NREN VS INTERNET

Welcome to the latest addition to the collection of Sunet blogs: the CTO team blog.

Here the technical leadership team is going to write about past, present and future technology initiatives. As technologists it is easy to have your attention consumed by the next shiny thing, but today we're going to lift our eyes and look at the horizon for a bit.

Today I'm going to start by talking about why are we here. What is Sunet and most other National Research and Education Networks (NRENs) all about, what do we bring to the table and what drives us to do what we do?

In the established tradition of the Internet generation attention-span-deficients, here is the TL;DR

TL;DR

Sunet is a National Research and Education Network (NREN). An NREN

- … operates a network that is built for research but also delivers regular Internet connectivity
- … forms a buyers club that uses the network and federated infrastructure as a lever in negotiations
- … delivers bespoke tools for research collaboration

These requirements form a positive feedback loop that (if managed carefully) serve to increase quality and lower cost.

NEVER LET FACTS GET IN THE WAY OF A GOOD STORY

Both Sunet and our nordic partner organization NORDUnet are *old* by Internet standards – in fact NORDU.net (along with .mil, .gov, .arpa, .edu and a bunch of other TLDs registered on January 1st 1985) is the oldest domain in operation on the Internet. The first root nameserver outside the US was originally called nic.nordu.net (now i.root-servers.org). The original SparcStation 1 can still be seen at the netnod offices where global i-root operations can be found to this today.
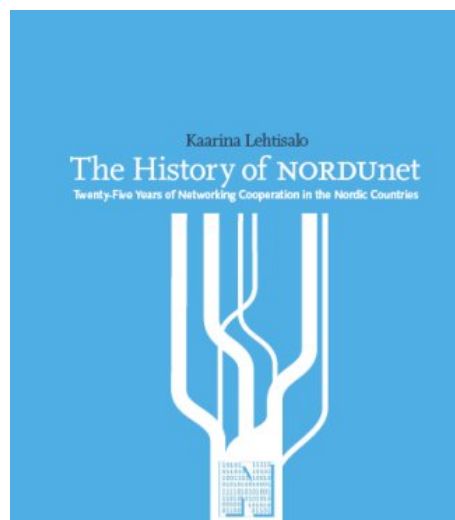
Back in the day (i.e the early 80s) Internet networking was new and was almost exclusively the domain of "hard" science (physics, mathematics, etc) where it was used for relatively simple applications like accessing mainframe computers (using telnet!) and email. There was no web, no real-time communications and no mobile or wireless Internet access. **Internet access was pretty much the same thing regardless of who you were and what you wanted to do. This is no longer true** and is an important part of our story going forward.

We all know how history unfolded: the web was invented, the 90s saw the first bubble and burst, mobile took over the Internet and we all drowned in social media and cat videos.

The first bubble, the rise of mobile and social media siphoned up a significant portion of the original technical talent from NRENs and has left us with an aging engineering community and leadership. The last few years have seen several of the original NREN founders retire or passing away and a new generation (like our own CEO Maria Häll) have come on-board to restructure and refocus research networks all over the world.

ITS ALL ABOUT THE HIGGS!

The fact that the web was invented at CERN is known to most people. Tim Berners-Lee, while working for CERN, famously designed HTTP and HTML as a way to organize research data and documentation. "TimBL" (depicted on the right) got his knighthood in '04 as a result of this work and maybe it was the success of the web and the torrent of clickbait sites that followed that made us temporarily loose track of the fact that CERN didn't stop doing science just because every domain got a "www." prefix.

Today a lot of science (this is of course a gross oversimplification) is either producing or consuming huge amounts of data which in turn places unique requirements on the networks, applications and other infrastructure designed to support research. The search for the Higgs boson drove the NREN community to build a global virtual network LHCONE to be able to process the massive data-

streams involved. Arguably Peter Higgs (picture on the left) payed for the excellent network connectivity Universities enjoy today.

At the same time that research projects all over the world grew into massive data-sinks and data-sources, Universities (the part that isn't just doing research) started using the Internet for ... everything ... *just like everybody else*. A University has all the requirements of a (often large) company along with all the requirements of a (often large) number of research activities.

A University therefore needs two types of connectivity and two types of services; Research network and research services aswell as "normal" enterprise services and regular Internet connectivity.

Internet connectivity from the point of view of most normal users means having good access to services like youtube, twitter, facebook, google, aws, azure, dropbox, O365, netflix, akamai, etc ... whereas access to Research Infrastructure means being able to connect any researcher to any data from/to anywhere on the planet. These are very different but (fortunately) compatible goals.

TOP-END LAPTOP DRIVES: 136
STORAGE: 136 TERABYTES
COST: $130,000
(PLUS $40 FOR THE SHOES)

On the application side, researchers often need unique applications to go with their unique network connectivity. During the last few years several NRENs have been busy establishing service portfolios.

Such service portfolios often closely match what happens to be popular services on the Internet in general which arguably doesn't always help researchers.

For instance, a lot of bulk research data transfer is still done via sneakernet even though most NRENs offer commercial data-synchronization services like Box or Dropbox and have access to practically limitless bandwidth.

The reason for this is *not* that researchers don't know about commodity Internet services – quite the contrary – most likely it is because research data requirements are simply outside the scope of consumer and enterprise services like Box or Dropbox. Why is this? The answer lies in looking at how commercial/commodity services are built and funded.
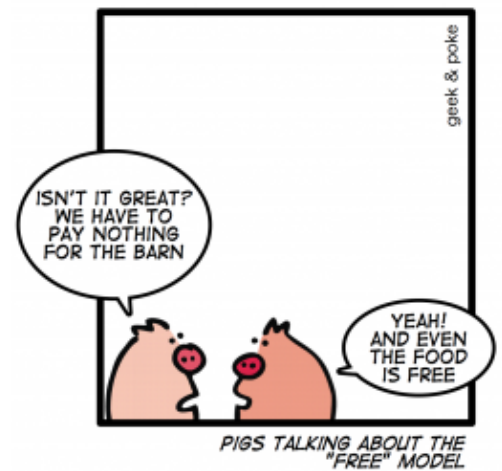
CUSTOMER OR PRODUCT?

There is no such thing as a free lunch. A lot of companies offering "free" services on the Internet today are working off of a common script:

1. have an idea
2. build value
3. bring on venture capital
4. IPO and exit or sell to a larger company and exit.
5. rinse, repeat.

This model is so common that it is getting its own pop cultural memes. The *free* bit often comes from the desire to build value by bringing on lots of customers that may end up becoming paying customers *in the future*.

What all this means is that most consumer-focused services with a free entry level will most likely be operated at a loss (at least initially) or the service will be restricted to fit a narrow set of use-cases – for instance, free online backup services with bandwidth restrictions that makes it impossible to restore any meaningful amount of data. There is of course every reason to be wary of the viability of a service where it is unclear if you are the customer or merely the vehicle for the next IPO.

ISN'T IT GREAT? WE HAVE TO PAY NOTHING FOR THE BARN

YEAH! AND EVEN THE FOOD IS FREE

PIGS TALKING ABOUT THE "FREE" MODEL

geek & poke

THE NREN BUYERS CLUB

The function of an NREN is to establish and operate a set of **useful and safe tools for supporting the core business of institutions of higher learning**. For Sunet this is captured in the strategy and vision statement. It is reasonable to ask wether NRENs should

even be involved with commercial services like Box or O365? Sometimes the answer is yes – especially when we can use the network to drive price point.

We have done this with Box, Kaltura etc. The benefit of the NREN as a buyers club is the ability to deploy the unique requirements placed on the network and core infrastructure by the research community as a lever to generate a capability surplus that can be used to drive price point and conditions for commodity services.

We do this both as Sunet and as part of a series of local and global collaborations. Together with the nordic countries via NORUnet and within the EU via GEANT. A recent example is that GEANT have successfully negotiated with Amazon to drop all AWS network costs for customers from the NREN community in the EU. The requirement on "no egress network costs" is part of the standard Sunet tender requirement repertoire today.

WHATS NEXT?

Sunet will continue to support the Swedish research community with core infrastructure and services. When we evaluate new technologies and services we always ask the following questions as a way to make sure we keep all the positive feedback loops between the network, SWAMID and other infrastructure working:

    how does the service/technology help the research community?

    what value does Sunet add to the service?

The first goal of an NREN is to serve our customers and that involves making sure that we spend our resources as efficiently as possible. As always we learn by doing.

Skriven av

LEIF JOHANSSON

Blogs about past, present and future technology
initiatives in the CTO-blog.