JET Meeting Minutes
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Participants

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Action Items
Carry forward
1. Bobby Cates will arrange for a DHS presentation on TICs to the JET
2. Jennifer Schopf will inform the JET members of her inexpensive deployments of perfSONAR on ACE.
3. JET members should provide comments on the draft JET charter to Grant Miller (miller @nitrd.gov) before mid-March

Proceedings
This meeting of the JET was chaired by Kevin Thompson of the NSF and Vince Dattoria of DOE/SC.

Internet2 Refresh: John Moore
Internet2 is planning a large network refresh and funding has been approved by the Internet2 Board. The overarching goals are:
- Align network services with evolving community needs
- Develop deeper partnerships for mutual benefit
- Provide leadership in network services

The current architecture provides AL2S services as the basic substrate with other services on top of that. The AL2S service enables SDN/OpenFlow for a deep level of programmability. The AL2S service provides connector backhaul for R&E Layer 3 and

TransitRail-Commercial Peering Service (TR/CPS) and provides a Layer 2 Open Exchange. Juniper and Brocade boxes will be used.

Internet2 is planning a re-architecture due to softening support for OpenFlow by the vendor community. Internet2 also has a looming hardware vendor swap. The Brocade 100G cards need replacing to maintain current service.
The Goals of the re-architecture are to:
- Modify the core network
- Remove dependency on OpenFlow in the core
- Build a rock-solid production single vendor for the MLPS-based core.
- Maintain the existing customer service view
- Provide a more agile platform
- Simplify the architecture and increase visibility for planning
- Position Internet2 to be more innovative and responsive to changing community needs
- Provide SDN in an overlay (e.g., to support GENI).

The new converged service delivery architecture will be MPLS based with a research support infrastructure overlay of OpenFlow 1.3 (when it is ready. SDN 1.3 has not been available and has impeded needed user services). Internet2 software will be evolved to support SDN in the overlay and in the Layer 3 core.

   The transition plan is to bring up the SDN overlay using Brocade boxes, swap hardware, bring up the new core and migrate users to the new capabilities. The target completion date is 4Q2016.

The 2018 network plan will be based on outreach to the user community to understand their priorities and to experiment with better ways to work cooperatively. Longer-term goals are to redefine the value proposition for the network, continue innovation, and to implement sustainable (increasing) usage.

   For the optical network, Ciena has been good and Internet2 will continue to work with them. A 2020-2021 optical refresh is expected and will be coordinated closely with ESnet.

JET Roundtable
CAAREN: Andrew Gallo
   The link to Ashburn is being upgraded to 100G, ETA 1-2 months. CAAREN is adding a 10G link into Equinix.

ESnet: Nick Buraglio
   ESnet is planning for ESnet6. They are testing smaller 100G devices. The 340 G across the Atlantic in support of CERN is functioning well with comfortable headroom. They transited some of the LIGO data via these links. There was a software upgrade across the Alcatel/Lucent backbone. They resolved a BGP bug. An upgrade to the Juniper equipment is imminent.

Internet2: Grover Browning
   Internet2 implemented configuration changes to assist in traffic reconfiguration pending the arrival of additional hardware. (1.8% of circuits were over the 40% usage

threshold, an additional ~4.3% over 30%). This resulted in a 5-10% drop in traffic on the most heavily used links. An outage on the Philadelphia to New York link due to a double card failure caused a 2 hour backbone outage. They implemented a 23 hour workaround. There was a 1 hour 15 minutes mean time to repair on AL2S.

NASA: Andy Germain
 Nothing new to report

NIH: Mike Gill
 Nothing new to report

NOAA: Mike Laufer
 Nothing new to report

NRL: Linden Mercer
 NRL is getting some new equipment in. There are no signinicant changes to report.

PacWave: Jonah Keough
 The upgrade at 1 Wilshire is completed. They expect the new Tokyo 100G connection there.

3ROX: Michael Lambert
 Nothing new to report

U.S. Ignite: Glenn Ricart
 U.S. Ignite is kicking off a new phase and is seeking new applications from cities. Currently 12 cities are supported by the NSF. An additional 19 cities have expressed an interest in participating. Gbps networking is basic to the new capabilities with 10Gbps to the users. 10G network islands exist in Kansas City and other cities. Cleveland has a pending 100G network. U.S. Ignite is establishing a Gbit Town Square for Gbit interactions. U.S. Ignite is using GENI capabilities for processing.

Exchange Points
MAN LAN: Grover Browning
 ANA experienced 3 long outages in January, one of which was a 25 hour outage. MAN LAN is following up with the provider. A possible cause is a short in the cabel's sheath.

WIX: Grover browning
 Nothing new to report

MAX: Dave Diller
 The MAX refresh is nearing completion. Customer upgrades to 100G are taking place in the Baltimore area. MAX received grant money to buy some of the latest Juniper equipment.

StarLight: Joe Mambretti via email
The StarLight consortium, with its research partners, is experimenting with multiple architectures and technologies related to a) integrating SDN with cloud services, b) services and capabilities for Software Defined Exchanges (SDXs), c) Software Defined Infrastructure (SDI), and d) Software Defined extensions to multiple additional resources (SDE).

Pacific Northwest GigaPoP: Jonah Keough
Nothing new to report

Internet2 Global Programs: Urszula Chomica
This presentation relies heavily on network maps and the presentation (including those maps is available on the JET monthly meeting Website at:
https://www.nitrd.gov/nitrdgroups/index.php?title=Joint_Engineering_Team_(JET)#JET_Meetings
Internet2 coordinates with 70-80 global networks. It currently is making major investments into ANA, Fujirah, and Singapore. The ANA 200G production ring was completed in November 2014 and provides a redundant 100G ring between 4 exchange points spanning the Atlantic. Internet2, CANARIE, NORDUnet, and SURFnet partnered on this project. A reciprocal backup agreement with ESnet is in-place. Its fat pipes connect NY, DC, London, Amsterdam, and CERN.
In the Middle East Internet2 is invested in the Arabian Global Education Open Exchange Point (AGE-OX) in Fujirah. Internet2 is also committed to fund an upgrade of the existing 2.5G link to 10G to Singapore – NYU Abu Dhabi/Ankabut/Internet2.
Internet2 is investing in a 100G SingAREN partnership with production in 2016 and a 10G CERNET partnership between Beijing and LA.
Internet2 and CUDI are cooperating to upgrade cross-border connectivity at El Paso from 1 to 10G – ETA March 2016.
Internet2 also supports the IRNC award networks:
- Americas Lightpaths Express and Protect
- FIU/Ga Tech for AtlanticWave SDX
- Global NOC with IU
- NetSage: Network monitoring and visualization over the NSF R&E networks
- International SDX at StarLight
Internet2 cooperates with GÉANT that connects R&E sites in 40 countries in Europe. Routers have 100G capability with potential for 500G super-channels.
Asian connectivity includes:
- TEIN*CC and TEIN4 interconnect R&E sites in 18 Asian countries and connect to GÉANT at 2.5 G from Madrid to Mumbai and 10G via ORIENTplus from Beijing to London.
- Future Trans-Pacific links:
    o 10G to India
    o China CERNET at 10G
    o Japan SINET 100G to the U.S.
    o Korea: KREONET at 100G to Chicago

        o   Australia/Hawaii upgrades to 100G

Middle East connectivity is through MENA and provides networking to Algeria, Jordon, and Egypt. The Middle East ASREN network provides connectivity to Jordan, Egypt, Morocco, Sudan and Tunis from GÉANT and Internet2.

African connectivity is through UbuntuNet interlinking Eastern and Southern Africa to Europe. AfricaConnect2 will link additional African sites throughout Africa. WACREN provides connectivity to West and Central Africa.

South American connectivity is through cooperation with Red CLARA and provides connectivity to Europe and the US (Florida and Texas).

C@ribnet provides connectivity to many of the Caribbean islands.

Meetings of Interest:

March 1-2	OIN, Millersville, PA
March 7	GENI Regional Workshop, Tempe, AZ
March 8-9	GEC24, Tempe, AZ
March 29-30	ESCC, Berkeley, CA
April 3-8	IETF 95, Buenos Aires, Argentina
April 17-20	ARIN 37, Montego Bay, Jamaica
May 15-18	Internet2 Global Summit, Chicago, IL
June 12-16	TNC16, Prague, Czech Republic
June 13-15	NANOG67, Chicago, IL
July 17-22	IETF 96, Berlin, Germany
August 1-5	APAN42, Hong Kong
September 25-28	TechX, Miami, FL
September 29-30	GLIF16, Miami, Fl

Next JET Meetings

March 15	12:00-2:00, NSF
April 19	12:00-2:00, NSF