

# CXL<sup>®</sup> Memory Solutions

## High Capacity, Cost-Effective Memory in the Big Data Era

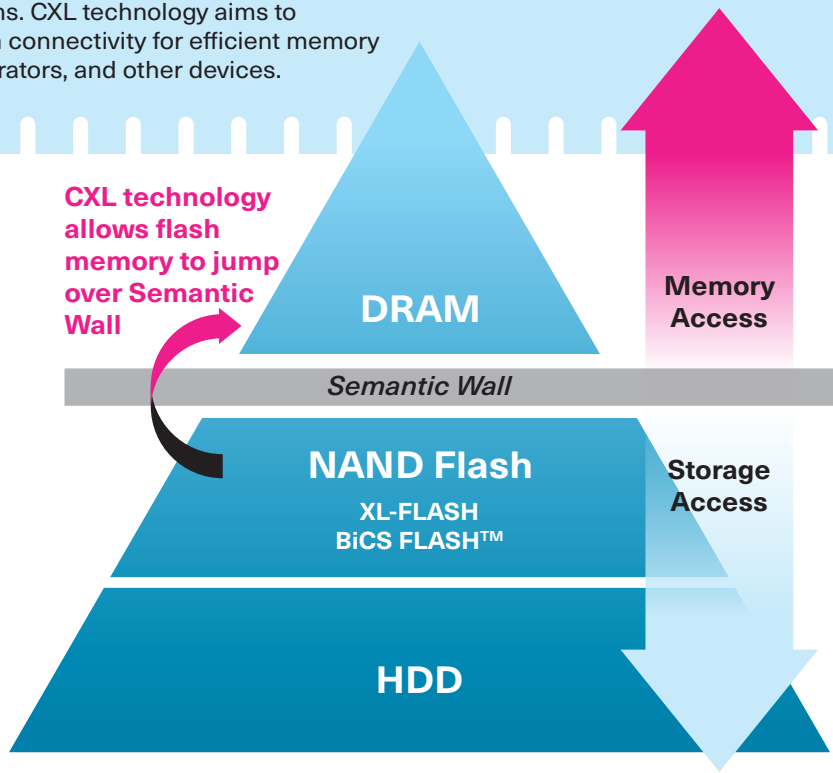
With the rise of AI and machine learning applications, there is a need to expand memory capacity and data bandwidth. Memory expansion through the conventional DIMM interface has constraints, therefore a new PCIe<sup>®</sup> based interface, CXL, has been adopted by the industry. Utilizing the CXL interface, KIOXIA is exploring ways to expand the use of flash memory for existing storage and memory applications by leveraging NAND-based CXL benefits of higher capacity and lower cost.

### What is CXL?

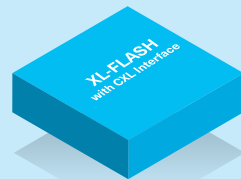
Recently, a PCIe based interconnect technology called Compute Express Link (CXL<sup>1</sup>) has been standardized and is gaining momentum in server and data center applications. CXL technology aims to provide low-latency, high-bandwidth connectivity for efficient memory sharing among CPUs, GPUs, accelerators, and other devices.

### Can Flash Memory Scale the Semantic Wall?

Flash memory has the advantage of density over DRAM. However, there is a huge Semantic Wall between DRAM and flash memory. To date, the idea of applying flash memory to achieve cost-effective memory expansion has been a dream. The emerging, new CXL interface makes it possible for flash memory to jump over this Semantic Wall enabling the provision of high capacity and cost-effective memory.



**BiCS FLASH™**  
with CXL Interface

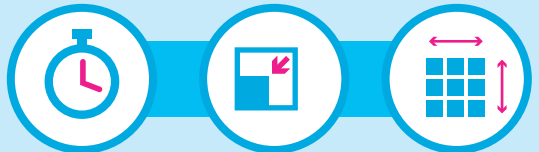


**XL-FLASH**  
with CXL Interface



**High capacity**      **High bandwidth**      **Read intensive**

#### Key Benefits



**Low latency NAND**      **Smaller page size**      **Random R/W access memory expansion**

For applications requiring a huge memory space and high bandwidth to send data to the CPU/GPU. Connecting a memory module using BiCS FLASH™ 3D flash memory, which features large capacity, to the CXL interface provides high density and high bandwidth data to the CPU/GPU.

For applications that require random read/write performance with a small data size and low latency. Connecting a memory module using XL-FLASH, which features low latency, to the CXL interface provides a cost-effective solution compared to lower density conventional DRAM devices.



**AI Training**      **Big Data Analytics**      **Enhanced Virtualization**

#### Target Applications



**AI Inference**      **In-Memory Databases**      **Graph Processing**

*Data creation shows no signs of slowing and the emergence of AI and Inference is driving the need for higher density solutions. Additionally, power efficiency in the data centers is a pressing need as they strive to meet performance demands. NAND flash paired with the CXL interface delivers a cost-effective NAND-based storage solution with the performance to jump the semantic wall and effectively compete with lower density, power-hungry DRAM.*

**Scott Nelson**, KIOXIA America Executive Vice President & Chief Marketing Officer

# KIOXIA

KIOXIA delivers flash-based products for next-generation storage applications. Having invented NAND flash over 35 years ago, KIOXIA is now one of the world's largest flash memory suppliers – and continues to move the technology forward.

1 Source: <https://www.computeexpresslink.org/about-cxl>  
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