



Technology Flash...

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Research, Analysis, Strategy, Insight

Is Optane Intel's Secret Weapon?

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Intel has announced availability of its first Optane storage solution (DC P4800x, 375 GB) targeted at data centers and built with its revolutionary 3D CrossPoint memory technology. This first release of Optane is targeted at replacing existing NAND-based SSD products, but we expect a full range of Optane powered memory products to be released in the coming quarters. Is this an indication that Intel wants to take over the memory business?

Optane is targeted specifically at the “warm” data market. Hot data needs to be kept near the CPU to maximize processing speeds and minimize latency, using dedicated memory chips (DRAM) and fast buses (DDR_x). Typically HDD/SSD devices are targeted at “cold” data where the primary selection criteria is the amount of data that can be stored at a reasonable price (hence the term mass storage), and not primarily the speed of data transfer, which is done on a relatively slow bus (e.g., eSATA). Warm data exists in between - not as close to the CPU as DRAM, but close enough and fast enough (e.g. PCIe) to aid the overall computing process, with even faster (e.g., NVMe) units coming. With all the expansion of compute intensive, memory hungry applications emerging, this is becoming a critical function.

... As Moore's Law slows and competitors like AMD and Qualcomm come at Intel in a variety of its markets, having exclusive availability of a technology like Optane could give it a 10%-25% competitive performance advantage.....”

Optane has an advantage in density and speed over NAND-based flash memory, as well as being able to scale in a traditional semiconductor process evolution. But NAND will, for the foreseeable future, remain lower cost and more available. This will make it a preferred mass storage platform for many applications, although traditional magnetic HDD devices will continue to dominate when largest capacity at lowest cost is the priority. Flash storage/SSDs have been coming down in price over the past few years reflected by their increasing share of the traditional storage market in both PCs and servers. But we don't expect Optane to compete directly with flash drives. Rather we expect Optane to be priced on a per byte basis between DRAM and NAND flash. As a result, we estimate Optane based SSDs will initially be priced at a 50%-75% premium compared to SSD equivalent devices, although on a price/performance basis, Optane will be a better value for process intensive applications (e.g., big data/analytics, graphics/gaming, video/CGI, VR/AR, AI/ML).

It's not only about the speed. Optane has 100X the endurance of NAND flash, a significant issue when many read/write operations are required. Flash storage elements in general have been known to wear out when written to many times. In one intensive graphics rendering application, a typical NAND

SSD will wear out in about 6 months, whereas the Optane equivalent will last about 4 years. Durability is no trivial issue for users of highly compute intensive read/write systems. And durability is no small selling point for these cutting edge applications, particularly in cloud based servers and high performance computing.

Does Intel really want to own the memory/storage market? While many have focused on Optane's ability to take market share away from traditional NAND storage devices, we believe that is missing the point. The true advantage of Optane, once machines are properly designed/configured for its unique capabilities, is that it can significantly increase performance and act as a processing accelerator. Because it is significantly less expensive than DRAM and can have 15X - 20X the memory capacity per die (e.g., 8GB vs 128GB) while achieving speeds at least 10X that of NAND, it is an ideal "intermediary" memory element where adding more relatively fast memory can significantly increase overall system performance at a lower cost than stacking it with large amounts of DRAM (Optane is likely to cost 5X - 10X less than comparable amounts of DRAM). This makes Optane ideal as an accelerator between the CPU and mass storage device. Indeed, we see this as the primary advantage to Optane for Intel going forward, since it's a proprietary technology and no other vendors have yet to come up with a similar technology that can be produced in volume.

We expect the initial primary markets for Optane to be in high performance computing like big data servers, high end gaming, and other data or graphics intensive applications where large amounts of memory are advantageous. For Intel, the first release of Optane as a purpose built SSD replacement makes the most sense, as it requires the least amount of work by the industry to adopt the technology, and gives Intel the opportunity to scale volume and capabilities. While the Optane SSD will offer significant performance boost over exiting SSDs (10X or more), it can only be used with Intel 7th gen Core products, eliminating the ability of companies to upgrade existing older generation systems. This has much to do with the internal bus structures on these machines, as well as a need to enhance the drivers and tune the system. It also allows Intel to give companies with older machines an incentive to upgrade, helping Intel accelerate the upgrade cycle and create more revenues.

Bottom Line: As Moore's Law slows and competitors like AMD and Qualcomm come at Intel in a variety of its markets, having exclusive availability of a technology like Optane could give it a 10%-25% competitive performance advantage. This could be a deciding factor in many corporate and consumer selection criteria, and may provide Intel with a competitive advantage it would not have with CPU production alone. We expect to see Intel increasingly leverage Optane as an accelerator and potentially a cost advantage in competing at the end point and server market, as well as create a new cloud-targeted computing platform strategy. As with all things semiconductor, we expect the price to come down and capacity and performance to increase over time, making Optane a strategic partner for all of Intel's processor and SoC offerings.

Jack Gold is the founder and principal analyst at J.Gold Associates, LLC., an information technology analyst firm based in Northborough, MA., covering the many aspects of business and consumer computing and emerging technologies. Follow him on Twitter @jckgld or LinkedIn at <https://www.linkedin.com/in/jckgld>.

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