INTEL/CISCO Product Updates

Oct 2019

Jay Yankeloff
Intel
SP Sales Development - Americas
AGENDA

- Intel/Cisco Product Alignment
- New Announcements –
  - Cascade Lake (CPU)
  - Optane (Memory and SSD)
  - New NIC coming soon
- Wrap Up
THE INTEL INGREDIENTS.......
CISCO PLATFORMS.... with INTEL INSIDE

A broad product partnership – beyond UCS

INTEL PRODUCTS IN CISCO PLATFORMS

CPU – Xeon XP Skylake (31xx, 41xx, 51xx, 61xx, 81xx), Cascade Lake (32xx, 42xx, 52xx, 62xx, 82xx)

SSD – SATA 3D NAND (45xx, 46xx) ; PCIe NVME (45xx, 46xx)

Optane – Memory (DDR4 RDIMM) and SSD (4800x)

NICS – i350, X520, X540, X550, X710, XL710, XXV710, E810 (coming) ; (options of 1GBe-100GBe)

SOCs – - Denverton, Broadwell-DE-NS, Skylake-D, Rangeley, Xeon-D, Atom

Chipsets – Lewisburg C6xx Series

FPGA – Altera Cyclone 4/5

Where does Intel fit --- CPUs, SSDs, FPGAs, NICs, Chipsets, and SoCs
SECOND GENERATION *(CASCADE LAKE)*

**INTEL® XEON® SCALABLE PROCESSORS**

>50 Dozens 8 to 56 >4.5TB 1 to 8

**STANDARD SKUS**

**CUSTOM SKUS**

**CORES PER SOCKET**

**MEMORY PER SOCKET**

**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
2-socket + Intel® Xeon® Roadmap

Today’s Focus

Platform code-named “Romley”

Intel® Microarchitecture code-named Sandy Bridge

Intel® Xeon® E5 -- code-named “Sandy Bridge”

32nm

New Micro-architecture

Intel® Xeon® E5 v2 -- code-named “Ivy Bridge”

22nm

Platform code-named “Grantley”

Intel® Microarchitecture code-named Haswell

Intel® Xeon® E5 v3 -- code-named “Haswell”

22nm

New Micro-architecture

Intel® Xeon® E5 v4 -- code-named “Broadwell”

14nm

Platform code-named “Purley”

Intel® Microarchitecture code-named Skylake

Intel® Xeon® Scalable -- code-named “Skylake”

14nm

New Micro-architecture

Processor code-named “Cascade Lake”

14nm

Not shown: Platform code-named “Brickland” includes Intel® Xeon® E7 v2, Intel® Xeon® E7 v3, and Intel® Xeon® E7 v4 processor models

PURLEY WITH CASCADE LAKE BRINGS NEW FEATURES, SKUs AND HIGHEST PERFORMANCE
Generational Platform Evolution

Grantley with Intel® Xeon® E5 v4 CPU
- 22C Per Socket
- Up to 2 Sockets per Server
- 40 Lanes PCIe* 3.0

Purley with Cascade Lake SP CPU
- 28C Per Socket +6
- Up to 8 Sockets per Server +6
- 48 Lanes PCIe* 3.0 +8
- Intel® Optane® DC Persistent Memory NEW
- Intel® Deep Learning Boost NEW
- Integrated Intel® QuickAssist™ Technology NEW
- Hardware Side Channel Mitigation NEW

Providing more of what you need:
- Scalability
- Performance
- Efficiency
- Throughput
- Resilience
- Programmability
- Security

30%-80% higher performance versus Intel® Xeon® E5 v4 based platforms

Minor validation impact potential for Intel® Xeon® Scalable-based implementations
Why Transition to Cascade Lake......

- **Process More ....for the same price !**
  More cores, more PCIe* lanes, more CPUs per server

- **Remove Storage Bottlenecks**
  New Intel® NVMe SSDs

- **Introduce New Classes of Storage**
  Intel® Optane® Memory Technology

- **Enhance A/I**
  Intel® Deep Learning Boost

- **Integrate More**
  Optional Built-in Intel® QuickAssist Technology (QAT) and Ethernet

- **Security Enhancement in HW** (for Side Channel/Spectre Meltdown)
WHAT IS Intel® Optane™ Technology

- evolutionary material
- write in place
- bit addressable
- ultra-low latency

Most significant memory and storage advancement in the last 20 years
Set or reset data as needed, no need to erase media
Every memory cell can be individually addressed
...together delivering extremely fast media

Intel® Optane™ Technology is not NAND.....and better performance/endurance
Intel® Optane™ Technology.....comes in 2 options

Intel® Optane® SSD

Intel® Optane® Datacenter Persistent Memory

NOTE – Optane SSDs are used in the Cisco Hyperflex solution (Cache and Storage options)
INTEL OPTANE AND QLC 3D NAND......Re-architecting the Memory / Storage Hierarchy

Memory
- DRAM (HOT TIER)
  - 10s GB, < 0.1 usec
- Persistent Memory
  - Intel® OPTANE Persistent Memory
    - 100s GB, < 1 usec
- Storage
  - SSD (WARM TIER)
    - 1s TB, < 10 usec
  - Persistent Memory
    - 10TB, < 100 usec
  - HDD / TAPE (COLD TIER)
    - 10s TB, < 10,000 usec

Improving memory capacity
- Nano-seconds
- Micro-seconds
- Milli-seconds

Delivering efficient storage
- SMALLER CAPACITY
- HIGHER COST
- FASTER PERFORMANCE
- LOWER COST
- LARGER CAPACITY
- SLOWER PERFORMANCE

Improving SSD performance
Transparent Volatile memory for more capacity (block) for more VMs

Rapid Recovery for Apps with High Speed Memory/Storage

Direct Memory Access for Apps and Workloads

Data Persistence/Retainment/ Less Downtime

128, 256, 512GB (DDR4)

Add-on Capacity for In-Memory Databases (SAP HANA)

Storing data lowers latency

Memory/App Direct Modes

With Cascade Lake CPU only
**Per Socket Memory Savings in Memory Mode with Optane**

<table>
<thead>
<tr>
<th>GB</th>
<th>DRAM</th>
<th>Optane Persistent Memory</th>
<th>~ Memory Cost Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>384</td>
<td>12x32GB</td>
<td>Recommend 512GB DC PMEM Config below</td>
<td>33% &gt; capacity</td>
</tr>
<tr>
<td>512</td>
<td>8x64GB</td>
<td>4x128GB Optane + 6x16GB DRAM, in a 2-2-1, 5.3:1 Ratio</td>
<td>26%</td>
</tr>
<tr>
<td>768</td>
<td>12x64GB</td>
<td>6x128GB Optane + 6x16GB DRAM, in a 2-2-2, 8:1 Ratio</td>
<td>32%</td>
</tr>
<tr>
<td>1024</td>
<td>8x128GB</td>
<td>6x128GB Optane + 6x32GB DRAM, in a 2-2-2, 4:1 Ratio</td>
<td>20%</td>
</tr>
<tr>
<td>1536</td>
<td>12x128GB</td>
<td>4x256GB Optane + 6x32GB DRAM, in a 2-2-1, 5.3:1 Ratio</td>
<td>44%</td>
</tr>
<tr>
<td>2048</td>
<td>8x256GB</td>
<td>6x256GB Optane + 6x32GB DRAM, in a 2-2-2, 8:1 Ratio</td>
<td>47%</td>
</tr>
<tr>
<td>3072</td>
<td>12x256GB</td>
<td>6x256GB Optane + 6x64GB DRAM, in a 2-2-2, 4:1 Ratio</td>
<td>40%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4x512GB Optane + 6x64GB DRAM, in a 2-2-1, 5.3:1 Ratio</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6x512GB Optane + 6x64GB DRAM, in a 2-2-2, 8:1 Ratio</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6x512GB Optane + 6x128GB DRAM, in a 2-2-2, 4:1 Ratio</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Significant memory savings in Memory mode**

*In App Direct, same memory savings, additional capacity & persistence*
OPTANE MEMORY.....2 OPERATING MODES

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

High capacity
• Targeting >1.2X More VMs

Affordable capacity
• 128GB, 256GB and 512GB DIMMs
• Up to 7.68TB per 2S system

Ease of adoption
• No code changes required

INTEL PERSISTENT MEMORY

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

Persistent data
• Up to 15TB per 4S system

High availability/less downtime

Significantly faster storage

BUILT-IN FLEXIBILITY TO USE BOTH MODES SIMULTANEOUSLY
Why OPTANE MEMORY....Solving customer problems

Identify and Address your customer Pain points

- DRAM is too expensive
- Scale Up is expensive
- Not enough capacity
- Operational Inefficiencies
- Poor workload performance
- Storage is too slow

Use Intel ® Optane™ DC Persistent memory to...

$ Save more
- Displace DRAM Systems >512GB
- Improve TCO Workloads that need large &/or persistent memory

- Increase memory size Large memory or SW license fees per core
- Consolidate Workloads High VMs, with low CPU utilization

Go faster
- Break the IO bottlenecks High Disk I/O Traffic
- Add high speed storage Tiered storage subsystem

Save more do more Go faster

Sales and Marketing Group
Storage Enhancements for 2\textsuperscript{nd} Gen Intel® Xeon® SP cascade Lake CPU Family

**New SSDs**

Processor-based PCIe storage enhancements

- Intel® Volume Management Device (Intel® VMD) provides support for PCIe Solid State Drives (SSD):
  - Hot-plug, enclosure management and error containment functions

**RAID and Storage Performance Enhancements**

- M.2 (SATA and PCIe) support – recommend for all server boot drives
- U.2 2.5 inch PCIe SSD for scalable high performance 3D NAND and Intel® Optane™ storage options
- PCIe based RAID using Intel® Virtual RAID on CPU (Intel® VROC) technology
- Updates to Intel® Cache Acceleration Software (Intel® CAS)

NOTE – Optane SSDs are used in the Cisco Hyperflex 4.0 solution (Cache and Storage options)
# Intel® enterprise ssd Roadmap

<table>
<thead>
<tr>
<th></th>
<th>Q1'19</th>
<th>Q2'19</th>
<th>Q3'19</th>
<th>Q4'19</th>
<th>Q1'20</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTEL® Optane™</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCIe / NVM<em>e</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SATA</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

## Intel® Optane™ SSD DC P4800X Series
U.2 15mm 375GB, 750GB, AIC

## Intel® SSD DC P4510/P4610 Series
U.2 15mm, 1TB – 16TB

## Intel® SSD DC P4511/P4611 Series, M.2 110mm, 1TB / 2TB

## Intel® SSD DC S4510/S4610
2.5” 240GB – 7.68TB, M.2 2280 240GB – 960GB

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* Bring Data closer to the Processor for Fast Caching/Fast Storage
Where do Intel Optane SSDs fit Today?

- **Optane SSD in Storage** (High Endurance/QoS)
  - Cisco HyperFlex* (Cache/Storage)
  - VMWare VSAN*
  - Microsoft S2D* / Azure Stack*
  - CEPH*

- **Database / AI** (Low Latency/High-Speed Caching)
  - MS SQL* Memory w/ IMDT
  - FSI (STAC): McObject*, AMPs*, Kx*
  - HTAP: Esgyn*

- **HPC** (Random Read/Write Intensive)
  - Memory pool expansion / fast cache

*Other names and brands may be claimed as the property of others.*
Intel® optane™ USE

**CASES**

**storage**
- Write Buffers
- Vaulting
- PMoF
- Caching Layers
- Meta-Data
- Hi-Perf Direct Attached Storage

**VMs**
- VM and Container Density
- Extended VM Memory Capacity
- Application Density
- Large Memory Java
- Compute-side Storage and Cache

**database**
- DB Memory Buffer Pool
- In-Memory DB
- Mixed Logging and memory
- User-Density
- Direct-attached DB Storage
- Dedicated Logging

**AI / analytics**
- Real Time Analytics
- Machine Learning Analytics
- In-Memory Analytics
- Off-Heap Memory

**hpc**
- Larger Memory
- Scratch & IO Nodes

**COMMS**
- NFVi
- Cognitive Networking
- Content Delivery Network (CDN) – Live Linear Streaming
- Content Delivery Network (CDN) – Cloud DVR

*Where use Intel® Optane™ DC technology:*
- DC Persistent memory (DDR4 RDIMM)
- DC P4800X SSD

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**NFVi** – Network Functions Virtualization

**PMoF** - Persistent Memory over Fabric

1 Workloads under investigation, subject to change
## Benefits

- Speeds of up to 100 Gigabit to a general purpose Ethernet Controller with a Programmable Pipeline for a broad range of deployments
- Interfaces for PCI Express v4.0 x16 Server and OCP adapters, backplanes and LAN on Motherboard (LOM)

## Features

<table>
<thead>
<tr>
<th>Intel® Ethernet Controller E810</th>
<th>Software configurable speeds of 2x100/50/25/10GbE or up to 4x25/10GbE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel® Ethernet Server Adapter E810</td>
<td>Broad offering of physical interfaces</td>
</tr>
<tr>
<td></td>
<td>RDMA ideal for routable and scalable storage solutions</td>
</tr>
<tr>
<td></td>
<td>Network Virtualization Overlay accelerators and offloads</td>
</tr>
<tr>
<td></td>
<td>Improved Virtualization support with VMQoS, VMDq and Intel® Ethernet Flow Director for overlay traffic</td>
</tr>
</tbody>
</table>

Coming Soon - Intel® Ethernet Controller E810

Speed and agility to deliver network flexibility using a programmable pipeline
Why refresh your Cisco UCS servers?

Jonathan Carmel
Data Center PSS
October 3rd, 2019
3 Challenges
IT organizations are being asked to solve

- Faster delivery of Applications
- Deploy and optimize in new Multicloud and Edge Environments
- Bridge across the old and new
Why should you care about refresh?

- **Reduce Total Cost of Ownership**: Tangible financial benefits derived from higher performance, lower support costs, significant server consolidation, and reduced system downtime.

- **Introduce New Capability**: Unlock new features made available through enhancements in hardware and software that can fundamentally change operations.

- **Consistency and Compliance**: Stay secure, reliable, and compliant, ensuring ongoing access to Cisco support, bug fixes and security patches.
Refresh to Lower TCO

UCS and HyperFlex M5: Do more with less

- Better Performance
- More Dense
- More Reliable
- Easy to Manage
- Power, Cooling, Cabling
- Software Licensees
- Warranty
- Administrative Overhead

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## Refresh to Lower TCO – What Customers Have Seen?

### Cisco HyperFlex

<table>
<thead>
<tr>
<th>Feature</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Cost of Operations</td>
<td>50%</td>
</tr>
<tr>
<td>Savings vs. Public Cloud</td>
<td>51%</td>
</tr>
<tr>
<td>5-year ROI</td>
<td>452%</td>
</tr>
<tr>
<td>Month Payback</td>
<td>8</td>
</tr>
</tbody>
</table>

### Cisco UCS

<table>
<thead>
<tr>
<th>Feature</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Cost of Operations</td>
<td>45%</td>
</tr>
<tr>
<td>Reduction in energy costs</td>
<td>79%</td>
</tr>
<tr>
<td>5-year ROI</td>
<td>227%</td>
</tr>
<tr>
<td>Reduced time to launch new lines of business</td>
<td>92%</td>
</tr>
</tbody>
</table>

1: 2019, IDC Business Value of Improved Performance and Agility with Cisco HyperFlex
Refresh for Simplification and Consolidation

M5 servers offer consolidation

10:7
Over M4 Servers

10:1
Over M3 Servers

And fewer servers means fewer switches and software licenses!

Fewer devices to track, support, and maintain

- Reduces administrative overhead
- Shortens maintenance windows
- Reduces OpEx
- Reduces security footprint

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Refresh for Performance

Newer memory architectures improves app performance

Processor architecture improvements (cores, frequency, instruction set)

579%

M5 servers support the latest generation of adapters

32Gb Fiber Channel  10/25/40/100Gb Ethernet  100Gb InfiniBand

*Based on Intel® Xeon® Processor Transition Guide as of 2019/06/10
*Based on data provided by AMD
### Cisco HyperFlex

<table>
<thead>
<tr>
<th>Feature</th>
<th>Comparison</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher IOPS</td>
<td>77%</td>
<td>143%</td>
</tr>
<tr>
<td>Lower Total Latency</td>
<td>54%</td>
<td>109%</td>
</tr>
<tr>
<td>Higher VM Level Performance Consistency</td>
<td>96%</td>
<td>142%</td>
</tr>
</tbody>
</table>

### Cisco UCS

<table>
<thead>
<tr>
<th>Feature</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less Power Consumption</td>
<td>60%</td>
</tr>
<tr>
<td>Reduction in Cabling</td>
<td>80%</td>
</tr>
<tr>
<td>Reduction in Provisioning</td>
<td>80%</td>
</tr>
<tr>
<td>Efficiency Increase</td>
<td>75%</td>
</tr>
</tbody>
</table>
Introduce New Capability

Modernize your architecture

Simple to provision, secure and tune
Connect, scale, and configure wherever and whenever.
Refresh for Consistency and Compliance

Reliability
Failure rates jump dramatically after 3 years

Can you afford to be down?

Avoid the outage costs with UCS or HyperFlex M5

$140K to $540K Per Hour

$5,600 Per Minute

Save money

Avoid negative perception

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Refresh for your Newest & Future Workloads

Enterprise App & Database Migrations

Big Data & Analytics

AI/ML
Nexus 9000 Switches

Ed Parkinson & Don Zaino
Data Center Networking PSS & TSA
October 2019
Nexus 9000
It doesn’t need to be complex. Scale without sacrificing performance and security.
Nexus 9000 Switches

Scale and Flexibility

Programmability and Automation

Intent Based
Delivering fabric wide cloud scale and services
Nexus 9000 powered by Cisco Cloud Scale ASIC

Superior Performance
Visibility & Security Pervasive
Reduced Power
Optimized Price
Investment Protection

Cisco distances themselves from the competition in the latest DC Networking Magic Quadrant - Learn more
Cisco Data Center Switching Competitive advantage

Best of breed switching—Cloud-scale ASIC

Industry leading programmability – Open NX-OS capabilities.
Industry leading DC network automation – ACI with policy based automation

Industry leading Analytics – Built in Tetration sensors for data plane analytics and streaming telemetry for control plane analytics

The confidence that the infrastructure is doing exactly what you intended it to do

Future ready: 400G, innovations, ASIC etc
Why would you want to refresh?

**Reduced TCO**
Tangible financial benefits derived from higher performance, lower power and cooling costs

**New Capability**
Unlock new features made available through enhancements in hardware and software that can fundamentally change operations

**Compliance**
Stay secure and compliant, ensuring ongoing access to Cisco support, bug fixes and security patches.
See how Nexus with Cloudscale helped a large photo sharing website to scale and reduce cost

- Millions of customers
- Free, unlimited photo storage
- Photo-based products and services

Mobile and Web apps
200+ Petabyte of Data
What does it mean to their network?

Requirements

- Provides compelling user experience with traffic growth
- Automates switch provisioning to save time
- Simplifies management

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Upgrade network with Cisco Nexus 9000 Switch across multiple data centers
During the holidays—our busiest season—we were able to sustain a 40 percent increase in traffic with no performance degradation whatsoever.

Director of Cloud Engineering

Provisioning tasks that used to take 3 to 4 person hours are now automated, saving approximately $400 each time.

Director of Network Operations
Simplicity
Choices for programmability and automation
Your Data center is unique
But one thing all of them have in common is
Automation can make it easier and faster
Choice for programmability and automation

- Start with NXOS out of the box automation
- POAP and XMPP out of the box are great options to bring up individual switches in an automated fashion
Choice for programmability and automation

Then use DCNM for VXLAN overlay provisioning

OR

Take advantage of open NXOS-APIs:

- Leverage DevOps support including Puppet, Chef, Ansible etc ...
- Bash Shell access and Linux container support
- Utilize Python scripting
- Leverage Open stack integration with Neutron
Choice for programmability and automation

SDN with ACI for automation of overlay, and underlay networking, policy models, multi-hypervisor support, service chaining, L4-7 integration, WAN interconnect and deployment, and more

ACI Anywhere – ready for the multi-cloud workloads
Automated policy, greater visibility into network fabric, robust application development architecture

Results

80% maintenance

20% innovation

Flipped this model

80% innovation

20% maintenance
Invest for the future

2018

Traditional data center

Cloud ready data center

Policy Driven Automation

Virtualization

Traditional Data Center

Multi Cloud

Hybrid Cloud

ITaaS
PaaS
SaaS
XaaS

CAPEX: optics, backward compatibility etc.

Flexible consumption models (on premise, cloud, licensing)
### Key takeaways

<table>
<thead>
<tr>
<th>Speed</th>
<th>Simplicity</th>
<th>Visibility</th>
<th>Assurance and compliance</th>
<th>Investment protection</th>
</tr>
</thead>
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<td>Speed</td>
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<tr>
<td>Best of Breed Switching - Cloud Scale ASIC</td>
<td>Industry leading programmability - Open NX-OS capabilities. Industry leading DC network automation - ACI with policy based automation</td>
<td>Industry leading Analytics - Built in Tetration sensors for data plane analytics and streaming telemetry for control plane analytics</td>
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<td>Future ready: 400G, innovations, ASIC etc</td>
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