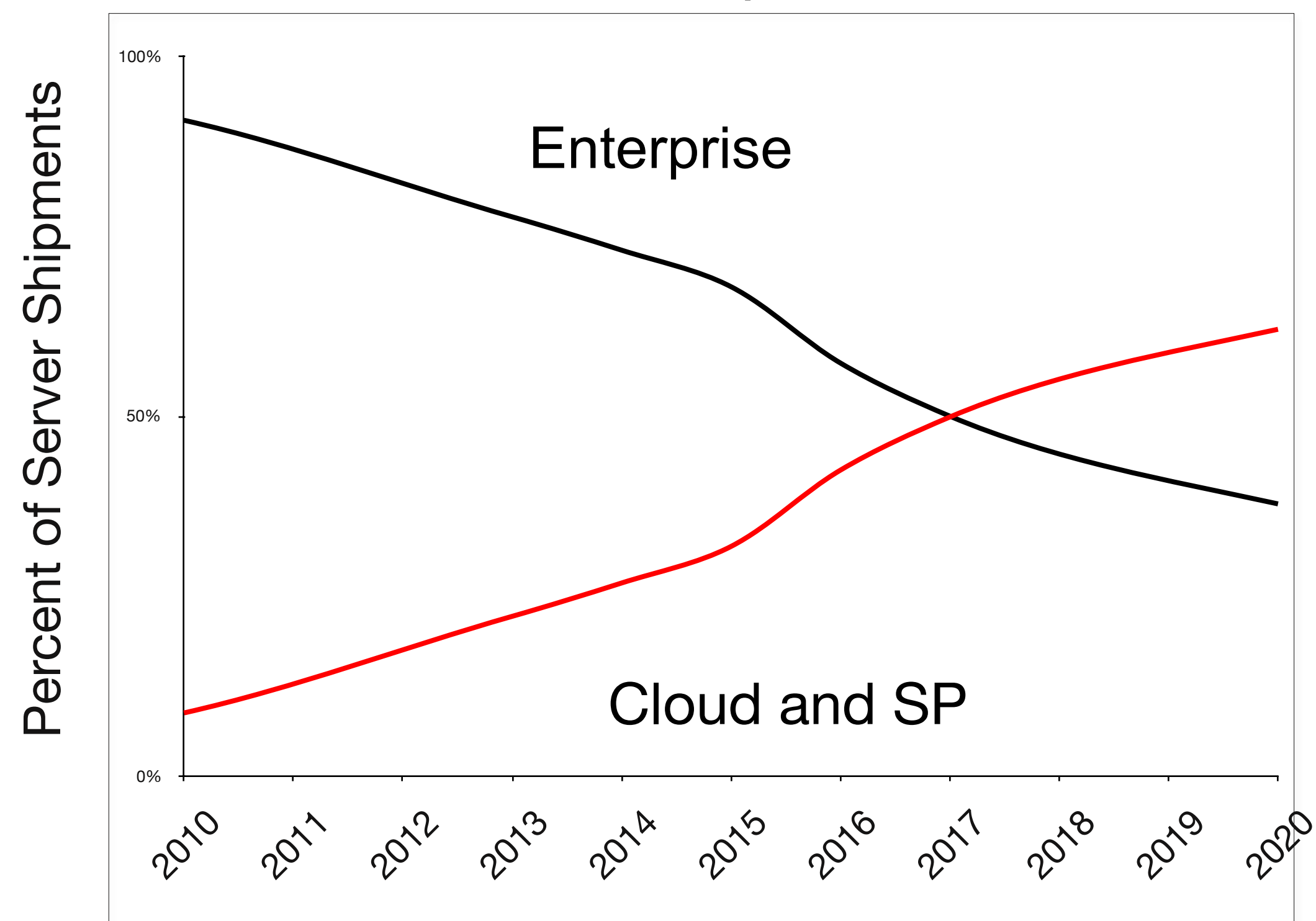


100G SERDES and Optics Transitions

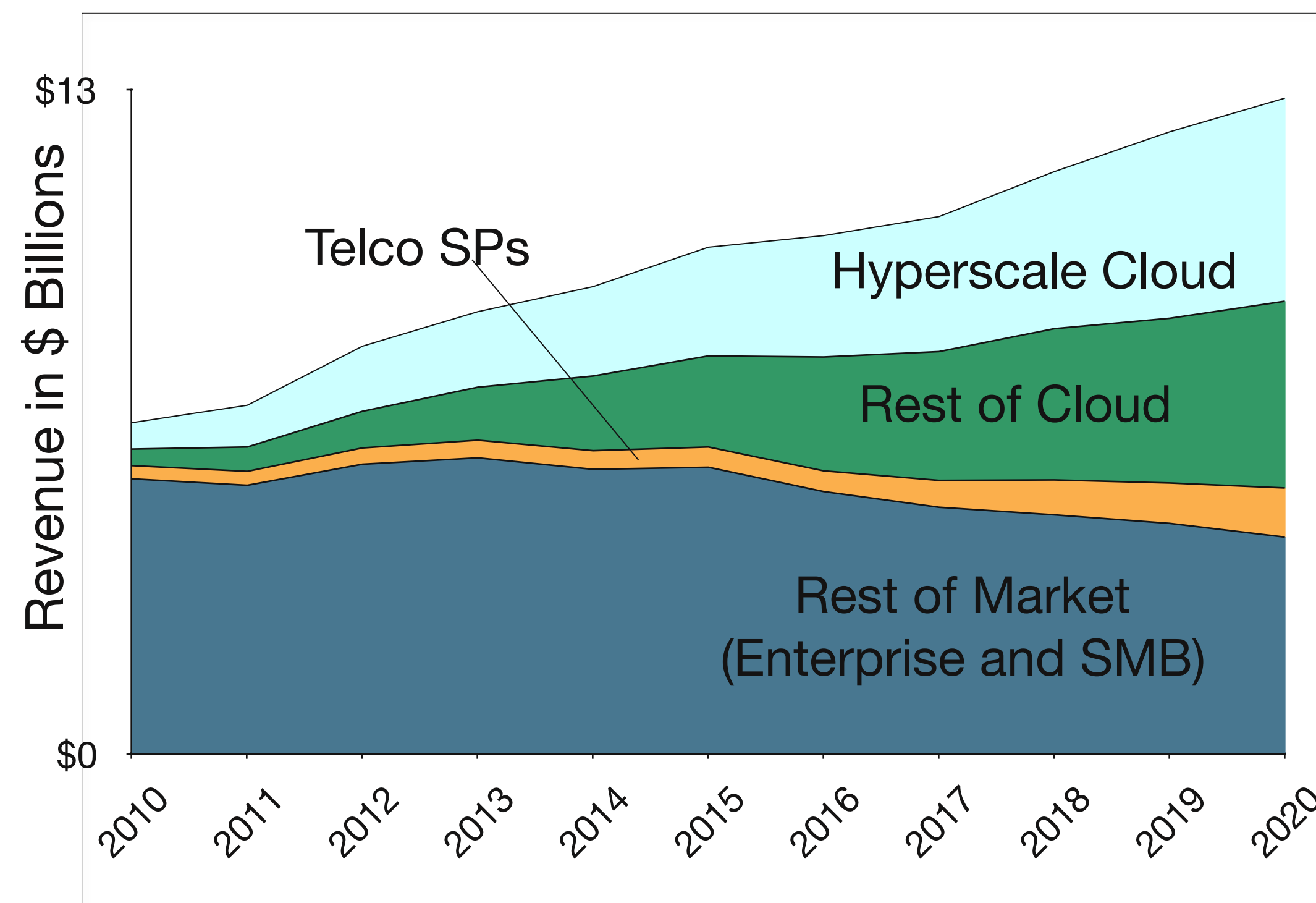
Arista Networks Inc
June 30, 2017

Cloud Has Become the Largest Consumer for Datacenter Network Technology

Server Shipments



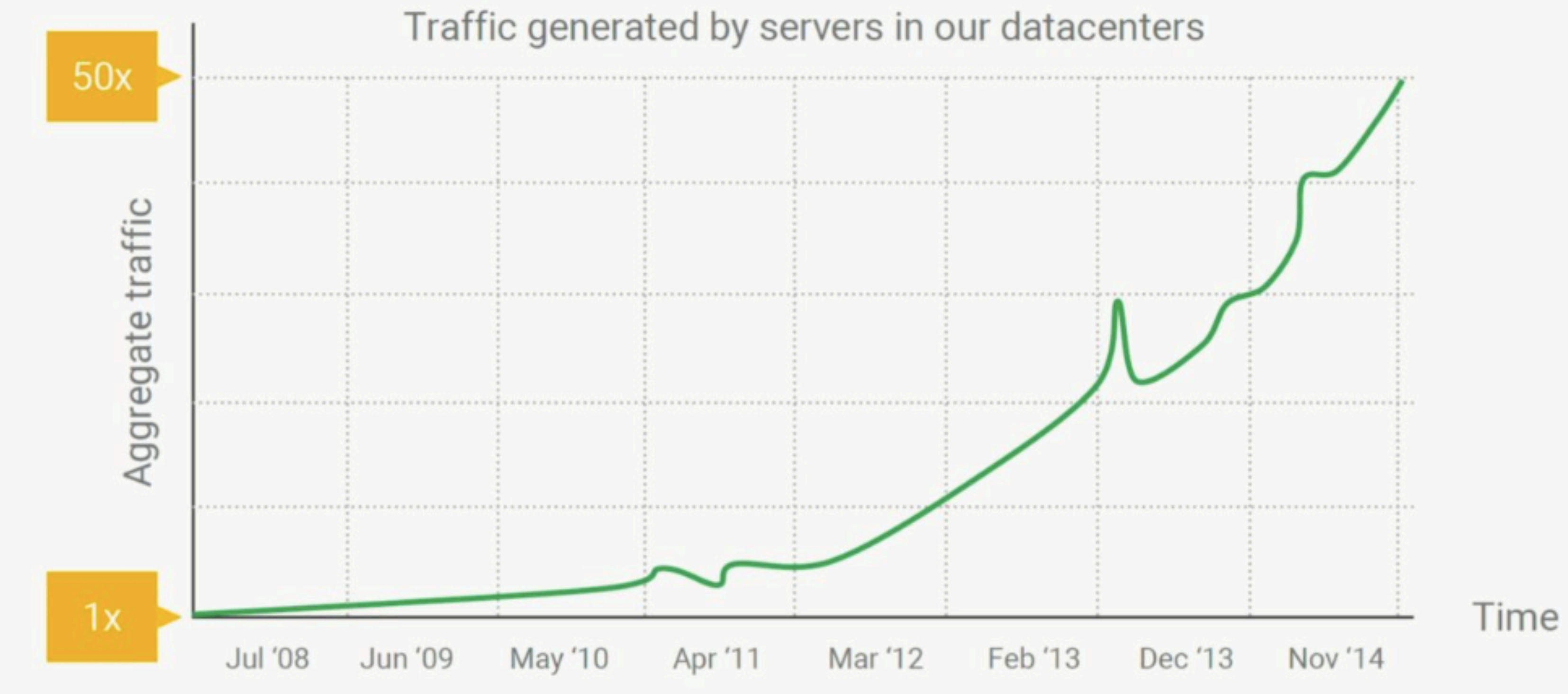
Data Center Ethernet Switch Revenue



Source: Dell'Oro Market Research, Ethernet Switch Update, January 2017

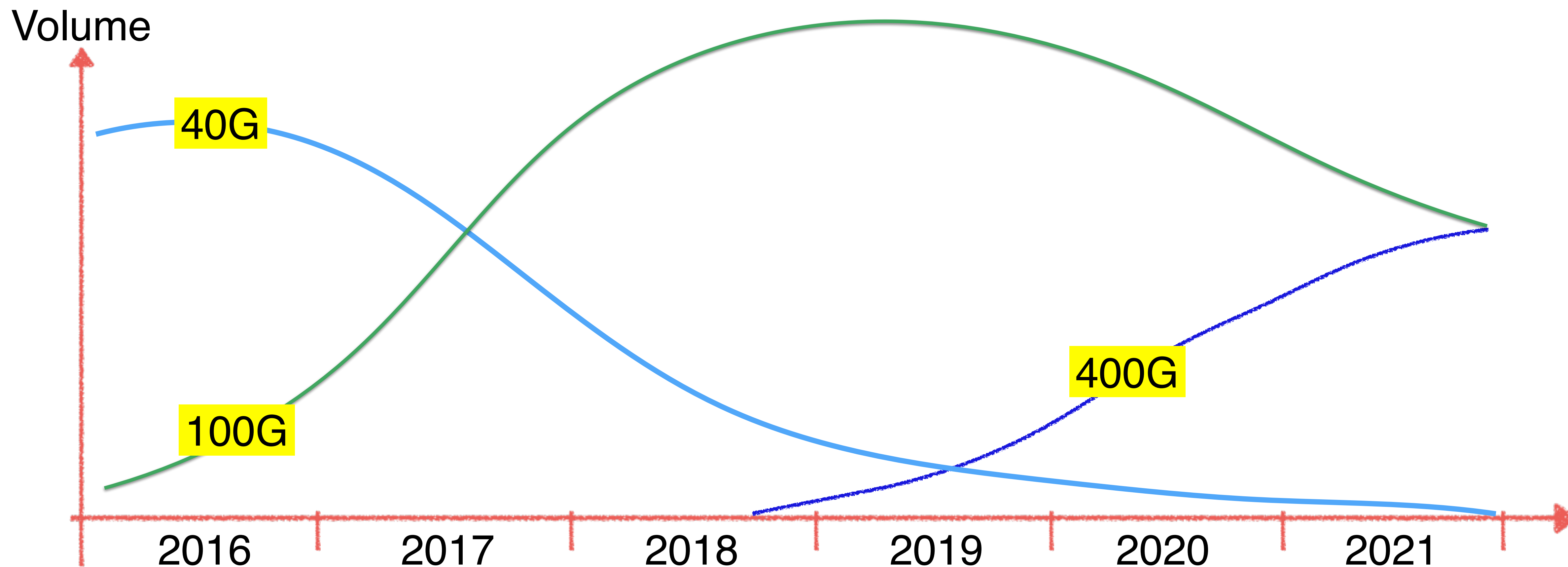
Cloud Network Intra-Datacenter Bandwidth Demand is Doubling every Year

Intra-datacenter Bandwidth Growth



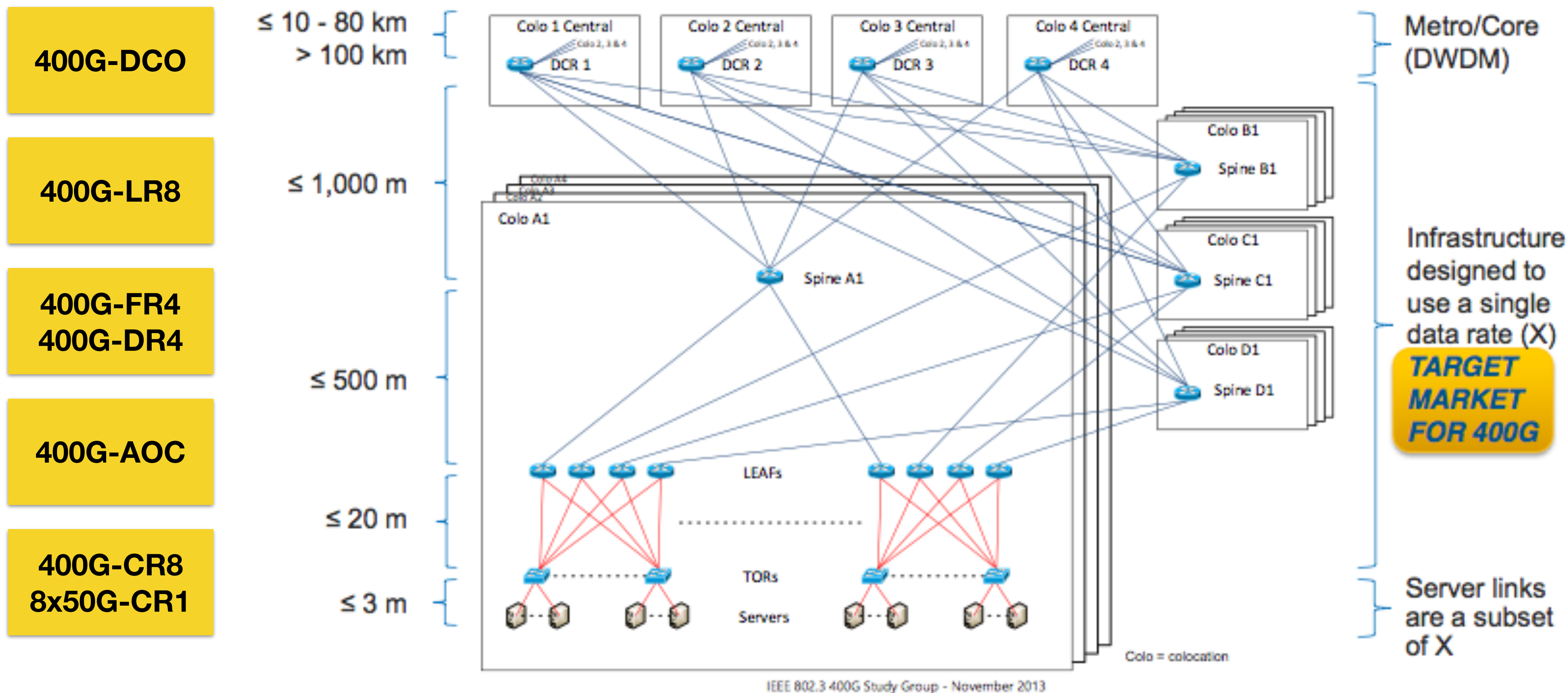
Source: Urs Hoelzle, Google Cloud

This Drives Rapid Adoption of Higher Speed Ports



Note: 400G port numbers includes both 8x50G and 4x100G implementations

400G In the Cloud Network



Ethernet Speed Transitions by Lane Speed

Lane Speed	10Gbps	25Gbps	50Gbps	100Gbps	
1X	10G	25G	50G	100G	Server Interface
2X	—	50G	100G	200G	
4X	40G	100G	200G	400G	Leaf-Spine Interface
8X	—	—	400G	800G	
Availability	2010	2015	2018	2020	



SERDES Speed Transition Observations

Active Lifetime of SERDES speeds is getting shorter

5 years for 10G, 3 years for 25G, 2 years for 50G

50G SERDES is an interim step to 100G SERDES

Majority of 400G ports shipped will use 100G SERDES

Economics drive rapid adoption of higher SERDES speeds

Improved system density, bandwidth and cost-performance

Market Transitions to new SERDES speeds fairly rapid

Volume typically falls about half 18 months after peak

Optics Speed Transitions

Switch Silicon SERDES Transitions drive Optics Lambda Transitions

10G-NRZ > 25G-NRZ > 50G-PAM4 > 100G-PAM4

Three Cases for Optics Lambda relative to Silicon SERDES speed:

Optics Lambda *matches* Switch SERDES speed: no gearbox required

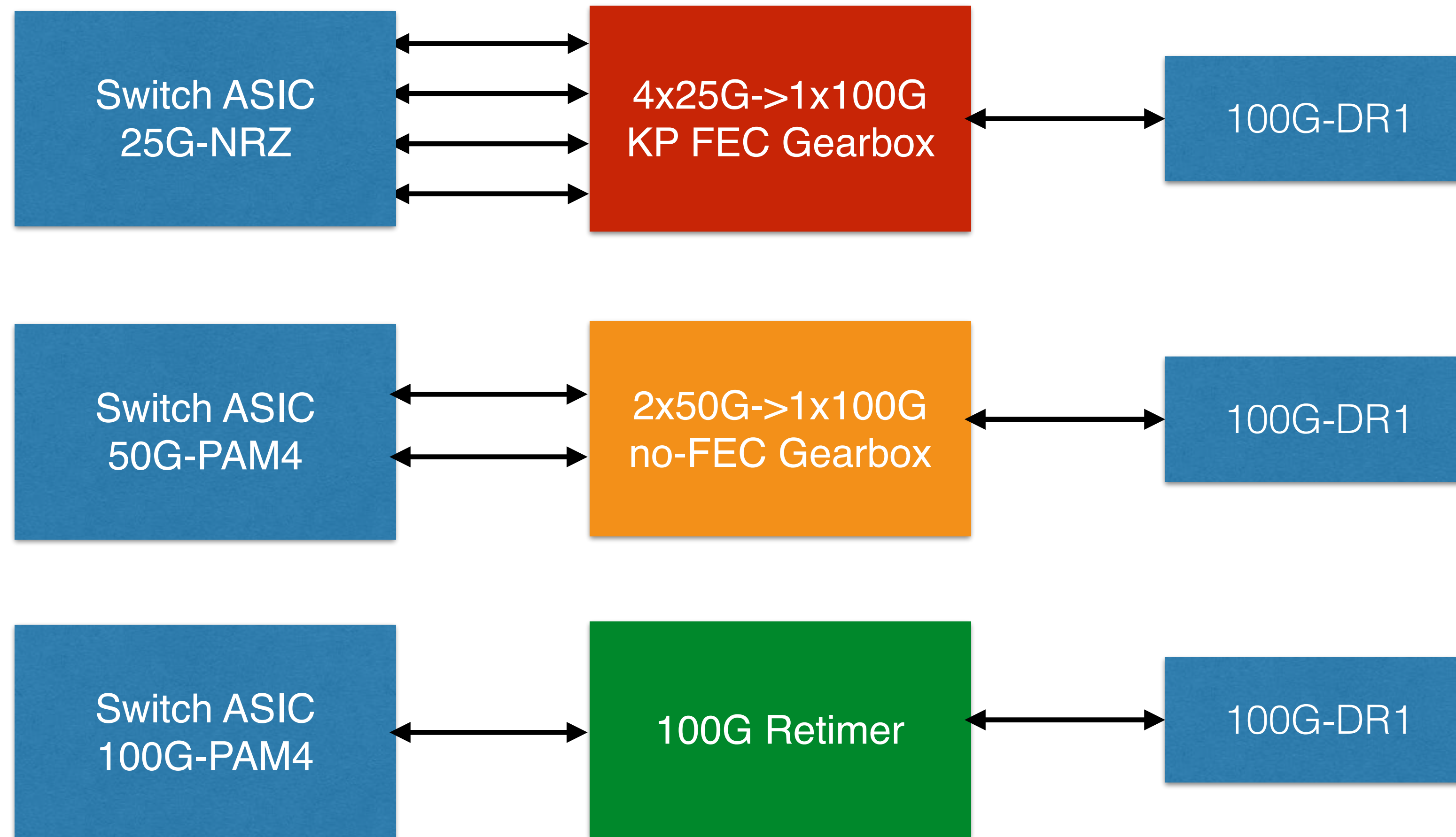
Optics Lambda *faster than* Switch SERDES speed: requires gearbox

Optics Lambda *slower than* Switch SERDES speed: inverse gearbox

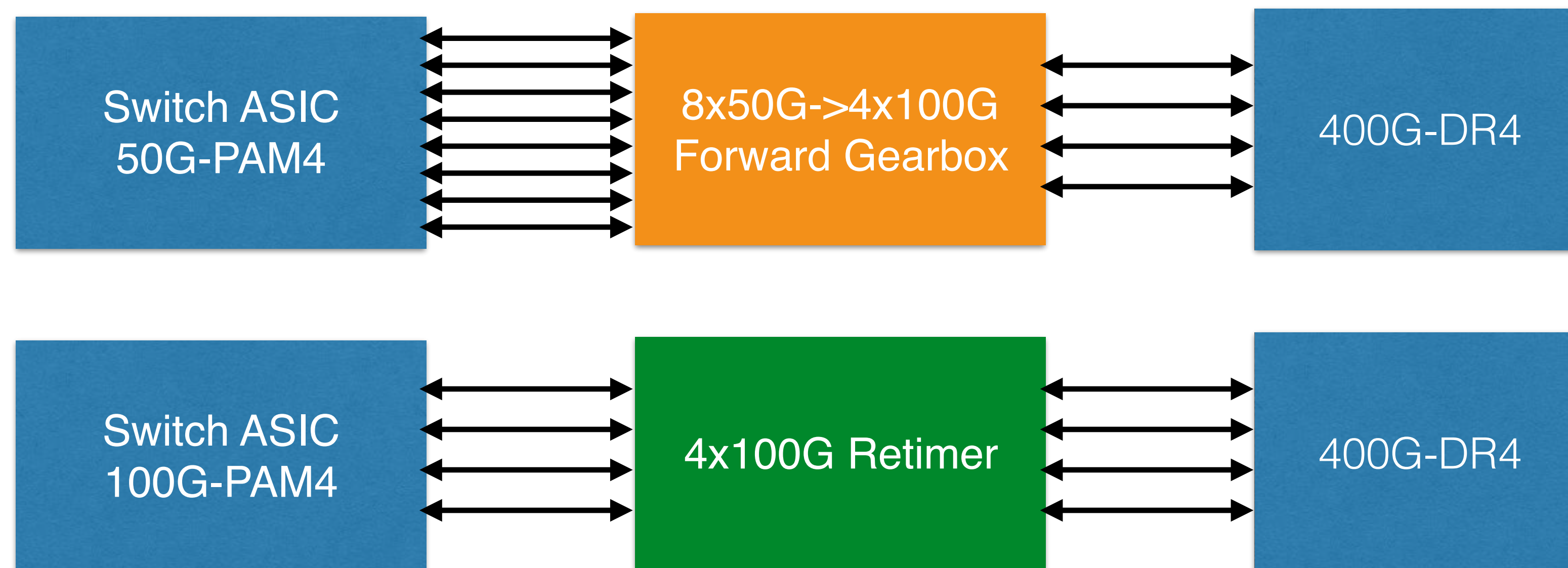
Optics Lambda slower than native SerDes speed undesirable

Inverse gearboxes add significant board space, cost and power

Example: 100G-DR1 Optics (100G Serial)



Example: 400G-DR4 Optics (4x100G Serial)



100G SERDES solution is denser and more power efficient

Conclusions

Switch SERDES drives Optics Lambda transition

Pace of new SERDES speed transitions quickening

Desirable to have Multi-generational Optics

Short 50G SERDES lifecycle favors 100G per lambda optics

100G per lambda SMF optics will be mainstream for 400G

VCSEL/MMF will also need to move to 100G per lambda

Supporting slower lambda optics speeds is undesirable

Inverse gearboxes add significant power and cost