

The background of the slide is a dark blue world map with a wireframe overlay of white lines connecting various points across the continents. The TrueNAS logo, consisting of a blue cube icon and the text 'TrueNAS', is positioned at the top center. Below it, the text 'Open Enterprise Storage' is displayed in a white sans-serif font.

TrueNAS

Open Enterprise Storage

Solution Proposal for City of Dickinson

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Solution Architected by:
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Proposal Agenda

1. Executive Overview & Summary

- 1.1. Executive Overview
- 1.2. Solution Summary

2. What Our Valued Customers Say

- 2.1. Gartner Peer Insights
- 2.2. Marquee Customers
- 2.3. Customer Testimonials

3. TrueNAS Overview & Support

- 3.1. TrueNAS Overview
- 3.2. Enterprise Support

4. Solution Configuration

- 4.1. Storage & Scalability
- 4.2. Performance & Networking
- 4.3. Compute & Power
- 4.4. Environmental

5. Pricing & Purchasing

- 5.1. True Cost of Storage
- 5.2. Pricing Table
- 5.3. Billing & Shipping
- 5.4. Remittance Details

Proposed Solutions & Clarifications on RFP Requirements

We are proposing two high availability solutions that fully align with the requirements outlined in the City of Dickinson Immutable On-Premise Backup Storage Server RFP. Both configurations are designed to deliver enterprise class resiliency, performance, and scalability, ensuring they meet and exceed the City's current and future needs.

The M60-HA and the F100-HA solutions each provide:

- RTO - Critical Systems - we want to boot the image with 30 seconds to 3 minutes and be fully restored within 3-7 Days
- RPO - 24 Hours
- 99.999% uptime (five 9s availability)
- High availability architecture with multiple processing nodes
- Redundant power supplies and redundant NICs to ensure continuous service and fault tolerance
- Consistent achievement of RTO and RPO requirements
- Native immutability (via S3 with Minio), that is fully compatible with Veeam Backup and Replication Essentials
- Built, designed, and engineered solely for the purpose of immutable backup storage

The M60-HA is a balanced hybrid platform combining performance and capacity. In addition, based on the City's interest in an all flash solution noted in the Q&A, we are proposing the F100-HA, an all-NVMe option. This configuration provides the same high availability architecture while delivering extremely low latency, lower drive failure rates, and maximum throughput for workloads that demand the highest levels of performance. Both solutions are built to scale and adapt as future storage and performance demands grow.

To complement the technology, we are also proposing our Gold Support tier, which delivers enterprise level support, proactive monitoring, and rapid response to maintain system reliability and long term success.

TrueNAS in 2025

Leading Enterprise Storage with **1M+ Deployments**

Our mission is to provide more performance, reliability, security, and quality of support per dollar than anything else on the market.



- > 1M Deployments
- 400K Active Systems
- Storing >100,000 Petabytes
- Adoption growing faster than ever
- > 60% of the F500 ...can't be wrong.

Storage Customer Choice Leader

3x Gartner Peer Insights Customers Choice Winner



Distributed File Systems



Primary Storage (2024)



Primary Storage (2023)

Customer Experience



Gartner's Highest Customer Satisfaction Rating

4.9



As rated by enterprise customers

TrueNAS Powers Critical Industries Worldwide

Global Reach: Over 60% of the Fortune 500



AUTOMOTIVE

EDUCATION

GAMING

GOVERNMENT

SECURITY & DEFENSE

MANUFACTURING

TECHNOLOGY

HEALTHCARE

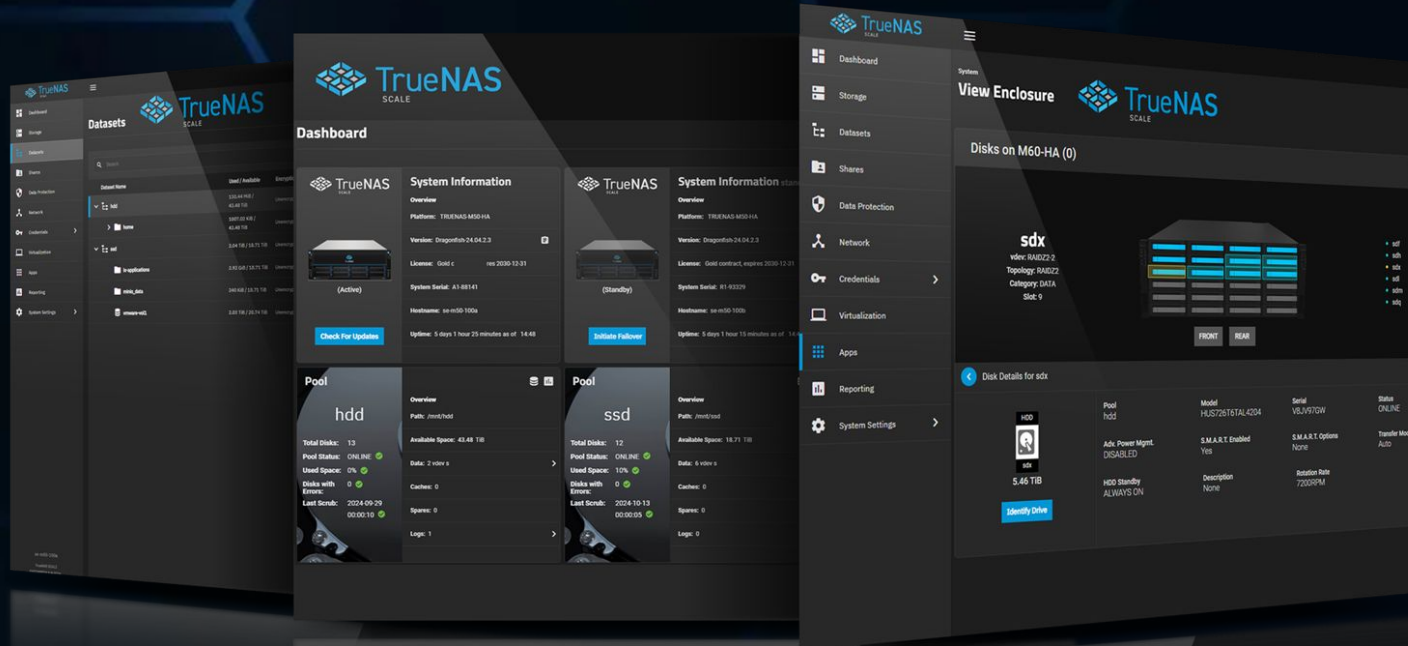
MEDIA & ENTERTAINMENT

SERVICE PROVIDER

RESEARCH

OTHER

How Does TrueNAS Stack up?



Secure // ZFS

Ultimate Data Protection

TrueNAS provides an extensive array of data protection features, starting with an open-source software-defined filesystem and volume manager (OpenZFS), which is a copy-on-write self-healing filesystem that provides automatic disk scrubbing, bit rot protection, end-to-end checksums, mirrored and parity based RAID, hot sparing, adaptive read and write caching, immutable snapshots, and multiple replication and encryption options.

TrueSecure™

TrueNAS complies with the requirements of the NIST Cybersecurity Framework. With this foundation, TrueNAS can be used for federal government use cases from military bases to law enforcement and secure research organizations. TrueNAS also has General Purpose OS STIG support and NIST 800-209 compliance to meet US federal requirements.



VEEAM

CITRIX

VMWARE

✓ Immutable

Immutable at the block-level by way of snapshots, which completely nullifies ransomware attacks and accidental data deletion or modification.

✓ Encrypted

FIPS 140-validated crypto modules for encryption in-flight and self-encrypting drives (SEDs) for at-rest encryption. Software encryption is also available.

✓ Replicated

Incrementally replicate to another TrueNAS system for backup and disaster recovery, or leverage third-party backup applications such as Veeam.

✓ Audited

Tracks access to SMB data and administration actions, providing a transparent history of interactions.

✓ Self-Healing

Data is protected against all causes of data corruption with end-to-end checksums that detect and correct errors. If corruption occurs, the correct blocks can be retrieved from mirrored or parity blocks and rebuilt.

✓ Certified

FIPS 140-2, ISO 27001, NIST 800-209 & HIPAA compliance. Meets Common Criteria standards for IT security and is certified with multiple software vendors.

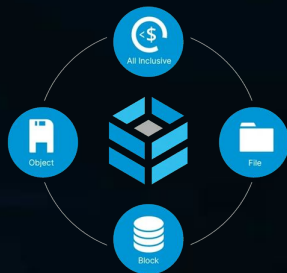
Versatile // Limitless

Open & Unified Storage

Experience the benefits of having all protocols and features on single, open platform. No costly artificial licensing enables your environment to adapt as your business needs evolve.

No Ceilings

Delivers unlimited snapshots, files, shares, and volumes with no capacity sizing limitations. Provides the capability to dynamically expand your storage capacity without incurring any downtime.



✓ Multi-Protocol

Leverage File (SMB3.1, NFSv3/v4), Block (iSCSI, FC), and Object (S3) storage on a single platform and unify and simplify your storage infrastructure. Fully compatible with all Windows, Linux, Hypervisors, and macOS clients.

✓ Highly Available

Ensure your data remains available around the clock. Highly Available (HA) Appliances provide 99.999% uptime and are designed for critical environments, ensuring that your business applications stay online.

✓ Intelligent Caching

Enhance performance by leveraging adaptive caching devices which significantly reduce latency and boost performance for demanding applications.

✓ Directory Services

Bind to Microsoft Active Directory, Entra ID, or an LDAP domain which allows you to manage user authentication and access control lists centrally.

✓ Cloud Backup

Seamless integration with cloud services like Amazon S3, Wasabi, Google Cloud Storage, Backblaze B2, and Azure Blob. Configurable scheduling with push or pull and operational modes sync, copy, or move.

TrueNAS F-Series



Experience True Performance

All-Flash NVMe and Legendary ZFS Reliability

Architecture

The F Series is a 2U NVMe appliance with dual, modular controllers. Each controller has direct, low-latency access to the NVMe drives, and uses a dedicated high-bandwidth interconnect between controllers for synchronization and high-availability to achieve 99.999% uptime.

F100-HA Solution Configuration

Storage

NVMe Performance & Density

Designed to safeguard your mission-critical, high-performance data where downtime is not an option. Density as high as 1.4 PB and 20 GB/s in a 2U form factor with the capability to scale to 10 PiB.

Storage You Can Rely On

The F-Series offers unmatched data reliability in both software and hardware. The OpenZFS file system is the last word in data protection with copy-on-write and bit-rot detection ensuring the integrity of your data from write to read.

Effortlessly Combine Storage Tiers

Streamline your storage footprint by combining multiple storage tiers onto a single appliance. The F-Series can also provide a HDD or hybrid tier in addition to NVMe.

All-Flash Pool

445.9 TiB Usable // 637.1 TiB Effective

Storage Media: 11 x NVMe-60TB
Profile: RAIDZ1 (4+1)
Hot Spares: 1



Usable capacity calculation accounts for RAID parity, ZFS allocation overhead, and TB to TiB conversion. The calculation does not account for capacity gains from data compression/deduplication.
Effective Capacity: Compression / Deduplication rates vary by application.

Scalability

Scale without Compromise

Begin building the foundation of your high-performance storage footprint with the F Series. Expand up to 10 PB of NVMe capacity across six expansion shelves (168 drives) or up to 9PB of HDD capacity across four shelves (408 drives).

Seamless Storage Expansion

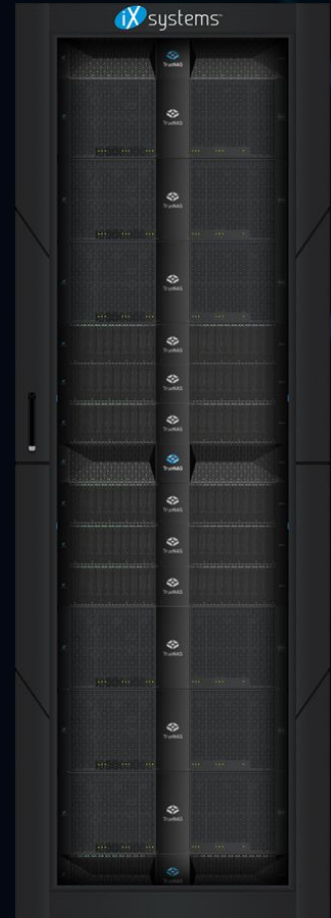
Storage capacity can be dynamically expanded without any service disruptions. Not only do expansions increase storage capacity, but they also boost overall pool performance. Additionally, expansion shelves can be added on-site, along with field HA upgrades for single-controller appliances, ensuring flexibility and scalability to meet evolving needs.

Expansion Shelves None Configured

Supports up to 6× 24-bay 2U NVMe Shelves
Scale to 7.19PiB

Drive Bay Utilization 11 / 24 NVMe Bays

Total Rack Space 2U



Performance

Built for High Performance Workloads

The F-Series boasts top-of-the-line performance for the most demanding workloads, including post-production, data analytics, virtualization, and many more. It is the industry's fastest OpenZFS appliance available, with all of the data protection and workload optimization capabilities that come with OpenZFS.

Reliability = Performance

Dual controllers and high-availability ensure over 99.999% uptime to maintain business operations and keep applications running around the clock.

Throughput

20 GB/s - 25 GB/s

1M Sequential I/O

IOPS

234K - 385K

32K Random I/O

Average Latency

0.5ms

32K Random I/O



Performance calculations are based on a cache hit ratio between 50-90% with a 70% read workload with a queue depth of 16 and a minimum of 12 clients.

Networking

Built-in Management Interface (WebGUI)

Experience unparalleled control and simplicity with the TrueNAS web interface. Our state-of-the-art GUI transforms the complex world of storage into an intuitive, user-friendly environment that empowers you to maximize efficiency and productivity.

Built-in OOB Management (GbE Base-T Port)

Out-of-band management allows users to manage the system via remote web-console, power cycle, monitor sensors, fans, and more.

Built-in Ports

Six 100GbE + 10GbE

Used for NVMe Shelves

Network Card I

Dual 25GbE SFP28

Specifications are per controller



Only the optics for the TrueNAS network cards are included. Customer is responsible for providing switch optic(s) and cabling. DAC cables and LR/BIDI optics can be used but are not officially supported nor do we test with them or warrant compatibility.

Compute

Smarter Storage for Faster Access

ZFS utilizes RAM as a high-speed cache to boost performance, accelerating read/write operations and optimizing resource use. This enhances responsiveness while supporting features like deduplication and compression for reliable, efficient data reduction.

RAM

512GB // Adaptive Read Cache

CPU

48 Cores // 96 Threads

Specifications are per controller



Power

Reliable, Redundant & Hot-Swappable

All TrueNAS appliances are designed with exceptional reliability in mind, featuring dual redundant, hot-swappable, high-efficiency power supplies.

Modular Architecture

The F-Series modular hardware architecture conserves power, space, and cooling while supporting multiple applications with its ultra-performant NVMe Flash.

Max Power Draw

510 // Watts

Max Heat Output

1739 // BTU/h



Environmental

TrueNAS Model	Max Expansion Shelves	Dimensions	Rack Requirements	Rackmount Rail Depth	Input Power
F100	6 x ES24N, 4 x HDD	3.5" x 19" x 27"	2U	27" to 37"	High-line (200-240V 50/60HZ) only

Expansion Shelf	Dimensions	Rack Requirements	Rackmount Rail Depth	Input Power
ES24N	3.4" x 17.2" x 27.4" (38.9" w/ CMA)	2U	27" to 37"	High-line (200-240V 50/60HZ) only



TrueNAS M-Series



Experience True Flexibility

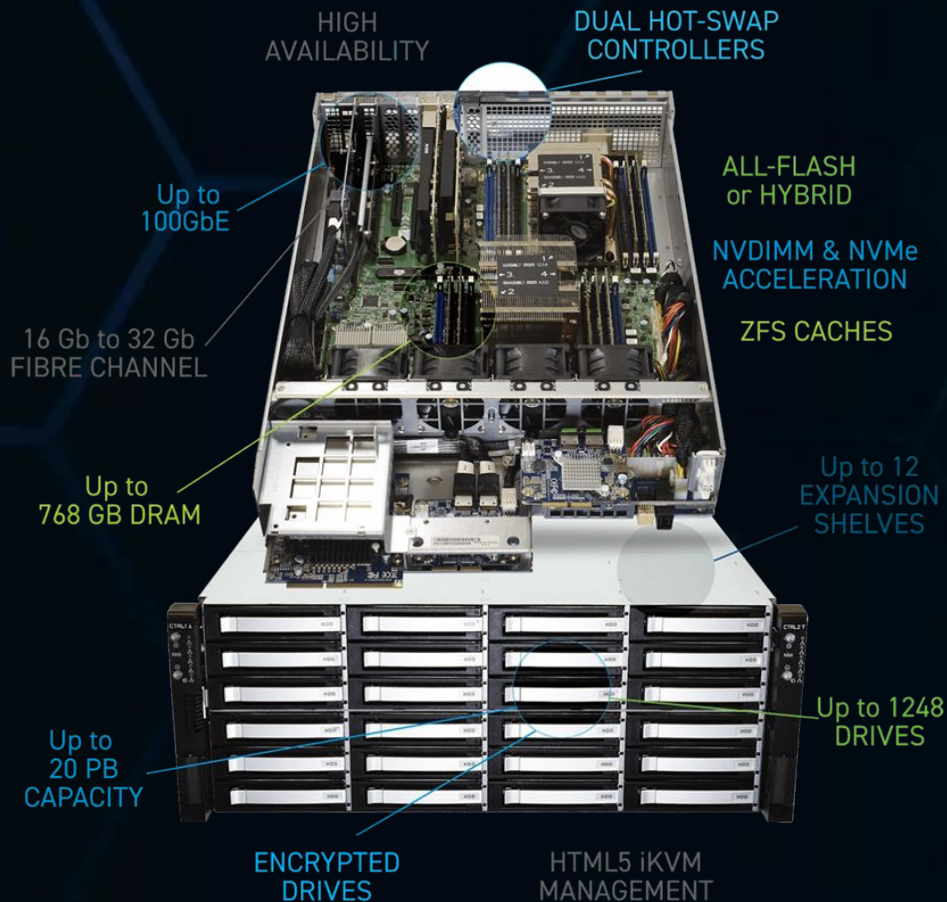
Elegantly Scalable and Legendary ZFS Reliability

Architecture

The M-Series is a 4U system with dual, modular controllers. Each controller has NVDIMMs for extremely low latency write caching and there is a high bandwidth PCIe interconnect between controllers to synchronize the NVDIMMs. The controllers share access to 24 × 3.5" drives and also can share 4 low latency NVMe drives which can be used for read caching.



NVDIMM & NVMe technology not available in M30



M60-HA Solution Configuration

Storage

Enterprise Storage

Built to maximize storage capacity, performance, and uptime, the M-Series is the flagship line of TrueNAS appliances. Designed with the flexibility to address an array of demanding storage requirements and adapt as needs change over time. With high-availability options and advanced data management tools, the TrueNAS M-Series safeguards data for mission-critical operations where downtime is not an option.

Storage You Can Rely On

The TrueNAS M-Series offers unmatched data reliability in both software and hardware. The OpenZFS file system is the last word in data protection with copy-on-write and bit-rot detection ensuring the integrity of your data from write to read.

Hybrid Pool

465.4 TiB Usable // 664.8 TiB Effective

Read Cache: 6.4TB Overprovisioned NVMe SSD | Write Cache: 2x 16GB NVDIMM

Storage Media: 42 x 18TB SAS 7.2K HDD

Profile: RAIDZ2 (6+2)

Hot Spares: 2



Usable capacity calculation accounts for RAID parity, ZFS allocation overhead, and TB to TiB conversion. The calculation does not account for capacity gains from data compression/deduplication.

*Effective Capacity: Compression rates vary by application.

Scalability

Scale without Compromise

Begin building the foundation of your storage footprint with the M-series. Expand to over 20PB on a single M60 with support for up to 12 expansion shelves (1,284 drives).

Hardware Management & Upgrades, Simplified

Servicing an M-Series system is made easy by the modular, tool-less hardware design. Additional integrated enclosure management capabilities save time and effort by providing graphical visualization of the system in the UI, making it easy to monitor the state of your system from a single screen. If performance or capacity needs change over time, it's as simple as a non-disruptive upgrade to higher-end M-Series controllers.

Expansion Shelves

1 x ES60G2 // 4U 60-bay 3.5" enclosure

Scales to 8x Shelves

Scale to 5.73PiB Usable

Drive Bay Utilization

42 / 84 3.5" Bays

Total Rack Space

8U



Performance

Built for High Performance Workloads

All-flash or hybrid? The M-Series can be both. Combining RAM and NVDIMM/NVMe flash as adaptive cache provides industry-leading storage performance. With up to four 100Gb/s network ports per controller, the TrueNAS M-Series is designed to move terabytes at maximum speed.

Reliability = Performance

Dual controllers and high-availability ensure over 99.999% uptime to maintain business operations and keep applications running around the clock.

Throughput

2.5GB/s - 5GB/s

1M Sequential I/O

IOPS

2.3K - 4.8K

32K Random I/O

Average Latency

1.7ms

32K Random I/O



Performance calculations are based on a cache hit ratio between 50-90% with a 70% read workload with a queue depth of 16 and a minimum of 12 clients.

Networking

Built-in Management Interface (WebGUI)

Experience unparalleled control and simplicity with the TrueNAS web interface. Our state-of-the-art GUI transforms the complex world of storage into an intuitive, user-friendly environment that empowers you to maximize efficiency and productivity.

Built-in OOB Management 1GbE Base-T Port)

Out-of-band management allows users to manage the system via remote web-console, power cycle, monitor sensors, fans, and more.

Built-in Ports

Dual 10GbE BaseT

Network Card I

Dual 25GbE SFP28

Network Card II

Not Configured

Specifications are per controller



Only the optics for the TrueNAS network cards are included. Customer is responsible for providing switch optic(s) and cabling. DAC cables and LR/BIDI optics can be used but are not officially supported nor do we test with them or warrant compatibility.

Compute

Smarter storage for faster access

ZFS utilizes RAM as a high-speed cache to boost performance, accelerating read/write operations and optimizing resource use. This enhances responsiveness while supporting features like deduplication and compression for reliable, efficient data reduction.

The M-series can scale up to 768GB RAM and 64 CPU Cores in a single controller M60.

RAM

768GB // Adaptive Read Cache

CPU

32 Cores // 64 Threads

Specifications are per controller



Power

Reliable, Redundant & Hot-Swappable

All TrueNAS appliances are designed with exceptional reliability in mind, featuring dual redundant, hot-swappable, high-efficiency power supplies.

Modular Architecture

The M Series modular hardware architecture conserves power, space, and cooling while supporting multiple applications.

Max Power Draw

1278 // Watts

Max Heat Output

4358 // BTU hour



Environmental

TrueNAS Model	Max Shelves	Dimensions	Rack Requirements	Rackmount Rail Depth	Input Power
M60	12	7" x 19" x 27"	4U	23" to 35.75"	High-line (200-240V 50/60HZ) only

Expansion Shelf	Dimensions	Rack Requirements	Rackmount Rail Depth	Input Power
ES60G2	7" x 19"x 28" (35" w/ CMA)	4U , 1000mm deep cabinet	24" to 32"	High-line (200-240V 50/60HZ) only

Support // Gold



World-Class Enterprise Support

Our support team has unparalleled expertise and knowledge. With a dedicated team of engineers available around the clock, you gain access to rapid issue resolution, comprehensive troubleshooting, and personalized guidance tailored to your specific environment.

Optional Spares Kit

Included with Gold 🏆

Spare components are included for unexpected events. Includes a cold spare drive for each storage pool and a power supply for each enclosure.

Defective Media Retention (DMR)

Allows customers to keep their storage media if it is defective and requires replacement while under warranty. With DMR, customers maintain control of their sensitive data, and dispose of the defective media in accordance with their security standards. Optional.



✓ 24×7 Enterprise Support Access

Direct access to highly trained support engineers with a two-hour response SLA.

✓ Proactive Support

Experience peace of mind with proactive support. Potential issues can be identified and addressed before they escalate with phone-home functionality.

✓ On-site Services & Repair

A field technician will be at your location within four hours of your request for incident resolution or field repairs.

✓ Remote Deployment

TrueNAS software introduction. Establish IPMI and WebUI connectivity. Configuration and setup for storage, networking, directory services, SSH, sharing (iSCSI, SMB, NFS), and critical administration information.

✓ Advanced Parts Replacement

Same day advanced parts replacement with overnight shipping.

TrueNAS RFP References

Company	Name	Contact Info
Managecast Technologies, Inc.	Nathan Golden	ngolden@managecast.com, 614-563-1228
Nevada Department of Corrections	Scott Shumway	sshumway@doc.nv.gov 775-977-5626
Region 7 Education Service Center	Chance McAdams	cmcadams@esc7.net, 903-988-6898

Additional Reference Material

JFK Library Video: <https://www.youtube.com/watch?v=8rFjH5-0Fiw>

TrueNAS Case Studies: <https://www.truenas.com/case-studies/>

True Cost of Storage

	M60-HA	F100-HA
6 Year True TCO	\$121,859.20	\$310,105.60
Total Usable Capacity (As Configured)	465.4 TiB	445.9 TiB
6 Year Solution Cost / Usable TiB	\$261.84	\$695.46
Annualized Solution Cost / Usable TiB	\$43.64	\$115.91
Monthly Solution Cost / Usable TiB	\$3.64	\$9.66
6 Year Hardware Cost	\$80,706.40	\$199,552.00
Annualized Hardware Cost	\$13,451.07	\$33,258.67
Monthly Hardware Cost	\$1,120.92	\$2,771.56
6 Year Support Cost	\$40,352.80	\$109,753.60
Annualized Support Cost	\$6,725.47	\$18,292.27
Monthly Support Cost	\$560.46	\$1,524.36
Remote Deployment Service	\$800.00	\$800.00
Hardware Replacement	\$0.00	\$0.00
Software Update & New Features	\$0.00	\$0.00
Spares Kit	\$0.00	\$0.00
Additional Users	\$0.00	\$0.00
API Calls & Usage	\$0.00	\$0.00
Use Case Changes	\$0.00	\$0.00
Detailed Monitoring & Reporting	\$0.00	\$0.00

Option 1: All-NVMe

Product Name	Unit Price	Quantity	Extended Subtotal
F100-HA	\$ 199,520.00	1	\$ 199,520.00
Gold 5-YR	\$ 109,753.60	1	\$ 109,753.60
Gold Spares Kit Spares Kit Includes: (1x) F100 PSU, (1x) NVMe-60TB	\$ 0.00	1	\$ 0.00
Remote Deployment Service TrueNAS software introduction. Establish IPMI and WebUI connectivity. Configuration and setup for storage, networking, directory services, SSH, sharing (iSCSI, SMB, NFS), and critical administration information.	\$ 1,000.00	1	\$ 1,000.00
			\$ 310,273.60
Shipping & Tax			
Aeronet Freight	\$ 2,275.00	1	\$ 2,275.00
Tax Tax Exempt	\$ 0.00	1	\$ 0.00
			\$ 2,275.00

Total \$ 312,548.60

Option 2: Hybrid

Product Name	Unit Price	Quantity	Extended Subtotal
M60-HA	\$ 80,706.40	1	\$ 80,706.40
Gold 5-YR	\$ 30,668.00	1	\$ 30,668.00
Gold Spares Kit Spares Kit Includes: (1x) M60 PSU, (1x) ES60, (1x) 18TB SAS 7.2K HDD	\$ 0.00	1	\$ 0.00
Remote Deployment Service TrueNAS software introduction. Establish IPMI and WebUI connectivity. Configuration and setup for storage, networking, directory services, SSH, sharing (iSCSI, SMB, NFS), and critical administration information.	\$ 800.00	1	\$ 800.00
			\$ 112,174.40
Shipping & Tax			
Aeronet Freight	\$ 1,650.00	1	\$ 1,650.00
Tax Tax Exempt	\$ 0.00	1	\$ 0.00
			\$ 1,650.00

Total \$ 113,824.40

iXsystems Payment Remittance Details

Vendor Legal designation: iXsystems, Inc.

Tax Identification Number: 27-3007169



CHECKS SHOULD BE MAILED TO (via US Postal Service):

iXsystems, Inc.
PO Box 92135
Las Vegas, NV 89193-2135

OR, VIA OVERNIGHT COURIER SERVICE:

iXsystems Inc.
c/o WAB Lockbox Operations Box #92135
5976 Euclid Street
Las Vegas, NV 89120

WIRES/ACH PAYMENTS SHOULD BE SENT TO:

Bridge Bank, a division of Western Alliance Bank
ABA or Routing Number: 121143260
Account number: 8392006144
For Credit To: iXsystems, Inc.

FOR RECEIVING INTERNATIONAL WIRES IN USD ONLY

Swift Code: BBFXUS6S