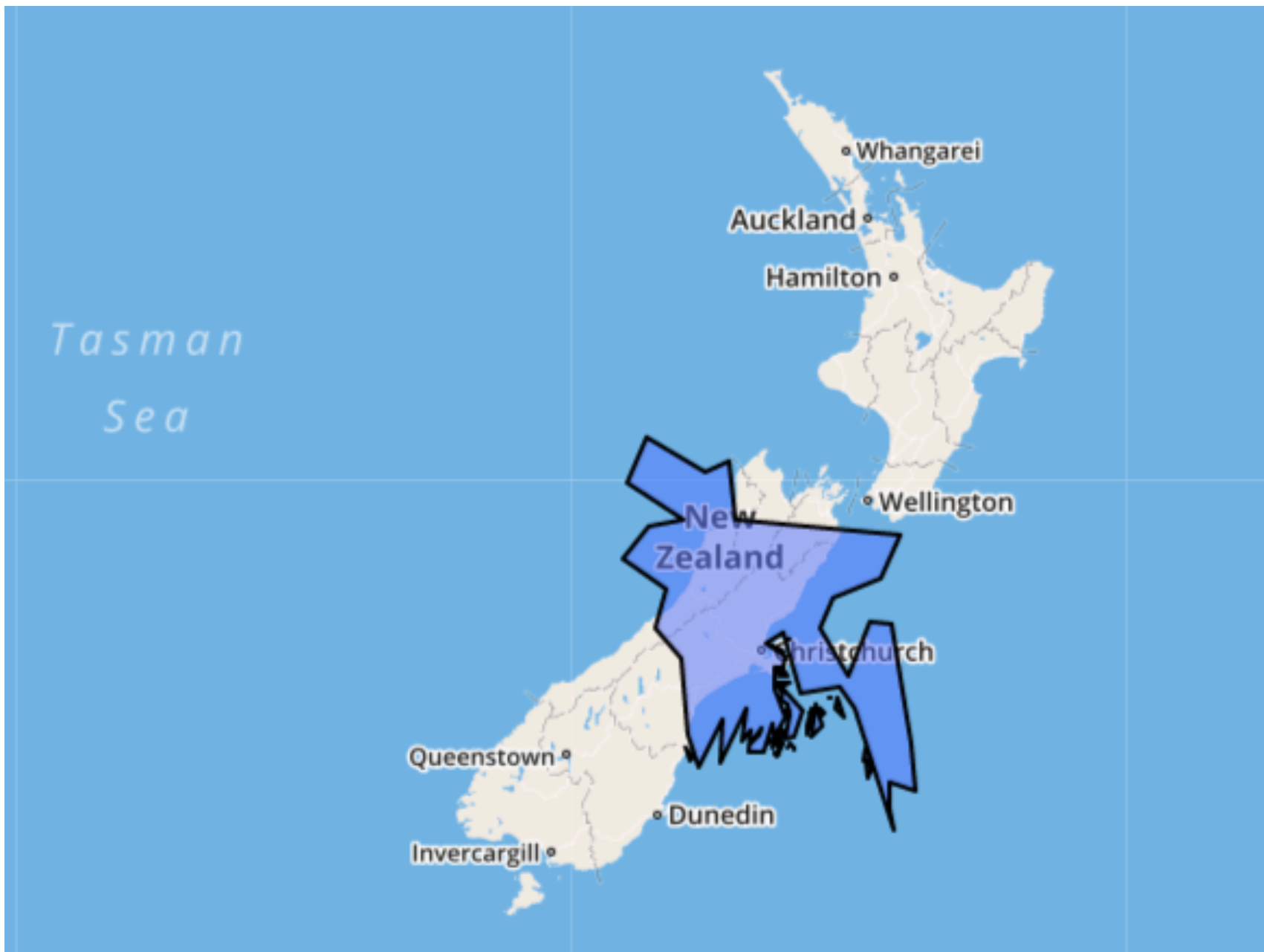REANNZ

First....some background about REANNZ and our members

New Zealand was the last major habitable land area to be settled – by Polynesians around 700 years ago

BD=160m people
NZ=4.7m people

NZ approx. 2x
the size of BD

# RESEARCH & EDUCATION ADVANCED NETWORK NZ LTD (REANNZ)



Owned by Government, we report to:
- Minister of Science and Innovation
- Minister of Finance



MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI



- Limited Liability Company/not for profit/we can't borrow, so have to save for re-investment
- Board of Directors appointed by the Govt
- Govt funding of USD$2M p.a (note = that's only 16% of total revenues)
- Balance comes from our members and services
- 27 highly skilled (i.e. expensive) staff

# REANNZ's target sectors
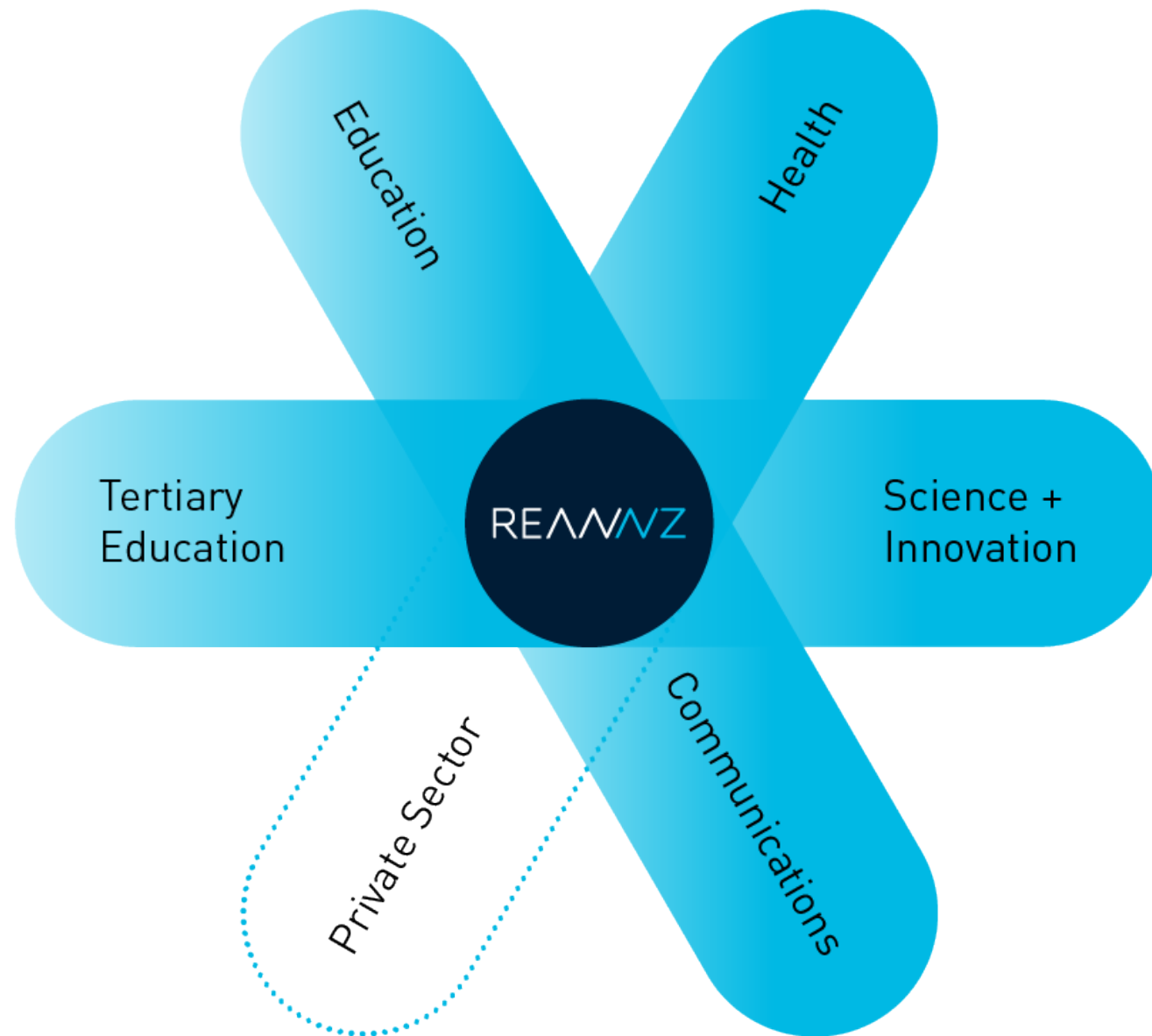
# REANNZ core members

## 8 Universities



## 7 Crown Research Institutes

# 8 Polytechnics – vocational training



# Independent research organisations/govt depts etc

# GLOBAL RESEARCH AND EDUCATION COMMUNITY /



NorduNet
Europe/Géant
UK/Jisc
Netherlands/SURFnet
CERN

Jisc
NORDUnet
GÉANT
Runet
Canarie
AMSTERDAM
LONDON
USA
SEATTLE
PORTLAND
INTERNET2
PALO ALTO
SAN JOSE
LOS ANGELES
NEW YORK
TEIN
BEIJING
SEOUL
TOKYO
LAHORE
THIMPHU
HONG KONG
TAIPEI
HONOLULU
MAUNA LANI
MIAMI
THUWAL
MUMBAI
DHAKA
HANOI
MANILA
GUAM
BANGKOK
COLOMBO
KUALA LUMPUR
SINGAPORE
UbuntuNet Alliance
BANDUNG
RedCLARA
SAO PAULO
SANTIAGO
BUENOS AIRES
CAPE TOWN
SUVA
aarnet
SYDNEY
PERTH
AUCKLAND
HAWAIKI CABLE

REANNZ is part of a global network of NRENs,
connecting researchers across the globe
to share information and ideas.

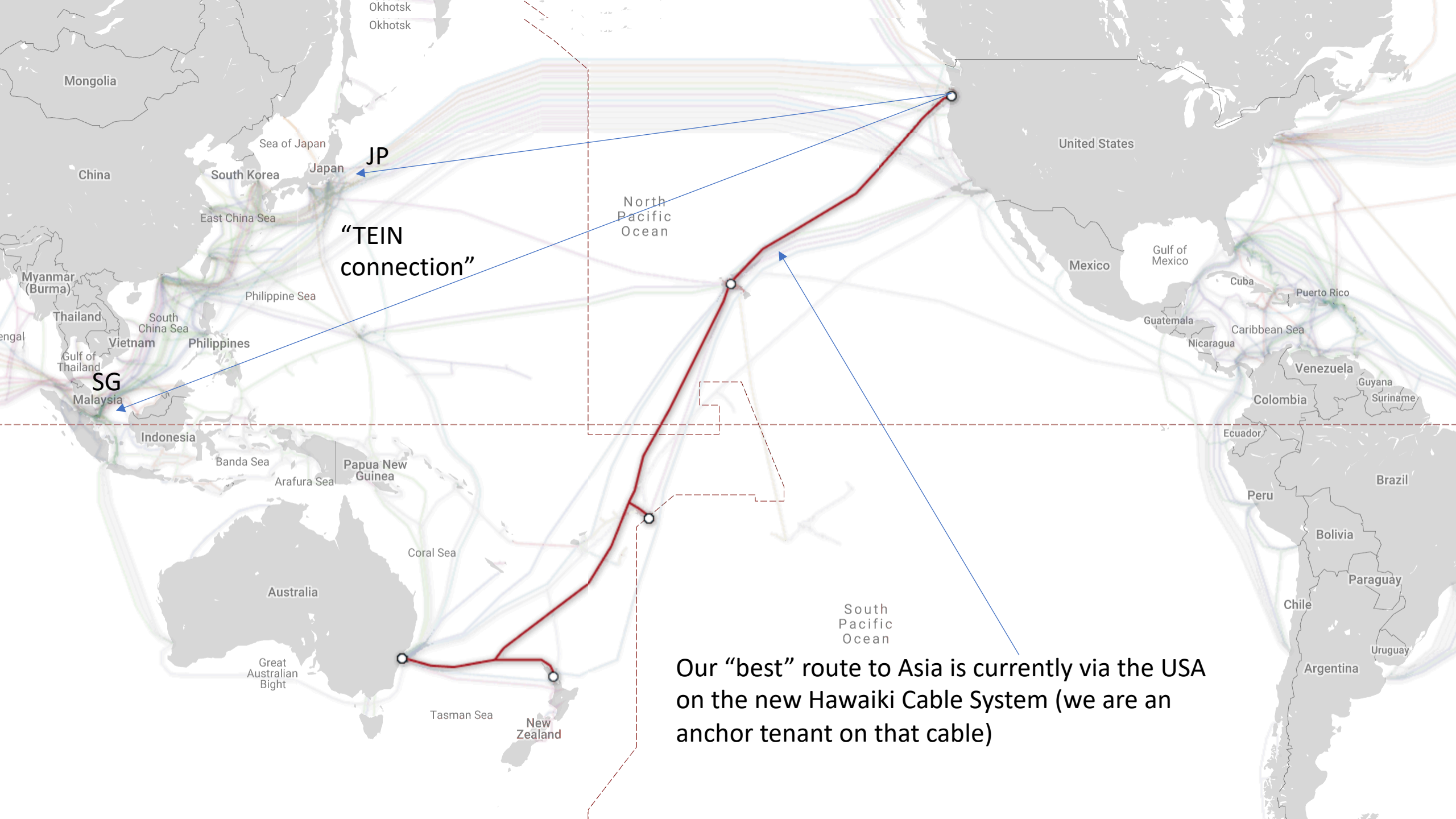These lines are indicative only and do not reflect exact routes.

REANNZ

I made NZ bigger so you can see it…☺

# Our International Network

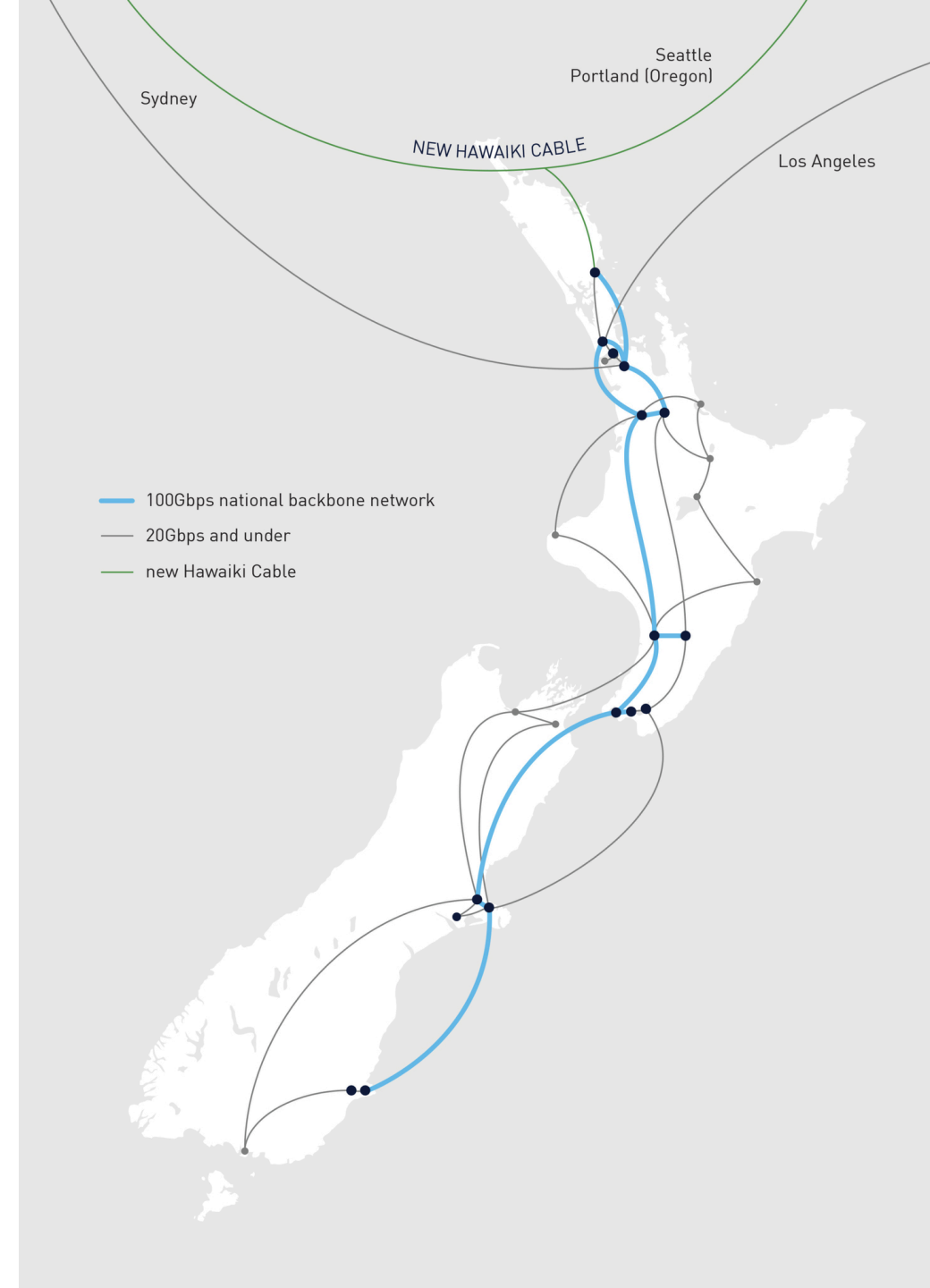- Long way from just about anywhere, so international connectivity is expensive – monopoly provider until 2018



3hrs 15mins to our closest neighbour

JP

"TEIN connection"

SG

Our "best" route to Asia is currently via the USA on the new Hawaiki Cable System (we are an anchor tenant on that cable)
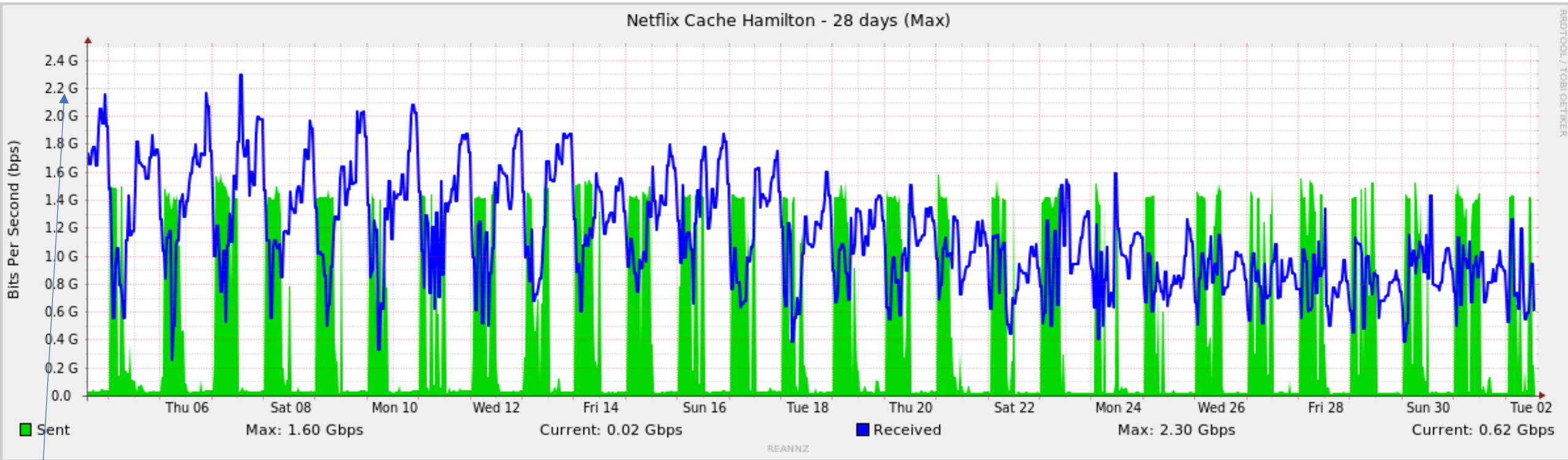
# Domestic network

- Upgraded core links supporting 100G on backbone links
- Domestic caches
      2x Akamai
      1x Facebook
      1x Google
      1x Netflix
- Monitoring upgrades

Achieved zero packet loss across our network, ie, <0.0000001% loss over 58 trillion packets.

# Netflix Traffic – last 28 days



Netflix Cache Hamilton - 28 days (Max)

| | |
|---|---|
| ■ Sent  Max: 1.60 Gbps  Current: 0.02 Gbps | ■ Received  Max: 2.30 Gbps  Current: 0.62 Gbps |

Up to 2.2gb/sec of international internet traffic

## Saving money for members (especially universities)
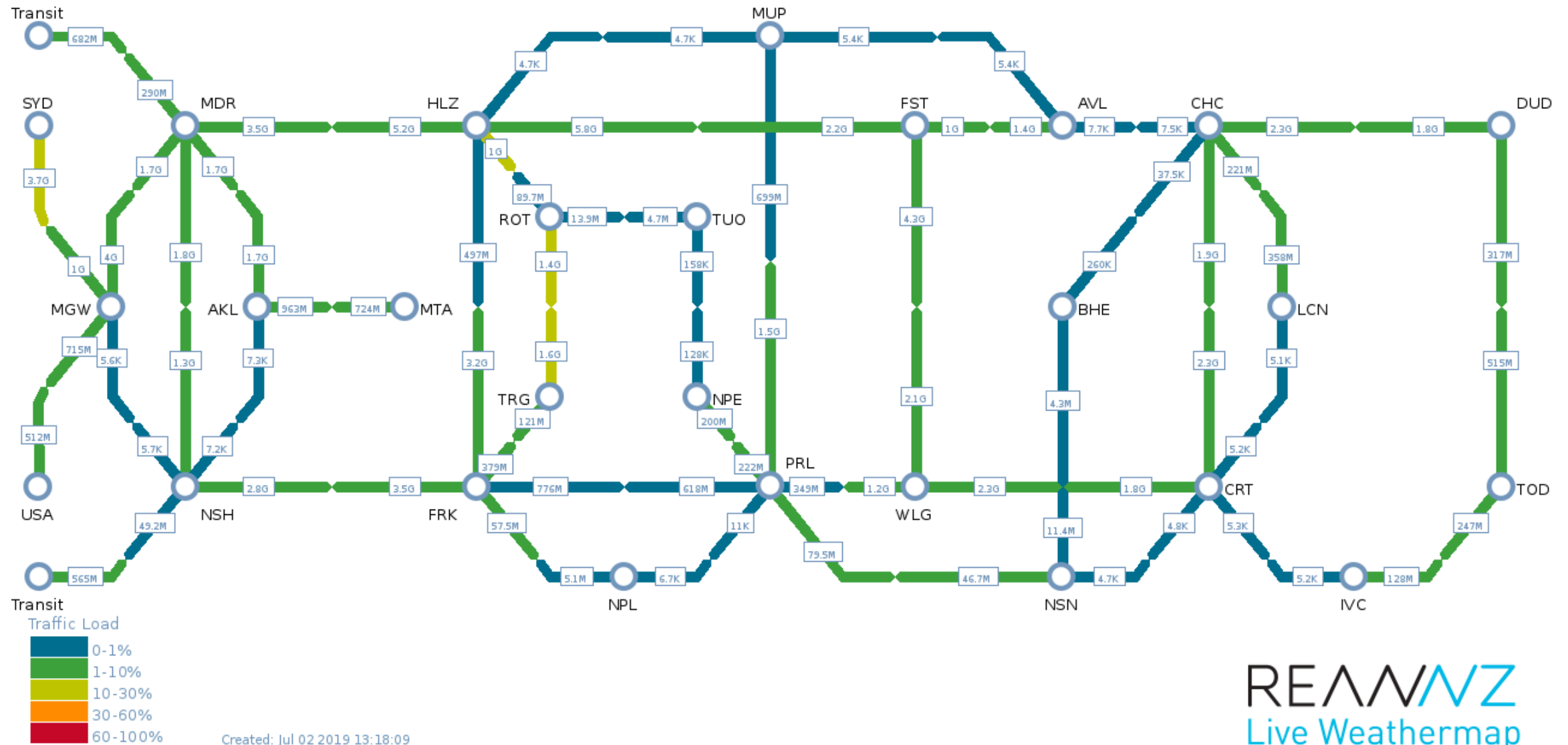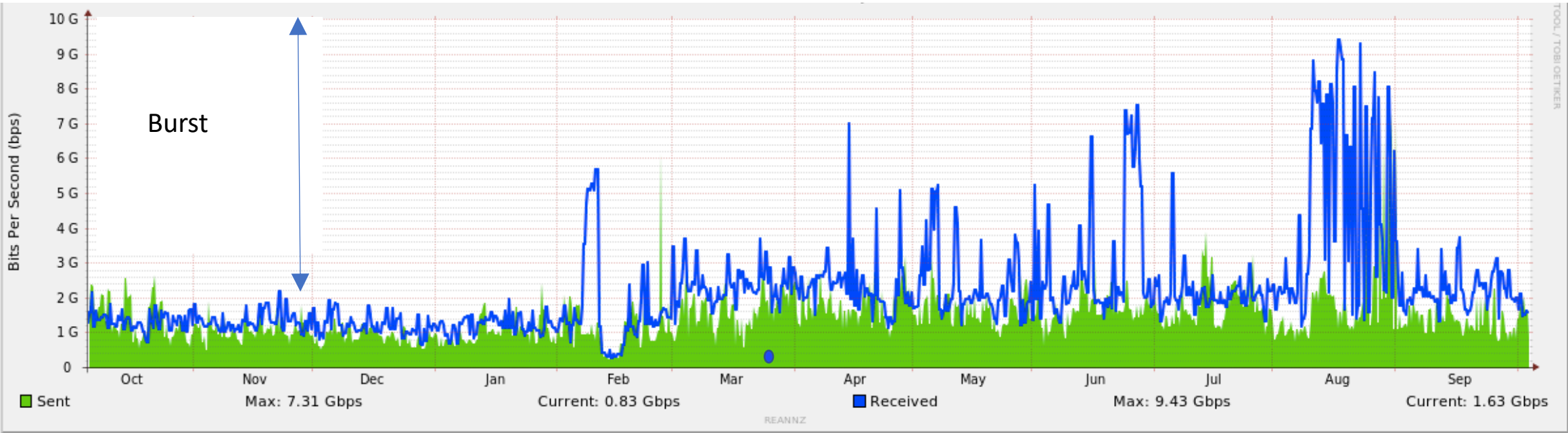
# Why do we exist?

- Increases in productivity

- Increases in capability
  (types of work simply not
  otherwise able to be done)

- International competitiveness

- Attraction of global talent to NZ

A file transfer that took 72 hours on commercial ISP →
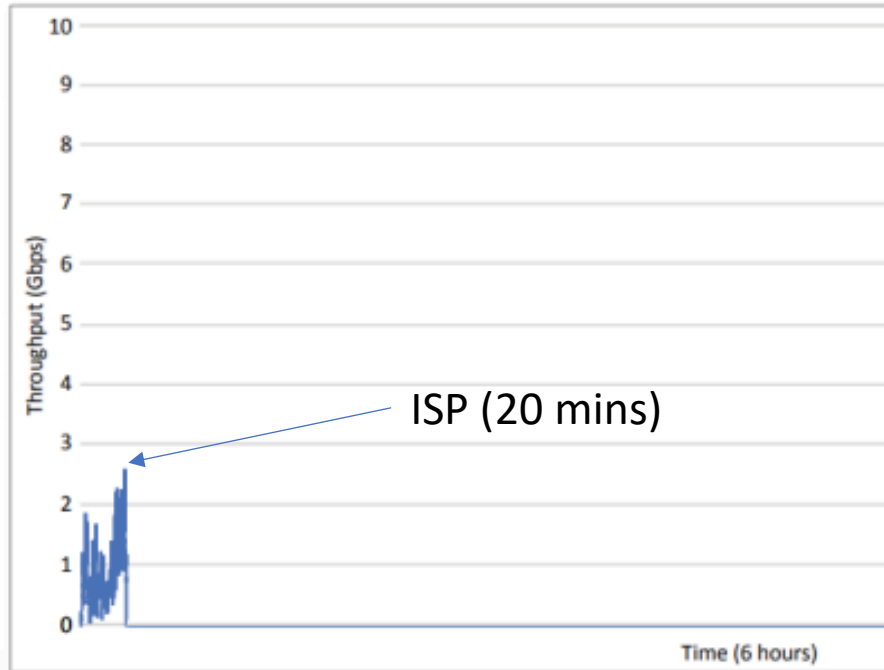55 mins on REANNZ

# Burst performance is our "competitive edge"

size of the member's connection



Burst

12 months of traffic flows

# Sustained transfer NZ-Europe over 6 hours



ISP (20 mins)

REANNZ
(6 hours)

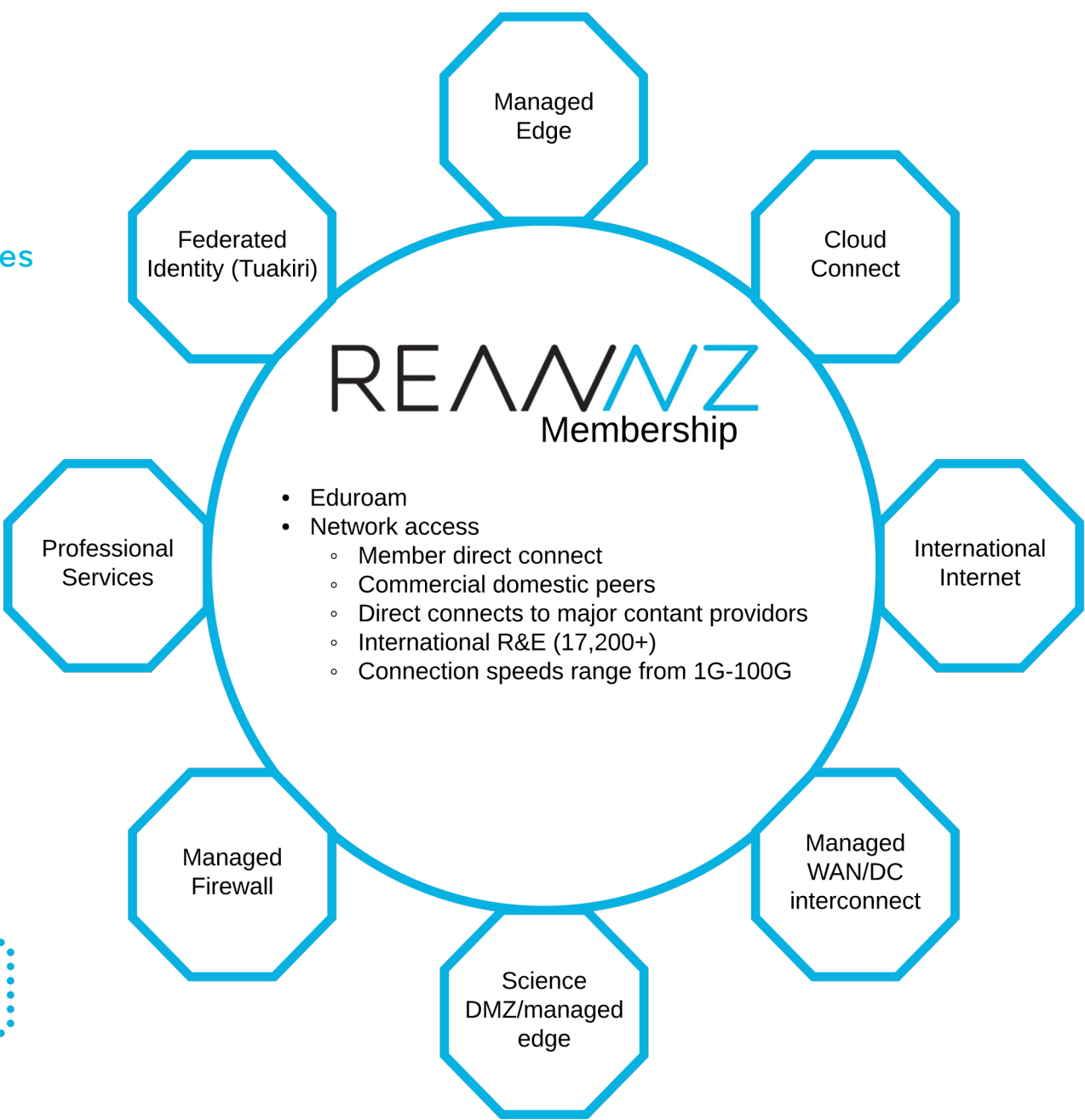Commercial ISP: Data transfer rates only reached **2.7 Gbps** before failing entirely.
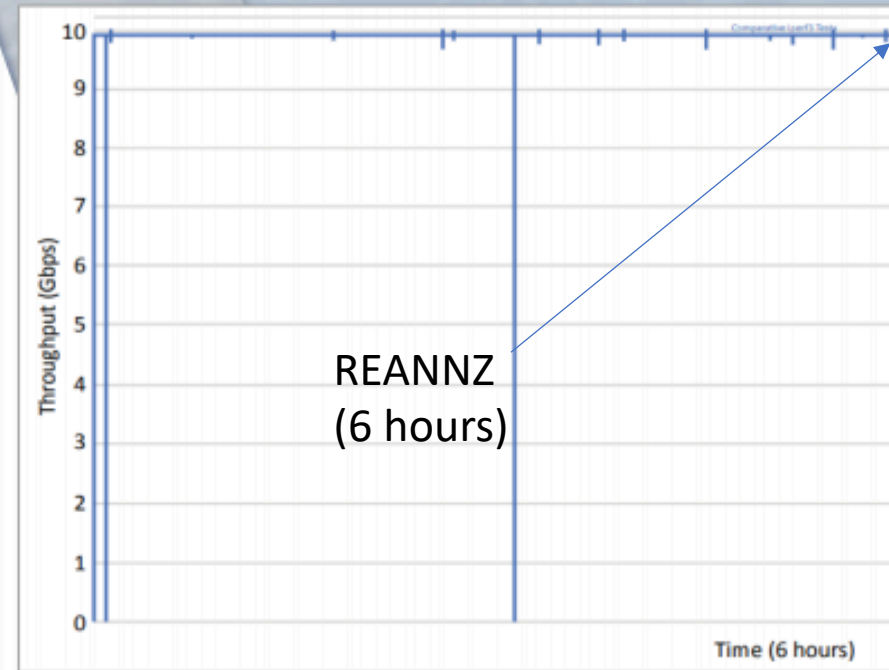
REANNZ: Data transfer rate reached **9.98Gbps** for 6 hours and completed.

# Services we offer our members:

**Problem:**

the commercial market in NZ also offers many of these services

**We compete on:**

a) the best service
b) having a product designed for R&E
c) "knowing our members"

Future member services being trialed

FAUCET SDN devleopment

Custom networking for network research applications

Security audits?

Cloud storage?

Access to other R&E partners

Managed Edge

Federated Identity (Tuakiri)

Cloud Connect

REANNZ Membership

- Eduroam
- Network access
  ◦ Member direct connect
  ◦ Commercial domestic peers
  ◦ Direct connects to major contant providors
  ◦ International R&E (17,200+)
  ◦ Connection speeds range from 1G-100G

Professional Services

International Internet

Managed Firewall

Managed WAN/DC interconnect

Science DMZ/managed edge
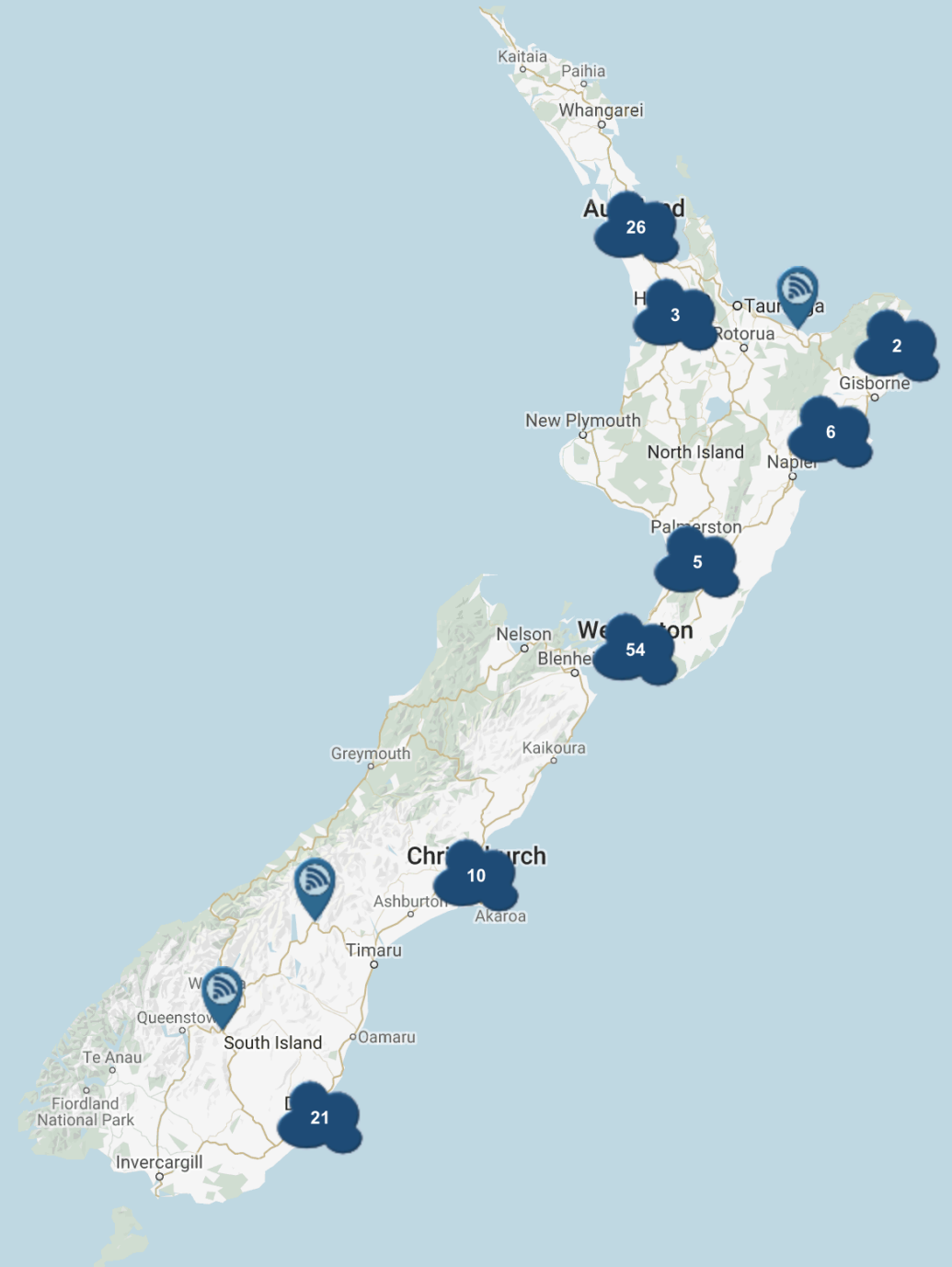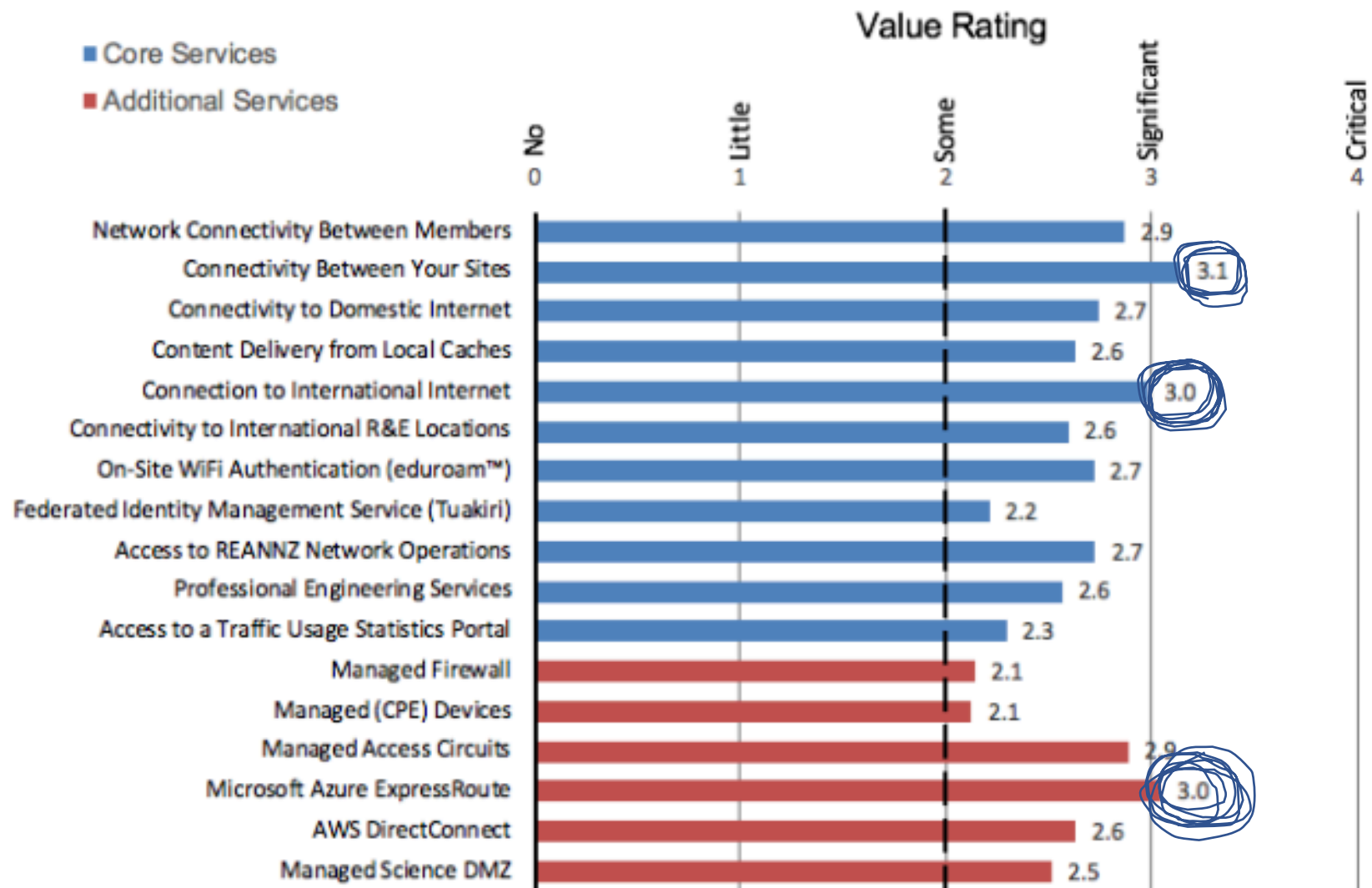
# Eduroam (of course!)

- 100+ countries
- Tens of thousands of hotspots around the world

Which services do they tell us they value the most?

# Average Value Rating for Service

**Value Rating**



| | No 0 | Little 1 | Some 2 | Significant 3 | Critical 4 |
|---|---|---|---|---|---|

- Core Services
- Additional Services

| Service | Rating |
|---|---|
| Network Connectivity Between Members | 2.9 |
| Connectivity Between Your Sites | 3.1 |
| Connectivity to Domestic Internet | 2.7 |
| Content Delivery from Local Caches | 2.6 |
| Connection to International Internet | 3.0 |
| Connectivity to International R&E Locations | 2.6 |
| On-Site WiFi Authentication (eduroam™) | 2.7 |
| Federated Identity Management Service (Tuakiri) | 2.2 |
| Access to REANNZ Network Operations | 2.7 |
| Professional Engineering Services | 2.6 |
| Access to a Traffic Usage Statistics Portal | 2.3 |
| Managed Firewall | 2.1 |
| Managed (CPE) Devices | 2.1 |
| Managed Access Circuits | 2.9 |
| Microsoft Azure ExpressRoute | 3.0 |
| AWS DirectConnect | 2.6 |
| Managed Science DMZ | 2.5 |

# 61% increase in international R&E traffic in the last 18 months



Research & education traffic growth
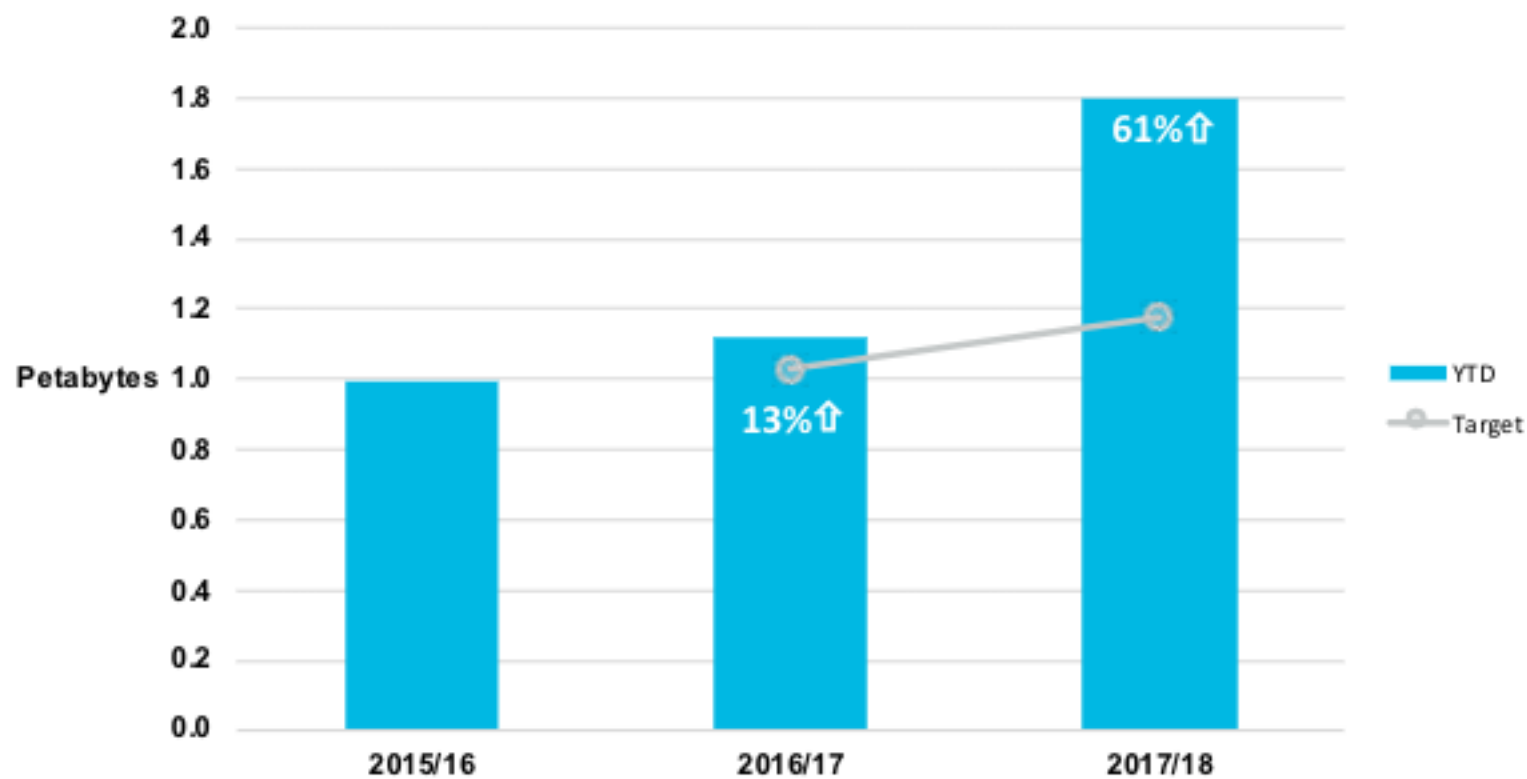
# Current financial challenges we face

a) 25% government funding reduction 2 years ago

b) competitive telco market in NZ means connection prices are dropping rapidly (our high value services aren't cheaper)

c) high end data transfers still only 10-15% of traffic

d) some universities say regular ISP is good enough for 90% of users (probably true)

e) small number of universities/long distances/low population in NZ means few economies of scale available

# Solutions?

a) remain focussed on what our members want

b) ongoing education for policy makers/govt officials

c) drive traffic growth to show value

d) focus on successful members and their stories

e) we can't change our physical location – if NZ wants to be part of the global R&E system then a suitable level of public good funding is required – NRENs are non-profit organisations for a reason..☺

f) don't try to compete with commercial ISPs – that's a race to the bottom!

# THANKYOU

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"enabling New Zealand's researchers, educators and innovators to thrive in a data-intensive and digitally advanced world"