

Impressions from 2016 Internet2

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- Good afternoon,

Having just wrapped up the last session I'll be attending at Internet2, I thought I'd share some impressions from the various sessions and talks I attended.

- This year marks the 20th anniversary of Internet2. The first meeting where everyone got together to agree on creating Abilene/Internet2 happened at the Chicago Hilton 20 years ago. There were 28 people in attendance one of them was Anne M, representing Harvard. Jim Bruce, former CIO of MIT, was also there. It's a good reminder of the leadership and innovation role that Harvard can and should play in the Internet2, R&E, and standards community. If we're not careful, we're going to continue a downwards trend of just being a consumer of innovations that other people do.
- Harvard is part of a small pack of universities who are pretty far along in their cloud programs. Coming out of the panel discussion I participated in yesterday, I received quite a few queries from other schools who are VERY interested in hearing more about what we've been doing. Although it may not feel like it at times, we're definitely at the front of the pack in terms of progress towards our cloud goals.
- There are a number of development_testing_research efforts underway that we could participate in if we were interested. For example, a distinguished engineer from Cisco that we've been working on re: multicast for teaching/learning over wireless extended an invite to us to participate in a test bed for a developing technology called Information-centric networking. The basic concept is a networking protocol that integrates multicast, namespaces, QoS, and CDN into a next-gen version of a CDN that is standards-based rather than proprietary. Not sure whether there is much of a fit for Harvard specifically, but perhaps doing it at the NOX level makes more sense.
- For our PerfSonar deployment, we should wait for 4.0 to become available in the fall for our production release. New hardware updates on low cost swarm nodes (\$150) and even low cost 10gb nodes (\$750) for the regional core PoP's. There is a user community that we (Matt W in particular) should really get involved with
- SDN has emerged aggressively from the lab and is all over high-Ed in full blown production deployments for campuses. It is no longer vaporware and it is genuinely past the "goofing around" stage. I saw several case studies on real-world campus applications of SDN that are in production today:

- o SDN for research bypass at 2 different universities (Duke and Univ of Kentucky)
- o Getting orchestration-style SDN "for free" as part of a regular lifecycle replacement. Interesting note: by moving off of Cisco to Plexxi, WSU saved 50-60% in capital relative to their last lifecycle schedule. They also made pretty aggressive use of passive optical gear for their buildings and then using Plexxi to manage entire buildings as 1 virtual switch — all heavily automated.
- o ANL did a big SDN deployment to automate an adaptive QoS strategy for research
 - Some other take aways on SDN:
- o Pay extra for a good network architect who is willing to pursue SDN and is not tied to older ways of doing networking. Invest in your staff. Opportunity to drive real innovation here — SDN shouldn't happen to them, they should be driving it.
- o Openflow may be neat for traffic engineering, but it is still problematic in mixed environments. Better to emphasize orchestration and automation with SDN than traffic engineering
- o Internet2 AL2S is actually moving AWAY from Openflow due to lack of vendor support for keeping up changes in the specification. They will move AL2S over to new Juniper routers running MPLS and just provide Openflow as an overlay to those who are interested in it.
 - Real need for Internet2 to start having conversations w/ EFF, Berkman Center, and others interested in Internet freedom and privacy. General recognition that Internet2 could provide more leadership here.
 - Recognized need for Internet2 and R&E to get more engaged w/ cyber security collaboration happening within the Defense Industrial Base. There's a lot to learn from the DIB re: threat landscape and InfoSec collaboration, universities should get involved.

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