

## **Hitachi GST Solid State Drive (SSD) FAQs**

**Q1: What are the benefits of SSDs for Enterprise customers?**

**A1:** Solid State Drives (SSD) deliver ultra-performance Input/output Operations per Second (IOPS) for transaction-intensive server and storage applications. SSDs reduce total cost of ownership through low power consumption, efficient cooling and minimal space requirements.

The synergistic relationship between the new throughput-enhancing SSDs and traditional hard disk drives (HDDs) in servers and storage arrays provides a cost effective, end-to-end enterprise-class storage solution, in terms of reliability, compatibility and system performance.

**Q2: Where do SSDs fit in typical Enterprise storage environments?**

**A2:** Enterprise storage environments can be classified into long-term archive (tier-3), capacity optimized (tier-2) and high performance (tier-1) workloads. I/O intensive applications, such as financial transactions and e-commerce, have pushed the envelope of storage and processor capabilities creating a new tier in storage: ultra-performance (tier-0). This new tier in the storage hierarchy describes applications requiring the ultra-high levels of performance and power efficiency. SSDs deliver the ultra-high I/O performance required for these demanding workloads.

**Q3: Why is Hitachi GST entering the Enterprise SSD market?**

**A3:** SSDs offer a significant growth opportunity, expanding the overall storage market by creating a new tier in the enterprise storage hierarchy for applications requiring ultra I/O performance and power efficiency. Tier-0 applications are of increasing importance to our global HDD customers.

**Q4: How will SSDs complement Hitachi's existing Enterprise HDD business?**

**A4:** Hitachi GST will continue to market and sell a comprehensive portfolio of Enterprise HDDs for high performance (tier-1) and capacity optimized (tier-2) applications. We expect HDDs and SSDs to be used interchangeably in tiered pools of storage, depending on the need for either capacity or performance/power efficiency.

**Q5: How will SSDs be priced, relative to traditional hard drives?**

**A5:** Although the initial costs of deploying SSDs are higher than traditional hard drives, their performance attributes translate to a reduction in the number of drives required to support a given set of IOPS requirements. This serves to offset higher purchase costs and reduce long-term operating expense.

**Q6: Why did Hitachi GST select Intel as a partner?**

**A6:** Intel has substantial expertise in NAND technology and world-class manufacturing capabilities. Hitachi brings proven Enterprise storage expertise in SAS and Fibre Channel design, firmware, reliability, customer qualification and system integration. This combination will deliver world-class solutions with the performance and reliability that Enterprise storage customers demand.

**Q7: Will your SSDs be branded and sold by Hitachi or Intel?**

**A7:** The jointly developed products will be exclusively branded, marketed and sold by Hitachi GST.

**Q8: What will differentiate Hitachi SSDs from those of other suppliers?**

**A8:** Hitachi will deliver a complete portfolio of Enterprise HDDs and SSDs. We will leverage our proven expertise in Enterprise customer requirements, SAS and Fibre Channel design, firmware, reliability, customer qualification and system integration to develop Enterprise SSDs that meet the stringent demands of mission-critical server and storage environments.

**Q9: What types of SSD products are planned to be offered?**

**A9:** Hitachi SSDs will have capacity points consistent with Enterprise customer expectations and provide both 6Gb/s SAS (2.5", 3.5" form factors) and 4Gb/s Fibre Channel (3.5" form factor). The products will offer ultra performance, both in sustained data rate (MB/s) as well as IOPs, while meeting customer needs for data integrity and endurance.

**Q10: What type of Flash memory will be used in the SSD?**

**A10:** Ultra performance (tier-0) and high performance (tier-1) storage applications will demand high performance, endurance and reliability. Hitachi will address these requirements using single-level cell (SLC) NAND flash memory combined with proprietary management in its first-generation products.

**Q11: How do you measure SSD endurance and reliability?**

**A11:** Enterprise SSD reliability includes the media bit error rate (BER), Mean Time

Between Failure (MTBF) and write endurance. SSD endurance is defined as the total amount of random host data that can be written within the life of the drive. A number of factors affect SSD endurance, including NAND technology, write workload, reserve capacity and SSD controller firmware. Hitachi SSDs will use advanced error detection and correction, as well as highly efficient wear leveling algorithms designed to provide data integrity and extended product life.

**Q12: When will the first Hitachi GST SSDs be available?**

**A12:** The first products are expected to be available in the first half of 2010.