

5 9S AVAILABILITY IN A LOWER COST DELL SC4020 PRODUCT? YES, REALLY!

**Built-in Small Enterprise Caliber Features and High Efficiency Deliver
Availability Levels Usually Reserved for Larger Enterprises**

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Every year Dell measures the availability level of its Storage Center Series of products by analyzing the actual failure data in the field. For the past few years Dell has asked Taneja Group to audit the results to ensure that these systems were indeed meeting the celebrated 5 9s availability levels. And they have. This year Dell asked us to audit the results specifically on the relatively new model, SC4020.

Even though the SC4020 is a lower cost member of the SC family, it meets 5 9s criteria just like its bigger family members. Dell did not cut costs by sacrificing availability, but by space-saving design like a single enclosure for media and controllers instead of two separate enclosures. Even with the smaller footprint – 2U to the SC8000's 6U -- the SC4020 still achieves 5 9s using the same strict test measurement criteria.

Frankly, many vendors choose not to subject their lower cost models to 5 9s testing. The vendor may not have put a lot of development dollars into the lower cost product in an effort to reduce cost and maintain profitability on a lower-priced system.

Dell didn't do it this way with the SC4020. Instead of watering it down by stripping features, they architected high efficiency into a smaller footprint. The resulting array is smaller and more affordable, and retains the SC Series enterprise features: high availability and reliability, performance, centralized management, not only across all SC models but also across the Dell EqualLogic PS and FS models. This level of availability and efficiency makes the SC4020 an economical and highly efficient system for the mid-market and the distributed enterprise.

The Starting Zone: High Availability

Storage system features and benefits don't mean much if you can't access storage when you need it, which is why every storage vendor tries to publish positive test reports on availability. Small blame to them, but the truth is that many of them use theoretical calculations, optimized machines, and ideal lab settings.

Dell doesn't do it that way. They run their 5 9s testing in the field, collecting real-time data on millions of runtime hours. Their real-world tests consistently prove that SC models throughout the family achieved and exceeded five nines availability.

Dell subjected lower cost SC4020 to exactly the same testing parameters as its bigger cousins. Dell asked Taneja Group to audit the results. Our bottom line findings were that the SC4020 – an economical unit dedicated to the mid-market— also offers 5 9s availability.

Between August 2015 and January 2016 (6 months), Dell gathered data on failure rates on the installed base of SC4020 systems that were running 24/7. There was no configuration cherry picking: the systems were attached to a variety of switches, servers, HBAs, enclosures, and media sizes and configurations. Dell used its Copilot CRM Incident data to run its Availability Analysis.

Runtime hours totaled 15.6 million hours, over which time 29 systems experienced data unavailability, 26 due to non-hardware and 3 due to hardware failures. The mean time to repair (MTTR) across all these systems was 4.83 hours. Based on this data, the availability level is calculated at 99.99910%, which is remarkable for a lower cost system. Please note that Taneja Group was provided the numbers from the CRM system to analyze and we did not actually go into the CRM system to extract the data.

Below we provide some rationale for achievement of such remarkable results on the SC4020 system.

Unlike some other vendors who scrimp on engineering in their lower cost systems, Dell adds enterprise features even to its midmarket offerings. Dell achieves 5 9s even in their entry systems because they incorporate all the architectural features of the bigger SC systems, along with all of the efficiency-producing features. The combination yields availability similar to that of the bigger systems.

This year Dell added important new advancements in Storage Center OS 7.0 and Live Volume. Combining these enhancements allowed them to improve on the enterprise features already built into the SC line, and to extend them to more affordable entrants like the SC4020. A few of these features include new de-dupe and compression features, centralized management, and extensibility within the SC and the PS Series systems.

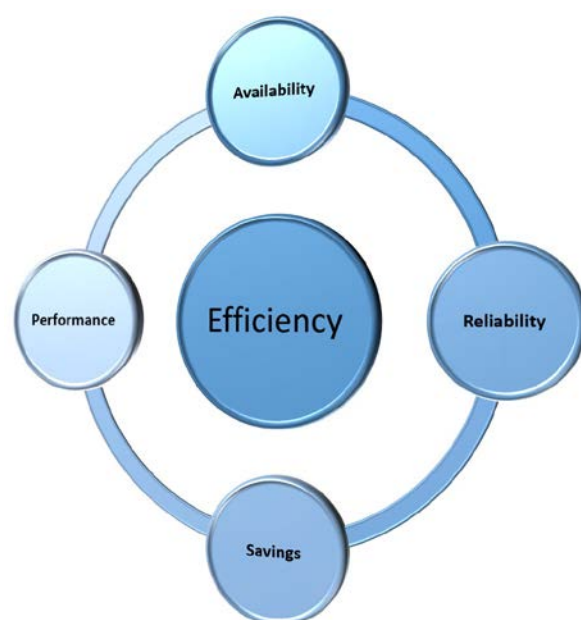
Extreme Efficiency as a Core Value

In the case of the SC4020, the core value would be **efficiency**: Efficiency that comes high availability and reliability. And storage efficiencies result in cost, time, and space savings.

EFFICIENCY = PERFORMANCE

The SC4020 offers a strong performance threshold even with HDD tiers, and performance improves with the addition of flash. Flexible performance options include the choice of all flash, hybrid flash, and hard drive systems. The flash tiers offer multi-tier flash optimization that writes data to the fastest drives and the highest RAID levels. As the data ages, Dell automatically progresses the data to less expensive flash and HDD tiers.

Space-efficient snapshots consist of the original data write and subsequent changes-only, which



saves significant space while providing near-continuous protection. This maintains very high write performance even on older blocks stored on slower tiers. Intelligent block-level compression, dedupe, and thin provisioning compete the storage savings picture.

EFFICIENCY = SAVINGS

Storage efficiencies save money on storage purchases and ongoing energy expenses, management time, and data center real estate. Its all-flash purchase price is low, and IT can start with lower priced HDD and hybrid flash for even lower Capex.

Simplified management minimizes administration time, freeing up IT to concentrate on strategic projects. Dell Storage Manager and SC OS v. 7 federate and centralize management across the SC and PS storage families, automating daily management tasks and enabling bi-directional replication. Volume movement remains transparent to the hosts.

The space-saving architecture is built on an integrated controller that does not require a separate enclosure, although customers may choose to add additional enclosures as an expansion option. The compact 2U size takes up less rack space and saves on energy costs. In spite of its small size, it comes with dual redundant controllers, 24 internal drive slots, 8 Fibre Channel or 4 iSCSI ports plus 4 additional 10Gb ports.

EFFICIENCY = HIGH AVAILABILITY

The SC4020 achieved 5 9's availability thanks to features that Dell bakes in to the entire SC line. For example, Live Volume Auto Failover ensures that users do not lose applications if an event interrupts storage access. Live Volume's fault-tolerant environment automatically protects the SC Series from IO interruption and data loss due to downtime. Live Volume works by creating a virtualized layer between paired SC storage systems across a metro or campus. Failover is automatic. Once the failover event is over, IT promotes the secondary back to the primary. The downtime event has no impact on end-users.

EFFICIENCY = SUPERIOR RELIABILITY

New releases of the OS and Live Volume automatically distribute workload IOs across clusters and aggregated arrays. SC Series Volume Advisor proactively monitors data placement and storage optimization throughout all arrays, and recommends actionable intelligence to administrators. And Storage Center's modular architecture ensures reliability with hot hardware swapping and software upgrades, self-monitoring tools and no single point of failure. Internal monitoring tracks information about every data block on the system. Metadata includes dates and times, access frequency, volume identities, flash or disk, and RAID levels. Performance and capacity are easily scalable: simply add new I/O cards or drives.

Taneja Group Opinion

Based on the failure rates we audited on the SC4020 systems, it is clear that this lower cost offering in the SC family of products is no slouch when it comes to availability levels. 5 9s is generally considered to be the hallmark for enterprise caliber storage systems in the market. But more often than not, lower cost systems don't reach this high—SC4020 does. But Dell's SC systems story starts with 5 9s availability and grows from there. Reliability, ease of management, auto-tiering, integrated flash support, inline data deduplication and compression and a wide variety of other enterprise-

caliber features are built in, just as they are in the rest of the family. That makes the SC4020 a game-changer in the market for near-continuous storage systems.

The array's flexibility lets mid-market and distributed enterprise customers use it as a standalone system for ROBO, or as an edge deployment for core SC arrays. This is a big achievement for Dell and an important benefit for its customers.

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