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
August 18, 2020 12:00-2:00 p.m. ET

Participants

Shawn Armstrong, University of Alaska
Jeff Bartig, Internet2
Joe Breen, UTEN/University of Utah
Nick Buraglio, ESnet
Rich Carlson, DOE/SC
Bobby Cates, NASA/Ames
James Deaton, GPN
Basil Decina, NRL
Martin Doczkat, FCC
Bill Fink, NASA/GSFC
Dale Finkelson, Internet2
Andrew Gallo, CAAREN/GWU
Alex Hsia, NOAA
Jonah Keough, PNWGP/Pacific Wave
Padma Krishnaswamy, FCC
Michael Lambert, PSC/3ROX
Paul Love, NCO/NITRD
Chris Lowe, USDA/ARS
Joe Mambretti, StarLight/MREN
Dave Mauro, NOAA
Linden Mercer, NRL
Melissa Midzor, NIST
Alex Moura, RNP
Ed Moynihan, Indiana University
Aruna Muppalla, NASA/GSFC
Glenn Ricart, US Ignite
Frank Seesink, University of North Carolina
Kevin Thompson, NSF
George Uhl, NASA/GSFC

Proceeding: This meeting was chaired by Kevin Thompson (NSF) and Rich Carlson (DOE/SC).

I. **Action Items**:

- Complete discussion of potential JET tasking for CY21 at September meeting for submission to the LSN
- ESnet update on its operational network security use of Rapid7.
- Internet2 and ESnet updates on their respective new networks.

II. **Review of the Minutes** of the July meeting: Corrections were received before the meeting. The Meetings of Interest section was updated to reflect changes due to COVID-19.

III. **Discussion on OMB's draft memo on IPv6 and ESnet's effort to build an IPv6 only management network for ESnet6 – Nick Buraglio**

A. This spring OMB released the current draft on policy for US government networks migration to IPv6. It can be found at:
   https://www.cio.gov/assets/resources/internet-protocol-version6-draft.pdf
B. Key take-aways:
   a. IPv6 only – no longer dual stack as in previous versions of this memo.
   b. At least 80% of IP network devices must be IPv6 only by the end of FY2025.

c. The move to IPv6 only was done "...to reduce operational concerns associated with maintaining two distinct network infrastructures."

C. Practically this means:
   a. Legacy systems may have IPv4.
   b. Some translation will be needed to reach external IPv4 systems.
   c. Planning requirements and their details are key to this draft.
   d. From the memo's issuance:
      i. Within 45 days designate an agency-wide team to govern and enforce IPv6 efforts.
      ii. Publish the agency's IPv6 policy within 180 days.
      iii. The policy must include that no later than FY 2023 all new networked equipment must be IPv6 enabled prior to being made operational
      iv. The policy must include a plan to phaseout the use of IPv4 for all systems by either converting to IPv6 only or replacing or retiring the IPv4 systems
      v. An agency must develop an IPv6 implementation plan by the end of FY 2021 to fully enable native IP6 operation.
      vi. An agency must completely at least one IPv6 only pilot network by the end of FY 2021.
      vii. Migration targets: At least 20% of all devices must be IPv6 only by the end of FY 2023, 50% by the end of FY 2024 and 80% by the end of FY 2025.
      viii. Work with external partners to migrate all network interfaces to the use of IPv6. External partners may need help and guidance – course correction suggestions – to reach the agency's needs.
      ix. All agencies need to finish any needed upgrades for public/external facing servers and services (e.g. web, email, DNS, ISP services, etc.) and any internal client applications that communicate with the public to operationally use native IPv6. This includes supporting enterprise networks. (These requirements were included in the previous OMB memos on IPv6.)
   e. Clarifications needed:
      i. Will enclaves and isolated systems running IPv4 be permitted?
      ii. For those systems not able to be converted will the exception process be easy or cumbersome?
      iii. What will happen an agency's IPv4 address allocations when they're no longer needed?
   f. Lessons learned from building ESnet6's IPv6 management net
      i. Building an IPv6 only network is a good bit of hard work regardless of how long your dual stack network has been running.
      ii. Most components have a reasonable IPv6 stack, or at least a good start at one. There are still little things (e.g. UPSs) that don't have an IPv6 stack or may have an incomplete one.
      iii. Be ready, willing, and able to test your needs and requirements (which means have them well defined up front).

iv. In working with vendors:
    1. Be clear about requirements – IPv6 must have parity with IPv4
    2. Frame the changes necessary as a partnership with vendors
    3. Offer to test features they implement at your request
    4. Provide clear, frequent feedback
    5. Ask that the vendor show their IPv6 only QA lab.

v. Be nimble - you may have to adjust some aspects in your design.

vi. Supporting IPv4 for even one component requires it be built and carried throughout the network.

g. Questions:

i. When will the draft OMB memo become official?

Unknown.

ii. Won't isolated/air gapped systems have to convert to IPv6 as support for IPv4 wanes due to lack of demand?

Yes – but the question is how many years before that happens.

iii. What is the strategy of the phase out of end systems? Wouldn't it be better to just say only need IPv6 only after certain date and then just wait for the old IPv4 boxes to be retired?

People tend to hand onto old boxes a long, long time. If a group's policy permits no longer supported networked equipment to remain in use, then they become a risk as they are no longer patchable. (Plus just one still in use means IPv4 must still be supported.)

iv. With this new memo out as a draft has there been any real change by vendors in fully supporting IPv6?

A range: Most network vendors do. Most modern hardware as well. Security hardware is adding support. Starts to degrade with appliances – little boxes: access points, cameras, IoT things – existing probably won't do IPv6, new ones may. Some software products may have an embedded open networking package that doesn't support IPv6. Older versions of Open VPN are one example.

Overall vendors seem to be moving to support.

v. Is there a channel for submitting comments on the draft?

Unknown. (Subsequent note. See: https://www.federalregister.gov/documents/2020/03/06/2020-04635/request-for-comments-on-updated-guidance-for-completing-the-transition-to-the-next-generation)

IV. D**iscussion of the JET's tasking on tools to help with inter-domain issues - Joe Breen, all**

A. Prototype/pilot status:

a. The pilots continue. Progress a bit slower these past few weeks due to vacations and higher priority projects diverting folks.

b. Andy Lake from ESnet gave a talk at this month's project meeting on their work with NetBeans including some of the tooling developed on it.

B. A few comments on the draft Letter of Intent to Share are still anticipated.

C. Background on efforts lead by Eric Boyd, Joe Breen, James Deaton, Dan Doyle, Dale Finkelson and Karl Newell:

a. The project gets basic SNMP metrics from groups around the country that are willing to share for trouble shooting and research. Metrics include link utilization, discards and errors. These are collected hop by hop as the path crosses multiple domains.

b. Several prototypes are going along with the drafting a basic letter of intent for those wishing to participate.

c. Tools: Telegraf container as an option for local collection. Nearly ready for production use.

d. Tracking sheet of networks willing to share data. Please update your network's entry. See: https://docs.google.com/spreadsheets/d/1pMW_PNVpeT42nAxa3bW4QostMxccHTXkWSPbZOplFwE/edit#gid=0
The spreadsheet also has an embedded link to measurement templates for campus, regional and national networks setting out what data is desired. See: https://drive.google.com/drive/folders/1l-LRyril6u4AvBeY6NlvyYYalNRpjByA

e. The Internet2 Performance Working Group Community Measurement, Metrics, and Telemetry project holds meetings on the second Tuesday for those participating or interested. If you are interested, please contact Joe:
Joe Breen <Joe.Breen@utah.edu>

f. While NASA polices preclude EOS from sharing this data, EOS has an internal perfSONAR (pS) mesh. They are happy to open their firewalls to permit pS testing by prior arrangement. Contact George at:
"Uhl, George D." <george.d.uhl@nasa.gov>

V. O**perational network security roundtable** (No updates.)

VI. **Networks Round Table**

A. CAAREN (Andrew Gallo): No update.

B. ESnet (Nick Buraglio):

a. ESnet6:

i. The packet RFP is completed. A public announcement of the results is yet to be scheduled.

ii. OLS installs are progressing very well. All nodes have been installed by Infinera and turned over to ESnet. ESnet has accepted phases 1-3 (everything east of Salt Lake City, UT, and El Paso, TX, except for the Chicago, IL, area metro ring connecting ANL and FNAL. Infinera needs to resolve some minor issues before phases 4 and 5 will be accepted.

b. ESnet is working through its transition from ESnet 5.0 to 5.5 to 6.0. It is prototyping the move from the current hop by hop to next hop LDP for BGP.

Then will turn on segment routing in ISIS as a lower preferred path computational piece.

C. GPN (James Deaton): No update other than congratulations to ESnet on their packet RFP.
D. International Networks – Indiana University (Ed Moynihan): All TransPAC and NEAAR circuits are stable.
    a. Indiana University's International Network (IUIN) group is working with the European Bioinformatics Institute and other European groups to look at COVID-19 traffic with US researchers to increase performance by route optimization.
    b. IUIN is also working with its partners in South Africa on traffic with southern and eastern Africa to also ensure all is taking the best path. Making sure the new AmLight express circuit between Angola and Brazil is used were appropriate.
    c. IUIN had a big presence at the APAN meeting two weeks ago. Michael McRobbie, Indiana University's president, gave a keynote. IN continues to work with its Asia Pacific partners to implement a planned perfSONAR mesh.
    d. IUIN is also working to optimize transpacific routing making use of newer circuits.
E. Internet2 (Jeff Bartag): No update.
F. NASA GSFC (Bill Fink/George Uhl): No update.
G. NOAA/N-Wave (Alex Hsia): No update.
H. NRL (Linden Mercer): Even though SC20 will be virtual NRL is planning on some demonstrations. Please contact Linden if you'd be interested in collaborating.
I. Pacific Wave (Jonah Keough):
    a. Pacific Wave (PW) has completed the upgrade of its core switches in Los Angeles, CA, and Seattle, WA.
    b. It has a couple of projects on net automation that are progressing.
    c. It is close to an agreement with its Korean partner, KISTI, on establishing autoGOLE service across their link. PW is hoping to have more partners join and operationalizing it.
J. RNP (Alex Moura): No update.
K. 3ROX (Michael Lambert): Neither 3ROX, XSEDE nor PSC have any network update.
L. University of Alaska (Shawn Armstrong): No networking updates. Awaiting the return of students.
M. University of North Carolina(Frank Seesink): No update.
N. UETN/University of Utah (Joe Breen):
    a. The UETN/University of Utah (UU) is migrating its metro network to be fully 400/800G capable.
    b. The university is upgrading its science DMZ environment. Moving to a leaf architecture with a 400G connection to UETN. In turn this will permit the use of a 400G connection to Internet2 when ready (vs 2x100G today).
    c. UU is upgrading all its DTNs and perfSONAR nodes as well as building out its telemetry infrastructure for UETN and the university's science DMZs.
O. USDA/ARS (Chris Lowe): No update.

P. US Ignite (Glenn Ricart): Much of US Ignite's (USI) recent work is with exchange points.
    a. KCIX in Kansas City is working with USI to use local access carries for more local routing.
    b. UCI is making some progress with the Albuquerque IX. Nick Buraglio volunteered to help with this.

VII. **Exchange Points Round Table**

A. PNWGP (Jonah Keough): No update.
B. Ames (Bobby Cates): No update.
C. StarLight (Joe Mambretti):
    a. During the recent APAN meeting the Global Research Platform community participated in the Asia-Pacific Research Platform workshop.
    b. StarLight (SL) is working jointly with FNAL and CERN on a FNAL led project to develop a software stack combining the Rucio data manager with FNAL's Big Data Express data mover and DOE's SENSE data orchestrator. Experiments are being run between SL and CERN. It's anticipated that results will be released during the LHC virtual meeting next month.
    c. SL is developing capabilities for its NSF IRNC SDX. These will include federating test beds. SL is working to automate some of the process of federating.
        i. SL recently integrated the National Informatics Institute with the Chameleon test bed.
    d. SL is working on DTN as a service. Part of this is jointly with ESnet using the ESnet testbed.
    e. SL is developing with NRL and GSFC a set of demos for the now virtual SC20. Initial plans include 400G from Washington, D.C., to SL with 400G from SL to Ottawa, ON. The demos will also include several 100G demos with various partners.
    f. The Chameleon partnership, which includes StarLight, received NSF funding to continuing supporting its computer science test bed for another four years.
    g. Development continues with SL's P4 testbed.
    h. Preparations continue for the 1TB FABRIC testbed. SL's node is anticipated in about 6 weeks.
    i. SL is working with ANL to extend SL directly into the HPC facility at ANL.
D. WIX and MAN LAN (Dale Finkelson): No changes.

VIII. **Possible CY2021 tasking to the JET from the LSN:**

The JET discussed possible tasking for CY2021. These suggestions will be reviewed during the JET's September meeting, accepted by the JET members and then submitted to the LSN for consideration during the LSN's October 2020 retreat.

A. Possible JET tasking from the LSN for CY2021
    a. Ongoing JET tasks:
        i. Assist in the planning of technology and application demonstrations of SDN & Big Data at SC21

ii. Technology tracking: perfSONAR, SDN/SDX/SDI, Science DMZs, network automation & orchestration, and segment routing
iii. Hold two meetings collocated with R&E networking community conferences:
    1. Internet2 Global Summit (18-21 April)
    2. SC21 (November)
iv. Continue to schedule meeting round tables of updates on members' networks, operational network security, exchange points and meetings of interest to the community
v. Continue coordinating the development of tools to monitor cross-domain workflows and automate the detection of transport issues. Additionally facilitate the sharing of measurement date between networks - anonymized as needed.

b. Potential JET Workshop: TBD

Meetings of Interest 2020

Note: Meetings cancelled since the August JET have been removed from this list. Those moved to a virtual format have been updated.

Sep 14, 2-4PM UTC *or* Sep 15, 7-9AM UTC	GNA Technical WG, in person cancelled, moved to a virtual meeting
Sep 15-17	NORDUnet 2020, Reykjavik, Iceland *Postponed to Sep 14-16, 2021*
Sep 16-17	LHCOPN/LHCONE meeting #45, virtual meeting
Sep 30 – Oct 1	The Quilt Fall Member Meeting, virtual meeting
Oct 6-7	TechEXtra, virtual meeting
Oct 14-15 & 23	ARIN 46, in person cancelled, moved to a virtual meeting
Oct 19-21	NANOG 80, in person cancelled, moved to a virtual meeting
Nov 14-20	IETF 109, in person cancelled, moved to a virtual meeting
Nov 15-20	SC20, in person cancelled, moved to a virtual meeting

Next JET meetings

Note: It is anticipated that JET meetings through the end of CY2020 will be virtual due to COVID-19 guidelines and SC20 moving to a virtual format.

Sep 15	12-2 p.m. ET
Oct 20	12-2 p.m. ET
Nov 17	12-2 p.m. ET *n.b.: Date & time tentative. Dependent on SC20 schedule.*
Dec 15	12-2 p.m. ET *n.b.: Will be held only if necessary*