

**Northern Tier Network Consortium  
Annual Meeting  
July 14-15, 2016  
Big Sky, MT**

Our thanks to Montana State University and the University of Montana for hosting a great meeting in Big Sky, MT in 2016.

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Montana State University CIO Jerry Sheehan and University of Montana CIO Matt Riley welcomed the group to Montana.

Annual NTNC Business meeting: The business meeting of the Northern Tier Network Consortium was called to order by President Marc Wallman at Big Sky Resort in Big Sky, MT at 8:00 a.m. on Friday, July 15, 2016. All present introduced themselves and their institutions. Minutes from the NTNC 2015 annual meeting and the NTNC 2016 Steering committee meeting were read and approved. The financial report was presented and approved. As of June 30, 2016, the NTNC account balance is \$175,584.

Election of officers: The Executive committee reported on election of officers for the new year, with Matt Riley, University of MT serving as President, Roberta Ambur, University of South Dakota serving as Vice President, and Kim Owen, North Dakota State University serving as secretary.

Annual review of bylaws: discussion included whether to change the voting structure so there is equal representation per state, and to ensure the executive committee doesn't make critical decisions in lieu of taking it to the full membership. Historically most member states make decisions regarding their network segments and communicate to the group as needed.

The 2017 Steering committee meeting is tentatively scheduled to be held in Denver, CO. The specific date and meeting details are forthcoming.

Summary of Steering committee actions from July 14, 2016 was provided.

- South Dakota / North Dakota discussion on NTNC north/south extension path. Planning for this must be part of the larger discussion of NTNC strategic planning going forward.
- States are requested to make their updates to be posted on the NTNC website
- The main page can be updated, in addition links to individual states should be included on the site
- Provide all updates to Matt; website is hosted and managed by Univ of MT
- NTNC map to be updated:
  - Remove color coding by state/local network currently displayed on the NTNC map
  - Add Internet2 services that run between Seattle –Chicago

Reports from each of the NTNC membership states and conference guest organizations were given by state representatives.

**South Dakota** Provided an update on recent activities of the regional Great Plains Network (GPN) and South Dakota's Research, Education and Economic Development (REED) network. A recent review of current and future needs for high performance computing (HPC) was completed through a contract with Henry Neeman from the University of Oklahoma. The purpose of the review was to determine the level of need for HPC centers in the state. Results indicated two HPC's for the state would be most efficient, one located at each of the two large research universities with collaboration among the other four smaller institutions to provide HPC service. The University of South Dakota (USD) has hired its first IT based grant coordinator, increasing

communicate and collaboration in grant planning across campus. Sanford Underground Research University (SURF) hosted its first Conference on Science at the facility in collaboration with the South Dakota School of Mines in May 2015. South Dakota State University (SDSU) and USD are two of the statewide partners involved in a major EPSCoR grant to implement BioSNTR. The mission of BioSNTR is to create infrastructure needed to catalyze innovation and discovery in bioscience and biotechnology. SDSU is currently implementing a science dmz initiative funded by NSF's CC- DNI program.

**Montana** Current research efforts at Montana State University include a CC DNI grant focusing on science dmz infrastructure at the building level. The institution is also working with UC San Diego on a project to move data between science dmz's. MSU encouraged NTNC to consider collaborations with other entities including a science dmz affinity group within the NTNC; and exploring potential areas for collaboration on federal regulations for open access. Network plans for future NTNC connections as existing IRU's come up for renewal will significantly impact MSU. If existing IRU's disappear then MSU will not have further access to Internet2 so they have issued an Invitation for Bids to secure other options as needed. Redundancy is also of critical concern to the state. The state is engaging both MSU and U-MT in planning conversations. MSU prefers to remain an NTNC partner as practical. The University of Montana (U-MT) has been in discussion with community anchors to explore the option of a statewide network. They are also seeing a move of increased use of their data center for research data.

**Michigan/Merit** Recent upgrades and projects include the BTOP fiber project, completion of the 100G Internet2 connector in Michigan, and a collaborative cybersecurity initiative. LTE home spectrum has been obtained for all of Michigan's Upper Peninsula. Plans are to continue expanding coverage, leveraging the Merit network to assist with backbone infrastructure needs. Additional grant funds are being pursued to help fund tower sites. Plans include a private social media system set up for K-20 that will enable a private platform to communicate with students. Merit is working on cybersecurity initiative with activities that include collaborations with a local network to 'cloud scrub', refresh of the peak load environment, deployment of threat mitigation.

**Wisconsin / WiscNet** Exploring options to locate a Tier 2 data center. Both facility and capacity issues are a concern. UW Madison recently completed a campus network security upgrade that included efforts to mitigate threats to the campus environment and to implement their own SOC (security operations center). UW Madison has completed a network upgrade to campus with the intention to get 100G across campus. Since UW Madison's Department of Information Technology provides services for the whole system, the state Board of Regents works with all campuses to support the budget for these initiatives. Two current fiber builds of interest include a collaborative partnership with WI DoT to cross the Mississippi River on I-90 by boring under the bridge to run fiber. This project will likely involve partnering with MN and BOREAS-Net to leverage resources for these activities. The second project involves a partnership with IA to build a path to Dubuque, again with the intent to tie in to BOREAS-Net fiber at some point. Exploring ways to increase efficiency and centralization across the UW system has found excess capacity in cooling across the campuses. UW Madison has the greatest need in this area and will be looking to partner with other sites to meet their needs.

WiscNet and Internet2 are entering into a pilot to provide express routes / access to Microsoft Azure and are hoping the model will be replicable across campuses. WiscNet's peering service could deliver this resource to multiple states. Ultimately this will be high quality access to Azure as this model provides the backbone infrastructure to make it easier. Advertising will target existing partners.

Since its inception E-Rate has served K12s and libraries. Higher ed/tech colleges have never had access to these funds. Now Arkansas Research & Education Optical Network (ARE-ON) has developed a model that allows use of E-Rate resources through their healthcare connect fund (<http://arkansaselink.com/fcc-healthcare-connect-fund-meeting/>) that involves partnerships with rural health care cooperatives. WiscNet is trying a pilot of the AR model to see if it works there.

**Iowa** A recently completed efficiency audit of the three largest public institutions by the state board will result in consolidation of data centers available for use as a re-charge service. There is a lot of new research activity at the University of Iowa on topics that include informatics research, a new HPC initiative and community clusters. They have found that post docs are well positioned to serve as research liaisons, facilitating communication between researchers and IT. The Big 10 academic alliance (<https://www.btaa.org/home> - formerly CIC) supports many studies, a good example of a collaborative research initiative that could be mobilized across NTN institutions

**Washington** Working closely with community connectivity consortium (<http://communityconnectivity.org>) to collaborate on fiber builds. Co-managed by CENIC and PNWGP, the Pacific Wave recently launched a new exchange point presence in Tokyo (<http://cenic.org/news/item/pacific-wave-announces-worlds-first-trans-pacific-100-gigabit-re-network>). The addition of a U.S. operated exchange point means that Japan R&E networks now have a full ring between Tokyo and the U.S.

**Nebraska** Network Nebraska is working to determine details for phase II of the network; recently confirmed a contract that will drastically reduce the cost of the last mile for subscribing members. Network NE is exploring other services that can be provided to increase return on investment by participants. The state has dedicated funding for new/upgraded equipment to increase capacity and redundancy and recently partnered with KANREN (<http://www.kanren.net>) and joined QUILT (<http://www.thequilt.net>). NE is also very interested in 'denial of service'(DoS) strategies, a threat they know is coming.

**North Dakota** NTN-ND is currently working to develop and implement two new R&E partnerships in the region. The long envisioned expansion of a NTN north/south path between North Dakota and South Dakota in order to provide additional redundancy and linkages to neighboring networks is again being revisited. A group of representatives from both states is exploring technical needs and funding options for moving forward on this project.

NTNC member USGS/Earth Resources Observation and Science (EROS) Center has initiated a request for a 10 GigE path from EROS to Chicago via the NTN span that includes Aberdeen, Fargo, Mpls and Chicago. Work to finalize the connection in terms of both contract and technical elements is ongoing.

A partnership between North Dakota State University and the USDA building on the north perimeter of the main campus has resulted in the extension of the campus network to the USDA Agricultural Research Service and the newly established National Agricultural Genotyping Center in order to provide Internet2 access for NDSU's researchers and graduate students working in those centers.

**Minnesota / BOREAS-Net** is working on a network upgrade to increase capacity. Router upgrades were completed just in time for denial of service (DoS) attacks to begin. Perceptions are the attacks would have crushed their previous network architecture. Other recent initiatives include 40G Netflix caches on site and 40G peering with Apple. With content providers coming to Minneapolis, it is expected that exchange points will exceed 100G in nightly traffic before the end of the calendar year. In preparation to mitigate damage from DoS attacks, the institution is purchasing 40GB cleaning capacity and Netflow protection. The campus network is being prepared for an upgrade that includes a 100G for data center and 100G backbone for the core. Any campus building with any significance will end up with 2 (10G) connections.

**Oregon** Planning an upgrade to 100G for the primary state ring. Portland is the site for an Internet2100G connector and hopes to connect Portland to other sites in the future. The University of Oregon is upgrading campus network to 100G core and is installing a new HPC cluster/science wall in science library. Planning has included engagement by faculty to determine where increased connections should be placed and determine existing data repositories that can/should be moved to the data center. Campus implements peering to enable them to push down their network flow.

Highlights of the celebration of Merit Network's 50<sup>th</sup> anniversary were presented by Bob Stovall. The presentation included the anniversary video produced by Merit and a brief introduction from Bob. Congratulations Merit!

Update from Internet2/PNWGP on AT&T fiber

Linda Roos representing Internet2, and Jonah Keogh representing PNWGP provided updates to the group related to upcoming renewal dates for AT&T fiber along the NTNC path. Marc Wallman provided a historical overview of the NTNC build of the initial path.

PNWGP will need to confirm interest from NTNC asset holders in keeping paths open for IRUs. They are interested in discussing collaboration options. Previous federally funded initiatives included specific restrictions on the build and use of the fiber. Those restrictions are currently not an issue. The challenge in this case is the different environments that each NTNC segment asset holder must align to – schedules/funding/state laws, etc. PNWGP is willing to commit to at least the next seven years of the IRU contract, if not the full contract. Changes occurring within the asset holder segments could result in changes to path routes. It is estimated that monthly AT&T costs would continue at the same rate, and if Internet2 engages as a partner there will be additional refresh costs. Partners to the east of the Mpls to Seattle segments may not need the path technically, but from a strategic standpoint, it would be a huge lapse to lose out on this part of the national footprint so the states of MN, WI and MI are very interested in engaging in the discussion and long term planning on this effort. More effort must be dedicated to use cases across the path that demonstrates the return on investment/value proposition for this initiative. Both sustaining current operations and refresh will dictate increases in capacity. Cost of operations and maintenance with current equipment is not expected to significantly increase if upgrades to 100G are implemented. Facilities cost will need to be reviewed based on current and future add/drop sites across the path.

Sites along the path include Seattle, Spokane, Missoula, Bozeman, Fargo, Minneapolis, Madison, Chicago (the last three are covered by BOREAS-Net). Upgrading infrastructure between Mpls to Fargo is a foregone conclusion, it's just a matter of when that will happen. Another potential segment to be discussed for upgrades is the Fargo to Bozeman/Missoula segment. Whether significant upgrades will be needed across the path from Seattle to Chicago, or Seattle to Mpls is dependent on the national R&E strategy. PNWGP has reasons to get to Chicago, and BOREAS-Net has reasons to get to Seattle, indicating a need for at least a TB path between Chicago and Seattle.

Dave Farmer offered to gather technical information on upgrade needs for sites in between the endpoints: Spokane, Missoula, Bozeman, Fargo. This portion of the span will require finding extra funds to use for upgrades and expansion.

Consensus by the membership to convene a working group that will be charged with further developing a problem statement and related executive summary that includes the national focus of the NTNC footprint, as well as the short and long term strategic planning needed by the NTNC for ongoing operations and maintenance.

Internet2 requests that NTNC provide a formal strategic request to move the conversation regarding the national perspective forward. The more commitments that can be confirmed from NTNC asset holders along this path, the

The initial problem statement and charge to the new working group as developed by the general membership follows:

Draft problem statement: *“In partnership with Internet2, in order to meet the R&E missions of the NTNC members and affiliates and to support the econ development of the associated states, we need to support, maintain and upgrade the NTN infrastructure.”*

Charge to the working group: Refine problem statement ensuring it does not become another mission statement and develop SWOT analysis and white paper or executive summary. In support of this vision, we charge this group with defining the specific problems that need to be resolved and suggesting solutions for the upcoming IRU renewal of AT&T fiber.

Timeline: complete by 9/15/2016 and forward to general membership for review and comments.

Members: NTNC Executive and Steering committees: Dave Farmer, BOREAS-Net, Jerry Sheehan, Montana State University, and an Internet2 representative.

Additional comments relative to this work:

Address the ultimate goals and needs of external/end-point partners such as Internet2, PNWGP, BOREAS-Net and what they need to accomplish. How can these needs be included as justification for our work and long term planning?

The Zayo contract has served to temporarily fill the gaps across the northwest region of the U.S. Once that contract ends, Internet2 needs to develop other solutions that will maintain the footprint in this region. Existing equipment along the path is still supported and is functioning very well. If some go off occasionally, they can be replaced with spares that will keep things viable for quite awhile past end of life. BOREAS-Net estimates equipment on the east end of the path will be operational through one more renewal period before upgrades need to be addressed. Operations and maintenance cycles are on a five year rotation.

Additional discussion:

- Plan to convene a group that focuses on best practices for dedicated denial of service (DDoS) and cybersecurity threats. These groups could work in tangent with similar groups convened by Internet2 and The Quilt.
- NTNC Annual Meeting 2017 location options included invites from Seattle, North Dakota and Montana to again convene in Big Sky. Unanimous vote by the group to return to Big Sky for the 2017 annual meeting.
- R&E collaborations to be considered by NTNC
  - Network performance initiatives – the NTN would provide a unique environment for this
  - \$100 mobile perfSONAR units to move around and explore performance
  - NSF collaborations across states/jurisdictions
  - NSF cybersecurity – Merit currently involved in one of these; Merit also has their own training curriculum available (and sandbox)

Crown of the Continent – Highlight on University of MT Research

Use Case Presentation provided by Rick Graetz, Lecturer in Geography, College of Humanities and Sciences at the University of Montana.

Meeting adjourned at 3:30 p.m. by President Matt Riley.