The ISP Column
A monthly column on things Internet

October 2012
Geoff Huston,

NORDUnet 2012 – My Impressions

I was able to attend NORDUnet 2012 in September of this year as an invited speaker. This is a brief report of my impressions of this meeting.

In many ways the national research network agenda has not changed all that much over the years. There is still the same degree of post-Internet uncertainty and a certain amount of "what are we doing?" being asked. The original rationale for these national and regional network service programs, that of providing networking services to the national academic and research enterprise of a type and on a scale that was simply not available from conventional industry telecommunication providers, is not exactly a clearly sustainable proposition these days. In terms of commodity IP services the commercial supplier market, with its range of fixed and mobile services and its scale of operation, is now easily capable of meeting the research sector's conventional service needs. So where now is the unique role for the NRENs? The NORDUnet presentation that, for me, was the most illustrative of this introspection about the future of the NREN approach was by the CEO of NorduNet, Rene Buch, who described his view of he coming 10 years, where he confidently expected the regional research backbone network to increasingly operate with conventional industry based inputs and operate like many other service providers, albeit with a highly specialized clientele.

However, the continuing issue here is that not all of the networking demands in a national, regional, or global research agenda have "conventional" networking needs. The topics at NorduNet that I picked up were big science, in the form of very large scale instruments, and consequently very large scale data sets. These big science projects are in the physics and astrophysics areas, and some of the biogenetic programs. They generally involve many researchers distributed across many institutions, and there is a demand for high capacity storage, high capacity processing and of course high capacity networks. The need for speed has been driving the leading edge of research networks for over two decades, and at NORDUnet there was the announcement from Uninett, the Norwegian NREN of a 100Gbps production circuit between Oslo and Trondheim, reportedly the first in the Nordic countries, and possibly the first such production circuit in Europe.

These days we've shifted attention from the Large Hadron Collider to the Square Kilometer Array project, which appears to again involve data generators. In the case of the SKA its in the form of radio telescopes, located in Western Australia and South Africa. As this is a large scale international project much of the data processing is expected to take place in Europe and presumably North America. The description of the SKA networking program at NORDUnet raised one very interesting technical facet for me in terms of networking applications. It appears that the SKA is indicative of a class of data networking that is quite possibly unique to the research networks, namely extremely large (multi-gigabit) time-critical loss tolerant single data streams. The general form of this model is a number of constant rate data generators, where there is a very low signal to noise ratio within the data. The objective is to bring multiple such noisy data streams to a single processing point to allow for synchronous combined processing that will pull a single signal from the accumulated data streams. The processing is performed in real time, so the purpose of the networking facilities is to take each data

stream from each of the instruments and pass it to the collection point. The data feeds are constant bit rate at the level of gigabits per second, and the network needs to preserve a constant delay for the data path. This has lead to a significant body of work in light path networking, where the role of the network is to maintain a dedicated circuit with constant capacity and constant delay. This is implemented as a provisioned wavelength on an optical bearer system. There is no concept of sharing or multiplexing, and the data protocol used, UDP, is used as a simple and widely implemented data framing protocol (https://events.nordu.net/display/ndn2012web/Technology+evaluation+for+time+sensitive+data+transport).

Another continuing theme of NRENs is the fascination with the latest in networking. In order to differentiate the NREN programs from their commercial counterparts there is a continual need to position themselves as technical innovators and early adopters of networking technology. At this point in time the latest fascination in networking is SDN (software defined networking) and Openflow. The best description I have heard about these technologies is from the US GENI project, which has chosen to use these technologies to create experimental sandboxes to expedite research into networking. In this light these technologies were not viewed as an end in and of themselves, but a way to research various networking scenarios. The combination of the elasticity and flexibility of Openflow and the user-defined control parameters enabled by SDN allows a user to create customized network configurations without needing to gain configuration access to each of the network's switching elements, and it also allows a number of such customized configurations to co-exist on a single underlying infrastructure platform. All this is great if the aim is to undertake research into networking itself, and do so at a scale and a load profile that far outstrip anything that can be simulated in a laboratory context. However, as the GENI program gathered momentum and partners it appears that, to some extent, the experimental platform is subtly changing into the production platform. A presentation from Internet2 at NORDUnet described how the US' Internet2 network is now an Openflow SDN platform. There is all the hallmarks of asserting that this networking architecture, if this form of meta-toolset that is used to create specific networking topologies could be termed a network architecture in its own right, is now the new architecture of the network itself. This is a distinct step away from looking at these basic tools as being one to exposes a structure for experimentation about networks. Some advocates for SDN and Openflow see in this model the ability to deliver high bandwidth virtual circuits on demand, but one wonders if this is a robust general purpose architecture for networking beyond the now 'classic' IP routing control models, or whether the set of interdependencies in SDN and Openflow are just too fragile to scale.

There were two IPv6 presentations, one from myself on a report on a number of recent experiments in measurement of IPv6 service quality and an analysis of application behaviours in a dual stack environment, (https://events.nordu.net/pages/viewpage.action?pageId=2294038) and one from Ole Trøan (https://events.nordu.net/display/ndn2012web/The+state+of+IPv6+adoption) showcasing a new IPv6 resource page (http://6lab.cisco.com).

There were also two presentations on the DNS, both related to DNSSEC. I presented on measuring DNSSEC (https://events.nordu.net/display/ndn2012web/Measuring+DNSSEC+use+in+today%27s+Internet), and Roland van Rijswijk of Surfnet presented on lessons learned from the DNSSEC deployment (https://events.nordu.net/display/ndn2012web/DNSSEC%3A+from+root+to+%28brown%29+leaves%3A+Lessons+learned+from+4+years+of+active+deployment+-+2).

In terms of themes and program material NORDUnet 2012 presented a relatively conventional program about topics of interest to the research community in the area of networking, and its application in the research endeavor. The evolution of this conversation within the research community is one that has evolved from a conversation about how to provide cost effective networking services to various research programs and applications to one of the application of networking technologies to transform the research endeavor through the widespread use of collaborative tools and shared access to common resources and assets. Along this vein, there was a number of presentations on high availability cloud services, from the perspectives of service delivery and security, collaborative technologies and video infrastructure, all of which are standard fare for the NREN communities these days.

Sustaining common purpose, momentum and interest in long term common infrastructure activities is always a challenge, particularly in the research community which is often characterized by a remarkably short attention span! NORDUnet appears to have succeeded in meeting this challenge and the high level of attendance, the variety of the program and the interesting corridor conversations all attest to the success of NORDUnet in the Nordic countries and their common NREN endeavor.

The NORDUnet 2012 program is at: https://events .nordunet.net/display/ndn2012web/Programme

Disclaimer

About the Author

Geoff Huston B.Sc., M.Sc., has been closely involved with the development of the Internet for many years, particularly within Australia, where he was responsible for the initial build of the Internet within the Australian academic and research sector. He is author of a number of Internet-related books, and has been active in the Internet Engineering Task Force for many years.

www.potaroo.net