Montage Technology
CXL Memory Expander
Enabling Optimized Bandwidth, Capacity and TCO

Roland Knaack
VP Strategic Marketing

EMPOWERING OPEN.

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Company Profile

Headquarters and Worldwide Office Locations

- Date Founded: May 2004
- Employees: 500+

- IPO on the SSE STAR Market in July 2019 (Code: 688008)

- High-performance, low-power IC based solutions for cloud computing and data center markets
- Customers: Memory and server vendors and Internet users worldwide


Shanghai (HQ)


Kunshan


Xi'an


Beijing


Macao


Korea

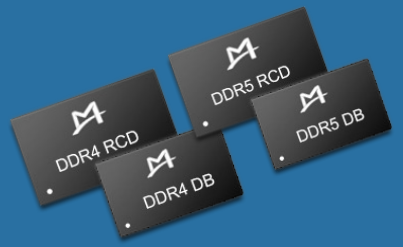
San Jose


Atlanta

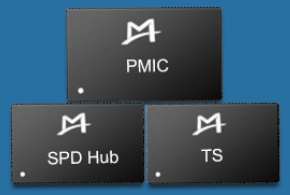

Austin

Products & Solutions

Interconnect Chips



Memory Interface Chips



DDR5 PMIC, SPD Hub and TS

PCIe Retimer

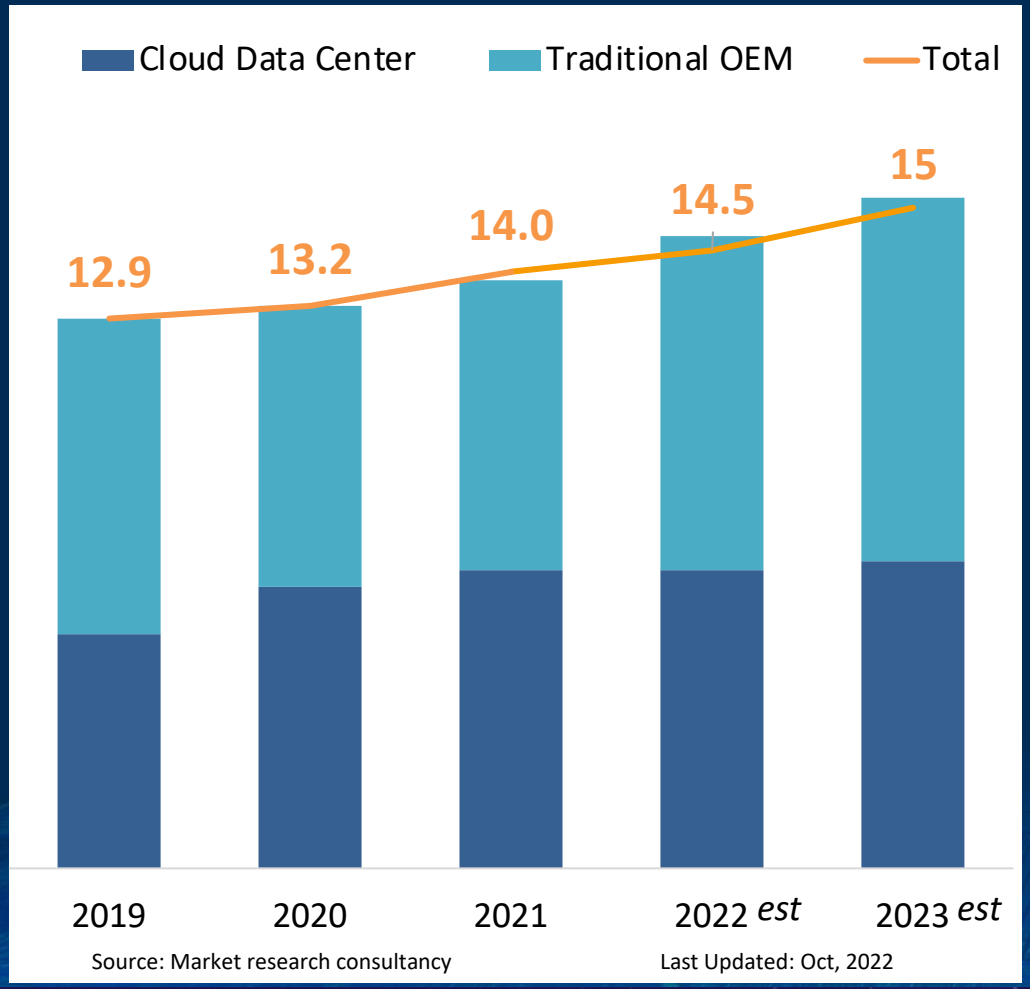
CXL Memory eXpander Controller (MXC)

Data Center

Provide high-performance, low-power silicon based solutions
to enable Higher Data Rate, Higher Bandwidth and Capacity for cloud computing and data centers.

Global Market Update: Servers

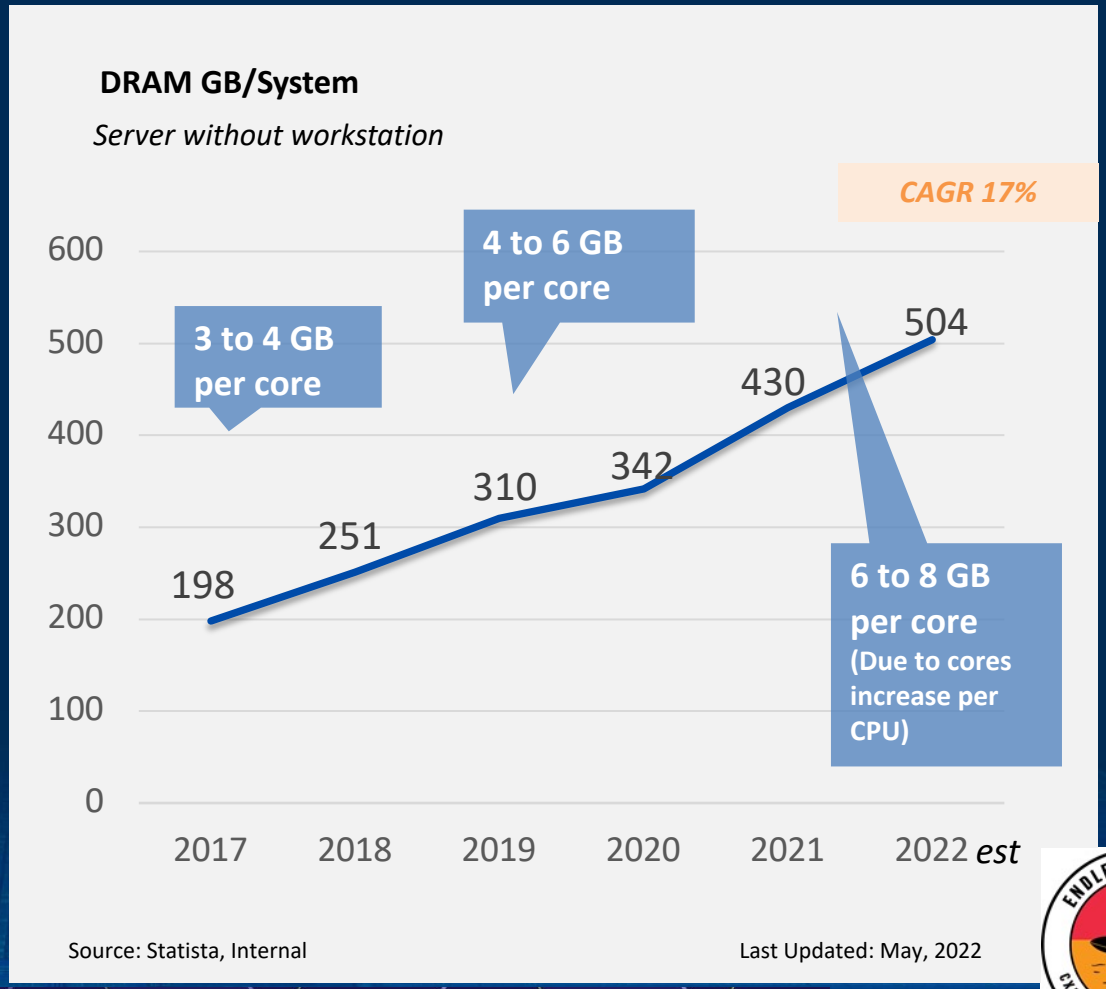
- **Global Total Server Market Estimate in Million Unit shipment**



Source: Market research consultancy

Last Updated: Oct, 2022

- **Total memory capacity per system**



Source: Statista, Internal

Last Updated: May, 2022

Mature Ecosystem Relationships and Collaboration

MONTAGE® Technology

intel. AMD .....

CPU/SOC Manufacturers

SAMSUNG SK hynix Micron Kingston RAMAXEL ADATA Apacer

Memory Module Manufacturers

Hewlett Packard Enterprise DELL Technologies H3C Lenovo 联想 inspur 浪潮 CISCO

Server OEMs

- High level of support throughout the ecosystem
- Increased visibility into opportunities
- Faster time to market

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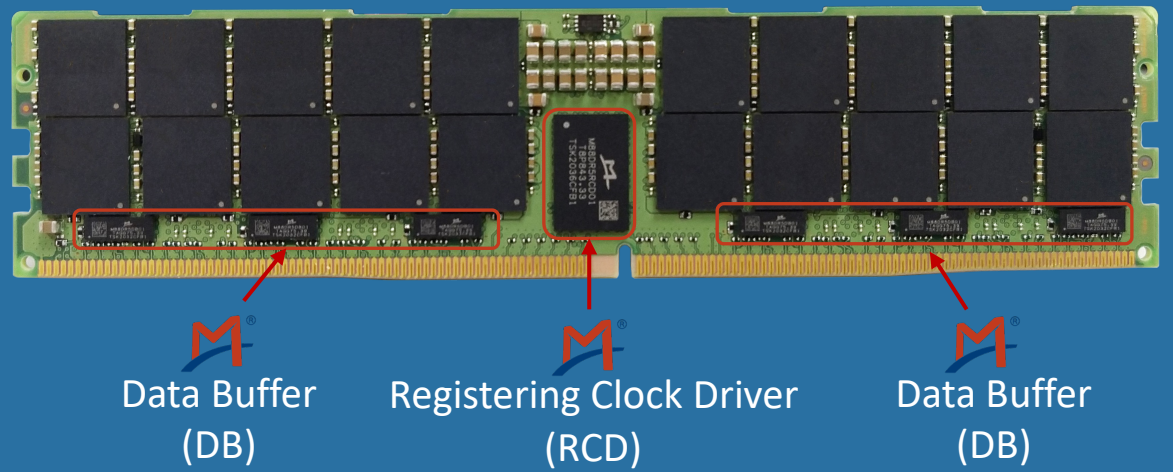
Memory Interface Chips: One-Stop DDR5 Interface Solution

Memory Interface Chips
（RCD, DB）

DDR5 LRDIMM



Enterprise Server

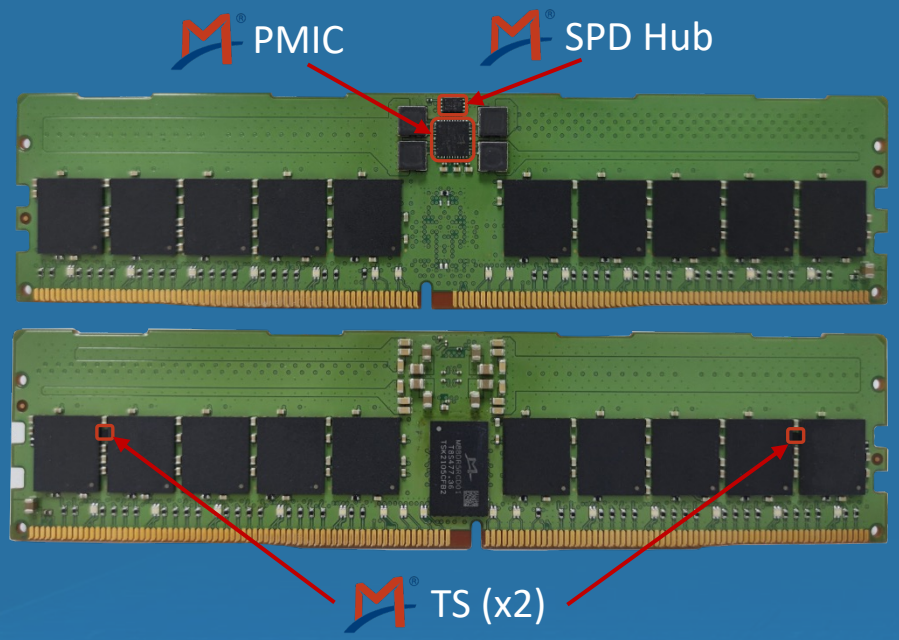
Note: This figure takes DDR5 LRDIMM as an application example

High-performance, low-power DDR4/DDR5 Memory Interface Chips:

- Compliant with JEDEC RCD/DB specifications
- Applicable to DDR4/DDR5 RDIMM, MRDIMM or NVDIMM
- Industry-leading memory interface solutions to improve the performance and capacity of memory systems for enterprise servers worldwide

DDR5 PMIC, SPD Hub and TS: One-Stop Memory Interface Solution

JEDEC compliant DDR5 PMIC, SPD Hub and TS chips for DDR5 memory modules



Note: This figure takes DDR5 RDIMM as an application example.

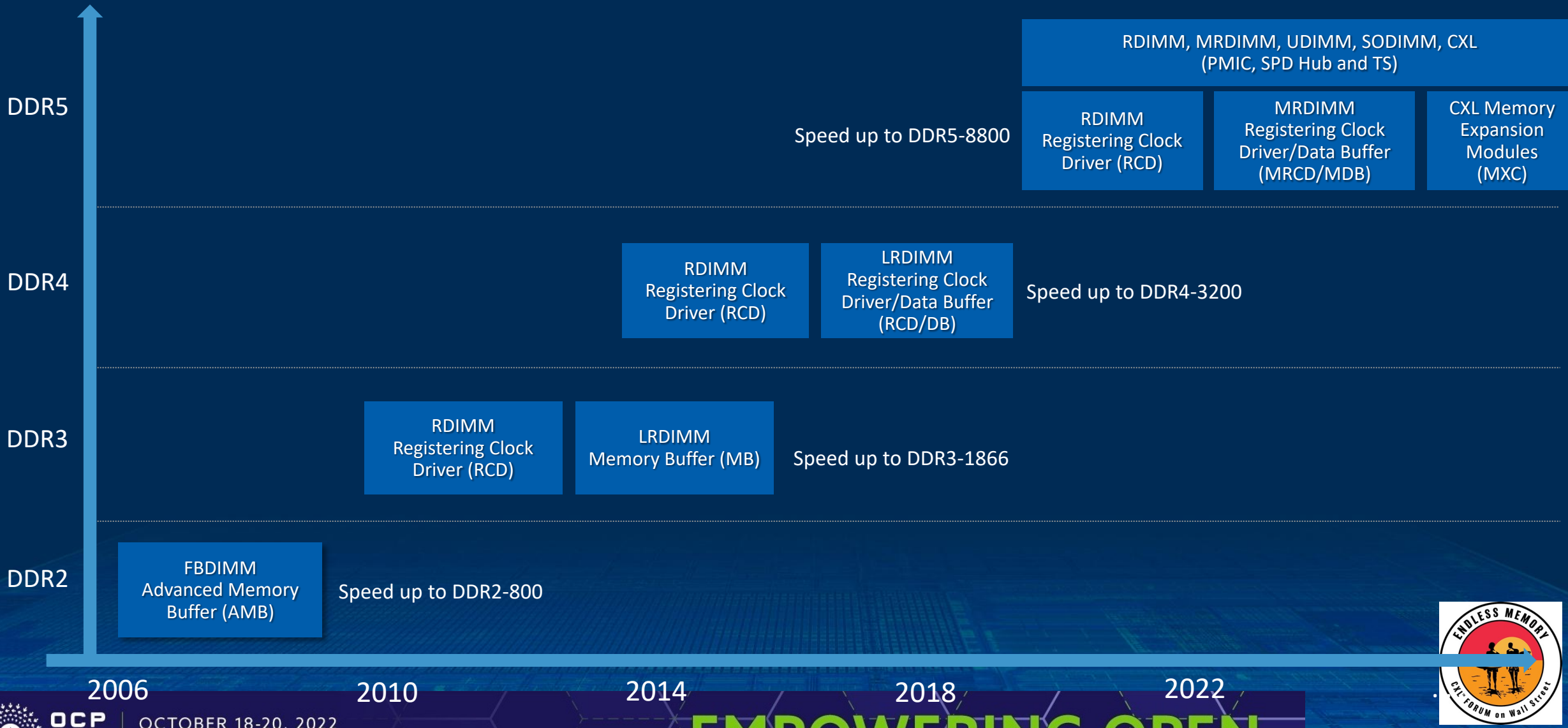
- **DDR5 SPD EEPROM with Hub (SPD Hub)**
  - Provide communication between the host and the local devices of the memory module
  - 8kbit SPD EEPROM with Hub function and Temperature Sensor
  - Applicable to DDR5 MRDIMM, RDIMM, UDIMM, SODIMM and CXL
- **DDR5 Power Management IC (PMIC)**
  - Provide power for other components on the memory module
  - I^2C and I3C serial bus interfaces
  - Applicable to DDR5 MRDIMM,RDIMM and CXL
- **DDR5 Temperature Sensor (TS)**
  - Realize thermal management for the memory module
  - I^2C and I3C serial bus interfaces
  - Applicable to DDR5 MRDIMM, RDIMM and CXL

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

Robust Product Portfolio



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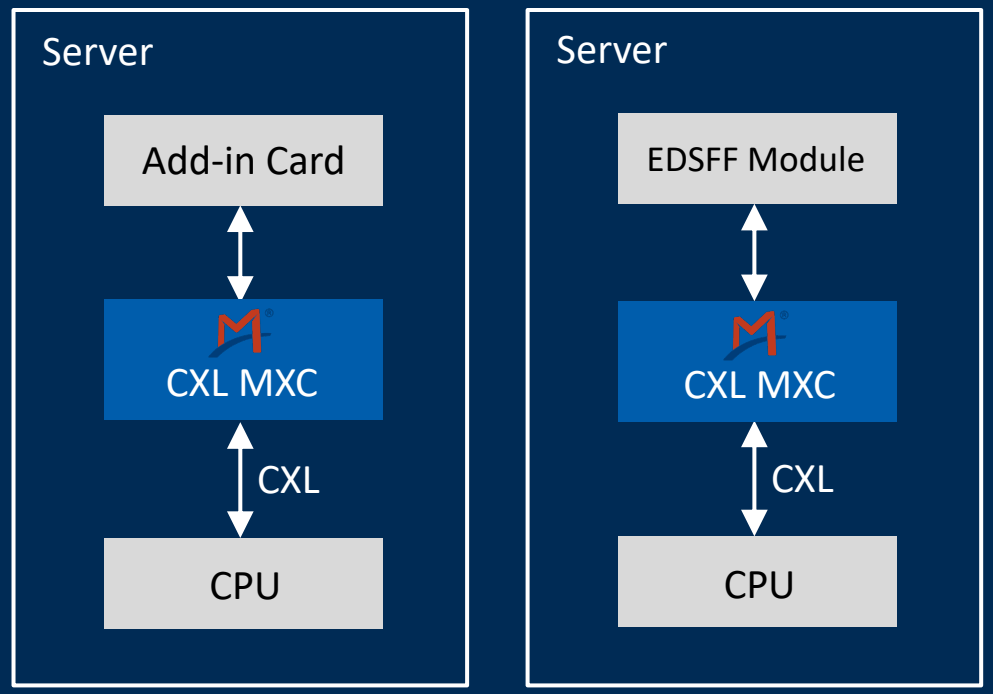
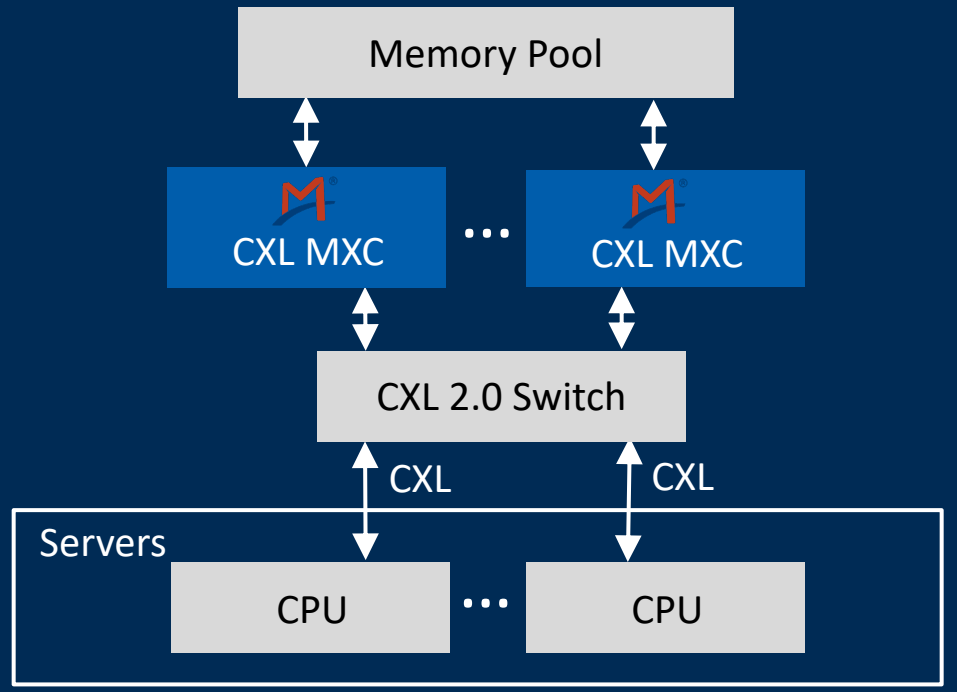
CXL MXC – Key Device for Memory Expansion and Pooling

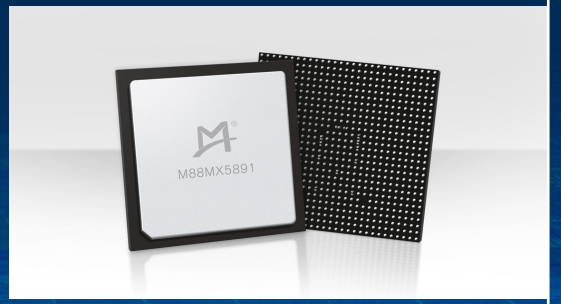


Memory Expansion



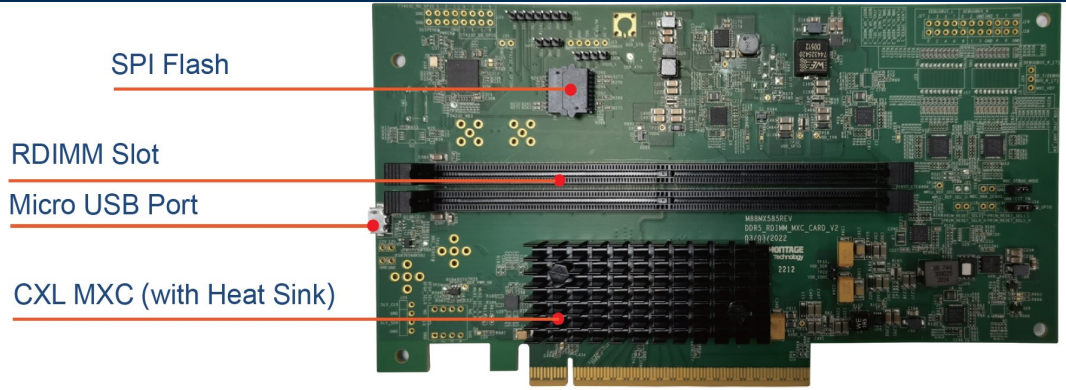
Memory Pooling

- 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 DDR4/DDR5 JEDEC 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



MXC Features

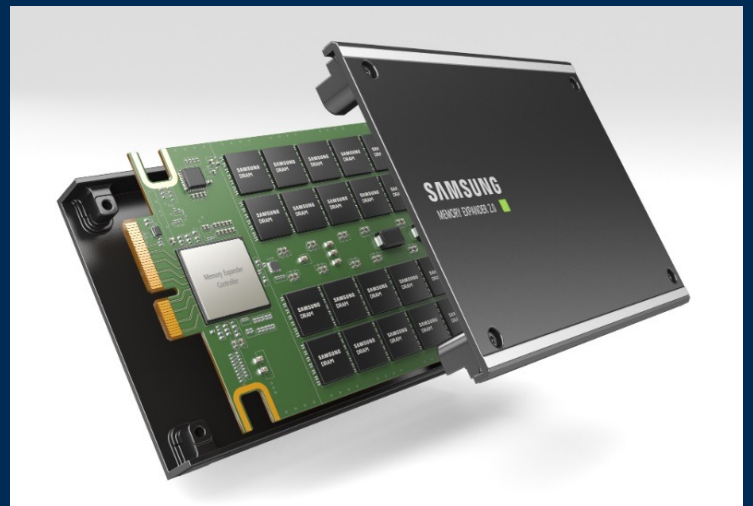
The MXC provides high-bandwidth and low-latency interconnect between the CPU and the CXL-based devices, allowing them to share memory for higher performance, reduced software stack complexity, and lower data center TCO.



CXL MXC Evaluation Board (DDR5 RDIMM)

- **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



Samsung's CXL Memory Module with Montage's CXL Memory eXpander Controller
(Source: Samsung Electronics)

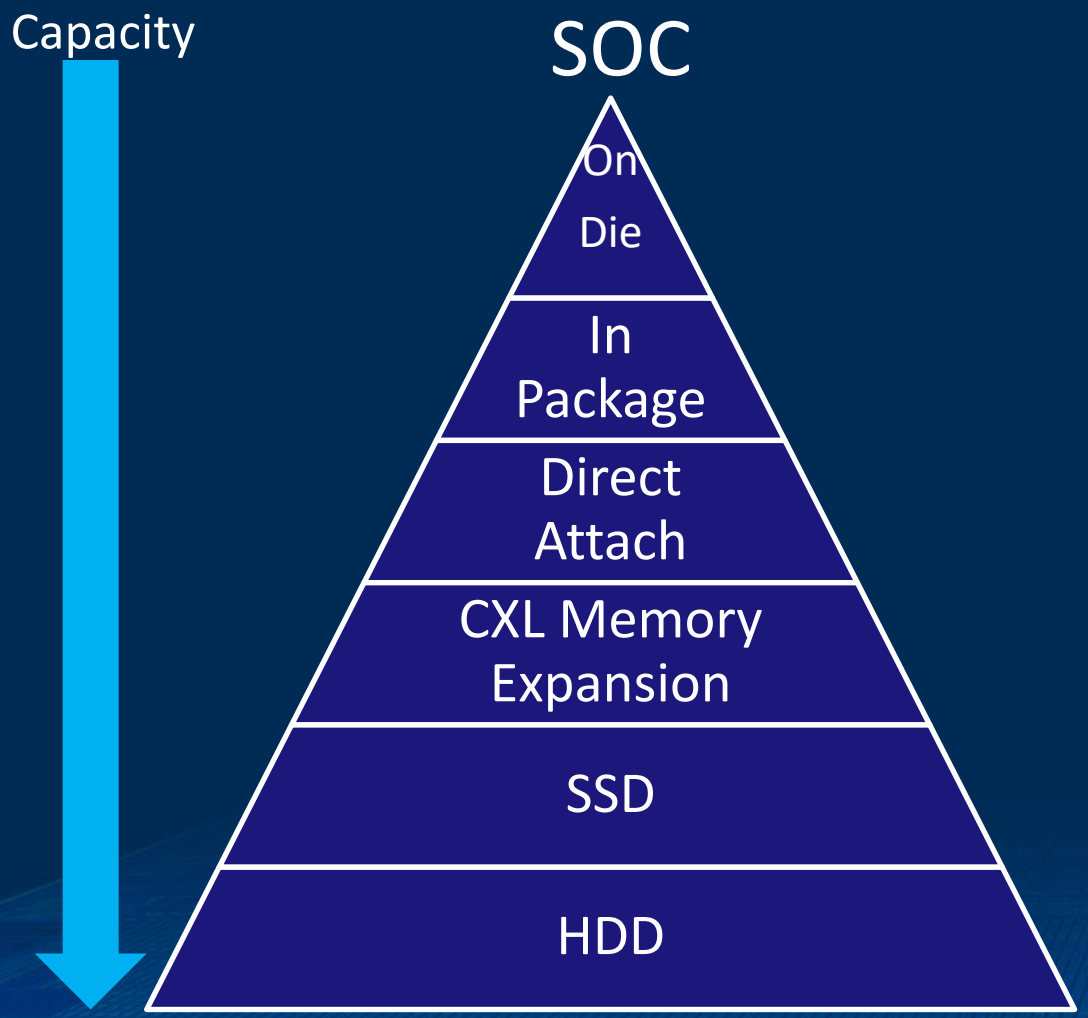
- **Status**

✔ All major SOC suppliers

✔ All major memory suppliers

Contact your module provider for solution availability

MXC Performance



Direct Attach Memory is not able to keep up with the capacity requirements per core

- **CXL Memory Expansion addresses this issue**
  - 4 ranks DDR5 per sub channel
  - Two 40bit DDR5 Sub Channels
  - One 72 bit DDR4 channel
  - 2 DIMMs per channel
  - Accommodate up to 80 DRAM placements
  - Low Power
  - 1.28TByte Capacity with 3DS DRAM
  - Latency Optimized to 1 NUMA hop

Thank You