Marvell's Vision for Transforming Cloud Data Centers with CXL

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Forward-looking statements

Except for statements of historical fact, this presentation contains forward-looking statements (within the meaning of the federal securities laws) including, but not limited to, statements related to market trends and to the company's business and operations, business opportunities, growth strategy and expectations, and financial targets and plans, that involve risks and uncertainties. Words such as "anticipates," "expects," "intends," "plans," "projects," "believes," "seeks," "estimates," "can," "may," "will," "would" and similar expressions identify such forward-looking statements. These statements are not guarantees of results and should not be considered as an indication of future activity or future performance. Actual events or results may differ materially from those described in this presentation due to a number of risks and uncertainties.

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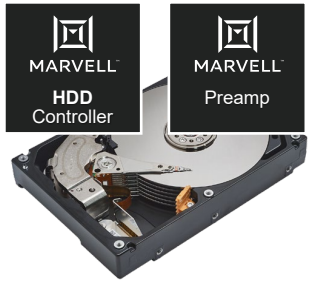
Dan Christman

EVP, Storage Products Group

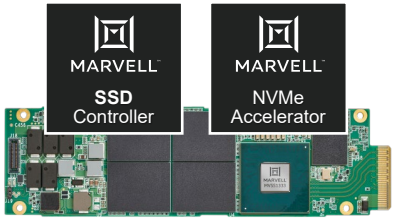
Storage products group business

Fibre Channel

HDD

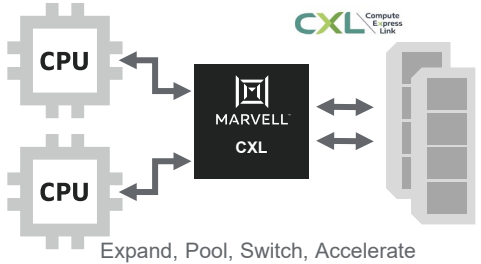


Flash



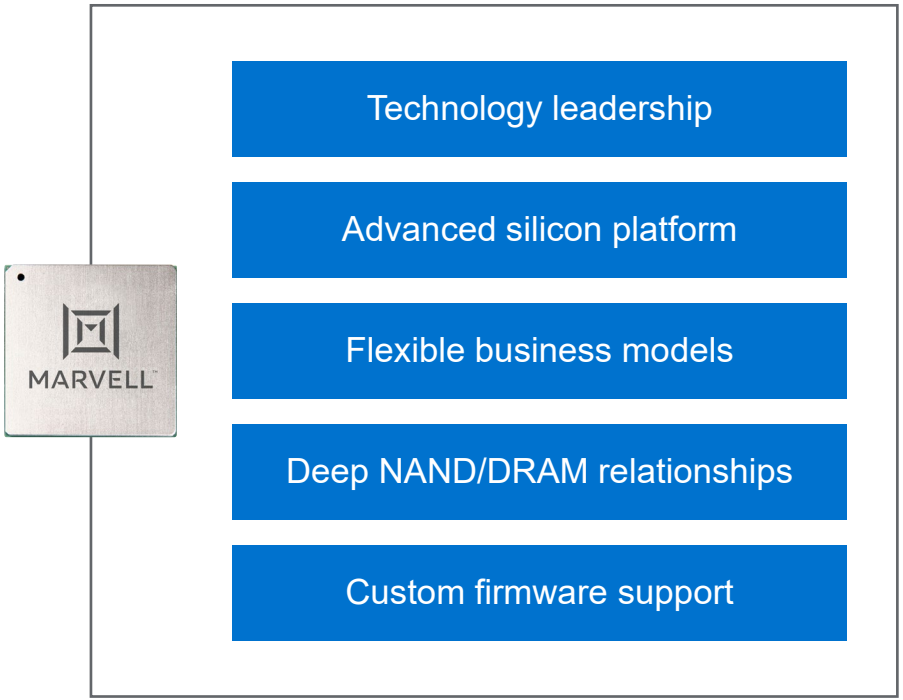
+

CXL



Expanding our market opportunity

Uniquely positioned to win in storage and memory



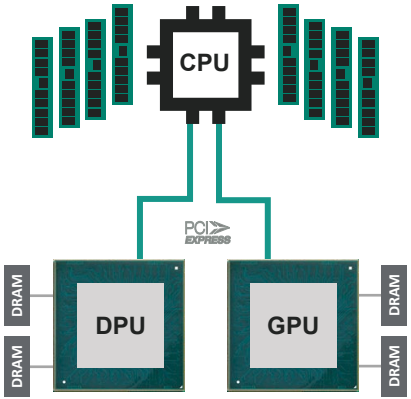
+ TANZANITE SILICON SOLUTIONS

Thad Omura

VP, Flash Marketing

Cloud data center memory challenges

Memory tied-down to xPUs



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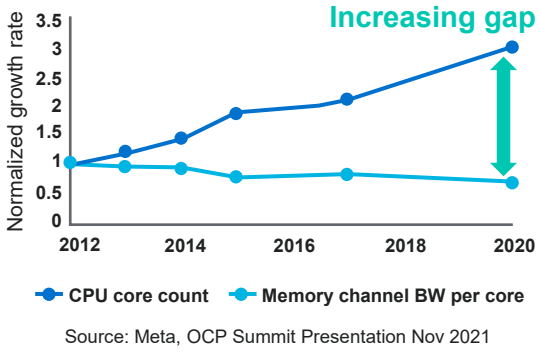
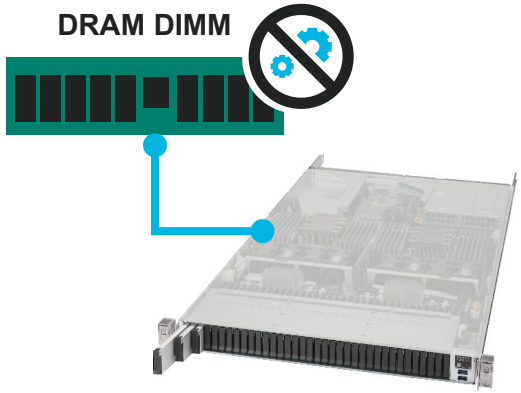
Bandwidth per core declining



Source: Meta, OCP Summit Presentation Nov 2021

Degrades efficiency

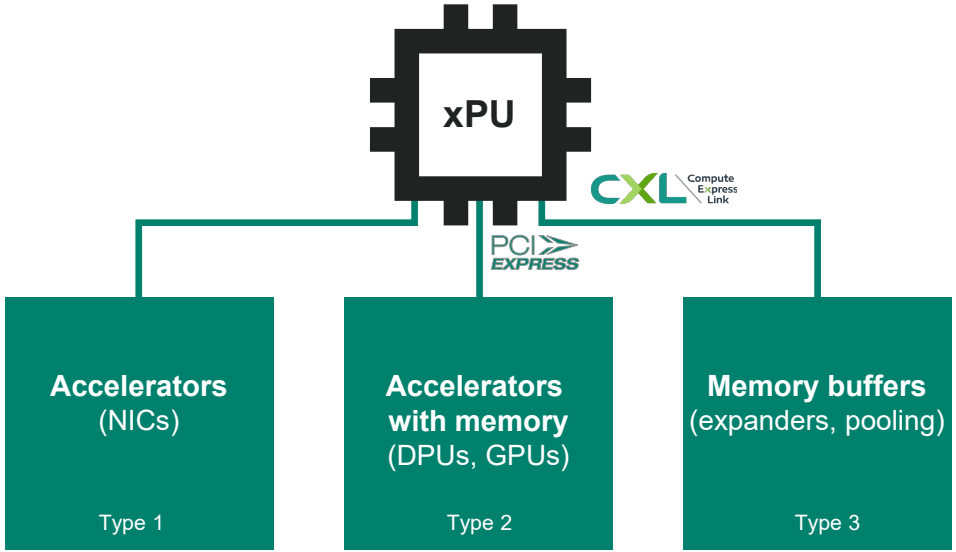
No near-memory compute



Limits performance

CXL is poised to address these issues

What is Compute Express Link (CXL)?

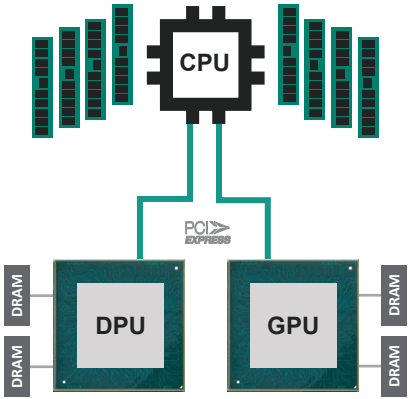


- Industry standard protocol
- Runs over PCI Express
- Low-latency interconnect
- Memory-optimized
- Cache-coherent

Tremendous ecosystem momentum driven by data center leaders

Cloud data center memory challenges

Memory tied-down to xPUs



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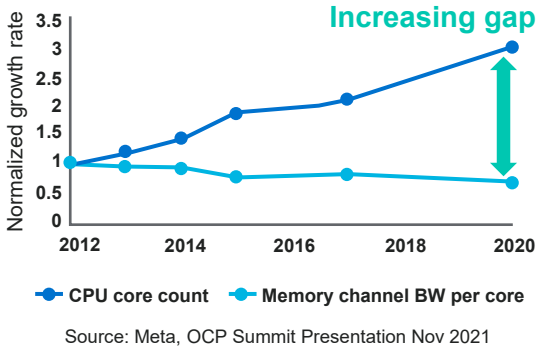

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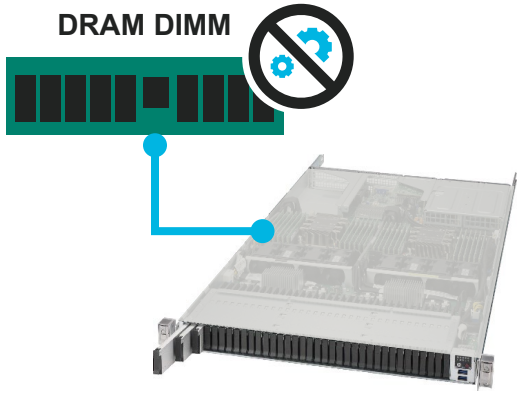

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Cloud data center memory challenges

Memory tied-down to xPUs

CXL Expander

CXL Pooling

CXL Switch

Bandwidth per core declining

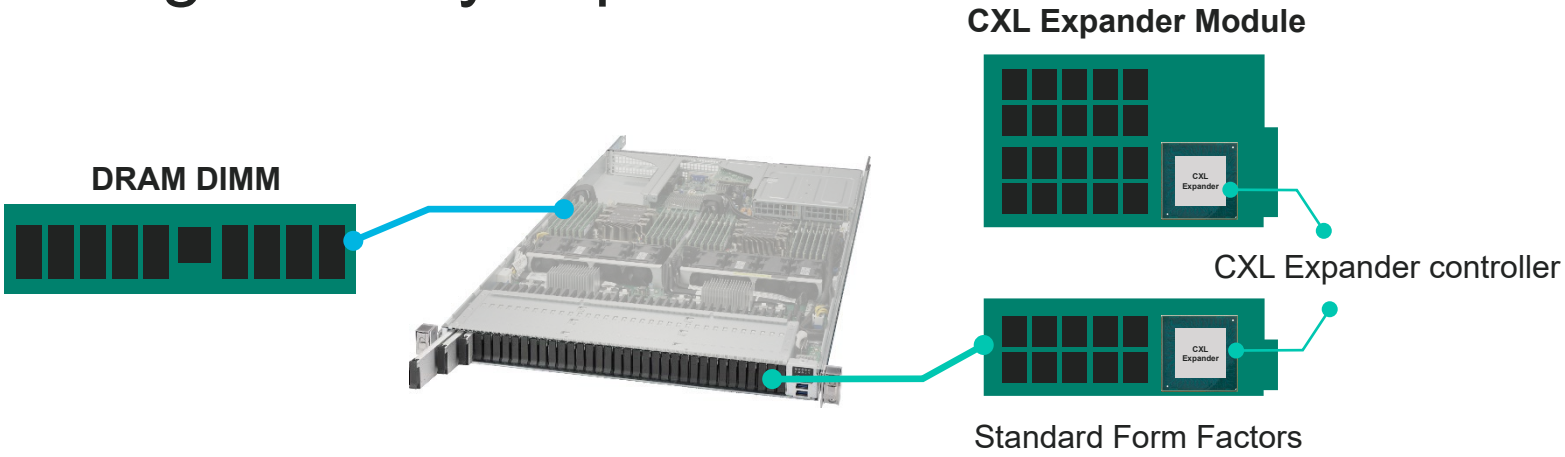
CXL Expander

No near-memory compute

CXL Accelerator

CXL is poised to address these issues

Addressing memory expansion



DIMM challenges

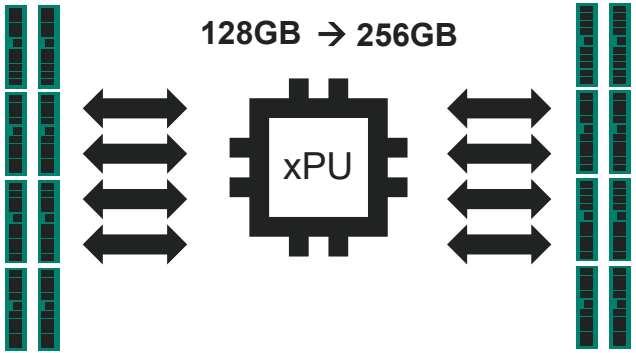
- Limited scalability
- Not serviceable
- No telemetry

CXL solution

- Scalable
- Pluggable
- Telemetry
- Improved thermals
- Mix-and-match DRAM
- Config flexibility

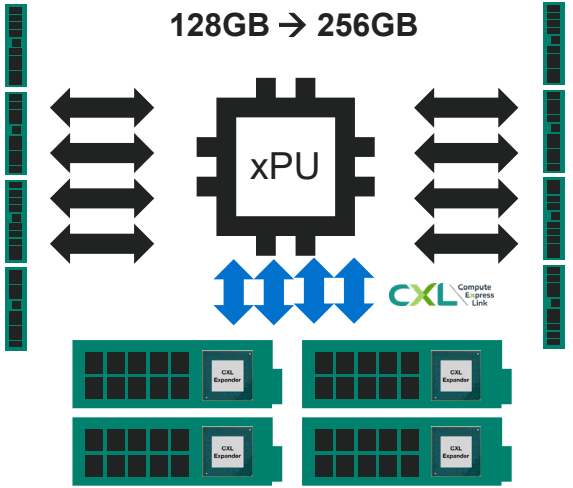
CXL memory expanders improve performance

Today: 2 DIMMs per channel (2DPC)



1DPC same bandwidth as 2DPC

1DPC + CXL Expanders

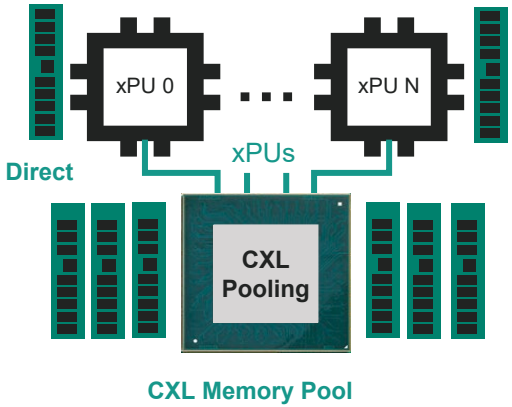


Use PCI Express to open bandwidth

Same capacity with greater bandwidth and utilization

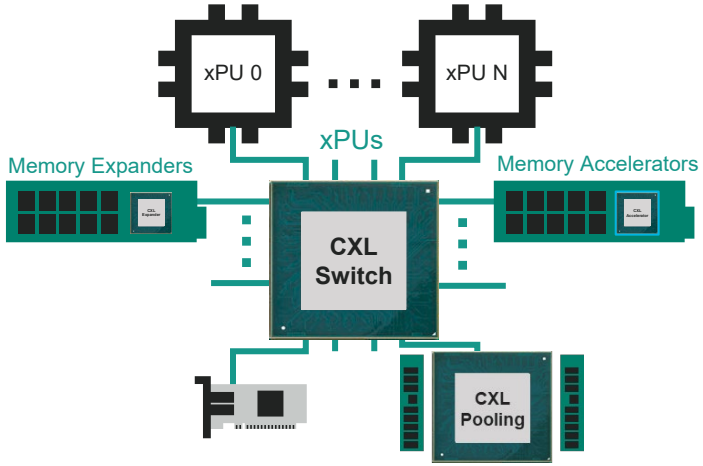
Sharing memory with CXL

CXL Pooling



- Pool memory across multiple xPUs
- Rescue under-utilized DRAM
- Scale memory independent of xPUs

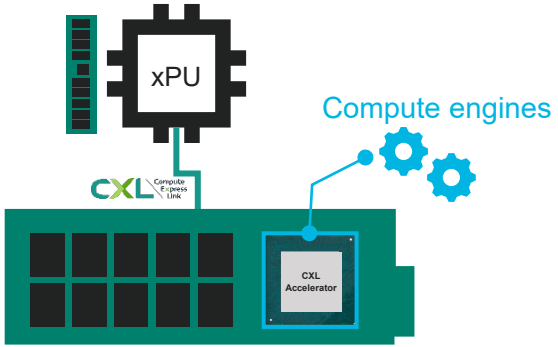
CXL Switch



- Flexible to connect resources into fabric
- Scalable, serviceable
- Enables fully composable infrastructure

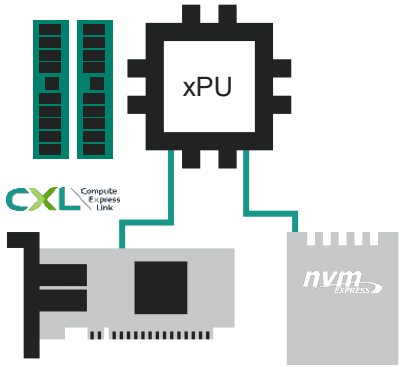
Accelerating with CXL

CXL Accelerator



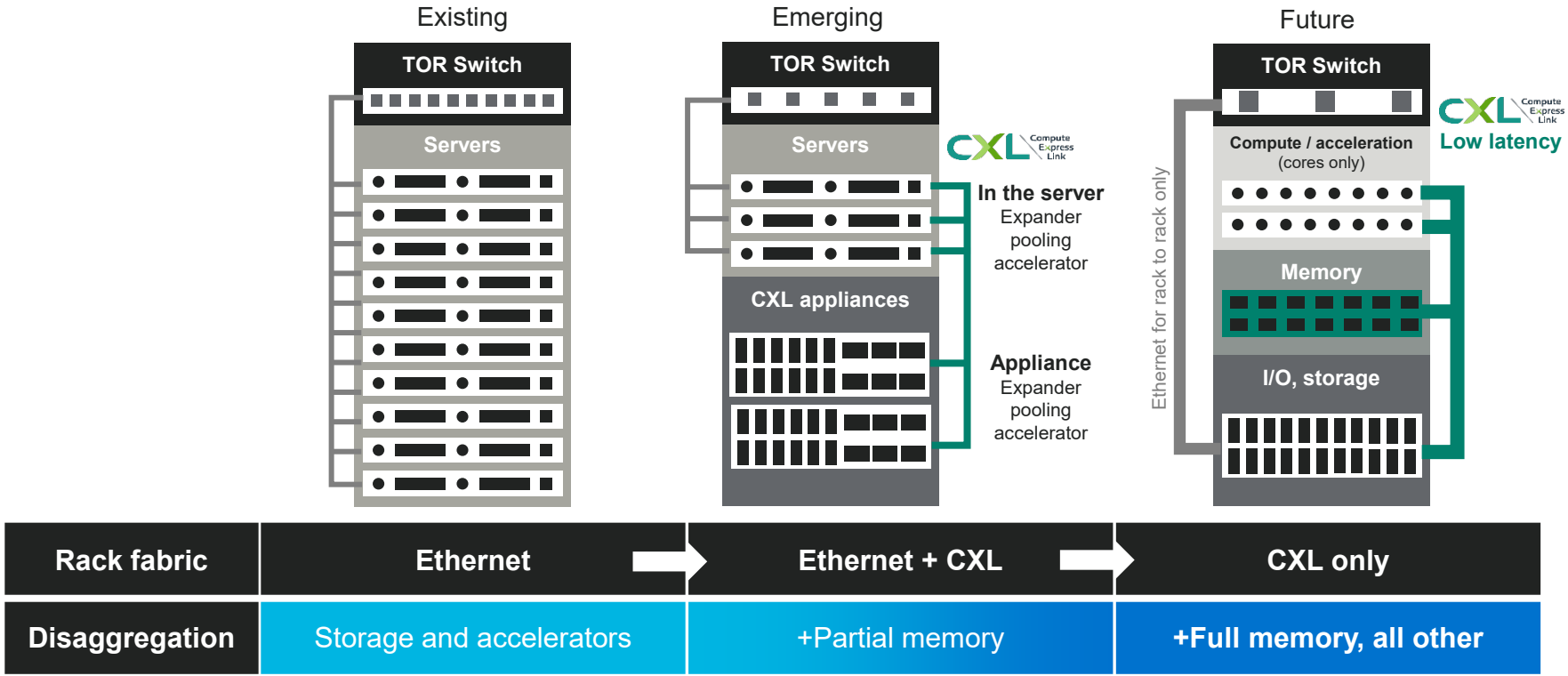
- Coherent, efficient
- Accelerate analytics, ML, search, etc.
- Improves efficiency and TCO

CXL I/O Acceleration



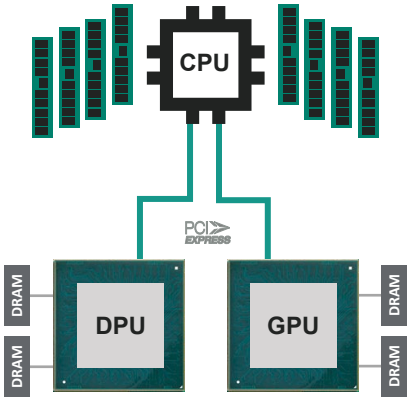
- DPU/NIC, SSD, …
- Accelerate protocol processing
- Composable I/O devices

CXL data center vision: full composability



Cloud data center memory challenges

Memory tied-down to xPUs



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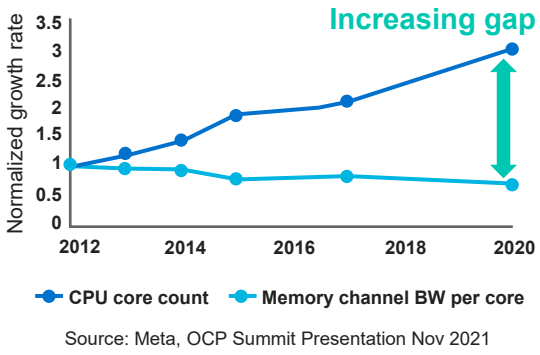

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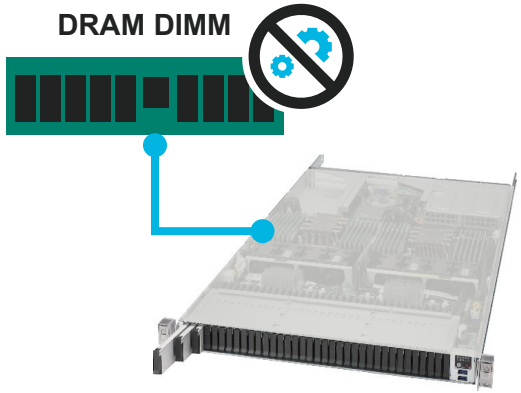
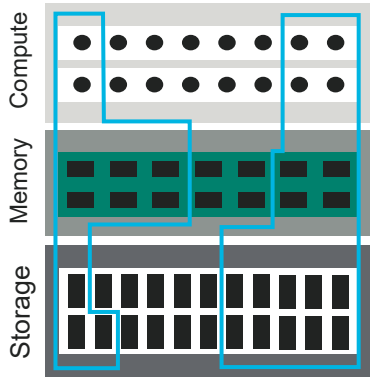


Limits performance

CXL is poised to address these issues

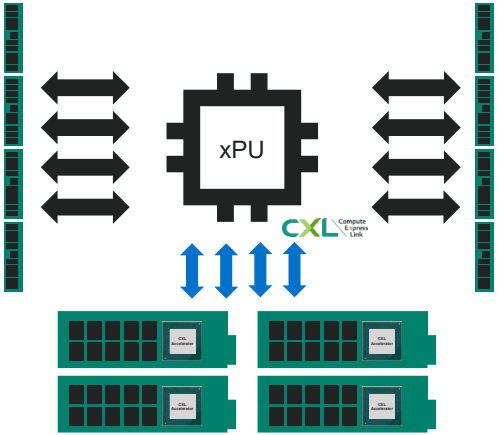
CXL ***solves*** data center memory challenges

Disaggregated memory



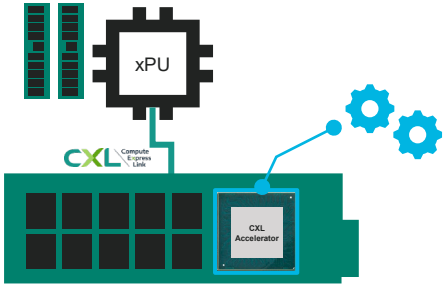
Fully composable

More bandwidth per core



Optimize efficiency

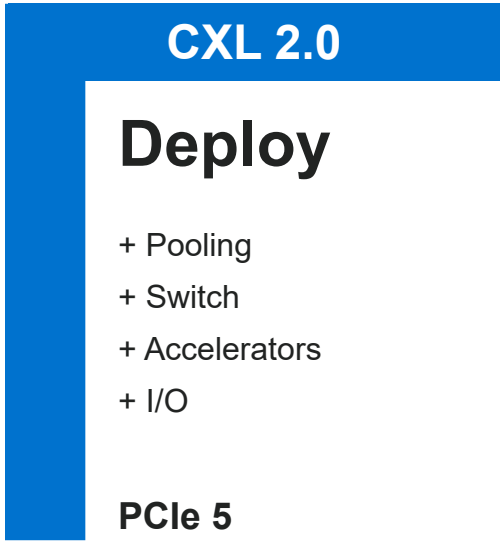
Near-memory computation

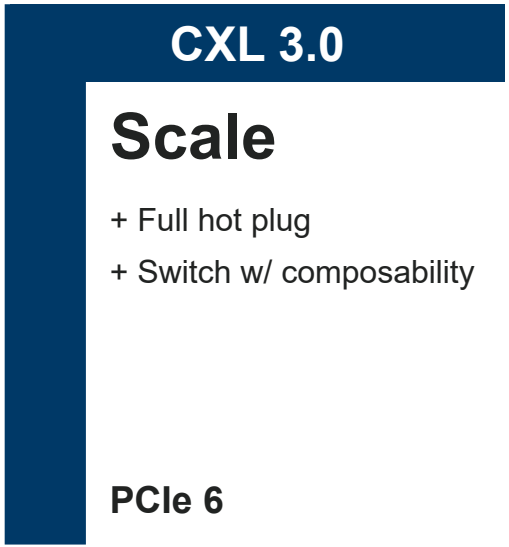


Ultimate performance

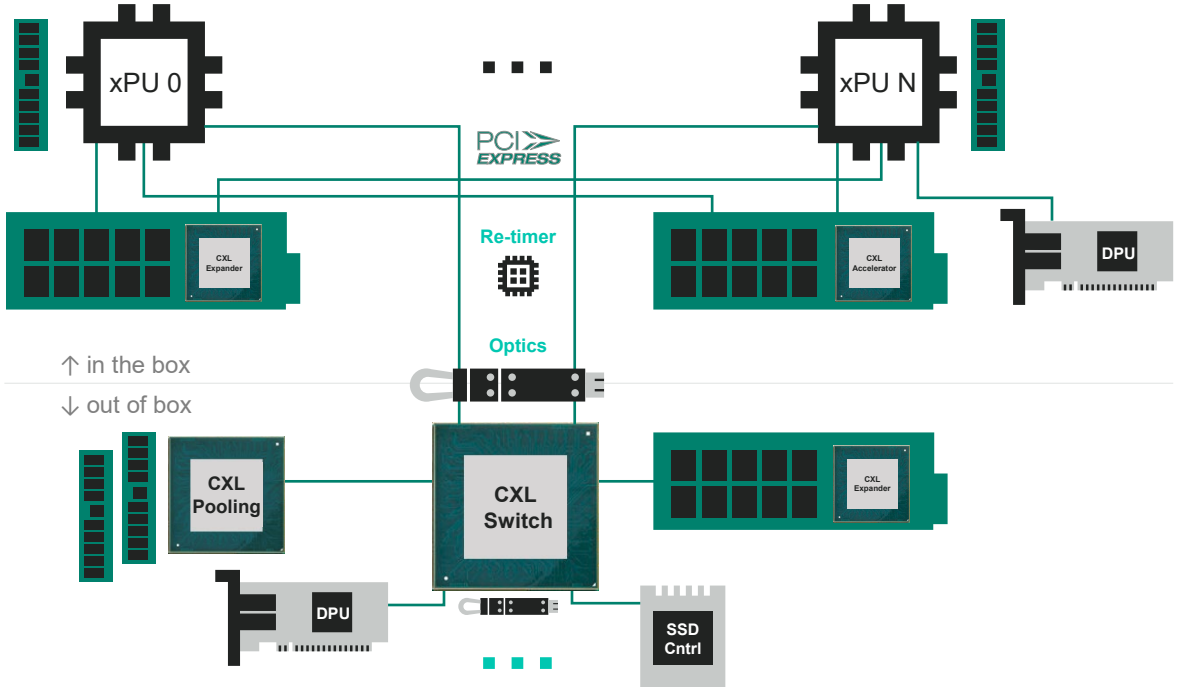
CXL is disrupting cloud data center architectures

CXL technology roadmap





Comprehensive end-to-end CXL solutions



CXL opportunities

- Expanders
- Pooling
- Switch
- Accelerators
- Custom Compute
- DPUs / SmartNICs
- Electro-optics
- Re-timers
- SSD Controllers

Multi-billion $ opportunity

Summary

1. CXL is disrupting cloud data center architectures
2. Uniquely positioned to enable end-to-end CXL in data center
3. CXL is driving the next multi-billion-dollar opportunity

Thank You

Essential technology, done right