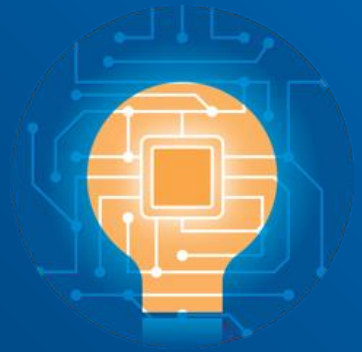
INTEL SILICON PHOTONICS
ENABLING DATA CENTER CONNECTIVITY

OFC 2016

COBO – What it is and why you should care

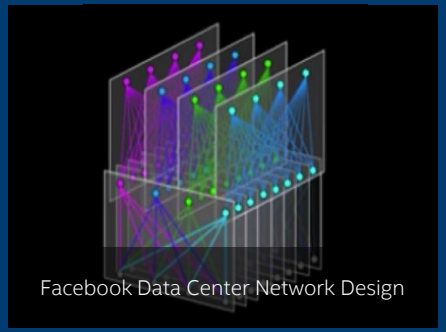
Robert Blum
Director of Strategic Marketing and Business Development
Silicon Photonics Products Division



HYPER SCALE DATA CENTER


Google Data Center


Facebook Data Center Fort Worth, Texas


Facebook Data Center Network Design

5 ZB

4x of the entire global internet traffic

$1B

Investment >200K Servers, 10K + switches

45% +

Optical Connectivity as % of Networking Spends

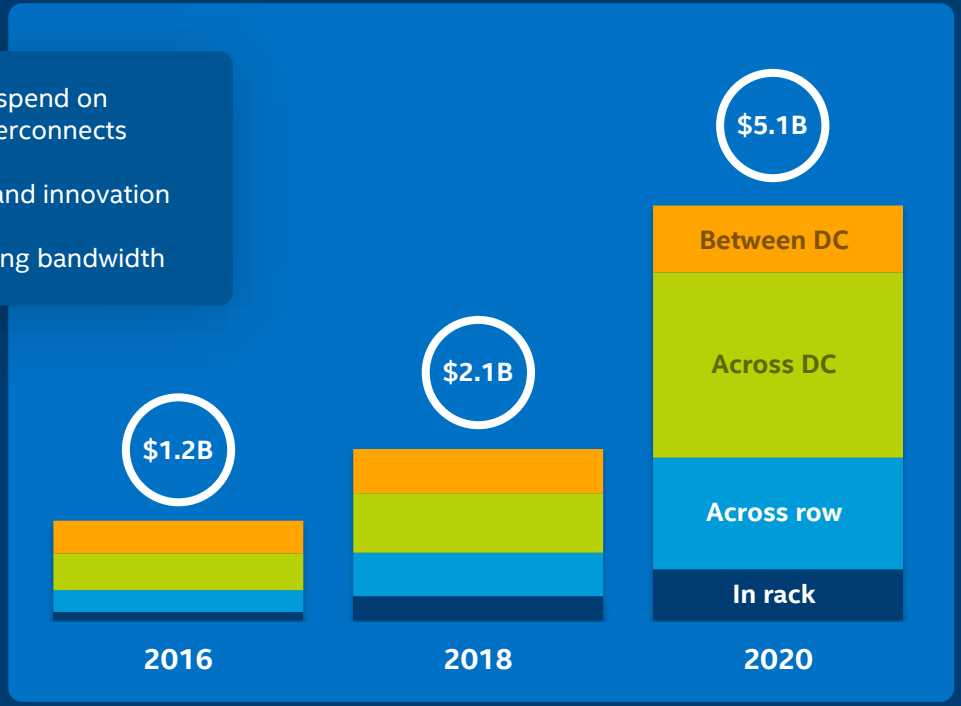
Source: Estimates from Facebook, Google, Cisco publications

DATA CENTER CONNECTIVITY TAM

Data Center total spend on
100G and 400G interconnects

Driven by CSP growth and innovation

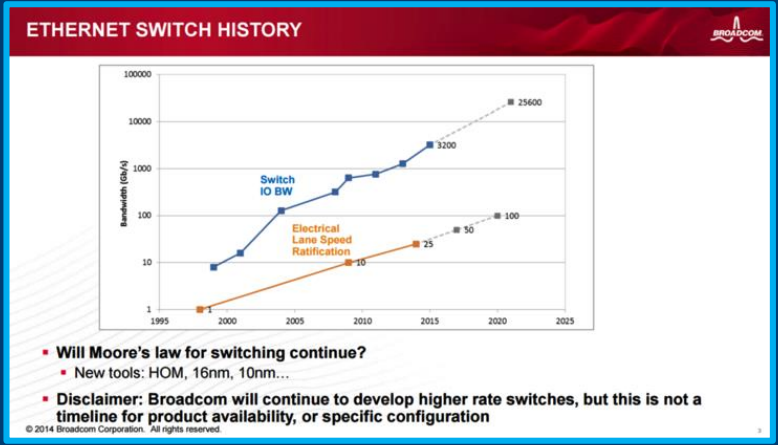
Requiring ever increasing bandwidth

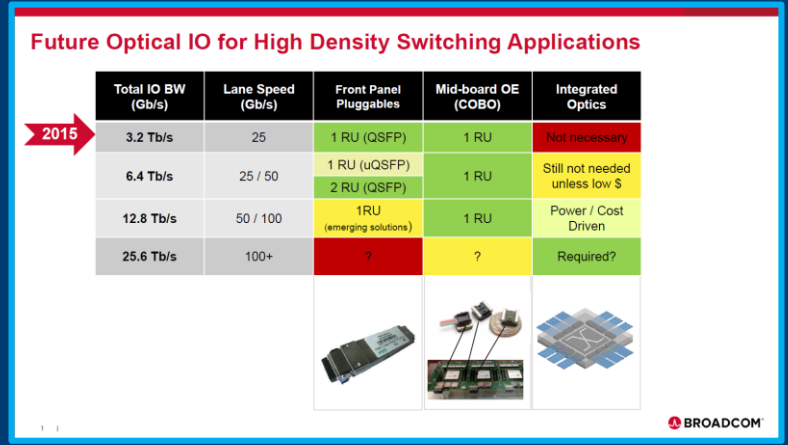


Source: Market model based on Dell'Oro, Crehan and Lightcounting 2015 reports

ETHERNET SWITCH HISTORY

and Package Limitations





- I/O Bandwidth is becoming a network constraint
- Continued bandwidth growth requires increasing the number of physical I/O ports on the switch to support radix and bandwidth requirements
- This drives the need for embedded and integrated optics

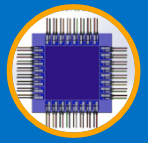
Source, Rob Stone, http://www.ethernetalliance.org/wp-content/uploads/2014/10/Rate-Debate-TEF-v6.pdf.
OFC 2016 Executive Forum Panel 4. http://ieee802.org/3/cfi/1115_1/CFI_01_1115.pdf

ENABLING BANDWIDTH GROWTH WITH SILICON PHOTONICS

Driving Industry Form Factor Evolution

Today
Pluggable 100G

Tomorrow
Embedded 400G



Next
Integrated Optics to Switch & Server

Future Requirements for Optical Interconnects

10X
Reduction in Cost per Bit ($/Gbit)

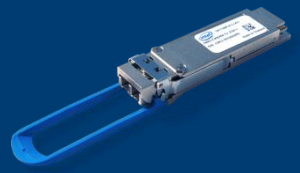
>10X
Bandwidth Density ($Gbps/mm^2$)

>30 → <10
Power per Bit (pJ/bit)

Design-in by customers now for 100G data center ramp

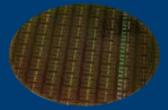
Supporting open standard 100G optics and beyond

100G CLR4 Alliance cobo



intel Silicon Photonics

True wafer-scale integration and manufacturing with hybrid laser



Most flexible optical integration platform including WDM

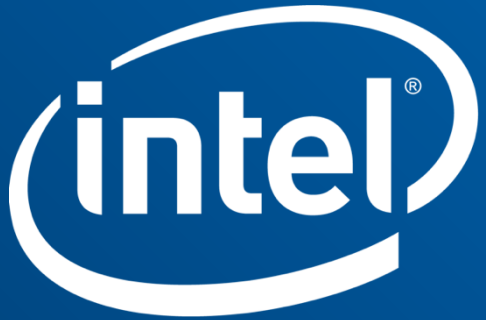
intel

SUMMARY

Cloud Service Providers are innovating across the data center and driving demand for high volume single mode optics today

Orders of magnitude improvements in cost per gigabit, power consumption, and bandwidth density are needed moving forward

Silicon Photonics is the key enabling technology for continued bandwidth growth in the data center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