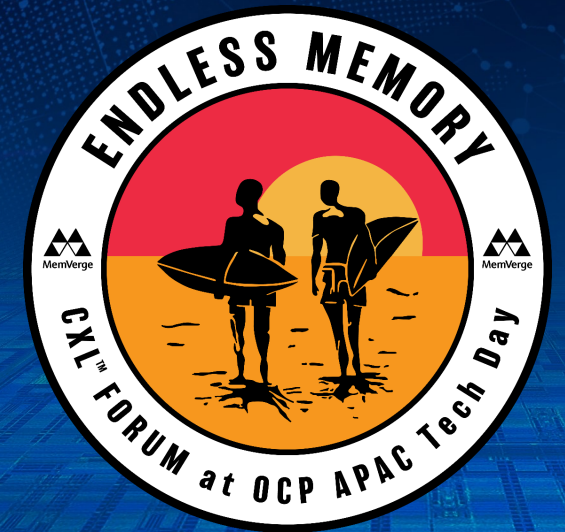


CXL Controller by Montage Technology

Flash Memory Summit

Geof Findley/Robert Jin/Leonard Datus

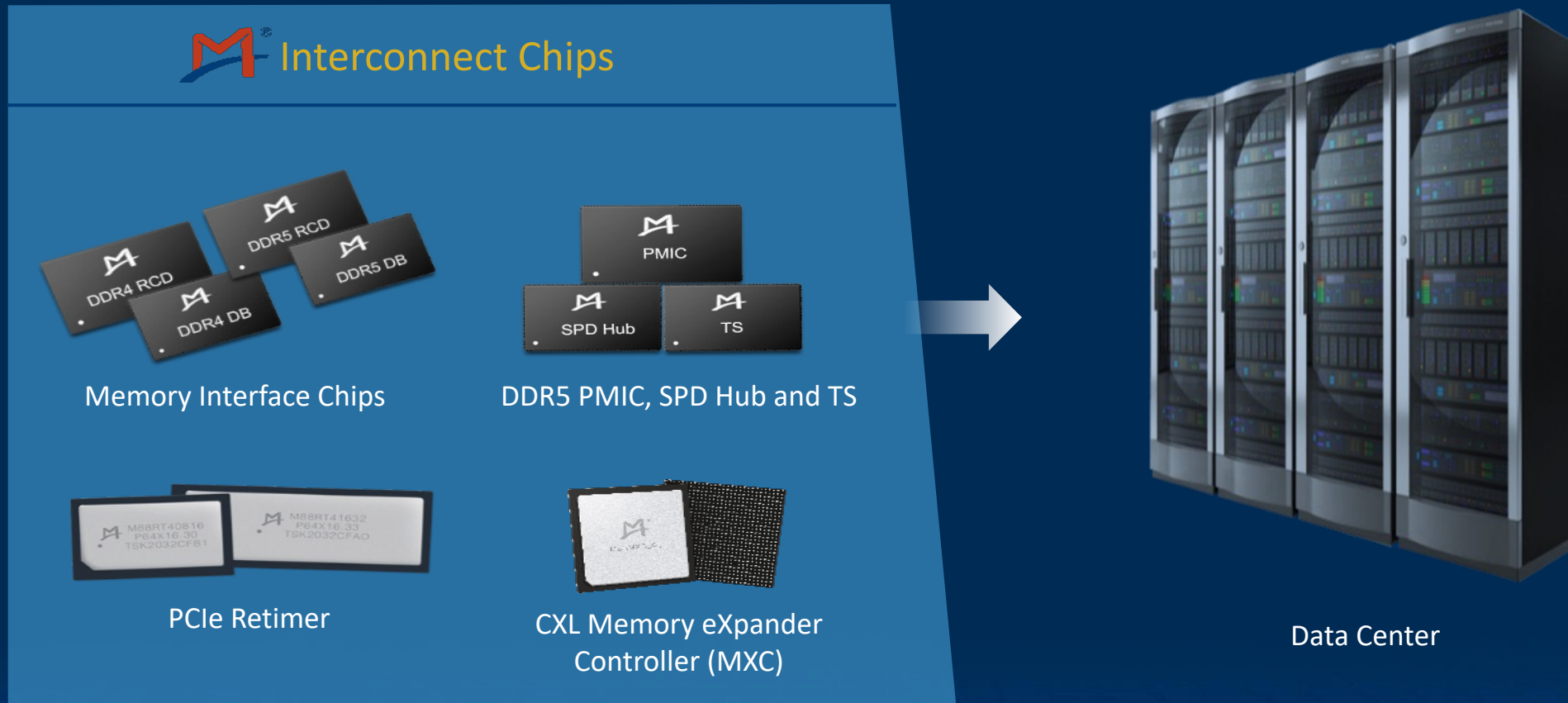
Business Development Montage



- Almost 20 years in high speed memory products leading the industry on DDR4 and DDR5 memory interface products
- PCIe Gen 4 and 5 Retimer portfolio with design wins around the world
- First to ship CXL controller
- First to ship a Mass Production CXL controller
- Design wins with all key customers
- Ecosystem enabling of over 50 customers World Wide

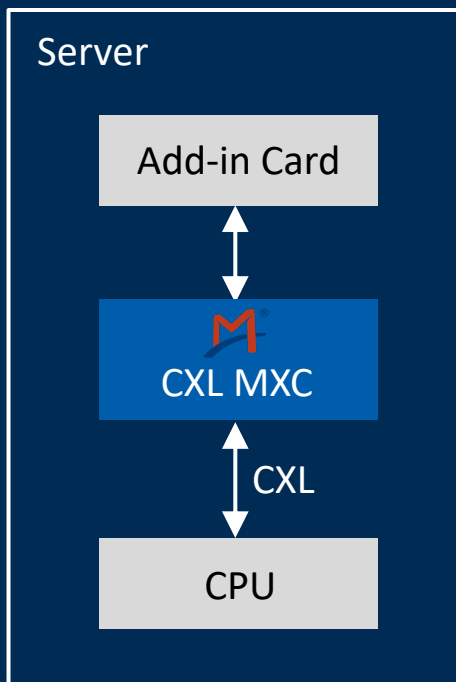
Solutions today and future products in the pipeline to address your needs!!

Products & Solutions for Data Center, AI, and Cloud Computing...

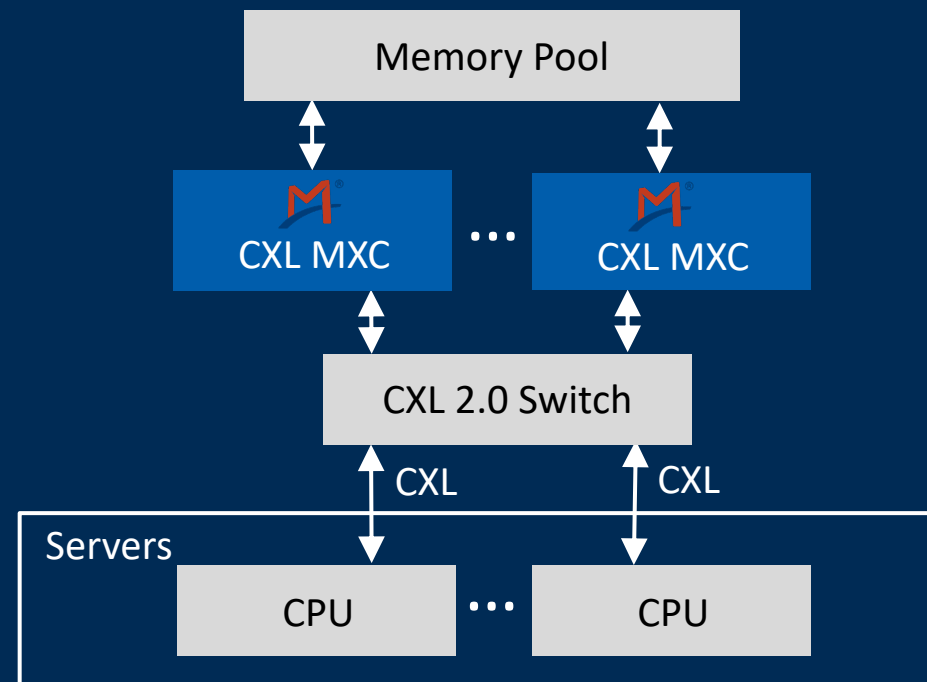
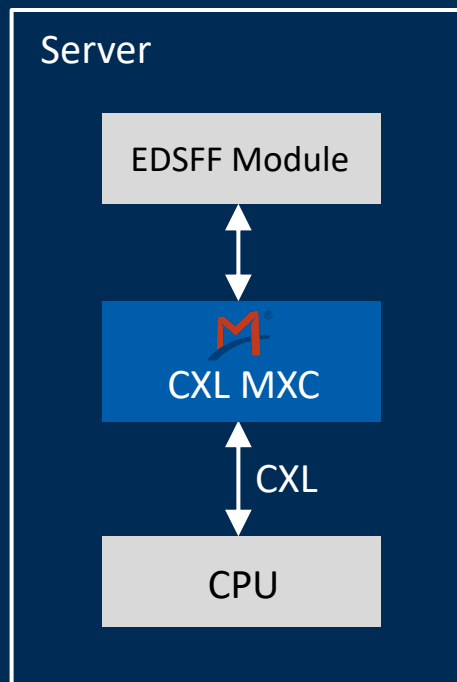


Provide high-performance, low-power silicon based solutions to enable **Higher Data Rate & Safer Computing** for cloud computing and data centers.

CXL MXC – Key Device for Memory Expansion and Pooling



Memory Expansion



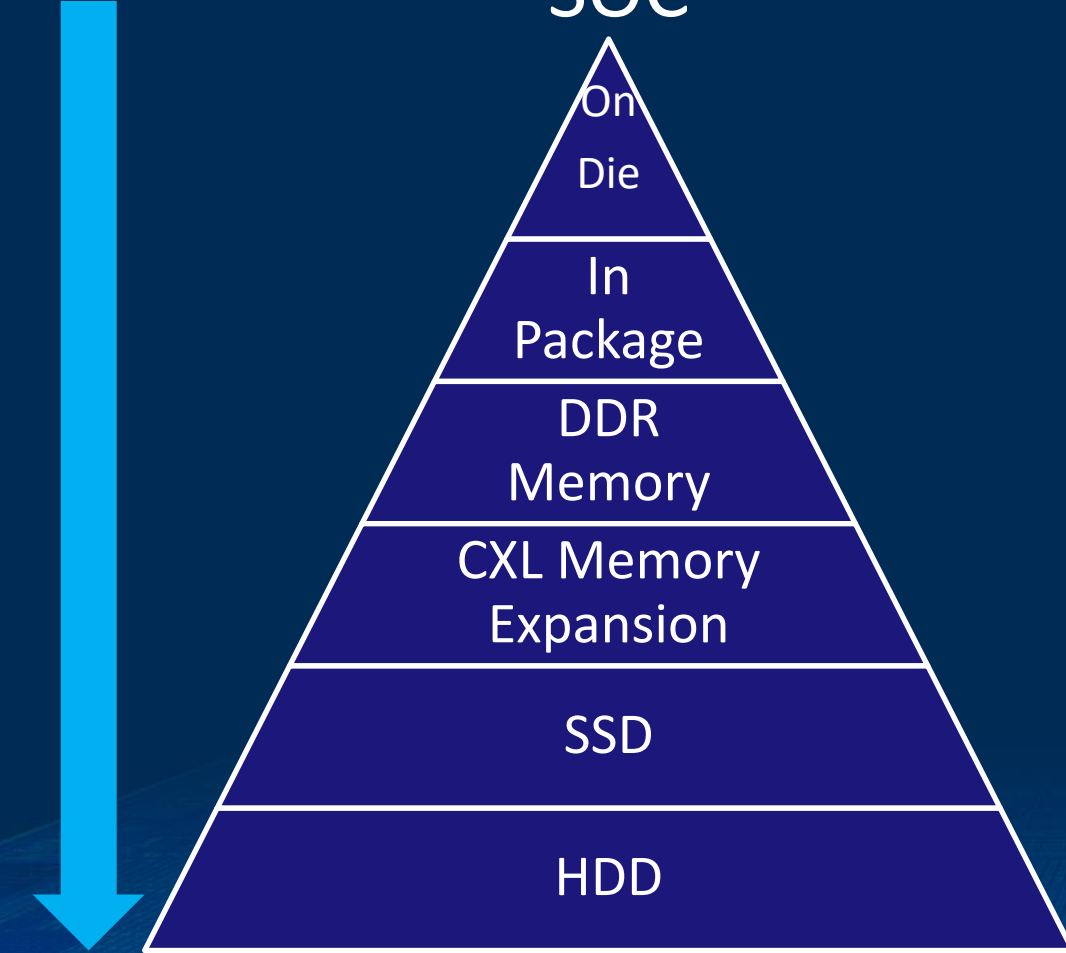
Memory Pooling

- Industry's first Type 3 CXL Memory eXpander Controller (MXC)
- Providing high-bandwidth and low-latency interconnect between CPU and CXL-based devices to enable memory expansion and pooling for data centers
- Compliant with JEDEC DDR4/DDR5 standards and CXL 2.0 specifications, supporting PCIe 5.0 speeds
- Designed for use in Add-In Card (AIC), EDSFF Memory Module and CXL pooled memory



Capacity

SOC



DDR Memory alone is not able to keep up with the capacity requirements per core

- **CXL Memory Expansion Supports**

- 2DIMMs/4 ranks DDR per channel
- Two 40bit DDR5 Sub Channels/per channel
- One 72 bit DDR4 channel
- Accommodate up to 80 DRAM placements
- Low Power
- 1TByte Capacity with 3DS DRAM
- Latency Optimized to 1 NUMA hop

CXL Memory eXpander Controller: MXC

- **Industry's First Memory Expander Controller**

- CXL Type 3 Memory Expander
- CXL 1.1/2.0 compliant
- PCIe Add-In Cards
- Backplane
- EDSFF memory modules
- DIMMS or soldered down Memory
- DDR4-3200 and DDR5-6400
- Rich RAS features supported
- High BW utilization & efficiency
- Ultra Low power optimized for Modules

- **Module Partners**

- Samsung
- SK Hynix
- Micron

DRAM Bandwidth and Capacity Aggregation across Multiple CXL™ Modules

CXL DRAM Memory Controller (MXC)

- CXL Type3 Memory Expander
- CXL 1.1 / 2.0 Compatible
- CXL.IO Gen5 support, up to 32GT/s
- Fully JEDEC DDR4/5 complaint and capable
- Rich RAS features supported
- DDR4 up to 3200 MT/s and DDR5 up to 6400 MT/s
- High BW utilization & efficiency
- Single Numa Hop Memory Latency optimized
- Ultra-Low Power Design optimized for Modules

Partners:

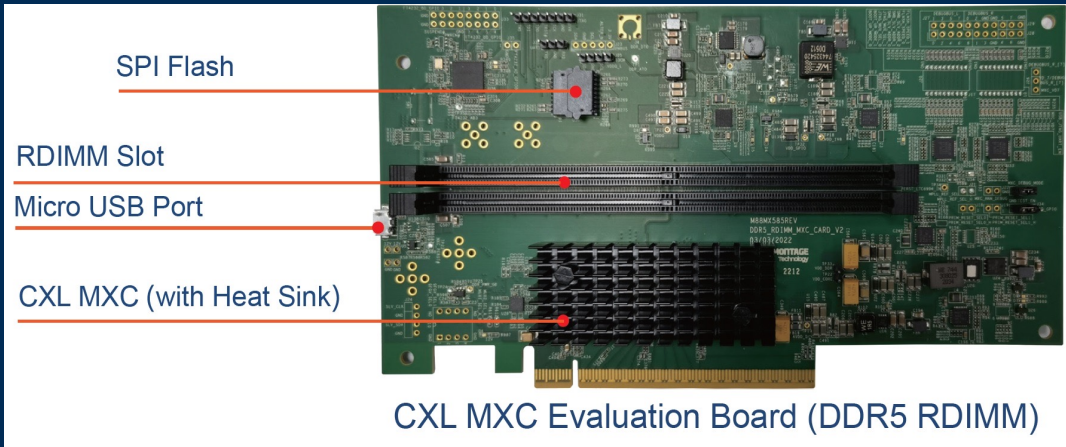


SAMSUNG



MXC Features

The MXC provides high-bandwidth and low-latency interconnect between the CPU and the CXL-based devices, allowing them to share memory for higher performance, reduced software stack complexity, and lower data center TCO.



- **CXL Type 3 Memory eXpander Controller**

- Integrated CXL Controller
- DDR 4/5 Controller
- RISC-V micro-processor
- On-Chip PVT Sensor
- SMBus, I3C, I2C, SPI Interfaces
- 767 ball FCCSP package

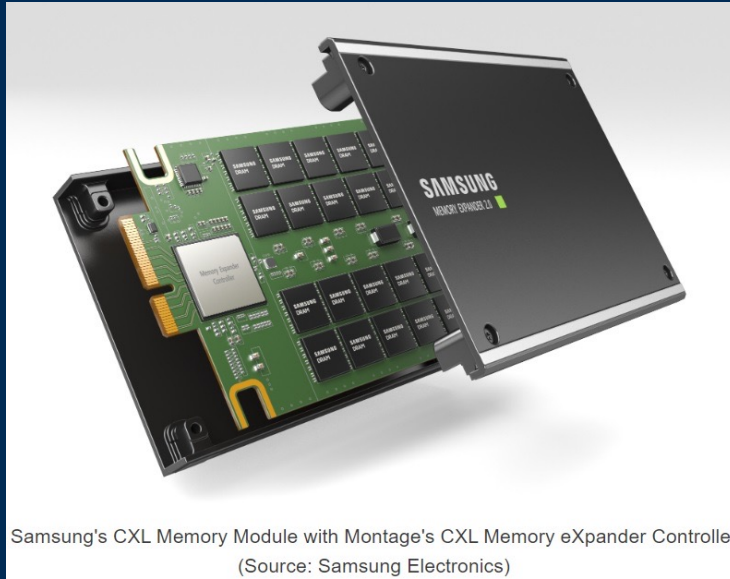
- **CXL Controller**

- Compliant with CXL 1.1 and CXL 2.0 RAS specifications
- Supports CXL.mem and CXL.io protocols
- X8 PCIe 5.0 interface up to 32GT/s
- Rich RAS features

- **DDR Controller**

- Compliant with JEDEC DDR4/5 standards
- Supports DDR4/5 UDIMM, RDIMM, soldered down DRAM
- Supports DDR4-3200 and DDR5-6400
- Low power consumption
- Optimized DDR I/O equalization
- Programmable I/O impedance

MXC Readiness – Components Available Now



- Status



All major SOC suppliers



All major memory suppliers

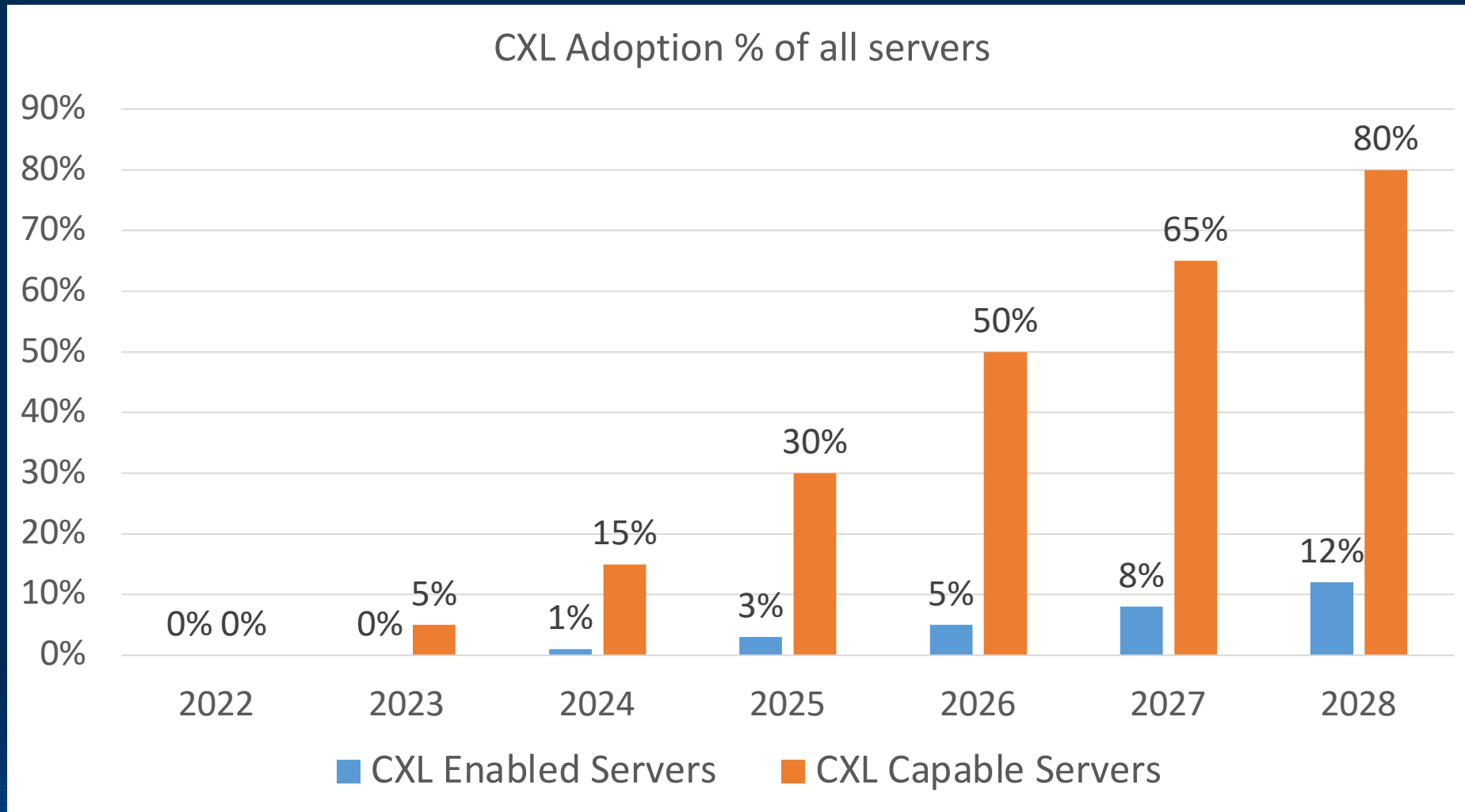
Contact your module provider for solution availability



Thank you !



CXL Adoption Estimate



Source: Yole, Montage

Last updated: April, 2023