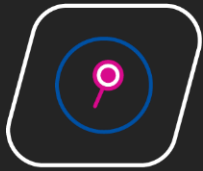


The role of Hong Kong at global traffic exchange

Introduction

- Homegrown in Hong Kong
- My 9th year to work related to network operation and planning.
- Love to watch the Hong Kong comedy movie especially the film starring Stephen Chow.



IP TRANSIT



CAPACITY



INTERNET



ETHERNET & VPN



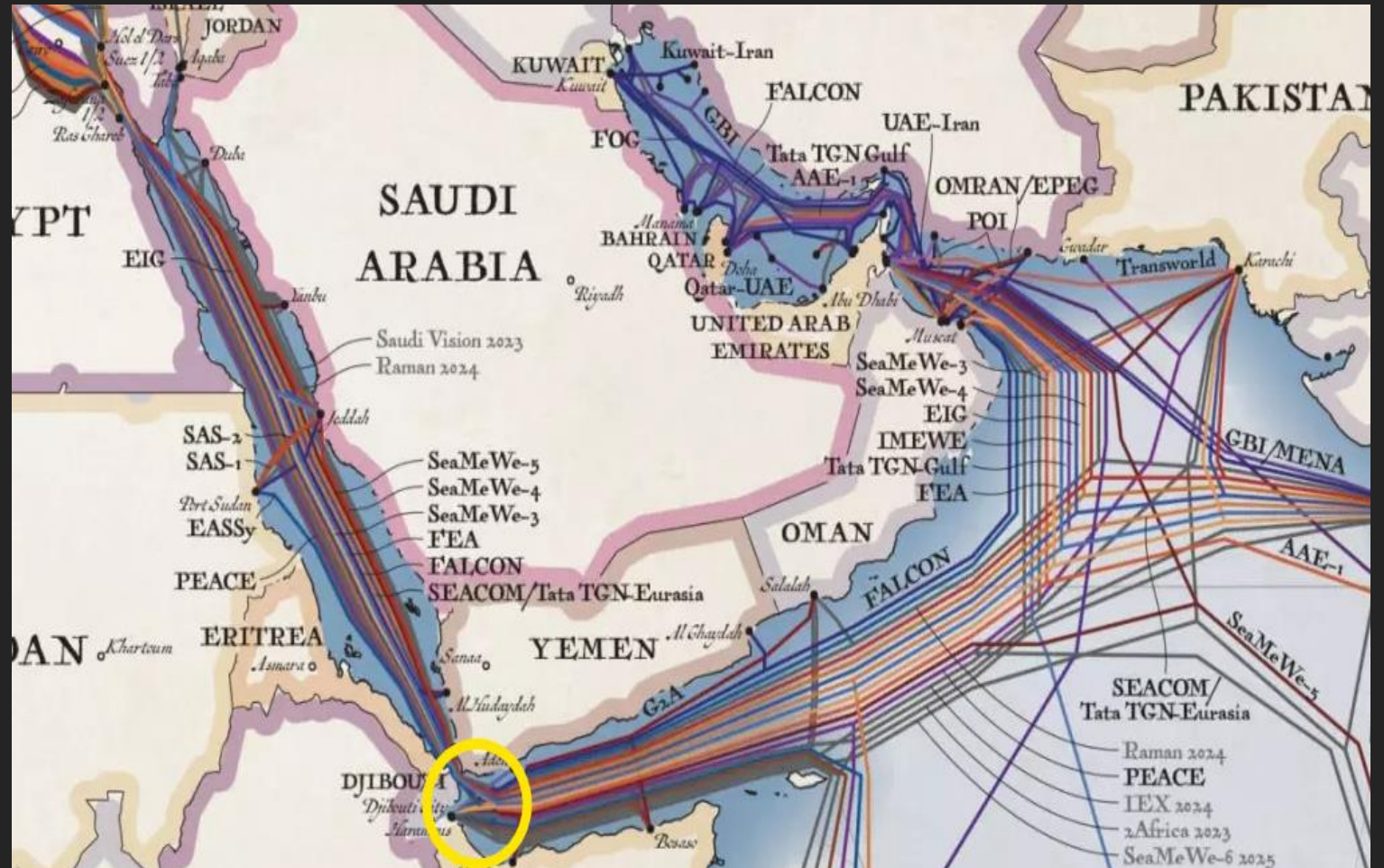
Typical network gateways in Asia

- Most of the network will use the following locations as their major network hub:
 - Hong Kong
 - Singapore
 - Japan



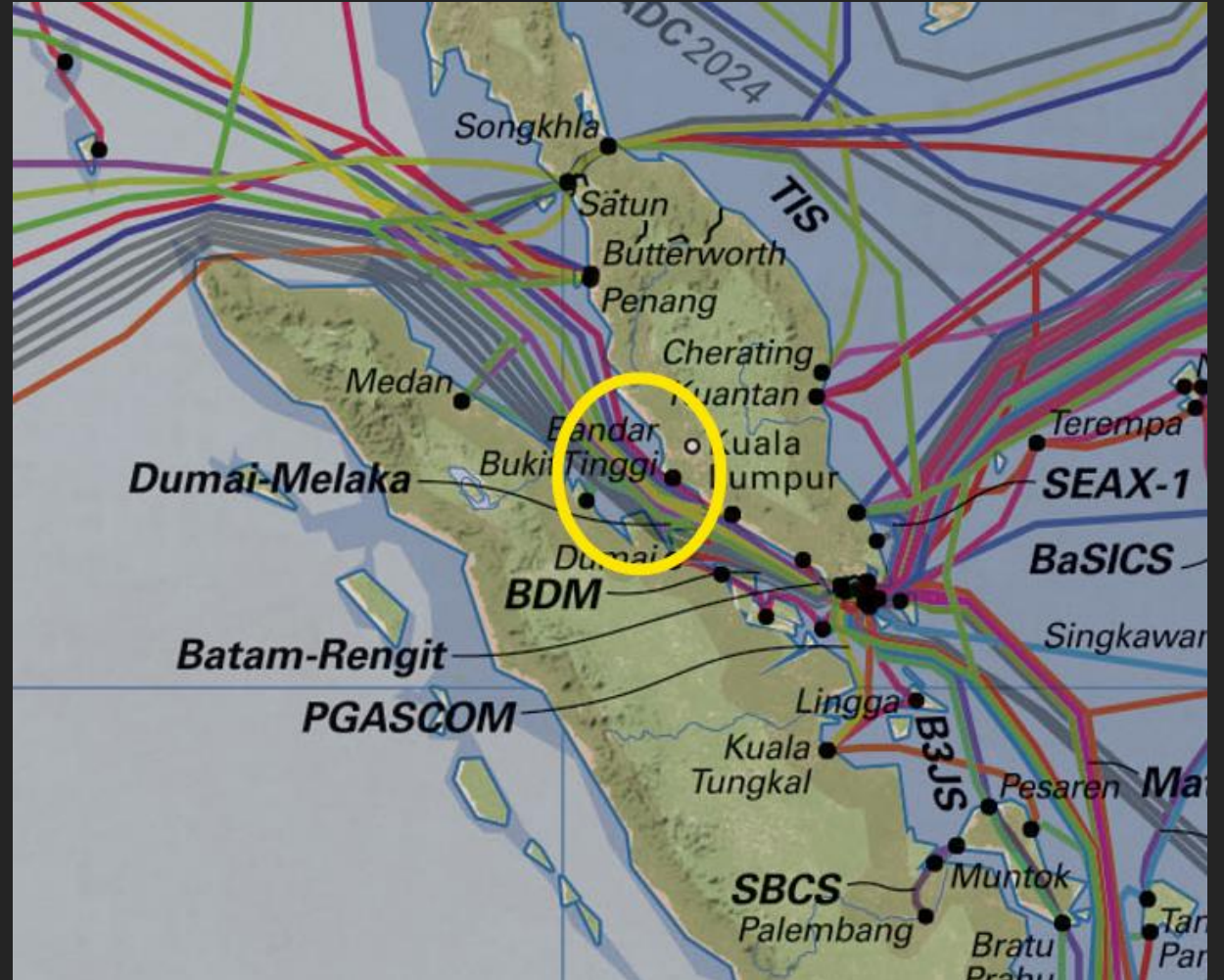
Red Sea incident

- On 22 February 2024, Houthi missiles sank a ship at Red Sea. Its anchor damaged the submarine cables at there.
- SEACOM, TGN, AAE-1 and EIG cables are out of service due to fiber cut since 24-Feb
- Direct subsea connectivity with big capacity between Singapore and Europe remains only SMW5.



Submarine cable fault on SMW5

- On 19 April 2024, there is another interruption on the cable between Singapore and Europe.
- No more direct submarine cable option between Europe and Singapore with big throughput
- SMW5 fixed ~ 28 June, 70days downtime
- AAE1 fixed ~17 July, 146days downtime

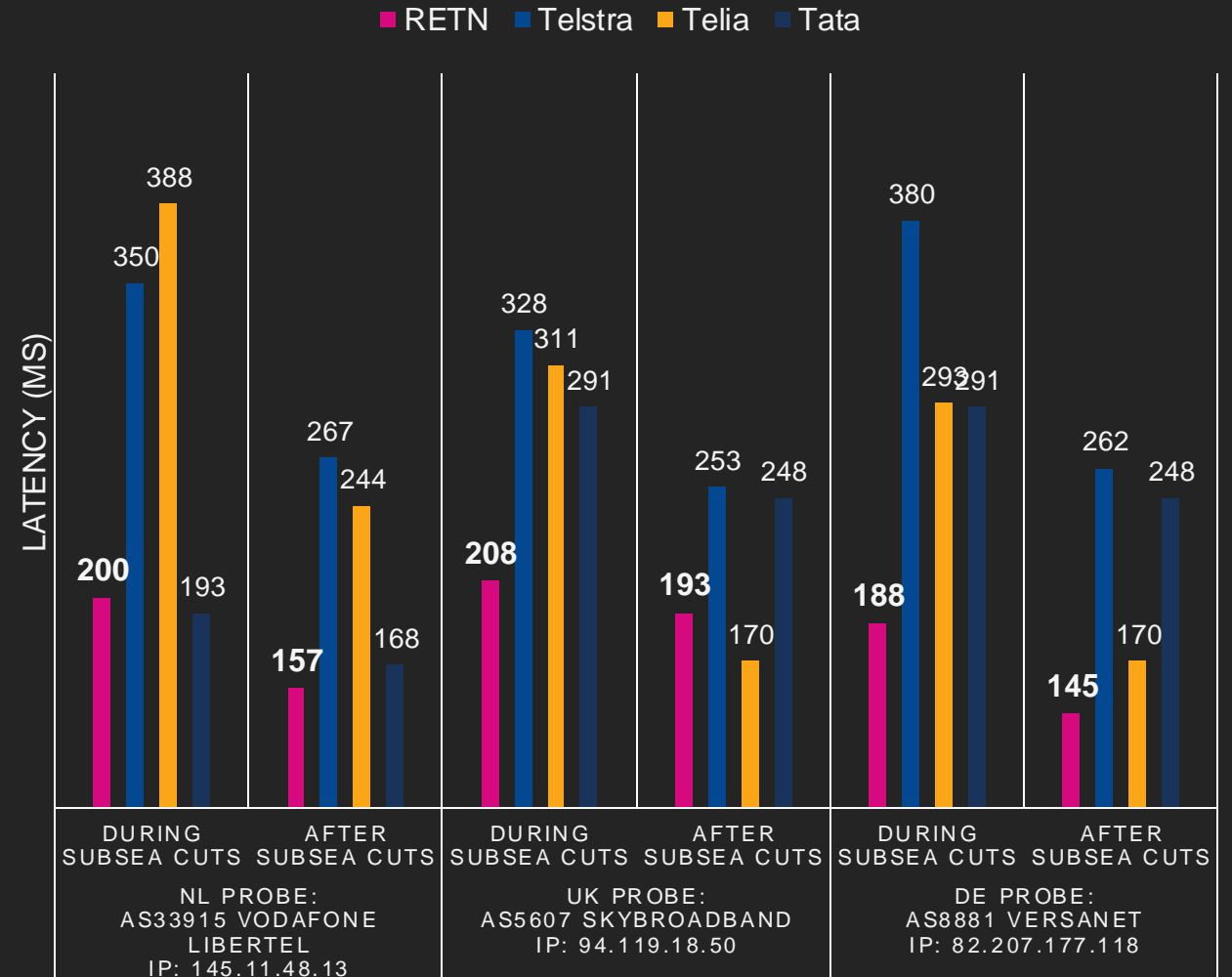


What is the impact?

- Drastically increase of RTT
- Packet loss due to congestion
- Loss of revenue due to traffic reduction



RTT FROM SINGAPORE TO IPS IN EUROPE



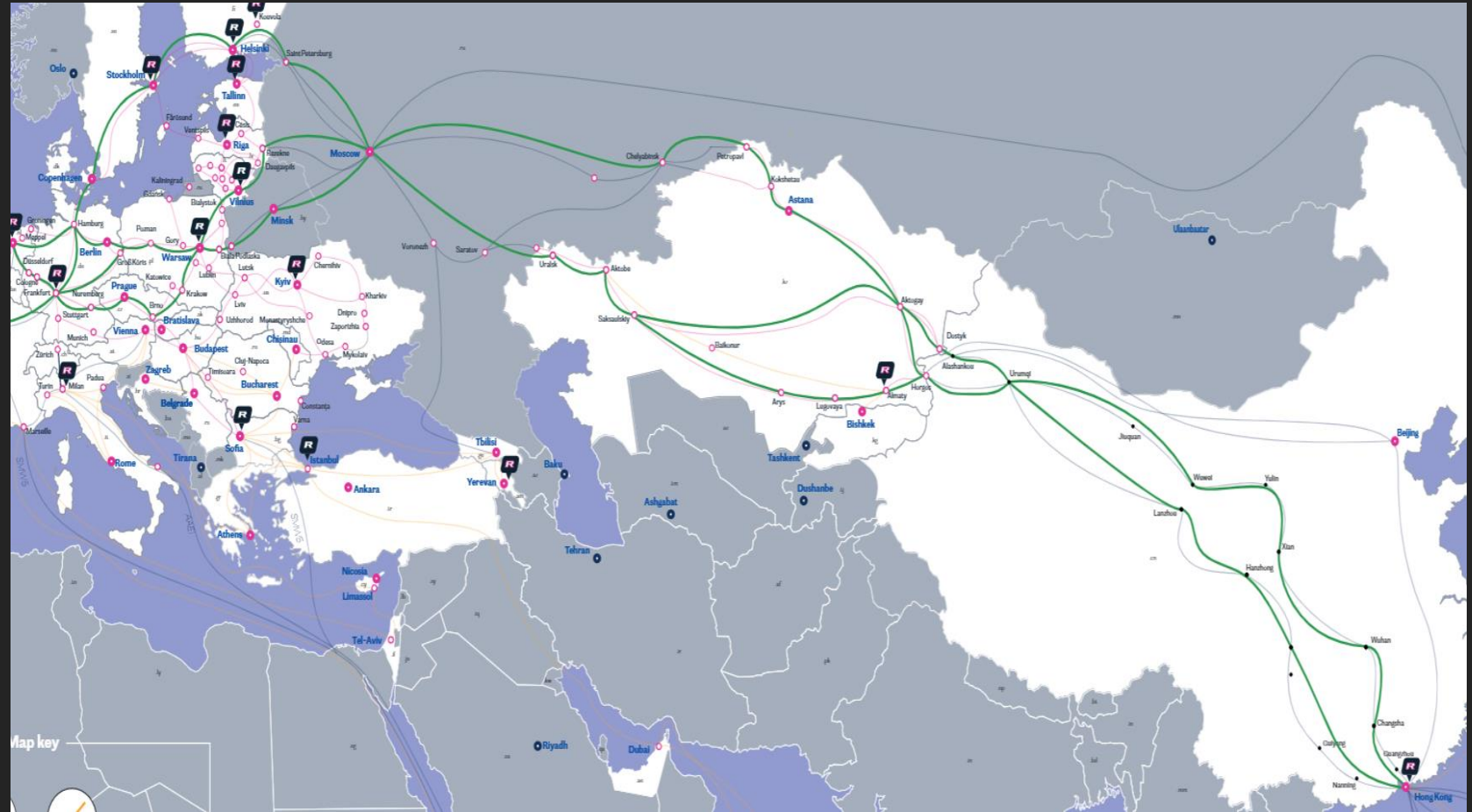
Mitigation strategy for the cable cut impact

- *Option 1 reroute to east direction*
Issue:
Double up the RTT compared with normal one
- *Option 2 reroute via terrestrial cable*
This is the option that we are offering to our customers at the end.



Popular choice of terrestrial cable

- ERMC
- TEA-4
- **TRANSKZ**



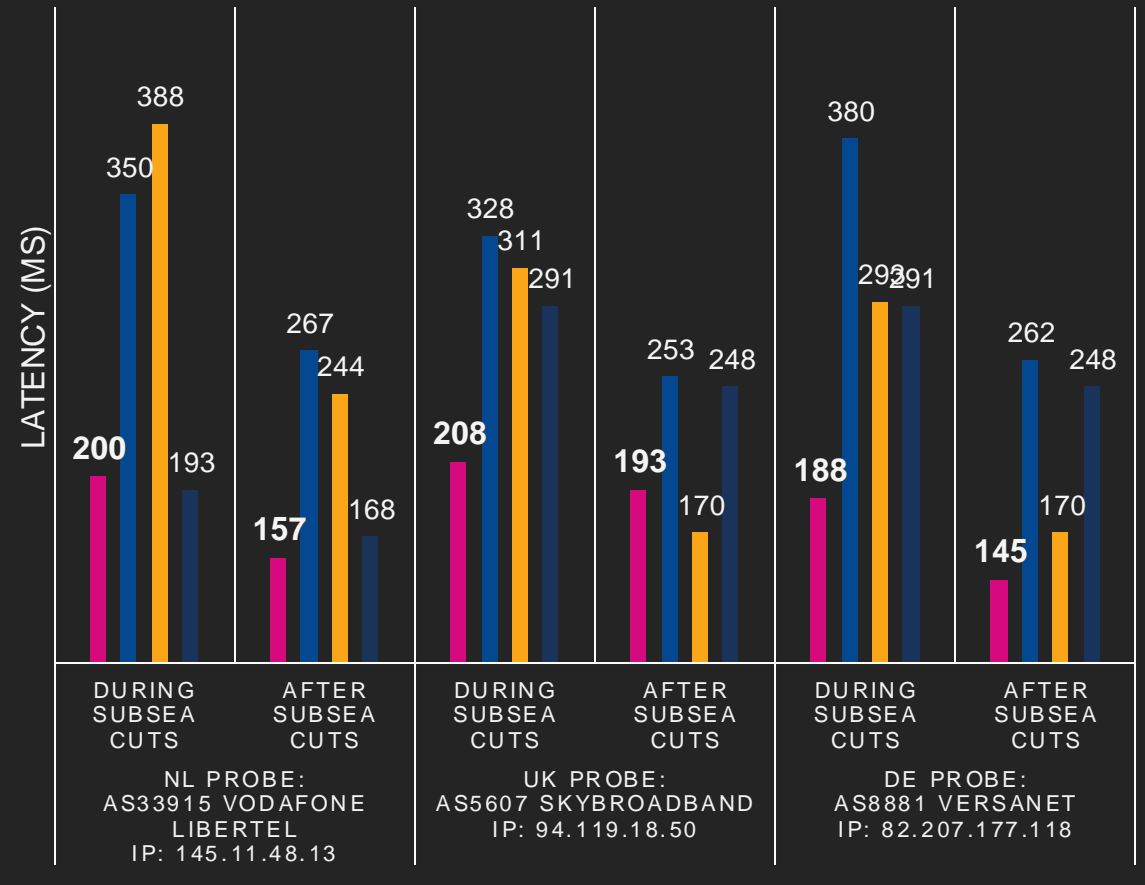
Terrestrial cable vs Submarine cable

RTT

- Roughly the same RTT for traffic between Singapore and Europe.
- Better RTT for traffic between Hong Kong/Japan to Europe

RTT FROM SINGAPORE TO IP IN EUROPE

■ RETN ■ Telstra ■ Telia ■ Tata



Terrestrial cable vs Submarine cable

- MTTR
 - 1 subsea fault: 40days.
 - 1 terrestrial cable cut: 4-12hours subject to severity
- Terrestrial cable:
 - Most of the available Trans-Eurasia terrestrial cable systems are offering protection to minimise the impact of cable cuts due to the long distance.



	Amount of cable faults	MTTR
Terrestrial cable	More	Shorter
Submarine cable	Fewer	Longer

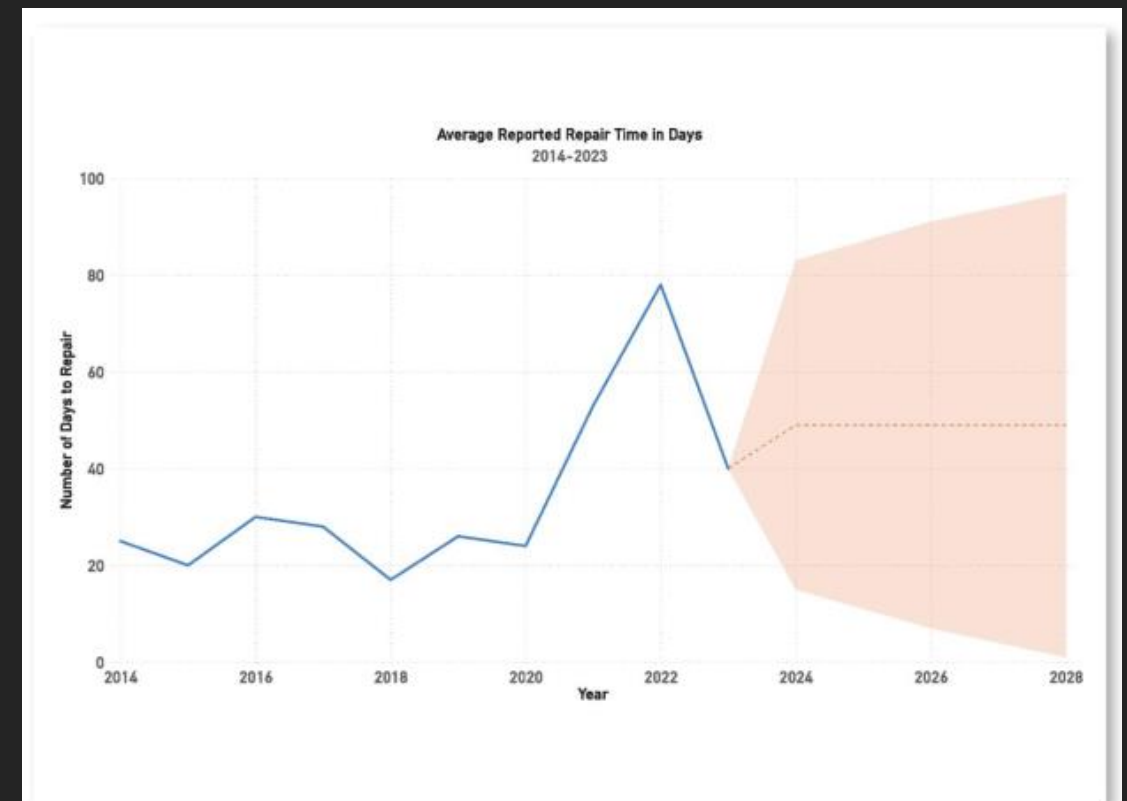


Figure 64: Average Repair Time in Days, 2014-2023



做大事，要成功，三個條件
To be a successful man, there are three conditions.



第一，銀紙；第二，銀紙；第三，都是銀紙。
First, money. Second, money. Third, still money.

Terrestrial cable vs Submarine cable

- Traffic volume ~ Revenue
- Terrestrial cable pricing is roughly double as submarine cable.
- What if you take account of the outage time of submarine cable into pricing?
- Assume you have subscribed two cable systems between Europe and Asia

	Submarine	Terrestrial
Cost per year	\$5000	\$10000
Revenue per year	\$20000	\$20000
Profit per year	\$15000	\$10000
Profit (include 146days submarine cable cut)	=20000*(365-146)/365 - \$5000 = \$7000	=\$10000

- Submarine cable cut: No SLA due to force majeure event
- Terrestrial cable cut: SLA available

Advantages of Hong Kong as a networking hub

- Rich of submarine cable choices, 14 of cables in total, 4 more new cable systems coming. (ADC/ALC/SJC2/SEA-H2X)
- Rich of terrestrial options for China access/cross border.
- Hong Kong is the only open market in Asia to get the terrestrial cable all the way up to Europe without any submarine cable segments.

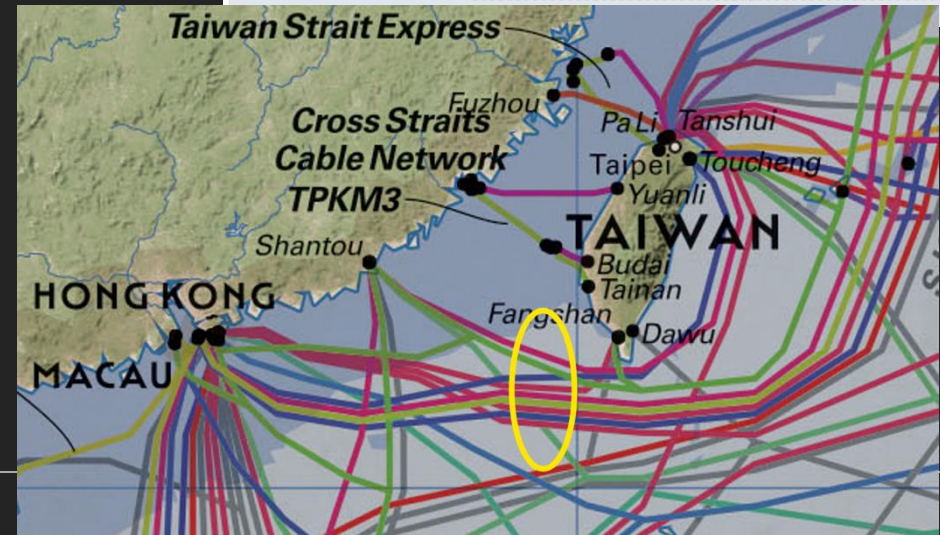
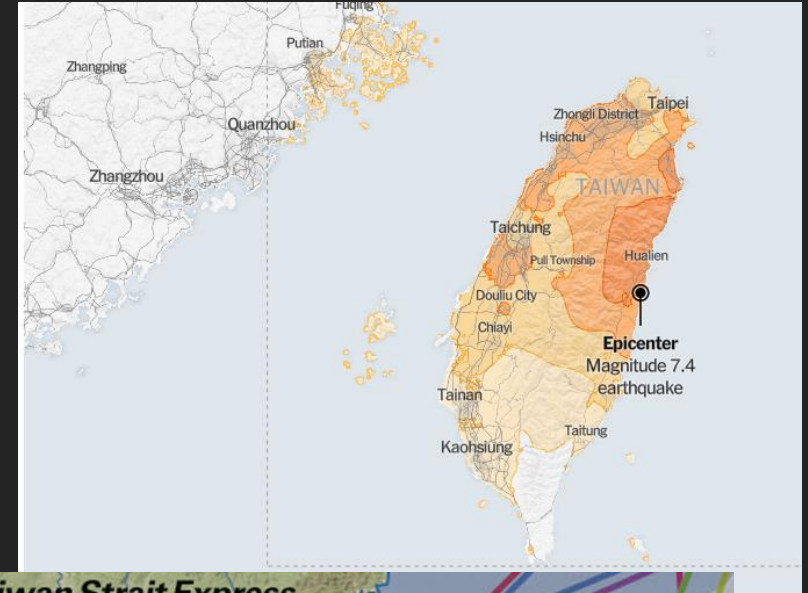


Submarine cable

Terrestrial cable

Potential risks of Hong Kong as a network hub

- RETN faced a big challenge on submarine resources in Q2 in Asia with total 9 cables are out of service. 7.4 magnitude earthquake happened in April brought a relatively long outage on RNAL between Hong Kong<->Taipei/Tokyo direction.
- Prone to faults compared with the cable system in other region due to earthquake or human activities in Southeast China sea
- Conflicts between USA and China
PLCN dropped Hong Kong from their initial plan to get the approval from CLS for US landing.



Potential risks of Hong Kong as a network hub

Cable system	CLS location	RFS	Uptime
	TKO	2012	12 years
EAC-C2C	TKO	2002	22 years
TKOConnect	TKO/HK Island	2023	1 year
APG	TKO	2016	8 years
ADC	HK Island	2024Q4	N/A
ALC	HK Island	2025Q4	N/A
AAE-1	HK Island	2017	7 years
TGN-IA	HK Island	2009	15 years
SMW3	HK Island	1999	25 years
SJC2	HK Island	2025Q1	N/A
SJC	HK Island	2013	11 years
EAC-C2C	HK Island	2002	22 years
H2HE	HK Island	2021	3 years
SEA-H2X	HK Island	2025	N/A
APCN2	Lantau Island	2001	23 years
FEA	Lantau Island	1997	27 years
FNAL/RNAL	Lantau Island	2001	23 years
AAG	Lantau Island	2009	15 years

- The lifespan of submarine cable is 25years usually based on the typical design



Potential risks of Hong Kong as a network hub

Cable system(in 2029)	CLS location	RFS	Uptime
ASE	TKO	2012	17 years
TKOConnect	TKO/HK Island	2023	6 years
APG	TKO	2016	13 years
ADC	HK Island	2024Q4	5 years
ALC	HK Island	2025Q4	4 years
AAE-1	HK Island	2017	12 years
TGN-IA	HK Island	2009	20 years
SJC2	HK Island	2025Q1	4 years
SJC	HK Island	2013	16 years
H2HE	HK Island	2021	8 years
SEA-H2X	HK Island	2025	4 years
AAG	Lantau Island	2009	20 years
EAC-C2C	TKO	2002	Retired
SMW3	HK Island	1999	Retired
EAC-C2C	HK Island	2002	Retired
APCN2	Lantau Island	2004	Retired
FEA	Lantau Island	1997	Retired
FNAL/RNAL	Lantau Island	2001	Retired

- Assume the cable system would be retired \geq 25years. 5 years later, cables would be mostly landed in Hong Kong Island only



The role of Hong Kong in global traffic exchange

- Tough as we are facing challenges from some fast-growing market. E.g. Philippines and Singapore.
- Have a strong position for traffic exchange based on our own and unique advantages.
- Tension between USA and China remains.
- Key is to how we adapt to the change.
- Keep an eyes on what is happening in the world as the issues happened in other countries might bring you impact.
- Good to do the network forecast regularly.



Reference and further reading:

- Submarine cable industry report
<https://subtelforum.com/industry-report/>
- TeleGeography submarine cable map
<https://submarine-cable-map-2024.telegeography.com/>
- Submarine cable cut on AAE-1 cable
<https://www.datacenterdynamics.com/en/news/at-least-one-subsea-fiber-cable-damaged-in-the-red-sea-some-reports-blame-houthi-rebels/>
- RETN Building the Networks of tomorrow
https://retn.net/trending/Building_the_networks_of_tomorrow

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