100Gbps
Core Network Deployment
Overall Network
Where Did The Upgrade Take Place?

- The upgrades were done in our Johannesburg and Cape Town PoP’s.
  - South Africa is our fastest growing market.
  - South Africa is a transit point for the WACS cable system.
Standard Core PoP Infrastructure

Cisco CRS Router
8-slot Chassis

Cisco C6880-X
Ethernet Switch
Why This Design?

• Core router ports are expensive.
• More efficient use of IP address space (LAN, not point-to-point links).
• The only traffic hitting the core routers is exiting the PoP.
• Hands–off the core routers.
• Easy to add edge devices within the PoP.
• Device upgrades can be detached/independent from/of each other.
• Avoid stranding bandwidth.
Previous Connectivity Compliment

- Each PoP was deployed with 80Gbps router \( \Leftrightarrow \) switch in the core.
- Capacity provisioned as 2x 40Gbps LAG’s.
- Each LAG comprises 4x 10Gbps ports.
- Each router has links to each of the 2 switches.
- 2 core routers + 2 core switches per PoP.
Previous Connectivity Compliment

• Generally, 80% of the core PoP’s are fine with this design.

• Johannesburg and Cape Town were starting to become a concern.
  • Large EoMPLS flows that don’t load balance well.
  • Transit traffic from other markets during a SEACOM cable outage.
  • Overall network growth in Johannesburg and Cape Town.
New Connectivity Compliment

4-port 100Gbps Line Card
Cisco CRS-X Router
400Gbps/slot

Arista 7508E Ethernet Switch

12-port 100Gbps Line Card
Arista 7508E Switch
1.2Tbps/slot

48-port 1Gbps/10Gbps Line Card
Arista 7508E Switch
480Gbps/slot
Why Change To Arista?

- Cheapest 100Gbps/port core switch on the market (as at 2017).
  - The Cisco Nexus 7710 was too expensive.
  - The Juniper QFX10008 was too expensive.

- Arista supported all the basic features we need for a core switch:
  - 802.1Q.
  - 802.1AX (a.k.a 802.3ad).
  - Load balancing both IP and non-IP traffic flows.
Why Keep The Cisco CRS?

• The Cisco CRS has been our standard core router since 2014.
• Options like the Cisco NCS and Juniper PTX were not available then.
• Nokia’s (ALU’s) 7950 XRS router would have been a new vendor.
• Although remote with each year, non-Ethernet requirements remain.

• The issue with the CRS:
  • The 4-port 100Gbps line cards are too pricey.
  • The CPAK optics are too costly.
  • But no immediate demand needed in other PoP’s.
  • Cisco claim maximum future per-slot throughput of 800Gbps.
  • Engineering support in the future is “unknown”.
  • Focus is on the NCS6000.

• But overall, the Cisco CRS is more than enough for our needs…
The Challenges

• Optics Incompatibility:
  • Initial order was for the Nexus 7710 switch.
  • The Cisco CPAK optics were based on the SR4 spec.
  • The Arista optics were based on the SR10 spec.
  • We waited a month to get the right SR4 optics for the Arista.

• Poor 100Gbps experience in Africa:
  • No one in the industry could assist with our challenges.
  • Little to no experience in the African market.

• Lack of 100Gbps accessories in Africa:
  • We were unable to source MPO cables locally in-continent.
  • Our African suppliers had no knowledge of MPO cables.
  • Resorted to our off-continent suppliers for the support.
  • Some MPO cables shipped with the wrong termination.
The Challenges

• Logistics:
  • 100Gbps line cards are new to African Customs departments.
  • Customs clearance of these was a major problem.

• Cisco CRS fabric upgrade:
  • Pre–100Gbps setup was CRS–3, i.e., 140Gbps/slot.
  • 100Gbps required a fabric upgrade to CRS–X, i.e., 400Gbps/slot.
  • This was known prior to the deployment.
  • A change in in–house teams meant this was forgotten.
  • Avenue of pleasure when the 100Gbps line card won’t boot 😏.

• Training on Arista:
  • We have generally been a 2–vendor network.
  • Cisco and Juniper only.
  • Arista is new, so training was needed.
  • But this wasn’t difficult. EOS looks like IOS.
The Challenges

• Vendor optics lock-in:
  • Arista tried to force us to use their own optics.
  • We insisted on using our own from 3rd party suppliers.
  • Arista provided an unlock code to allow these on their platform.

• Data centre changes:
  • The Cisco 6800-X used 10A power sources.
  • The Arista 7508E needed 16A power sources.
  • We also needed to obtain additional rack space for the Arista’s.
Final Result
Final Result
Thank You

Q&A

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