South Dakota
State Networking Update
April 2009

Internet2 Member Meeting April 28, 2009
Washington, D.C.
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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

Backup 1 GE circuit

OC3 to N.L.

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
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
New Sanford Lab Network

Diagram showing the network layout with various components such as routers, switches, firewalls, and network segments connected by 1 GigE, 10 GigE, and 1/10 GigE connections.