

## **JET Meeting Minutes**

### **August 16, 2016**

#### **Participants**

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#### **Action Items**

#### **Proceedings**

This meeting of the JET was chaired by Vince Dattoria of DOE/SC and Kevin Thompson of the NSF. Scott Chevalier of IU ([scheval@iu.edu](mailto:scheval@iu.edu)) provided a briefing on inexpensive equipment to support perfSONAR.

#### **perfSONAR-9 Hardware Small Nodes: Scott Chevalier**

Limited budgets for deploying perfSONAR provide an incentive for using low-cost, small-form nodes. The small-form nodes provide transportability to alternative sites.

They initially investigated ARM solutions (Cubox/perfCube), Beaglebone/Raspberry Pi) that are great for some uses (OWAMP) but they can not support 1Gbps testing and are difficult to support for ARM. Their low cost offers the opportunity for very widespread use. A survey identified that users were willing to pay a little more if they could then test at 1 Gbps. They targeted around \$200. per node with the capability of 1 Gbps BWCTL throughput using Intel CPUs supporting ARM builds.

Possible solutions included:

- LIVA by ECS for \$100-150 providing 1 GE, 2G memory, 32 or 64 G onboard flash drive. Newer models may include models Liva X and Liva X2. LIVA/Debian requires a Ubuntu 12.04.5 desktop. The briefing provides URLs for equipment descriptions and installation instructions.

- GigaByte BRIX for \$150-200 supporting 1 GE with 2/4/8G memory. Recommended model is 32G SSD. It requires a separate memory purchase and uses a single NIC
- Intel NUC costing \$150-200. Supporting 1GE, 2/4/8G memory and 32G SSD (requires mSATA), requires memory purchase
- Zotac costing \$150-200, supporting 1GE, 2/4/8G memory, 32G SSD, requires memory purchase. It has a quad-core CPU but uses a single NIC
- SuperMicro by Servers Direct costing \$600-1,000 rack mounted 1 GE/10GE tested, providing for customizable builds.

You get what you pay for and prices vary widely. Most of the options are single NIC. A near-term system is:

- 4 NIC node costing \$170-200 supporting individual NIC per test, OWAMP and throughput, and quad-core CPU

Current low-cost deployments include:

- Raspberry Pi at U of Hawaii.
- LIVA deployment: ESnet/IU GlobalNOC, GEANT
- NUC/Gigabyte/Zotac: IU, GEANT
- Servers Direct deployment: KENET-NSRC and IU
- APAN mesh
- I-Light mesh: IU
- PRAGMA mesh: in coordination with IU and in initial stages

For the full briefing please see:

[https://www.nitrd.gov/nitrdgroups/index.php?title=JET\\_Meetings\\_2016](https://www.nitrd.gov/nitrdgroups/index.php?title=JET_Meetings_2016) under the August meeting.

### **JETnet Roundtable**

#### **NASA networking: Kevin Kranacs**

NASA/GSFC established its first 100G link to the MAX

#### **NIH/NLM: Mike Gill**

Nothing new to report

### **PacWave: Dave Reese**

The AARnet 40G link has been upgraded to 100G. PacWave implemented 100G perfSONAR nodes in LA and Seattle. They will initiate testing soon and provide the testing results to the JET. The PacWave SDX controllers are installed and PacWave is looking for SDX users and trials. A 100G link to Hawaii is due next calendar year and is dependent on the SEA-US cable.

The AARnet link to the Hawaii Big Island is implementing a link to Oahu and the university's Manoa campus. There is a new 100G link between Hawaii and Guam.

#### **NOAA: Mark Mutz**

NOAA is in the process of implementing its DC TICAP. There have been some delays with colo in Denver.

**3ROX: Michael Lambert**

Nothing new to report

**ESnet: Nick Buraglio**

In coordination with ESnet, the University of Amsterdam has written a correlation tool for flow data to identify a targeted attack. It helps detect attacks on side channels under TCP.

ESnet is providing connectivity between Oak Ridge and the VA to move human genomics data. ESnet is connecting the VA's TIC location in Washington, DC at 10G to Pittsburg and Austin. They are using a VPN tunnel from the TIC to an enclave at Oak Ridge.

ESnet is continuing architecture planning for ESnet6.

The ESnet SDN testbed is being implemented as part of ESnet6. The Corsa gear supporting it has arrived and was just installed in Netlab.

**US Ignite: Glenn Ricart**

US Ignite is demonstrating advanced wireless applications for the NSF and the Whitehouse.

**Exchange Points****StarLight: Joe Mambretti**

StarLight is working with KISTI to implement an SDN wide area network between Daejong and StarLight. It provides for specialized network segmentation and supports data-intensive science.

StarLight is preparing for SC16. They are provisioning 5 x 100G from StarLight to the SC16 show floor. They are supporting and using a Tbps ring around the SC16 show floor. In addition there will be 3 x 100G links from the Washington, DC area to the show floor. The client side is very complex with a multitude of demonstrations and partners including bioinformatics, physical data streaming (NOAA), and Ciena programmable light paths and bonded superchannels.

SDXs are also being demonstrated: point-to-point services based on NSI including Singapore at 100G, Compute Canada DTN, FermiLab demonstration with Brookhaven of multicore, an IRNC application between Lowell, Massachusetts, U of Austin, and the U of Kentucky, international SDXs, and a demonstration of Chameleon.

**JET tasking from the LSN: Grant Miller**

JET develops its recommendations for tasking from the LSN. Included in this are suggestions for workshops to be held under the LSN during the upcoming year.

Suggestions from the JET members for workshops included:

- SDN workshop to discuss the status of developing SDN capabilities and discussing the ESnet SDN testbed expected to be available around the end of CY2016.
- Low latency support to support streaming VR, video conferencing including remote monitoring of movement in real-time.
- DTNs of different flavors. Review the state-of-the-art and inform potential users of how to implement DTNs

- Provide visibility into segment routing (Comcast, Walmart, and Microsoft currently use it). Address path computational operations to move to alternative network links under congestion. Discuss cross-path/domain visualization.
- Community discussion of mutual community concerns such as DDOS attacks and response.

**Meetings of Interest:**

September 25-28      [TechX](#), Miami, FL  
 September 29-30      [GLIF16](#), Miami, FL  
 October 17-19        [CANS2016](#), Houston, TX  
 October 17-19        [NANOG68](#), Dallas, TX  
 October 18-21        [ESCC/Quilt/NSF PIs](#), Philadelphia, PA  
 October 20-21        [ARIN 38](#), Dallas, TX  
 November 13-18      [IETF 97](#), Seoul, South Korea  
 November 13-18      [SC16](#), Salt Lake City, UT  
 November 22-23      [CANARIE National Summit 2016](#), Montreal, QC  
 February 6-8, 2017   [NANOG68](#), Washington, DC  
 March 26-31          [IETF 98](#), Chicago, IL

**Next JET Meetings:**

September 27        7:00-8:30 AM, Sandringham/Windsor Room, InterContinental  
                                  Miami on Chopin Plaza, 100 Chopin Plaza, Miami, FL  
                                  *nb*: This is during Internet2's TechX.  
 October 18            12:00-2:00 EDT, NSF  
 November 13-18      During SC16, Salt Lake City, UT