Deploying a Backbone in APAC

How we failed,
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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

F5 made multiple acquisitions (NGINX, Shape, Volterra, Silverline) to build a services portfolio (WAF, DDoS Protection, Edge computing…)

These services requires a strong underlying backbone to perform
Backbone History
Backbone History

- It all started as a small French network Start Up called Acorus Networks
- 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
• 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 Waves
- 3 Paths per POP
- Submarine cable diversity
APAC Deployment

SINGAPORE TERRESTRIAL EXAMPLE

• We also studied terrestrial backhauls diversity between CLS* and POPs
• 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
Why so many issues?
APAC Deployment

Q3/Q4-2021

• Upgraded capacity (120 Gbps)

• Added more paths, new HK pop

• 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 were commercially available.

Credits https://www.submarinecablemap.com
Each small square/rectangle represent a CLS

(Cable Landing Station)
We mapped out most cable system we could get capacity on and studied the CLS diversity
Mapping out all kmz as well to check diversity between CLS, BMH*, POPS

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

Q3-2022

- Upgraded capacity (1 Tbps)
- More paths (4+) per POP
- More cable diversity
- New POPs
- L2 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 (twice)
- 4 out of 5 circuits down (4 different paths) were related to our Hong Kong POP
The last circuit connecting HK 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

Last 8 months circuits availability Oct-22 to May-23

- 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)
CLS study is on going for our deployment in Middle East like we did for APAC

*CLS : Cable Landing Station
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
Our experience
WHAT WE’VE LEARNED

- 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?