



Joint Engineering Team (JET) Meeting Minutes

National Coordination Office for Networking and Information Technology R&D (NCO/NITRD)
490 L'Enfant Plaza SW, Suite 8001, Washington, DC 20024
November 14, 2023, 12:00 – 2:00p.m. ET
This meeting was held as a hybrid in Denver, CO, at the
Colorado Convention Center, 700 14th St, Denver, CO 80202

Participants

Adrian Baranyuk, NCO/NITRD	Ann Keane, NOAA/N-Wave
Jeff Bartig, Internet2	Kazunori Konishi, APAN-JP
Christopher Bruton, CENIC/Pacific Wave	Michael Lambert, PSC/3ROX/ACCESS
Todd Butler, NASA/GSFC	Theo Lavis, MCNC
Dale Carder, ESnet	Paul Love, NCO/NITRD
Scot Colburn, FRGP/UCAR/NCAR	Joe Mambretti, StarLight/MREN
Buddy Collins, FRGP/UCAR/NCAR	Ralph McEldowney, DREN
James Deaton, Internet2	Linden Mercer, NRL
Basil Decina, NRL	Keith Obenschain, NRL
Phil Dykstra, DREN	David Rouse, Verizon
Chris Everich, Verizon	Craig Schlenoff, NCO/NITRD
Gregory Factor, NASA/GSFC	Robert Sears, NOAA/N-Wave
Fabian Guerrero, FRGP/UCAR/NCAR	Michael Sinatra, ESnet
Felton Hayes, Verizon	Kevin Thompson, NSF
William C. Horne, NRL	Chris Wilkinson, Internet2

Proceeding: This meeting was chaired by Kevin Thompson (NSF) and Ralph McEldowney (DREN).

I. **Action Items:** (none pending)

II. **Review of the Minutes of the October 2023 meeting:** Corrections were received and are reflected in the posted final minutes.

III. Craig Schlenoff, National Coordination Office Director
NITRD's new NCO director introduced himself to the JET, outlined his background in robotics at NIST and his recent co-chairing of the AI IWG. He is always available to the JET's participants for any questions/discussions.

IV. **Operational Security Round Table:**

- A. Internet2 (Chris Wilkinson): Internet2 (I2) has been doing NIST's SP 800-53. It has recently hired a contractor to start the NIST Cybersecurity Framework (CSF) process. CSF

includes a stakeholder engagement so some of you may be approached. This will be good to complete as it's been a while since I2 did a comprehensive security assessment.

V. Network and Exchange Point round tables

The slides for this meeting can be found at:

<https://www.nitrd.gov/coordination-areas/lsn/jet/jet-meetings-2023/>

- A. MCNC (Theo Lavis): No update this month.
- B. 3ROX/PSC/ACCESS (Michael Lambert): No updates for 3ROX, PSC or ACCESS.
- C. NOAA/N-Wave (Rob Sears):
 - a. The National Weather Service is upgrading about thirty of its facilities with increases in bandwidth and a migration to N-Wave. These sites range from large locations such as the National Hurricane Center and Regional Headquarters to Forecast Offices.
 - b. N-Wave organized an Alaskan regional networking summit, the Arctic Region Technical Interchange Consortium, in September. It included NOAA sites, other federal agencies, tribal governments, the university, and the state who discussed better connectivity in Alaska. The goal was to try to ensure that the funds available to the various groups in Alaska are used in complementary ways. When the BTOP awards were made a dozen years ago N-Wave worked with partners and hopes this can be replicated with the current broadband funding.
 - c. N-Wave's current 1G backbone runs Seattle<->Anchorage<->Fairbanks<->Seattle. It's in the midst of upgrading this to 2G as more NOAA sites in the state come online. N-Wave is also adding a second Anchorage POP.
 - d. One portion of the partnering in Alaska will be the creation of an Alaskan Peering Exchange as there currently isn't one in Alaska. NOAA has a large number of sites in Alaska and, with multiple terabytes going from its Alaskan sites to just university, a vested interest in keeping local traffic within state rather than hairpinning in Seattle, WA. N-Wave is planning to build the Exchange so that NOAA data can go directly to those who need it. The exchange will be open to any who wishes to join. In looking to partnerships, NOAA hopes exchanges can be developed in Juneau and Fairbanks.
 - e. N-Wave is working with NOAA's Cyber Security Division on bringing up a TICAP in Anchorage.
- D. ESnet (Michael Sinatra):
 - a. ESnet held its second CONFAB meeting in the Washington, D.C., area late in October. This brought together members of the science community and others interested in the science drivers for ESnet. This included the Integrated Research Infrastructure (IRI) that is driving lot of what the Department of Energy is coordinating and building. Immediately after CONFAB23 ESnet's site coordinators meet. Both were productive meetings.
 - b. ESnet is continuing to build out its IPv6-only enclave. This is in addition to the IPv6-only management plane.

- E. DREN (Phil Dykstra and Ralph McEldowney)
 - a. There are still several topics to be worked through that are left over from the transition to DREN 4.
 - b. There is also the new Zero Trust security area to be addressed. This will involve putting NetScout monitors out to examine DREN's NetFlow data with an agent on every machine.
 - c. DREN is starting to deploy Precision Time Protocol to sites that have the need for it. This is non-trivial as there are a lot of choices to be made when it's brought up.
 - d. DREN is modifying its performance portal so that it's no longer just internal to DREN but available to those with the appropriate need. Not widely advertised.
 - e. DREN is having performance issues in downloading large amounts of data from AWS' S3. About 1.5Gbps is the maximum it has been able to achieve. Any help/suggestions on improving would be very welcome. (Michael Sinatra (ESnet) noted they were getting 5Gbps. James Deaton (I2) mentioned that Igor Sfiligoi at UCSD/SDSC has done a lot of work stress testing and pushing S3.)
 - f. DREN participated in NOAA's ARTIC meeting last September in Anchorage.
 - g. DREN has had new sites come up in Alaska – total of 3 currently. The DREN 4 backbone now runs to Alaska at 1G.
 - h. DREN's infrastructure to and in Hawaii is very robust.
 - i. The next meeting of the Hawaiian Intranet Consortium (HIC) will be the last two days of January on Kauai.
- F. Verizon (David Rouse):
 - a. Verizon is providing circuits to support SCinet.
 - b. Verizon also has a private 5G net on the floor to demonstrate the possibilities of private wireless.
- G. FRGP (Scott Colburn and Buddy Collins):
 - a. FRGP has recently installed NS304 routers; three in Denver and a fourth in Boulder, CO.
 - b. FRGP has recently brought up a 100G peering with Google in Denver.
 - c. FRGP is working on its RPKI – currently 44% of their customer routes are covered.
 - d. FRGP was an early adopter of MANRS.
- H. Intenet2 (Chris Wilkinson):
 - a. I2 is upgrading its international connections. Part of this is upgrading its three East Coast IXPs to support 400G to handle the new 400G transatlantic circuits. Washington, D.C. and New York City are completed. The Boston, MA, IXP should be done by the end of 2023.
 - b. The AP-REX consortium upgrade to NA-REX is starting to come online with 400G circuits. The first piece to come up is the 400G link between Starlight and Seattle, WA. NA-REX should be completed by the end of 2024.
 - c. I2 is starting to deploy new DWDM optics. It's anticipated they will have a reach of around 1,000km.

- I. AP-Japan (Kazunori Konishi): A new, 400G, circuit is coming online to the US.
- J. NRL (Basil Decina): NRL's Dark Fiber Testbed – ATDnet
 - a. ATDnet is comprised of leased dark-fiber operated by NRL. The leased fiber is on a twenty-year IRU with about four years remaining. It's augmented by dark-fiber leased by NIST and NASA/GSFC. Together they form the basis for the Washington Metro Quantum Network Research Consortium testbed to support experiments among the DC-Qnet partners. This connects with the national quantum networks (NQI).
 - b. DC-QAnet is made up of NRL, NASA/GSFC, NIST, ARL, DARPA, DISA, NSA, the US Naval Observatory, and the University of Maryland.
- K. Pacific Wave (Christopher Bruton):
 - a. Pacific Wave's (PW) 400G backbone upgrade is progressing. It's anticipated to be in production in January or February 2024.
 - b. PW is delighted to be an early adopter of NA-REX.
- L. StarLight (Joe Mambretti):
 - a. Much of what StarLight (SL) does turns out to be building blocks for the Global Research Platform (GRP).
 - b. The work is primarily about large scale science whose cyber infrastructure tends to create their own ecosystems – they are distributed world-wide and require large amounts of bandwidth. (For example, the High Luminosity LHC primary computational centers (LHCOPN) will each need Tbps links to CERN plus backup circuits as well.) Some remain in a single domain; some are multi-domain. Some of the large-scale science project, the ones that will produce exabytes of data and may well need Tbps networks, are:

i. High Luminosity LHC	v. Next Gen Advanced Photon Source
ii. SKA	vi. Bioinformatics/ Genomics
iii. Vera Rubin Observatory	
iv. KSTAR	
 - c. Most large-scale science projects tend to become a bit of a silo as those involved are very focused on what the issues and problems are of their project. GRP provides opportunities for information sharing across projects and domains.
 - d. Particle physicists who are not part of the LHC consortium have access to the LHC's Open Network Environment (LHCONE) along with the LHC experimenters. The benefits of this access have given rise to other large scale science projects. Outside particle physics, asking for a similar network environment to aid their research.
 - e. Next Generation Research Platforms
 - i. Basically, large scale, highly distributed, science DMZs
 - ii. Nodes will often be super facilities where a network node also includes storage and computational resources
 - iii. Research platforms run span from national to continental to global.

- f. Themes of the research platforms
 - i. Orchestration among multiple domains
 - ii. High-capacity WAN transport: 400G, 800G, 1.2T
 - iii. High-fidelity data flow monitoring: visualization, analytics, diagnostic algorithms using AI, ML and DL for event correlation
 - iv. Data-intensive science testbeds on an international scale
 - g. Some of the basic platforms for the research platforms work are: AutoGOLE open R&E exchanges, ESnet 6, I2's NGI, NA-REX and APOnet.
 - h. SL basic stats:
 - i. Over 110 100G connections, over 20 at 400G
 - ii. Currently prototyping 800G
 - iii. Supports ~25 network research testbeds and two SDXs (NSF IRNC and GENI).
 - i. iCAIR is supporting SC/SCinet in the creation of a SCinet WAN national testbed with 400G, 800G and 1.2T paths. This testbed is directly engaged in the support of demonstrations and experiments in innovations for data intensive science as part of SC's Network Research Exhibits program. 22 NRE exhibits were supported by SL at this year's SC (please see slide 34 in the SL slide deck for a complete list.)
 - j. For SC23 1.2T in capacity was brought up from the Joint Big Data Testbed facility in McLean, VA, to SL in June. The early availability was a great help to NRL and GSFC in the development of their experiments for SC.
 - k. NASA's High End Compute Networking Team from GSFC successfully demonstrated in the SL booth 400G WAN disk to disk file transfers from McLean<>McLean looping at SC23 along various paths direct and via SL. This used NVMe-oF/TCP.
 - l. The SL booth demonstrated end-to-end 1.2T traffic. This was done over 3x400G into three DTNs at each end.
 - m. Last year at SC22, SCinet's "Blow the Doors Off" data Tsunami was near 5Tbps. We're hoping to beat that this year. (Note: For SC23 it was nearly 6Tbps.)
 - n. SL also supports the SCAAsia Data Mover Challenge by helping to pull together the needed testbed.
 - o. A quantum exchange testbed, the Illinois Express Quantum Network, is being developed in the Chicago area involving FNAL, ANL, Northwestern University and SL. It uses dedicated fiber and co-propagation with three quantum computers connected. This was showcased at OFC last March in San Diego, CA.
- M. NRL (Linden Mercer):
- a. The challenge for the Department of Defense (DOD) is resiliency to improve the decision cycle with:
 - i. Global data acquisition
 - ii. Dynamic and resilient distributed processing
 - iii. Immediate global data access
 - b. DOD's data source's volume ranges from kbps to Tbps and its users range from a few with very large volumes to millions with very low. All need to be brought

together so each level can make informed, timely decisions from an individual up to the national leadership.

- c. At SC23, NRL plans to demonstrate dynamic arrangement/rearrangement to process large data volumes as the resources (network, compute, and storage) continually change.
- d. Its specific goals are network deployment, monitoring, reporting and redeployment (reconfiguration). Tbps RDMA performance over global distances with a goal of << 1minute Tbyte transfers on an Nx400G network while supporting the dynamic configuration changes. At SC23 NRL was able to fill up a 400G circuit pretty well with a single stream.
- e. NRL uses the Mission Oriented Reconfigurable Networking (MORN) system to continually monitor the network and orchestrate applications to available resources and dynamically reallocate as needed.

Meetings of Interest 2023

Nov 12-17	SC23 , Denver, CO
Dec 12-14	AINTEC , Hanoi, Vietnam
2024	
Jan 21-24	PTC'24 , Honolulu, HI
Jan 29 – Feb 2	APAN57 , Thailand
Jan 30-31	HIC , Kauai, HI
Feb 5-7	NANOG 90 , Charlotte, NC
Feb 19-22	SupercomputingAsia 2024 , Sydney, Australia
Mar 4-7	Internet2's Community Exchange , Chicago, IL
Mar 12-14	The Quilt Winter Meeting , virtual
Mar 16-22	IETF 119 , Brisbane, Australia
19-20 Mar	KNIT 8 , San Diego, CA
20-22 Mar	Fifth National Research Platform Workshop , San Diego, CA
Mar 24-28	OFC , San Diego, CA
Apr 14-17	ARIN 53 , Bridgetown, Barbados
Jun 10-12	NANOG 91 , Kansas City, MO
Jun 10-14	TNC24 , Rennes, France
Jul 20-26	IETF 120 , Vancouver, B.C. Canada
Aug (date TBA)	APAN58 , Pakistan
Sep 16-19	Fifth Global Research Platform Workshop at IEEE eScience , Osaka Japan
Sep 17-19	The Quilt Fall Meeting , location/format TBA

Next JET meetings

Note: It is anticipated that most JET meetings will remain virtual for the foreseeable future

Dec 19, 2023	12-2 p.m. ET <i>n.b. This meeting will be held only if needed</i>
Jan 16, 2024	12-2 p.m. ET

Mar 6, 2024

12-1:15 p.m. CT, hybrid

Note: This meeting is collocated with Internet2's Community Exchange in the Sheraton Grand Riverwalk Chicago, 301 E North Water St, Chicago, IL 60611

Apr 16, 2024

12-2 p.m. ET