Bredbandsfylket Troms

How to make trouble for yourself
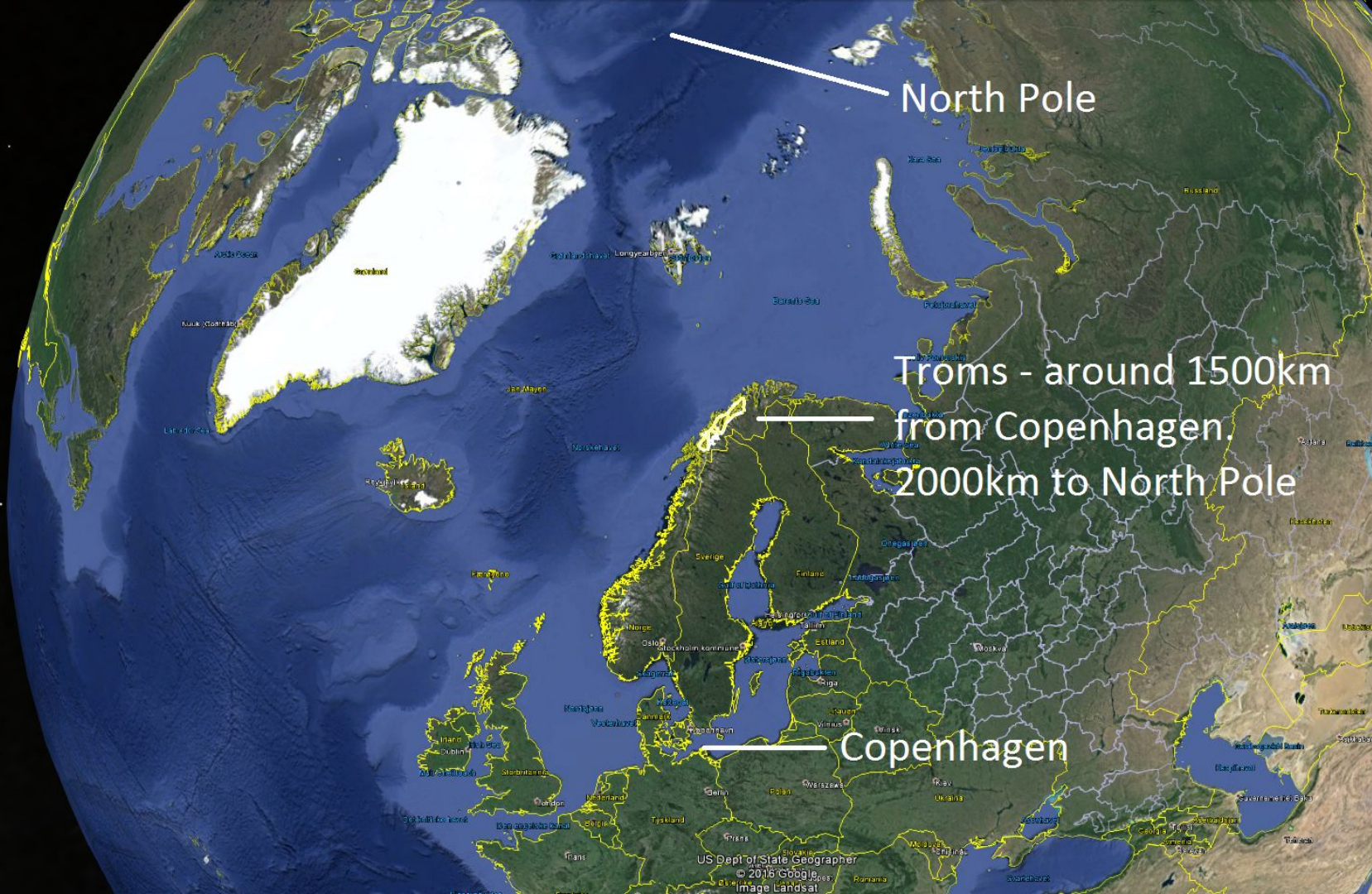
... you build an IPv6-Only network in 2016

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point to point:
344km - Harstad - Hammerfest (p2p)
134km - Tromsø - Harstad
213km - Tromsø - Hammerfest

Failure on our infrastructure (fiber)

- Shotgun and hunting, whales, trucks etc...

Failure on our infrastructure part 2 (fiber)

Our fiber will break -

redundancy is a must

Picture is after a Heli took out more

than 50% of our cable - missing a

22kV powerline by around 10cm...

About Bredbåndsfylket Troms
(Broadband County of Troms)

Our owners are
- County of Troms
- All 24 municipalities in the county of Troms

No-profit company

Long term and stable ownership of fiberoptic network

• **Prepare the infrastructure for future need for the municipalities and county for the next 25-30 years (from 2003-2004…)**

• **Be a tool for our owners in providing better and more efficient services with the established infrastructure**

Our upgraded network - v2 2015 - 202x

Version 1 lasted from 2004 until 2016…

Has to be future proofed, IPv6 needed due to RFC1918 overlap

150-300 location in total, all can get 10G and redundant uplink,
automatically failover in case of one distribution node fail

End User should never notice that we lose half of our network
we can handle any one core/dist failover AND fiber outage anywhere

Never down due to external factors
have our own infrastructure, fiber, power(48v DC) and nodes etc

End users can get access and manage their own CPE...

Bredbåndsfylket

Partnership

Contract in November 2015

Started building in January 2016

Operational in April 2016

Production from medio May 2016

About nLogic

<u>Partner</u> with both vendors and customers

Design, support, implementations, advisor for ISPs, DCs.

Enterprise and public sector

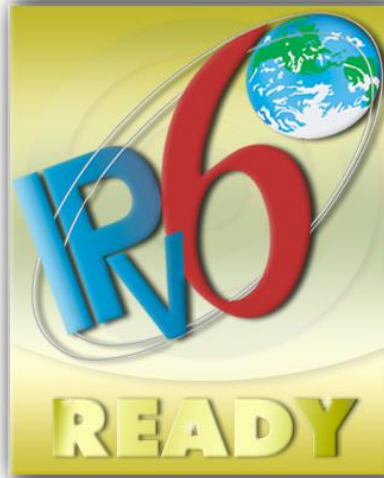IPv6 as a core technology to build future proof networks

About the network

Juniper

- MX104 and MX480 as core
- ACX5048 as PE
- EX3300 as CPE

"IPv6-ready" ≠ "IPv6-only-ready"

"KISS"

Use standard functionality

Automate processes (limit human intervention and errors)

Zero Touch Provisioning

CPE boots up

Gets IP using DHCP

Gets Option 43-values for config file download location

Downloads config over http

Automatically install and run new config file

No support for DHCPv6...

IPv6 management

CPE supports Static IPv6 on management-interface

CPE supports SLAAC on management-interface

CPE does NOT support DHCPv6 for management-interface

Need to set static IPv6-address in config

- Unique config for each CPE

Solution

"KEA" DHCP-server (the new ISC-DHCP)

Created a "hook" (plugin) - https://github.com/Olen/kea_hooks

Using Option82 parameters to generate config on the fly

IPv4 for management is disabled in the config the CPE downloads over IPv4...

Junos Space Management Platform

Full support for IPv6 (in principle)

"Discovers" new devices by scanning pre defined subnets…

No built in solution to allow the host to "self register"

Junos Space Management Platform

Junos Space API

Junos on host scripting (slax)

- CPE can send a "discover me" using curl

Junos Space Management Platform

How does the CPE know that it is reachable?

- Junos event-scripts
- Can trigger on ping
    - IPv4 only
- Can trigger on http-request
    - IPv4 only
- Can NOT trigger on RIPng route received
- Can trigger on a timer
    - Fire once every 60 seconds for 5 minutes before giving up

Radius

Radius for user authentication

FreeRADIUS on Ubuntu 14.04

- Ubuntu 14.04 - kernel bug in UDP-parsing (#1527902)
    - New kernel-package not released at the time of writing, but available in "-testing"
- Junos 12.1 - cat /var/etc/pam_radius.conf
    - 2a00:d740:101:1801::1000:1812 "SECRET" 3 3 0.0.0.0
- Junos 15.1: cat /var/etc/pam_radius.conf

    - 2a00:d740:101:1801::1000|1812 "SECRET" 3 3 ::0

- Upgrade image from Junos Space to version 15.1

Pre install of a new CPE

Simple web form to add new CPE

- Add IPv6 and hostname to DNS
- "Cut and paste" config for PE-routers
  - Could be added with netconf, but currently disabled

Result

Deploy a new CPE with IPv6-only management i 5 simple steps:

1. Register new location in web-UI
2. Unbox a brand new CPE
3. Connect power and uplink cable
4. Wait for a few minutes
5. CPE is ready
   - Configured and remote manageable (ssh/netconf++) over IPv6
   - Services are "ready to use" (internet, other internal services)
   - CPE is registered in Junos Space for logging, monitoring, management...
   - Radius authentication up after upgrade to latest software (from Junos Space)

Thank you