

Ruru: Real-time TCP latency monitoring

REANNZ

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SCONE Meeting – Glasgow – 12 January

About REANNZ

- National Research and Education Network (NREN) of New Zealand
- About 30 people based in Wellington, New Zealand
- One of the most innovative NRENs in the world
 - Well respected in the NREN community
- As of September 2015, 86 organizations at 66 sites across New Zealand had connections to REANNZ.





- REANNZ POP
- REANNZ 40Gbps INTERNAT
- REANNZ NATIONAL NETWORK
- ACCESS TO TEIN NETWORK
- OTHER R&E POP
- OTHER R&E NETWORK

About the name

- Ruru is an owl in NZ



2014 – moving forward

- 2014-: the years of software-defined networking
 - New paradigms, tools with wide **vendor / operator support**
- Software switching is everywhere
 - OvS, BESS, BPFabric, Lagopus, ...
- Dataplane programming
 - P4
 - Intel Data Plane development Kit
 - Available for all Intel network cards
 - Other vendors have also joined

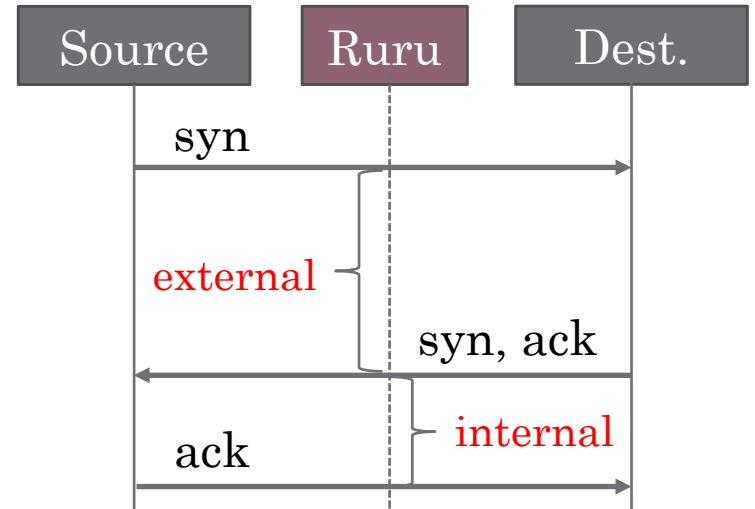


What does Ruru do

- We analyse real user's traffic, not generated traffic
- We are measuring **actual, accurate** end-to-end latency
 - What we see is exactly what a user experiences
- Ruru reports in real-time
- It is using today's cutting-edge technologies
 - Intel DPDK – high speed packet processing
 - Zero MQ – zero copy socket communication
 - Influx DB – time series data storage
 - WebGL – high-performance graphics library in a browser

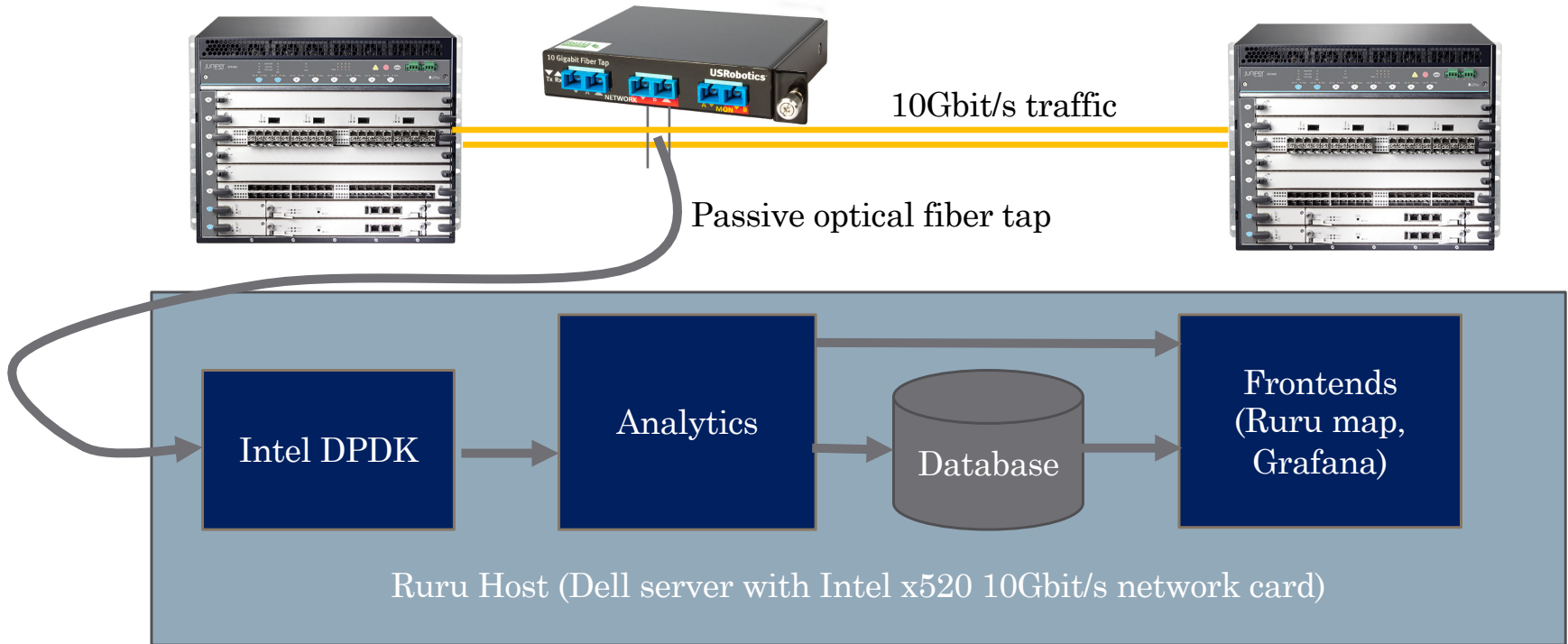
Measuring latency

- Round-trip time (RTT)
 - In telecommunications, the round-trip delay time (RTD) or round-trip time (RTT) is the length of time it takes for a signal to be sent plus the length of time it takes for an acknowledgment of that signal to be received.
- TCP only
 - Web browsing, e-mail, chat, etc.
 - But usually not media
- IPv4 only for now
 - Geolocation is only available for IPv4
- RTT guidelines
 - NZ to South Africa: 500ms
 - NZ to US: 130ms



End-to-end: internal + external

Architecture



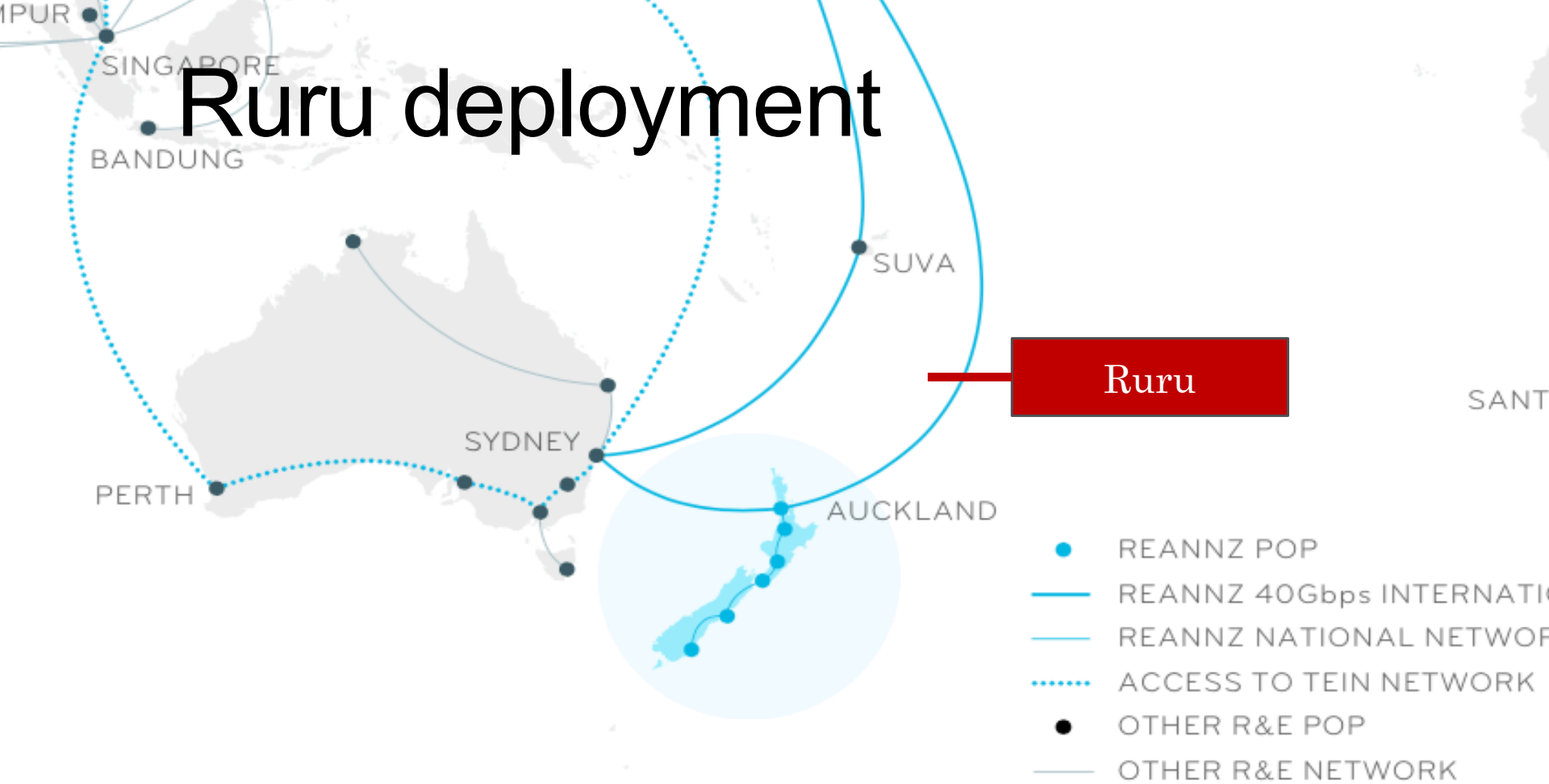
Applications

- Fault localisation for wide area networks
 - “Immediate notice if latency has started to increase to Facebook’s AS”
 - “Some of our users are getting higher latency compared to others”
- Fault localisation for internal network
 - “A set of our users are getting higher internal latency than others”
 - Could be router / switch issue for those clients
- Network planning / auditing
- Looks nice at NOC 😊

Success stories

- Using Ruru we found out two network issues that no other monitoring system found
- The “00:48 bug”
 - Increased latency to 4 sec at 00:48 every night for all connections
 - Turned out there was a firewall update that time
- Software switch issue has also been noticed by looking at the internal latency

Ruru deployment

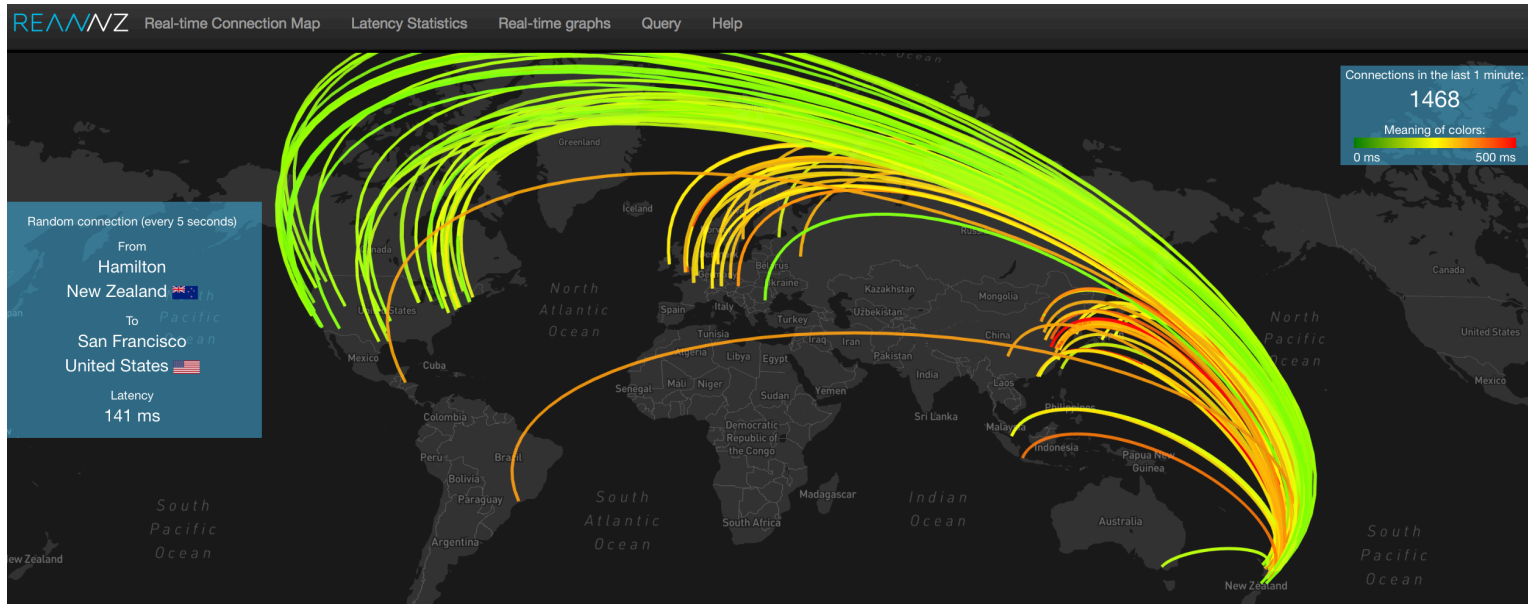


Data is still being collected

- Source / Destination
 - GPS coordinates
 - City
 - Country
 - ASN
 - AS name
- Latency (ms)
 - Internal
 - External

We could provide this data
for research purposes if required

Ruru map (live at NOC)



Thank you

Any questions?