



# Deploying a Backbone in APAC

HOW WE FAILED, WHAT WE'VE CHANGED, WHAT WE'VE LEARNED

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[PIERRE-YVES.MAUNIER@F5.COM](mailto:PIERRE-YVES.MAUNIER@F5.COM)

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# Who is F5



# Who is F5

FROM HW/APPLIANCE

You probably know F5 for the BIG IP

F5 is often seen as a HW/Appliance company

This was true a few years back but it's no longer the case



# Who is F5

TO SAAS/SERVICES

F5 acquired several companies to build a strong services portfolio

These services need a network to be delivered

**NGINX**

**SHAPE**

**Volterra**

**F5<sup>®</sup> Silverline<sup>®</sup>**

DDoS Protection



# Backbone History

# Backbone History

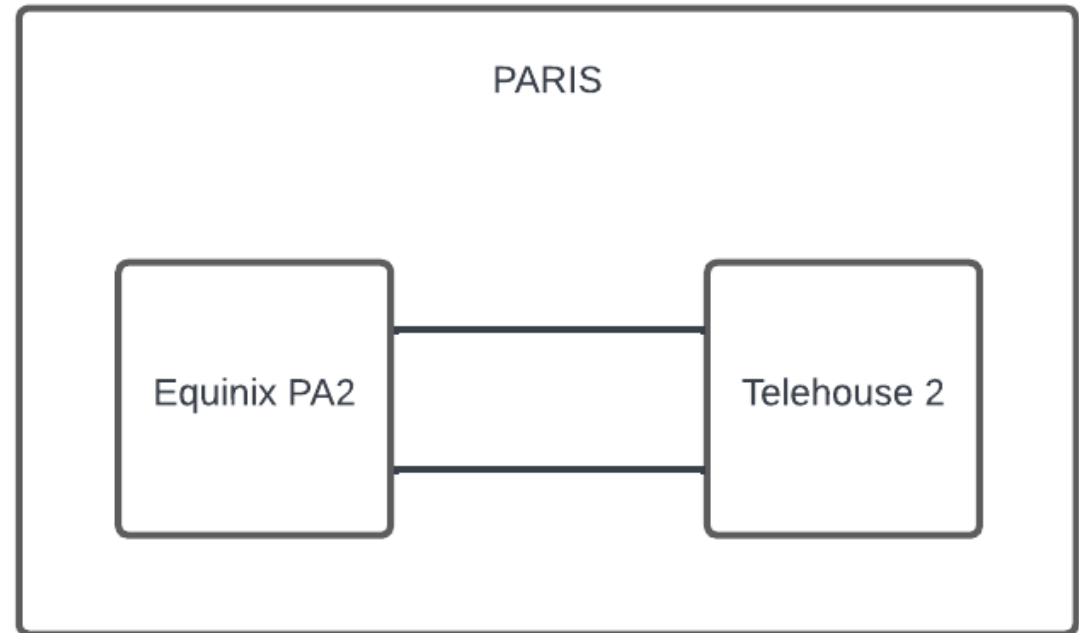
It all started as a small French network Start Up.

A few guys and a small network foot print, the goal was to be better at DDoS mitigation



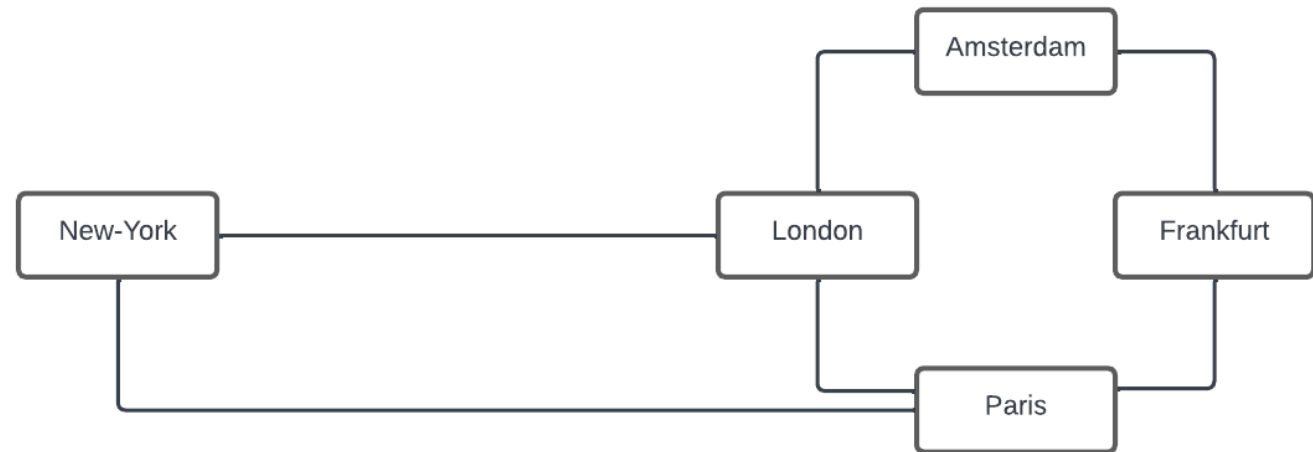
# Backbone History

Started in France with the 2 main POPs in Paris



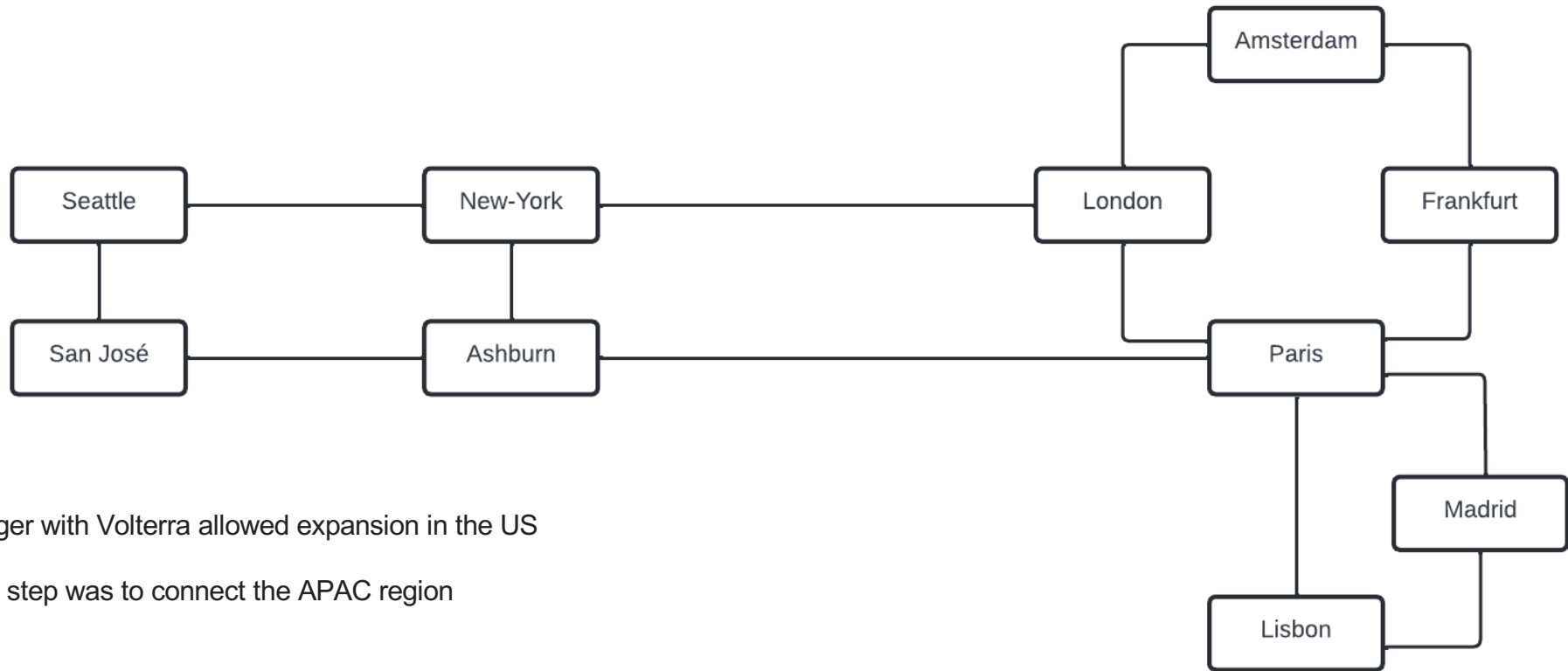


# Backbone History



Expanded pretty fast to the main Europe locations and started to connect the US

# Backbone History



The Merger with Volterra allowed expansion in the US

The next step was to connect the APAC region

# APAC deployment

# APAC deployment

## Several challenges

Distances / Latencies

Costs

Where do we start ?



# APAC Deployment

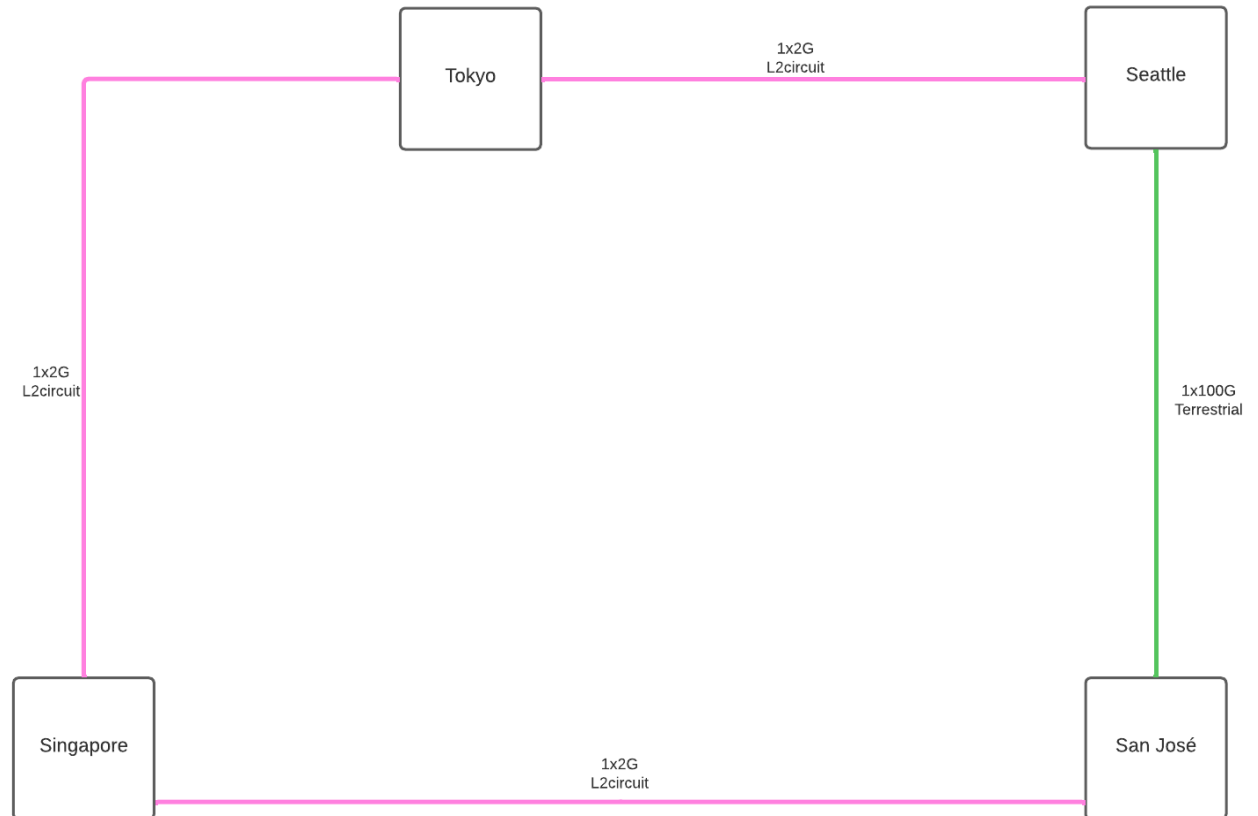
Q1-2020

Started with L2circuit with cost efficiency and resilience in mind

It was horrible : unreliable, frequent packet loss, hard down, latency increase etc

We worked with the provider to try to improve the situation with no results

After a few months we looked at other solutions



# APAC Deployment

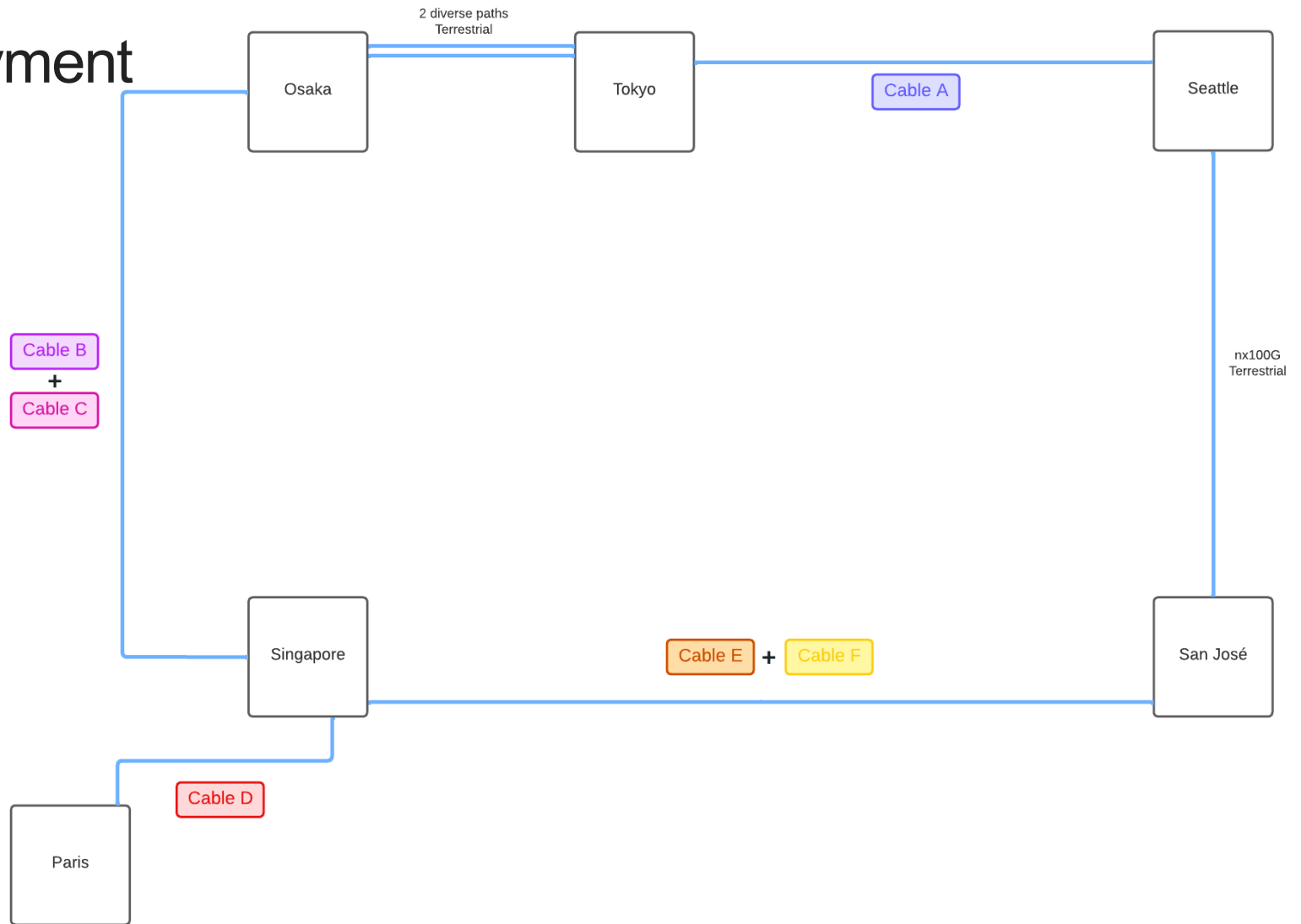
Q1-2021

Ditched L2circuits

Went with 10G Wavelengths

3 paths per POP

Submarine cable diversity



# APAC Deployment

## SINGAPORE TERRESTRIAL EXAMPLE

We studied all terrestrial backhauls between CLS and POPs for diversity

But it's not enough

Cuts happen frequently and can take several weeks until repaired

Maintenances are more frequent than terrestrial cables in our experience

\*CLS : Cable Landing Station

Singapore terrestrial backhauls



# Why so many issues ?

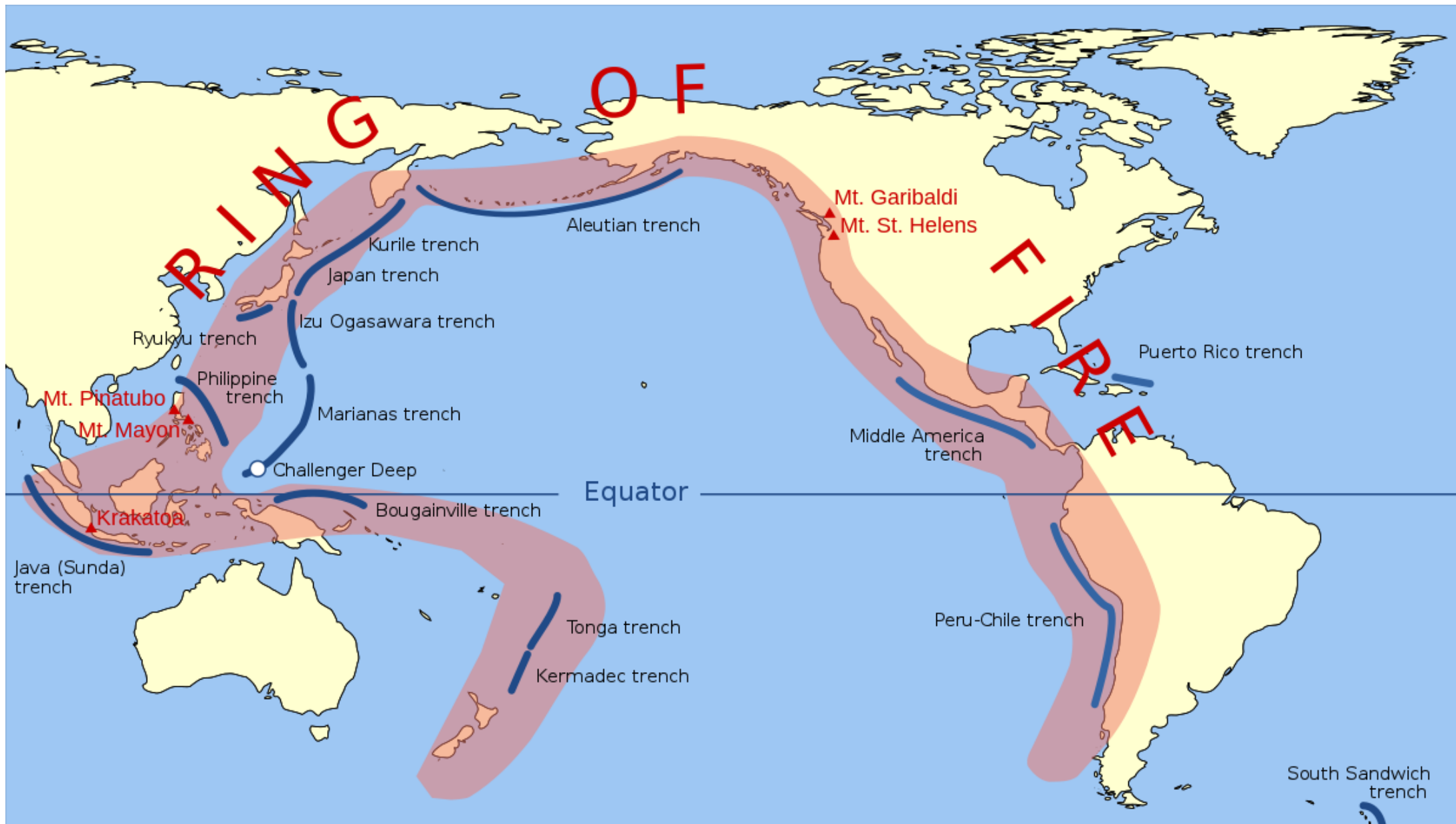






# Singapore Harbor





# APAC Deployment

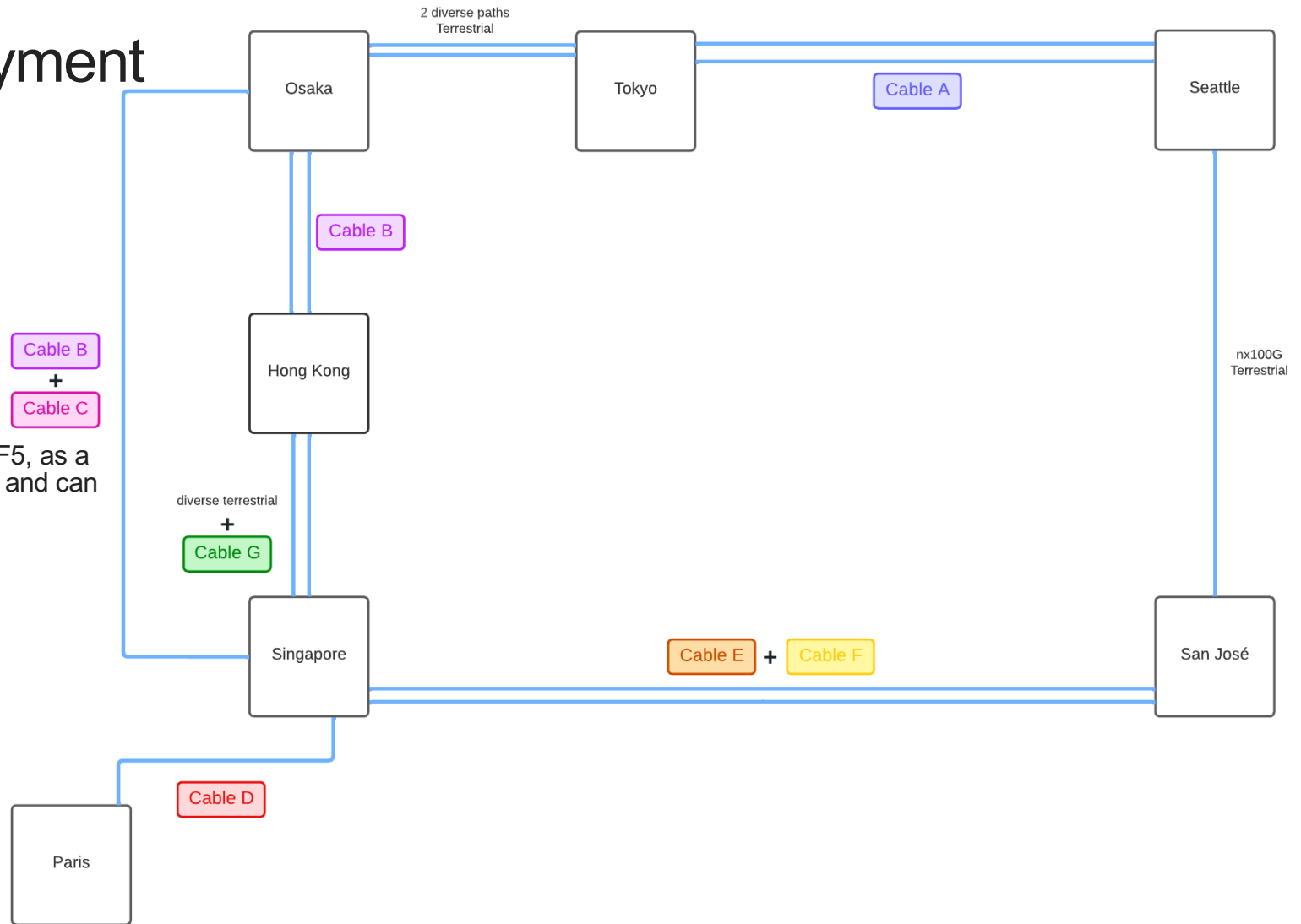
Q3/Q4-2021

Upgraded capacity (120 Gbps)

Added more paths

Still not enough

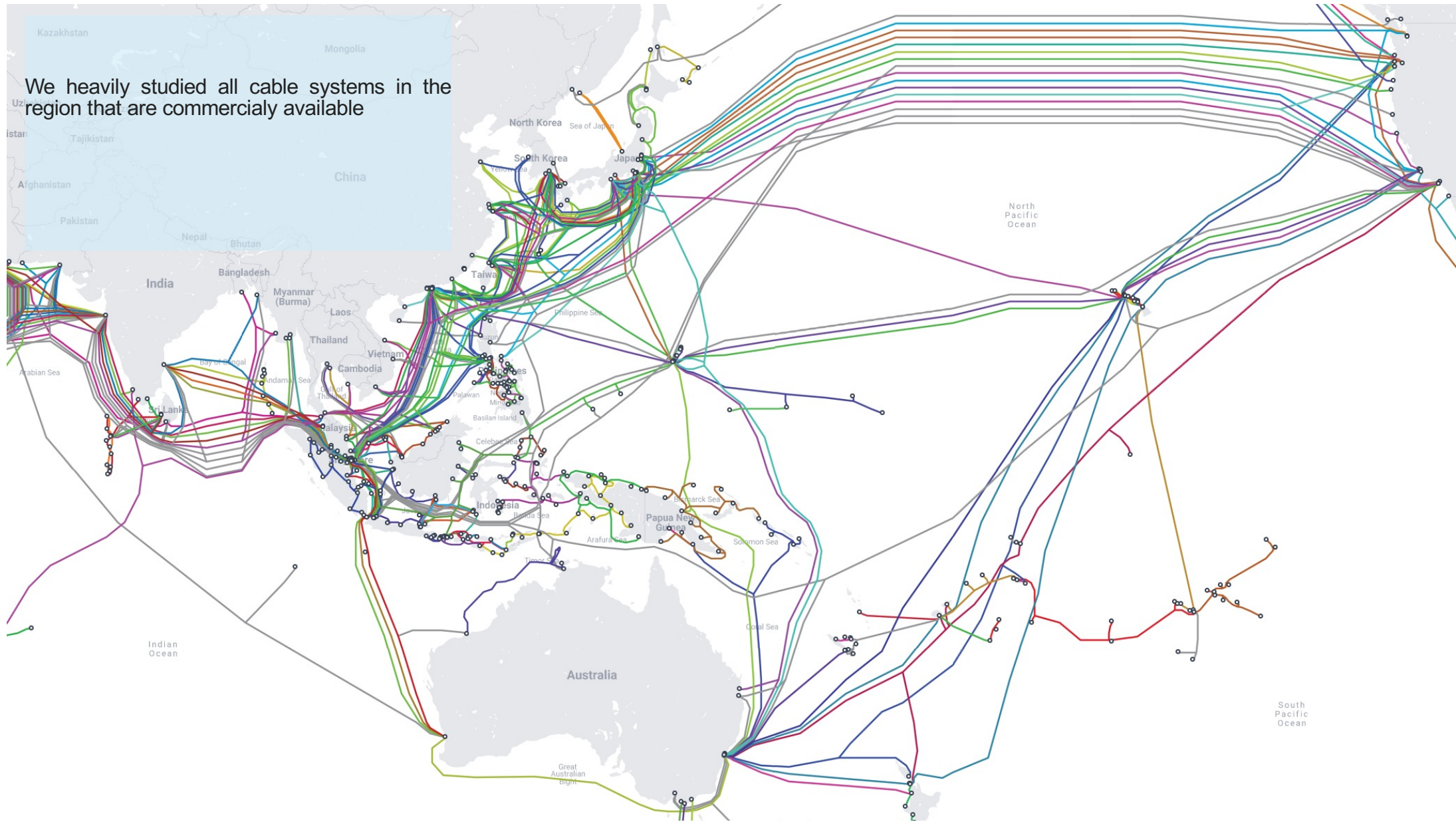
Now that the backbone is part of F5, as a global cloud company we have to and can do better





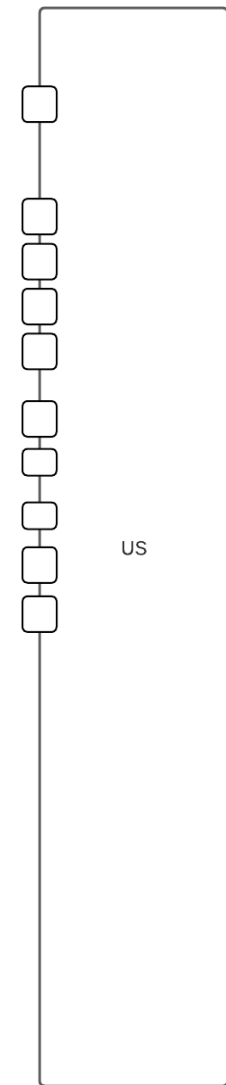
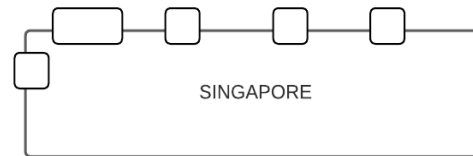
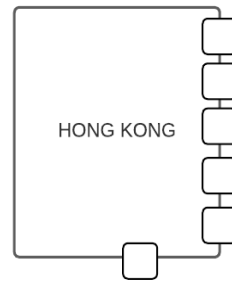
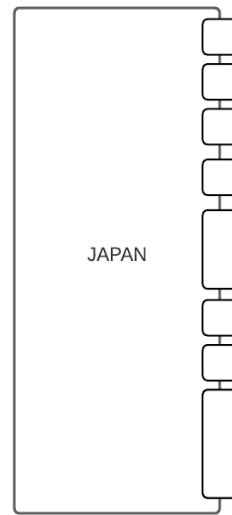
# Back to the drawing board

We heavily studied all cable systems in the region that are commercially available

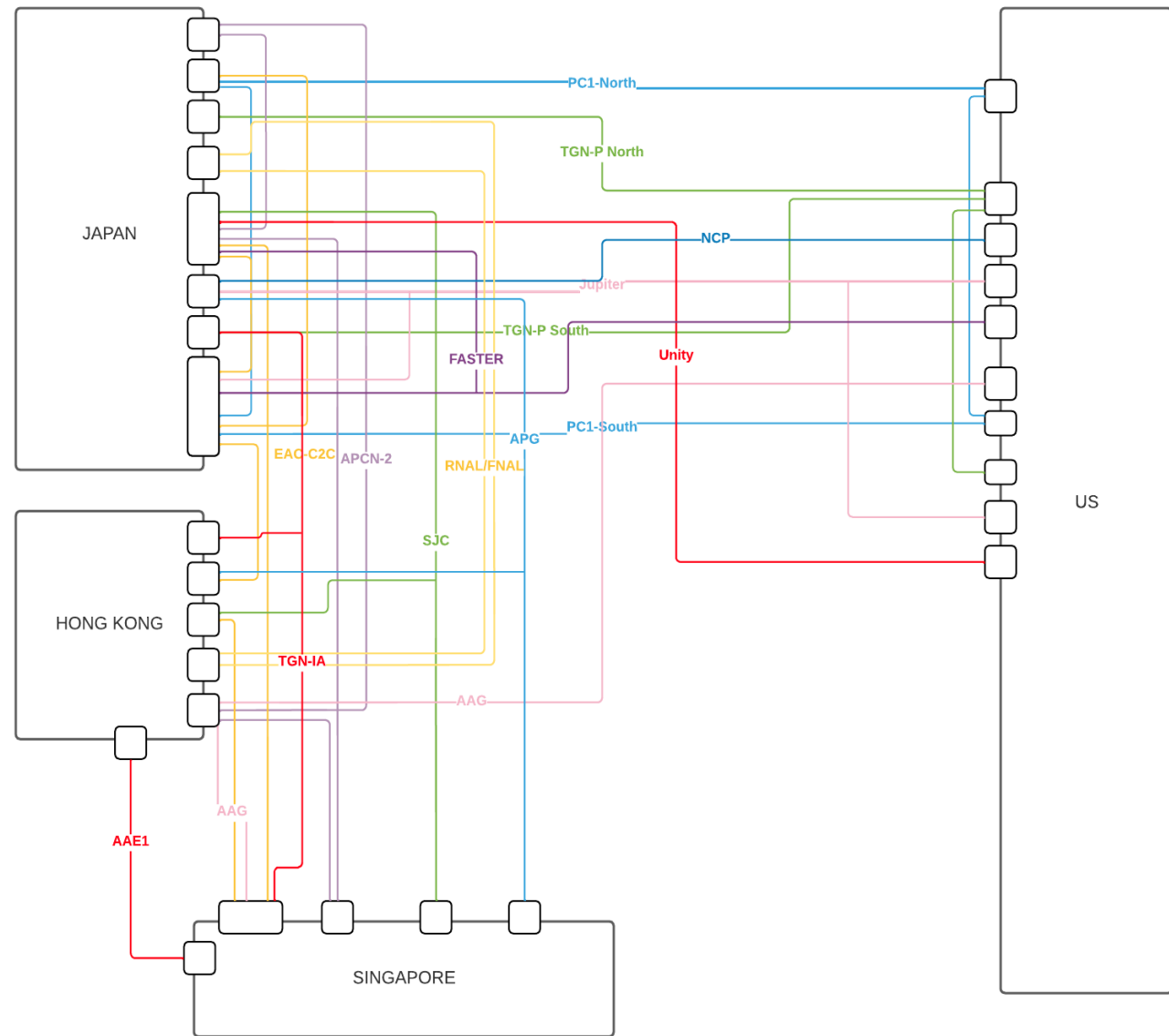


Each small square/rectangle represent a CLS

(Cable Landing Station)



We mapped out most cable system we could get capacity on and studied the Cable Landing Station diversity

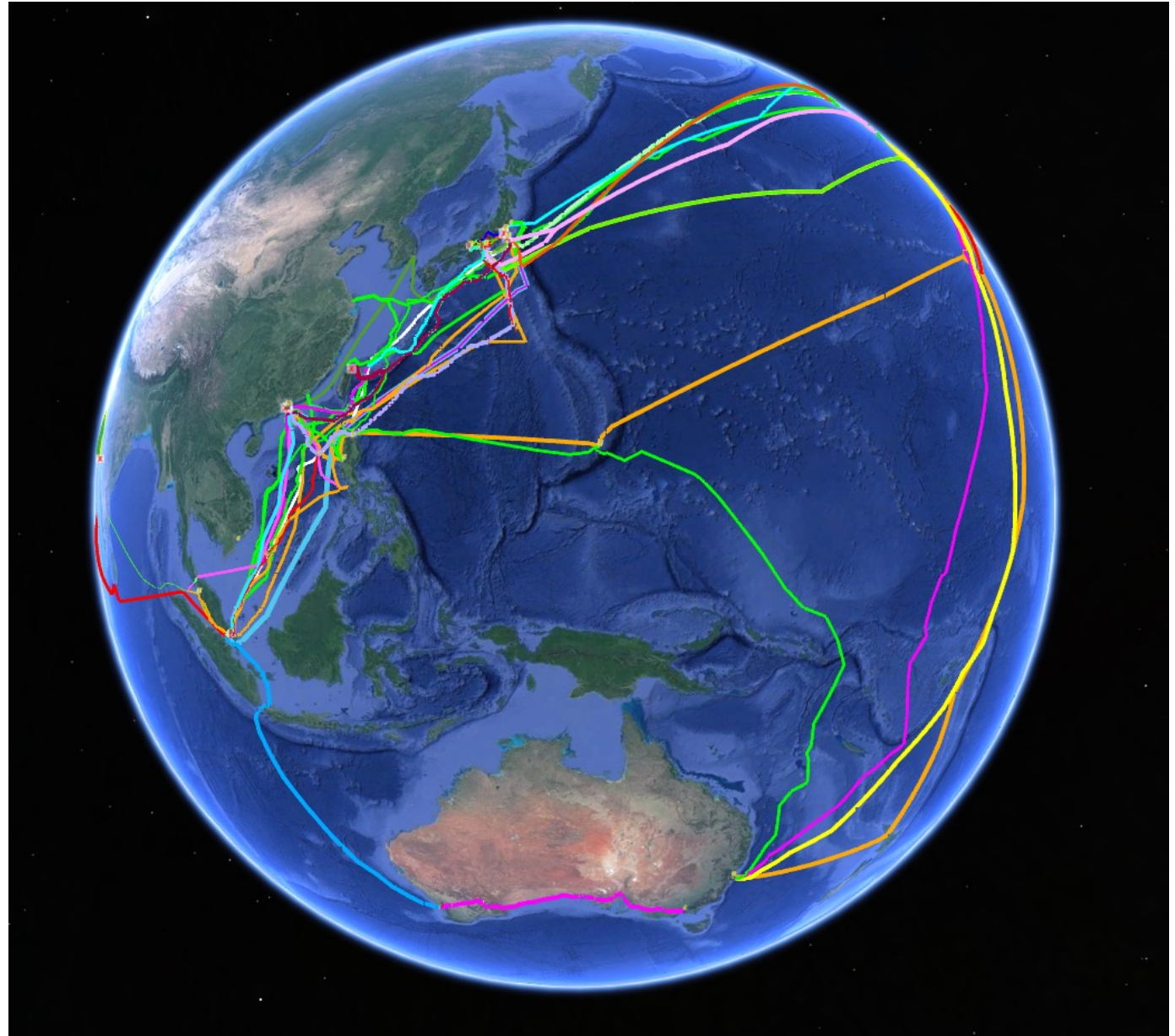




Mapping out all kmz as well to check diversity between CLS, BMH, POPS

CLS : Cable Landing Station

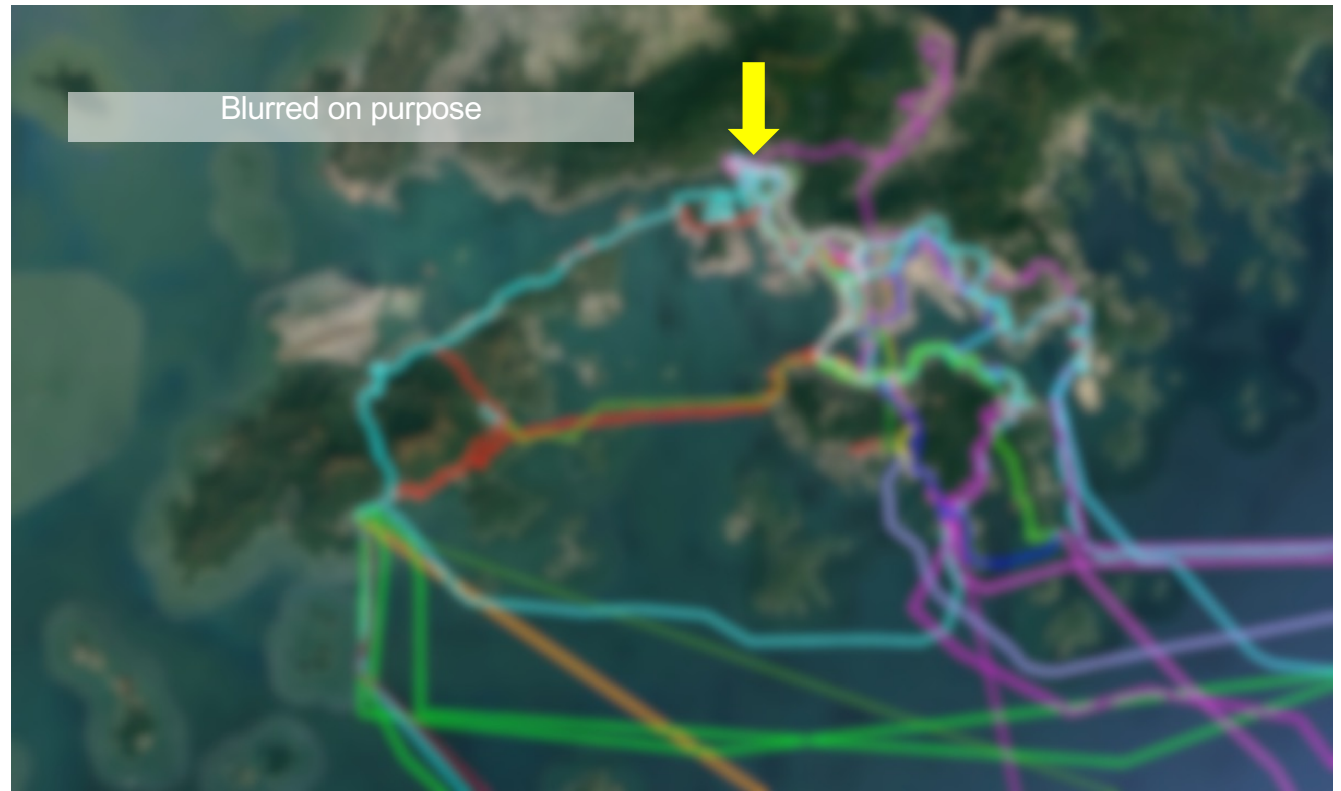
BMH : Beach Manhole, where the subsea cable meets terrestrial fiber to go to the CLS



# APAC Deployment

## HONG KONG

Our Hong Kong DC of choice makes it difficult to find resilient paths for the terrestrial backhaul



# APAC Deployment

Q3 2022

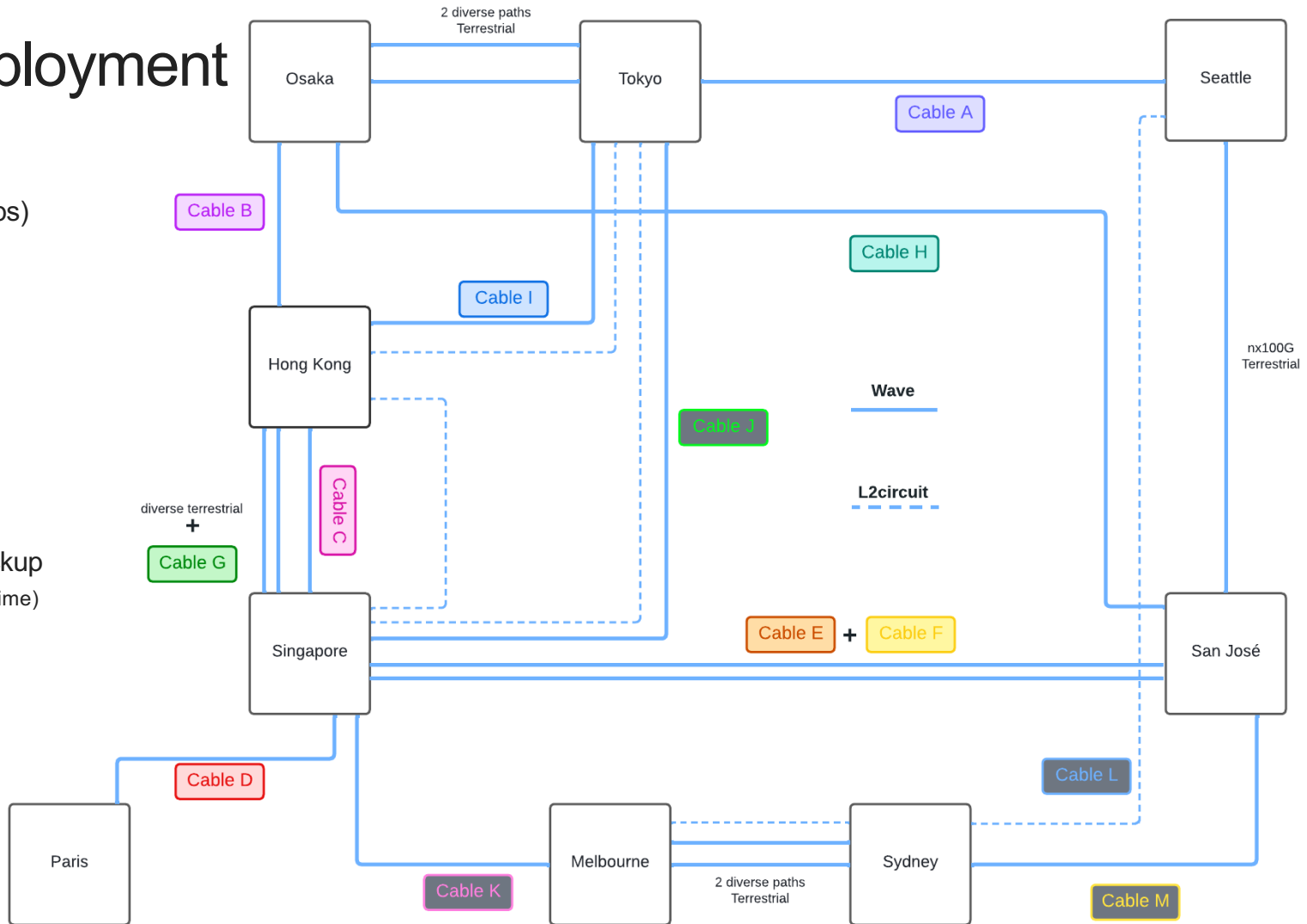
Upgraded capacity (1 Tbps)

More paths (4+) per POP

More cable diversity

New POPs

Layer 2 as last resort backup  
(not the same provider as last time)



# APAC Deployment

## EXPERIENCE

- Like before, outages last for ever
- No POP downtime due to circuits availability issue ...
- ...But we had a close call
- 4 out of 5 circuits down were related to our Hong Kong POP

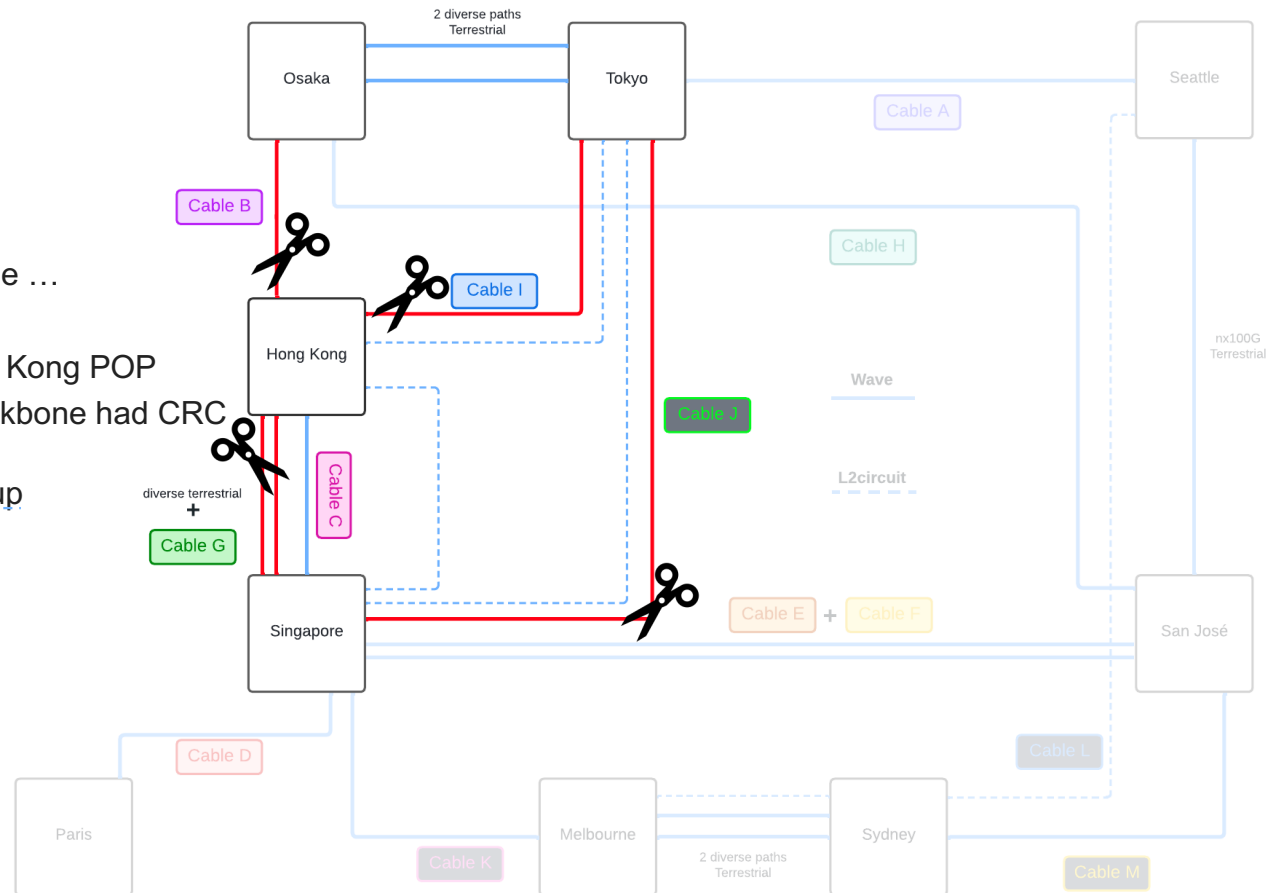
## APAC 180 days circuits availability from 2022-09-28 to 2023-03-27



# APAC Deployment

## EXPERIENCE

- Like before, outages last for ever
- No POP downtime due to circuits availability issue ...
- ...But we had a close call
- 4 out of 5 circuits down were related to our Hong Kong POP
- The last circuit connecting Hong Kong to our backbone had CRC errors on it ...
- Thankfully we were able to use our Layer2 backup with some adjustments
  
- So far we're happy with our design
- How does this compare to other regions ?



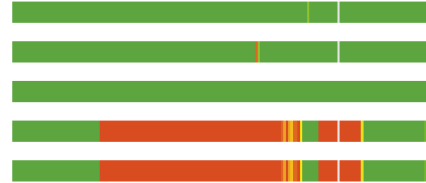
# APAC Deployment

## EXPERIENCE

**APAC**  
180 days circuits availability  
from 2022-09-28 to 2023-03-27



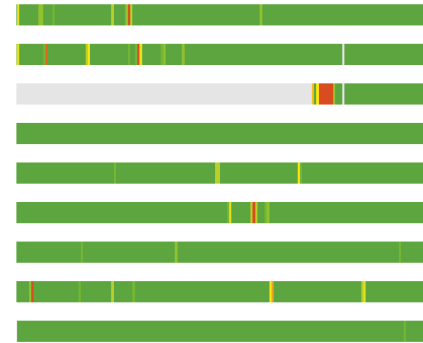
**Transpacific**  
180 days circuits availability  
from 2022-09-28 to 2023-03-27



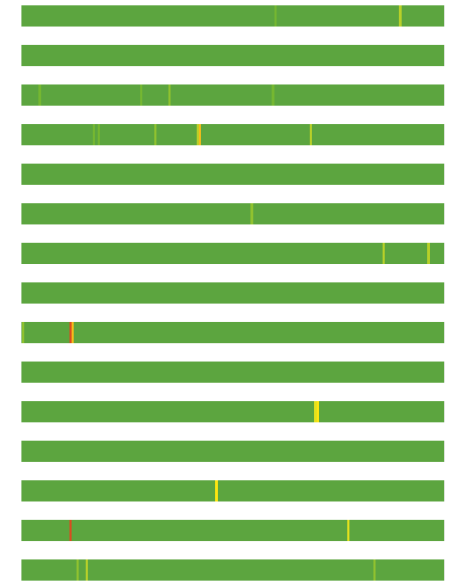
**Transatlantic**  
180 days circuits availability  
from 2022-09-28 to 2023-03-27



**North America**  
180 days circuits availability  
from 2022-09-28 to 2023-03-27



**Europe**  
180 days circuits availability  
from 2022-09-28 to 2023-03-27



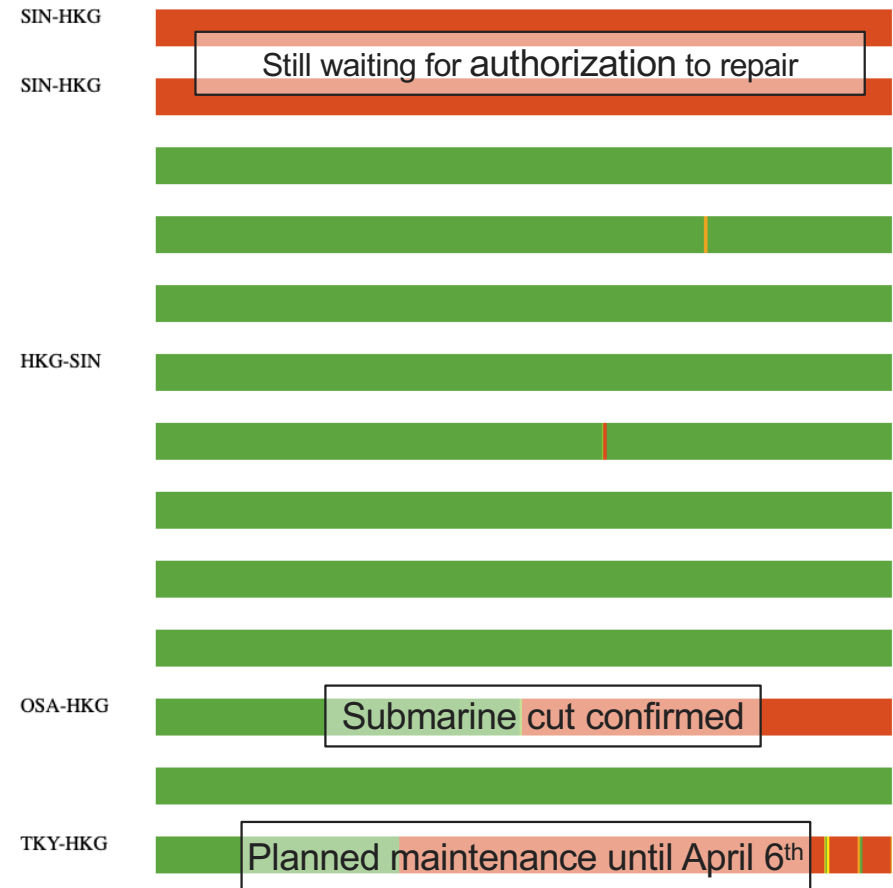
- No surprise here, submarine cables means longer outages
- APAC and Transpacific outages usually last longer than Transatlantic
- North America / Europe (mostly terrestrial) are obviously more reliable (and way cheaper)

# Last Minute Bonus

## EXPERIENCE

- We're back at 4 out of 5 circuits down towards our Hong Kong pop (3 different paths)
- We (once again) activated our L2 backup just in case the last circuit (HGK-SIN 2nd path) goes down too.

## APAC Last 7 days circuits availability from 2023-03-27 to 2023-04-03



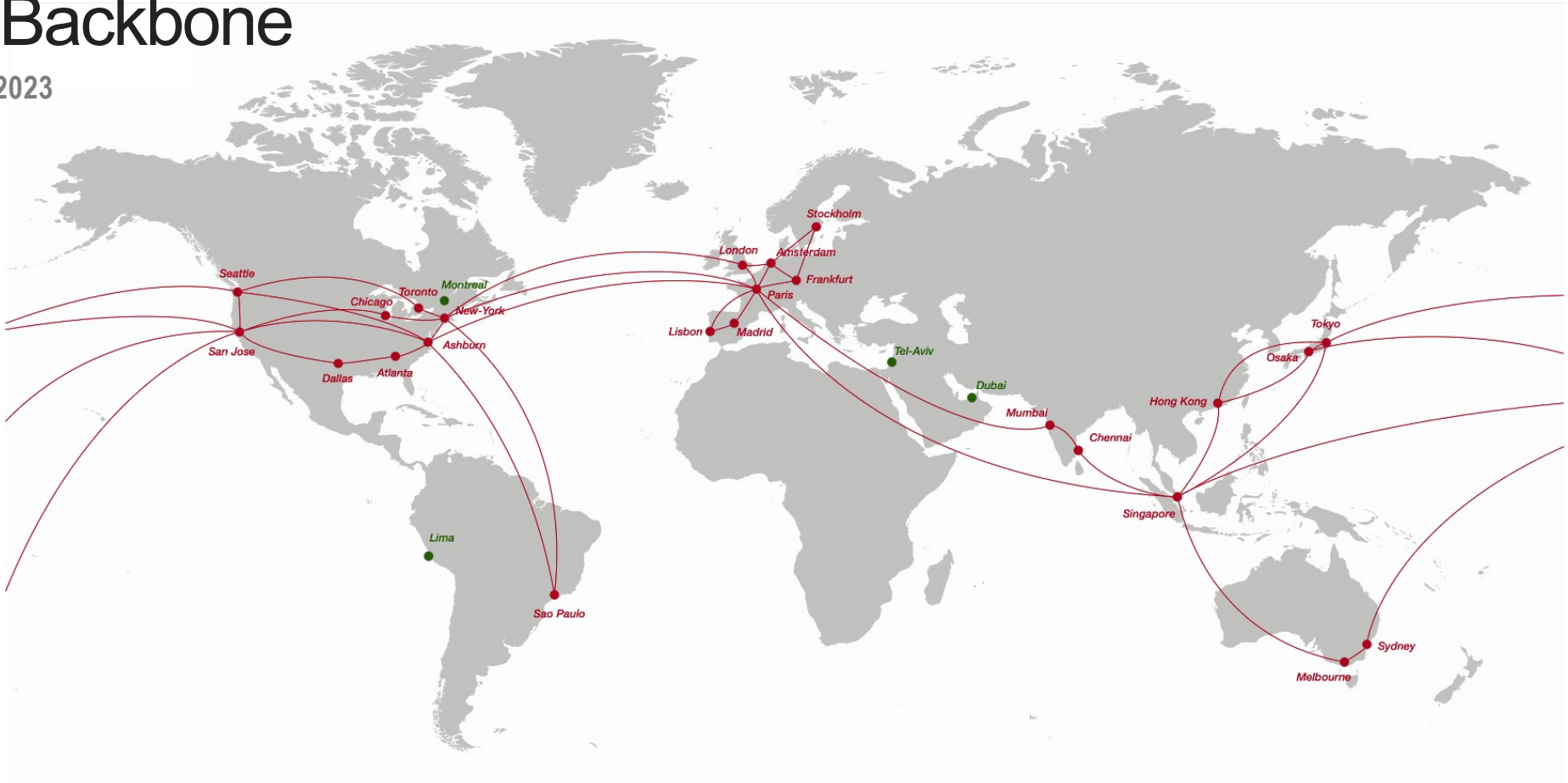
# F5 Backbone today





# F5 Backbone

APRIL 2023



# Our experience

What we've learned

# Our experience

## WHAT WE'VE LEARNED

- APAC is expensive, it accounts for approx. 50% of all backbone costs (transit/peering/circuits)
- Submarine cables outages can last for months increasing the probability of having multiple cable cuts during the same time window
- Requires a lot of path diversity, 4+ paths per pop gets you close to 100% availability but things can still go sideways
- We initially thought L2 backup was overkill with our diversity, turned out we used it multiple times
- It took a long time to study all routes (CLS+BMH+Terrestrial backhaul), but we think it was worth it
- Our circuits providers were always ready to help with backhaul modifications to increase terrestrial diversity
- Shipping hardware, dealing with customs is often difficult.

# Thank You

Questions ?