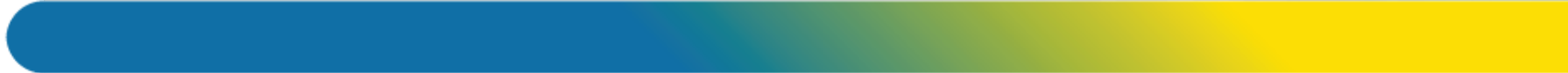




# Forecasting Demand for Ethernet Optics

IEEE 802.3 Beyond 400 Gb/s Ethernet Study Group Electronic Meeting

Vlad Kozlov | February 2021

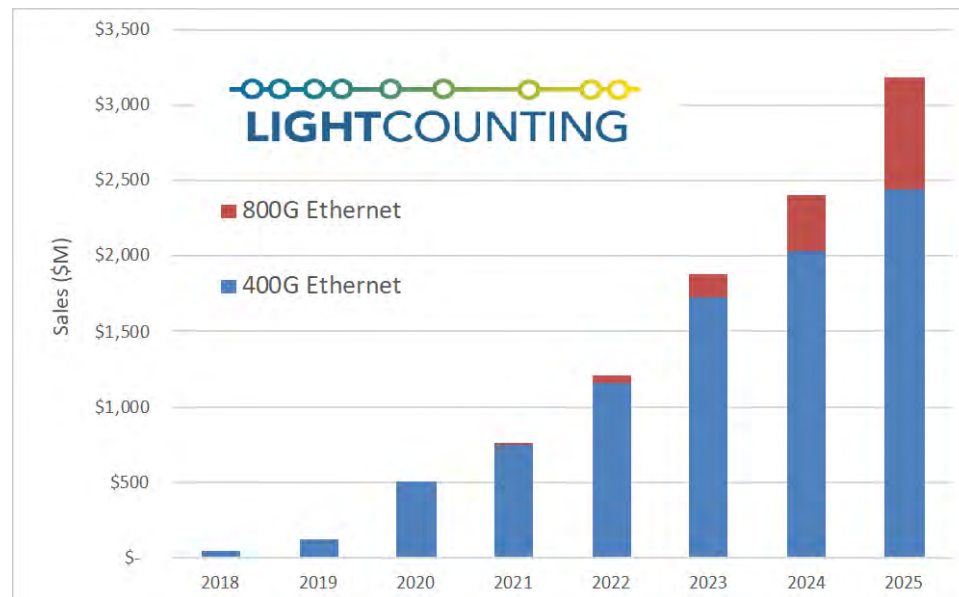


# What is driving demand for Ethernet optics?



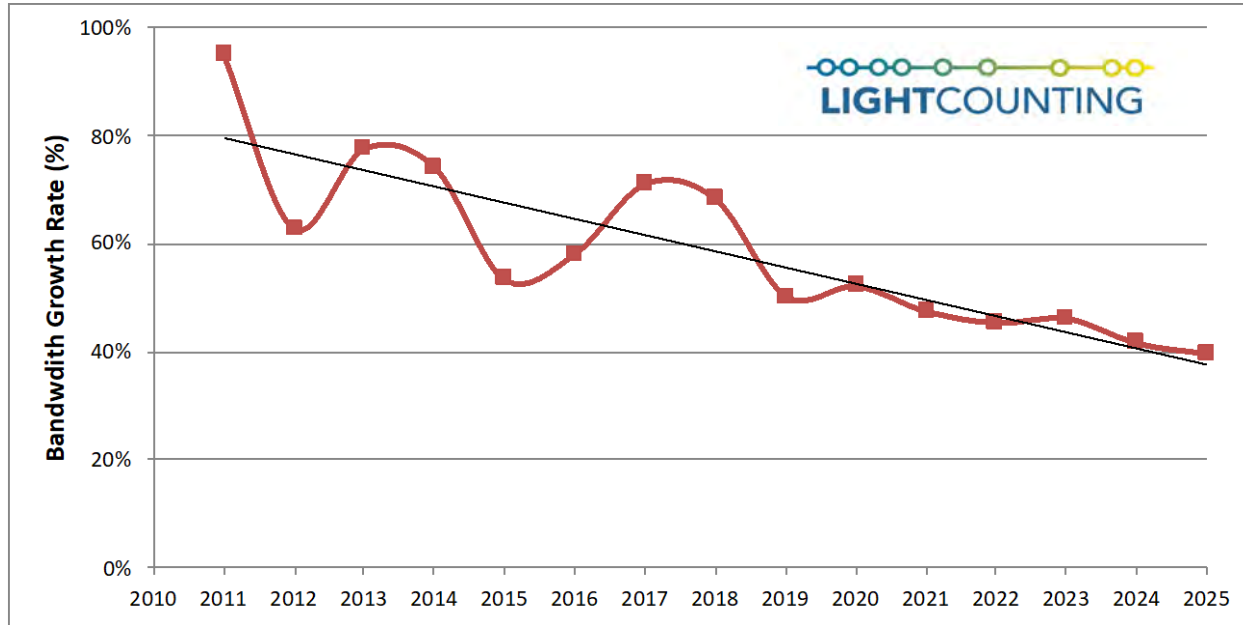
Yes, it is the Cloud, but for how long will this last?

- New Customers?
  - No longer the case for established companies
- New Cloud Services and Applications
  - Some, but will AI deliver on the expectations?
- Increasing data traffic, mostly driven by video
  - The growth rate is moderating (see next slide).
- How much to invest into datacenters?
  - Cloud companies are very profitable, because of advertising revenues. Cloud services are still losing money (apart from Amazon).
- Why transition to higher data rates?
  - Lower cost per bit.

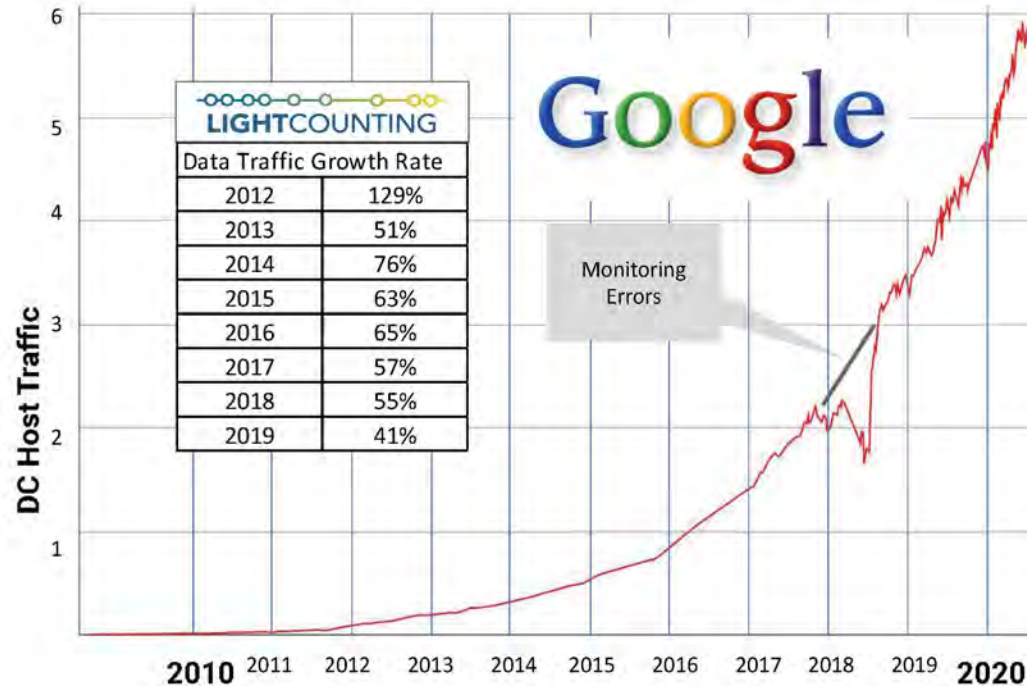


# Forecast “Sanity Check”

The bandwidth is calculated by multiplying transceiver units by data rate and adding them up

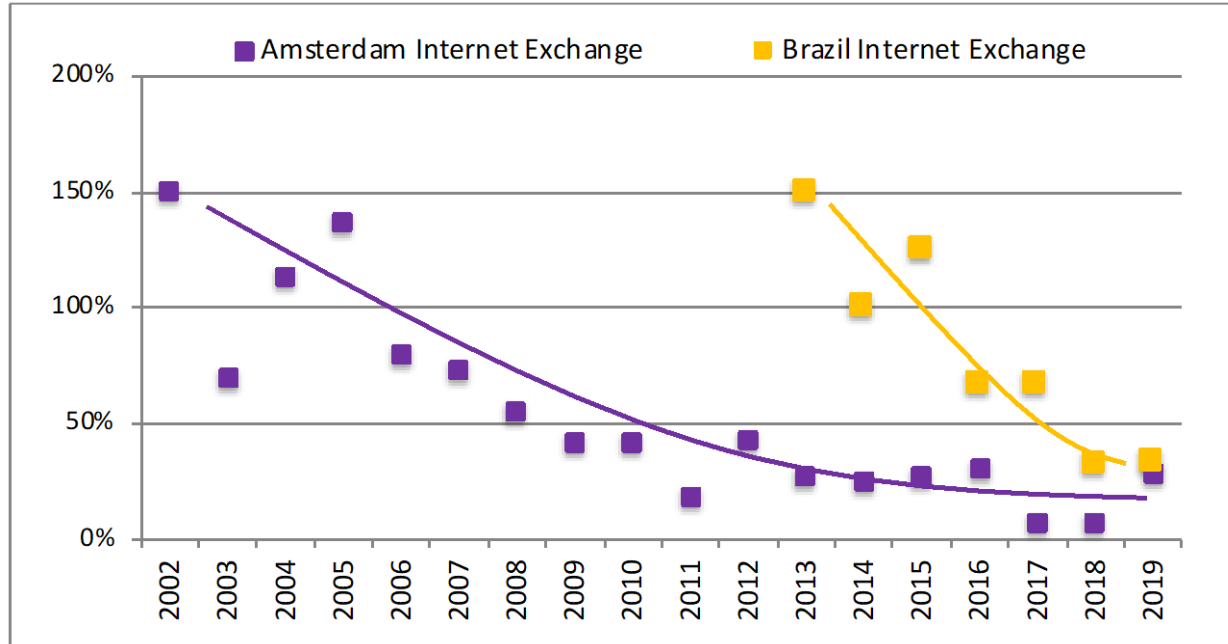


# Traffic Growth in Google's Data Centers



# Traffic growth at Internet Exchanges

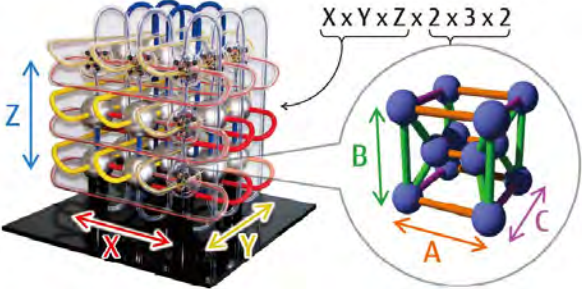
At 40%, traffic growth rate at Google in 2019 matches Amsterdam IX in 2009. Will it fall to single digits by 2027? It will, unless new Cloud applications emerge.



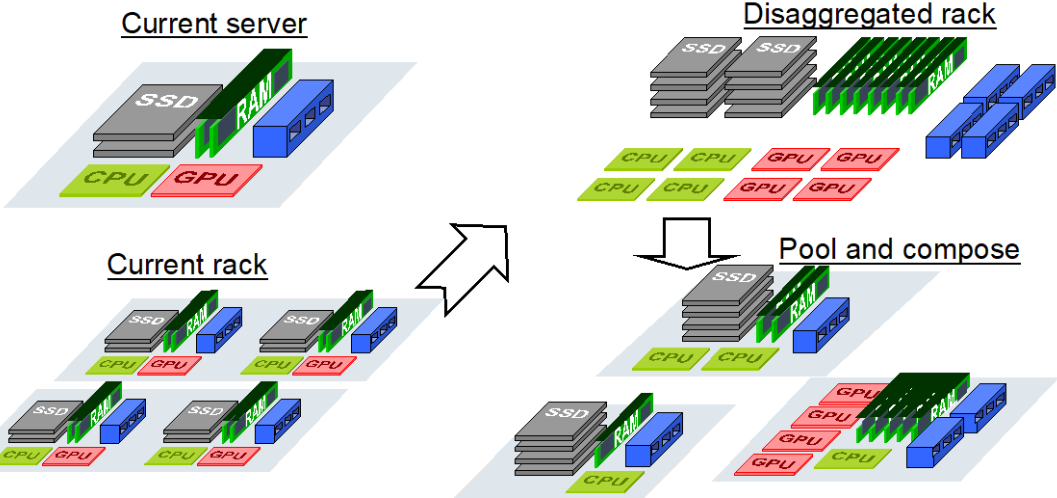
# Evolution of HPCs and AI Clusters

High Bandwidth connectivity is becoming even more critical for these systems

Fujitsu TofuD 6D Interconnect



Disaggregated designs will need 100x bandwidth

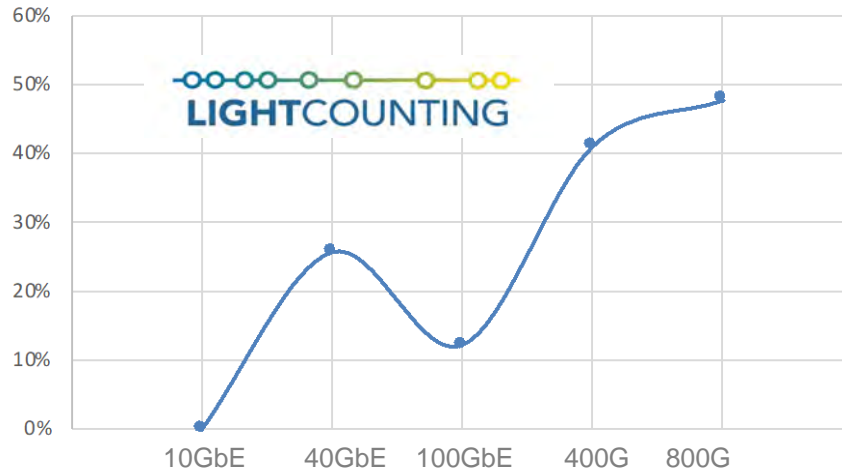


# Parallel fiber connections is the future

Multi core fibers may help as well

Data rate	10GbE	40GbE	100GbE	400G	800G
Parallel Fiber Modules	?	PSM4	PSM4	DR4	DR8/PSM8
Year of Deployments	2010	2016	2020	2023	2025
Percent of the total shipments	0%	26%	12%	41%	48%

Adoption of Parallel Fiber Optical Transceivers



One vendor's CPO solution:

64 fibers per chip

500 Gbps/mm bandwidth density

This is just a starting point:  
 "the bandwidth will double every 2 years" -  
 Kozlov's version of Moore's Law 😊





# Thank You



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