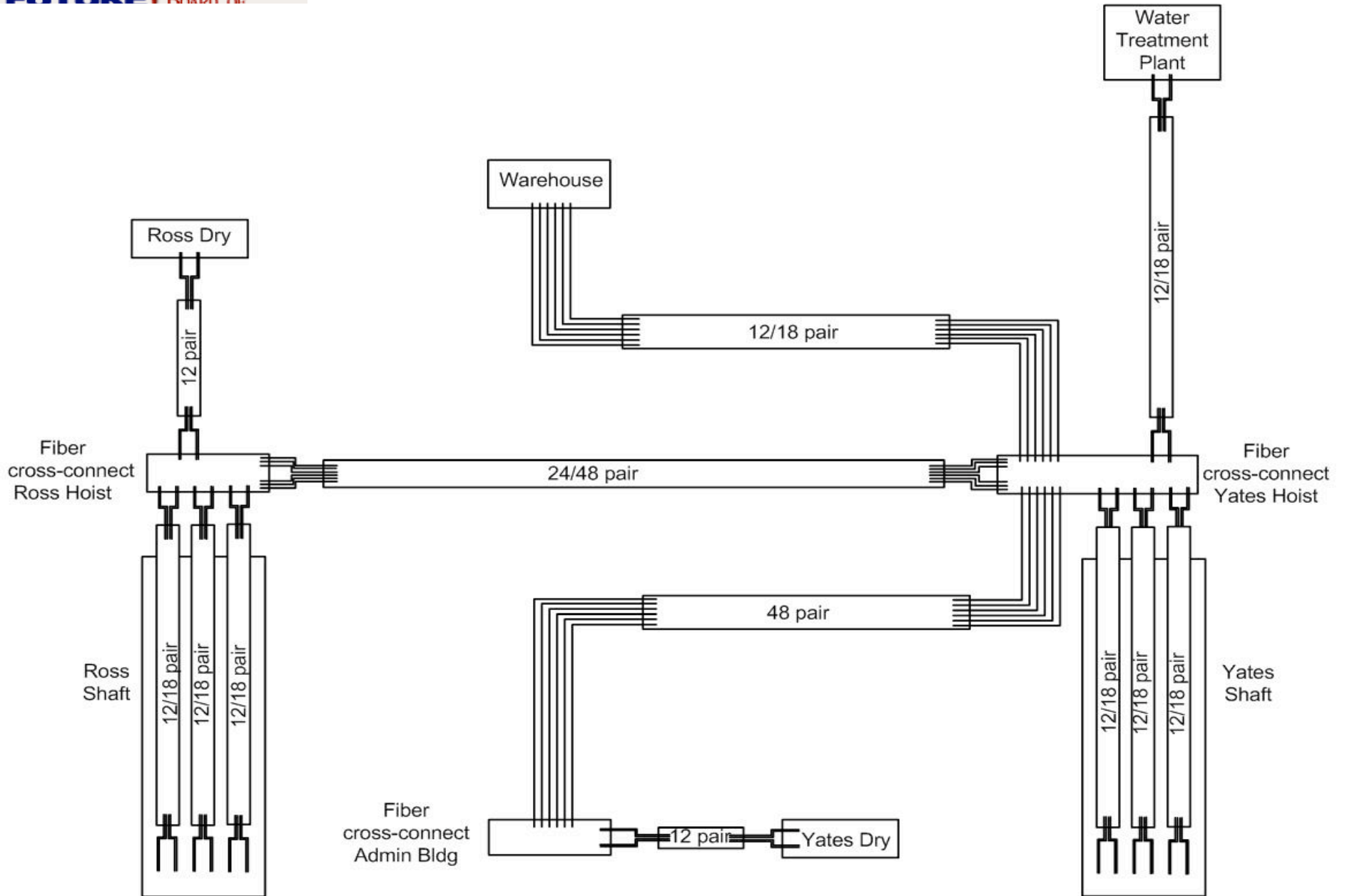
New Sanford Lab Network



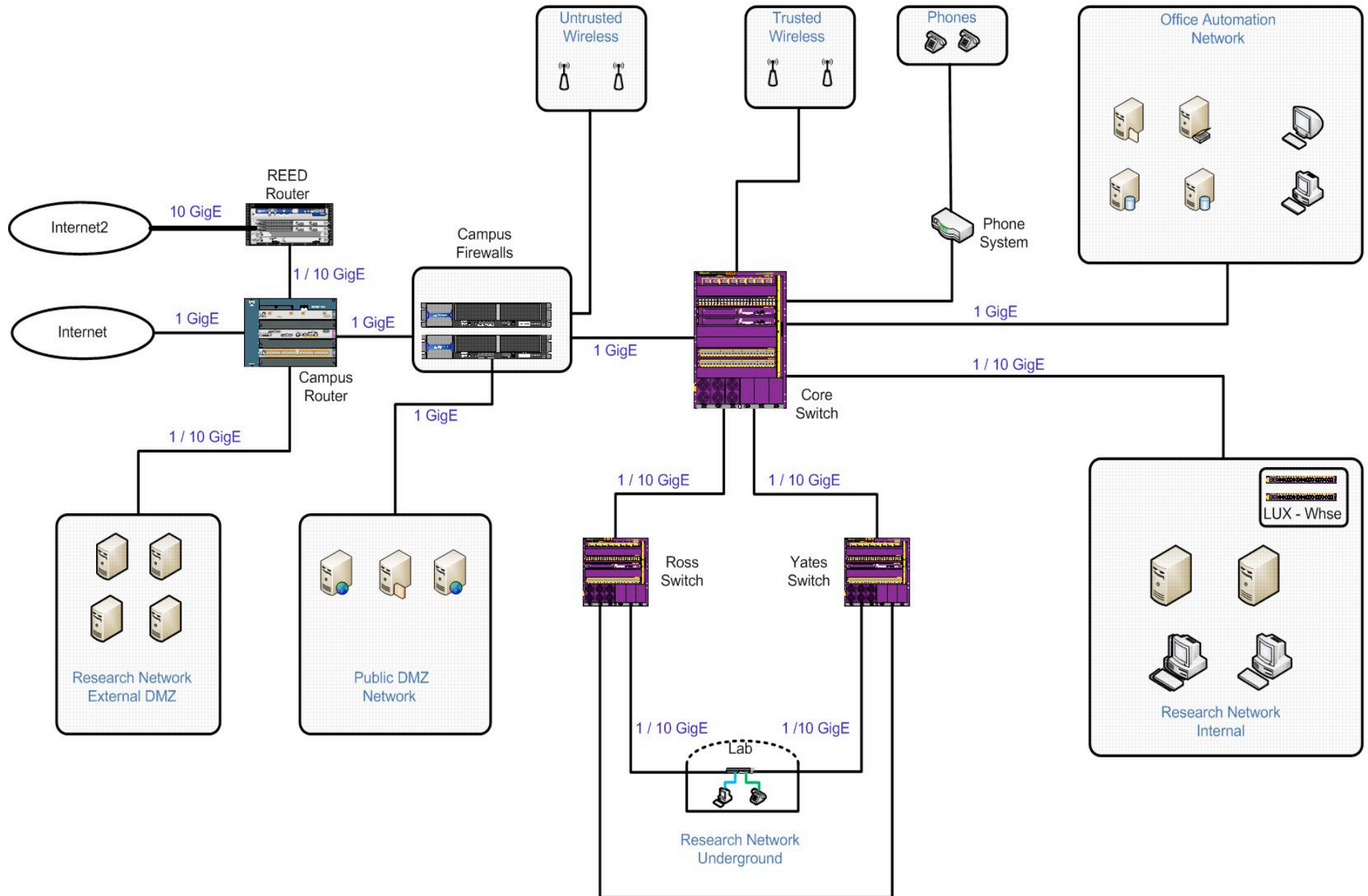
Sanford Lab Fiber Design



Sanford Lab Overall Fiber



New Sanford Lab Network





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Questions???