TrueNAS® M-Series:
Unified All-Flash Storage

TrueNAS Combines Open Source Economics, High-Availability ZFS, and All-Flash

The TrueNAS M-Series combines the #1 Open Source storage software with the latest flash memory technology to increase storage performance. This performance makes it possible for IT departments to meet increasing demands for more powerful and flexible storage while also reducing costs. Performance applications like databases and metadata servers need more IOPS or lower latency. All-flash dramatically reduces the physical footprint and has a 70% lower total cost of ownership than a hybrid solution. Performance storage no longer needs massive RAM caches or hundreds of small HDDs to increase IOPS.

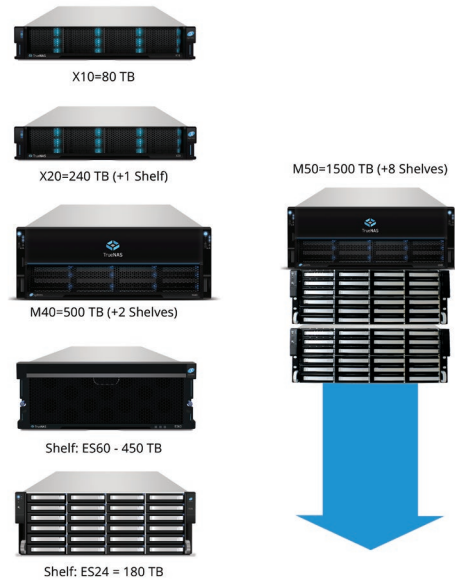## TrueNAS Provides Choice of Media with Same Software

The TrueNAS M-Series provides the evolutionary unified storage platform needed to manage the transition from hard disk drives (HDDs) to solid-state flash drives (SSDs). It can be deployed in hybrid mode (HDDs with ZFS cache SSDs) or all-flash mode with ZFS pool SSDs.

All-flash includes two classes of ZFS pool SSDs: Performance SSDs and Read Intensive RI-SSDs. Performance SSDs have 12 Gb/s interfaces and use Triple Level Cell (TLC has three bits per flash cell) technology. RI-SSDs cost less, have 6 Gb/s interfaces, and are based on Quad Level Cell (QLC has four bits per flash cell) flash technology. Performance SSDs are typically 3X faster than RI-SSDs and over 12X faster than HDDs. Save on costs by backing up all-flash systems to HDD storage. TrueNAS simplifies this without the need for new software or management systems. TrueNAS enables each of the major storage media in the same system.

ZFS Technology is Flash Optimized

Data integrity is the name of the game, and TrueNAS leaves nothing to chance. With self-healing ZFS, data is protected and rebuilt through multiple drive failures. Any data corruption is automatically detected and repaired. Bit rot is no longer a concern for your critical storage where perfection is the only acceptable result. NVDIMMs are used as ultrafast write caches and ZFS provides the data integrity and protection needed to manage enterprise data. Snapshots, clones, replication, and data scrubbing are standard data management services. OpenZFS provides excellent performance with SSDs using RAID-Z1 and RAID-Z2. OpenZFS uses a "Copy-on-Write" model that turns random writes into flash-friendly sequential writes. These writes are much faster and more efficient than RAID-5 or RAID-6 which require Read-Modify-Write sequences for smaller writes. The result is that RAID-Z delivers significantly better performance and endurance than RAID-5 using the same SSDs.

X10=80 TB

X20=240 TB (+1 Shelf)

M50=1500 TB (+8 Shelves)

M40=500 TB (+2 Shelves)

Shelf: ES60 - 450 TB

Shelf: ES24 = 180 TB

M-Series Delivers Flash Scalability

The TrueNAS M-Series with all-flash is ideal for latency-sensitive and business-critical virtual machines and physical workloads. Latencies of less than a millisecond are typical for most deployments. High Availability is provided through a dual controller configuration. When needed, both an all-flash pool and a hybrid pool can be configured on the same TrueNAS system. Multi-shelf scalability of the TrueNAS M-Series enables growth from 8 TB to 1500 TB of all-flash storage.

Systems can support 10 GbE, 40 GbE, or even multiple 100 GbE networking. The TrueNAS M50 system can be configured for over 10 GB/s and 800K IOPS. Self-encrypting drives (SEDs) provide encryption without a performance penalty. TrueNAS can scale to over 1500 TB of all-flash storage.

Intelligent Storage Optimization Reduces Costs

Clones provide maximum space savings when you're deploying hundreds of similar virtual machines. SSDs provide more IOPS per TB, improving the performance of space-efficient systems. TrueNAS also includes in-line compression and the option for deduplication at no additional cost.

The adaptive compression algorithm is so efficient that it actually boosts storage performance while maximizing storage capacity. Data is normally compressed before being written. Incompressible data is detected and written directly. The combination of clones, compression, and deduplication let you make the most out of every byte of storage by increasing capacity up to 10x.

Unlimited Snapshots and Replication

Unlike most storage appliances which require additional licenses for advanced features, TrueNAS provides unlimited file version retention and restoration at no additional cost. Snapshots automatically protect data against unintentional modifications with minimal storage overhead. Data can be replicated to a lower-cost, off-site hybrid TrueNAS system for backup, disaster recovery, and remote synchronization.

With the power of TrueNAS, any data protection or disaster recovery policy is simple to implement and maintain. TrueNAS supports VAAI and seamlessly integrates with a VMware datastore by coordinating snapshot creation with VMware. When VMware snapshots are deleted, the TrueNAS snapshots can still be retained as stable resurrection points.

M-Series Platform

Available Storage Media

- Enterprise Nearline Hard Drives 7200 RPM SAS3:
  - Capacities from 4 TB to 22 TB
  - SED, FIPS 140-2 options
- Enterprise SSDs
  - SAS3: from 1.92 TB to 15.3 TB
  - RI, SED, FIPS 140-2 options
- NVMe SSDs:
  - From 1.6 TB to 3.2 TB

Power Management

- Dual redundant, hot-swappable, high-efficiency (80%+) power supplies
- Auto-switching 100-240V 50/60Hz input power on TrueNAS M30/M40/M50
- High-line 200-240V 50/60Hz input power on TrueNAS M60
- IPMI Remote power on/off

Disk Management

- Global hot spares
- Hot-swappable drives
- Corrupted block scan + HDD S.M.A.R.T.
- Hard drive activity/alert LEDs
- Local and remote (KMIP) key management
- Enclosure monitoring and alerts

Physical Parameters

- 4U: 24× 3.5/2.5" hard drive bays (front-loading, hot swap)
- Dimensions (l x w x h):
  - 27" x 19" x 7" │ 686 × 483 × 178 mm
- Rackmount rails 26" - 36.5"
- Operating temperature: 0°C to 35°C
- Non-operating temperature: -10°C to 70°C
- Humidity: 5% to 95% non-condensing
- Empty weight: 75 lbs │ 34 kg
- Fully-Loaded weight: 114 lbs │ 52 kg
- RoHS 6/6 compliant, CE, FCC Class A, UL, BSMI

TrueNAS® M60 Rear

veeAM   citrix   vmware   Asigra.

TrueNAS M-Series Models

	TrueNAS M30	TrueNAS M40	TrueNAS M50	TrueNAS M60
Hybrid or All-Flash Storage	Optional	Optional	Optional	Optional
Dual Controller (HA)	Optional	Optional	Optional	Optional
Controller	64 GB	128 GB - 192 GB	256 GB - 348 GB	768 GB
Read Cache (Max)	800 GB SAS	2.4 TB SAS or 3.2 TB NVMe	6.4 TB NVMe	12.8 TB NVMe
Write Cache	16 GB SAS	16 GB TrueCache® NVDIMM	16 GB TrueCache® NVDIMM	2× 16 GB TrueCache® NVDIMM
Networking	2× 10/25/40 GbE (optical) / 2× 10GBase-T (standard)	2× 10/25/40/100GbE (optical) / 2× 10GBase-T (standard)	2× 10/25/40/100GbE (optical) / 2× 10GBase-T (standard)	4× 10/25/40/100GbE (optical) / 2× 10GBase-T (standard)
Fiber Channel	2× 16 Gb	4× 16 Gb	4× 16 Gb or 2× 32 Gb	4× 32 Gb
Max Storage	500 TB	3 PB	10 PB	25 PB
Max Expansion Shelves	0	2	8	12
Maximum Power Draw:				
Single Controller	450 Watts	825 Watts	975 Watts	1225 Watts
Dual Controller (HA)	600 Watts	950 Watts	1150 Watts	1450 Watts
Heat Output	1535/2047 BTU/h	2815/3241 BTU/h	3327/3924 BTU/h	4180/4947 BTU/h

▽ TrueNAS Enterprise Specifications

File-Based Protocols
- SMB v1/2/3
- NFSv3, v4
- AFP, FTP, WebDAV

Block-Based Protocols
- iSCSI
- Fibre Channel
- OpenStack Cinder

Object Protocols
- S3-compliant
- Minio Management

Directory Services
- Active Directory (AD)
- Kerberos
- LDAP, NIS

Networking
- Port Trunking/NIC Teaming
- IEEE 802.3ad link aggregation
- IEEE 802.1q VLAN support

Virtualization
- Supports VMware and VAAI, ESXi snapshot integration, VM Warn/Stun, vCenter
- Supports KVM, Citrix XenServer, Microsoft Hyper-V, bhyve, and other common hypervisors
- Microsoft VSS, ODX, and CSV
- Integrated Jails and Plugins

File System
- OpenZFS Self-healing file system
- Snapshots and clones
- Thin and thick provisioning
- Online capacity expansion
- Virtual block devices
- In-line compression and deduplication
- ZFS Stripe, Mirror, RAID-Z1/Z2/Z3

High Availability
- Dual controller support
- Automated failover without data loss
- Virtual IP address migration
- Online software updates
- TrueCache® NVDIMM sync between controllers

Backup
- Snapshot-based OpenZFS local/remote replication
- Rsync and cloudsync
- Backup data to public clouds
- Supports Asigra, Acronis, Veeam, Nakivo, NetBackup, and more

Supported Public Cloud Providers
- Amazon Simple Storage Service (S3)
- BackBlaze B2 Cloud
- Google Cloud
- Microsoft Azure

Remote Administration
- Alert notifications via email, AWS-SNS, Hipchat, InfluxDB, Slack, Mattermost, OpsGenie, PagerDuty, and VictorOps
- SSH, Syslog
- Automated backup of system configuration and state

- Graphical reporting, enclosure management
- Signed updates with the ability to rollback
- IPMI Remote Management with iKVM HTML5
- REST APIs and SNMP
- TrueCommand Single Pane of Glass