DATA-CENTRIC INNOVATION SUMMIT

AUGUST 8, 2018 | SANTA CLARA, CA

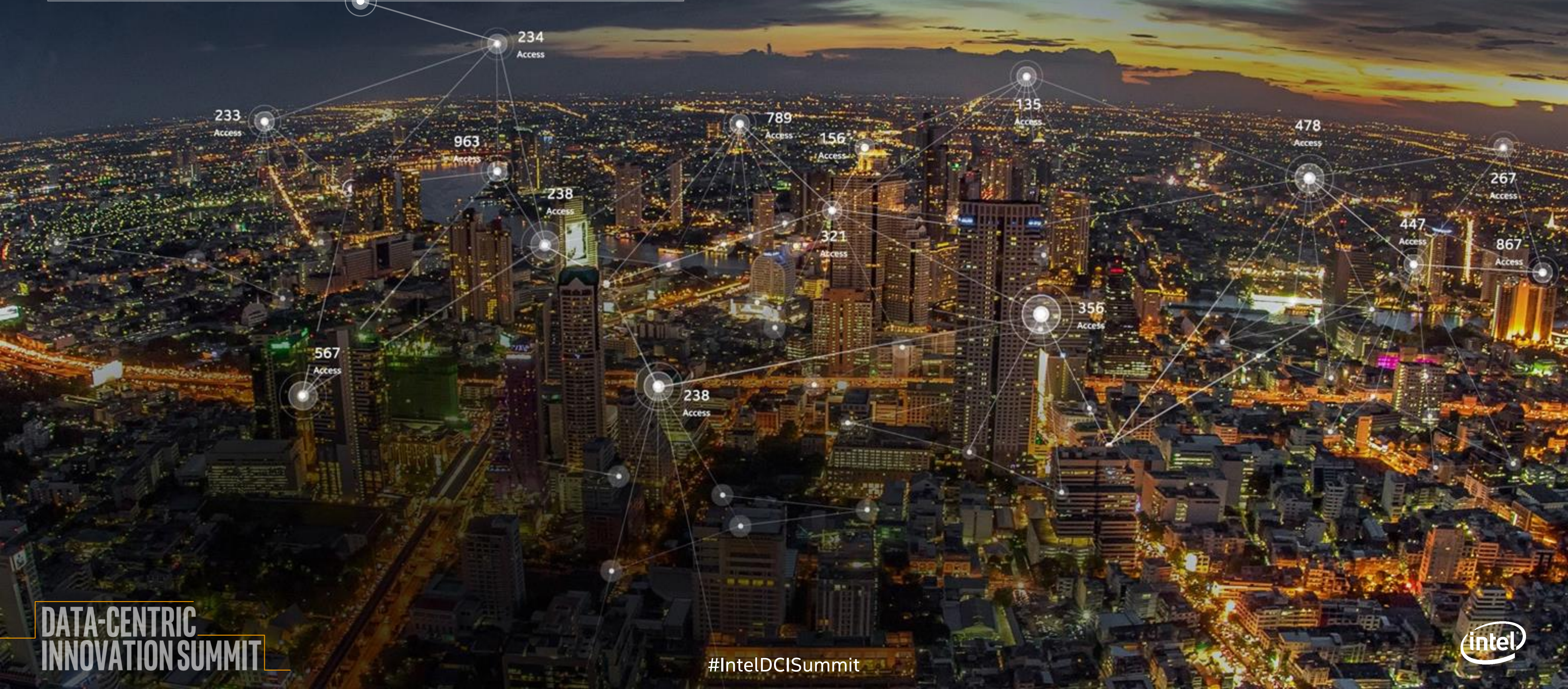
intel | DATA-CENTRIC INNOVATION SUMMIT

INNOVATIONS FOR THE NEXT ERA OF CONNECTIVITY

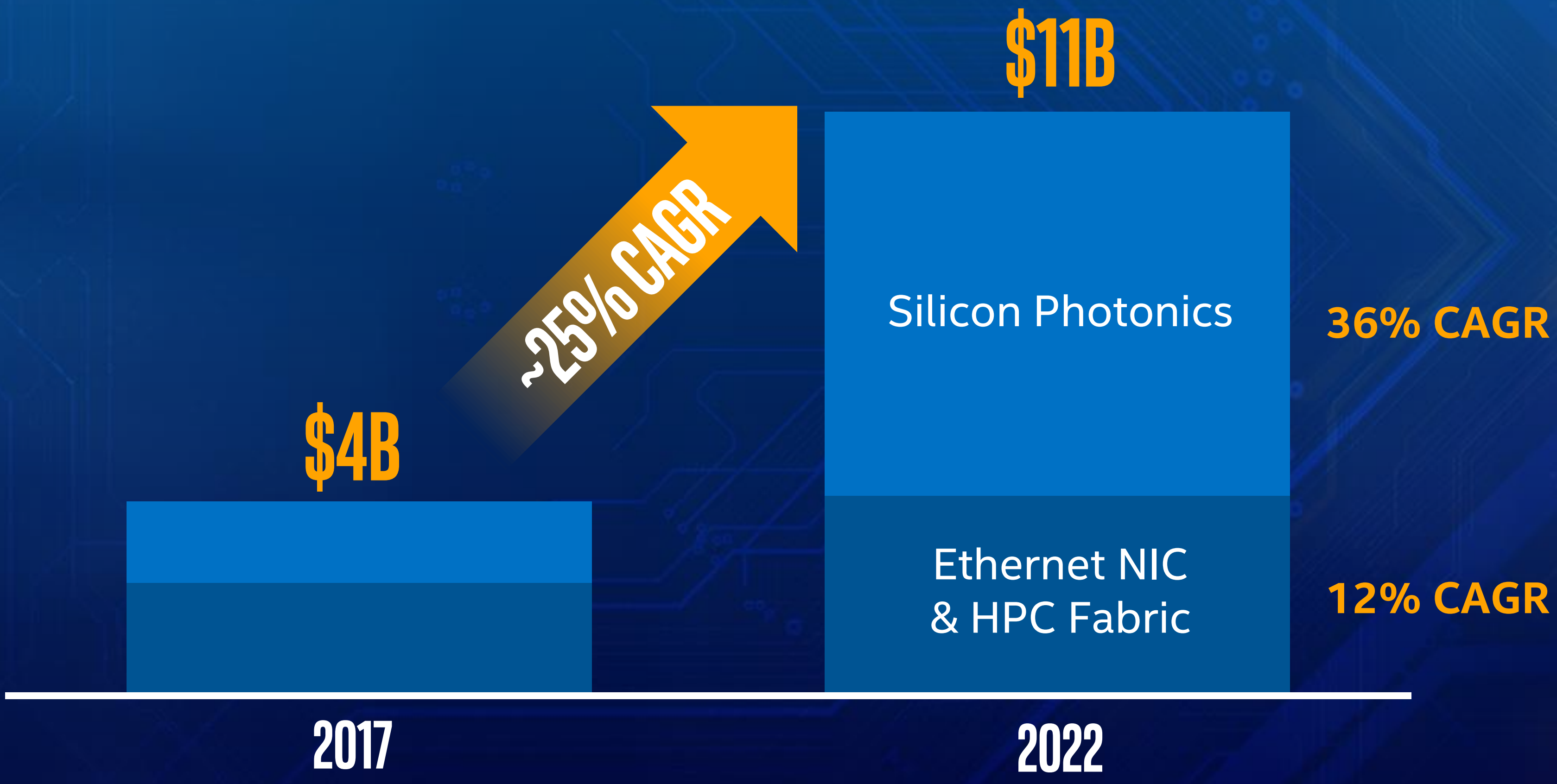
ALEXIS BJÖRLIN

CORPORATE VICE PRESIDENT & GENERAL MANAGER
CONNECTIVITY GROUP

INNOVATION IN END-TO-END CONNECTIVITY



DATA CENTER CONNECTIVITY OPPORTUNITY



Forecasts are an amalgamation of analyst data and Intel analysis, based upon current expectations and available information, and are subject to change without notice. Silicon Photonics includes 100G+ links in the data center. Ethernet Switch Silicon TAM is not included in Connectivity chart (is included in Network Logic Silicon TAM).

CRITICALITY OF CONNECTIVITY TO COMPUTE

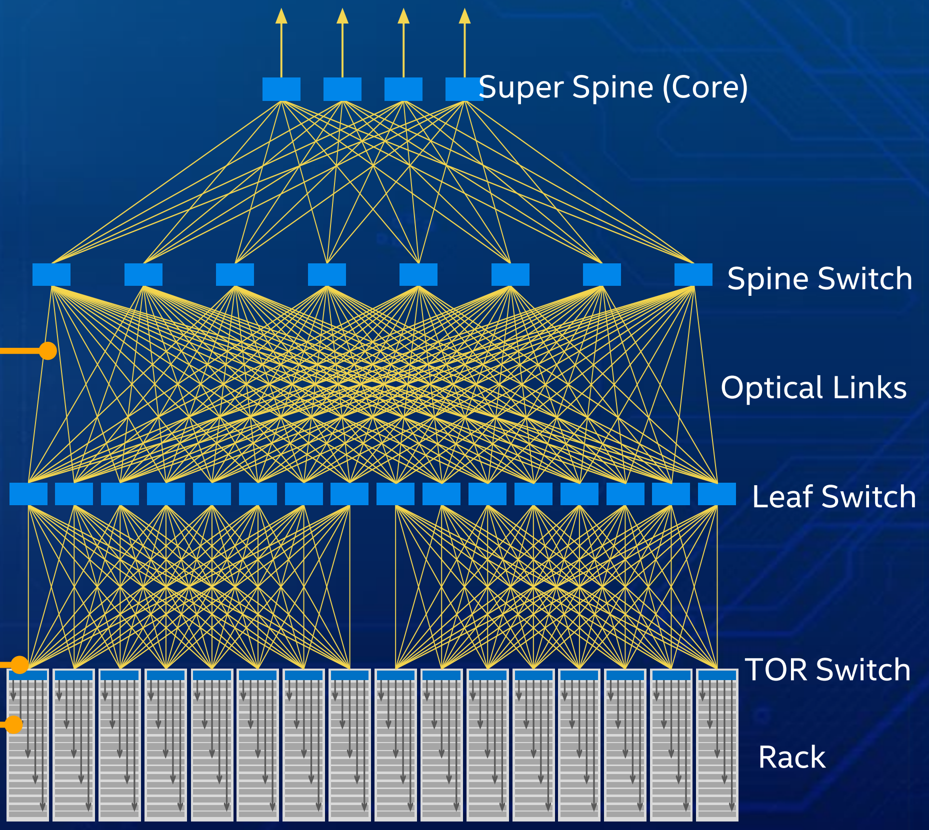
INTERCONNECT: MODULES & CABLES

SWITCH: TOP OF RACK

NIC: HOST-FABRIC INTERFACE

NIC

SERVER



Compute, Storage, Accelerator, Networking

CONNECTIVITY DEFINES PERFORMANCE AT SCALE

Improves Compute Performance, Efficiency & Scale

Enables Storage & Accelerator Pools

Enforces Platform Policy & Security

Enables Warehouse → Global-scale Compute

SILICON PHOTONICS ENABLES SCALE

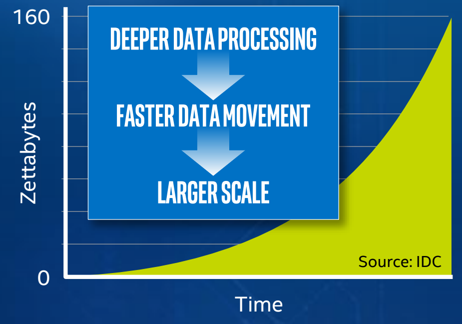
Spans Increasing Distance @ Increasing Speed

SMARTNIC ACCELERATES INFRASTRUCTURE WORKLOADS

Network, Storage, Security

CRITICALITY OF CONNECTIVITY TO SCALE

EXPONENTIAL DATA GROWTH → FABRIC INNOVATIONS



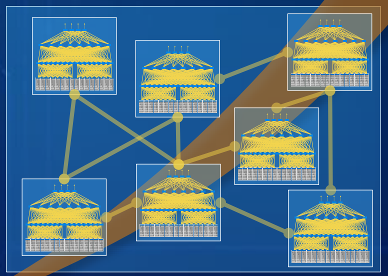
DEEPER DATA PROCESSING

FASTER DATA MOVEMENT

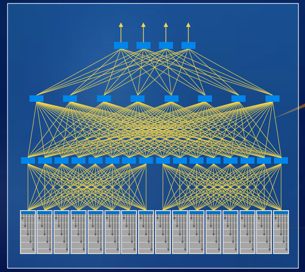
LARGER SCALE

Source: IDC

Global-Scale Fabric



Regional-Scale Fabric



Warehouse-Scale Fabric

CONNECTIVITY GROWING SUPER-LINEARLY TO SUPPORT SCALE OUT OF COMPUTE & STORAGE

PER DATA CENTER...	GROWTH '15 -'18[1]
SERVERS	10X
SWITCHES	>15X
OPTICAL TRANSCEIVERS	>30X

INNOVATION IS REQUIRED

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[1] Source: Intel estimates of connectivity growth in hyper-scale cloud datacenters

DATACENTER NETWORK INFLECTIONS: HOW WE WIN

INFRASTRUCTURE ACCELERATION IMPROVES PERFORMANCE

Strategy: Deliver Intelligent Platform Acceleration

Performance-Optimized Solutions

Deliver Flexible Platform

CLOUD SCALE: THE BIG GET BIGGER

Strategy: Pioneer Next-gen Connectivity

Co-innovate with Cloud

Next Gen Product Collaboration

CRITICAL WORKLOADS EVOLVE THE NETWORK

Strategy: Offer End-to-End Solutions

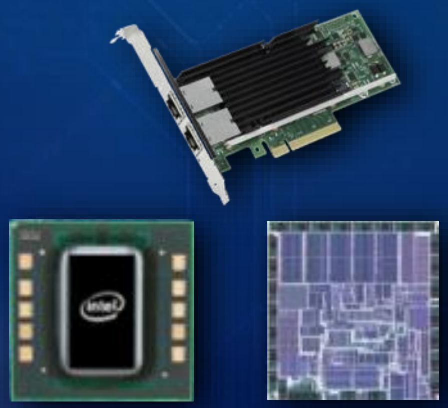
Optimize Connectivity Solutions for AI, Storage

Optical IO Integration

INTEL'S CONNECTIVITY PORTFOLIO

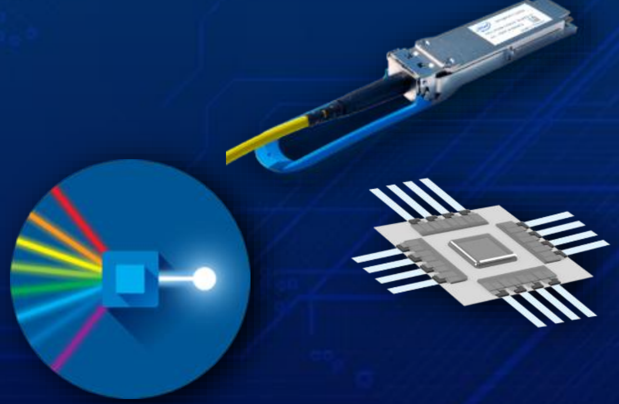
INTEL® ETHERNET

30+ YEAR LEADERSHIP



INTEL® SILICON PHOTONICS

LIGHTING UP SILICON

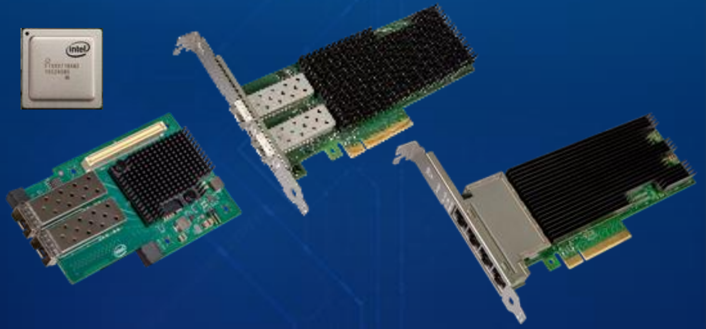


INTEL® OMNI-PATH FABRICS

LEADING HPC FABRICS

INTEL® ETHERNET PORTFOLIO & INTEL® PACS

FOUNDATIONAL NICS



Broad Portfolio
1GbE – 100GbE

30+ Years of Leadership

#1 MSS[1]

NEW! SMARTNICS

Infrastructure Acceleration

Fully Validated
Solution Packages

Highly Programmable

PROGRAMMABLE ACCELERATION CARDS

Versatile, Multi-Function
Acceleration

Intel-FPGA Based

Fully Programmable

LEADING PORTFOLIO OF INTELLIGENT, CONFIGURABLE NETWORKING PRODUCTS

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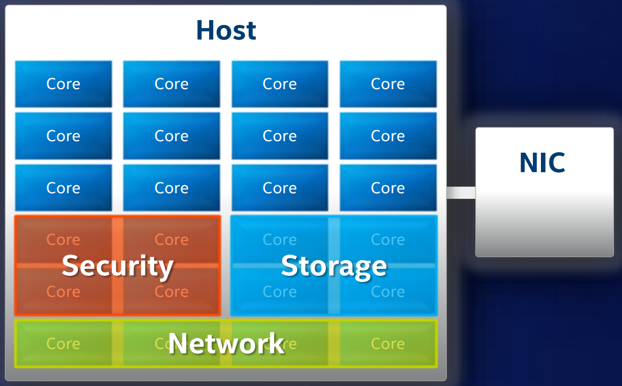
[1] Source: #1 in server Ethernet Controller and Adapter revenue MSS. Dell'Oro Research CA01A_Expanded_Controller_and_Adapter_Report_1Q18 . " Intel remained the clear leader in the 10 Gbps controller and adapter market, posting all-time-highs of 80% share in port shipments…"

NEW INTEL – SMARTNIC PRODUCT FAMILY

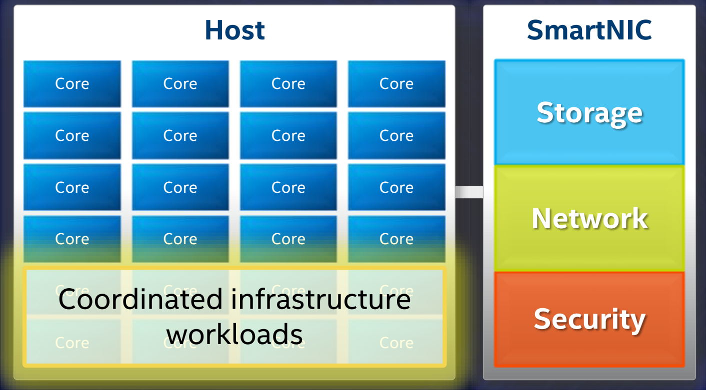
Improved TCO and System Performance for Comms and Cloud Service Providers


Host

Core Core Core Core
Core Core Core Core
Core Core Core Core
Security | Storage
Network

NIC

Using Foundational NICs


Host

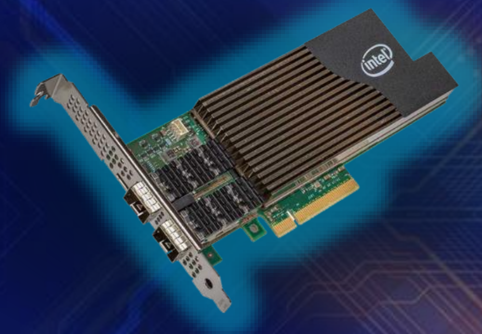
Core Core Core Core
Core Core Core Core
Core Core Core Core
Core Core Core Core

Coordinated infrastructure workloads

SmartNIC

Storage
Network
Security

Using SmartNICs



Cascade Glacier

INTEL LEADERSHIP

Industry First
World's First SmartNIC that Supports VM Live Migration Without Special Drivers[1]

Highly Efficient
Minimizes CPU core Usage With Full Open vSwitch Acceleration On SmartNIC[2]

Programmability with Ease of Deployment
Unique Validated Solution Packages for Infrastructure Acceleration with Intel's Leading FPGAs

Cascade Glacier
Sampling Now
2x25GbE Today
100GbE In Future

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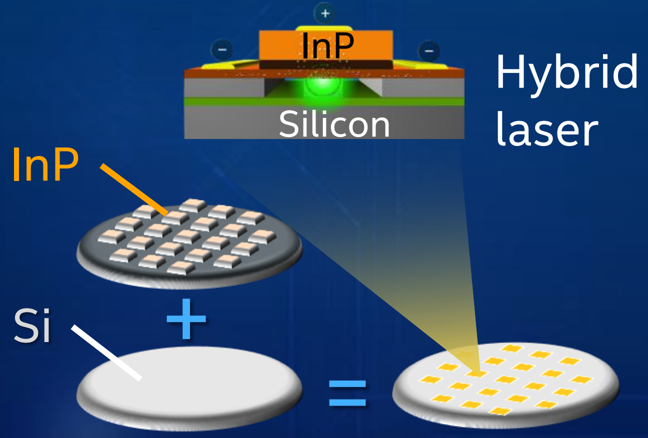
1. Intel provides industry's only hardware-based VirtIO support
2. Based on Intel lab data for full OVS offload including fast path and slow path

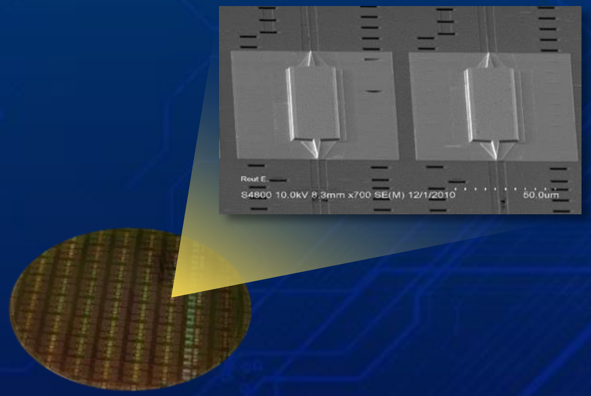
INTEL® SILICON PHOTONICS: OPTICS AT SILICON SCALE

SILICON INTEGRATION



Integrated Optics, Enabled by Intel's Hybrid Laser Technology

SILICON MANUFACTURING



Advanced CMOS Mfg Process at Intel Fabs On 300mm Wafers

SILICON SCALE

Automated On-wafer Optical, Electrical, and High-speed Test

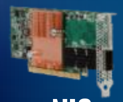
DIFFERENTIATED SOLUTION THROUGH HYBRID LASER APPROACH

INTEL® SILICON PHOTONICS – LIGHTING UP INTEL SILICON

INTERCONNECT: MODULES & CABLES

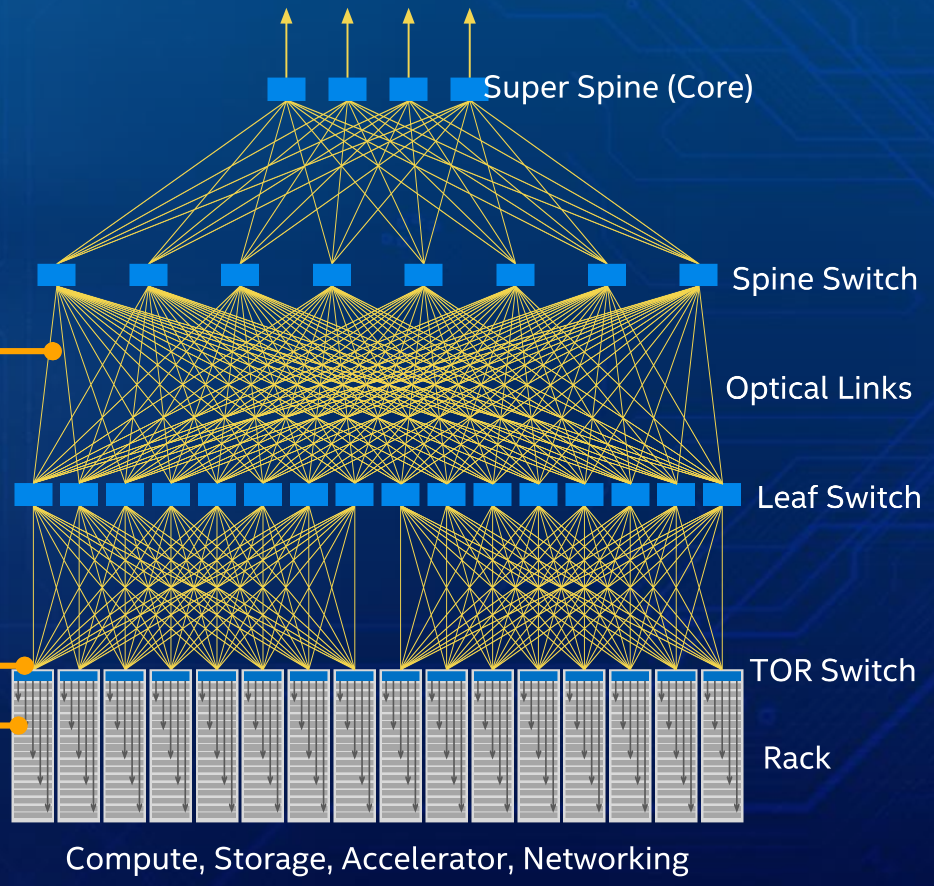
SWITCH: TOP OF RACK

NIC: HOST-FABRIC INTERFACE



NIC

SERVER



ENABLING SCALE

Spans Increasing Distance at Increasing Speed
Integrated Optics + Intel Hybrid Laser = High Volume

GAINING MOMENTUM

Ramped Hyper-scale Cloud
Demonstrated 400G
Winning Awards
New 5G Product

IN VOLUME PRODUCTION WITH MILLION+ UNIT RUN RATE

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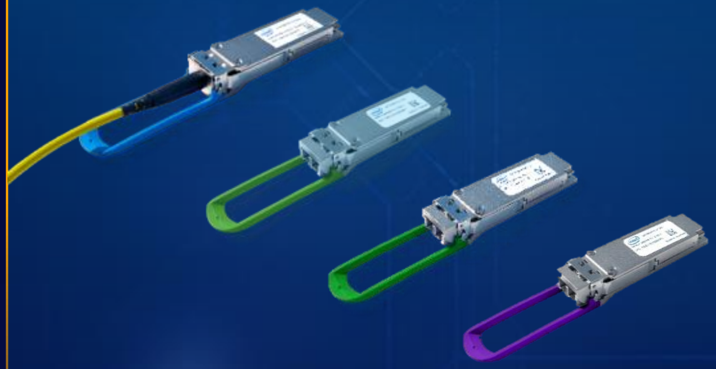
INTEL® SILICON PHOTONICS – NEW GROWTH BUSINESS

SILICON-BASED PHOTONIC PLATFORM MANUFACTURED BY INTEL

IN PRODUCTION AT CLOUD SCALE

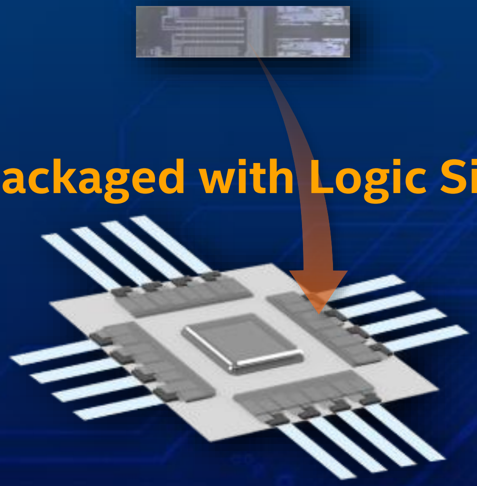
100G Optical Module Portfolio



400G in Development

LIGHTING UP INTEL SILICON

Highly-integrated Photonics

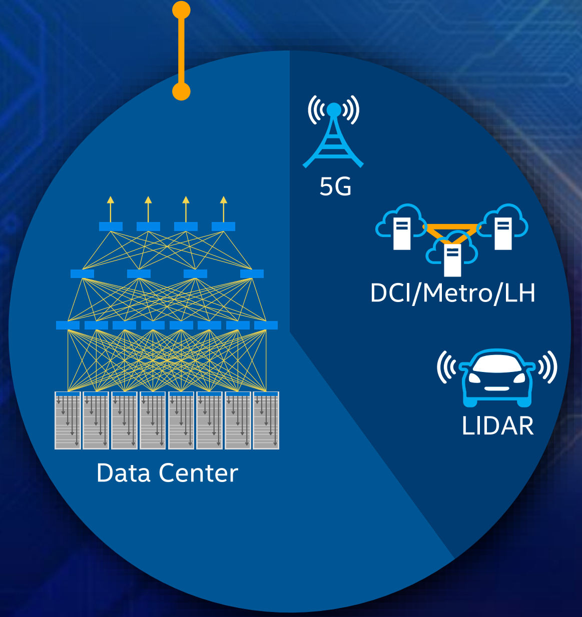


Co-packaged with Logic Silicon

Reduces Power, Costs & Complexity
Increases Density[1]

OFFERS SIGNIFICANT GROWTH FOR DCG

~$7B Datacenter TAM in 2022[2]



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Source: 1. Based on measurements of Intel Silicon Photonics vs traditional optics “gold box” products
2. 2018 Intel estimates based in part on Dell’Oro, Crehan and Lightcounting 2018 reports

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INTEL® OMNI-PATH ARCHITECTURE MARKET SUCCESS

END-TO-END HPC FABRIC SOLUTION

Silicon, Systems, Software

DEPLOYED IN ALL REGIONS & ALL SEGMENTS

Supercomputers

Artificial Intelligence

Traditional HPC

HPC Cloud

Enterprise R&D

TOP500 MOMENTUM

Record # of Systems / FLOPS

Up ~36% In Total FLOPs Since Nov '17

50% 100Gb Nodes

18% of Top100 Systems

27% of Top100 Green Systems

TOP 500 The List.

Source: Top500.org June '18

SUMMARY: CONNECTIVITY IS CRITICAL TO COMPUTE

- CONNECTIVITY **UNLEASHES THE POWER OF COMPUTE AT SCALE**
- CONNECTIVITY IS AN **$11B+ DATACENTER OPPORTUNITY**
- SMARTNICS AND SILICON PHOTONICS **REVOLUTIONIZE NETWORK EFFICIENCY**
- INTEL'S E2E **CONNECTIVITY PORTFOLIO LEADS** THE INDUSTRY

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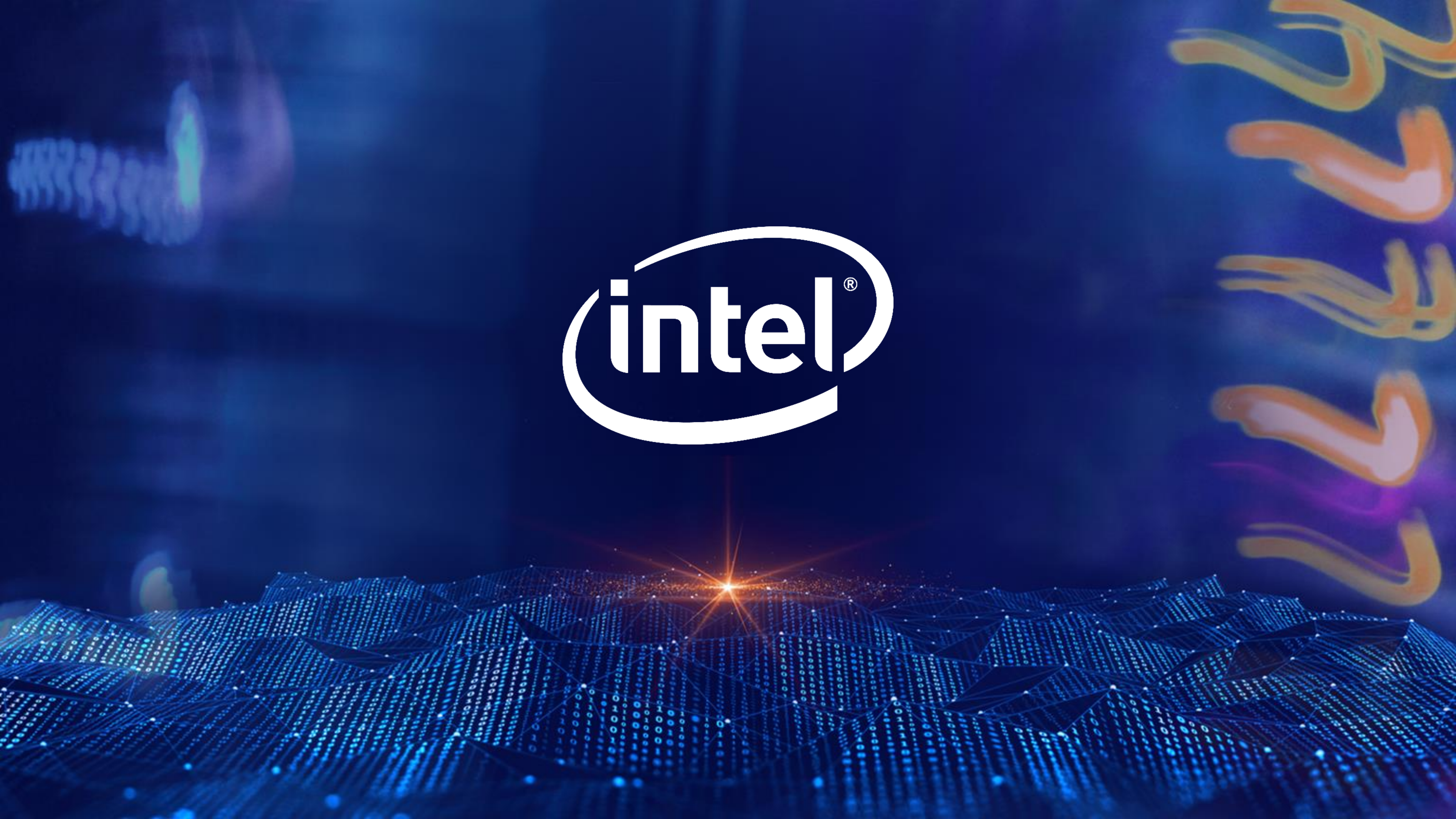
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