

RAM-SAN™

2-TB

The World's Fastest Storage®

RamSan-500

- 1 or 2 TB Flash Storage
- 2 Gigabytes per Second
- 100,000 IOPS
- RAM Cache 16-64 GB
- 2-8 FC Links (4Gb)

Flash & RAM



RamSan-500

RamSan-5000:
In One 40U Rack (3KW)

**20-TB Flash storage, 20-GB per second,
640-GB DDR cache, and 1-million IOPS**

Very Fast Solid State Disk (SSD)

The RamSan-500 Flash/RAM storage is the World's Fastest Flash-based SSD. Performance and capacity are the key features of this Enterprise grade SAN storage unit. With a capacity of 2-TB, a Flash bandwidth of 2-GB/sec, and 100,000 IOPS, the RamSan-500 sits at the peak of the SAN storage hierarchy in regards to cost-effective performance, capacity and low power (300W). As a SAN storage unit, the RamSan-500 provides advanced LUN provisioning management, WWN masking, and failover protection via its web-based management application.

Hybrid Flash and RAM Storage System

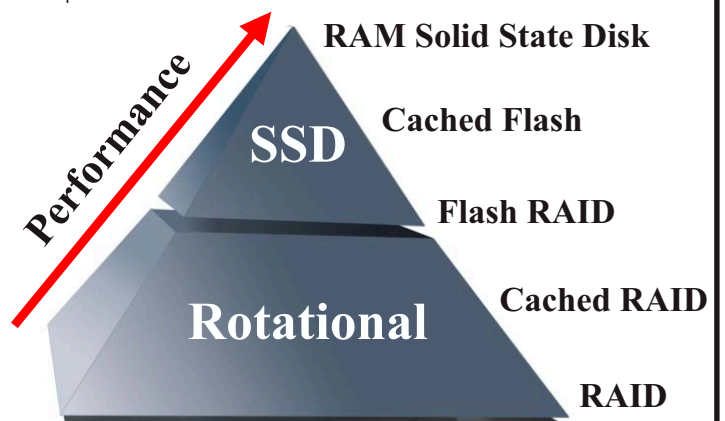
The unique advantage of the RamSan-500 is its tight integration of high capacity Flash storage and the large high-speed RAM cache. While other Flash units incorporate a small cache, the RamSan-500 has a large RAM cache. The 16-64 GB RAM cache provides a sustained dataflow (2-GB/sec) between Flash storage and the SAN Enterprise Servers. Even faster operations (3 GB/s) are available for cached files. Its 2-8 Fibre Channel ports provide true access to this awesome bandwidth and IOPS capabilities.

Highly Reliable Storage

The RamSan-500 is designed to offer superior reliability compared to other SSD and RAID devices. Its standard features include: Chipkill™-protected RAM, RAID protected hot-swap Flash storage, hot-swap power supplies, redundant Fibre Channel ports, and SNMP compatibility. The RAID design ensures data integrity even with a complete failure of a single Flash module. In addition to the RAID protection, each Flash module incorporates its own error-correcting technology.

Modular and Scalable Flash Storage

The basic unit contains nine Flash storage modules accessible from the front, with a combined capacity of 2-Terabytes (RAID protected) and a data bandwidth of 2-GB/sec. Multiple RamSan-500 units scale in capacity, bandwidth, and IOPS to satisfy even the most extreme requirements.



CACHING

The Large DDR RAM Cache in the RamSan-500 enables the system's high performance

- The fusion of RAM and Flash allows the RamSan-500 to leverage the strengths of both media:
 - Blazing read/write performance (RAM)
 - Fast read performance (Flash)
 - High density (Flash)
 - Low power (Flash)
- Cache can be tuned for Read-Ahead
- Write-through and write-back caching modes are supported
- In write-back mode dirty writes flush to Flash memory when shut down or if external power fails
This operation is supported with redundant internal batteries

SCALABILITY

- 16-64GB RAM Cache
- 1 or 2TB Flash Storage
- Multiple RamSan-500s can be used to scale to higher capacities: one 40U rack can hold 20 TB

LUN SUPPORT

- 1 to 1024 LUNS with variable capacity per LUN
- Flexible assignment of LUNs to ports
- Hardware LUN masking

MANAGEMENT

- Browser-enabled system monitoring, management, and configuration
- SNMP support
- Telnet management capability
- Front panel displays system status and provides basic management functionality



RamSan-500

FLASH MODULES

- The RamSan-500 leverages nine proprietary Flash modules with up to 256 GB of capacity each. Each module has the look and feel of hard disk, but that is where the similarities end. Within each module is a powerful Flash controller that handles wear leveling and parallel operations to reach high performance levels. The module's back-end connectors use a high density pin block connector and a specialized low latency protocol.
- The Fastest Write Performance of any Flash system is achieved with the RamSan-500 since the writes are buffered by the battery-backed Cache before they are mapped to the Flash.
- RAID-3 protection across the modules is provided by dual RAID controllers that are built specifically to leverage Flash. The controllers allow modules to be hot-swapped and can rebuild the RAID online.

DATA RETENTION

- Completely nonvolatile solid state disk

RELIABILITY AND AVAILABILITY

- RAM Cache Features
 - ECC and Chipkill prevent data corruption by protecting against single-bit errors as well as chip failures
 - Soft error correction improves system reliability by rewriting ECC corrected data
- Flash Memory Features
 - Layer 1: ECC (chip)
 - Layer 2: RAID 3 - hot swap modules provide the highest availability for the Flash
 - Wear leveling
 - SLC NAND Flash memory
- Hot swap redundant power supplies
- Redundant batteries
- Active:Active controllers

Specifications

Capacity	(unit)	1-2TB Flash memory
	(cache)	16-64GB DDR RAM
I/Os per second read		100,000 (random)
I/Os per second write		25,000 (random)
Bandwidth		2-GB/second
Latency: cache hit		15 μ s
	cache miss	200 μ s
RAID		RAID-3
Power Supplies		Redundant Hot-Swap
Batteries		2 Redundant
Size		7" (4U) x 20"
Power Consumption		300 Watts
Weight (maximum)		75 lbs
Interfaces		2-8 FC Links (4Gb)