Networking discussion

NSRC Visitors

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Acronym soup

- University Corporation for Atmospheric Research (UCAR; http://www.ucar.edu)
- National Center for Atmospheric Research (NCAR)
- Front Range GigaPoP (FRGP)
- UCAR Point of Presence (UPoP)

Questions and discussions throughout please – and as for acronym soup ingredients, please ask if we miss one or check the decoder page at http://bit.ly/acronym-soup
Reviews and updates

- Front Range GigaPoP (FRGP)
- UCAR Point of Presence (UPoP)
  - Colorado K-12 networking
  - Colorado Telehealth Network (CTN)
- National networking activities
  - The Quilt, Inc.
  - WRN
  - Internet2
  - NLR
  - Others/misc
FRGP

- Front Range GigaPoP
- 11 years of operation by UCAR Network Engineering and Telecommunications Section (NETS)
- 13 Members
- http://www.frgp.net
Front Range GigaPoP (FRGP)

- Increasing traffic
  - Qwest, Level3, TeliaSonera (TSIC)
  - TransitRail (TR) and Internet2/Commercial Peering Service (CPS)
- Peering
FRGP members

- Colorado School of Mines
- Colorado State University System
- National Oceanic and Atmospheric Administration (NOAA-Boulder)
- State of Colorado
- United States Antarctic Program
- University Corporation for Atmospheric Research
- University NAVSTAR Consortium (UNAVCO)
- University of Colorado Boulder
- University of Colorado Colorado Springs
- University of Colorado Denver
- University of Denver
- University of Northern Colorado
- University of Wyoming
FRGP and WRN

- Western Regional Network (WRN): a multi-state partnership to ensure robust, advanced, high-speed networking availability for research, education, and related uses through the sharing of network services

- Expansion and sharing of network services in support of advanced research and operations

- Support of academic, economic development, and inter-regional services
WRN members

- Pacific Northwest GigaPop (PNWGP)
- Front Range GigaPoP (FRGP)
- The University of New Mexico (on behalf of the State of New Mexico)
- Corporation for Education Network Initiatives in California (CENIC)

http://westernregional.net/
WRN states

Increased potential for shared applications among communities across the west—networking services to the following states:

- Alaska
- California
- Colorado
- Idaho
- Montana
- Nevada
- New Mexico
- Washington
- Oregon
- Wyoming
WRN for FRGP

* Intra-region peering
* NLR and Internet2 services shared and backed-up
* Back each other up (provide diverse layer 2 and 3 to cover on-net failures)
* Efficient and cost-effective CIS as well as TR and CPS connections
* Potential place to land for-profits from CTN, EagleNET, US-UCAN, others?
UPoP

- UCAR Point of Presence
- [http://upop.ucar.edu](http://upop.ucar.edu)
- 4 years of operation
- 21 members
UPoP members

- Auraria Higher Education Center
- Colorado Association of Research Libraries
- Centennial Board of Cooperative Educational Services
- City of Boulder
- City and County of Denver
- Colorado Community College System
- Colorado Telehealth Network
- Community College of Denver
- Colorado Department of Higher Education
- Colorado Mountain College
- Deproduction
- Denver Health and Hospital Authority
- DIA
- EDUCAUSE
UPoP members

- Fort Lewis College
- Front Range Internet, Inc. (two school districts)
- Metropolitan State College of Denver
- St. Mary's Academy
- Science and Technology in Atmospheric Research (STAR) Institute
- University of Colorado Hospital
- Coming soon: ARTstor
UPoP – future connections

- Additional school districts
- WICHE - [http://www.wiche.edu/](http://www.wiche.edu/)
- PacketRail [http://www.packetrail.net](http://www.packetrail.net)
- connections (e.g., FLC)
- Frequent discussions with a variety of others
Colorado Telehealth Network

- FCC Rural Health Care Pilot Program (RHCPP)
- Colorado Health Care Connections (CHCC; from Colorado Hospital Association (CHA))
- Rocky Mountain Healthcare Network (RMHN; from Colorado Behavioral Healthcare Council (CBHC))

- CTN has FCC RHCPP funding
- Qwest rolling out network now

- [http://www.cotelehealth.com](http://www.cotelehealth.com)

- Internet2 Health Network Initiative:
  - [http://www.internet2.edu/health/](http://www.internet2.edu/health/)

- NLR: [http://www.nlr.net](http://www.nlr.net)
EAGLE-Net

* Educational Access Gateway Learning Environment Network
  * [http://www.co-eaglenet.net/](http://www.co-eaglenet.net/)

* BTOP round 2 award received

* Intergovernmental Agency (IGA)
  * Rolled out from CBOCES
  * Board in place
  * Technical Advisory Committee being formed
SEGP updates

- Intended to allow expanded access to the Internet2 network for regional education networks
  - through sponsorship by Internet2 university members
- State and regional networks connect K-20 educational institutions
- The program began in early 2001 and as of June 2011 there are 39 SEGPs
  - Including one of the newest: **Colorado - 2009**
BiSON partnership

- Bi-State Optical Network (BiSON)
- 5 year old partnership between NCAR, NOAA-Boulder, University of Wyoming, University of Colorado and Colorado State University
- Goal: create an optical WDM network connecting Boulder, Denver, Laramie, Fort Collins and Longmont
BiSON future plans

- Expand dark fiber plant to include NCAR Wyoming Supercomputing Center (NWSC)
- Initially at least four 10G circuits will be active
- Expansion to 40G and 100G a possibility
- Direct connections for High Performance Computing to other BiSON members also a possibility
BiSON Capacity

- System is engineered for 40 individual lambdas
- Each lambda can be a 10G, 40G, or soon a 100G connection
- Independent lambdas can be sent each direction around the ring
- With a major upgrade system could support 80 lambdas
- $100\text{Gbps} \times 80 \text{ channels} \times 2 \text{ paths} = 16\text{Tbps}$
NWSC WAN Conceptual Diagram

- Laramie
- NWSC
- Stateline
- Fort Collins
- Longmont
- Platteville
- Boulder
- Denver

Legend:
- NCAR Internal to ML
- FRGP / Internet / R&E
- Optional UW Dedicated
- All links are 10G Ethernet carried via BiSON DWDM.
NWSC

- NCAR Wyoming Supercomputing Center
  - [http://www.cisl.ucar.edu/nwsc](http://www.cisl.ucar.edu/nwsc)

- Scheduled to be operating in early 2012

- BiSON fiber connectivity
Internet2

* [http://www.internet2.edu](http://www.internet2.edu)
National LambdaRail (NLR)

* http://www.nlr.net
SHLB Coalition

- Schools, Health, and Libraries Broadband Coalition (SHLB Coalition)
- Supports FCC’s National Broadband Plan and US UCAN
- focus on higher capacity bandwidth to community anchor institutions
Example stimulus links

* http://broadbandusa.gov/
* http://broadbandcensus.com
* http://www.educause.edu/Resources/Browse/EconomicStimulus/34622
* http://www.colorado.gov/recovery
* http://www.ntia.doc.gov/broadbandgrants/
* http://www.recovery.gov
* http://www.internet2.edu/government/stimulus.html
The Quilt, Inc.

- [http://www.thequilt.net](http://www.thequilt.net)
- 28 members currently:
  - [http://www.thequilt.net/participants.html](http://www.thequilt.net/participants.html)
- Non-profit regional network aggregators providing advanced network services in support of research and education
- Several work groups, lots of tracking, coordination and strategic planning efforts
NOAA-WAVE (N-WAVE)

- NOAA building national NOAA research network called N-WAVE
- Utilizing I2 and NLR 10Gbps lambdas
- Initial sites: NOAA-Boulder, NOAA-DC, GFDL, ORNL
- Secondary sites: Seattle, Florida, Oklahoma
ESNet

- ARRA Advanced Networking Initiative (~$62M)
- 100G Prototype Network and Testbed
- DOE scientists are now generating data at the terabyte scale, and datasets will soon be in the petabyte range
- LHC: also a very large networking experiment
Discussion

任何形式后的问题或对已覆盖内容的反馈吗？

其他事项吗？

Thank you!