Enterprise NAS (Network Attached Storage) RAID 5 vs RAID 6 Rebuild Times - Official Technical Overview & Hardware Datasheet

EXECUTIVE SUMMARY

Enterprise network attached storage (NAS) platforms must balance capacity efficiency against data protection during drive failures. RAID 5 and RAID 6 differ fundamentally in rebuild behavior: RAID 5 tolerates a single drive failure and rebuilds from parity distributed across all remaining members, while RAID 6 tolerates two simultaneous failures and uses dual parity, increasing rebuild complexity and duration. This official technical overview quantifies the operational impact of RAID 5 versus RAID 6 rebuild times for enterprise NAS hardware, providing presales engineering guidance on risk windows, performance degradation, and deployment selection for business-critical storage tiers.



ARCHITECTURE & CHASSIS DESIGN

The evaluated enterprise NAS platform is a rack-optimized storage node supporting 12 to 24 hot-swap drive bays in a 2RU to 4RU chassis. The architecture combines a dual-controller or single-controller head unit, a PCIe Gen3/Gen4 backplane, redundant hot-swap power supplies, and N+1 fan modules. RAID 5 and RAID 6 arrays are managed by a hardware RAID controller or software-defined storage stack with battery-backed or supercapacitor-backed write cache. Rebuild operations are background tasks prioritized against host I/O through configurable rebuild rate throttling. Drive rebuild time is governed by drive capacity, interface speed, array width, controller throughput, and workload contention.

HARDWARE FEATURES

Key hardware capabilities supporting predictable rebuild behavior include:

- Hot-swap SAS/SATA/NVMe drive bays with per-drive activity and fault LEDs
- Hardware RAID engine with dedicated XOR/parity acceleration and dual-parity RAID 6 support
- Battery-backed or supercapacitor-backed cache to preserve write integrity during failure events
- Redundant hot-swap cooling and power to maintain thermal stability during extended rebuilds
- Out-of-band management with rebuild progress telemetry, SMART predictive failure alerts, and event logging
- Configurable rebuild priority and background task throttling to protect production latency

COMPLIANCE & STANDARDS

The platform is designed to meet common enterprise storage and safety requirements, including:

- RAID levels 0, 1, 5, 6, 10, 50, and 60
- SAS-3/SAS-4 and SATA III interface compliance
- S.M.A.R.T. drive monitoring and NCQ support
- Redundant power supply safety and EMC certifications typical of enterprise

datacenter equipment

- Management interfaces supporting SNMP, REST API, and syslog for integration with monitoring platforms

TECHNICAL SPECIFICATIONS

RAID 5 rebuild time is primarily a function of the capacity of the replacement drive divided by the effective rebuild throughput, adjusted for array width and host workload. RAID 6 rebuild time is longer because dual parity must be recomputed and written for every stripe, and because the array remains in a degraded state with reduced fault tolerance during the rebuild. Representative figures for enterprise 7.2K RPM nearline SAS drives in a 12-drive array are shown below; actual values vary by controller, drive model, array width, and workload.

Parameter	Specification
Supported RAID Levels	RAID 0, 1, 5, 6, 10, 50, 60
Drive Bays	12 to 24 hot-swap SAS/SATA/NVMe bays
RAID 5 Rebuild Time (12-drive array, 8 TB 7.2K SAS)	Approximately 12 to 20 hours at 50% rebuild throttle
RAID 6 Rebuild Time (12-drive array, 8	Approximately 18 to 30 hours at 50%

TB 7.2K SAS)	rebuild throttle
Rebuild Throttle Range	10% to 100% configurable background task priority
Fault Tolerance	RAID 5: one drive failure; RAID 6: two simultaneous drive failures
Cache Protection	Battery-backed or supercapacitor-backed write cache
Power Supply	1+1 redundant hot-swap AC or DC
Management	SNMP, REST API, syslog, out-of-band rebuild telemetry

ORDERING OPTIONS

Enterprise NAS configurations should be ordered with RAID 6 for arrays using high-capacity drives (8 TB and above), wide array widths (10+ drives), or workloads requiring continued operation through a second drive failure. RAID 5 remains appropriate for smaller arrays, lower-capacity drives, and cost-sensitive tiers where backup and restore objectives can absorb a longer risk window. Recommended ordering options include:

- RAID 5 starter configurations for capacity-optimized secondary storage
- RAID 6 configurations for primary business-critical file services and

virtualization datastores

- Hot spare drives to automate rebuild initiation and reduce exposure time

- Extended service contracts covering drive replacement and controller support

