REANNZ
An Infrastructure Talk

T. Charles Yun

NZ Positioning Strategy: GGOS Vision workshop

LINZ, Wellington, NZ

1 Dec 2014

Overview

- Who are: REANNZ, Charles
- The REANNZ Network
- Connectivity from Southland to Warkworth
- International connectivity
- Network as a tool
- eRNZ2015, Queenstown

About…

REANNZ

- In one sentence:
  - REANNZ is the computer network that connects the universities, CRI's and polytechs to one another and on to the rest of the world.
- In one paragraph:
  - REANNZ is **New Zealand**'s R&E (research and education) network **connecting researchers** to their instruments, data and collaborators. We **help** drive the discoveries and inventions that are powering NZ's economy into the future. The REANNZ network is **designed for "big-data"**, as a result, everything else our members do over our network is **more efficient**. As a Crown-owned company and not-for-profit, REANNZ is charged with **exploring and supporting** the activities that help bring dreams closer to reality.
- History of strong support for radio astronomy, VLBI and Sergei's work.
- LINZ is a member!

About…

Charles

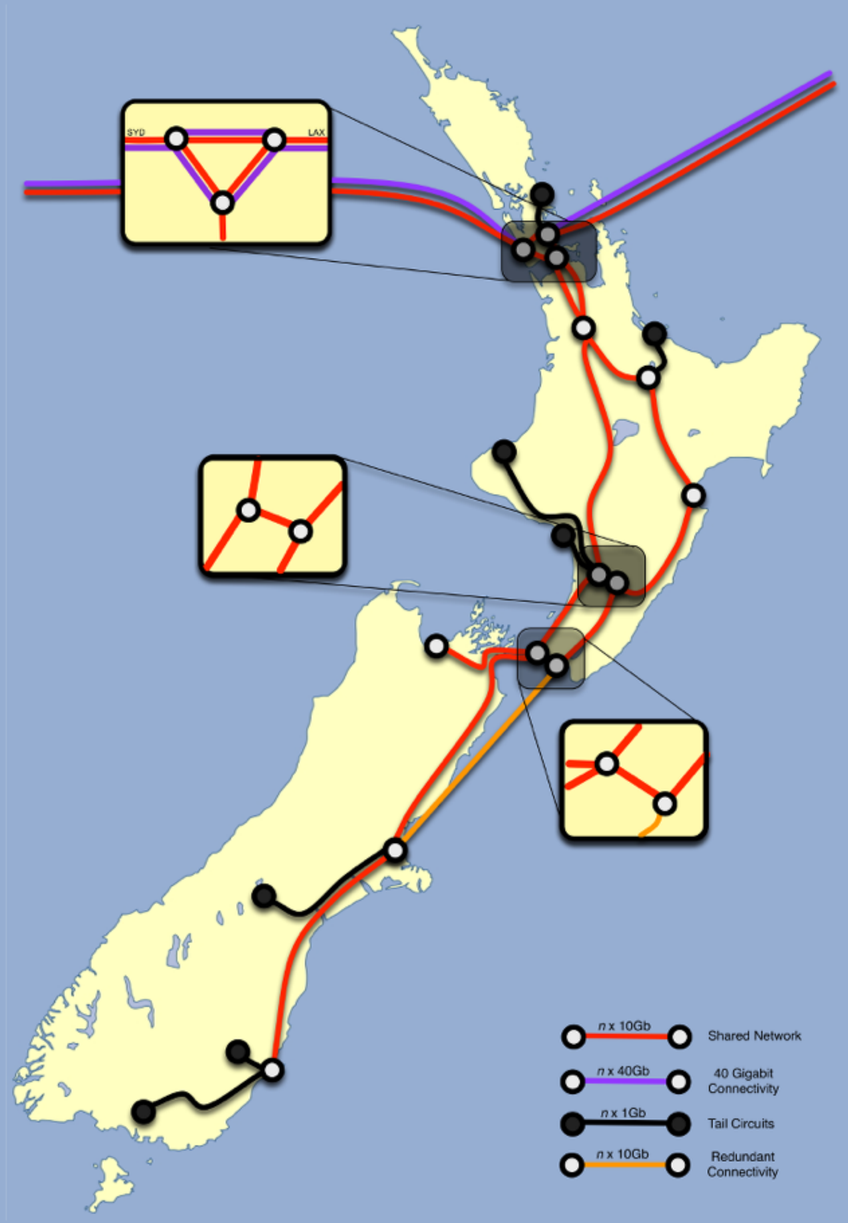
- At REANNZ for ~13 months
- Previously with JIVE (e-vlbi, radioastronomy) in the Netherlands building the SKA pathfinder technologies (getting rid of DHL)
- Previous to that, with Internet2 working to embed the network as a primary tool in large-facility science communities
- Deeper into the past, a software consultant and mechanical engineer (automotive computer aided analysis) and caffeine entrepreneur

Preparations

A bit about our network

- 99.9+% uptime
- 40x increase in international capacity to AU and US
- 46% growth in traffic volume
- 4.5 Gbps commodity capacity purchased by members
- 2 Tbps national, optical capacity
- 100 Gbps ring around Auckland
- Resilient, “ladder-design” backbone

…and a few different views of our network



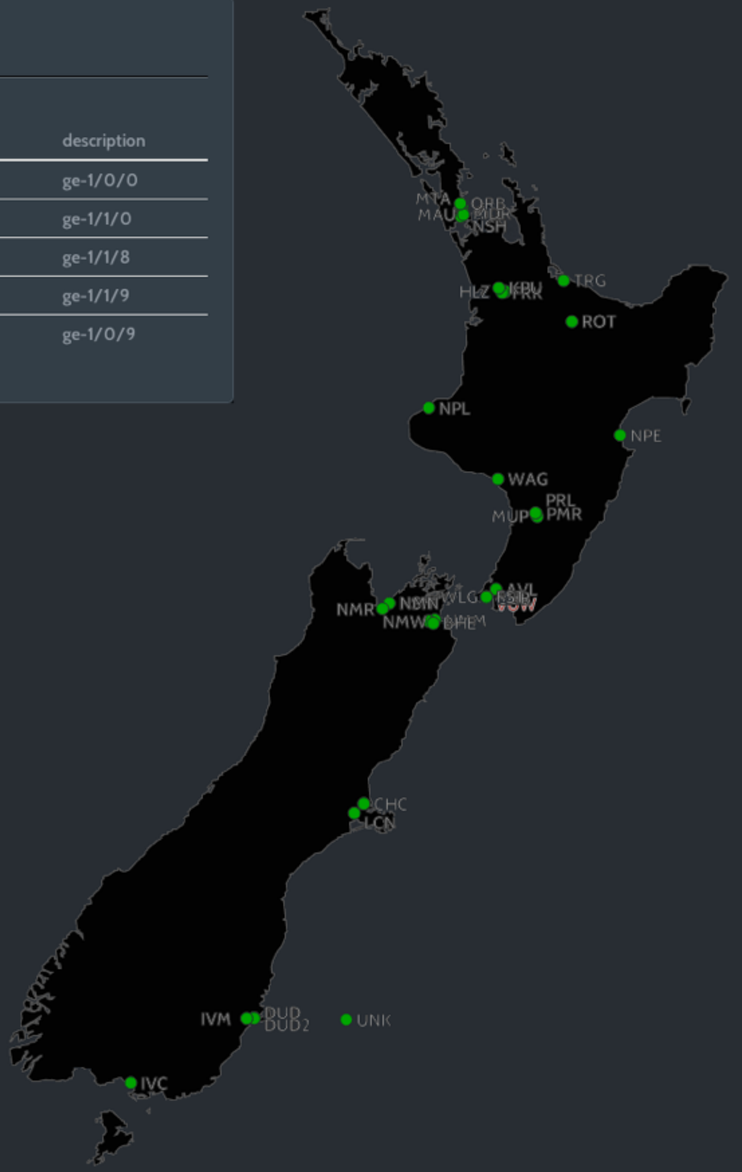
note: this image is out of date, but still mostly accurate

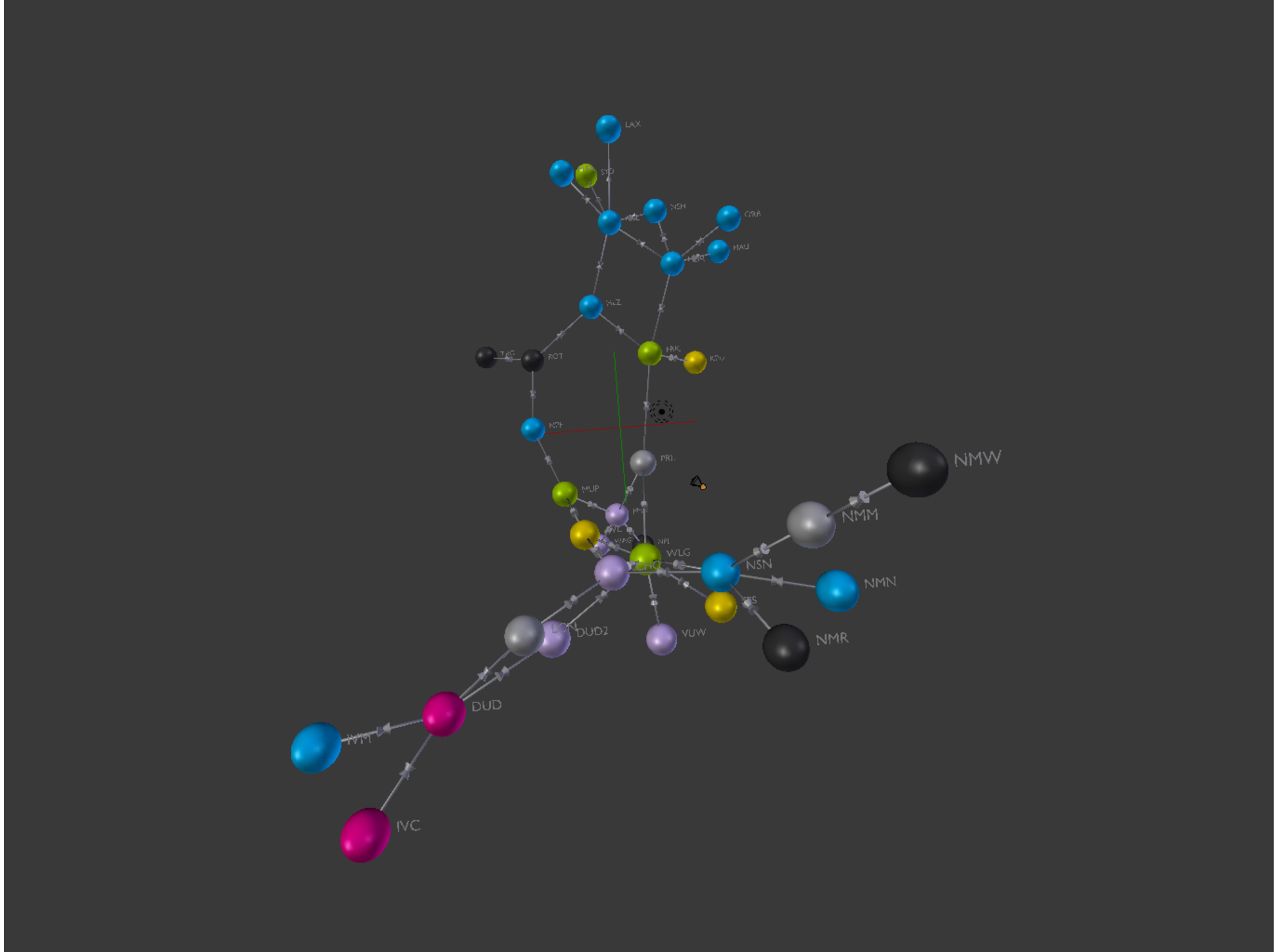
IVC

Invercargil, SIX, 50 Dee Street, Invercargil

and28

parsed	index	state	use	description
✔	512	active	member	ge-1/0/0
✔	522	active	backbone	ge-1/1/0
✔	530	active	member	ge-1/1/8
✔	531	active	member	ge-1/1/9
✔	521	active	outofband	ge-1/0/9

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PRL
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NMN
NMR
VUW
DUD2
DUD
IVC

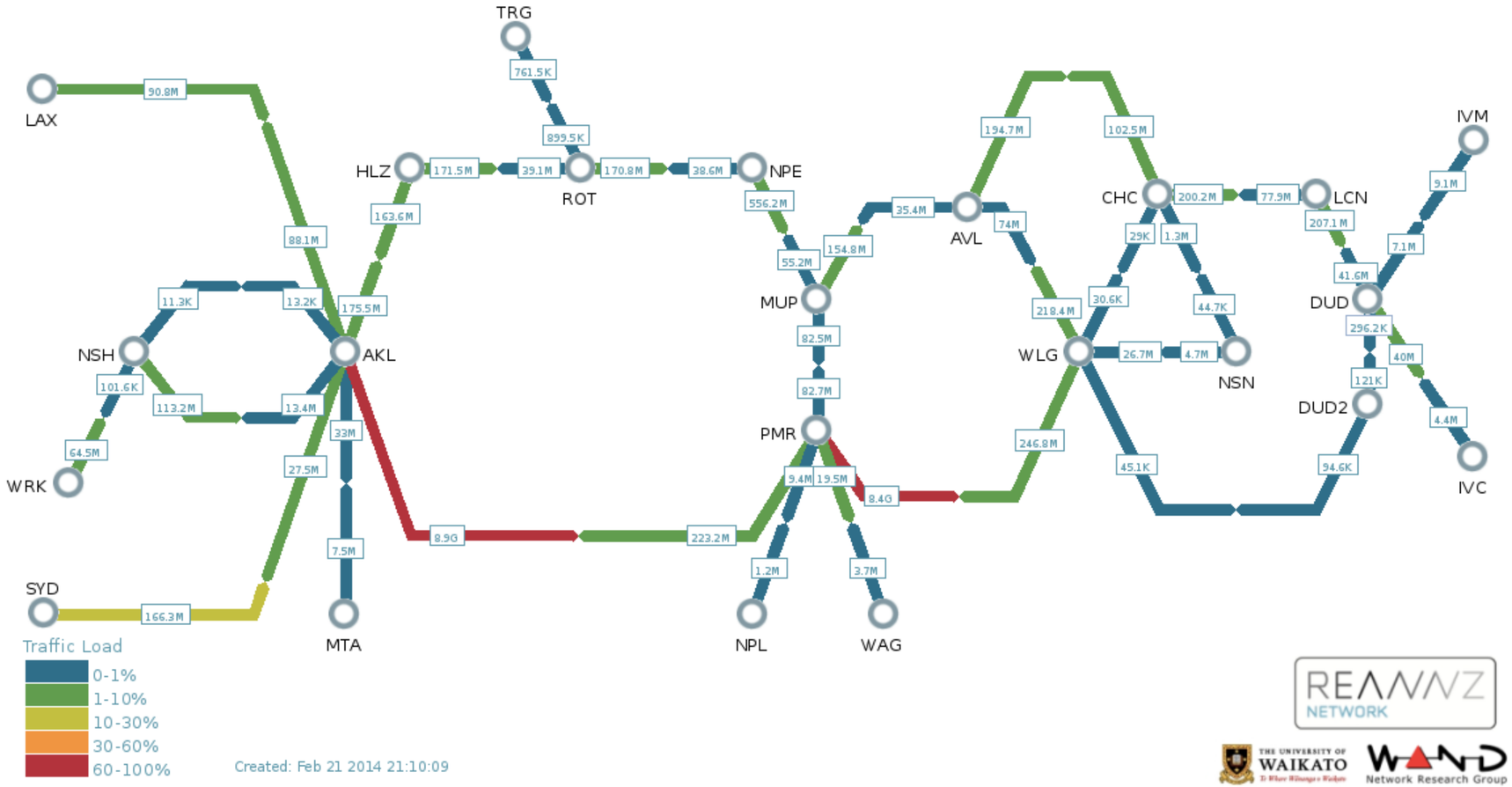
Southland to Warkworth

Packets from the Extremities

- Currently:
  - dual 10 Gbps paths from Dunedin (via Auckland) to Warkworth
  - 1 GBps from Dunedin to Invercargill
  - 10 Gbps path from Warkworth into Auckland
- The backbone is designed to balance capacity along one of the two sides (xref weathermap diagram next)
- End node capacity is still available (xref RRD charts next)

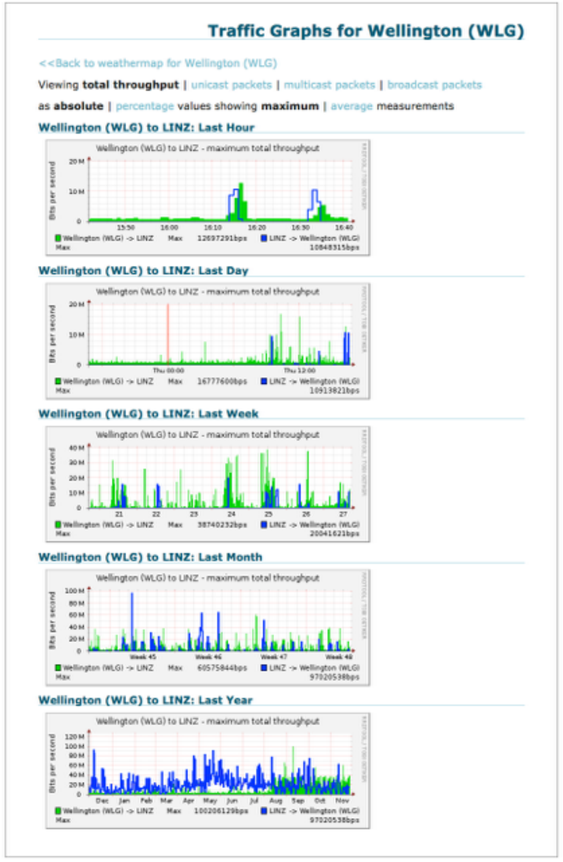
Southland to Warkworth

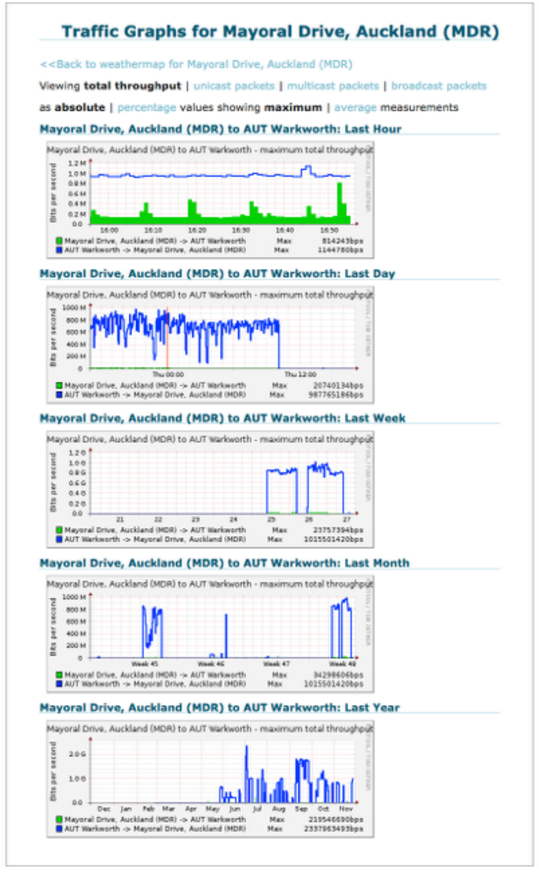
REANNZ Weathermap

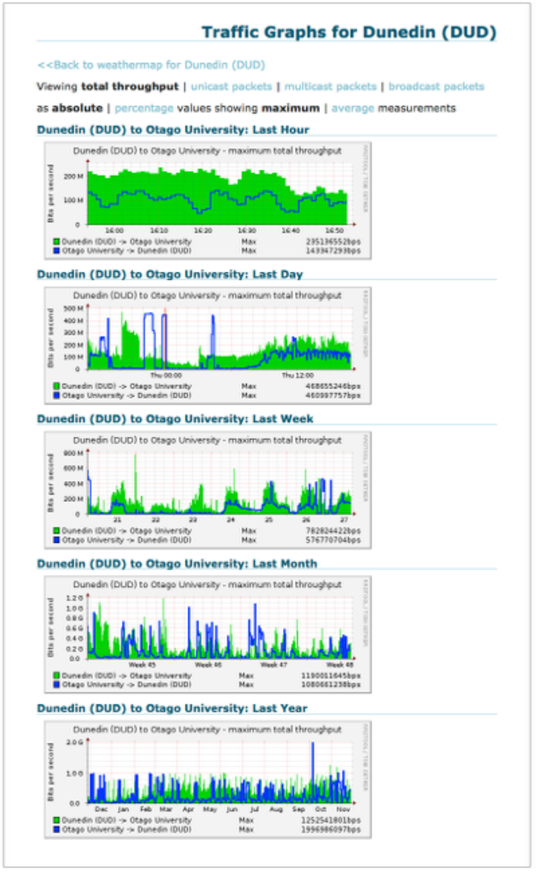


Southland to Warkworth

RRD Graphs (traffic)







Southland to Warkworth

Additional national support

- GEOnet: providing diversity connections
- Network Engineering: workshops, best practices, consulting on how to better move digital bits from point A →B
- Future considerations: which is different than planning, specifically around distributed clock timing
- 8K display (and minor cluster): we have a big visualisation wall that might be of interest. Talk to me if you have big data that you would like to visualise

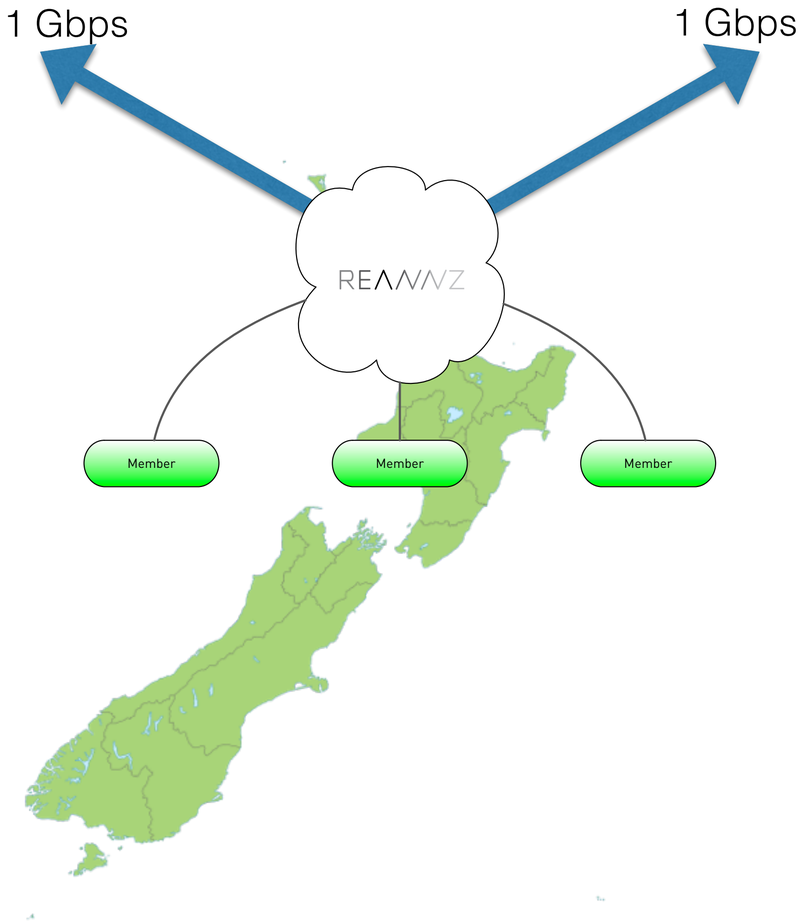
International Capacity

Exporting the bits

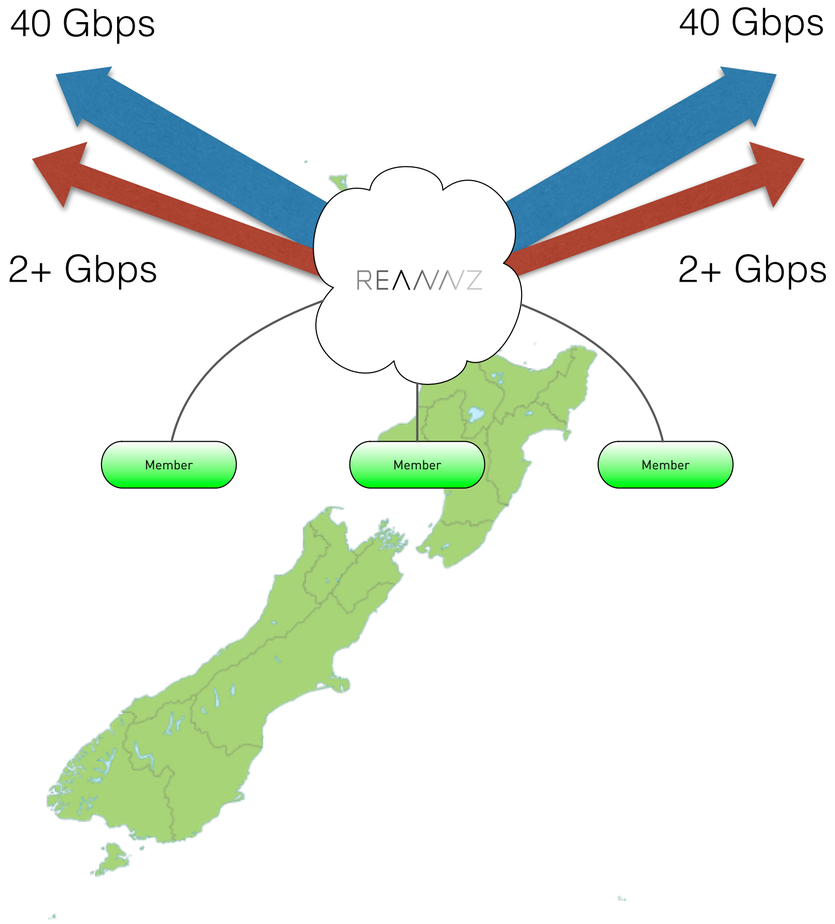
- REANNZ has 4+Gbps of commodity internet capacity (videos of cats)
- REANZ provides a dedicated 40 Gbps Science Wave supporting our R&E members research
  - There are independent connections to Australia and the United States
  - Specifically: Cooperation with other dishes and the ability to bring that data back to our NZ correlation pipeline

International Capacity

40 Gbps Science Wave



before Sept this year



Now (hint 40+Gbps is better)

Vision

the Network…

- is integral: it is no longer a byproduct but considered in the proposal stages as part of the data acquisition system.
- extends the lab: it removes the tyranny of distance and enables collaboration thus increasing the sources of primary data.
- requires collaboration: researcher, IT staff, department chair, VC Research, president must all cooperate with one another **and then** the rest of the community—this is how *NETWORKS* operate.
- enables: to be a university/department/researcher of global significance, you have to work with your international peers with the same class of tools. Increasingly, world-class research will be synonymous with world-class access.

Vision

Supporting Exploration

- Distributed Clock
  - Hydrogen Maser && Fiber Cable
  - ability to distribute maser class clock signal over hundreds of kilometres
  - orders of magnitude more accuracy vs GPS
  - Applicability to entirely new classes of activities: science, finance, construction, etc.
- Ability to cross reference other communities
  - network compression, BoD, direct connectivity (“second cable”), opportunistic capacity,…

Vision

REANNZ's vision

- We have built a world class network
- We are collaborating with the world's best networks and their engineers
- We provide researchers with enviable international capacity
- We are ready for your science

…captive audience…

eRNZ 2015

- eResearcch New Zealand 2015

  23-25 March 2015

  Rydges Hotel, Queenstown, NZ

  http://ernz2015.eresearch.org.nz/

- New co-hosting arrangement. Focusing on demonstrations and use of infrastructure.

- Call for proposals is open, submit a talk!

- …I am on the program committee, I have to pitch it.

Questions?

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