

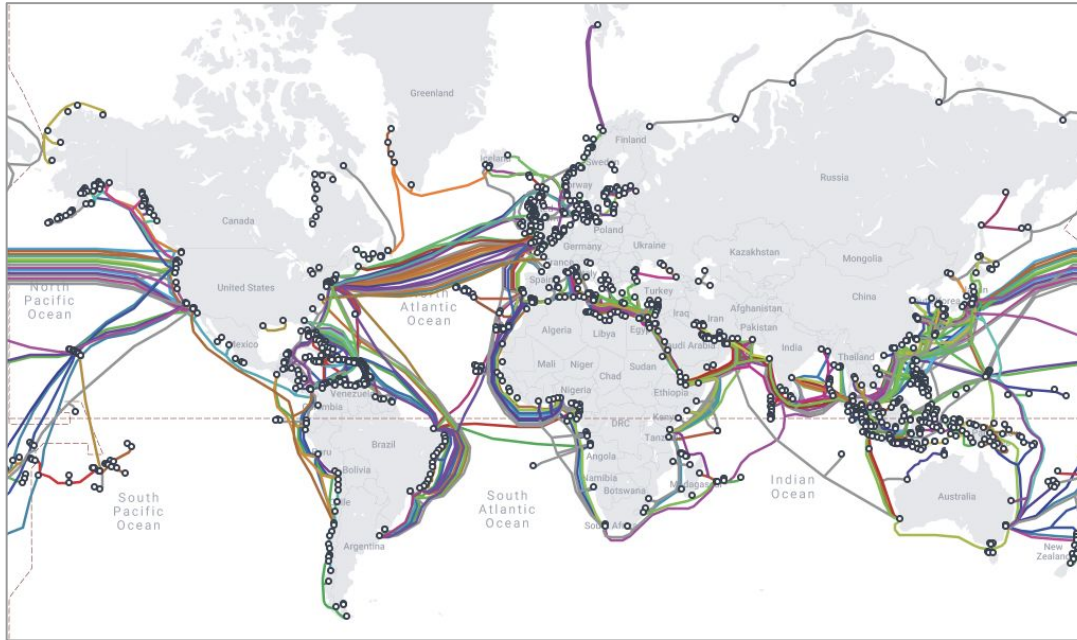
Inferring undersea cables links in traceroute data

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13/10/2021

Global mesh of submarine cables



Global submarine cable network (<https://www.submarinecablemap.com/>)

- 2021: 445 deployed cables.
- > 99% of the international traffic [1].
- Critical infrastructure for connectivity.

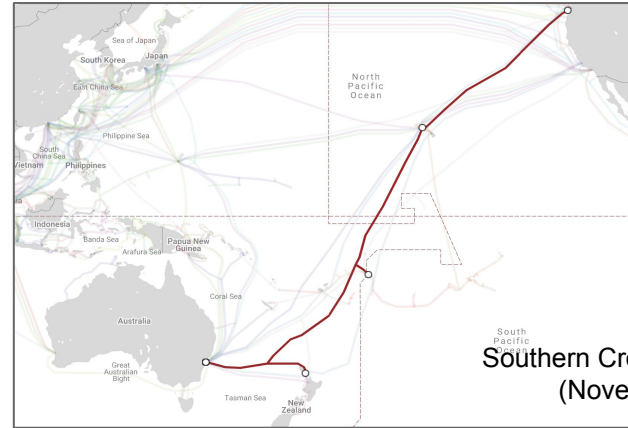
- *Goal: Develop an undersea cable IP link inferring methodology using public data.*

[1] Undersea Cables Transport 99 Percent of International Data
(<https://www.newsweek.com/undersea-cables-transport-99-percent-international-communications-319072>)

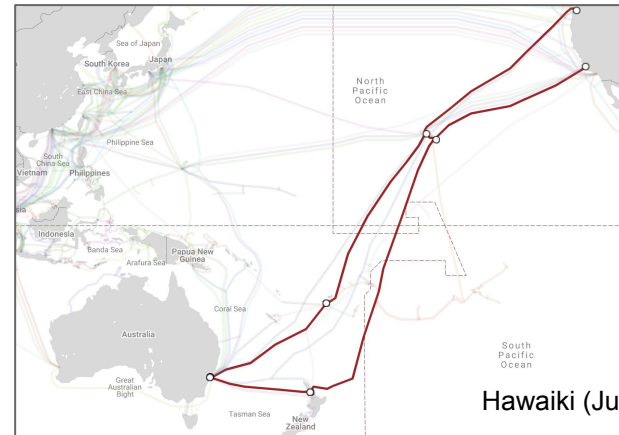
Inferring undersea cable links



*Tasman Global Access Cable
(March 2017)*



**Southern Cross Cable Network
(November 2000)**

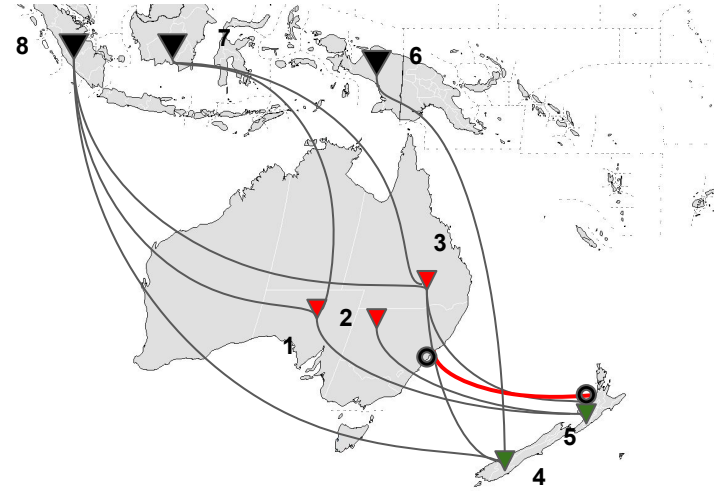
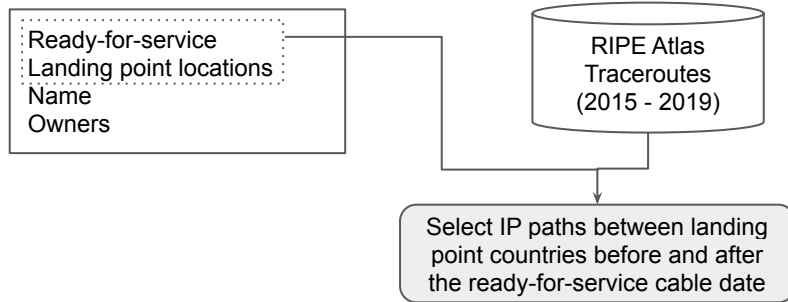


Hawaiiiki (July 2018)

Outline

- *Undersea cable IP link inferring approach*
- *IP link validation*
- *Lessons learned (Challenges)*

Inferring undersea cable links

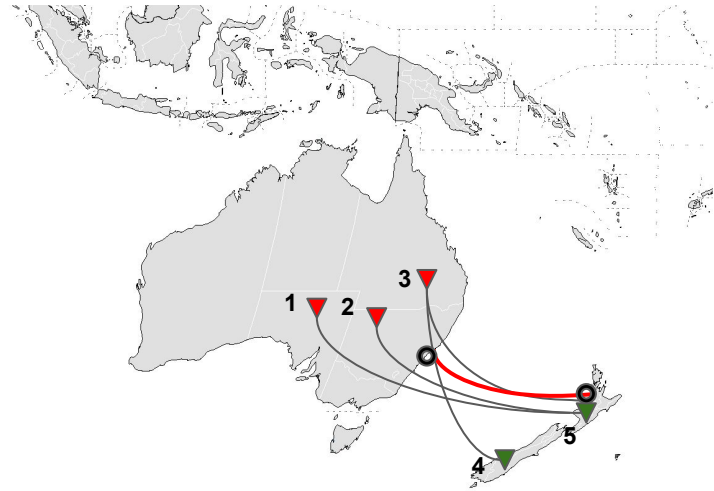
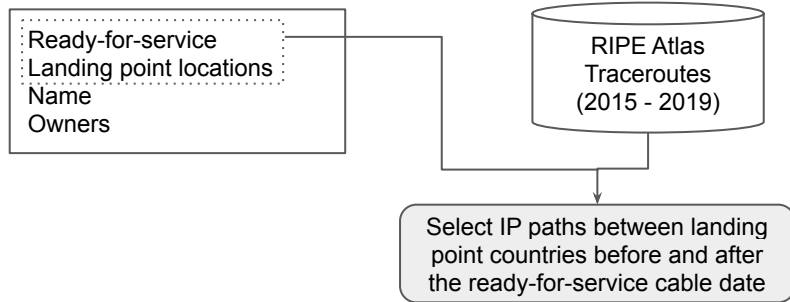


Tasman Global Access Cable:

Ready-for-service: March 2017

Landing points: Oxford Falls, Australia and Raglan, New Zealand

Inferring undersea cable links

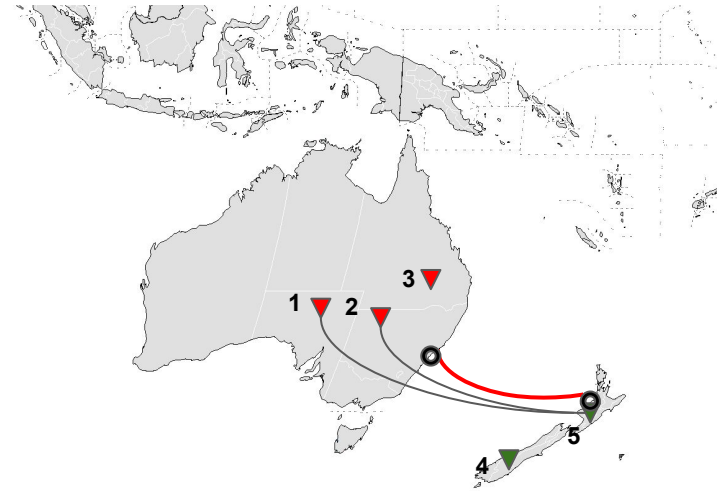
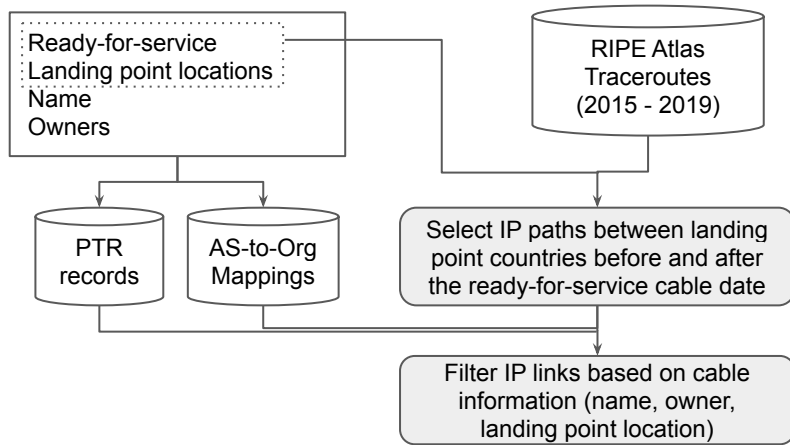


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Inferring undersea cable links



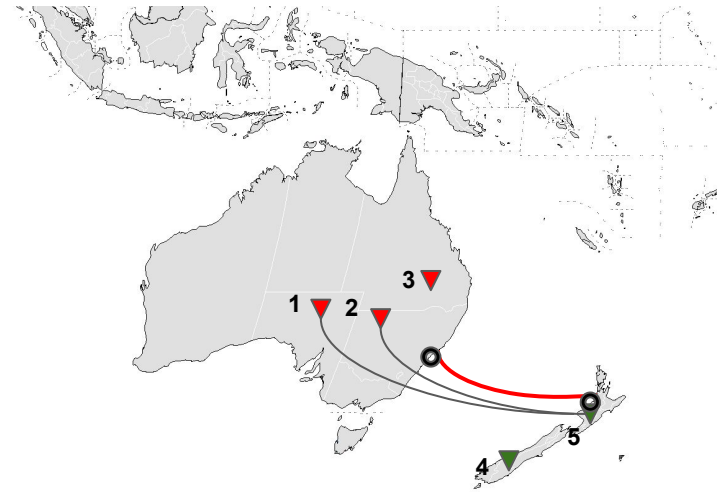
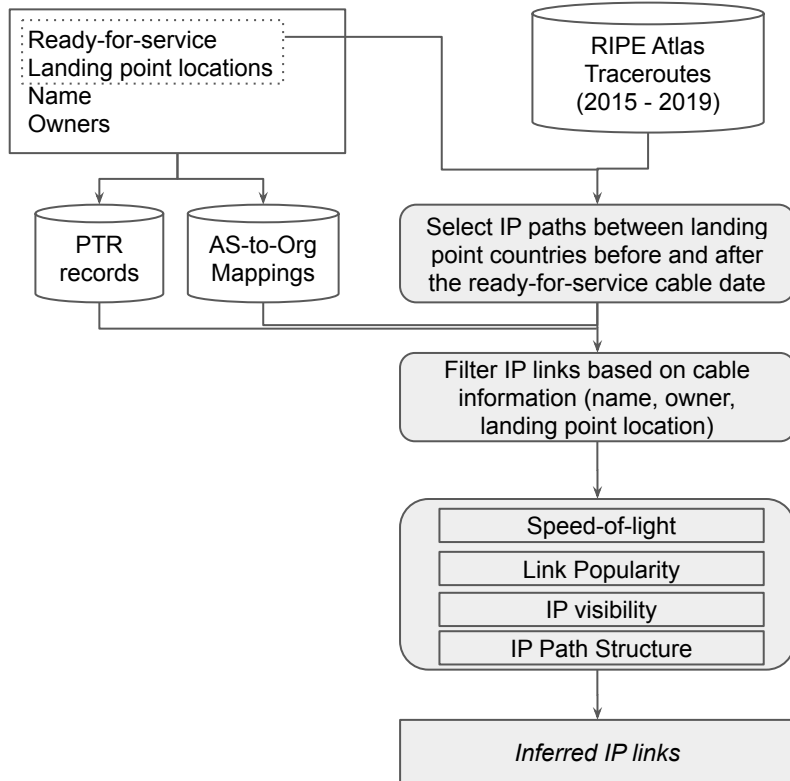
Tasman Global Access Cable:

Ready-for-service: March 2017

Landing points: Oxford Falls, Australia and Raglan, New Zealand

Owner: Spark New Zealand, **Telstra**, Vodafone

Inferring undersea cable links



Tasman Global Access Cable:

Ready-for-service: March 2017

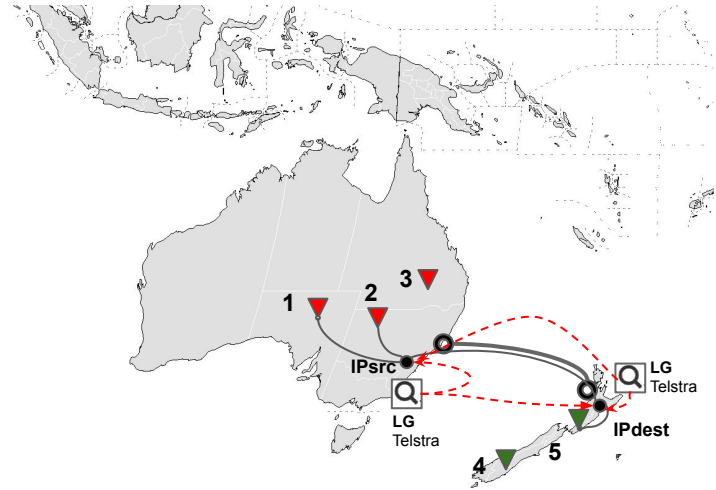
Landing points: Oxford Falls, Australia and Raglan, New Zealand

Owner: Spark New Zealand, Telstra, Vodafone

Length: 2,288 km

Undersea cable IP links validation: active measurements

- Probe IPs from the looking glasses located within the cable owner network and near the cable landing point.



70% of the classifiable links are valid

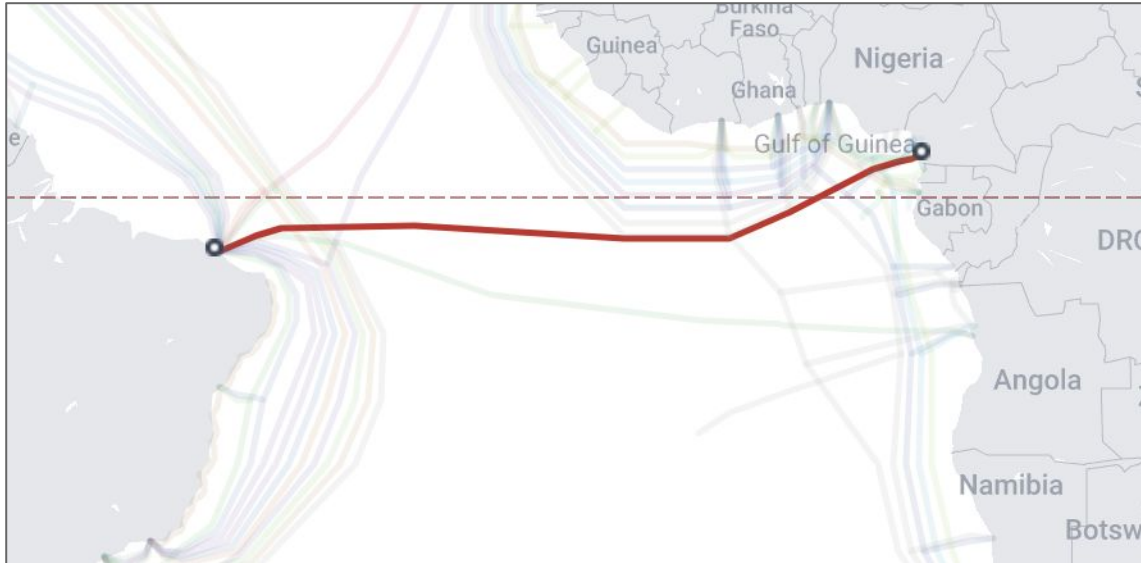
- Probe IPs from the looking glasses located within the cable owner network and near the cable landing point and

IP address → *valid*, *misclassified*, *unclassifiable*
(renumbered, unresponsive, no looking glass)

<i>IP src/dest</i>	<i>IP src/dest</i>	<i>IP link</i>
valid	valid	valid
valid	unresponsive	valid
misclassified	misclassified	misclassified
misclassified	valid	misclassified
misclassified	unresponsive	misclassified
unclassifiable	unclassifiable	unclassifiable
unclassifiable	valid	unclassifiable
unclassifiable	misclassified	unclassifiable

Lessons learned: Challenges in inferring undersea IP links

- Data coverage (Vantage points, Measurements)



South Atlantic Inter Link (SAIL) (2020)

RIPE probes:

- Brazil: 71
- Cameroon: 4

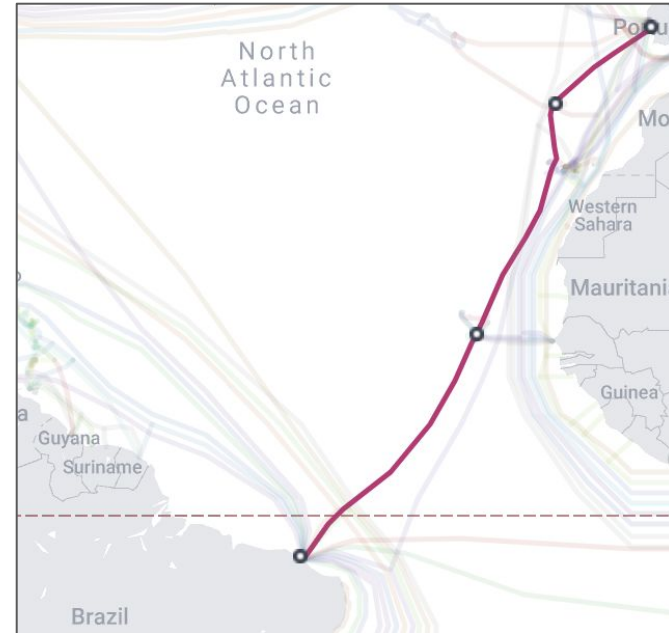
No traceroute data between the two countries.

Lessons learned: Challenges in inferring undersea IP links

- Third-party organizations that utilize the undersea cable



South America-1 (SAM-1) (March 2001)
Owner: Telxius



EllaLink (June 2021)
Owner: EllaLink