JET Meeting Minutes
September 16, 2014
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Action Items

1. Please contact Matt Zekauskas if you wish to use Internet2 resources for SC14 demonstrations.

Proceedings
This meeting of the JET was chaired by Vince Dattoria of DOE.

DREN IPv6 Lessons Learned: Ron Broersma
DREN is completing the installation of DREN III under a prime contract with CenturyLink. IPv6 requirements were explicitly stated in the acquisition and contract. Vendors say their equipment is IPv6 capable but that means nothing. Lessons learned include:
- All products lack IPv4/IPv6 parity
- Vendors are not using their IPv6 capabilities
- IPv6 bugs and missing features do not get resolved unless there is a strong corporate commitment to IPv6 or there is tight contractual language.

The FAR and USGv6 help but contracting officers don't enforce FAR IPv6 policy and FAR IPv6 policy does not generally apply to services, only to equipment.
DREN III is an IPv6 network with legacy support for IPv4. IPv6 must work better or equal to IPv4. All network management functions are IPv6-only!
Findings for the IPv6 deployment included:
- Testing identified that IPv6 had equivalent performance
- When the NOC was built, all addresses in site routers (SDPs)were required in IPv6
- RSA SecurID clients did not support IPv6 and RSA equipment will be replaced
- InfoVista could not support netflow capture over IPv6. SevOne will replace InfoVista
- ALU Service Aware Manager (SAM) has multiple IPv4 dependencies: Unresolved
- HP iLO: NTP and Syslog are IPv4 only: fixed in a later release
- ALU 7750: NTP over IPv6 not supported: fixed in newer version of code
- Cisco 2960s were replaced by Juniper switches
- Juniper MX, SRX, EX: TACACS did not work over IPv6: MX was fixed
- Infoblox grid only worked over IPv4: fixed
- Perle IOLAN: PPP only worked over IPv4: fixed

DREN requires all customers to connect with dual-stack, run BGP, support Jumbo Frames, and support 802.1q tagging. It was found that at DREN III sites IPv6 was supported in all customer products. Many customers had apathy to IPv6. They need incentives to pursue it.
DREN rules for IPv6 products include:
- If they can't get to the company website via IPv6, the company is not considered
- Verify that the vendor is using IPv6 themselves and test the product in an IPv6 network

Enterprise IPv6: a note on DHCPv6:

IPv6 address assignment was initially SLAAC which worked. However, privacy addresses broke everything (loss of stability, predictability and control).

You can't make fixed IPv6 address assignments based on MAC addresses as in DHCP. MAC addresses can be extracted from DUIDs through various means. Long-term resolution is through RFC 6939, Client Link-Layer Address option in DHCPv6. DHCPv6 Relay-Forward messages will provide the link-layer (MAC) address to the server. Initial deployment in some routers expected in mid-2015.

There are also resolvable issues with dynamic DNS updates in DHCPv6 vs. DHCP for v4.

Discussion indicated that:
- The Un. of New Hampshire tests equipment for IPv6 performance on a continuing basis and publishes data on IPv6 compliance of equipment
- High speed transfers using IPv6 face the same issues as high speed transfers in IPv4: Buffer size, jumbo frames, nuttcp
- Hitting tunnels in IPv6 can result in strange results.
- IPv6 multicasting is simpler to implement than IPv4 multicast

For more information please contact Ron Broersma <ron@dren.hpc.mil>
When it's cleared for public posting the complete briefing will be on the JET Website at:
https://www.nitrd.gov/nitrdgroups/index.php?title=Joint_Engineering_Team_(JET)#title

Network Roundtable
TransPAC: Jennifer Schopf

TransPac has 2 links, one from LA to Beijing and one from LA to Tokyo. TransPac is implementing upgrades to the LA infrastructure. They have applied for funding for TransPac 4 and will hear about it in the spring.

Internet2: Matt Zekauskas

Internet2 will have 2 x 100G to SC14, one link to MAN LAn and one to Chicago. There are no changes to the Layer 3 Internet2. At layer 2 Internet2 will connect to Hartford this week.

ACE: Jennifer Schopf

ACE links are currently operational and stable. The Chicago to Europe link will be increased to 60G. The Singapore link is operational.

CAAREN: Andrew Gallo

No significant changes.

DREN III: Ron Broersma

The transition of DREN networking to DREN III is complete and operational. DREN will increasingly become involved with the research community. Phil Dykstra will be interacting with the GENI and SDN communities. DREN is working with NRL.

ESnet: Nick Buraglio

ESnet is expanding its connectivity to Europe. A CERN link will be completed this week. Amsterdam connectivity is scheduled soon. ESnet is preparing for the SC14 demonstrations.

GENI: Heidi Dempsey
More GENI racks are in production. October 23-25 the GENI conference is being held in Bloomington, Indiana. A GENI rack is being installed at GWU.

NASA Networking: Hugh LaMaster, Bill Fink, and Andy Germain
The NREN configuration hasn't changed. NREN is experimenting in their lab on SDN and high speed performance. A new switch for PAX is slated soon for 10G+ connectivity
NASA Goddard lost R&D connectivity to Ames and is working with ESnet to reestablish this connectivity.
Goddard ran IPv4 and IPv6 from Goddard to Atlanta. IPv6 performance was poor to all external links. A Cisco router had an ACL processing IPv4 but not IPv6.

NIH Networking: Don Preuss
NIH is running a 100G backbone network. They are past the midpoint of a technology refresh for NIH campus networking providing 40G+. NIH is establishing a 2nd 100G link which will go to the MAX by the end of the year. NIH has many big data applications using the increased NIH bandwidth.

NOAA: Dave Hartzell
NOAA is building out its TIC sites at Hawaii, Seattle, Boulder, Fort Worth and Silver Spring. The first TIC is scheduled for completion in January 2015. NOAA is implementing a new 100 meg link to Gilmore Creek in Alaska, a satellite downlink site. It will connect to N-Wave's Seattle core node. A Washington, DC DWDM ring is under construction.

PacWave: Jonah Keough
The 40G link to Australia through LA is now operational. They have 100G to Seattle which provides for a future upgrade. A 100G link to Canarie is planned.

PSC-3ROX: Michael Lambert
The PSC-3ROX GENI rack is now installed. It awaits network connectivity in the near future.

Exchange Points
PNWGP: Jonah Keough
PNWGP has implemented hardware upgrades to support 100G.

NASA Ames: Hugh LaMaster
Ames is upgrading its switches over the next few weeks.

StarLight: Joe Mambretti
StarLight completed its upgrade to StarWave 100G capability by replacing the 5410 switch with an 8700 switch providing greater programmability. StarLight is providing support to the GLIF Americas meeting in Queenstown, New Zealand. They are currently meeting with the LHCONE and LHC optical communities in Ann Arbor, exploring the potential for a network interface as a tool for LHCONE to provide point-to-point connectivity. Auto-provisioning for the

NSI is going into production in a number of networks. StarLight is staging 10 sets of 100G demonstrations for SC14. StarLight is supporting demonstration of AutoGOLE capabilities.

StarLight is working on an SDN exchange in partnership with the GENI Program Office. StarLight interfaced with SDXs in Georgia Tech, TERENA, and Amsterdam. A cooperative SDX capability is being fielded to support an international weather system. The Google SDX in New Zealand will demonstrate interoperability with SDXs in the Georgia Tech, Amsterdam, StarLight, and Taiwan.

StarLight is building customized exchanges for domain science applications. Computational informatics and computational genomics will be demonstrated at SC14. StarLight was awarded $10Million by NSF to support a distributed cloud over 100G links.

WIX and MAN LAN: Matt Zekauskas

A DREN connection to WIX is expected to be completed this week. A WIX trans-Atlantic 100G to London is expected by the end of September. A MAN LAN link to Amsterdam is expected by the end of November.

JET Focus Topics, FY14 and FY15: Grant Miller

During FY14 the JET was tasked by LSN to focus on:

1. Continuation of JET Big Data Task
   - Emphasis on metrics and performance measurement
   - Work with endusers to improve end-to-end big data flows
2. perfSONAR Workshop
3. Track technologies
   - SDN
   - IPv6
   - TICs
   - perfSONAR
4. Continue Co-located JET meetings with Internet2/ESnet meetings

Each of these tasks was addressed and the status of these tasks is reviewed in a separate white paper.

Discussion at the last JET meeting identified JET focus topics for FY15. They include:

1. Continuation of JET Big Data Task: Work with endusers to improve end-to-end big data flows. Provide demonstrations for SC15
2. LSN Workshops
   - SDN planning workshop: Next steps, commercial participation
   - Integration of mobile wireless technology with SDN and GENI resources (NSF has a workshop planned that should be expanded to broader LSN/JET sponsorship and participation)
   - Enabling Extreme Data Science: Making more routine the End-to-End support of data-intensive science including endpoints with 100G NICs. Enabling ~98 Gbps over 100G links for end-to-end applications (or ~9.5 Gbps over 10G links)
3. Track technologies
   a. SDN/SDX
   b. TICs
   c. perfSONAR

        d. IPv6
        e. Others, TBD
4. Continue Co-located JET meetings with SC15, Internet2/ESnet meetings
    -   Internet2 Global Summit: April 2015
    -   SC15
    -   Internet2/ESnet 2015 Technical Exchange, October 2015
5. Provide a continuing forum to discuss enabling use of bleeding edge technology/architecture in experimental networks, testbeds and production networks.

AI: Grant Miller will prepare a briefing of JET tasking to the LSN Annual Planning Meeting

Meetings of Interest:

29 September – 1 October	[14th Annual Global LambdaGrid Workshop](#), Queenstown, New Zealand
October 1-2	GENI workshop on next generation control plane technology for federated interoperability, Washington, DC
October 6-8	[NANOG62](#), Baltimore, MD
October 20-23	[GEC21](#), Bloomington, IN
October 26-30	[2014 Technology Exchange](#), Indianapolis, IN
November 6-7	[Introduction to GENI](#), Baltimore, MD
November 9-14	[IETF91](#), Honolulu, HI
November 13-14	GENI Workshop on Future Research Infrastructure for the Wireless Edge, Washington, DC
November 16-21	[SC14](#), New Orleans, LA
February 2-4, 2015	[NANOG63](#), San Antonio, TX
March 22-27	[IETF92](#), Dallas, TX
March 23-26	GEC22, Arlington, VA
April 26-30	[Internet2 Global Summit](#), Washington, DC

Next JET Meetings:

October 21   11:00-2:00 EDT, NSF
November 19 1:30-3:30PM CST, Room 264, Ernest N. Morial Convention Center, New Orleans, LA   *nb*: This meeting is concurrent with SC14
December 16 11:00-2:00 EST, NSF *nb*: Scheduled only if needed