

# Opportunities and Challenges of Emerging Memory in the Era of All About Data

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All over the world, our lives have been forever changed in the course of the Covid-19 pandemic. We have become more and more reliant on social closeness with various technologies, while physical distancing has been enforced. Now our daily routines are virtually connected to the global world through countless devices. In result, all connected devices have been generating unprecedented amount of data. For example, AI applications have been intimately into our daily lives and new applications such as Metaverse has been realized more than just a story in sci-fi novels. In semiconductor industries, we are proud that the backbone of these technologies which has made all this possible are semiconductors. However, it is also true that these new applications have put the historical challenges and opportunities on semiconductor scaling to move faster and more efficient in terms of power-performance-area-cost.

Among many great semiconductor technology opportunities, memory innovation has been recognized as one of key solutions to address the challenges in the era of all about data. It is not only important that the memory technologies deliver all the traditional values of memory such as high performance, lower power, lower cost and higher capacity, but also bring smarter solutions to bring down the barrier of memory-compute. In this talk, we will discuss the journey of memory innovation starting with the path of emerging memory technologies for new applications and then the path for ultimately breaking down the memory-compute boundaries. With the introduction of new interfaces such as Compute-Express-Link (CLX), the journey of emerging memory technologies begins with a few research options including chalcogenide-based and ferroelectric materials for emerging memory toward better performance and process simplicity, going beyond existing industry solutions such as 3DxP. We will explore chalcogenide-based memory solutions much further toward better performance and process simplicity.

Finally this journey will merge into the path for Beyond Memory by breaking the boundary between compute and memory. At Last but not the least, we truly believes that the journey to Beyond Memory could be only possible when semiconductor industries can embrace open innovation to make a better and sustainable world together.