

JET Meeting Minutes February 21, 2017

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Action Items

Proceedings

This meeting of the JET was coordinated by Kevin Thompson of the NSF. John Moore described planning for the next generation Internet2. Chin Guok described planning for ESnet6, the next generation ESnet.

Internet2 Future Infrastructure Planning: John Moore

Internet2 is beginning the process of defining the future network architecture to support its user community needs, provide a national-scale infrastructure, and provide support for research and education in the U.S. Internet2 is currently seeking inputs from users, campus IT/networking professionals, regionals and other users. They are holding workshops and calling for papers from these communities to identify future needs. Industry organizations and providers are also involved to provide opportunities for collaborations. Working groups are currently being formed to focus on academic enterprise needs and to identify research community needs. Internet2 is seeking broader input as well. To date input has identified a need for:

- An infrastructure and services ecosystem

Provide an ecosystem in collaboration among community stakeholders: scope needs to be national and international; the technical platform will be more software, less on manual configuration.

- Partnerships with all potential users, providers, and affected organizations

Integrated services require tight coupling of all providers. Industry should be engaged, including open industry collaborations such as: Open compute platform, CORD,...

- Infrastructure as a platform

The community needs a platform for experimentation. Refresh needs to be incremental. The platform needs to be nimble, support services at different scales, integrate commercial clouds, and provide dedicated, tuned connectivity among science DMZs.

- Engineering and architecture

Services for academic enterprise and research support should be separated. Cost-effectiveness is critical. Transparency should be a fundamental design principle. We need a cheap reliable core with a flexible local edge. Enable a shareable, distributed, generalized compute infrastructure. Security, resilience, trust and identity are critical.

- Advocacy and coordination

Internet2 should advocate for national and state investment in R&E networking. Shareholders should be an integral part of the planning and operational coordination. The community needs to be engaged about developing the workforce to staff the network and to plan for future workforce needs.

Over the next few weeks working groups will be formed and convene to refine architectural concepts and to document requirements. A draft plan will be presented at the April Internet2 Global Summit. The plan will be circulated for further comment and refinement. Executable infrastructure experiments and pilots will be developed.

ESnet6 Planning and Architecture: Chin Guok

ESnet6 is being planned to provide for exponential expansions in network capacity, to increase the network reliability, and to provide increased flexibility at all network layers to support science. ESnet is currently carrying out research and testing to support ESnet6 implementation in 2019-2022. In 2017 ESnet expects approval for the emission need for the new network.

ESnet has worked with the large-scale science communities to identify predicted baseline usage for 2020, 2025, and 2030. They did router predictions so router ingress traffic data matches ESnet's 25+ year total growth curve. They added burst overhead bandwidth and additional bandwidth for paths based on resiliency strategy to predict total network needs. Based on the capacity needs ESnet developed a network backbone capacity architecture.

ESnet has gone through an ESnet6 services definition project to determine projections of workflows based on user inputs. They derived production services from the workflow specifications and potential/experimental services (Virtual Private clouds, Content Delivery, named Data Networking). Based on the services, they defined the network technical requirements.

Based on the planning inputs ESnet identified 6 potential architectures:

- A. Router and DWDM Ethernet switch architecture

- B. Packet transport router architecture
- C. Router and OTS architecture
- D. Router and PKT/OTN OTS architecture
- E. SDN router and PKT/OTN OTS architecture
- F. SDN router and OTS architecture

Architectures A&B (Packet Optical Integration) are highly scalable, cost-effective, and power and space efficient but they are all in one box so if you replace one component you have to replace all. Architectures C&D provide clean layer separation providing simpler resiliency planning, but are cost, power, and space challenging. You can replace a router easily but the technology is not scalable. Architectures E&F (SDN) are highly flexible for resource slicing and service creations, potentially highly scalable and cost effective but require non-trivial design complexity (distinct requirements and designs for management control and data planes) and potential production support complications. Network engineers will require significant training on SDN technology.

An architecture decision is expected by summer of 2017 that will merge aspects of each architecture.

JETNet Roundtable

CAAREN: Andrew Gallo

Nothing new to report

ESnet: Nick Buraglio

ESnet is integrating its security pieces. The trans-Atlantic circuits are in-place.

GENI:

GENI is holding a GENI engineering conference March 14-15 at FIU.

NASA/ GSFC: George Uhl

Nothing new to report

NOAA: Mark Munz

All 5 of NOAA's TICAPs have been completed. Customers are being moved behind the TICAPs. NOAA will report on its TICAPs in detail at the March JET meeting.

NOAA upgraded its Denver to Chicago and Chicago to DC links to 20G

NRL: Linden Mercer

Nothing new to report

Oregon State University: Tony Brock

OSU is carrying out a statewide evaluation on how to reach the state's education facilities. They are also evaluating how to increase capacity to 2 remote campuses

RNP: Alex Moura

RNP is implementing a 100G footprint with energy line companies as partners. They are currently instituting agreements with the companies. By the end of FY17 they expect to

deploy dark fiber from companies in the Brazilian Northeast with Layer 1 operability. RNP is developing plans to purchase new optical equipment. By May 2018 they expect to announce the winning company for the purchase. RNP is defining user services for the community. They plan to deploy special services designed for science community users. RNP is launching a connectivity program to Europe in conjunction with Red Clara.

Exchange Points

WIX: Dale Finkelson

Nothing new to report

MANLAN: Dale Finkelson

MANLAN deployed a 100G link to Europe. It will be available for use later this week.

StarLight: Joe Mambretti by email

StarLight has started the process of planning for SC17 demonstrations in Denver and is in discussions with SCInet .

AIX: Bobby Cates

The AIX is extending DREN to the Level 3 PoP in Sunnyvale to pick up Internet2, PacWave, and ESnet. This connectivity will be extended out to the PAX and Equinix. AIX is holding discussions with DHS on TICs for how to integrate Amazon Web services with TIC requirements. The new NASA TIC manager at NASA is Mark Bunn.

Meetings of Interest:

March 14-15	GENI Engineering Conference, FIU https://www.eventbrite.com/e/geni-engineering-conference-25-gec-25-tuesday-march-14-2017-wednesday-1pm-march-15-2017-tickets-30339268569
March 26-31	IETF 98 , Chicago, IL
April 2-5	ARIN 39 , New Orleans, LA
April 23-26	Internet2 Global Summit , Washington, DC
May 29 – June 2	TNC17 , Linz, Austria
June 5-7	NANOG70 , Bellevue, WA
SC17	http://sc17.supercomputing.org/ , Nov 12-17, Denver, Co.

Next JET Meeting:

March 21	12-2 EST, NSF
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