



ADOA - ASET

Arizona Strategic Enterprise Technology

Project Investment Justification

Version 01.01

A Statewide Standard Document for Information Technology Projects

**Project Title: Network File Server (NSF) and Security Upgrades -
Medical Marijuana**

Agency Name:	Arizona Department of Health Services
Date:	February 26, 2014
Agency Contact Name:	Raghu Ramaswamy
Agency Contact Phone:	
Agency Contact Email:	

[Hover for Instructions](#)

I. Management Summary*

ADHS implemented the voter approved Medical Marijuana Act initiative in April 2011. We initially purchased database, web tier infrastructure, and launched applications in support of cardholders, caregivers, and law enforcement. In the summer of 2012, we held a lottery to select dispensaries and then launched several additional applications in support of dispensaries including dispensary agent card processing and point of sale.

Over the course of the last several years, we have experienced several infrastructure issues, which have caused downtime for our medical marijuana applications. Since these applications are supporting functions which require 24 X 7 availability (such as the verification of cards by law enforcement) and point of sale during business hours which often include Saturday and Sunday (medical marijuana dispensing) we need to ensure that these systems are highly available. We have analyzed our outage issues and state of infrastructure to determine what systems need to be replaced or upgraded.

The purpose of this project is to procure and implement highly available infrastructure, enhanced security, and performance-tuning software in support of our Medical Marijuana program.

II. Project Investment Justification (PIJ) Type*

Yes No Is this document being provided for a Pre-PIJ / Assessment phase?

If Yes,

Identify any cost to be incurred during the Assessment phase.	\$
Based on research done to date, provide a high-level estimate or range of development costs anticipated for the full PIJ.	\$844,641.99

Explain:

[Click here to enter text.](#)

Yes No Will a Request for Proposal (RFP) be issued as part of the Pre-PIJ or PIJ?

III. Business Case

A. **Business Problem***

ADHS implemented the voter approved Medical Marijuana Act initiative in April 2011. We initially purchased database, web tier infrastructure, and launched applications in support of cardholders, caregivers, and law enforcement. In the summer of 2012, we held a lottery to select dispensaries and then launched several additional applications in support of dispensaries including dispensary agent card processing and point of sale. Over the course of the last several years, we have experienced several infrastructure issues, which have caused downtime for our medical marijuana applications. Since these applications are supporting functions which require 24 X 7 availability (such as the verification of cards by law enforcement) and point of sale during business hours which often include Saturday and Sunday (medical marijuana dispensing) we need to ensure that these systems are highly available. We have analyzed our outage issues and state of infrastructure to determine what systems need to be replaced or

upgraded. The purpose of this project is to procure and implement highly available infrastructure, enhanced security, and performance tuning software in support of our Medical Marijuana program.

B. Proposed Business Solution*

Procure and implement the infrastructure and software for the Medical Marijuana program to ensure high availability, enhanced security, performance-tuning, data backup, and archiving as follows:

- StorageTek SL150 modular tape library to ensure data is backed up and available for system restoration and archiving.
- ZFS Appliance with infinity band for direct fast-speed connection to the Exadata database appliance. This provides enterprise-class network-attached storage and will be used to store files/images directly on the appliance.
- Platinum Services to enable two-way communication with Oracle via the Oracle Advanced Support Gateway server.
- Audit Vault Database Firewall accurately detects and blocks unauthorized database activity including SQL injection attacks by monitoring traffic to Oracle and non-Oracle Databases. Database firewall uses SQL grammar analysis and easy-to-define white lists and blacklists to ensure high accuracy and performance.
- Database Vault is a database security option that you use to protect application data from privileged user access, enforce protection of database structures from unauthorized change, protect the integrity of your DBA team and set a variety of access controls to implement dynamic and flexible security requirements.
- Diagnostic Pack offers a comprehensive set of real time and automatic performance diagnostics and monitoring functionality built into the core database engine and Oracle Enterprise Manager Cloud Control 12c. Whether you are managing one or many databases, Oracle Diagnostics Pack offers a complete, cost effective, and easy to use solution for managing the performance of your Oracle Database environment. When used with Enterprise Manager, Oracle Diagnostics Pack additionally provides enterprise-wide performance and availability reporting, a centralized performance repository, and valuable cross-system performance aggregation, significantly simplifying the task of managing large sets of databases
- Tuning Pack automates the database application tuning process, thereby significantly lowering database management costs while enhancing performance and reliability. Key features of Oracle Database Tuning Pack include ◦SQL Tuning Advisor and ◦SQL Access Advisor.
- Partitioning enhances the manageability, performance, and availability of a wide variety of applications. Partitioning allows tables, indexes, and index-organized tables to be subdivided into smaller pieces, enabling these database objects to be managed and accessed at a finer level of granularity. Oracle provides a comprehensive range of partitioning schemes to address every business requirement. Moreover, since it is entirely transparent in SQL statements, partitioning can be applied to any application, from OLTP to Data Warehousing.

C. Quantified Benefits*

<input checked="" type="checkbox"/>	Service enhancement
<input type="checkbox"/>	Increased revenue
<input type="checkbox"/>	Cost reduction
<input checked="" type="checkbox"/>	Problem avoidance
<input checked="" type="checkbox"/>	Risk avoidance

Explain:

The main benefit is service enhancement by reducing/eliminating application downtime. Other benefits are to avoid problems/risks by having state-of-the-art equipment.

IV. Technology Approach

A. Proposed Technology Solution*

Hardware

Tape Library: Oracle StorageTek SL150

The existing Sun StorageTek SL500 modular tape library proved to be a sound investment and continues to perform optimally although further scalability is not available due to system limitations. Because of the past and present dependability of the SL500 modular tape library, the agency is considering the purchase of an Oracle StorageTek SL150 modular tape library. The SL150 enables the agency to build the capacity and performance required to continue automated tape backups without decreasing reliability and to meet growing data backup requirements. Scalability from 30 to 300 cartridge slots enables capacity to reach nearly 1.9 petabytes (PB) with the use of StorageTek LTO6 half-height tape drives. The proposed configuration includes 7 LTO6 half-height tape drives and 15 boxes of 20- each 900-gigabyte (GB) tapes. The proposed configuration will meet the needs of the agency for at least 5 years considering the future data growth and backup requirements.

ADHS utilizes the Sun StorageTek SL500 modular tape library to ensure over 36 terabytes (TB) of agency data is backed-up daily to tape and archived monthly at the Arizona State Library, Archives and Public Records Division. When initially purchased in 2006, the Sun StorageTek SL500 Modular tape library provided the agency with a scalable, rack mounted, tape automation system capable of reliable tape robotics and offsite data transportability. After functioning for 8 years in the Enterprise production environment, and two timely upgrades, the SL500 tape library has reached capacity and does not have the scalability to meet the growing data backup needs of the agency. Additionally, the annual maintenance support costs are rising and exceed \$10,700. To ensure the agency can continue to perform automated tape backup capabilities, a replacement tape library is required.

Key Features

Performance	
Throughput Per Hour, Maximum Native (Uncompressed)	
LTO 5 (20 drives, 140 MB/sec)—10 TB/hr	
LTO 6 (20 drives, 160 MB/sec) – 11.5 TB/hr	
Capacity	
Capacity, Maximum Native (Uncompressed)	
LTO 5 (1.5 TB/cartridge)—450 TB (300 cartridges)	
LTO 6 (2.5 TB/cartridge) – 750 TB (300 cartridges)	
Number of Cartridge Slots	
<ul style="list-style-type: none"> • 30–300 cartridge slots • Base module: 30 slots • Up to 9 expansion modules: 30 slots each module 	
Number of Tape Drives/Types	Mail Slot
Half Height LTO 5 FC or SAS: 1–20	Base module: 4-cartridge capacity
Half Height LTO 6 FC or SAS: 1–20	
Availability	
Non-disruptive serviceability	Hot-swappable drives; redundant hot-swappable power supplies with redundant fans
Mean Swaps Between Failures (MSBF)	2 million robot load/unload cycles
Compatibility	
Supported host platforms	Oracle Solaris, UNIX, Windows, Oracle Linux (IPv4, IPv6)

NFS Server: Oracle ZFS Storage Appliance ZS3-2

The existing Sun SPARC 280R NFS server proved to be dependable. However, the Oracle ZFS Storage Appliance ZS3-2 provides a dual controller HA cluster with external disk shelf storage to deliver an ‘active-active’ configuration. The ZS-3 also enables data compression to conserve backup media with four distinct compression options to balance data reduction with performance for specific workloads. With 168 TB RAW disk-space available, per appliance, the ZS3-2 will meet the NFS needs of the agency for at least 5 years.

ADHS utilizes a single Sun SPARC 280R server to enable 24x7 access to network files for business critical applications and client computers. During the first 5 years in the production environment, the 280R NFS server performed optimally having required unscheduled maintenance only once. Recently, aging components and faulty circuits have caused multiple hardware failures preventing the agency from delivering public facing web services due to the aforementioned Sun SPARC 280R NFS Server issues. The agency purchased the Sun SPARC 280R NFS server in 2004 and continues to pay rising maintenance support costs, which are currently \$1,843.63 annually. Furthermore, the Sun SPARC 280R reached end-of-service-life in 2011. To ensure the agency can deliver highly available public facing web services and reliable client computer access to business critical files, highly available (HA) NFS servers are required.

Key Features

Oracle ZFS Storage Appliance Software	
Included Features	Details
Oracle Intelligent Storage Protocol	Oracle Database 12c sends metadata to the ZFS Storage Appliance about each I/O, enabling storage to dynamically tune itself for optimal performance
File system	Oracle Solaris ZFS (128-bit addressability)
File-level protocol	NFS v2/v3/v4, CIFS, HTTP, WebDAV, FTP/SFTP/FTPS
Block-level protocol	ISCSI, Fibre Channel, iSER, SRP, IP over InfiniBand, RDMA over InfiniBand
Data compression	Four distinct compression options to balance data reduction with performance for specific workloads
Hybrid Columnar Compression	3x to 5x reduction in storage footprint with existing Oracle Databases for OLTP , data warehousing, or mixed workloads
Data deduplication	Inline, block-level deduplication
Monitoring	DTrace Analytics (for system tuning and debugging); dashboard monitoring for key system performance metrics; plug-in available for Oracle Enterprise Manager
Automated serviceability	"Phone Home" capability with automatic case creation, configurable alerts
RAID	Striping, mirroring, triple-mirroring, single-parity RAID, double-parity RAID, triple-parity RAID, wide stripes
Remote management	HTTPS, SSH, SNMP v1/v2c, IPMI
Snapshots	Read only, restore, Microsoft Volume Shadow Copy Support (VSS)
Directory services	NIS, AD, LDAP

Oracle Platinum Gateway Server

Oracle Platinum Services provides ADHS with free monitoring services under the Oracle support contract. The Gateway Server enables two-way communication with Oracle via the Oracle Advanced Support Gateway. Oracle Platinum Services provides enhanced support for HA and performance by running certified configurations of the Oracle Exadata Database Machine. A server is required to run the Oracle Platinum Gateway Services.

Key Features

	Features	Benefits
Fault Monitoring	24x7 fault monitoring	Fastest identification, notification and restoration of issues
	Event filtering and qualification	Focus on critical events
	Reporting on event management	Full visibility into faults detected by Oracle
	A single global knowledge base, tool set and client portal	Take advantage of the depth and breadth of Oracle's collective knowledge
Respond and Restore	24x7 Response Times: <ul style="list-style-type: none"> • 5-min fault notification • 15-min restoration or escalation to development • 30-min joint debugging 	Highest level of response with the fastest path to issue restore
	Escalation process and hotline with dedicated escalation managers	Expert support staff available 24x7
Patching	Assess and Analyze – produce patch plan	Proactive identification of best practice configuration for optimal performance
	Plan and Deploy - Proactively plan and deploy patches up to four times per year	Minimize business disruption and ensure systems performance

Software

Oracle Audit Vault Database Firewall

Database Firewall accurately detects and blocks unauthorized database activity including SQL injection attacks by monitoring traffic to Oracle and non-Oracle Databases. Database firewall uses SQL grammar analysis and easy-to-define while lists and blacklists to ensure high accuracy and performance.

Oracle Database Vault

Oracle Database Vault is a database security option that you use to protect application data from privileged user access, enforce protection of database structures from unauthorized change, protect the integrity of your DBA team and set a variety of access controls to implement dynamic and flexible security requirements.

Oracle Diagnostic Pack

Oracle Diagnostics Pack offers a comprehensive set of real time and automatic performance diagnostics and monitoring functionality built into the core database engine and Oracle Enterprise Manager Cloud Control 12c. Whether you are managing one or many databases, Oracle Diagnostics Pack offers a complete, cost effective, and easy to use solution for managing the performance of your Oracle Database environment. When used with Enterprise Manager, Oracle Diagnostics Pack additionally provides enterprise-wide performance and availability reporting, a

centralized performance repository, and valuable cross-system performance aggregation, significantly simplifying the task of managing large sets of databases

Oracle Database Tuning Pack

Oracle Database Tuning Pack automates the database application tuning process, thereby significantly lowering database management costs while enhancing performance and reliability. Key features of Oracle Database Tuning Pack include

- SQL Tuning Advisor and
- SQL Access Advisor.

Oracle Partitioning

Oracle Partitioning enhances the manageability, performance, and availability of a wide variety of applications. Partitioning allows tables, indexes, and index-organized tables to be subdivided into smaller pieces, enabling these database objects to be managed and accessed at a finer level of granularity. Oracle provides a comprehensive range of partitioning schemes to address every business requirement. Moreover, since it is entirely transparent in SQL statements, partitioning can be applied to any application, from OLTP to Data Warehousing.

Oracle Remote Replication

Oracle Storage Appliance Replication software enables replication from one Oracle ZFS Storage Appliance product to another.

B. Technology Environment

The Medical Marijuana program applications are developed in .NET/C# with Oracle as the database. It is a 3-tier environment with the User Interface and Application tiers using Windows Virtual servers and the Database tier using an Oracle Exadata server. We are currently using a SunFire 280R NFS server and a Sun StorageTek SL500 tape library to be replaced as described in this PIJ.

C. Selection Process

Tape Library

ADHS considered two modular tape library products. Both products use the LT06 tape drive and 8GB FC throughput. The primary difference between the products is the number of cartridge slots available. The HP tape library has 24 cartridge slots available while the Oracle tape library has 30 cartridge slots available. The preferred tape library is the Oracle StorageTek SL150 due to more cartridge slots being available during the nightly backup window.

- HP StoreEver MSL6480 (Alternate)
- Oracle StorageTek SL150 (Preferred)

NFS Server

ADHS considered three NFS server products. Each product provided exceptional storage management capabilities and secure file access requirements to deliver HA file services for the Enterprise applications and web services. The preferred NFS server is the Oracle ZFS Storage Appliance ZS3-2 due to the extensibility and integration of the Automatic Storage Management (ASM) system with agency-owned infrastructure components like the Oracle Exadata. Oracle ASM is a volume manager and a file system for Oracle database files that supports single-instance Oracle Database and Oracle Real

Application Clusters (Oracle RAC) configurations. Oracle ASM is Oracle's recommended storage management solution that provides an alternative to conventional volume managers, file systems, and raw devices.

- HP StoreEasy 1830 (Second Alternate)
- EMC Data Domain (Alternate)
- Oracle ZFS Storage Appliance ZS3-2 (Preferred)

Gateway Server

ADHS considered two server products to run the Oracle Platinum Gateway Services. Each product provided the necessary performance, scalability, and flexibility required to run the web-based solution. The main distinction between each product is the initial purchase price and data center hosting cost. The HP ProLiant BL460c Gen8 Server Blade costs \$4,089.00 while the Oracle X4-2 costs \$7,090.87. Data center hosting for the ProLiant BL460c Gen8 Server Blade is \$0 annually due to previous infrastructure investments in the C7000 blade server chassis while the data center hosting cost for the Oracle X4-2 is \$720 annually.

- Oracle X4-2 (Alternate)
- HP ProLiant BL460c Gen8 (Preferred)

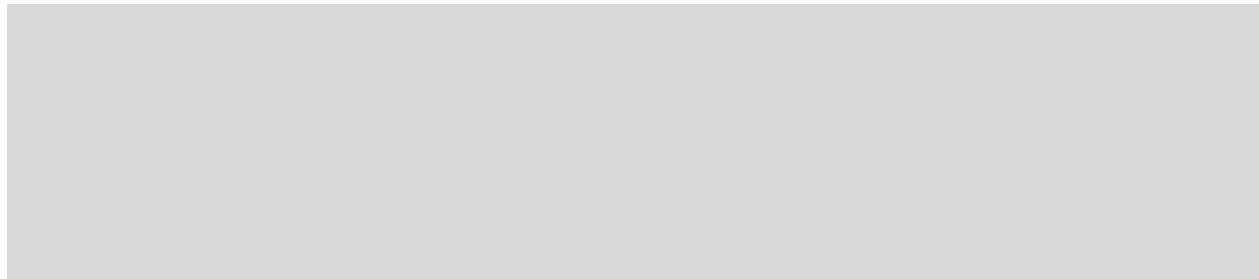
V. Project Approach

A. Project Schedule*

Project Start Date: 3/26/2014 **Project End Date:** 8/26/2014

B. Project Milestones

Major Milestones	Start Date	Finish Date
Procure hardware and software	3/26/2014	4/18/2014
Implement ZFS Appliance, cutover from existing NFS and Test	5/30/2014	7/14/2014
Implement tape library and test	5/30/2014	7/14/2014
Implement gateway server and test	5/30/2014	7/14/2014
Implement Audit Vault Database Firewall and test	7/14/2014	7/31/2014
Implement Database Vault and test	7/14/2014	8/4/2014
Implement Diagnostic Pack and test	7/21/2014	8/11/2014
Implement Tuning Packs and test	7/28/2014	8/18/2014
Implement Partitioning and test	8/4/2014	8/25/2014
Go Live	8/26/2014	8/26/2014



VI. Roles and Responsibilities

A. Project Roles and Responsibilities

B. Project Roles and Responsibilities

Project Executive Sponsor – Don Herrington, Assistant Director for Public Health Preparedness - This position will provide project oversight and approval for project scope. Specific responsibilities will include (but not be limited to):

- *Project champion, provides direction and support to the team.*
- *Approves project scope and funding.*

Information Technology Executive – Paula Mattingly, Assistant Director / Chief Information Officer This position will be accountable to assign the necessary Information Technology resources to meet the goals within the budget and timeline. Specific responsibilities will include (but not be limited to):

- *Project champion, provides direction and support to ITS team*
- *Implement necessary Infrastructure and meet the immediate business needs*
- *Monitoring business value*
- *Management of IT staff or other resources*

Chief Financial Officer – James Humble - This position will be accountable to ensure resource availability at the Agency level to meet the goals within the budget and timeline.

ITS Application Services Manager - Raghu Ramaswamy - This position will provide overall leadership and oversight of solution delivery and efforts necessary to align technology to meet the Department needs. This position will report to CIO. Specific responsibilities will include (but not be limited to):

- *Coordinating resources assigned to the project and engaging Customers*
- *Assessing needs and bridging gap between Technical and functional needs*
- *Direct and delegate approved plan*
- *Coordinating the operational needs and performance troubleshooting and resolution.*

Information Technology Project Manager – David Gilbert, Technical Services Manager - This position will provide leadership and overall project management and efforts described in this document and for the future technology needs of the Department. Specific responsibilities will include (but not be limited to):

- Coordinating resources assigned to the project.
- Allocating resources to ensure project completion on schedule, within scope, and within budget.
- Providing status reports to the Executive Management and ASET as required.

Database, UNIX and Network Administration Teams - Specific responsibilities will include (but not be limited to):

- Monitor vendor installation of the ZFS Storage Appliance, tape library, and gateway server.
- Monitor vendor configuration of the ZFS Storage Appliance, tape library, and gateway server.
- Test ZFS Storage Appliance, tape library, and gateway server
- Configure and Implement all Oracle software products
- Provide support as needed.

Vendor Resources - This position will ensure that the appropriate vendor resources are allocated and made available for the proposed duration of the project, technical staff, and trainers. Provides issue escalation and resolution, and assists with change management and scope control.

C. Project Manager Certification

- Project Management Professional (PMP) Certified
- State of Arizona Certified
- Project Management Certification not required

D. Full-Time Employee (FTE) Project Hours

Total Full-Time Employee Hours	
Total Full-Time Employee Cost	\$

VII. Risk Matrix, Areas of Impact, Itemized List, PIJ Financials

VIII. Project Approvals

A. Agency CIO Review*

Key Management Information	Yes	No
1. Is this project for a mission-critical application system?	X	
2. Is this project referenced in your agency's Strategic IT Plan?	X	
3. Is this project in compliance with all agency and State standards and policies for network, security, platform, software/application, and/or data/information as defined in http://aset.azdoa.gov/security/policies-standards-and-procedures , and applicable to this project? If NO , explain in detail in the "XI. Additional Information" section below.	X	
4. Will this project transmit, store, or process sensitive, confidential or Personally Identifiable Information (PII) data? If YES , in the "XI. Additional Information" section below, describe what security controls are being put in place to protect the data.	X	
5. Is this project in compliance with the Arizona Revised Statutes (A.R.S.) and GRRC rules?	X	
6. Is this project in compliance with the statewide policy regarding the accessibility to equipment and information technology for citizens with disabilities?	X	

B. Project Values*

The following table should be populated with summary information from other sections of the PIJ.

Description	Section	Number or Cost
Assessment Cost (if applicable for Pre-PIJ)	II. PIJ Type - Pre-PIJ Assessment Cost	\$
Total Development Cost	VII. PIJ Financials tab	\$844,641.99
Total Project Cost	VII. PIJ Financials tab	\$1,430,013.54
FTE Hours	VI. Roles and Responsibilities	

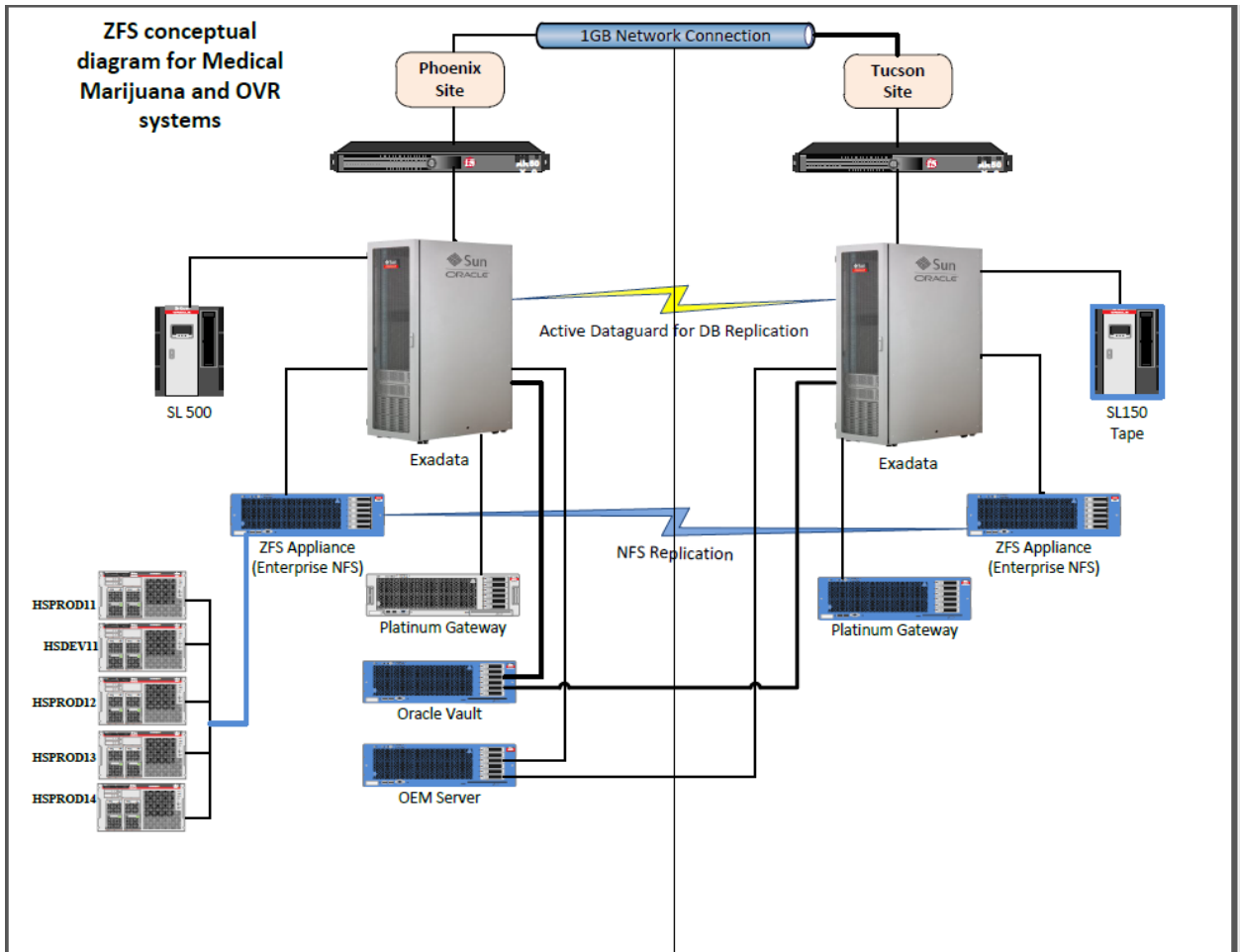
C. Agency Approvals*

Contact	Printed Name	Signature	Email and Phone
Dave Gilbert Project Manager:	Dave Gilbert		
John Stark Agency Information Security Officer:	John Stark		
Paula Mattingly Agency CIO:	Paula Mattingly		
Jim Humble Agency CFO:	Jim Humble		
Don Herrington Project Sponsor:	Don Herrington		
Janet Mullen Deputy Director for Planning & Operations:	Janet Mullen		
Will Humble Agency Director:	Will Humble		

IX. Optional Attachments

A. Vendor Quotes

B. Network Diagram



X. Glossary

XI. Additional Information

XI. Additional Information (continued)

Links:

[ADOA-ASET Website](#)

[ADOA-ASET Project Investment Justification Information Templates and Contacts](#)

Email Addresses:

[Strategic Oversight](#)

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