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EXPERIENCE
DAY

DISCLOSURES

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors.
Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products.
For more information go to www.intel.com/benchmarks.
Performance results are based on testing as of several dates following result information and may not reflect all publicly available security updates. See configuration disclosure for details. No product or component can be absolutely secure.

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СЕРВЕРНЫЕ ПРОДУКТЫ INTEL

Vasily . Lizunov @ intel . com

DATA-CENTRIC ERA

CLOUDIFICATION EXPANSION AND SCALE TO THE POINT OF USE

CLOUD

COMMS

ENTERPRISE

DELIVER NEW SERVICES FASTER TO HANDLE THE DELUGE OF DATA

DELIVER OPERATIONAL EFFICIENCIES

DELIVER SECURE INFRASTRUCTURE TO PROTECT DATA PRIVACY

MORE THAN

50%

OF WORLD'S DATA WAS CREATED IN THE PAST TWO YEARS

AND ONLY

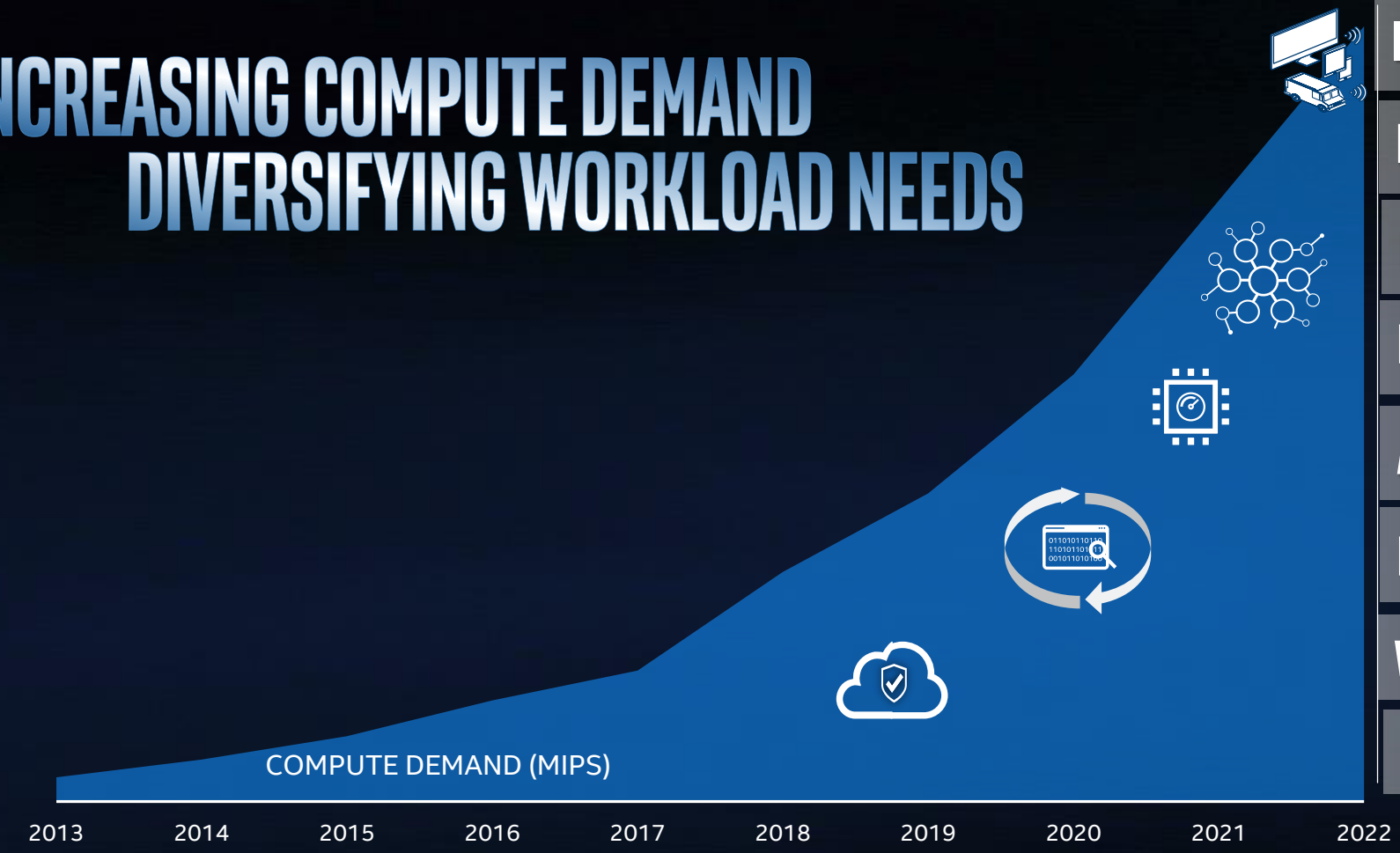
2%

HAS BEEN ANALYZED

Source: Data Age 2025, sponsored by Seagate with data from IDC Global DataSphere, Nov 2018

DRIVING BUSINESS TRANSFORMATION

INCREASING COMPUTE DEMAND
DIVERSIFYING WORKLOAD NEEDS



- INTELLIGENT EDGE (IoT / 5G)
- MULTI & VISUAL CLOUD
- NETWORK TRANSFORMATION
- HPC
- ANALYTICS
- DATABASE
- VIRTUALIZATION & ORCHESTRATION
- SECURITY / PRIVACY

AI

Source: Intel analysis

DATA-CENTRIC INFRASTRUCTURE FOCUS

MOVE FASTER

intel ETHERNET

intel SILICON PHOTONICS

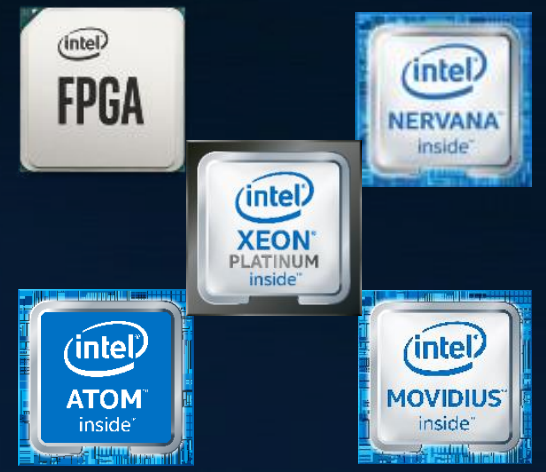
BAREFOOT NETWORKS | an Intel company

STORE MORE

intel OPTANE™ DC SOLID STATE DRIVE

intel OPTANE™ DC PERSISTENT MEMORY

PROCESS EVERYTHING



SOFTWARE & SYSTEM-LEVEL OPTIMIZED

intel select solution

ANNOUNCED ON APRIL 2, 2019

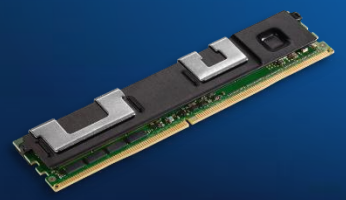
2019 DATA-CENTRIC PORTFOLIO

MOVE FASTER

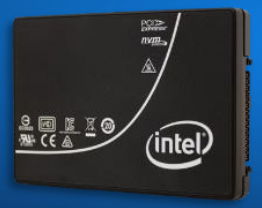
INTEL® ETHERNET 800 SERIES

STORE MORE

INTEL® OPTANE™ DC PERSISTENT MEMORY



DUAL PORT INTEL® OPTANE™ DC SSD



INTEL® QLC 3D NAND SSD

PROCESS EVERYTHING

2ND GENERATION INTEL® XEON® SCALABLE

INTEL® XEON® D-1600

INTEL® AGILEX™ FPGA

intel select solution

DATA CENTER GROUP

INTEL.COM/XEONSCALABLE

#datacentric

intel

SECOND GENERATION

INTEL® XEON® SCALABLE PROCESSORS

>50 STANDARD SKUS

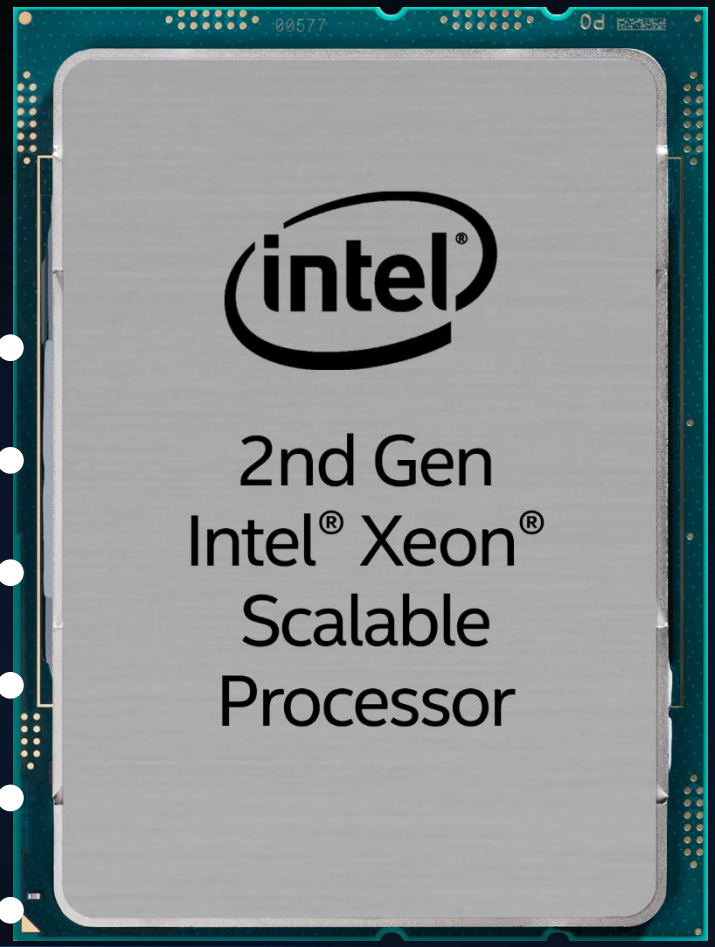
DOZENS CUSTOM SKUS

8 TO 56 CORES PER SOCKET

>4.5TB MEMORY PER SOCKET

1 TO 8 SOCKETS

- INTEL® OPTANE™ DC PERSISTENT MEMORY
- INTEL® DEEP LEARNING BOOST
- INTEL® SPEED SELECT TECHNOLOGY
- NETWORK-OPTIMIZED SKUS
- CLOUD-OPTIMIZED SKUS
- SECURITY MITIGATIONS



BUILDING ON **20 YEARS** OF DATA CENTER PROCESSOR INNOVATION

INTRODUCING SECOND GENERATION INTEL® XEON® SCALABLE PROCESSORS

INTEL® XEON® PLATINUM 9200 PROCESSORS

A NEW CLASS OF ADVANCED PERFORMANCE

INTEL® XEON® PLATINUM 8200 PROCESSORS

INTEL® XEON® GOLD 6200 PROCESSORS

INTEL® XEON® GOLD 5200 PROCESSORS

INTEL® XEON® SILVER 4200 PROCESSORS

INTEL® XEON® BRONZE 3200 PROCESSORS

BUILT-IN VALUE

- **UNINTERRUPTED** LEADERSHIP WORKLOAD **PERFORMANCE**
- **GROUNDBREAKING** MEMORY INNOVATION
- **EMBEDDED** ARTIFICIAL INTELLIGENCE **ACCELERATION**
- **HARDWARE ENHANCED SECURITY**
- **ENHANCED** AGILITY & UTILIZATION

INTEL® XEON® SCALABLE PLATFORM & PROCESSOR ROADMAP

THE INFORMATION ABOVE IS NOT AN OFFICIAL POR DOCUMENT
DATES, DETAILS AND INFORMATION ARE SUBJECT TO CHANGE WITHOUT NOTICE

INTEL® XEON® D-1600 PROCESSOR

INTEL® QUICKASSIST TECHNOLOGY | INTEL® ETHERNET | INTEL® VIRTUALIZATION TECHNOLOGY

COMPUTE

UP TO 1.29X MORE
INTEGER THROUGHPUT[1]

NETWORK

UP TO 1.25X MORE
PACKET FORWARDING[2]

STORAGE

UP TO 1.4X HIGHER
READ/WRITE THROUGHPUT[3]

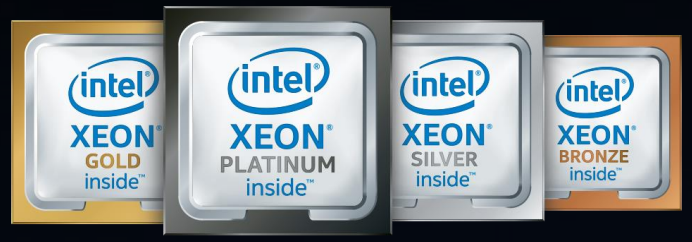
UP TO 2.7X LOWER
LATENCY[3]

Intel's compilers may or may not optimize to the same degree for non-Intel microprocessors for optimizations that are not unique to Intel microprocessors. These optimizations include SSE2, SSE3, and SSSE3 instruction sets and other optimizations. Intel does not guarantee the availability, functionality, or effectiveness of any optimization on microprocessors not manufactured by Intel. Microprocessor-dependent optimizations in this product are intended for use with Intel microprocessors. Certain optimizations not specific to Intel microarchitecture are reserved for Intel microprocessors. Please refer to the applicable product User and Reference Guides for more information regarding the specific instruction sets covered by this notice.

INTEL OFFERS A PORTFOLIO OF PRODUCTS FOR ADVANCED DATA-CENTRIC INTELLIGENCE

TO BUILD AND ACCELERATE DATA-DRIVEN

SERVICES AND SOLUTIONS INTEGRATED WITH ENDPOINTS DEVICES



INTEL® XEON® SCALABLE PROCESSOR

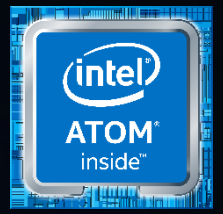
BEST PERFORMANCE, MOST SCALABLE

DESIGNED FOR TRADITIONAL OPERATING ENVIRONMENTS WITH FLEXIBLE OPERATING SPACE AND POWER

INTEL® XEON® D PROCESSOR

OPTIMIZED FOR DENSITY, LOWER POWER

DESIGNED FOR ENVIRONMENTS CONSTRAINED BY OPERATING SPACE AND POWER



INTEL ATOM® C PROCESSOR

PURPOSE-BUILT FOR VERY LOW POWER

DESIGNED FOR ENVIRONMENTS CONSTRAINED BY PHYSICAL SIZE AND EXTREME TEMPERATURES

INTEL® XEON® E PROCESSOR

ENTRY SERVERS & EDGE APPLIANCES

DESIGNED FOR TRADITIONAL OPERATING ENVIRONMENTS AND SMALL BUSINESS CUSTOMERS

INTEL ATOM® C3000 PROCESSOR LANDSCAPE

Base Stations	Routers & Switches	Storage	Security	Web Servicing	Internet of Things
4G/5G base stations delivering SDN and NVF to the network edge	Low power, intelligent routers and switches supporting SDN and NFV	Energy efficient entry storage, entry SAN/NAS, and cold storage	VPN, firewall, ADC, IPsec and WAN acceleration appliances	Dedicated static web hosting and memory caching appliances	Low power intelligence at the edge from smart buildings, industrial IoT and more

Tremont: Top-level Design Targets

Single thread performance

Networking

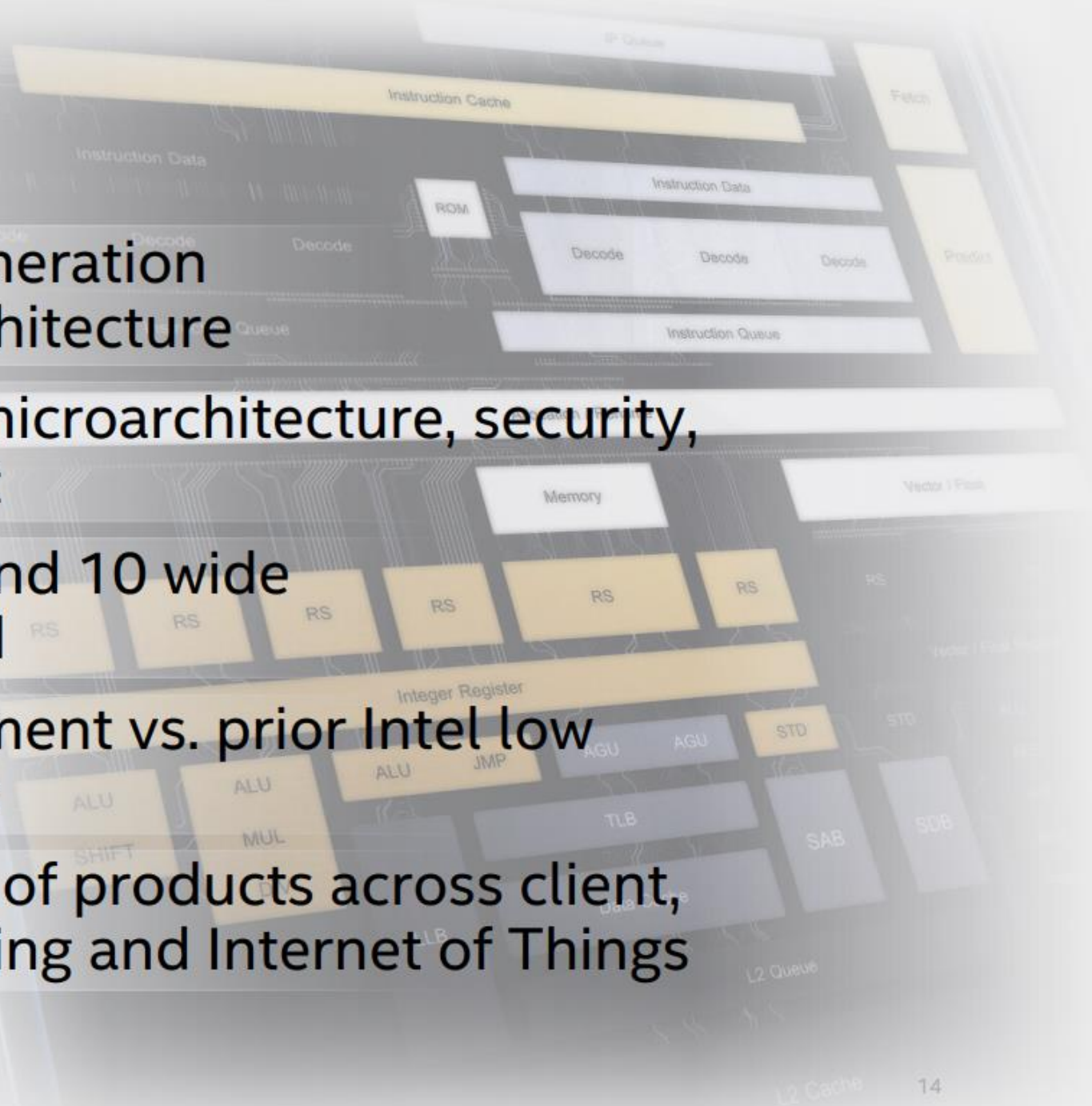
- Performance/mW
- Performance/mm^2
- New instructions

Battery life

- Performance/mW

Summary

- Tremont: Intel's next generation low power x86 microarchitecture
- Advancements on ISA, microarchitecture, security, and power management
- Out of order front end and 10 wide execution port back-end
- Significant IPC improvement vs. prior Intel low power x86 architectures
- Targeting a wide variety of products across client, data center, 5G networking and Internet of Things



DELIVERING DATA-CENTRIC PLATFORM LEADERSHIP

OVER 20 YEARS OF INTEL® XEON® PLATFORM LEADERSHIP

OS, SOFTWARE, WORKLOADS AND SERVICES

FIRMWARE AND DRIVERS

CONNECTIVITY

MEMORY AND STORAGE

ACCELERATORS

PROCESSORS AND PLATFORMS

LIBRARIES AND FRAMEWORKS | ENABLING AND SUPPORT | select solution

SOFTWARE | DRIVERS | FIRMWARE

ETHERNET | OMNI-PATH FABRIC | SILICON PHOTONICS

OPTANE DC PERSISTENT MEMORY | OPTANE DC SOLID STATE DRIVE | QLC 3D NAND | NAND

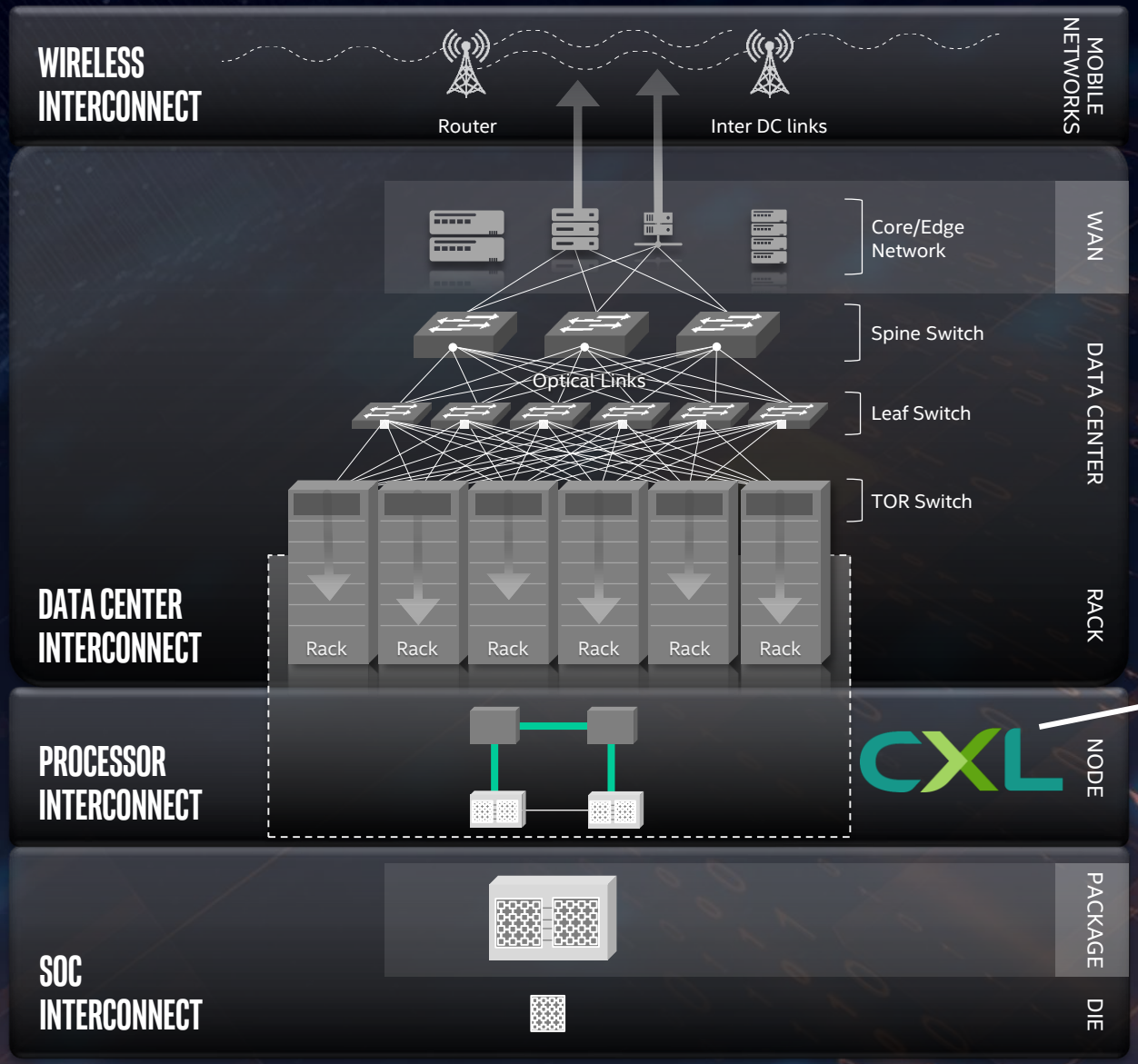
FPGAs | NNPs | QUICKASSIST | GRAPHICS

XEON PLATINUM | AGILEX | STRATIX 10 | NERVANA | CHIPSET | CPU INSTRUCTION ACCELERATORS | CPU PACKAGING TECHNOLOGY

END-TO-END PLATFORM INNOVATIONS TO DELIVER UNPRECEDENTED SCALE AND UTILIZATION

NOT A COMPREHENSIVE LIST OF PRODUCTS AND CAPABILITIES
DATES, DETAILS AND INFORMATION ARE SUBJECT TO CHANGE WITHOUT NOTICE

PROCESSOR INTERCONNECT

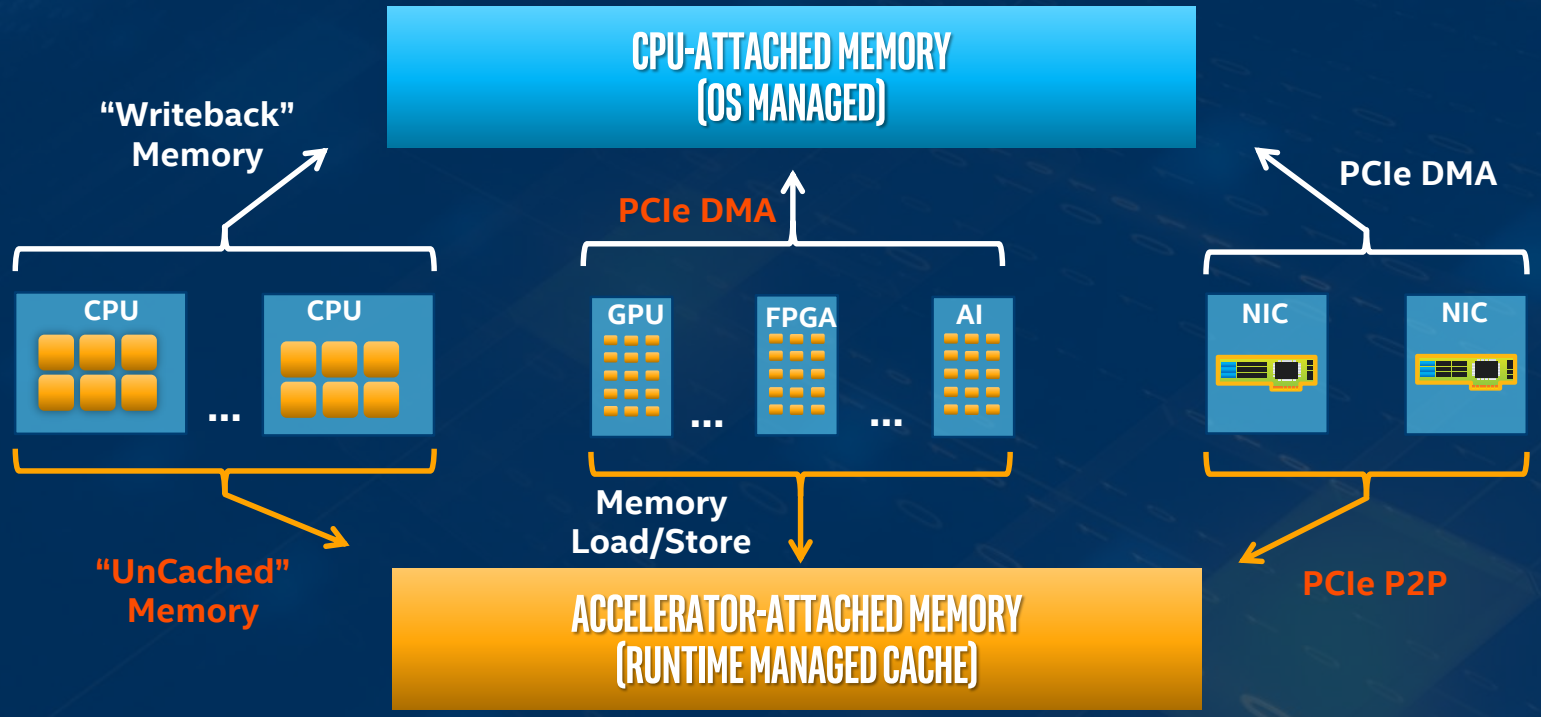


CXL: A NEW CLASS OF INTERCONNECT FOR DEVICE CONNECTIVITY

WHY A NEW CLASS OF INTERCONNECT?

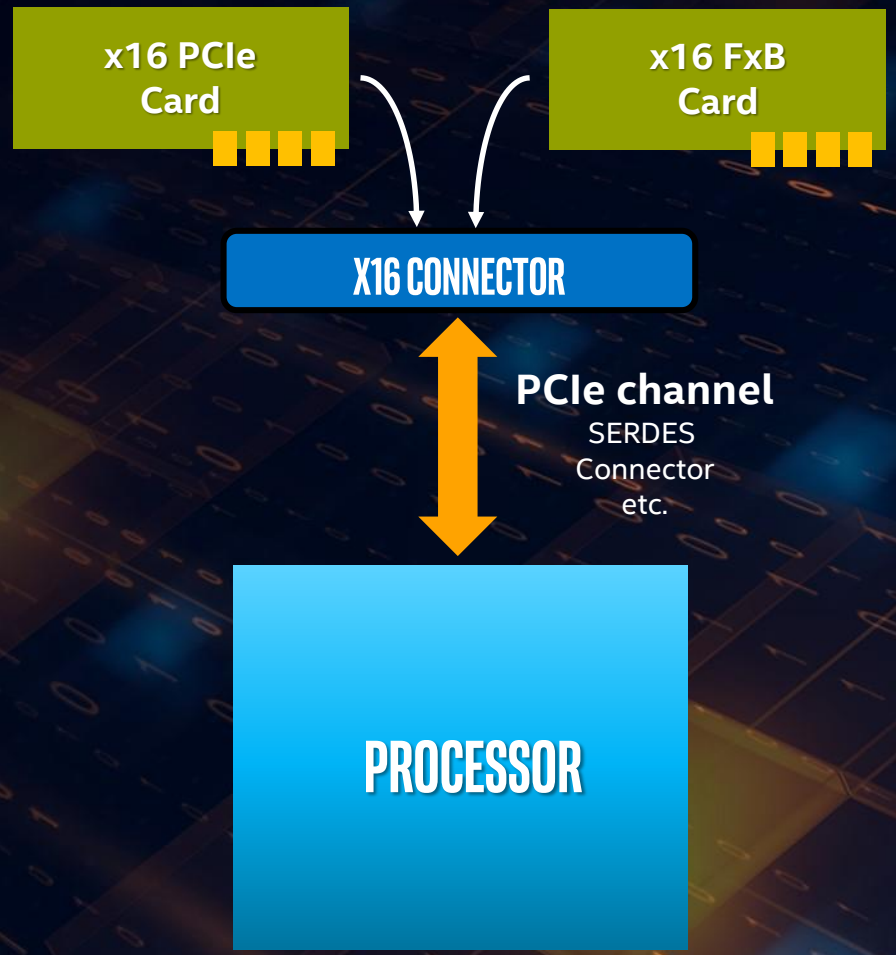
MOVE PAST THE PCIE LIMITERS ON HETEROGENEOUS COMPUTING AND SERVER DISAGGREGATION USAGES

- PCIe creates isolated memory pools with an inefficient mish-mash of access mechanisms.
- Moving operands and results back and forth between accelerators and devices is painful and inefficient
- Resource sharing is all but disallowed.
- Latencies are an order of magnitude off of what is needed to enable disaggregated memory.



WHAT IS CXL?

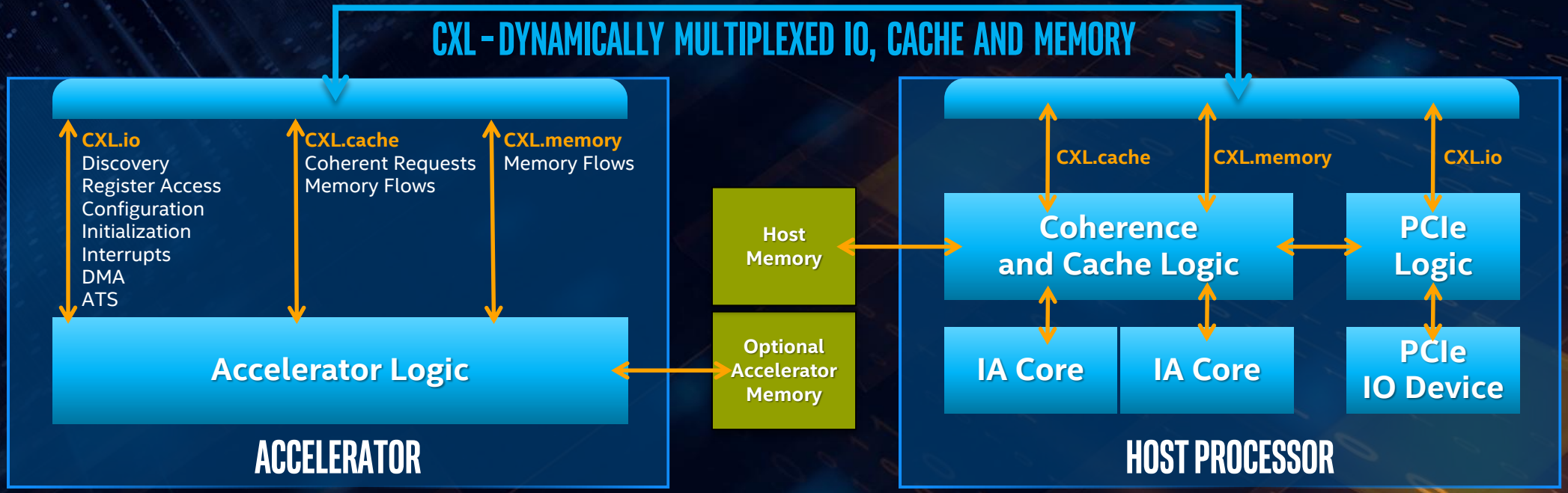
- CXL is an alternate protocol that runs across the standard PCIe physical layer
- CXL uses a flexible processor port that can auto-negotiate to either the standard PCIe transaction protocol or the alternate CXL transaction protocols
- First generation CXL aligns to 32 Gbps PCIe Gen5
- CXL usages expected to be key driver for an aggressive timeline to PCIe Gen6



CXL PROTOCOLS

THE CXL TRANSACTION LAYER IS COMPRISED OF 3 DYNAMICALLY MULTIPLEXED SUB-PROTOCOLS ON A SINGLE LINK:

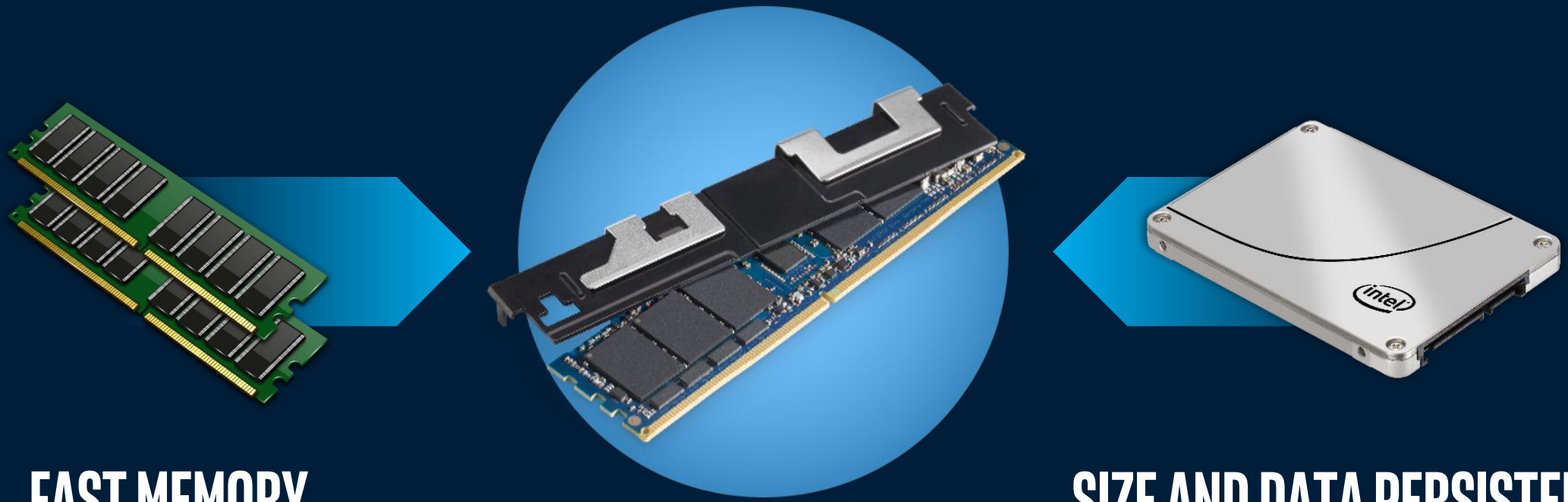
- CXL.io – Discovery, configuration, register access, interrupts, etc.
- CXL.cache – Device access to processor memory
- CXL.memory – Processor access to device attached memory



INTRODUCING

INTEL® OPTANE™ DC PERSISTENT MEMORY

intel OPTANE™ DC PERSISTENT MEMORY



FAST MEMORY

ENHANCE DATA INSIGHTS BY REDEFINING THE MEMORY AND STORAGE HIERARCHY

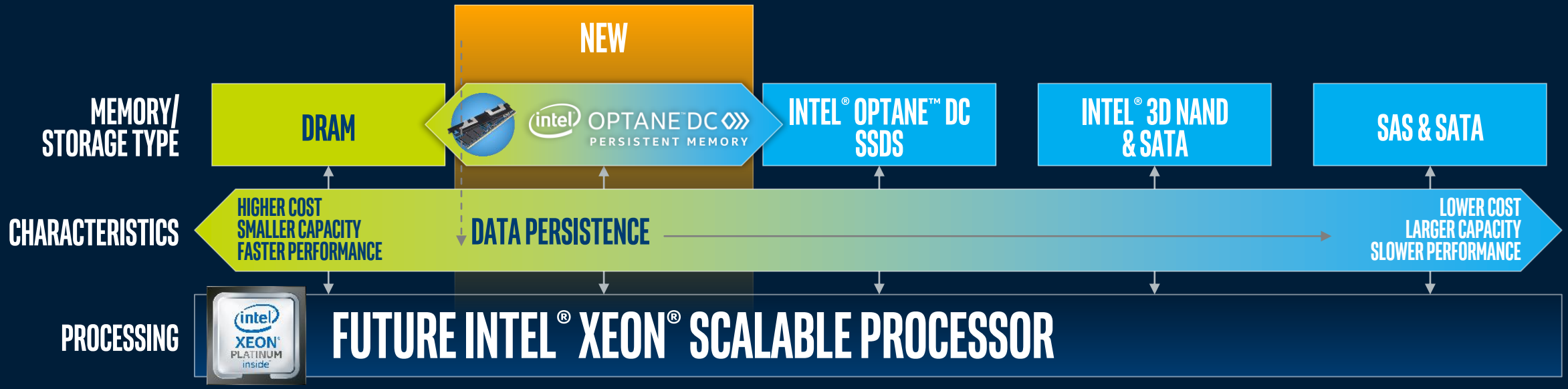
SIZE AND DATA PERSISTENCE OF STORAGE

Supported on future
Intel® Xeon® Scalable Processors
Platinum and Gold SKUs

intel XEON PLATINUM inside

intel

REDEFINING THE MEMORY AND STORAGE HIERARCHY



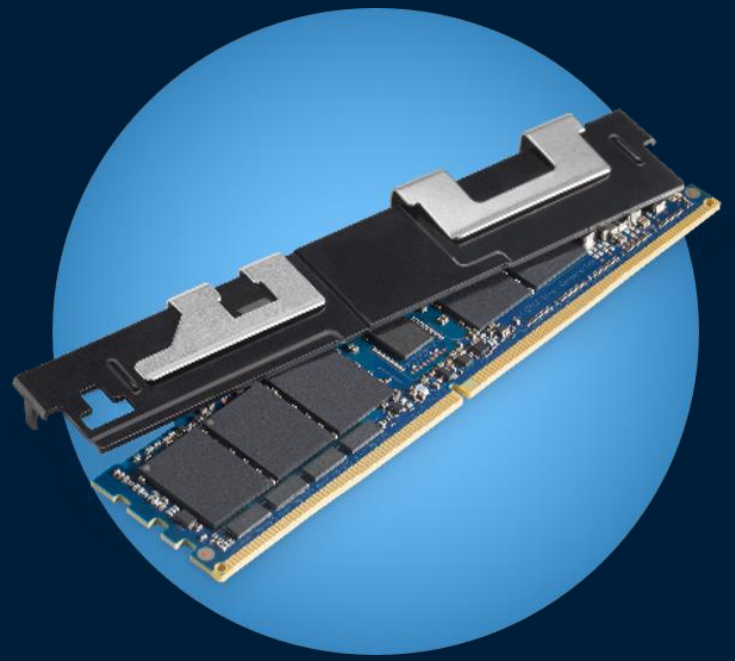
PERFORMANCE OF MEMORY, PERSISTENCE OF STORAGE.
FLEXIBLE AND SCALABLE TO ACCELERATE YOUR DATA INSIGHTS.

OPERATING MODES

"APP DIRECT" MODE

APP/WORKLOAD DIRECT ACCESS TO HIGH SPEED, HIGH CAPACITY STORAGE

- Persistent and much higher data capacity
- High availability/ less downtime
- Significantly faster storage



intel OPTANE™ DC PERSISTENT MEMORY

MEMORY MODE

PLATFORM/OS/APP ACCESS TO HIGH SPEED, HIGH CAPACITY MEMORY

- High capacity
  Targeting >1.2X More VMs[1]
- Affordable capacity
  128GB, 256GB and 512GB Modules
- Ease of adoption
  No code changes required

BUILT-IN FLEXIBILITY TO USE BOTH MODES SIMULTANEOUSLY

[1]Performance results are based on testing as of dates shown in configuration and may not reflect all publicly available security updates. See configuration disclosure for details. No product or component can be absolutely secure. For more complete information about performance and benchmark results, visit www.intel.com/benchmarks.

Target List as of 04/02/2019

INTEL® OPTANE™ DC PERSISTENT MEMORY

TARGET WORKLOADS WITH APPLICATION SUPPORT FOR LAUNCH

intel OPTANE™ DC PERSISTENT MEMORY

STORAGE

RDMA/Replication
*Oracle Exadata**

Faster Storage
*MSFT S2D**

APP DIRECT MODE

MEMORY MODE

INFRASTRUCTURES

VM, Container, Application Density
*VMWare vSphere**
*MSFT HyperV**
*KVM**
*Redis**
Memcached

DATABASES

IMDB, Large/Persistent Caching

*SAP HANA**
*MSFT SQL**
*OracleDB**
Oracle Exadata
*Aerospike**

Redis
RocksDB

AI / ANALYTICS

Real Time Analytics
*SAS**

Machine Learning Analytics
*Databricks by Spark**

HPC

Large Memory Tech Computing TBD

COMMS

Content Delivery Network (CDN)

PERSISTENT MEMORY FOR SEAMLESS CONTENT DELIVERY

REVENUE-FOCUSED + HIGHEST AEP AFFINITY

*Other names and brands may be claimed as the property of others.

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ECOSYSTEM SUPPORT

accenture
AEROSPIKE
AIC
Alibaba Group 阿里巴巴集团
ALTIBASE
Apache CASSANDRA
Apache Spark
AsiaInfo 亚信科技
Atos
aws
Baidu Cloud
宝信软件 BAOSIGHT
BONC 东方国信
CISCO
cloudera
COLFAX Customized Solutions
CRAY
databricks
DATASTAX
DELL EMC
FUJITSU
GBASE
GIGABYTE
GIGASPACES innovate with confidence
Google Cloud
H3C
hazelcast
Hewlett Packard Enterprise
海鑫科金 HISIGN TECHNOLOGY
HUAWEI
IBM
inspur
Inventec
JABIL
人大金仓 Kingbase
Kingsoft Cloud KSCLOUD
kx
Lenovo
Microsoft
NARI 国电南瑞 NARI-TECH
NetApp
Neusoft
ORACLE
PENGUIN COMPUTING
QCT
redhat
redislabs
RocksDB
SAP
sas
SUNJESOFT SUNJESOFT Inc.
中科曙光 Sugon
SUPERMICRO
SUSE
Tencent Cloud
THINKMATE HIGH PERFORMANCE COMPUTING
TYAN
ubuntu
UNICOM Engineering, Inc. A Division of UNICOM Global
Virtuozzo
vmware
wiwynn
World Wide Technology

DEVELOPER RESOURCES FOR INTEL® OPTANE™ DC PERSISTENT MEMORY

Find the PMDK (Persistent Memory Development Kit) at http://pmem.io/pmdk/

Getting Started

- Intel IDZ persistent memory- https://software.intel.com/en-us/persistent-memory
- Entry into overall architecture - http://pmem.io/2014/08/27/crawl-walk-run.html
- Emulate persistent memory - http://pmem.io/2016/02/22/pm-emulation.html

Persistent Memory Programming Video Series - https://software.intel.com/en-us/persistent-memory/get-started/series

Linux Resources

- Linux* Community Pmem Wiki - https://nvdimm.wiki.kernel.org/
- Pmem enabling in SUSE Linux Enterprise 12 SP2 - https://www.suse.com/communities/blog/nvdimm-enabling-suse-linux-enterprise-12-service-pack-2/

Windows* Resources

- Using Byte-Addressable Storage in Windows Server 2016 - https://channel9.msdn.com/Events/Build/2016/P470
- Accelerating SQL Server 2016 using Pmem - https://channel9.msdn.com/Shows/Data-Exposed/SQL-Server-2016-and-Windows-Server-2016-SCM--FAST

Other Resources

- SNIA Persistent Memory Summit 2018 - https://www.snia.org/pm-summit
- Intel manageability tools for Pmem - https://01.org/ixpdimm-sw/

FOCUSED INVESTMENTS TO ACCELERATE HPC & AI

ADVANCED ARCHITECTURES

Intel Xeon Platinum inside | Xe | Intel Nervana inside | Intel Movidius inside | Intel Stratix inside

SCALAR VECTOR MATRIX SPATIAL

+ Quantum & Neuromorphic

COMPUTE ARCHITECTURES FOR ALL YOUR WORKLOADS

MANUFACTURING EXCELLENCE

PROCESS

FPGA

Intel AGILEX inside

10 NM in 2019

10th Gen Intel® Core™ Processor

10 NM in 2019

PACKAGING

EMIB + "FOVEROS"

ADVANCED PACKAGING FOR HETEROGENEOUS INTEGRATION

INTELLIGENT INTERCONNECT

OPEN STANDARDS

CXL Compute Express Link

ADVANCED HIGH PERFORMANT FABRICS

INTERCONNECT BEYOND "I/O"

SIMPLIFIED PROGRAMMING

OPEN STANDARDS

oneAPI Services and Tools

UNIFIED SINGLE SOFTWARE ABSTRACTION AND DOMAIN-SPECIFIC LIBRARIES

TRANSFORMING MEMORY & STORAGE

OPEN STANDARDS

DAOS

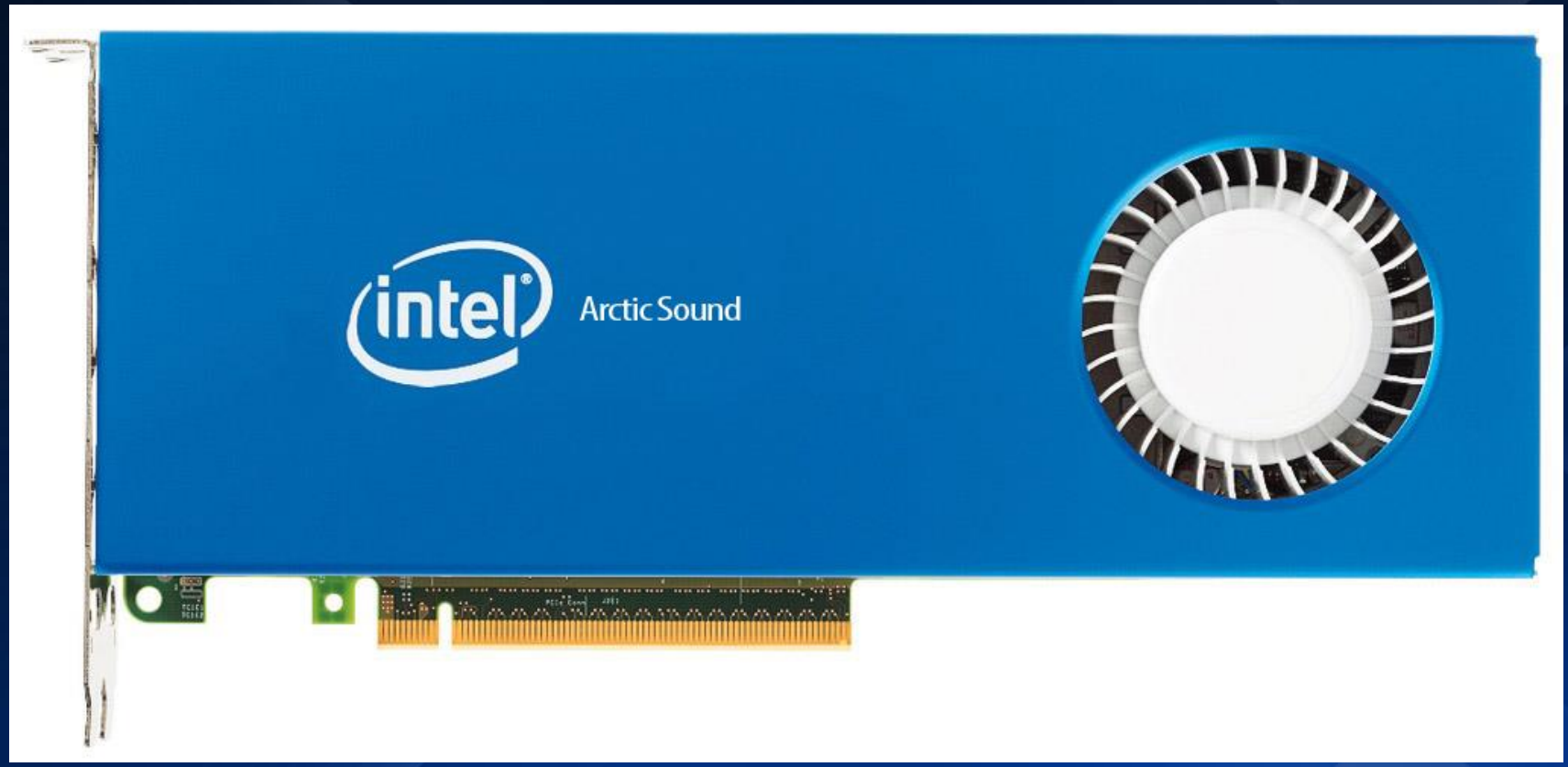
RE-ARCHITECTING THE MEMORY HIERARCHY AND FILE SYSTEMS

BUILT-IN SECURITY

SECURITY AT ALL LEVELS: CORE, SOC, BOARD, PLATFORM, & SOFTWARE

UNIQUELY POSITIONED TO IMPLEMENT SECURITY TECHNOLOGIES AT EVERY LEVEL

GROWING THE ECOSYSTEM AND ADVANCING HPC & AI THROUGH OPEN STANDARDS


intel
Arctic Sound

ACCELERATING AI

LEADERSHIP PERFORMANCE FOR DATA LEVEL PARALLEL AI WORKLOADS

7NM PROCESS TECHNOLOGY

EMIB (2D) AND FOVEROS (3D) TECHNOLOGY

POWERING AURORA

DELIVERED IN 2021

intel

ANNOUNCED ON APRIL 2, 2019

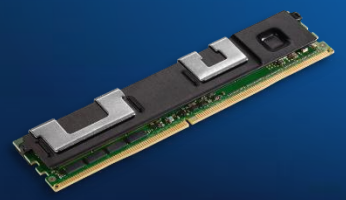
2019 DATA-CENTRIC PORTFOLIO

MOVE FASTER

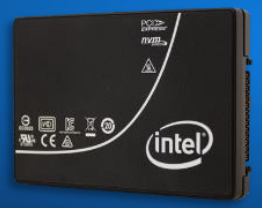
INTEL® ETHERNET 800 SERIES

STORE MORE

INTEL® OPTANE™ DC PERSISTENT MEMORY



DUAL PORT INTEL® OPTANE™ DC SSD



INTEL® QLC 3D NAND SSD

PROCESS EVERYTHING

2ND GENERATION INTEL® XEON® SCALABLE

INTEL® XEON® D-1600

INTEL® AGILEX™ FPGA

intel select solution

DATA CENTER GROUP

INTEL.COM/XEONSCALABLE

#datacentric

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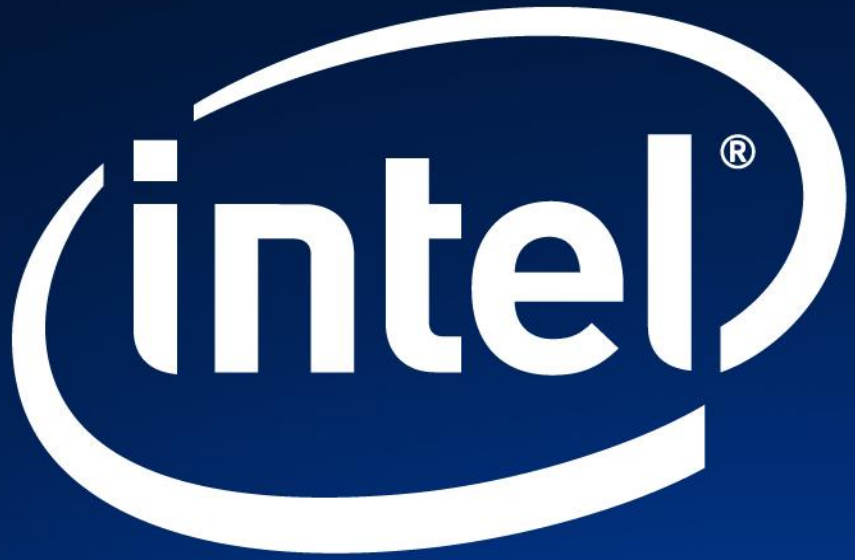
ВОПРОСЫ ?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