



# TrioNAS LX U400HA/U600HA

Dual Active Controller NAS for Your Mission-Critical Enterprise Storage



TrioNAS LX HA is based on QSM (Qsan Storage Management) operating system, a unified / hybrid NAS storage system, targeting SMB enterprise customers. TrioNAS LX HA can help you scale capacity, performance, and service availability at the same time and provide zero business downtime in one box.

- A genuine active-active design makes it worth every penny you spend. TrioNAS LX HA adopts dual controller and fault tolerance design to achieve **99.999%** high availability. Both controllers can deliver data services at the same time.
- RAID controller, fan module, and power supply are all redundant and hot swappable to achieve **NO SINGLE POINT OF FAILURE** design.
- Fast failover time is achieved by using high bandwidth (64Gb/sec) PCI Express lanes running on the backplane to achieve real-time caching mirroring and cluster heartbeat.
- Controller failback can be set as manual or automatic for flexible management.
- Support ALUA and global namespace
- Network port failover can immediately carry on data services through the mirrored port on peer controller.
- Controller failover and online firmware upgrade can provide non-stop data services to protect your valuable data.
- File-level snapshot provides best protection against virus attack and accidental deletion or modification. Retrieve the original file as simple as copying a file. Up to 4096 snapshots are supported.
- Instant ready mechanism allows **NO** initialization time **AT ALL** when creating RAID group to use for the first time.

## A breed apart : Genuine dual controller NAS

Imagine that two cluster nodes are placed in one box with high speed bus connected with each other to communicate inter-process communication data. This is how TrioNAS LX HA is designed. The memory caches of both controllers are in mirror all the time using high speed PCI-Express lanes (64 Gb/s) implemented on the backplane, not the cable solution you may see in most cluster environment using commodity server hardware. This is why TrioNAS LX HA has responsive failover time, ALUA support, better performance and efficiency. Moreover TrioNAS LX HA offers a lower total cost solution and flexibility to scale capacity and performance at the same time. An active-standby design is **NOT a genuine** dual controller NAS.

Benefits :

- Cache mirroring through high speed bus, not cable solution
- Active-active design and support ALUA
- Responsive failover time
- Easy management to scale performance and capacity
- No quorum disk is needed.
- More economic than commodity cluster servers



### Active-Active vs Active-Standby

Active – Active	Active - Standby
<b>Fast failover</b> Inter-process communication and heartbeat is achieved using high speed bus on backplane protected by the enclosure.	<b>Slow failover</b> IPC and heartbeat is carried out using 1Gb Ethernet external cable. It is slow and prone to external errors.
<b>Efficiency</b> Support all RAID levels in the storage pool. Support global namespace. Both controllers see the same HDD configuration and storage pool.	<b>Waste of resources</b> Limited to RAID 1 for HDD mirroring. Because you need to set aside the same HDD capacity in the passive system, it's a waste of HDD capacity.

Active – Active	Active - Standby
<p><b>Performance scaling</b></p> <p>Both controllers can deliver I/O and services at the same time. IOPS can scale 1.5 times.</p>	<p><b>No performance scaling</b></p> <p>Passive controller will not deliver I/O. The resource is idle and wasted.</p>
<p><b>Consistent data after recovery</b></p> <p>After recovery from controller failure, all disk data remain intact and consistent.</p>	<p><b>Inconsistent data after recovery</b></p> <p>After recovery from controller failure, the failed system doesn't have the latest disk data. Synchronization process is needed and it is time consuming.</p>



## Redundant & fault tolerance design

RAID controller, fan module, and power supply module are all redundant and hot swappable for maximum availability and super easy on-site maintenance. All modules are connected to the backplane circuit board to achieve the most reliable signal transmission and the best aerodynamic thermal efficiency.

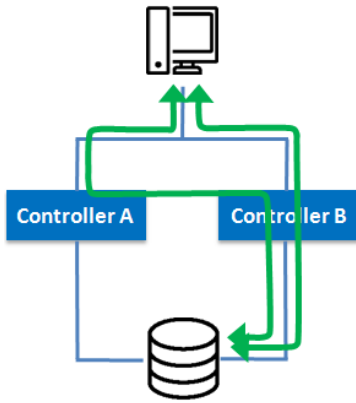
## Fast failover

Why do you want dual controller NAS? It's because you need insurance that when one of NAS controllers fails, the data services get the lowest impact, which means the failover time is as short as possible. So the users and applications won't even notice that one of NAS controllers is down. In SMB2, the default values of "Request Expiration Timer" and "Session Expiration Timer" are 60 seconds and 45 seconds respectively. Failover time in TrioNAS LX HA is less than 60 seconds on average. In some cases, it is around 10 seconds. All data services are protected by controller failover.



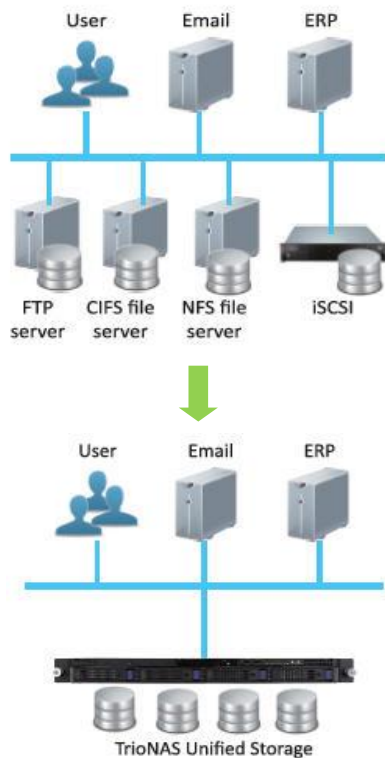
**Failover < 20 seconds**

The faster the failover is, the less impact to business continuity. Failover time is the quintessential index to judge the quality of a dual controller NAS system.



## ALUA support

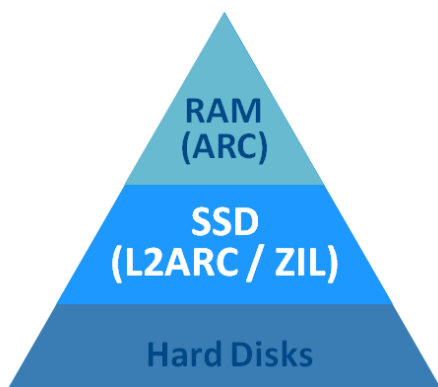
ALUA (Asymmetric Logic Unit Access) is supported in TrioNAS LX HA to provide active-active controller mode. Command shipping and data shipping functions are implemented by Qsan in-house technology. This enables higher fault tolerance and better performance and efficiency.



## Unified storage with simple management

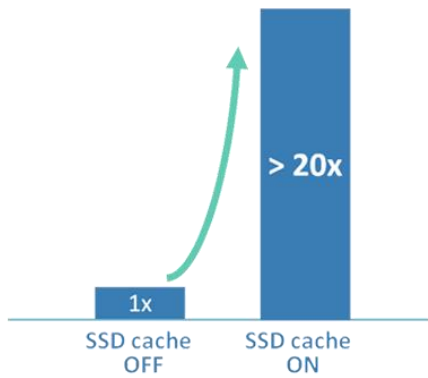
TrioNAS LX HA consolidates NAS and IP-based iSCSI SAN in one box. Unified storage can help consolidate your IT infrastructure and reduce hardware expenses. You don't need multiple file servers for SMB, NFS, AFP and FTP\*. TrioNAS supports all these protocols in one box including iSCSI. TrioNAS LX HA will be your common storage pool that is accessible at either file or block level over existing IP networks. It's the most cost-effective and efficient storage solution.

\*AFP and FTP will be supported in the near future.



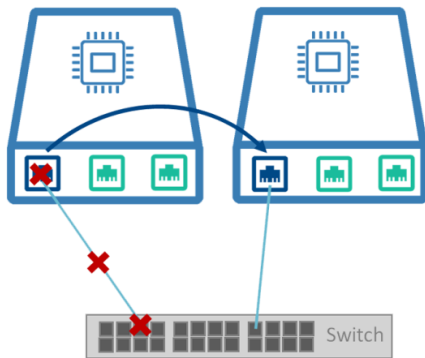
## Hybrid storage for better IOPS performance

Storage tiering function (SSD caching) is supported to leverage the benefits of flash technology. Hybrid storage can combine SSD drives and enterprise SATA drives to deliver the equivalent IOPS to performance SAS hard drives. Hybrid storage can help you combine the strengths of both SSD drive and SATA drive and enjoy the overall lower cost at the same time.



## SSD caching support

TrioNAS LX HA supports using high performance SSD drives as fast storage tiering. SSD caching\* can greatly improve random IO performance. You can combine SSD drives and SATA drives as a hybrid storage pool and have a net performance result of a pure SAS storage pool.



## Fail-safe network mechanism

The network interfaces of both controllers are mirrored each other to form the foundation of cluster IP and provide fail-safe network ports. If either network path within the cluster IP fails, fail-safe network mechanism will step in instantly and perform transparent failover and provide non-stop services.



## ZFS and RAID protection

TrioNAS LX HA adopts ZFS file system, which is a transactional, copy-on-write, crash-free file system with 128-bit huge addressing space. ZFS can detect silent data corruption and has self-healing capability and guarantees end-to-end data integrity. There are abundant RAID levels\* to choose from to meet application requirements such as redundancy and performance.



Storage Efficiency

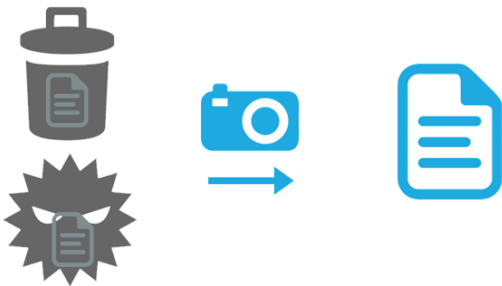
## Thin provisioning

Thin provisioning allows just-in-time capacity and allocates storage space that does not exist. You can delay the hard drive purchase until it is absolutely necessary.



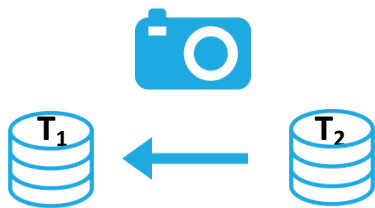
## Best Integration of Windows Active Directory

TrioNAS LX HA delivers outstanding integration of Windows Active Directory & LDAP for IT administrators to easily manage accounts. The supports for multiple domains of Windows Active Directory plus the patent-pending UnifiedAUTH empower TrioNAS to provide superior manageability.



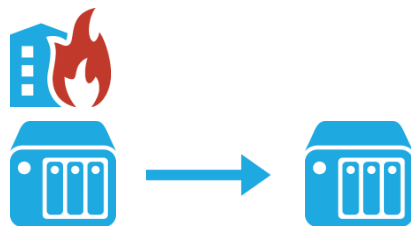
## Folder and share snapshot

File-level snapshot helps IT administrator to retrieve a file as easy as browsing through a directory when things like virus attack and accidental deletion or modification happens. You can rollback the snapshot to a certain point in time in the past or clone the snapshot to become an independent folder.



## LUN snapshot

TrioNAS LX HA supports snapshot for block-level storage such as LUN. Using copy-on-write technology, differential data are recorded between two given points in time. You can rollback the snapshot to a certain point in time in the past or clone the snapshot to become an independent LUN.



## Remote replication for disaster recovery

TrioNAS supports both Rsync and block-level snapshot-based replication function. Both of them are asynchronous. Remote replication task can be created for folders and LUNs. Only differential data at block level will be replicated to achieve maximum efficiency.

When disaster strikes at site A, you can quickly switch to site B to make sure business continuity and data security.

TrioNAS LX		
	U400HA	U600HA
<b>Hardware</b>		
Processor	Intel Xeon dual cores	
Memory (per controller)	16GB DDR3 ECC	
Host channels (per controller)	7x 1GbE	2x 10GbE (SFP+, RJ45) 3x 1GbE
Hard drive interface	6Gb SAS, SATA, and SSD (3.5" and 2.5") SATA drive requires MUX board	
Expansion (per controller)	1x 6Gb SAS wide port for J300Q 6Gb SAS series	
Max. HDD drives	256	
Fan module	2x redundant hot swappable	
Power supply	4U : 3x 550W hot swappable with PFC (auto switching) 3U/2U: 2x 550W hot swappable with PFC (auto switching)	
Form factor	19" IEC rackmount, SBB compatible 4U 24bays : 446.0mm x 499.5mm x 176.0mm (W x D x H) 3U 16bays : 446.0mm x 499.5mm x 130.0mm (W x D x H) 2U 12bays : 446.0mm x 499.5mm x 88.0mm (W x D x H)	
<b>Feature highlights</b>		
RAID & Pool	RAID levels 0, 1, 5, 6, 10, 50, 60 Multiple RAID groups in one storage pool Global & dedicated hot spare Replace & automatic rebuild Online RAID group expansion	Online pool expansion Offline pool roaming HDD SMART table SSD caching (L2ARC, ZIL)
Data service	Global namespace CIFS/SMB (2.1)	NFS v3/v4 iSCSI target (MCS, MPIO, SCSI-3 persistent reservation)
Storage efficiency	Thin provisioning Compression (LZJB)	
Networking	DHCP or static IP Cluster IP setting Trunking / LACP(IEEE 802.3ad) / Balanced-alb Jumbo frame support (9000bytes)	VLAN tagging NTP client WINS client IP filtering
High availability	Controller failover, ALUA support Automatic/manual controller failback Network port failover/failback	
Directory service	UnifiedAUTH Microsoft Active Directory	LDAP
Data protection	Folder/share snapshot LUN snapshot Remote replication (asynchronous)	Amazon S3 backup Anti-virus (ICAP-based)
Security	Access control for shares Encrypted Access: HTTPS, FTP with SSL/TLS (Explicit), SFTP & SSH (Admin)	
Management	Web UI management, start-up wizard, performance monitor, system health monitor HDD S.M.A.R.T., Network UPS support, build-in LCD display	
O.S. support	Windows XP/7, Windows Server 2003 R2, 2008, 2008 R2 & 2012 R2 Red Hat Enterprise Linux 5/6; Solaris 10/11; Mac OS 10.6 or later	
Virtualization	VMware, Hyper-V, Citrix	
Green	80 PLUS Gold power supply	Auto disk spindown
Safety & EMI	CE, FCC, RoHS, CB, BSMI, UL	
Warranty	3 years	
<b>Operation environment</b>		
AC Input	90 ~ 264V, 47/63Hz, 10A@115V / 5A@230V 550W	
DC Output	3.3V-25A; 5V-32A; 12V-40A	
Operating temperature	0 to 40°C	
Relative humidity	5% to 95% non-condensing	

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