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At the intersection of DC and subsea trends

PTC – January 2022

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Geopolitical considerations impacting both cables and DC

Several cables have been reconfigured or designed to avoid the disputed waters of the South China Sea or to comply with FCC requests as the FCC will not grant licenses to cables connecting the US directly with Hong Kong or China.

- Permitting timeline for cables in the South China Sea in the order of 40 months with no sign of improvement.
- Repair times in HK SAR are getting longer.
- The attractiveness of HK as a landing point is diminished

Reconfigured cables:

- PLCN & HKA
- Bay to Bay Express renamed CAP-1
- Apricot

Designed from the start to avoid disputed waters of the South China Sea:

- Echo
- Bifrost

Created opportunities for new entrants: Hawaiki Nui

Increased incentive to build from Singapore going west: IAX, SING, MIST, SMW6

Territorial claims in the South China Sea

Source: Wikipedia

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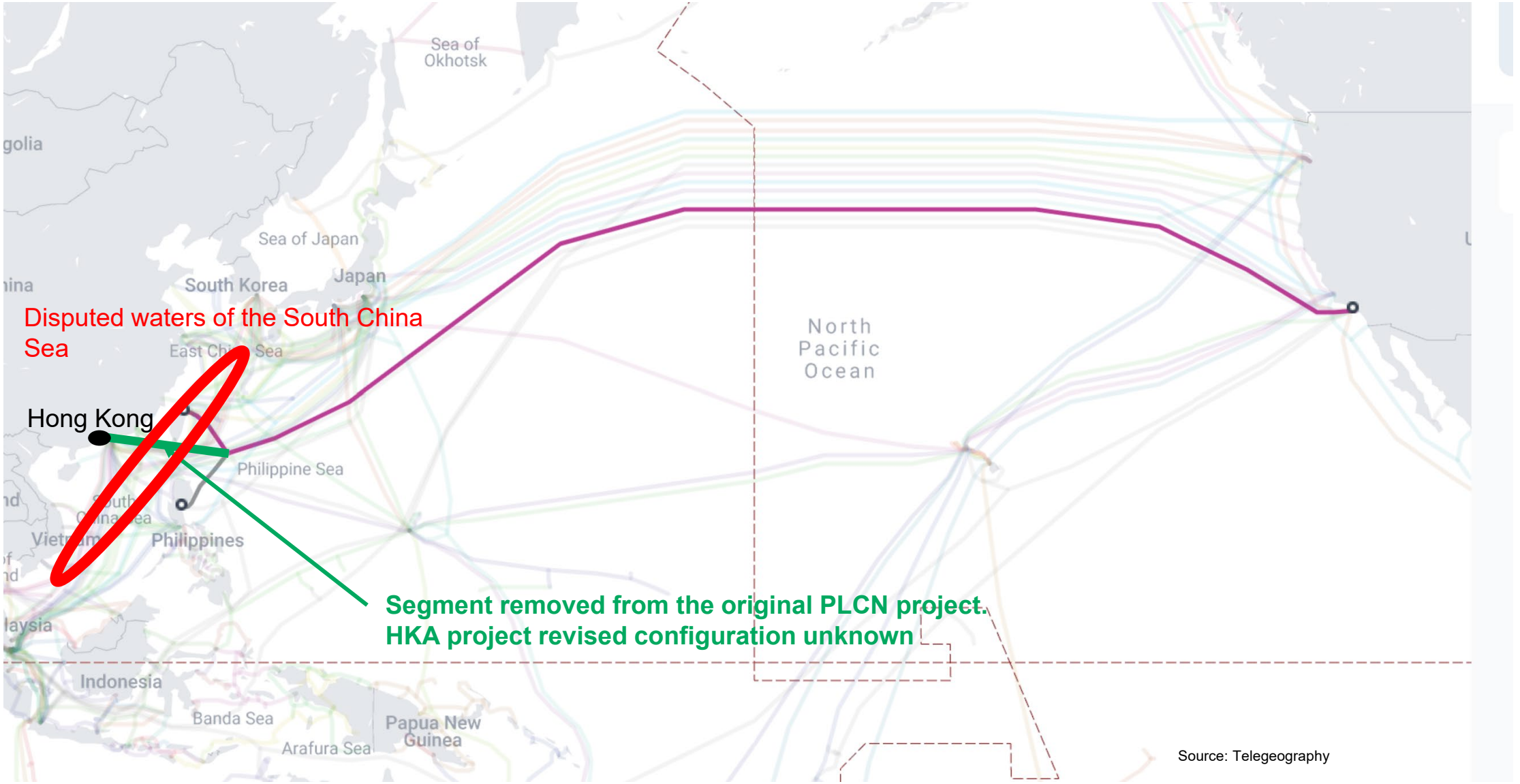
PLCN & HKA share similar routes



Source: Telegeography

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Bay to Bay Express original route

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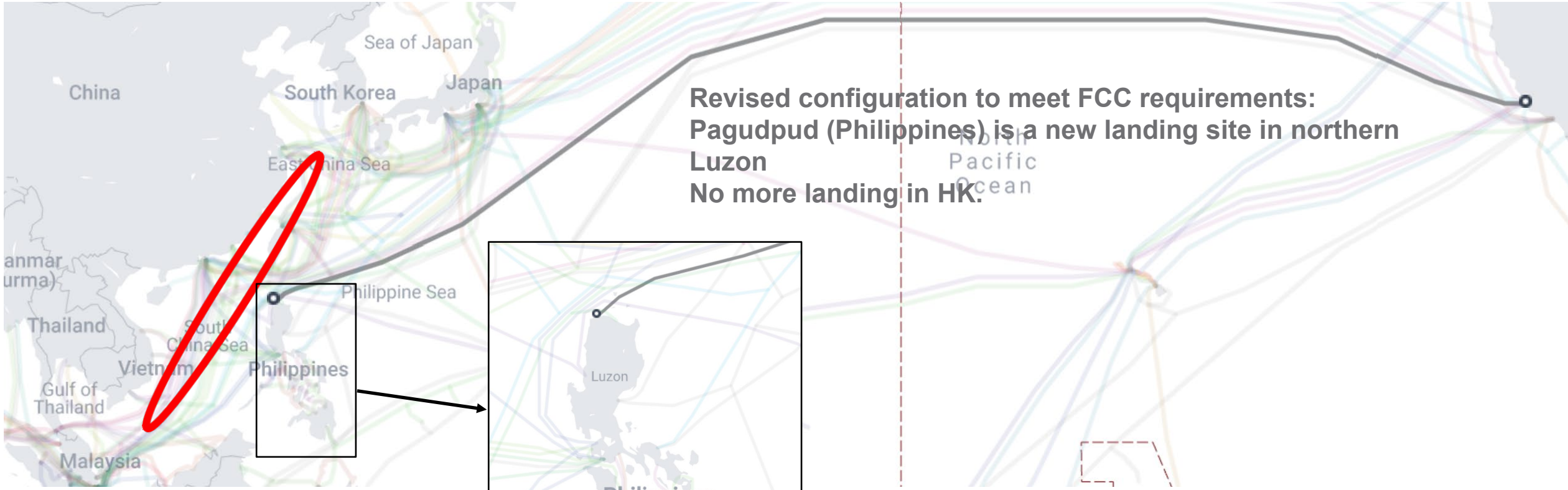
CAP-1 is the Bay to Bay system that has been redesigned



Revised configuration to meet FCC requirements:
Pagudpud (Philippines) is a new landing site in northern Luzon
No more landing in HK.

Source: Telegeography

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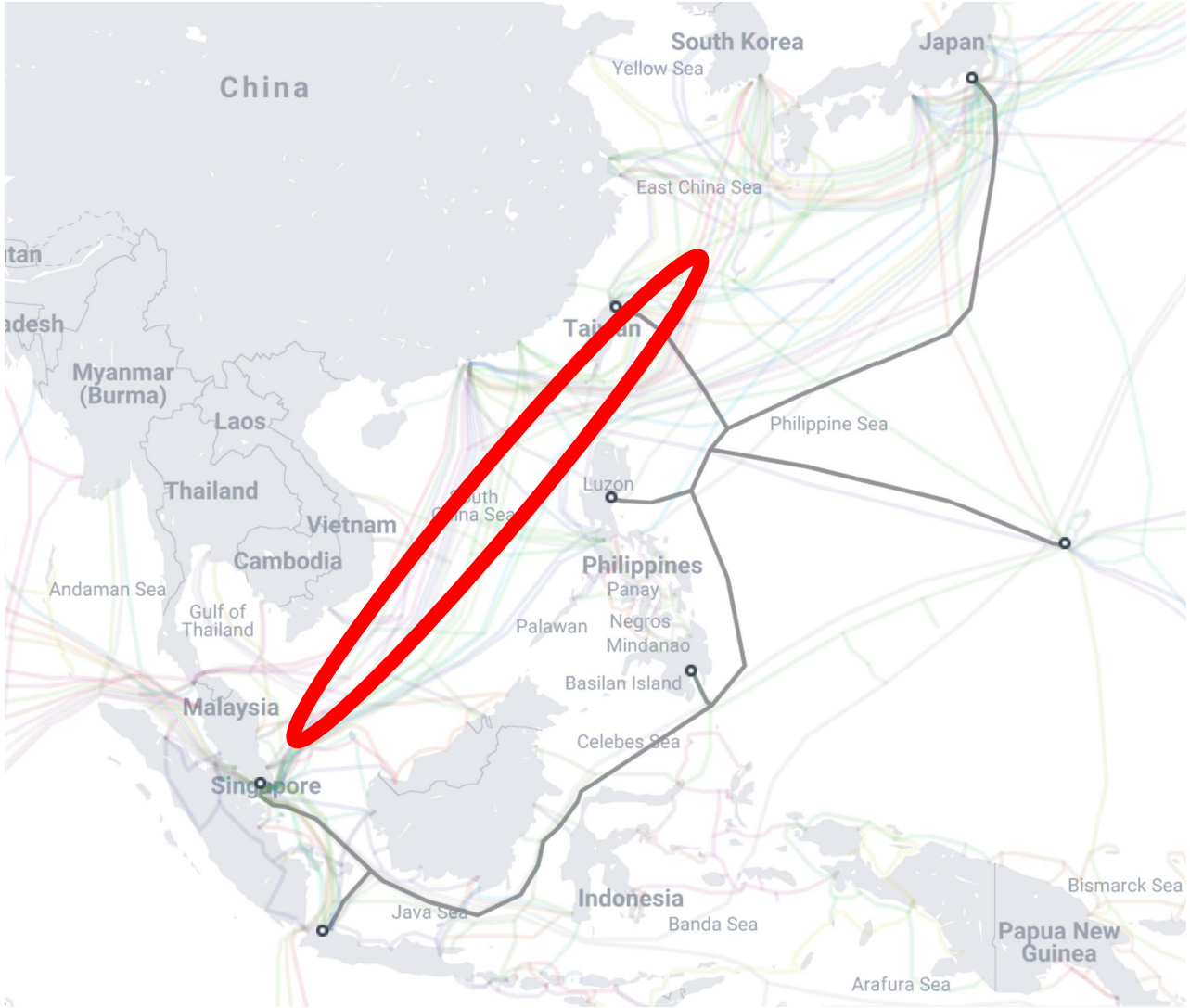
Echo & Bifrost designed to avoid disputed waters & meet FCC requirements

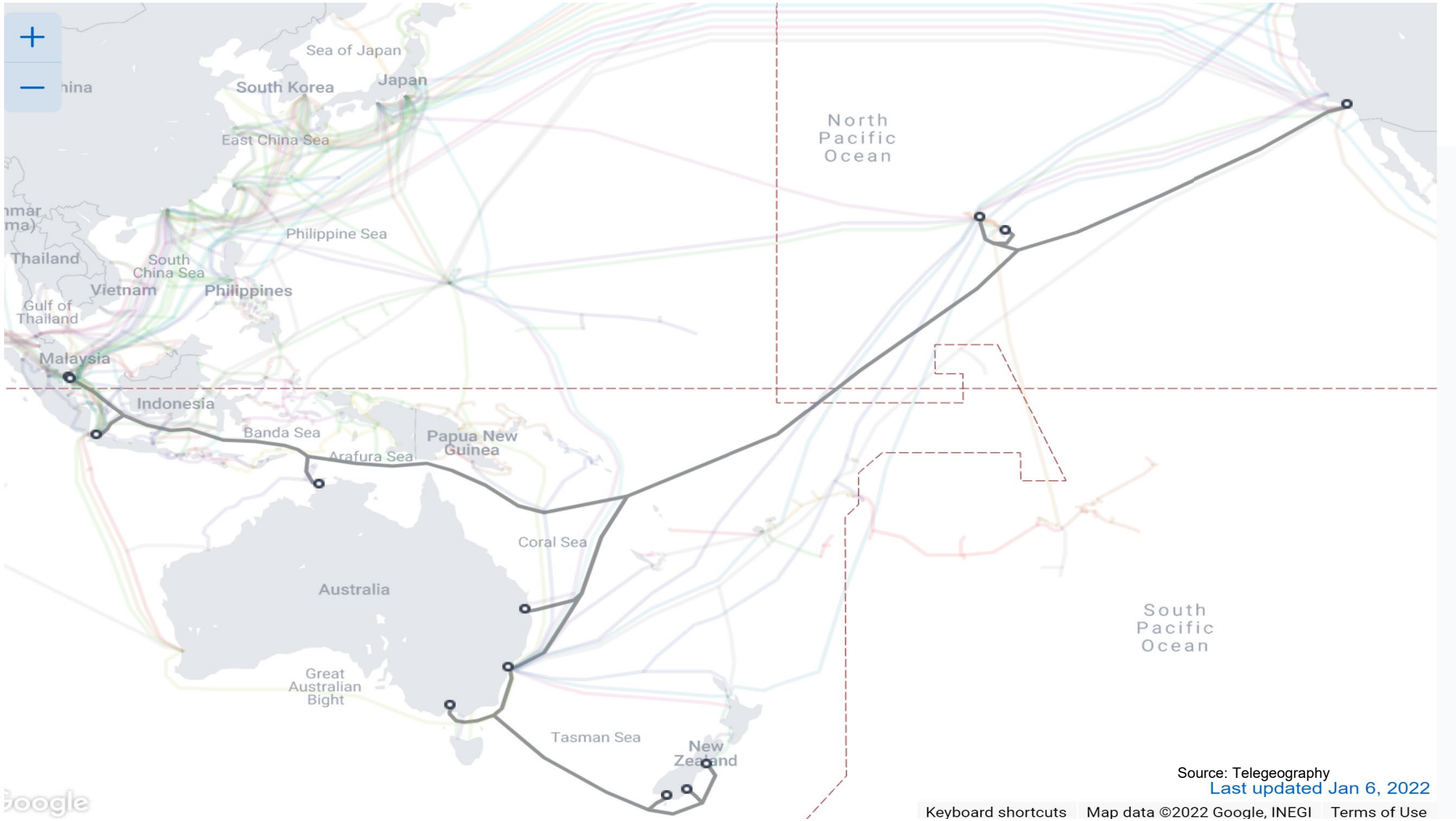
Apricot



- System designed to avoid disputed waters
- Transit through the Java sea and the Celebes Sea between Borneo and Sulawesi. Similar route to Bifrost

Source: Telegeography

Hawaiki Nui


Sea of Japan
South Korea
Japan
East China Sea
North Pacific Ocean
Philippine Sea
Thailand
South China Sea
Vietnam
Philippines
Gulf of Thailand
Malaysia
Indonesia
Banda Sea
Arafura Sea
Papua New Guinea
Coral Sea
Australia
South Pacific Ocean
Great Australian Bight
Tasman Sea
New Zealand
Source: Telegeography
Last updated Jan 6, 2022
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Implications

HK may have lost up to 6 landings as a result of the permit risk (and duration) in PRC waters and the FCC's actions.

The need for network interconnection and resiliency will need to be satisfied through a redesign of the networks to meet the new challenges;

- Opportunity for new network nodes.
- Opportunity for more intra-asia cables that could benefit HK; the PLCN and HKA segments in the South China sea are installed and unused. They can be repurposed or integrated as part of an intra-asia system.

In its ruling the FCC stated the following as a condition to grant Meta/Facebook its license for PLCN:

- Pursue diversification of interconnection points in Asia, including but not limited to Indonesia, Philippines, Thailand, Singapore and Vietnam

With the Singapore moratorium on DC this creates interesting opportunities for the other four countries mentioned.

New routes create opportunities for new landings and interconnection points

- The Philippines, Indonesia and Guam are benefiting greatly from the new routes.
  - Echo & Bifrost added two additional landings in Guam & Jakarta
  - Apricot has added landings in Jakarta, the Philippines (Davao) and Guam
  - CAP-1 added a Pagudpud landing in Northern Luzon

	Jakarta	Guam	Philippines
Apricot	1	1	1
Bifrost	1	1	
CAP-1			1
Echo	1	1	
Total	3	3	2

This is likely to attract more cable landings in Guam, Jakarta and the Philippines

The new routes through the Java and Celebes seas are longer with more shallow waters which will decrease reliability, drive up cost and increase latency. The lower reliability points out to the needs for additional cables and landing sites.

Examples of sites that illustrates these trends: Bordeaux, Genoa, Barcelona, Virginia Beach, Myrtle Beach, Baler, Pagudpud.

Other key trends at the intersection of subsea and DC

Data processing moving to the edge

- Creates caching opportunities close to where the data is consumed. With 40% of the world population living in coastal areas (<100km from sea/ocean) we see an opportunity for multi-use coastal facilities.
- Growing need for DC (500 KW – 5 MW) to serve these use cases

Modular Edge DC

The need for facilities that are smaller, scalable, multi purpose, cost effective and green is set to grow:

- Business case for a large facility serving the retail market alone may not stack up
- Initial business case may rely on a single subsea customer.
- The facilities are designed to host subsea cables, caching, 5G, IoT, retail colo space, and IasS /High Power Computing.
- Large land/space to accommodate a full fledge DC is becoming harder to find.

A New Data Center Platform at Equinix

	BBDC (New) 	Retail IBX (Mature) 	xScale (Mature) 
Deployment size	250 – 500 kW+ / x MW	30 MW	30 MW+
Operating SLA	Power: 99.999 Environmental: 99.99	Power: 99.999 Environmental: 99.99	Power: 99.999 Environmental: 99.99
Energy Delivery	High Voltage Fuel Cell Local Energy Storage	High Voltage	High Voltage
Cooling System	Equinix Thermal Wall N+1 Chillers N+1	CRAC/CRAH N+1	Equinix Thermal Wall N+1
UPS	2N (or N+1 N+2)	Primarily N+1 N+2	N+1
Generators	N+1 (or N+2)	Primarily N+1 N+2	N+1
Environmental Range	ASHRAE Allowable ASHRAE Recommended	Equinix Standard	ASHRAE Allowable ASHRAE Recommended

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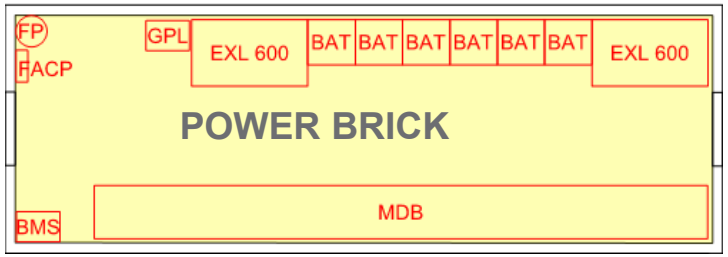
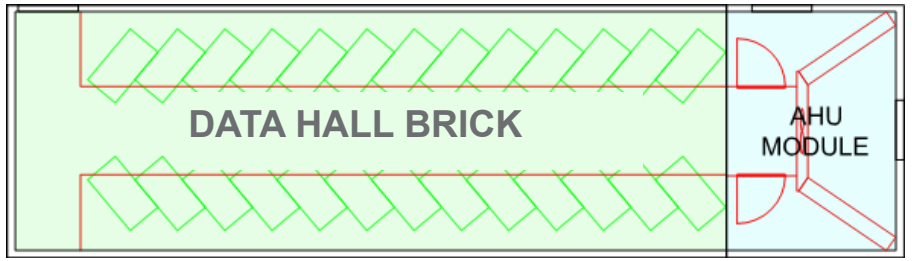
Equinix Brick Based Design

Introducing the Bricks

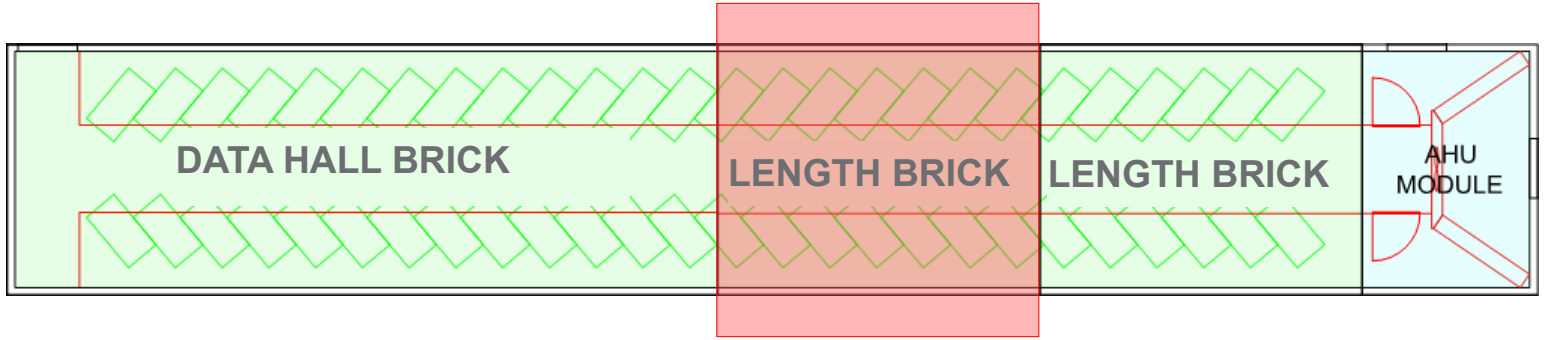


Common ‘power’ brick can support up to two data halls.

Enables flexible sourcing of power (eg HV, Fuel cells, Generators (temp or permanent))



Data Hall brick 250kW critical - 26 Cabs
9.6 kW/Cab Ave; 20 kW/Cab (max) racks



Length [expansion] brick adds up to 14 racks (up to 2 expansions per DH)

Reduces density (IT power doesn’t change)

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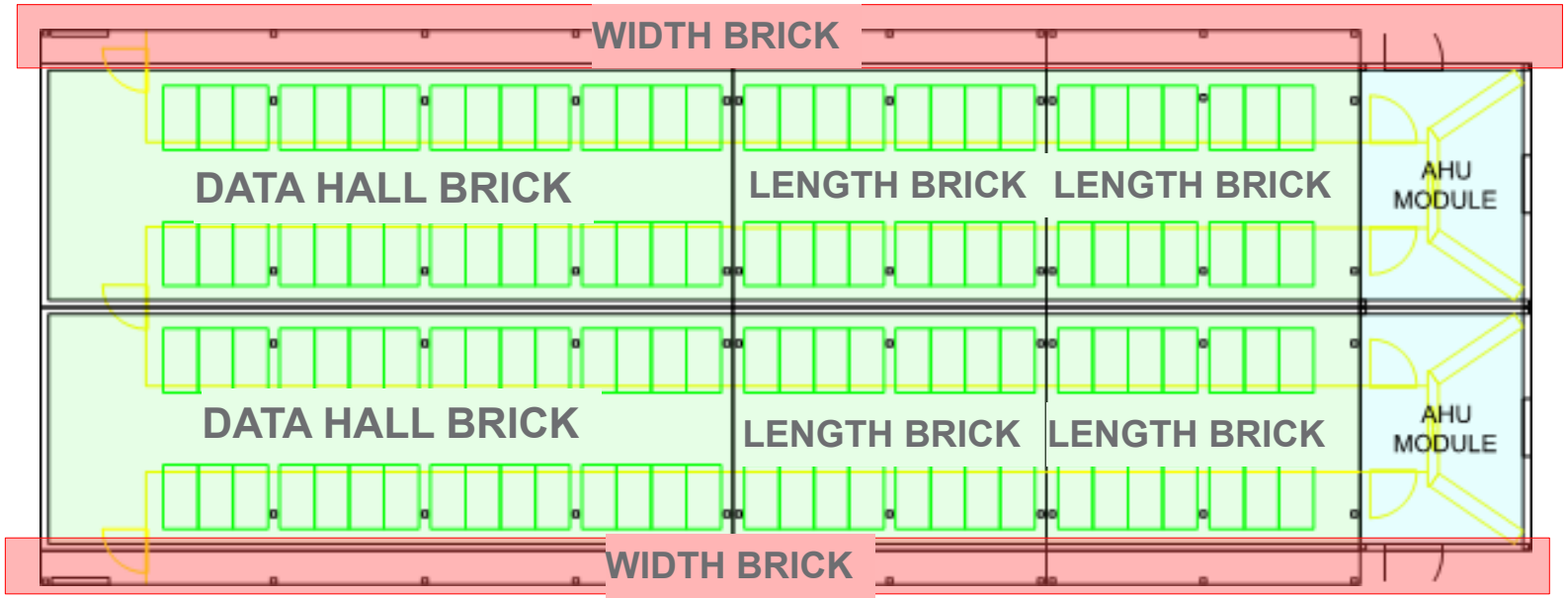

Width [expansion] brick– add width for larger isles.

Enables traditional (90 degree) rack arrangement and caging.

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Modular Data Center

‘5G/EDC’ configuration rendition

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