State of West Virginia
Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER	PAGE
STO12007	1

ADDRESS CORRESPONDENCE TO ATTENTION OF:

FRANK WHITTAKER
304-558-2316

RFQ COPY
TYPE NAME/ADDRESS HERE

VENDOR
SYCOM TECHNOLOGIES
1802 BAYBERRY CT.
SUITE 201
RICHMOND, VA 23226

SHIP TO
STATE TREASURER
MAIN CAPITOL BUILDING
SUITE E-145

CHARLESTON, WV
25305   304-343-4000

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
03/06/2012				

BID OPENING DATE: 04/10/2012   BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
0001	1 LS		205-05			

COMPUTER NETWORK INFRASTRUCTURE

REQUEST FOR PROPOSAL
(RFP)

THE WEST VIRGINIA PURCHASING DIVISION, FOR THE
THE WEST VIRGINIA STATE TREASURER'S OFFICE, IS
SOLICITING PROPOSALS FOR REPLACEMENT OF
NETWORK INFRASTRUCTURE COMPONENTS PER THE
ATTACHED SPECIFICATIONS.

MANDATORY PRE-BID
A MANDATORY PRE-BID WILL BE HELD ON 3/16/12 AT 10:30 A
RM EB96, BLDG. 1, 1900 KANAWHA BLVD. E. CHARLESTON. ALL
INTERESTED PARTIES ARE REQUIRED TO ATTEND THIS MEETING.
FAILURE TO ATTEND THE MANDATORY PRE-BID SHALL RESULT IN
DISQUALIFICATION OF THE BID. NO ONE PERSON MAY
REPRESENT MORE THAN ONE BIDDER.

AN ATTENDANCE SHEET WILL BE MADE AVAILABLE FOR
POTENTIAL BIDDERS TO COMPLETE.   THIS WILL SERV
OFFICIAL DOCUMENT VERIFYING ATTENDANCE AT THE
PRE-BID.   FAILURE TO PROVIDE YOUR COMPANY AND
REPRESENTATIVE NAME ON THE ATTENDANCE SHEET WI
IN DISQUALIFICATION OF THE BID.   THE STATE WII
ACCEPT ANY OTHER DOCUMENTATION TO VERIFY ATTEN
THE BIDDER IS RESPONSIBLE FOR ENSURING THEY HA
COMPLETED THE INFORMATION REQUIRED ON THE ATTE
SHEET.   THE PURCHASING DIVISION AND THE STATE
WILL NOT ASSUME ANY RESPONSIBILITY FOR A BIDDE
FAILURE TO COMPLETE THE PRE-BID ATTENDANCE SHE

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE   TELEPHONE

TITLE   FEIN   ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

GENERAL TERMS & CONDITIONS
REQUEST FOR QUOTATION (RFQ) AND REQUEST FOR PROPOSAL (RFP)

1. Awards will be made in the best interest of the State of West Virginia.

2. The State may accept or reject in part, or in whole, any bid.

3. Prior to any award, the apparent successful vendor must be properly registered with the Purchasing Division and have paid the required $125 fee.

4. All services performed or goods delivered under State Purchase Order/Contracts are to be continued for the term of the Purchase Order/Contracts, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise available for these services or goods this Purchase Order/Contract becomes void and of no effect after June 30.

5. Payment may only be made after the delivery and acceptance of goods or services.

6. Interest may be paid for late payment in accordance with the *West Virginia Code*.

7. Vendor preference will be granted upon written request in accordance with the *West Virginia Code*.

8. The State of West Virginia is exempt from federal and state taxes and will not pay or reimburse such taxes.

9. The Director of Purchasing may cancel any Purchase Order/Contract upon 30 days written notice to the seller.

10. The laws of the State of West Virginia and the *Legislative Rules* of the Purchasing Division shall govern the purchasing process.

11. Any reference to automatic renewal is hereby deleted. The Contract may be renewed only upon mutual written agreement of the parties.

12. BANKRUPTCY: In the event the vendor/contractor files for bankruptcy protection, the State may deem this contract null and void, and terminate such contract without further order.

13. HIPAA BUSINESS ASSOCIATE ADDENDUM: The West Virginia State Government HIPAA Business Associate Addendum (BAA), approved by the Attorney General, is available online at **www.state.wv.us/admin/purchase/vrc/hipaa.html** and is hereby made part of the agreement provided that the Agency meets the definition of a Cover Entity (45 CFR §160.103) and will be disclosing Protected Health Information (45 CFR §160.103) to the vendor.

14. CONFIDENTIALITY: The vendor agrees that he or she will not disclose to anyone, directly or indirectly, any such personally identifiable information or other confidential information gained from the agency, unless the individual who is the subject of the information consents to the disclosure in writing or the disclosure is made pursuant to the agency's policies, procedures, and rules. Vendor further agrees to comply with the Confidentiality Policies and Information Security Accountability Requirements, set forth in http://www.state.wv.us/admin/purchase/privacy/noticeConfidentiality.pdf.

15. LICENSING: Vendors must be licensed and in good standing in accordance with any and all state and local laws and requirements by any state or local agency of West Virginia, including, but not limited to, the West Virginia Secretary of State's Office, the West Virginia Tax Department, and the West Virginia Insurance Commission. The vendor must provide all necessary releases to obtain information to enable the director or spending unit to verify that the vendor is licensed and in good standing with the above entities.

16. ANTITRUST: In submitting a bid to any agency for the State of West Virginia, the bidder offers and agrees that if the bid is accepted the bidder will convey, sell, assign or transfer to the State of West Virginia all rights, title and interest in and to all causes of action it may now or hereafter acquire under the antitrust laws of the United States and the State of West Virginia for price fixing and/or unreasonable restraints of trade relating to the particular commodities or services purchased or acquired by the State of West Virginia. Such assignment shall be made and become effective at the time the purchasing agency tenders the initial payment to the bidder.

I certify that this bid is made without prior understanding, agreement, or connection with any corporation, firm, limited liability company, partnership, or person or entity submitting a bid for the same material, supplies, equipment or services and is in all respects fair and without collusion or Fraud. I further certify that I am authorized to sign the certification on behalf of the bidder or this bid.

INSTRUCTIONS TO BIDDERS

1. Use the quotation forms provided by the Purchasing Division. Complete all sections of the quotation form.

2. Items offered must be in compliance with the specifications. Any deviation from the specifications must be clearly indicated by the bidder. Alternates offered by the bidder as **EQUAL** to the specifications must be clearly defined. A bidder offering an alternate should attach complete specifications and literature to the bid. The Purchasing Division may waive minor deviations to specifications.

3. Unit prices shall prevail in case of discrepancy. All quotations are considered F.O.B. destination unless alternate shipping terms are clearly identified in the quotation.

4. All quotations must be delivered by the bidder to the office listed below prior to the date and time of the bid opening. Failure of the bidder to deliver the quotations on time will result in bid disqualifications: Department of Administration, Purchasing Division, 2019 Washington Street East, P.O. Box 50130, Charleston, WV 25305-0130

5. Communication during the solicitation, bid, evaluation or award periods, except through the Purchasing Division, is strictly prohibited (W.Va. C.S.R. §148-1-6.6).

State of West Virginia
Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER	PAGE
STO12007	2

ADDRESS CORRESPONDENCE TO ATTENTION OF:
FRANK WHITTAKER
304-558-2316

RFQ COPY
TYPE NAME/ADDRESS HERE

VENDOR
SYCOM TECHNOLOGIES
1802 BAYBERRY CT., SUITE 201
RICHMOND, VA 23226

SHIP TO
STATE TREASURER
MAIN CAPITOL BUILDING
SUITE E-145

CHARLESTON, WV
25305   304-343-4000

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
03/06/2012				

BID OPENING DATE:	04/10/2012	BID OPENING TIME	01:30PM

LINE	QUANTITY	UOP	CAT NO.	ITEM NUMBER	UNIT PRICE	AMOUNT

ADDITION, WE REQUEST THAT ALL POTENTIAL BIDDERS INCLUDE
THEIR E-MAIL ADDRESS AND FAX NUMBER.

ALL POTENTIAL BIDDERS ARE REQUESTED TO ARRIVE PRIOR TO
THE STARTING TIME FOR THE PRE-BID. BIDDERS WHO ARRIVE
LATE, BUT PRIOR TO THE DISMISSAL OF THE TECHNICAL
PORTION OF THE PRE-BID WILL BE PERMITTED TO SIGN IN.
BIDDERS WHO ARRIVE AFTER CONCLUSION OF THE TECHNICAL
PORTION OF THE PRE-BID, BUT DURING ANY SUBSEQUENT PART
OF THE PRE-BID WILL NOT BE PERMITTED TO SIGN THE
ATTENDANCE SHEET.

ALL TECHNICAL QUESTIONS MUST BE SUBMITTED IN WRITING TO
FRANK WHITTAKER IN THE WV PURCHASING DIVISION VIA EMAIL
AT FRANK.M.WHITTAKER@WV.GOV OR VIA FAX AT 304-558-4115.
DEADLINE FOR ALL TECHNICAL QUESTIONS IS 03/20/12 AT
4:00 PM. ALL TECHNICAL QUESTIONS WILL BE ADDRESSED BY
ADDENDUM AFTER THE DEADLINE.

NOTICE TO PROCEED: THE SOLUTION IS TO BE INSTALLED AND
OPERATIONAL WITHIN 75 CALENDAR DAYS AFTER THE
NOTICE TO PROCEED IS RECEIVED. UNLESS OTHERWISE
SPECIFIED, THE FULLY EXECUTED PURCHASE ORDER.
WILL BE CONSIDERED NOTICE TO PROCEED.

LIFE OF CONTRACT: THE ANNUAL MAINTENANCE WILL BE ADDED
BY CHANGE ORDER AND EXTEND FOR A PERIOD OF ONE
(1) YEAR OR UNTIL SUCH "REASONABLE TIME" THEREAFTER
AS IS NECESSARY TO OBTAIN A NEW CONTRACT OR RENEW THE
ORIGINAL CONTRACT. THE "REASONABLE TIME" PERIOD SHALL
NOT EXCEED TWELVE (12) MONTHS. DURING THIS "REASONABLE
TIME" THE VENDOR MAY TERMINATE THIS CONTRACT FOR ANY
REASON UPON GIVING THE DIRECTOR OF PURCHASING 30 DAYS
WRITTEN NOTICE.

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	TELEPHONE	DATE
TITLE	FEIN	˙ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

State of West Virginia
Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER	PAGE
STO12007	3

ADDRESS CORRESPONDENCE TO ATTENTION OF

FRANK WHITTAKER
304-558-2316

RFQ COPY
TYPE NAME/ADDRESS HERE

VENDOR
SYCOM TECHNOLOGIES
1802 BAYBERRY CT.
SUITE 201
RICHMOND, VA 23226

SHIP TO
STATE TREASURER
MAIN CAPITOL BUILDING
SUITE E-145

CHARLESTON, WV
25305   304-343-4000

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
03/06/2012				

BID OPENING DATE:	04/10/2012	BID OPENING TIME	01:30PM

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT

UNLESS SPECIFIC PROVISIONS ARE STIPULATED ELSEWHERE
IN THIS CONTRACT DOCUMENT BY THE STATE OF WEST
VIRGINIA, ITS AGENCIES, OR POLITICAL SUBDIVISIONS, THE
TERMS, CONDITIONS, AND PRICING SET FORTH HEREIN ARE
FIRM FOR THE LIFE OF THE CONTRACT.

RENEWAL: THIS CONTRACT MAY BE RENEWED UPON THE MUTUAL
WRITTEN CONSENT OF THE SPENDING UNIT AND VENDOR,
SUBMITTED TO THE DIRECTOR OF PURCHASING THIRTY (30)
DAYS PRIOR TO THE EXPIRATION DATE. SUCH RENEWAL SHALL
BE IN ACCORDANCE WITH THE TERMS AND CONDITIONS OF THE
ORIGINAL CONTRACT AND SHALL BE LIMITED TO FOUR (4)
ONE (1) YEAR PERIODS.

CANCELLATION: THE DIRECTOR OF PURCHASING RESERVES THE
RIGHT TO CANCEL THIS CONTRACT IMMEDIATELY UPON WRITTEN
NOTICE TO THE VENDOR IF THE COMMODITIES AND/OR SERVICE
SUPPLIED ARE OF AN INFERIOR QUALITY OR DO NOT CONFORM
TO THE SPECIFICATIONS OF THE BID AND CONTRACT HEREIN.

OPEN MARKET CLAUSE: THE DIRECTOR OF PURCHASING MAY
AUTHORIZE A SPENDING UNIT TO PURCHASE ON THE OPEN
MARKET, WITHOUT THE FILING OF A REQUISITION OR COST
ESTIMATE, ITEMS SPECIFIED ON THIS CONTRACT FOR
IMMEDIATE DELIVERY IN EMERGENCIES DUE TO UNFORESEEN
CAUSES (INCLUDING BUT NOT LIMITED TO DELAYS IN TRANS-
PORTATION OR AN UNANTICIPATED INCREASE IN THE VOLUME
OF WORK.)

BANKRUPTCY: IN THE EVENT THE VENDOR/CONTRACTOR FILES
FOR BANKRUPTCY PROTECTION, THE STATE MAY DEEM THE
CONTRACT NULL AND VOID, AND TERMINATE SUCH CONTRACT
WITHOUT FURTHER ORDER.

THE TERMS AND CONDITIONS CONTAINED IN THIS CONTRACT

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	TELEPHONE	DATE
TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

State of West Virginia
Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER	PAGE
STO12007	4

ADDRESS CORRESPONDENCE TO ATTENTION OF:

FRANK WHITTAKER
304-558-2316

RFQ COPY	
TYPE NAME/ADDRESS HERE	

VENDOR
SYCOM TECHNOLOGIES
1802 BAYBERRY CT.
SUITE 201
RICHMOND, VA 23226

SHIP TO
STATE TREASURER
MAIN CAPITOL BUILDING
SUITE E-145
CHARLESTON, WV
25305   304-343-4000

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
03/06/2012				

BID OPENING DATE: 04/10/2012   BID OPENING TIME   01:30PM

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT

SHALL SUPERSEDE ANY AND ALL SUBSEQUENT TERMS AND
CONDITIONS WHICH MAY APPEAR ON ANY ATTACHED PRINTED
DOCUMENTS SUCH AS PRICE LISTS, ORDER FORMS, SALES
AGREEMENTS OR MAINTENANCE AGREEMENTS, INCLUDING ANY
ELECTRONIC MEDIUM SUCH AS CD-ROM.

REV. 01/17/2012

                    NOTICE

A SIGNED BID MUST BE SUBMITTED TO:

          DEPARTMENT OF ADMINISTRATION
          PURCHASING DIVISION
          BUILDING 15
          2019 WASHINGTON STREET, EAST
          CHARLESTON, WV 25305-0130

THE BID SHOULD CONTAIN THIS INFORMATION ON THE FACE OF
THE ENVELOPE OR THE BID MAY NOT BE CONSIDERED:

SEALED BID

BUYER: 44

RFQ. NO.:   STO12007

BID OPENING DATE: 04/10/2012

BID OPENING TIME: 1:30 PM

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	TELEPHONE	DATE
TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

State of West Virginia
Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER	PAGE
STO12007	5

ADDRESS CORRESPONDENCE TO ATTENTION OF:

FRANK WHITTAKER
304-558-2316

RFQ COPY
TYPE NAME/ADDRESS HERE

VENDOR

SYCOM TECHNOLOGIES
1802 BAYBERRY CT.
SUITE 201
RICHMOND, VA 23226

SHIP TO
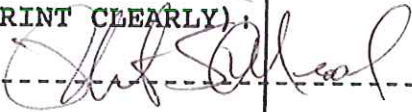
STATE TREASURER
MAIN CAPITOL BUILDING
SUITE E-145

CHARLESTON, WV
25305   304-343-4000

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
03/06/2012				

BID OPENING DATE:	04/10/2012	BID OPENING TIME	01:30PM

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT

PLEASE PROVIDE A FAX NUMBER IN CASE IT IS NECESSARY
TO CONTACT YOU REGARDING YOUR BID:

FAX#: 804-262-5157
- -
EMAIL PONEAL@SYCOMTECH.COM
CONTACT PERSON (PLEASE PRINT CLEARLY):

PHIL O'NEAL
- -

****** THIS IS THE END OF RFQ   STO12007 ****** TOTAL: "COST" ENVELOPE

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	TELEPHONE	DATE
TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

= SyCom
Connected.

Response to RFP # STO12007
Computer Network Infrastructure
WV State Treasurer's Office

SyCom Technologies

1802 Bayberry Ct.
Richmond, VA 23226

804-474-5240
804-262-5157 (fax)
Phil O'Neal, Account Manager
poneal@sycomtech.com

April 9, 2012

State of West Virginia
Department of Administration
Attn: Frank Whittaker, Purchasing Division
2019 Washington Street, East
Post Office Box 50130
Charleston, WV 25305-0130

April 9, 2012

Mr. Whittaker:

<mark>We at **SyCom Technologies** are excited as we look forward to the Oral presentation phase of this RFP.</mark> We will present how we will work closely with the Treasurer's office to deliver the solution that will exceed the expectations of the Virtual Server and SAN infrastructure refresh project. The following response meets all the requirements requested. We hope the information included will impress upon you that **SyCom** is clearly the right choice for a skilled, trusted, flexible and cost-effective partner for this project.

<mark>**SyCom's concise solution statement meets all the specification of the RFP with:**</mark> *a single VCE - OEM solution which is a collaborative initiative of three enterprise networking companies: VMware (V), Cisco(C) and EMC (E). The VCE manufacturer's model chosen to meet the specifications required by the WVSTO RFP is the VBlock 300 FX, which comes pre-mounted in a single cabinet. SyCom determined to use the VBlock chassis with the B200 UC servers, which are pre-racked at the factory and ready for the customized configuration process. Additional software licenses are also included to meet all of your desired specifications. SyCom has also included some post sale support services, which will be presented in more detail orally.*

SAN Solution:

- Redundant **8 Gpbs** fiber port connectivity; **Upgradable to 10Gbps Ethernet**;
- Supports up to **20,000 IOPS** for server vms; additional capacity to support an **8,000 IOPS** for desktop vms; plus the capacity to host **CIFS file shares of 3TB+**, with concurrent access up to 120 users.
- **25 TB** of useable capacity in the production configuration, divided into **17TB** for Server VMs, **5TB** for file shares, and **3 TB** for virtual desktops.
- **35TB** of useable capacity in the disaster recovery configuration, with **10TB in RAID-6**.
- **EMC** owns VMware software and development teams for both companies have recognized that **VMware vSphere and Site Recovery Manager integrates with EMC storage** and the EMC **Replication licenses are included**.
- **Data-at-rest encryption** is an option supported by the EMC solution.
- **Expansion capacity of 2x the provided storage is available by adding trays and disks only. No additional controllers, replication or snapshot licenses are required when adding disk arrays or hard drive disks to the provided EMC solution.**

= SyCom
Connected.

SAN Switches Solution:

- **Fiber Channel** protocol is being used between the SAN and Servers. Ethernet protocol over the FC switches capability is also included.

Servers Solution:

- **Seven (7) blade servers** are included at each site, **four (4)** to host the virtualized server and **two (2)** to host the desktop infrastructure platform, and provide a **single hot spare**.
- **100% SAS** hard drives are provided in the **production servers**, to meet IOPS requirements; a combination of **60% SAS** and **40% SATA** hard drives are provided at the **disaster recovery** site servers.

SyCom's ability to satisfy the requirements of the RFP?
SyCom has these certified technical engineering resources capable to design, configure, and deliver the proposed solution for the treasurer's office, under Section 2.3.3.

- 3 – **Cisco UC Server Certified Professionals**
- 10 – **Cisco UC Solution Certified Professionals**
- 9 – **Cisco Network Infrastructure Certified Professionals**
- 2 – **EMC Velocity Sales Engineers**
- 1 – **EMC VNX Technical Architect**
- 3 – **EMC VNX Implementation Engineers**
- 2 – **EMC RecoverPoint Replication Specialists**
- 3 – **EMC Clariion Implementation Quick Start Certifications**
- 3 – **EMC DataDomain Implementation Quick Start Certifications**
- 5 – **VMware Certified Professionals**
- 2 – **VMware Technical Sales Professionals**
- 3 – **Technical Solution Architects - VDI**

A complete picture of **SyCom's** technical engineering resources is provided on the org chart in section 2.3.1. A photo of the whiteboard design session is included behind page 12, in Section C.

Finally, the **SyCom** solution includes a 8x5 technical call center support agreement which provides Level 2 technical support, remote monitoring and alerting for the **SyCom** solution hardware..

We hope that you will feel the same sense of excitement about **SyCom** as we do: proud of our successful history but always growing and evolving. Our 500+ customers consistently rate us at 4.88 on a 5 scale in the Cisco customer satisfaction survey, yet we continue to improve by enhancing our Cisco practice, upgrading our Project Management Office, and investing in a new technical briefing center now providing live 24x7x365 technical support services.

Sincerely,

Phil O'Neal
Account Manager
SyCom Technologies

TABLE OF CONTENTS

Attachment A: VENDOR RESPONSE SHEET

Section 2.3 Qualifications and Experience

2.3.1 – Company and Staff

Since 1996, **SyCom** has earned a reputation as a unique firm in a fast-paced marketplace. Our Richmond-based company has been built from a technical base with a strong focus on providing high quality data center solutions while leveraging virtualization, server and storage optimization. **SyCom** collaborates with clients to consistently deliver high-quality integration projects on time and within budget. Innovation, attention to detail and integrity have been the cornerstones of **SyCom's** growth and success.
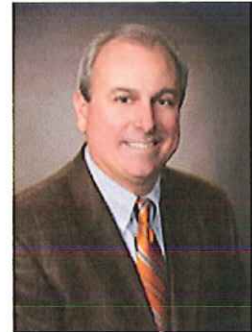
"Our business is about technology. But it's also about building lasting relationships with our clients."

Tom Cricchi
President/CEO
SyCom Technologies

We recognize the IT business environment is ever-changing and customers need to gain efficiencies by optimizing their data center environments. Properly designing and implementing a new state of the art storage area network at the Treasurer's office will provide the foundation for managed system growth. **SyCom's** experience as a system integrator with superior value-added services for public sector and commercial clients will be leveraged during this project. Our company's superior customer care and breadth of services have resulted in significant repeat business with customers, collaborating to make optimal use of technology today while planning for the future. Today, more than 450 Mid-Atlantic clients rely on **SyCom's** expertise to leverage their investment in technology and guide them into the digital world.

SYCOM PROFILE

Delivering excellence in network services is the common denominator of **SyCom's** business model. We do this in every stage of our client relationship, from inception to completion of the project life-cycle. We seek to become an integral partner supporting the state's business objectives, as we continue to do for so many other successful clients throughout the Mid-Atlantic region.

SyCom builds an in-depth profile and understanding of each customer's goals, targets and aspirations to create tailor-made IT services. This, combined with unrivalled product knowledge, engenders a spirit of trust and partnership paramount for any successful long-term relationship. Our mission statement clearly articulates our commitment to clients: **"To provide outstanding and memorable service in everything we do."** **SyCom** believes commitment to continuous improvement in the quality of all products and services is the key to long term customer relationships. Every individual within the SyCom organization is accountable for quality and for providing both internal and external customers with service that is complete, reliable and on time, every time.

SyCom believes that our service and technical support to our customers starts with hiring the best people. The **SyCom** engineering team has decades of experience and have successfully built and implemented solutions that have taken customers to the next levels of service and profitability. Complete end-to-end analysis, design, implementation and support of your data center, communication/collaboration, network, and security requirements – the very infrastructure of your organization – are what we do best.

Other attributes that support our systems integration team are:

- Our engineers are trained, experienced, and certified in the integration of a range of advanced technologies.
- Our broad, multi-disciplined, technical expertise enables us to provide a variety of solutions in the areas that are most important to your industry.
- We apply a consistent implementation process guided by a strong project management methodology.
- An intimate knowledge of existing and emerging technologies gained over hundreds of projects ensures the right solution for your organization.

At **SyCom** we pride ourselves in building "best of breed" solutions that will meet your current and future business objectives. In order to do this, we must have experience and insight into a broad range of vendor technologies and products that can be leveraged to meet your goals.

Our services portfolio features a broad offering of data center and networking solutions. The state can expect the highest level of quality and professionalism from the **SyCom** team of engineers. Our Cisco/EMC-based services include:

- Pre-Sales – architectural design, product review/demo, lab environment
- Product Procurement – ordering, staging, configuration and delivery
- Professional Services – design, testing, implementation, documentation
- Project Management – PMI certification, project plans, status reviews
- Support Services – monitoring, 24x7, managed services, MACs
- SmartNet Management – contract maintenance, quarterly true-ups

SyCom Technologies has stood tall during the technology boom and bust cycles over the last decade and has proven we can prosper during all economic conditions. With highly-skilled people focused on providing world-class IT services, SyCom has developed a loyal client base that counts on us to be responsive and reliable.

SyCom's five year vision is to remain true to our heritage as an infrastructure-based service provider and meet the challenges of the dynamic technology industry. We will transition from a "Technology Provider" to a "Business Solutions Provider" and expedite our clients' transformation to using technology as a business enabler and competitive advantage.

SyCom Technologies is a Limited Liability Corporation (LLC) and presently employs 120 people, the majority of which are in technical disciplines ranging from Desktop Support to senior level Network Architects and Project Managers. SyCom is a certified <u>Small Business</u> through Virginia's Department of Minority Business enterprise (Certification # S-6659).

Name:	SyCom Technologies, L.L.C.
Site:	www.sycomtech.com
Founded:	April, 1996
Location:	1802 Bayberry Court
	Suite 201
	Richmond, Virginia 23226
	Satellite offices in Roanoke, Norfolk, Tyson's Corner, recently Charleston, WV

Philosophy: SyCom Technologies is dedicated to providing successful business solutions through the effective use of information systems technology. We achieve these solutions by working in partnership with clients and by providing the necessary critical analysis, planning, implementation and support expertise to meet the challenges posed by today's heterogeneous environment. Inherent in our approach is positioning the client to leverage future technological growth and change.

SyCom's **Technology** Growth
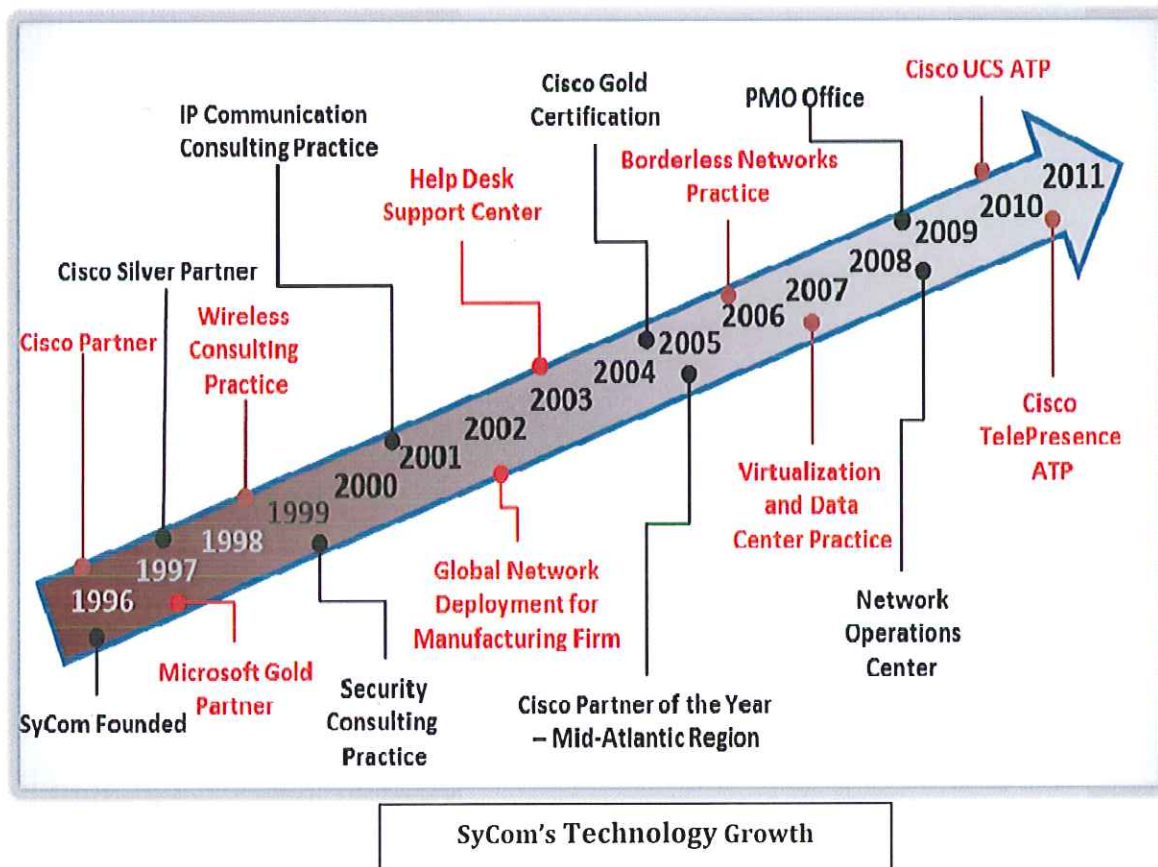
= **SyCom**
Connected.

2.3.1.1 - Engineer Organization Chart

```
                        ┌─────────────────┐        ┌──────────────────┐
                        │  Allen Jenkins   │────────│ Technical Solution│
                        │Director of       │        │ Architect         │
                        │Technology        │        │ Bill Sutton       │
                        └─────────────────┘        │ Citrix/MS         │
                                                    └──────────────────┘
```

Client/Server Solutions	Data Center Solutions	Unified Communications Solutions	Network Infrastructure Solutions	System Center Solutions
AJ acting PAM	Chris Lifsey PAM	Allen Hartman PAM	John Billups PAM	Chris Timberlake PAM
Rob Spitzer Principal Consultant SoVA MS Team Lead	Scott English	Bryan Nguyen	Aaron Storey	Chris Oswalt
Steve English	Aaron Margeson	Dave Caston	Scott Strickland	Brenda Jackson
Kevin Pomerleau	Steve Harris	Jay Nichols VDOT	Allen Surface	Turner Tilman
John Morris		Bill Smith Areva	Shannon Wyatt	Sarah Dawson
Mike Healy VDOT		James Vaughn	Tom Watkins	Josh Krodel
Robert Golmon		Michael Molla	Arnaud Juan	Rashid Sufi
Don Tweedie		Kim Haboush	Andrew Travis	
Tom Raisbeck Principal Consultant NoVA MS Team Lead		Bill Watts	Thomas Hopson	
Mike Canalini		Jeff Lamareaux		
Chip Blanks Principal Consultant Citrix Team Lead				
Travis Brooks				

Section 2.3: Qualifications and Experience

2.3.2 – References*

*Please contact SyCom prior to calling the references to allow SyCom the opportunity to extend the proper courtesies to our clients.

- Massey Energy Company

  Darrell Purcell
  804-405-2742
  Darrell.purcell@mwv.com

- Virginia Housing Development Authority

  AJ Mezynski
  804-343-5806
  AJ.Mezynski@VHDA.com

- Babcock & Wilcox Companies

  Chris Crickenberger
  434-522-6713
  Clcrickenberger@babcock.com

- Mary Washington HealthCare

  George Amols
  540-741-1884
  George.amols@mwhc.com

Section 2.3: Qualifications and Experience

2.3.3 – Certifications

Technical engineering resources at our company have the following expertise related to the proposed solution at the treasurer's office:

- 3 – Cisco UC Server Certified Professionals
- 10 – Cisco UC Solution Certified Professionals
- 9 – Cisco Network Infrastructure Certified Professionals
- 2 – EMC Velocity Sales Engineers
- 1 – EMC VNX Technical Architect
- 3 – EMC VNX Implementation Engineers
- 2 – EMC RecoverPoint Replication Specialists
- 3 – EMC Clariion Implementation Quick Start Certifications
- 3 – EMC DataDomain Implementation Quick Start Certifications
- 5 – VMware Certified Professionals
- 2 – VMware Technical Sales Professionals
- 3 – Technical Solution Architects - VDI

2.3.4 – Past Project Descriptions

Project One:
Locations: Massey Energy Company HQ, Richmond, VA
                 MEC DR site: Verizon Co-lo, Richmond, VA

SyCom Team:
|		
Account Manager:	Phil O'Neal	804-474-5240
Project Manager:	Tom Ball	804-474-5209
Client Reference:	Darrell Purcell, CIO	804-405-2742

Project type: **Servers, Storage Array Network, VMWare**

Project Goals and Objectives:

Massey Energy Company (MEC) accepted SyCom's recommendation, and met their objectives in 2010. Unfortunately, in June 2011, Alpha Natural Resources acquired MEC and proceeded to dismantle the Richmond headquarters and the DR co-lo data centers. SyCom served MEC for 16 years with a dedicated support office located in Charleston WV since 2000. Alpha Natural Resources closed the SyCom office in March 2012. SyCom is diligently working to re-open the Charleston office.

SEE the following enclosed solution documentation:
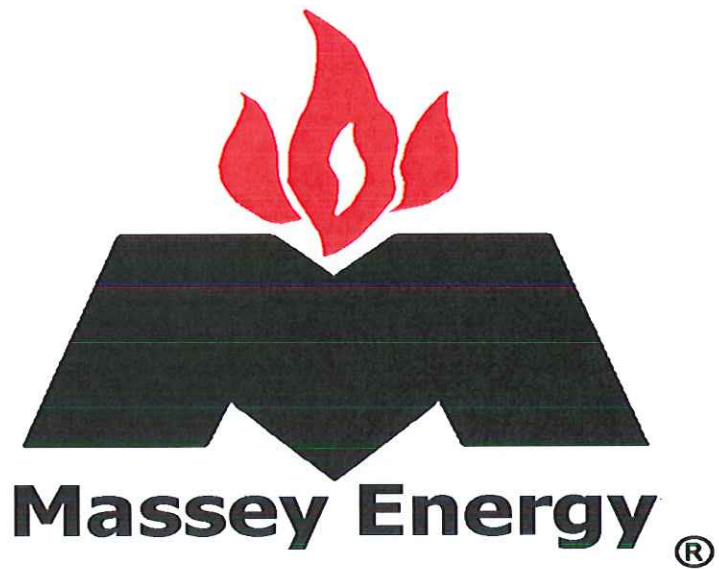
Massey Energy Company

Data Center Modernization Project

by:
SyCom Technologies

= SyCom
Connected.

June, 2010

Executive Summary

Massey Energy Company is the fourth largest coal company in the United States and operates mines throughout the Appalachian Mountains within the states of West Virginia, Virginia and Kentucky. Headquartered in Richmond, VA, Massey Energy Company relies heavily on its technology infrastructure to support its business operations. Massey's current technology infrastructure includes a 75 server network of both physical and virtual composition. Due to several business and technical requirements, Massey desires to develop and implement a datacenter strategy based on modern storage, server and virtualization technologies.

As a Microsoft Gold Partner, VMWare Authorized Consultant and HP Partner, SyCom works with customers to identify current state, desired state and a clear path to success. Our experienced team combines technical acumen with an understanding of customer business needs. The result is a solution that maximizes the customer's return on investment. This document describes our recommendations for datacenter modernization.

Background

SyCom and Massey Energy Company have a long standing business partnership in fulfilling Massey Energy Company's technology solutions. Recently, SyCom and Massey Energy Company met to discuss the desire to design and implement a datacenter strategy. The main drivers to this effort are the need to consolidate its technology resources to reduce costs through an infrastructure refresh, the need to have additional business continuity capabilities and the need to further its disaster recovery strategy. The following information forms the basis for the work identified in this document.

- Massey Energy Company has several existing SAN "islands"
- There are numerous physical servers which need to be replaced
- Some virtualization exists in the production environment
- There is a need to move data from direct attached storage to shared storage
- There is a need to have a more robust disaster recovery strategy in place in the near term

This document outlines the recommended datacenter strategy, architecture, and services offered by SyCom to meet the business and technical needs of Massey Energy Company.

Terminology

To better understand the proposed strategy and integration, there are several terms and acronyms that are used in the following sections. Many of these terms are listed here with a brief description. Should more detailed information and or explanation be required, please contact your SyCom Account Manager for more descriptive reference information.

- **Common Internet File System (CIFS)** – once referred to SMB, it is a network file system protocol used to access Windows file shares.
- **Network File Systems (NFS)** – a distributed file system and protocol used by Unix systems to share data.
- **SAN** – a storage area network that typically provides block level storage access and includes the storage array and interconnected via fiber channel or iSCSI data switches.
- **NAS** – the storage system that contains the cabinet of physical disks that provides file systems accessed via CIFS, or NFS
- **Storage Array** – the storage system that contains the cabinet of physical disks that is accessed via iSCSI or Fiber Channel protocols.
- **LUN (logical unit number)** - An identifier for a disk volume in a storage array.

- **Storage Virtualization** – aggregating storage (systems or disks) into a single logical unit without regard to the underlying storage.
- **Asynchronous Replication** – delayed replication of data at the block level between storage arrays
- **Snapshot** – a point-in-time copy of data.
- **Fiber Channel over IP (FCIP)** – standardized protocol for connecting two or more SANs using an IP network.
- **vSphere Infrastructure** – the VMware logical architecture that provides virtualized operating systems on VMware ESX servers.
- **Datacenter** – a logical collection of one or more Clusters.
- **Cluster** – a logical collection of VMware ESX servers, networks and storage that is treated as a single set of resources within a Data Center
- **Resource Pool** – a sub division of resources within the Cluster to run virtual machines.
- **VMotion** – the VMware technology that allows a running virtual machine to be moved from one ESX Server to another.
- **High Availability (HA)** – the VMware technology that monitors the ESX Servers in a Cluster and restarts virtual machines when there is a failure.
- **Distributed Resource Scheduler (DRS)** – the VMware technology that monitors performance in a Cluster and places virtual machines on the most appropriate ESX Server.
- **VMware vCenter** – the virtual infrastructure management console
- **ESX Server** – the VMware hypervisor that runs on a physical server and hosts the virtual servers
- **Datastore** – VMware VMFS formatted storage where virtual machines are stored. It is considered a Shared Datastore when on a Storage Array.
- **Storage Clustering** - allows consolidation of multiple storage nodes into pools of storage. All available capacity and performance is aggregated and available to every volume in the cluster. As storage needs increase the HP EVA SAN can scale performance and capacity on-line.
- **Thin Provisioning** - allocates space only as data is actually written without requiring pre-allocation of storage. This raises the overall utilization and efficiency of the SAN and ultimately increases the ROI.
- **Snapshots** - create thinly provisioned, instant point-in-time copies of data on a per-volume basis. Built in application integrated snapshots enable automated quiescing for Microsoft VSS-enabled applications like Windows Server 2003 and 2008. Administrators can access EVA SAN snapshots to recover individual files/folders from the volume, or rollback an entire volume to a prior state.
- **EVA** - HP StorageWorks Enterprise Virtual Array (EVA) disk arrays
- **StorageWorks Continuous Access EVA Software** - Protects valuable data by replicating from one HP EVA to another - providing advanced disaster recovery with ease of management.
- **StorageWorks Command View EVA Software** – A software tool used to discover, monitor and configure EVA disk arrays from a single Web-based console giving strong control over the HP Storage environment.
- **StorageWorks Business Copy EVA Software** – A software tool used to improve application availability and reduce the backup window for the HP EVA by combining management simplicity and advanced local replication technologies.
- **StorageWorks EVA Dynamic Capacity Management Software** - DCM provides a comprehensive solution that automates storage provisioning and improves capacity utilization for the HP EVA family.
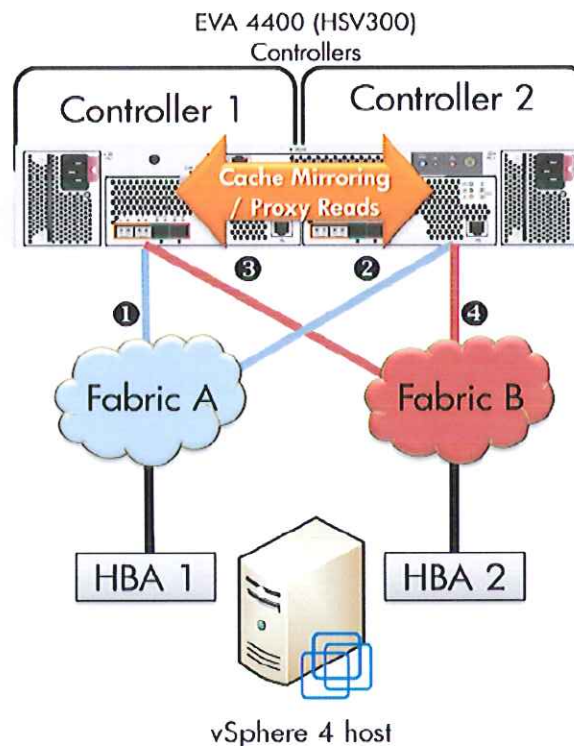
![SyCom Connected. logo]

Strategy and Architecture

In every strategy there exists a cornerstone or foundation architecture that allows the business and technical needs to begin to be met. In the architecture proposed in this datacenter modernization project for Massey Energy Company the foundation to be leveraged is storage and server consolidation.

Storage consolidation is the effort to take as much storage as possible in an environment and consolidate it into as few shared storage systems as possible. The storage to be consolidated can exist as local storage within a server, storage directly attached to the server and as SAN islands of storage that exist for a single purpose or application. While individual systems and applications would require their own physical storage device, the shared storage provides mechanisms to accomplish this from a single storage array.

Server consolidation is the effort to virtualize the applications, services and resources on the servers and consolidate them down to the fewest physical servers as recommended for a specific companies' environment. Previously, Massey Energy Company attempted to consolidate the applications onto fewer servers, but due to complexity, this proved to be nearly impossible. Server consolidation has taken on the form of virtualizing the servers onto a pool of server resources. While this doesn't reduce the number of server instances, it does greatly reduce the amount of server hardware required. Server consolidation through virtualization also takes advantage of consolidated shared storage. The overall architecture is represented in the following diagram:

EVA 4400 (HSV300) Controllers — Controller 1, Controller 2 — Cache Mirroring / Proxy Reads — Fabric A, Fabric B — HBA 1, HBA 2 — vSphere 4 host

Storage Consolidation

Recognizing that Massey Energy Company has a need for true block level storage and requires layered applications to provide local and remote replication has led SyCom to recommend an HP EVA fiber channel storage array. While there are many storage vendors that provide storage solutions, the HP EVA storage array provides many features either not found or that are limited in solutions from EMC, NetApp and IBM. Key features of the EVA platform include integrated support for:

Superior availability and disaster recovery

- **Continuous Access Software** enables compliance to Massey Energy Company's business continuity and regulatory goals. Using advanced replication technologies, information is protected from disaster or unplanned downtime. Continuous Access EVA offers both synchronous and asynchronous modes of data transfers. These two replication modes provide flexibility in recovery time and recovery point objective planning.
- **Business Copy Software** provides features like Vsnap, Snapclone and MirrorClone to support fast, non-disruptive point-in-time data copies. These allow Massey Energy Company to assign disk group and RAID membership to match protection levels to business value and improve application availability through non-disruptive restore of online volumes.

Scalable Performance

- **Dynamic Capacity Management Software (DCM)** provides a comprehensive solution that automates storage provisioning and improves capacity utilization for the EVA. DCM Software uses advanced automation to "right-size" the supported file system and the EVA virtual disk (Vdisk) storage volume to the needs of an application. This improves capacity utilization by allowing the administrator to simply specify a capacity utilization range for each Vdisk provisioning which reduces the resource cost of ongoing storage provisioning while allowing postponement of additional capacity purchases due to increased storage utilization. File systems and storage volumes are automatically expanded online as application needs increase, or shrink to reclaim unused capacity that can returned to the disk group for use by other applications.

Easy to manage SANs for virtualized environments

- **Command View EVA Software** provides Massey Energy Company with a centralized storage management console while automating and aggregating storage management. Provisioning capacity is simple, and it is possible to dynamically expand LUNs and add drives online without downtime. New Vdisks can be created, in addition to growth or shrinkage of LUNs all without downtime. This software also allows replication of data with snapshots for immediate use.

Storage Network Infrastructure

SyCom recommends the use of high-performance and high resiliency offered by the MDS 9134 Fabric Switch as the core of the storage area network. Fiber channel storage switching delivers advanced storage networking capabilities with "pay as you grow" port activation features. This switch provides line-rate 4Gbps and 10Gbps ports designed to support high-performance, high-density, enterprise-class availability. With the flexibility to optionally expand from 24 to 32 ports in 8-port increments or to activate the two, 10Gbps ports for higher performance, the MDS 9134 fabric switch is designed to offer the port and rack densities required for a top-of-rack switch in the datacenter and provides edge connectivity in enterprise SANs. The MDS 9134 is designed to offer non-blocking architecture, with 32, 4Gbps ports and the 2, 10Gbps ports all operating at full line rates concurrently. With the MDS 9134 there are no hidden license and software support charges for ISL trunking, extended distance support, security, real-time performance and event monitoring and virtual SANs. Designed for environments where downtime is not an option, the hot-pluggable design supports non-disruptive upgrades, VSANs for fault isolation, with redundant power supplies and PortChannels for ISL resiliency.

Also included in the proposed storage area network architecture is a pair of HP StorageWorks MPX200 routers which enable simultaneous iSCSI, FC and FCoE connectivity to the EVA resulting in increased storage consolidation and utilization. The MPX200 can also be used to provide 1 GbE, 10 GbE iSCSI to HP StorageWorks XP Arrays. The MPX200 includes FCIP functionality enabling Massey Energy Company to connect the HQ and DR SAN's for remote data replication over the Verizon WAN using HP StorageWorks Continuous Access EVA and XP Software.

Server Consolidation

In conjunction with the software component of virtualization, there is also a requirement of a properly sized, enterprise-ready server hardware infrastructure to host the consolidated virtual machines. HP has proven to be a valuable technology partner with Massey Energy Company and thus SyCom proposes that Massey Energy continue to invest in HP server solutions by purchasing an appropriate size and quantity of HP DL380 G7 servers. SyCom recommends that Massey Energy Company invest in a total 16 host servers to properly serve it's application environment based our engineering experience in supporting Massey's business needs over the past 13+ years.

Key aspects of the HP solution include:
- Dual processor, quad core capable
- Up to 192GB of memory
- Up to six expansion slots
- Multiple 1GB and 10GB Ethernet interfaces
- High efficiency (~90% efficient) power supplies
- Intelligent power and cooling to reduce power consumption
- Numerous built-in management and monitoring tools

Figure 1: vSphere Infrastructure

While there are numerous virtualization technologies available for server consolidation, VMware is the de facto industry standard. VMware's vSphere solution provides not only the ability to consolidate servers, but allows for a range of consolidation ratios that can be configured to meet the needs of any size business. SyCom proposes VMware vSphere Enterprise Plus as the best of breed virtualization solution that Massey Energy Company can deploy as the foundation of the server consolidation initiative. Key aspects of the VMware solution include:
- The ability to over commit memory resources when required.
- The ability to move running virtual guest machines between resources transparently to the end user.
- Support for numerous versions of Microsoft Windows and Linux operating systems.
- The ability to hot add and remove virtual hardware assigned to the virtual machine.
- Thin provisioning of virtual machine storage to reduce storage over allocation.
- Flexibility to add and remove server, storage and network resources to the infrastructure with little to no impact on availability.

Key features of the <u>VMware Enterprise Plus</u> version include:

- **8-way Virtual SMP™.** Enable a single virtual machine to simultaneously use up to 8 logical processors on your server (increased from 4 for VMware ESX/ESXi 3). With 8-way Virtual SMP even the most processor intensive software applications like databases and messaging servers can be virtualized.
- **Host Profiles.** Establish standard configurations for VMware ESX/ESXi hosts and automate compliance to these configurations, simplifying operational management of large scale environments and reducing errors due to misconfigurations.
- **Resource pool access control and delegation.** Secure resource allocation at different levels in the company. For example, when a top-level administrator makes a resource pool available to a department-level use, all virtual machine creation and management can be performed by the department administrator within the boundaries assigned to the resource pool.
- **vNetwork Distributed Switch**: Aggregate virtual networking across many ESX hosts and even clusters. These are all capabilities of the vNetwork Distributed Switch:
  - **Centralized virtual network management**. Simplify provisioning and administration of virtual networking through a centralized interface. Create and manage a single distributed switch with distributed virtual port groups than span a Datacenter wide array of ESX/ESXi hosts.
  - **Support for Private VLANs**. Simplified setup and monitoring of Private VLANs, segmenting network traffic easily in shared environments
  - **Network VMotion**. Retain network runtime state centrally as virtual machines live migrate from server to server in shared DRS clusters; simplifying network troubleshooting and monitoring.
  - **Bidirectional Network Traffic Shaper**. Enhance virtual machine traffic prioritization and management through bidirectional rate limiting
  - **Third Party Distributed Virtual Switches**. Enable monitoring and control of your virtual networking environments through the familiar interfaces of third party networking tools, with the capability to plug in third party software virtual switches such as the Cisco Nexus 1000V.

Nexus 1000V

For those familiar with VMware ESX prior to vSphere 4.0, you know that networking was often a source of confusion and misconfiguration. While virtualization in general is an industry changing evolution in computing and business infrastructure, the convergence of historically independent silos in the data center creates new challenges. The convergence and challenges created were especially evident in the networking aspect of the virtual machines.

In typical data centers, the network administrator was responsible for configuring the network only to the physical ESX hosts and the VMware administrator was responsible for configuring the networking properties of the actual virtual machines. While this may be acceptable for the initial configuration, the network administrator was not aware that the application servers were changing physical locations on the ESX hosts (vMotion). This would lead to situations were the primary database server was now on the network with a web server profile including security, QoS, monitoring, etc. Obviously, this was a concern for the business. There needed to be a way to associate the network profile at the virtual machine level instead of just the physical ESX host level. For vSphere 4.0, VMware released Virtual Distributed Switches that addressed these concerns. The Virtual Distributed Switch allows the network administrator to take back control of the networking profiles at the application server level regardless of where the application server physically resides.

In a tight collaborative project with VMware, Cisco jointly developed the <u>Nexus 1000V Virtual Distributed Switch</u> that plugs into VMware vCenter. This solution allows the network administrator to "see" a Nexus switch in each VMware cluster. Now, the management and configuration of the virtual machine's network settings are similar as if they were still running on physical servers allowing the network administrator to work within their expertise, i.e. networking, and the VMware administrator to work within their expertise while maintaining the security and business rules the organization has standardized. Because the Nexus 1000V Virtual Distributed Switch appears as a physical Nexus switch to the network administrator, all of the organizations investment in training and management tools is preserved.
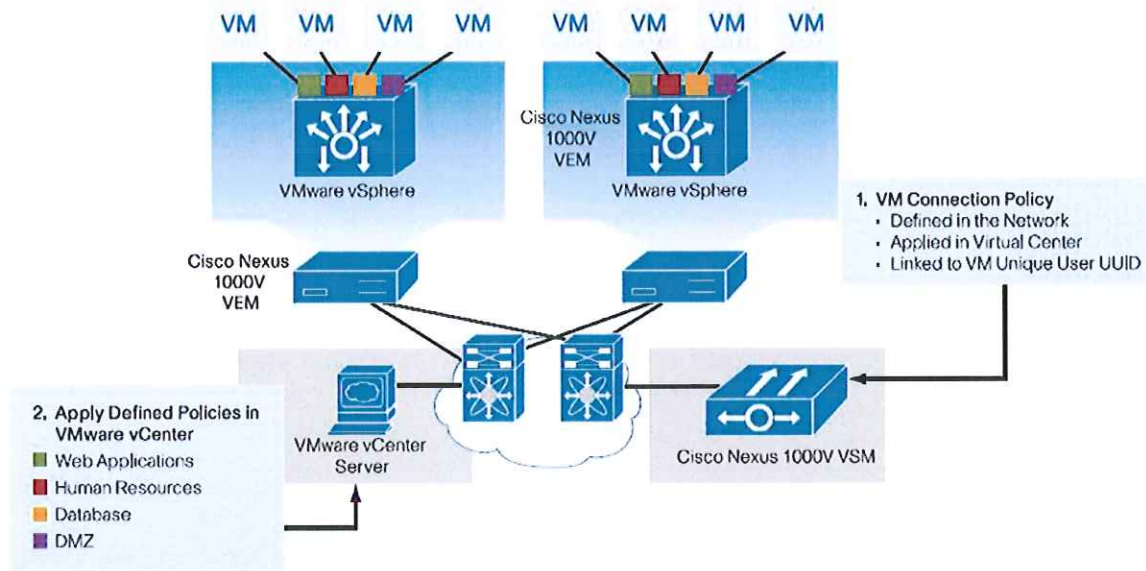
Figure 2: Policy-Based VM Connectivity

From the VMware administrator's perspective, they just simply pick a network profile from a drop down box when they create a new virtual machine according to the role of the new VM (web server, database server, workstation, etc.). Forever gone are the days of manually coordinating the configuration of each ESX host's virtual switch to ensure proper communication. Again, this allows both administrators to work within their comfort zones while maintaining the integrity of the network and business rules.

Figure 3: Mobility of Network and Security Properties

Business Continuity & Disaster Recovery

As a natural extension of the server and storage consolidation efforts, many organizations also desire to leverage both in order to extend the strategy for business continuity and disaster recovery. Massey Energy Company has determined that such a strategy is important for their organization as well.

Once the storage and server consolidation solutions are in place, business continuity can be maximized by leveraging the features of vSphere such as High Availability, Distributed Resource Scheduling and VMotion. These features work in concert with each other to transparently move virtual machines across the vSphere infrastructure when a resource constraint, component failure or planned downtime (maintenance) occurs within the vSphere Infrastructure.
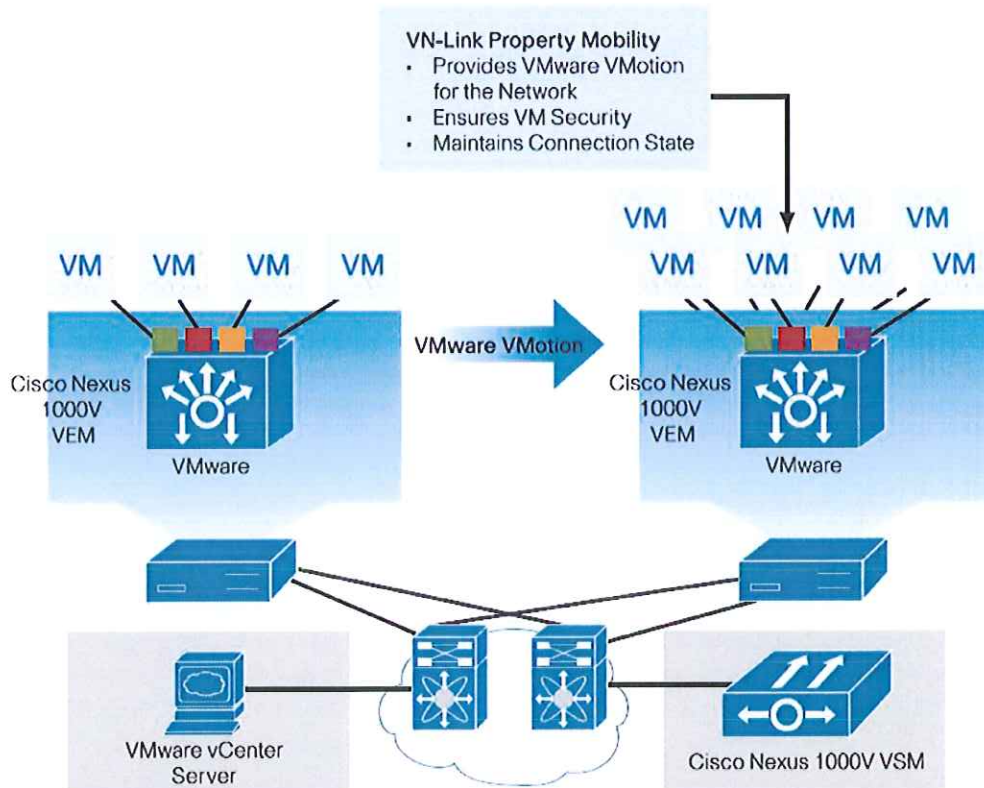
For the storage consolidation solution, the component level redundancy within the HP EVA array such as dual storage processors, multiple fiber channel ports for host access, mirrored cache for data cache and uninterruptable power supplies ensure the storage remains accessible.

To achieve a solution for resource recovery in a disaster, the same server and storage consolidation solutions can be duplicated in a redundant data center and configuring the vSphere infrastructure to span both sites. By having a mirrored environment, the virtual machines and other shared data can be replicated between sites.

Replication can occur asynchronously over the existing IP network between storage arrays. SyCom recommends that Massey Energy implement asynchronous replication using HP Continuous Access and Business Copy installed on the EVA 4400 storage array.

Distributed Resource Scheduling

A key feature of <u>VMware Enterprise Plus</u> is Distributed Resource Scheduling (DRS). This feature allows you to align your IT infrastructure with your business goals by dynamically allocating and balancing computing resources. VMware DRS continuously monitors utilization across resource pools and intelligently allocates available resources among virtual machines according to business needs. It is in this proposal to provide support of "any server anywhere" mobility, which can be used to move servers across the VMware infrastructure during peak load times (such as month end close) or to allow maintenance on a server with no user downtime.

VMware DRS continuously balances computing capacity in resource pools to deliver the performance, scalability and availability not possible with physical infrastructure. VMware DRS allows you to:

- Improve service levels for all applications. VMware DRS continuously balance capacity will ensure that each virtual machine has access to appropriate resources at any point in time.
- Easily deploy new capacity. VMware DRS will seamlessly take advantage of the additional capacity of new servers added to a resource pool by redistributing virtual machines without system disruption.
- Automate planned server maintenance. VMware DRS can automatically migrate all virtual machines off physical servers to enable scheduled server maintenance with zero downtime.
- Dramatically increase system administrator productivity. Enable system administrators to monitor and effectively manage more IT infrastructure.

NetBackup 7.0

NetBackup 7.0 will be installed and configured to back up all of the physical and virtual servers. The following is a high-level overview of new features in the latest NetBackup 7.0 release.

Includes native deduplication within the NetBackup client and allows customers to increase the speed of backups in remote offices, the data center, and virtual environments.
- Built-in client-side deduplication improves physical & virtual backups speeds by up to 10x
- Software-based deduplication reduces costs by up to 70% versus appliance approaches
- Integrated client and target-side deduplication provides more coverage with fewer tools
- Manage and improve the performance of 3rd party deduplication appliances using OpenStorage

Simplifies virtual server data protection by standardizing backup of Hyper-V and VMware.

- New VMware data protection improves speed by 50% and reduces storage by up to 40%
- Only NetBackup offers instant file recovery from any type of VMware or Hyper-V backup
- Complete deduplication across all virtual and physical systems regardless of backup method
- No backup or recovery compromises for customers who backup directly to tape

Ensure rapid and easy recovery of critical applications and backup data at other sites with integrated replication features.
- Recover terabytes of application data in seconds from anywhere at any point-in-time
- Efficiently manage and move up to 80% less data between different sites with optimized replication
- Unified analytics and reporting reduces recovery risk across locations and backup products

Provides centralized console for integrated reporting, monitoring, alerting and management for multiple backup and archive domains.
- Better predict backup and archiving storage consumption
- Analyze risk and quantify exposure and assess the recoverability of clients and applications
- Easily track backup success rates by backup application across the entire organization
Expanded Support for Windows Server and Applications
- NetBackup 7 fully supports Windows 2008 R2, Vista/XP/Windows 7, and Storage Server 2008
- NetBackup 7 offers full backup and recovery support for Exchange 2010 DAG environments and Exchange 2003

Site Recovery Manager

To reduce the amount of hands on tasks that need to occur in the event a disaster response is required, SyCom recommends that VMware Site Recovery Manager (SRM) be incorporated in the DR solution. VMware SRM is a Windows application that plugs into VMware vSphere to automate failover of virtual servers between vSphere infrastructures. Once the failover plan is configured by an administrator, it can be activated by the administrator in the event of a disaster. Upon being activated, SRM works in conjunction with HP EVA replication and vSphere to perform the requested tasks.
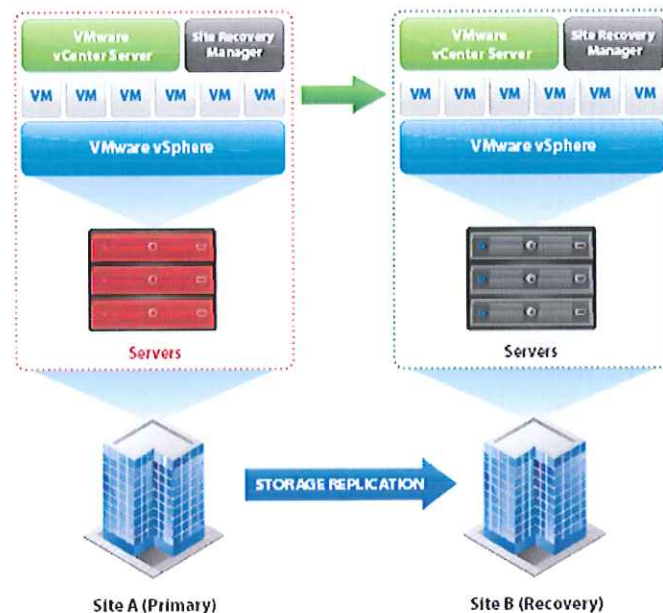
Site Recovery Manager manages and automates failover and recovery of virtual machines

Figure 4: Logical SRM Failover

SRM allows you to accelerate recovery and ensure successful recovery by automating the recovery process and eliminating the complexity of managing and testing recovery plans. VMware vCenter Site Recovery Manager eliminates complex manual recovery steps and removes the risk and worry from disaster recovery. VMware

vCenter Site Recovery Manager guides users through the process of building, managing and executing disaster recovery plans. It integrates seamlessly with VMware Infrastructure and VMware vCenter Server to make recovery plans significantly easier to manage and update. By automating recovery, VMware vCenter Site Recovery Manager eliminates error-prone manual steps in the recovery process and ensures that recovery procedures will be consistently executed as intended. VMware vCenter Site Recovery Manager also makes it easy to execute non-disruptive tests of recovery plans within an isolated testing environment so that you can ensure that they are up to date and will execute successfully.

Key aspects of the VMware Site Recovery Manager solution include:
- Administrator defined failover tasks including virtual machine in order startup and reconfiguration
- Non disruptive failover testing.
- Integration with various storage replication technologies including EVA Continuous Access.
- Integration with VMware vSphere Infrastructure.
- Accelerate recovery for the virtual environment through automation
- Ensure reliable recovery by enabling non-disruptive testing
- Simplify recovery by eliminating complex manual recovery steps and centralizing management of recovery plans

Exchange 2010

SyCom recommends a parallel installation of Exchange 2010 and a migration of all HQ mailboxes to this new infrastructure. With new deployment and storage options, enhanced inbox management capabilities, and e-mail archiving built-in, Exchange Server 2010 helps lower costs and enhance reliability. Exchange Server 2010 includes new features including new integrated e-mail resiliency, archive and discovery functionality, new user features to battle inbox overload and improvements that simplify administration:

- New integrated archiving and discovery capabilities.
- New unified mailbox resilience model that provides high availability, disaster recovery, and back up capabilities.
- Ability to easily delegate administration to specialized users, such the help desk or a compliance officer.
- Comprehensive information protection capabilities—from e-mail moderation to automatic e-mail encryption.
- A consistent inbox, calendaring, and contacts experience across the PC, browser and phone.
- An improved Outlook Web Access environment with more features, speed and browser support.
- Integrated conversation view bringing together information across all folders, inbox and sent and deleted items.
- Ability to remove (or "mute") themselves from irrelevant conversations with the click of a button.
- Mail Tips to notify users about potential mistakes before they send e-mail.

Project Overview

Based upon the number of technology solutions proposed in this document the SyCom recommends a two-part project approach. The following are descriptions and high level summaries of the services work to translate the proposed solution architecture into reality:

Part 1 – Richmond Data Center Server and Storage Consolidation

- Receive acceptance sign-off from Massey Energy Company representative.
- Oversee Davis & Green installation of the Liebert UPS for server migration power protection.
- Install and configure:
    o HP MDS 9134 fiber channel switch infrastructure.
    o MPX 200 storage router.
    o EVA 4400 storage array.
    o DL380G7 servers and vSphere Infrastructure
    o VMware Virtual Center Console.
    o Physical to virtual application server migrations.

- o   Exchange 2010 servers; two Enterprise version, one Standard version
- o   Symantec Netbackup 7.0 backup software.
- Migrate all identified stand alone data to the HP EVA SAN solution.
- Perform functionality and server backup/recovery testing
- Move live users and data to the new systems

Part 2 – Disaster Recovery Site Server and Storage Consolidation Implementation

- Install and configure:
  - o   HP MDS 9134 fiber channel switch infrastructure.
  - o   MPX 200 storage router.
  - o   EVA 4400 storage array.
  - o   DL380G7 servers and vSphere Infrastructure
  - o   VMware Virtual Center Console.
  - o   Physical to virtual application server migrations.
- Confirm the critical systems and data to be replicated.
- Confirm data sizes and change rates.
- Install and configure Continuous Access and Business Copy including replication of the identified data.
- Install and configure VMware SRM including failover plans.
- Perform functionality and server backup/recovery testing

Each part of the project has an enclosed itemized statement of work and line item configuration bill of materials. This approach provides Massey Energy the flexibility to refresh the Richmond production server and storage infrastructure and the Disaster Recovery location's infrastructure in two stages. SyCom recommends the implementation of both phases simultaneously to ensure hardware and software versions are identical through completion. A two step lease/purchase option has been considered in the proposed project's pricing.

SyCom
Connected.

Massey Energy Company

Quote: Virtual Servers; Switches; Storage; Exchange 2010 Breakdown
HP EVA Storage Solution

Part Number	Description	QTY
G7 Servers & Software		
583914-B21	HP DL380G7 Chassis, 6F	16
587498-L21	HP X5680 DL380G7 FIO Kit	16
587498-B21	HP X5680 DL380G7 2nd Kit	16
534562-B21	HP 1GB Flash Backed Cache	16
500658-B21	HP 4GB PC3-10600R-9 Kit	128
418367-B21	146GB 10K SAS 2.5" Hard Drive	48
AK344A	HP 81Q Single-Port PCIE 8GB FC Server Adapter	32
AF556A	HP Nema 5-15 Power Cord	32
512327-B21	HP 750Watt CS HE Power Supply Kit	32
CTG-27165	Cables to Go 25ft Cat6e Gigabit Patch Cable Snagless - White	64
		Virtual Server Hc
579237-B21	DL360G7 Chassis	1
588074-L21	HP E5506 DL360G7 FIO Kit	1
500656-B21	HP 2GB PC310600R-9 Kit	3
462968-B21	HP 256MB P-Series cache Upgrade	1
462969-B21	HP 650Mah P-Series Battery	1
532068-B21	HP DL360 SATA DVD-RW Kit	1
460355-B21	250GB 5.4K SATA 3.5" Hard Drive	2
AJ764A	HP 82Q Dual-Port PCIE 8GB FC Server Adapter	1
503296-B21	HP 460Watt HE 12V Hotplug AC Power Supply	1
AF556A	HP Nema 5-15 Power Cord	2
		Virtual Server Management Cons
VS4-ENT-PL-AK-C-A	Vmware vSphere 4 Enterprise Plus for 8 CPU w/Vcenter =16 + 2	2
VS4-1KT-BUN-C	Vmware vSphere 4 Enterprise Plus for 1 CPU w/N1000V	16
VC-SRM4-C-A	Vmware Site Recovery Manager 4 - 1 CPU - HQ 11 host only	22
*Could be included in EA Symantec NetBackup Lic Symantec	Enterprise Upgrade per Host Server w/unlimited Guest Servers (Upgrade from existing Std server client to Enterprise Client)	14
		Virtual Se
		Servers HW & S
Maintenance		
HA104A3-Opt. 7G3	3 Yr DL380G7 HP Carepack Support Upgrade	16
HA104A3-Opt. 7G2	3 Yr DL360G6 HP Carepack Support Upgrade	1
VS4ENTPLAK3PSSSC	3 Yr Vmware 24x7 Support v 4 Enterprise Plus for 8 CPU =16	2
VS4-NK1-BUN-3P-SSS-C	3 Yr Vmware vSphere 4 Enterprise Plus for 1 CPU w/N1000V	16
VC-SRM4-3P-SSS-C	3 Yr Vmware 24x7 Support Site Recovery Manager 1 CPU	22
Symantec	1 Yr Netbackup Enterprise Upg License Maintenance & Support	14
Symantec	2 Yr Netbackup Enterprise Upg License Maintenance & Support	28
Symantec	(Credit for Std maintenance Upg prorated 4/1/2010 - 12/31/2010)	

Massey Energy Company

Quote: Virtual Servers; Switches; Storage; Exchange 2010 Breakdown
HP EVA Storage Solution

Part Number	Description	QTY
		Virtual Server
Services		
SE Services Fixed Price	SE Services HQ Standup Installation	1
SE Services Fixed Price	HQ Migrate 33 servers from physical to VM servers	1
SE Services Fixed Price	SE Services HQ revisit Computer room weekend breakdown	1
SE Services Fixed Price	SE Services DR Standup Installation	1
SE Services Fixed Price	DR Migrate 8 servers from physical to VM servers	1
		Virtual S
MDS9123 Switch Upgrades for MDS9124 & UPS		
AG875A	HP MDS9134 32-port Active Fiber SAN Switch	2
AE379A	HP MDS9000 4GB FC SFP 4pk Short Range XCVR	16
T5171A	HP MDS9124 8-port Upgrade License	2
CTG33038	CTG 15m Multi-mode OM3 LC/LC FC cable	46
WS-C3750G-24T-S	Cisco 3750 24 20/100/1000T Std Multi-layer Image	2
CISCO-N1K-C	Nexus 1000V Virtual Switch SW non-bun w/E+	16
Q01308407	Liebert 10kVA UPS with PD-103	1
		Switch
Maintenance		
HA110A3	HP 3 Yr Support Plus 24 SVC	1
Opt.699	HP Internal T5171 A (2)	2
HA110A3	HP 3 Yr Support Plus 24 SVC	1
Opt.7KV	Cisco MDS Fabric Switch Support for AG647A (1)	2
CON-SNTP-375024TS	Cisco 24x7x4 SMARTNET 3750G 24TS 1 Year	6
CISCO-N1K-3P-SSS-C	3 yr SMARTNET 24x7 Nexus 1000	16
		Switches
Services		
SE Services Fixed Price	HQ SE Services Switch MDS9134; 3750G & UPS	1
SE Services Fixed Price	DR SE Services Switch MDS9124	1
Davis & Green	Richmond Electrical Services - UPS Hardwire to Panel	1
		Swi
Storage w/Software	**EVA 24TB Raw**	
AG637B 0D1	HP EVA4400 Dual Controller Array	2
AG638B 0D1	HP M6412-A Fiber Channel Drive Enclosure	16
AJ872B 0D1	HP EVA M6412A 600GB 15k Fiber Channel Hard Disk Drive	80
AP771A 0D1	HP MPX200 Multifunction Router 1Gbe Base	2
AJ718A 0D1	HP 8Gb Short Wave FC SFP+ 1 Pk	4
AF002A	HP Universal Rack (matches existing HP rack in computer room)	2
AF002A 001	Factory Express Base Racking	2
248929-B21	HP Rack 10000 series Carbon Baying Kit	1
AF054A	HP 10642 G2 Sidepanel Kit	1
252663-D72 0D2	HP 24A High Voltage Modular PDU	4
AF593A	HP 3.6m C19 Nema L6-20P NA/JP Pwr Crd	6
T5486BAE	HP Continuous Access EVA4400 Unlimited E-LTU	2

Massey Energy Company

Quote: Virtual Servers; Switches; Storage; Exchange 2010 Breakdown
HP EVA Storage Solution

Part Number		Description	QTY
T5497BAE		HP Command View EVA4400 Unlimited E-LTU	1
TA801AAE		HP CV+BC+DCM SW Bundle EVA4400 E-LTU	1
TA766A		HP MPX200 Half Chassis FCIP License	2
AJ835A		HP 2m MM OM3 LC/LC FC Cable	8
T5505FAE		HP SmartStart for EVA v3.2 E-Media Kit	2
			St

Maintenance

HA110A3		HP 3 Year Support Plus 24 SVC	1
Opt.13F		EVA4400 Dual Controller JW Support	2
Opt.13J		EVA 450-1TB HDD HW Support	80
Opt.13N		CV EVA Unlimited LTU SW Support	1
Opt.13W		CA EVA Unlimited SW Support	2
Opt.1LQ		MPX200 Multifunction Router Base Support	2
Opt.1P0		CV+BC+DCM SW Bundle EVA4400 LTU	1
Opt.9DS		EVA M6412A FC Drive Enclosure Support	16
			Storage

Services

SE Services Fixed Price		SE Services HQ Storage	1
HA113A1	5JQ	HP EVA Rack Installation	2
HA114A1	58D	HP EVA Options Installation	2
HA124A1	5G1	HP CA for EVA Level 1 Tier 1 SU	2
HA124A1	5G2	HP CP I&S BC-Level 1 Tier 1	1
HA124A1	53A	HP EVA SAN Level 1 Tier 1 SU	2
SE Services Fixed Price		SE Services DR Site Storage	1
			Sto

Exchange 2010

105200709	Symantec Netbackup Agent for Exchange 2010	5
		Exchange 2

Maintenance

105200709 to be changed	Symantec Netbackup Agent for Exchange 2010	5
OLP - no Maintenance		

Services

SE Services-RIC	Upgrade to Exchange 2010 add-on vs Exc2007 virtualization	1
		Exchange 2

2.3.4 – Past Project Descriptions

Project Two:

Locations: Virginia Housing Development Authority, Richmond, VA
             VHDA DR site: Cox Road Co-lo, Richmond, VA

SyCom Team:
Account Manager: David D'Surney   804-474-5211
Project Manager: Tom Ball   804-474-5209
Client Reference: A.J. Mezynski, CIO   804-343-5806

Project type: **EMC VNX Storage Array Network, Data Domain B/U, VMWare**

Project Goals and Objectives:

Virginia Housing Development Authority had near term- objectives to replace an existing Hewlett-Packard (HP) EVA storage array system that would focus on the following benefits:
- **Increase capacity**
- **Improve performance**
- **Enhance reliability**
- **Better infrastructure integration with Cisco and VMware**
- **Provide scalability**
- **Expand management capabilities**

SyCom designed, configured, and implemented an EMC/Data Domain solution that met all of these objectives. The details of the project that are enclosed provides the details of SyCom knowledge, depth and strengths in enterprise Data Center solutions.

SEE the following enclosed solution documentation:

2.3.5 Sub-Contractors

The SyCom proposal **does not include any sub-contractors**; however SyCom storage specialists will be on-site along with the VCE storage specialists at the time of delivery to assist the WVSTO staff with the connectivity process.

Proposal

Virginia Housing Development Authority

SAN and Storage Implementation Statement of Work

Document Revision January 11, 2012

Richmond Office

SyCom Technologies

1802 Bayberry Court
Richmond, Virginia 23226

www.sycomtech.com

In Partnership With:

EMC²
where information lives*

Restrictions on Use and Disclosure

The information contained in this document constitutes trade secrets and commercial and/or financial detail that is either confidential or privileged in nature. It is furnished to VHDA in confidence with the understanding that it will not, without written permission from SyCom, be disclosed to any third party.

The restriction does not limit VHDA's right to use or disclose this information if obtained from a source, other than SyCom, without restriction.

Executive Summary

VHDA wishes to implement a new EMC Storage solution to replace the existing Hewlett-Packard EVA 8000 and EVA 6000 storage arrays and improve the overall quality and reliability of their data stores. SyCom's proposed solution includes the implementation of an EMC VNX 5500 system at VHDA Headquarters and an additional VNX 5500 at the VHC facility. Each system is configured with a combination of solid state drives (EFD) and high speed SAS drives to furnish the capability to "tier" and prioritize data based upon defined business requirements. The new EMC solution will take advantage of the existing Cisco MDS Fiber Switches. Key production data will be replicated, bi-directionally, between the two locations with the EMC RecoverPoint solution.

Also proposed is the use EMC's DataDomain appliance to significantly improve backup efficiency and replicate backup data between the Headquarters and VHC sites.

VHDA's near-term objectives with the Storage Refresh project are focused on implementing a solution which will replace the Hewlett-Packard EVA 8000 and EVA 6000 and deliver the following benefits:

- Increase the available storage capacity of SAN-based data for both the production and development environments
- Improve application performance based upon storage pooling capabilities, FAST cache and solid state drives
- Enhance the reliability, performance and management of back-up processes with the use of de-duplication and SAN Media Server abilities
- Better integration of the storage resources into the existing VMware and Cisco infrastructures (such as new VMware APIs to offload backend hypervisor processing to storage array)
- Provide the scalability to meet increasing storage requirements from upcoming business initiatives (SharePoint, eDOCS, LOS\Lender Portal, Lawson ERP, HCVP, VDI)
- Expand system management capabilities with EMC UniSphere such as providing holistic management of all storage and extension into VMware environment

While not specifically addressed under this Statement of Work, VHDA's longer-term objectives are to transition to a high available, fault tolerant networking environment which will furnish the capability for Disaster Recovery. These long-term goals are significant for this project because the proposed SAN solution will be the initial platform for accommodating VHDA's evolving Disaster Recover objectives.
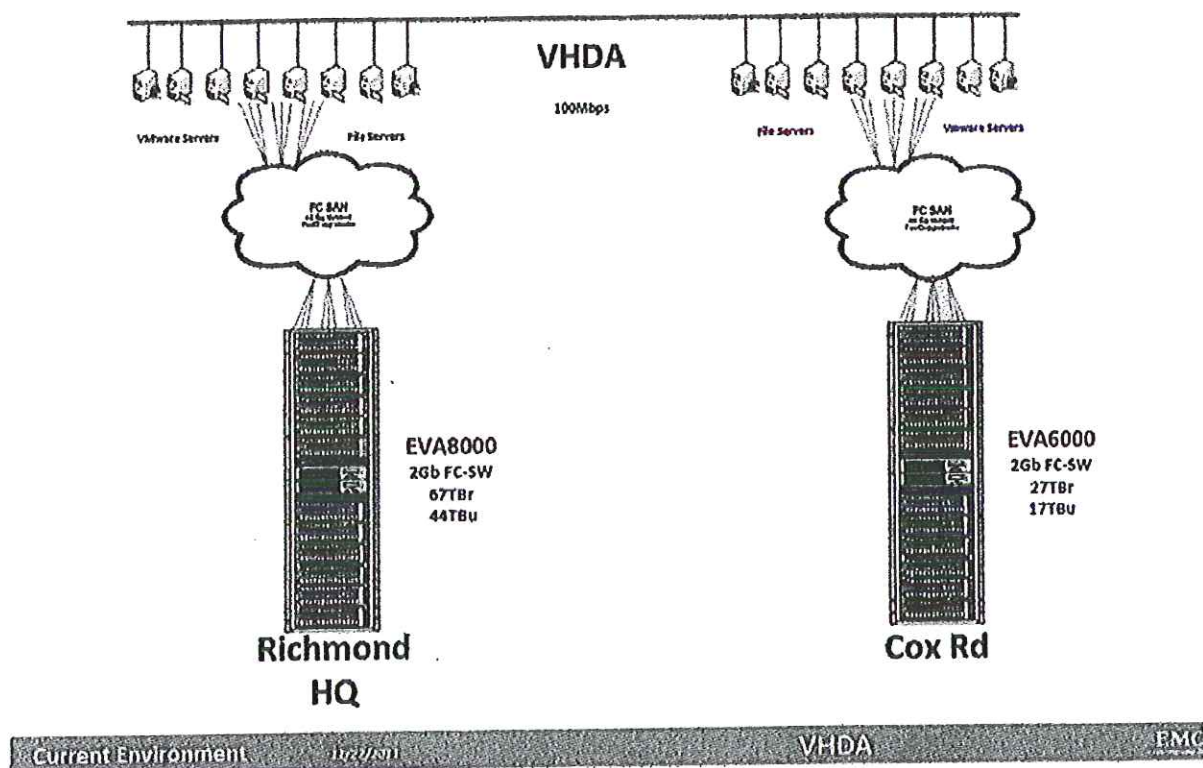
To meet their Business Continuity and Disaster Recovery objectives, VHDA's desire is to transition to a "Tiered" model for both business critical applications and their associated data pools, where business data is classified and managed based upon its criticality to business operations. As illustrated in the sample matrix below, the EMC VNX solution will allow VHDA to eventual classify data based upon commonly accepted Best Practices.

Alignment Attributes Scheme		Specification	Tier 1	Tier 2	Tier 3	Tier 4
Primary Storage	Guaranteed Performance	Performance throughput per port (I/O sec)	5,000+	Up to 5,000	Up to 3,500	Up to 1,500
		Response time (ms)	< 8ms	7-14ms	12-30ms	12-30ms
	Availability	Maximum unplanned downtime per year (mins)	< 26.5	< 26.5	< 525	< 263
Archiving Storage	Performance	Response time	< 1 second	1 second	24 hours
		Throughput	< 300 Mbps	< 200 Mbps	< 80 Mbps
	Availability	Maximum downtime (yr)	< 5.25 mins	< 52.56 mins	< 175.2 hours
	Retention & Disposition	Retention period	< 30 years	< 10 years	< 5 years
		Data shredding compliance	Yes	No	No
	Accessibility	Read / annual access frequency	< Hourly	< Hourly	Daily
	Data Integrity	Guarantee of authenticity	Yes	No	No
	Offsite	Recovery point objective	< 1 minute	< 24 hours	< 30 hours
Operational Recovery	Recovery Classification	Recovery classification	Complete app restore	Complete app restore	File or file system restore	File or file system restore
	Operational Recovery Pt Obj	Amount of data loss	1 hour	24 hours	24 hours	30 days
	Operational Recovery Time Obj	Time required for recovery	< 30 minutes	30 minutes	7 GB/minute	10 GB/minute
	Recoverability	Ability to recover backed up data	100%	100%	95%	85%
	Retention period	Length of time data is retained	2 hours	24 hours	3 weeks	1 month
Disaster Recovery	Disaster Recovery Pt Obj (RPO)	Amount of data loss	0 minutes	< 4 hours	24-48 hours	24-72 hours
	Disaster Recovery Time Obj (RTO)	Time req'd to restore data	< 2 hours	< 12 hours	< 48 hours	< 72 hours

One of the most critical phases of any project is the initial discovery of the current environment and the customer expectations for the new environment. SyCom will work closely with VHDA in collecting all the necessary data, analyzing the output, presenting recommendation and agreeing on a final design. SyCom will then develop and deliver for approval a Detailed Implementation Plan for this project.

VHDA Current SAN Infrastructure

VHDA

100Mbps

VMware Servers   File Servers

File Servers   VMware Servers

FC SAN

FC SAN

EVA8000
2Gb FC-SW
67TBr
44TBu

EVA6000
2Gb FC-SW
27TBr
17TBu

Richmond HQ

Cox Rd

Current Environment   VHDA   EMC

VHDA New SAN Infrastructure
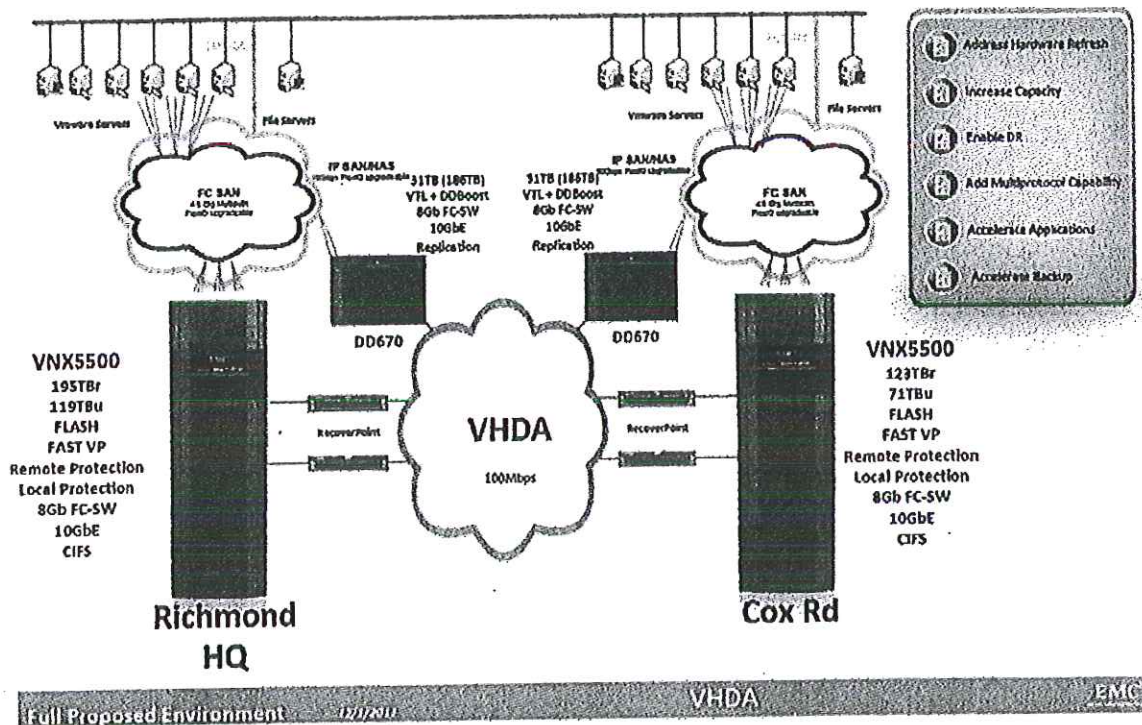
Project Scope

The Staff of VHDA and experienced SyCom services personnel will work closely together to perform the tasks and activities necessary to ensure the success of this engagement. During this engagement, the VHDA\SyCom team will:

- Determine the engagement process and schedule.
- Gather the information required for the engagement.
- Verify that the environment meets all hardware and software requirements.
- Develop a detailed Architectural Design
- Create a Detailed Implementation Plan
- Schedule install /implementation times
- Perform the SyCom Implementation within the VHDA's environment as defined in this document.
- Document the configuration.
- Perform the tests in the *Test and Acceptance Plan*.
- Provide the applicable documentation to the VHDA.
- Conduct knowledge transfer to VHDA personnel

VNX 5500 Installation

Based on the previous tasks, Project Discovery and Pre-Host Migration , personnel from the VHDA\SyCom will perform, where applicable, the following tasks related to the implementation, configuration and testing of the EMC VNX 5500 at each location:

- Rack Mount VNX Systems
    - Unboxing and racking equipment
    - Cable VNX 5500 per EMC recommended configurations
    - Power up array\control stations\data movers
    - Configure array with appropriate installation assistant
    - Perform code upgrade for File
    - Perform code upgrade for Block
- Verify and correct if necessary the following

- o Storage Processor IP addressing scheme
- o FC Port Settings
- o Read/Write Cache settings
  - High/Low watermarks
  - Size of Read/Write Cache
  - Page Size
- o Access Logix Setting
- o Unisphere Analyzer configuration
- Create Raid Groups\Raid Pools, LUNs, and Storage Groups
- Configure Reserved LUN Pool for SnapView
- Configure Reserved LUN Pool for SnapSure
- Create monitoring template and verify call home
- Data totaling 38TB will be migrated from the existing EVA 8000 array at Headquarters to the replacement VNX5500 array within the same site
- Data totaling 23TB will be migrated from the existing EVA 6000 array at VHC to the replacement VNX5500 array within the same site
- Data migration will be performed using a combination of both block and file based replication solutions to include RoboCopy, MirrorView, SanCopy and VMware Storage vMotion
- Headquarters Host Presentation - Migration preparation includes preparing storage presentation between 16 existing hosts to the fiber channel switch infrastructure and the newly deployed storage array and creating any required LUNs to support the migration
- VHC Host Presentation - Migration preparation includes preparing storage presentation between 8 existing hosts to the fiber channel switch infrastructure and the newly deployed storage array and creating any required LUNs to support the migration
- Identify storage group's and\or LUNs with VHDA to test migrations and validate migration procedure before beginning phase I migrations
- Develop migration plan and prepare test plan as required for customer acceptance testing
- All migrations will be performed in accordance with VHDA's defined schedules. Migration process will be a joint effort between VHDA and SyCom personnel and typically include the following processes:

- o VM Migration
    - Connection of VMware environment into EVA and VNX storage environments
    - Presentation of data stores to VMware
    - Live time migration of VMs using Storage VMotion on a per server basis
- o Data Migration
    - Host Readiness – application of appropriate firmware, upgrades, EMC utilities
    - Migration on a per host basis of host and associated LUNS in a synchronous or asynchronous process (depending upon outage allowances). This will be done using Block Level and File Level migration utilities.
- SyCom Engineering team will conduct basic functional overview of the migration process, with the expectation of VHDA personnel participating or owning any part of the data migrations

RecoverPoint Installation and Implementation

SyCom and EMC personnel will work closely with VHDA staff to perform the following services for the implementation of the RecoverPoint appliances at Headquarters and VHC:

- Ensure that the environment and operational implementation requirements (hardware, software, and infrastructure) are met by VHDA, and provide VHDA with a list of required or beneficial updates.
- Install and configures a RecoverPoint solution, which includes the following components:
    - o Concurrent local and remote (CLR) replication.
- Install four RecoverPoint Appliances (RPA) total:
    - o Two RPAs clustered at VHDA HQ facility
    - o Two RPAs clustered at VHDA VHC facility
- Install the RecoverPoint client software on up to two servers.
- Performs all necessary SAN work, which may include:
    - o Configuring an array-based splitter solution on VNX storage array.
        Or
    - o Configuring host-based splitter K-drivers solution on an existing Windows server.
    - o Performing all necessary zoning changes.

- Perform all necessary configurations on the clustered RPAs via RecoverPoint Deployment Manager.
- Build and document the proposed architecture, using data from the Configuration Guide.
- Configure RecoverPoint local and remote replications, including consistency groups and replication jobs:
  - o Up to four consistency groups total (local and remote sites).
  - o Up to 20 LUNs total (local and remote sites).
  - o Up to 40 TB of data.
- Complete and deliver the Configuration Guide.
- Validate the Implementation using the Test Plan.
- Verify the installation and/or configuration results.
- Review the EMC Implementation for RecoverPoint acceptance testing requirements with the VHDA-assigned resource(s).
- Provides VHDA with the applicable documentation specified in the "Materials" section below.
- Conducts a basic product Functional Overview to familiarize VHDA with the implemented RecoverPoint appliances, demonstrating the normal operations as installed in VHDA's environment.

DataDomain Installation and Implementation

SyCom and EMC personnel will work closely with VHDA staff to perform the following services for the implementation of the DataDomain 670 appliances at Headquarters and VHC:

- Ensure that the environment and operational implementation requirements (hardware, software, and infrastructure) are met, and provide VHDA with a list of required or beneficial updates.
- Plan and estimate schedule for the installation and configuration tasks for the Services.
- Conduct a Customer kick-off meeting.
- Validate that the equipment is on-site at the appropriate location with power and cable requirements met.
- Provide assistance to rack and stack the Data Domain appliance.
- Connect LAN cables to the Data Domain appliance.
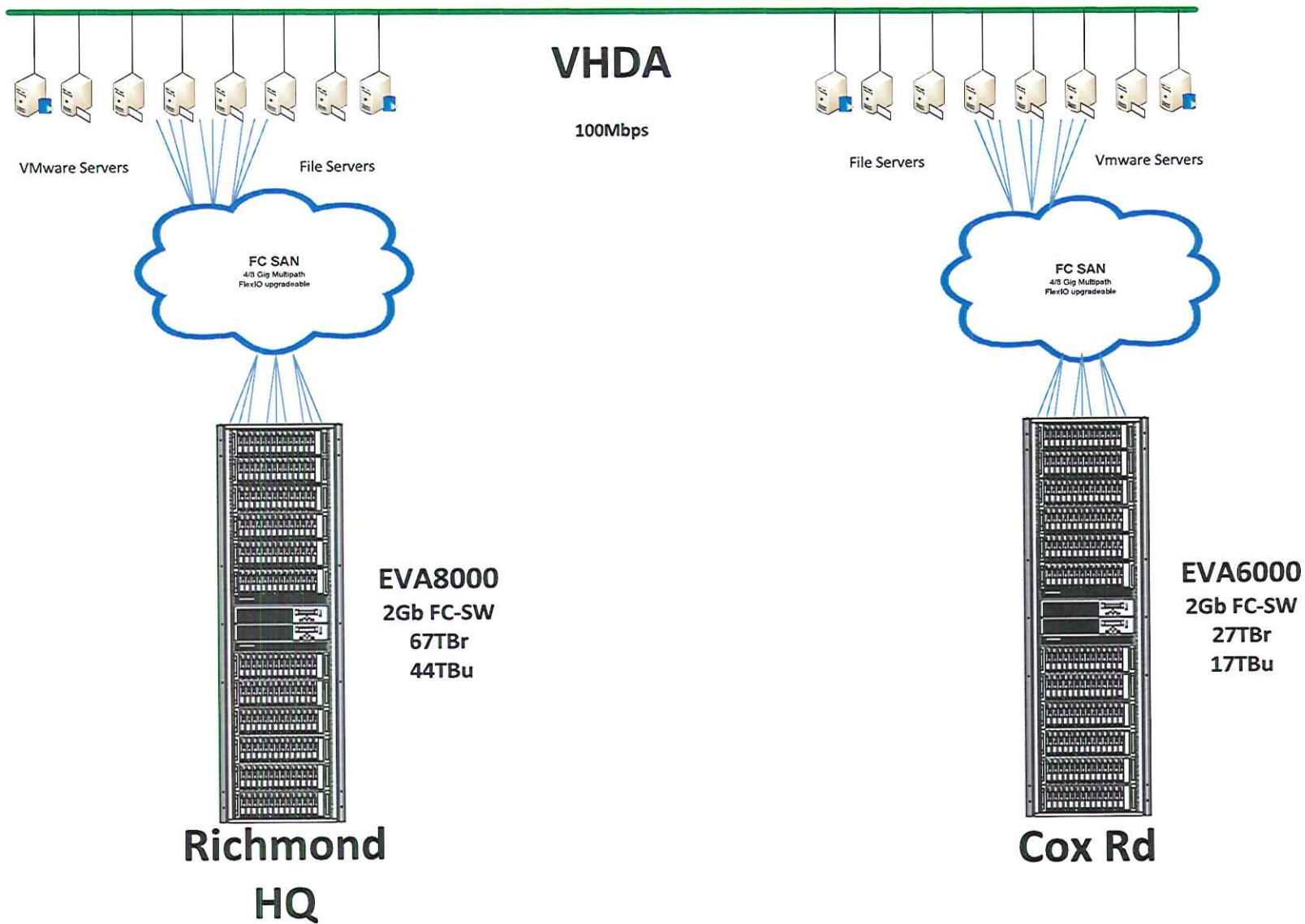- Connect power cables to the Data Domain appliance.

- Perform an initial Data Domain system configuration.
- Configure Data Domain purchased software license
- Configure system administration for auto support and alerts.
- Verify and configure LAN connectivity.
- Configure data access for CIFS and/or NFS shares.
- Verify Data Domain auto support and alerts, sending and submitting customer support ID information.
- Provide assistance in racking and stacking the Data Domain expansion disk shelves.
- Connect power cables to the Data Domain expansion disk shelves.
- Cable expansion disk shelves to the Data Domain appliance.
- Expand new storage into the Data Domain appliance file system.
- Demonstrate additional capacity is recognized by the Data Domain storage system.
- Configure up to three Mtrees.
- Configure data movement policies on all applicable Mtrees.
- Document the implementation, detailing engagement notes and configuration information.
- Perform, complete and deliver the tests in the *Test Plan* for VHDA.
- Conduct a basic *Functional Overview* of the implemented Data Domain environment for knowledge transfer.

Deliverables

Documentation, Functional Review and Acceptance
- Finalize and submit complete project documentation of deployed solutions to include a full architectural drawing of storage infrastructure and data placement
- Conduct functional overview to include knowledge transfer with the customer on the use and management of the deployed EMC solutions
- Project closeout and customer sign-off
- *Detailed Implementation Plan* as defined in the *Project Scope* section above
- Test and Acceptance Plan, which includes a basic Functional Overview to demonstrate installed / implemented service capabilities
- Configuration Guide documenting the implementation and final SAN infrastructure layout

VHDA

100Mbps

VMware Servers **File Servers**

File Servers **Vmware Servers**

FC SAN
4/8 Gig Multipath
FlexIO upgradeable

FC SAN
4/8 Gig Multipath
FlexIO upgradeable

EVA8000
2Gb FC-SW
67TBr
44TBu

EVA6000
2Gb FC-SW
27TBr
17TBu

Richmond HQ

Cox Rd

10GbE

Vmware Servers

File Servers

10GbE

Vmware Servers

File Servers
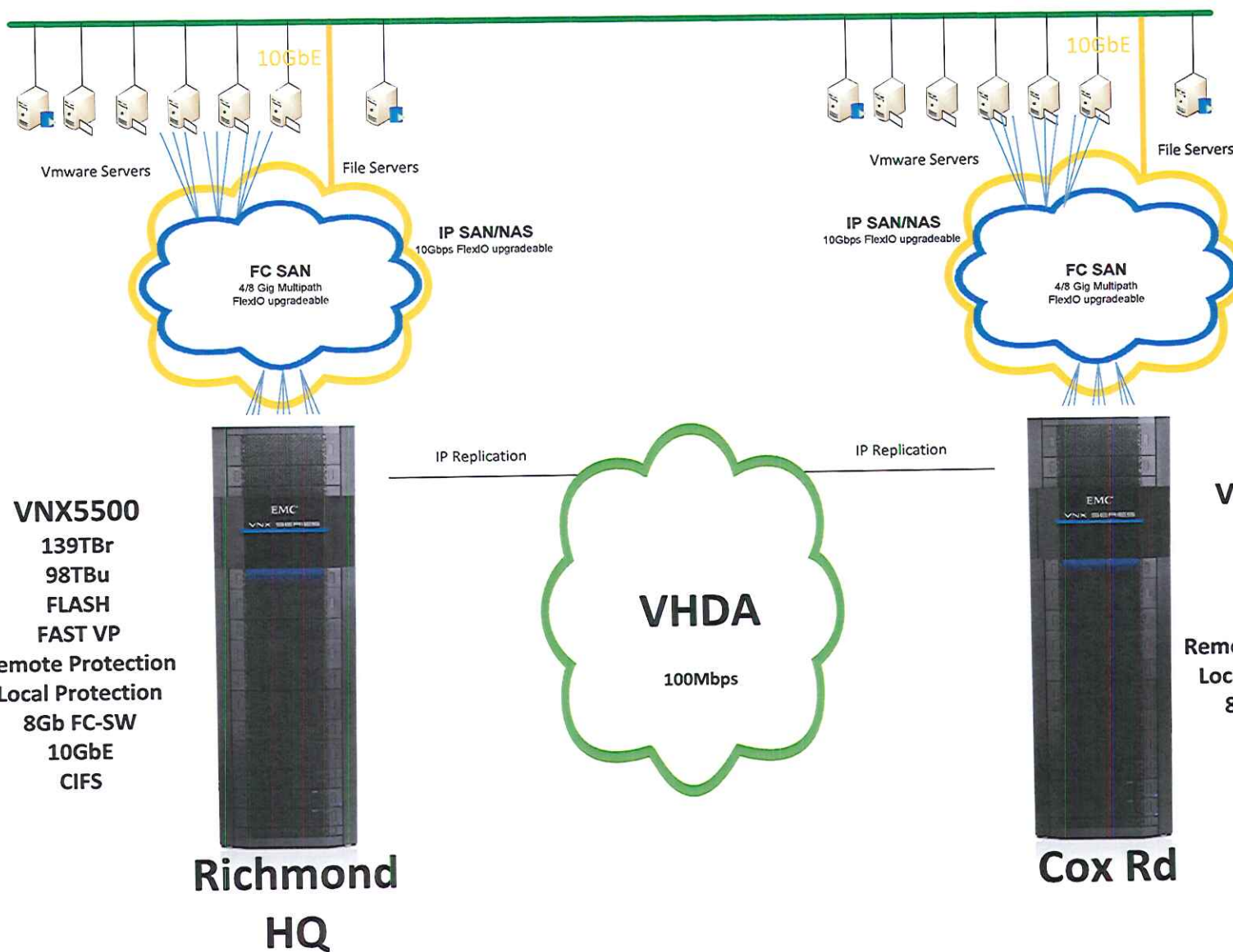
Address Hardware Refresh

Increase Capacity

Add Multiprotocol Capability

Accelerate Applications

Accelerate Backup

FC SAN
4/8 Gig Multipath
FlexIO upgradeable

IP SAN/NAS
10Gbps FlexIO upgradeable

31TBu (186TB)
VTL + DDBoost
8Gb FC-SW
10GbE
Replication

31TB (186TB)
VTL + DDBoost
8Gb FC-SW
10GbE
Replication

IP SAN/NAS
10Gbps FlexIO upgradeable

FC SAN
4/8 Gig Multipath
FlexIO upgradeable

DD670

DD670

VNX5500
139TBr
98TBu
FLASH
FAST VP
Remote Protection
Local Protection
8Gb FC-SW
10GbE
CIFS

VHDA

100Mbps

VNX5500
71.4TBr
49TBu
FLASH
FAST VP
Remote Protection
Local Protection
8Gb FC-SW
10GbE
CIFS

Richmond
HQ

Cox Rd

Base + Backup Environment   *11/22/2011*

VHDA

EMC²
where information lives

Richmond HQ

VNX5500
190TBr
124TBu
FLASH
FAST VP
Remote Protection
Local Protection
8Gb FC-SW
10GbE
CIFS

Cox Rd

VNX5500
122TBr
80TBu
FLASH
FAST VP
Remote Protection
Local Protection
8Gb FC-SW
10GbE
CIFS

VHDA
100Mbps

RecoverPoint

DD670

IP SAN/NAS
10Gbps FlexIO upgradeable
31TB (186TB)
VTL + DDBoost
8Gb FC-SW
10GbE
Replication

FC SAN
4/8 Gig Multipath
FlexIO upgradeable

Vmware Servers

File Servers

10GbE

- Address Hardware Refresh
- Increase Capacity
- Enable DR
- Add Multiprotocol Capability
- Accelerate Applications
- Accelerate Backup

VIRGINIA HOUSING DEVELOPMENT AUTHORITY

Attn:	AJ Mezynski
Phone:	804.343.5806
Email:	aj.mezynski@vhda.com

Quote#: VHDA EMC VNX5500 with Incentive 122211msl

Qty	Description	Part Number	List Price	Ext. List Price
	VNX5500 Unified w/RP - HEADQUARTERS			
1	VNX5500 DPE; 15X3.5 DRIVE SLOTS-EMC RACK	VNX5500DP15	$15,141.00	$15,141.00
1	VNX 40U RACK WITH CONSOLE	VNXRACK-40U	$2,922.00	$2,922.00
10	VNX 15X3.5 IN 6GB SAS EXP DAE -EMC RACK	VNX6GSDAE15	$4,104.00	$41,040.00
1	VNX CONTROL STATION-EMC RACK	VNXCS	$0.00	$0.00
1	VNX 2ND CONTROL STATION-EMC RACK	VNXCS2	$2,276.00	$2,276.00
2	VNX 1GBASE-T DM MODULE 4 PORT	VDMM1GCUA	$1,739.00	$3,478.00
2	VNX 10GBE 2 OP MODULE (2 SFP+)	VDMMXG2OPA	$5,217.00	$10,434.00
1	VNX5500 ADD ON DATA MOVER+FC SLIC-EMC RACK	VNX5500DM	$5,598.00	$5,598.00
1	VNX5500 DME: 1 DATA MOVER+FC SLIC-EMC RACK	VNX5500DME	$0.00	$0.00
69	600GB 15K 520BPS 6GB SAS 3.5 CARRIER	VX-VS15-600	$1,505.00	$103,845.00
34	100GB 6GB SAS FLASH DRIVE	VX-VS6F-100	$4,375.00	$148,750.00
50	3.5 IN 3TB 7200RPM DISK DRIVE FOR 6GSDAE-15	VX-VS07-030	$1,905.00	$95,250.00
1	3.5 IN 600GB 15K VAULT PACK FOR 6GSDAE-15/15 drive DPE	V-VX-VS1560	$6,020.00	$6,020.00
1	CAB QUAD POWER CORD US TWISTLOCK	PW40U-60-USV	$800.00	$800.00
1	DOCUMENTATION KIT FOR VNX5500	VNX55-KIT	$0.00	$0.00
4	GEN4 RPA FOR VNX5500; VNX5700; VNX7500	VNX-RPHW5-G4	$10,160.00	$40,640.00
1	VNX 4 PORT 8G FC IO MODULE PAIR	VSPM8GFFEA	$4,348.00	$4,348.00
1	ADDITIONAL 8 G SFP FOR VNX5500	VNXFCSFP	$696.00	$696.00
1	DPA REPLICATION ANALYSIS: VNX5500(BLOCK)	456-103-621	$0.00	$0.00
1	Replication Manager: VNX5500	456-005-708	$0.00	$0.00
1	UNISPHERE FOR UNIFIED FOR A VNX-5500	UNIU-V55	$19,304.00	$19,304.00
1	BASE FILE LICENSE (CIFS AND FTP) FOR VNX5500	BASEP-V55	$0.00	$0.00
1	ADV FILE LICENSE (NFS; MPFS AND PNFS) FOR VNX5500	ADVP-V55	$0.00	$0.00
1	TOTAL EFFICIENCY PACK FOR VNX5500	EPAK-V55	$70,240.00	$70,240.00
1	VNX OE LICENSE MODEL FOR VNX5500	VNXOE-55	$0.00	$0.00
151	VNX OE PER TB HIGH CAPACITY FOR VNX5500;5700;7500	VNXOECAPTB	$471.00	$71,121.00
47	VNX OE PER TB PERFORMANCE FOR VNX5500;5700;7500	VNXOEPERFTB	$1,091.00	$51,277.00
1	RECOVERPOINT SE-FIXED	PS-BAS-RPSE	$10,850.00	$10,850.00
1	PREMIUM SOFTWARE SUPPORT	M-PRESW-001	$48,354.00	$48,354.00
1	PREMIUM HARDWARE SUPPORT - WARR UPG	WU-PREHW-001	$42,929.00	$42,929.00
				$795,313.00
	VHDA - VNX5500 Unified - VHC			
1	VNX5500 DPE; 15X3.5 DRIVE SLOTS-EMC RACK	VNX5500DP15	$15,141.00	$15,141.00
1	VNX 40U RACK WITH CONSOLE	VNXRACK-40U	$2,922.00	$2,922.00
6	VNX 15X3.5 IN 6GB SAS EXP DAE -EMC RACK	VNX6GSDAE15	$4,104.00	$24,624.00
1	VNX CONTROL STATION-EMC RACK	VNXCS	$0.00	$0.00
1	VNX 2ND CONTROL STATION-EMC RACK	VNXCS2	$2,276.00	$2,276.00
2	VNX 1GBASE-T DM MODULE 4 PORT	VDMM1GCUA	$1,739.00	$3,478.00
2	VNX 10GBE 2 OP MODULE (2 SFP+)	VDMMXG2OPA	$5,217.00	$10,434.00
1	VNX5500 ADD ON DATA MOVER+FC SLIC-EMC RACK	VNX5500DM	$5,598.00	$5,598.00
1	VNX5500 DME: 1 DATA MOVER+FC SLIC-EMC RACK	VNX5500DME	$0.00	$0.00
37	600GB 15K 520BPS 6GB SAS 3.5 CARRIER	VX-VS15-600	$1,505.00	$55,685.00
18	100GB 6GB SAS FLASH DRIVE	VX-VS6F-100	$4,375.00	$78,750.00
33	3.5 IN 3TB 7200RPM DISK DRIVE FOR 6GSDAE-15	VX-VS07-030	$1,905.00	$62,865.00
1	3.5 IN 600GB 15K VAULT PACK FOR 6GSDAE-15/15 drive DPE	V-VX-VS1560	$6,020.00	$6,020.00
1	CAB QUAD POWER CORD US TWISTLOCK	PW40U-60-USV	$800.00	$800.00
1	DOCUMENTATION KIT FOR VNX5500	VNX55-KIT	$0.00	$0.00
1	VNX 4 PORT 8G FC IO MODULE PAIR	VSPM8GFFEA	$4,348.00	$4,348.00
1	ADDITIONAL 8 G SFP FOR VNX5500	VNXFCSFP	$696.00	$696.00

Qty	Description	Part #	Unit Price	Extended
1	UNISPHERE FOR UNIFIED FOR A VNX-5500	UNIU-V55	$19,304.00	$19,304.00
1	BASE FILE LICENSE (CIFS AND FTP) FOR VNX5500	BASEP-V55	$0.00	$0.00
1	ADV FILE LICENSE (NFS; MPFS AND PNFS) FOR VNX5500	ADVP-V55	$0.00	$0.00
1	FAST SUITE FOR VNX5500	FSTS-V55	$27,147.00	$27,147.00
1	REMOTE PROTECTION SUITE FOR VNX5500	RPS-V55	$19,492.00	$19,492.00
1	VNX OE LICENSE MODEL FOR VNX5500	VNXOE-55	$0.00	$0.00
100	VNX OE PER TB HIGH CAPACITY FOR VNX5500;5700;7500	VNXOECAPTB	$471.00	$47,100.00
26	VNX OE PER TB PERFORMANCE FOR VNX5500;5700;7500	VNXOEPERFTB	$1,091.00	$28,366.00
1	PREMIUM SOFTWARE SUPPORT	M-PRESW-001	$35,609.00	$35,609.00
1	PREMIUM HARDWARE SUPPORT - WARR UPG	WU-PREHW-001	$24,266.00	$24,266.00
				$474,921.00

	VHDA - DD670 - HEADQUARTERS			
1	SYSTEM; DD670+1ES32;44TB;NFS;CIFS	DD670-1E32	$178,000.00	$178,000.00
1	SYSTEM; DD670; 12TB; NFS; CIFS	DD670-12TB-B	$0.00	$0.00
1	SYSTEM; DD670; NFS; CIFS	DD670	$0.00	$0.00
1	OPTION; ES20 STORSHELF;32 TB; DUALCTRL	C-E32-DC-B	$0.00	$0.00
1	OPTION;DD670 CAP EXP KIT; 36TB TO 76TB	C-670AUP76T-B	$0.00	$0.00
4	POWER CORD; NORTHAMER;120V;5-15P;C13;6FT	PC-NA120V-6	$0.00	$0.00
1	OPTION; DD670 ADD ES EXP KIT; DUAL PATH	C-670-AES-B	$0.00	$0.00
2	OPTION;HBA;8GBIT FC;PCIE;2-PORT	C-8GFC-2P	$0.00	$0.00
1	OPTION;NIC;10GBE;LP;PCIE;SFPP;DP;COP	C-10G-L2PC	$5,000.00	$5,000.00
1	DOCS; BOOST; S2	D-BST-DOCS2	$0.00	$0.00
1	DOCS; DD OS DOC; A2	DDOS-DOC-A2	$0.00	$0.00
1	LICENSE; REPLICATOR; DD670	L-REP-670	$10,000.00	$10,000.00
1	LIC;VTL;670; INCL 2XPCIE CARD;DP;8G	L-VTL-670-2	$18,000.00	$18,000.00
1	LICENSE; BOOST; DD670	L-BST-670	$9,000.00	$9,000.00
1	PREMIUM SYSTEM SUPPORT (DD)	M-PREHWDD-01	$48,060.00	$48,060.00
1	PREMIUM SOFTWARE SUPPORT (DD)	M-PRESWDD-01	$19,980.00	$19,980.00
				$288,040.00

	VHDA - DD670 - VHC			
1	SYSTEM; DD670+1ES32;44TB;NFS;CIFS	DD670-1E32	$178,000.00	$178,000.00
1	SYSTEM; DD670; 12TB; NFS; CIFS	DD670-12TB-B	$0.00	$0.00
1	SYSTEM; DD670; NFS; CIFS	DD670	$0.00	$0.00
1	OPTION; ES20 STORSHELF;32 TB; DUALCTRL	C-E32-DC-B	$0.00	$0.00
1	OPTION;DD670 CAP EXP KIT; 36TB TO 76TB	C-670AUP76T-B	$0.00	$0.00
4	POWER CORD; NORTHAMER;120V;5-15P;C13;6FT	PC-NA120V-6	$0.00	$0.00
1	OPTION; DD670 ADD ES EXP KIT; DUAL PATH	C-670-AES-B	$0.00	$0.00
2	OPTION;HBA;8GBIT FC;PCIE;2-PORT	C-8GFC-2P	$0.00	$0.00
1	OPTION;NIC;10GBE;LP;PCIE;SFPP;DP;COP	C-10G-L2PC	$5,000.00	$5,000.00
1	DOCS; BOOST; S2	D-BST-DOCS2	$0.00	$0.00
1	DOCS; DD OS DOC; A2	DDOS-DOC-A2	$0.00	$0.00
1	LICENSE; REPLICATOR; DD670	L-REP-670	$10,000.00	$10,000.00
1	LIC;VTL;670; INCL 2XPCIE CARD;DP;8G	L-VTL-670-2	$18,000.00	$18,000.00
1	LICENSE; BOOST; DD670	L-BST-670	$9,000.00	$9,000.00
1	PREMIUM SYSTEM SUPPORT (DD)	M-PREHWDD-01	$48,060.00	$48,060.00
1	PREMIUM SOFTWARE SUPPORT (DD)	M-PRESWDD-01	$19,980.00	$19,980.00
				$288,040.00

	Spares			
1	EMC SECURE REMOTE SUPPORT GATEWAY CLIENT	ESRS-GW-200	$0.00	$0.00
1	ZERO DOLLAR ESRS INSTALL	PSINST-ESRS	$0.00	$0.00
3	CUSTOMER SUB EXPIRE 1YR FROM INV DATE	CE-SUBCUS01	$11,000.00	$33,000.00
				$33,000.00

	Data Domain - Wytheville			
1	SYSTEM;DD620;NFS;CIFS	DD620	$0.00	$0.00
1	SYSTEM; DD620-12X1;12T;NFS;CIFS	DD620-12TB	$30,000.00	$30,000.00
2	POWER CORD; NORTHAMER;120V;5-15P;C13;6FT	PC-NA120V-6	$0.00	$0.00
2	OPTION;NIC;GBE;LP;PCIE;TX;2-PORT;COPPER	C-1G-L2PC	$900.00	$1,800.00
1	DOCS; DD OS DOC; A2	DDOS-DOC-A2	$0.00	$0.00
1	LICENSE; REPLICATOR; DD620	L-REP-620	$2,540.00	$2,540.00
1	ENHANCED SYSTEM SUPPORT (DD)	M-ENHHWDD-01	$6,750.00	$6,750.00
1	ENHANCED SOFTWARE SUPPORT (DD)	M-ENHSWDD-01	$1,143.00	$1,143.00
				$42,233.00

| | | | | $1,921,547.00 |

2.4   Project Goals and objectives contained in Section 2.4

Section 2.4.1 Yes/No questions are answered with handwritten marks on a Xerox copy of the RFP document page 29 starting on the following page. Immediately following pages 29 & 30, where questions required a more detailed response in describing how we propose to meet the goal or requirement, a new document was created with both the question and the response starting with 2.4.1.1.

under the contract; however, the Vendor is responsible for payment of all subcontractors. Information/response must be included above, Section 2.3.5.

The WVSTO is aware that there may be multiple solutions that may be proposed as described in section 2.4.2, such as use of Rack Mount Servers or Blade Servers. The WVSTO desires the **best** solution to meet its current and future needs. If a Vendor plans to submit more than one solution, they may do so but it must be marked accordingly **and** prepared separately as each solution will need to be evaluated on its own capability and costs.

Some items will ask for a simple "yes or no" response while others will require a more detailed response in describing how you propose to meet the goal or requirement.

2.4.1 The following sets of questions are explanation based, concerning the **Unified Storage Array** that may be proposed.

a. Does the array have 8Gbps Fibre Channel connections to the SAN switches?
   Vendor response: yes or no

b. Does the array have the capability to support 10Gbps FCoE for storage presentation?
   Vendor response: yes or no

c. Does the array have the capability to support 10Gbps iSCSI for storage presentation?
   Vendor response: yes or no

d. Does the array support automatic, dynamic read/write memory (cache) allocation?
   Vendor response: yes or no

e. Does the array support both 2.5" and 3.5" disk drives?
   Vendor response: yes or no

f. Does the array support RAID 1/0 (striped and mirrored)?
   Vendor response: yes or no

g. Does the array support RAID 5 (single parity)?
   Vendor response: yes or no

h. Does the array support RAID 6 or RAID-DP (double parity)?
   Vendor response: yes or no

i. Can the storage administrator choose which tier of disk in a storage pool is used when creating a new LUN?
   Vendor response: yes or no

j. Can individual LUNs be expanded "on the fly" without down time on the system using the LUN?
   Vendor response: yes or no

k. Can individual LUNs be converted from thick to thin provisioned and vice versa?
   Vendor response: yes or no

l. Does the array support space reclamation on existing thin provisioned LUNs?
   Vendor response: yes or no

m. Can individual LUNs be manually migrated between disk types in a storage pool without down time on the system using the LUN?
   Vendor response: yes or no

n. Does the array support the exclusion of particular LUNs from automatic tiering?
   Vendor response: yes or no

o. Are full copies (clones) of LUNs available for use immediately after initiating clone operation?
   Vendor response: yes or no

p. Are full copies (clones) mountable by a different host?
   Vendor response: yes or no

q. Does the replication technology in the array support both local and remote protection?
   Vendor response: yes or no

r. Does the storage array utilize 10Gbps Ethernet for the NAS (CIFS/NFS) functionality?
   Vendor response: yes or no

s. Does the storage array support NDMP for backup of raw file systems?
   Vendor response: yes or no

t. Does the NDMP support allow for file and folder level restoration without the need to restore the entire NAS file system containing those items?
   Vendor response: yes or no

u. Does the CIFS file server support Windows 2008 R2 native-mode Active Directory domains?
   Vendor response: yes or no

v. Does the CIFS file server support Volume Shadow Copy to allow end-user or support staff recovery of files and folders using the "Previous Versions" features built into the Windows client operating systems when utilizing snapshot technology on the CIFS file shares?
   Vendor response: yes or no

w. Does the CIFS file server support ABE (access-based enumeration)?
   Vendor response: yes or no

x. Does the array support de-duplication of data presented via file protocols (CIFS/NFS)?
   Vendor response: yes or no

y. Does the array support compression of data presented via file protocols (CIFS/NFS)
   Vendor response: yes or no

z. Does the array provide the ability to administer the system via a command line interface (CLI installed on a remote system or direct SSH/telnet interface)?
   Vendor response: yes or no

aa. Does the array provide the ability to script administrative actions for bulk operations?
    Vendor response: yes or no

2.4.1.1 Does the array support the use of solid state drives (SSD) or enterprise flash drives (EFD) as an extension of read/write cache to enhance performance and alleviate hot spots from sudden, unexpected spikes in workload? If yes, response should provide details on how this works within the array and any limitations of this technology.
Vendor Response:

2.4.1.2 How many total active paths does a host have to an individual LUN?
Vendor Response:

2.4.1.3 What is the total bandwidth available for a host to an individual LUN?
Vendor Response:

2.4.1.4 What is the total number of drives and drive enclosures supported by the array (expandability)?
Vendor Response:

2.4.1.5 When implementing the data-at-rest encryption does the array provide internal key management system, utilize (or require) an external key management system or rely on drive-based encryption without the need for a key management system?
Vendor Response:

2.4.1.6 How many tiers of storage (drive types) may be placed in a single storage pool?
Vendor Response:

2.4.1.7 Does the array support automatic data tiering within a configured storage pool to allow migration of data to higher or lower speed disks based on an activity algorithm? If yes, response should explain how the automatic data tiering works in the proposed unified storage array.
Vendor Response:

See Next Page

2.4.1.1 Does the array support the use of solid state drives (SSD) or enterprise flash drives (EFD) as an extension of read/write cache to enhance performance and alleviate hot spots from sudden, unexpected spikes in workload?   If yes, response should provide details on how this works within the array and any limitations of this technology.

Response: yes, by using FAST Caching

2.4.1.2 How many total active paths does a host have to an individual LUN?

Response: 2

2.4.1.3 What is the total bandwidth available for a host to an individual LUN?

Response:8gb (depends on speed of HBA)

2.4.1.4 What is the total number of drives and drive enclosures supported by the array (expandability)?

Response:250

2.4.1.5 When implementing the data-at-rest encryption does the array provide the internal key management system, utilize (or require) an external key management system or rely on drive-based encryption without the need for a key management system?

Response: array will provide

2.4.1.6 Haw many tiers of storage (drive types) may be placed in a single storage pool?

Response:3

2.4.1.7 Does the array support automatic data tiering within a configured storage pool to allow migration of data to higher or lower seed disks on an activity algorithm? If yes, response should explain how the automatic data tiering works in the proposed unified storage array.

Response: yes

2.4.1.8 Does the array support policies on automatic tiering to allow SAN administrators to designate particular LUNs that should only be migrated to higher (or lower) speed disks?   If yes, response should explain how this functionality is implemented in the proposed array.

Response: yes

2.4.1.9 Does the array allow scheduled policy changes for automatic tiering of individual LUNs based on regularly occurring events? (An example would be the ability to schedule a particular LUN to only be migrated to higher speed disks during a time period that is known to be very busy)

Response: yes

2.4.1.10   Does the array allow dynamic expansion of storage pools through the addition of more drives and/or RAID arrays in to the storage pool? If yes, response should provide details on how this feature is implemented and any limitations imposed on this proves.

Response: yes

2.4.1.11   Does the array support de=duplication of data contained on LUNs presented via block level protocol 9FC/FCoE/iSCSI)? If yes, response should explain this functionality on the proposed array.

Response:yes

2.4.1.12   How many snapshots of a single LUN can be made? Response should include any details on performance degradation when utilizing multiple snapshots on a LUN.

Response: RecoverPoint will support 16,000 snapshots of a LUN given the capacity to support

2.4.1.13   Please outline the typical storage requirements for snapshots, both individual and multiple incremental snapshots of the same LUN? Also, response should provide a brief explanation of how snapshot technology is implemented on the array.

Response: 3gb repository – 1 cluster per site/2 clusters, 5gb min for journal – 1 per protected site

2.4.1.14   Does the replication technology in the array have the ability to take multiple snapshots of the LUNS to enable recovery or testing with copies of those LUNS at a user configurable interval? If yes, response should provide details on how this technology is implemented on the array.

Response: yes

2.4.1.15   What are the typical bandwidth requirements of the replication technology after initial seeding of the data to the remote site has been completed?

Response: min of 3mbs per sec

2.4.1.16   Is the data being replicated compressed or de-duplicated to reduce the bandwidth requirements?

Response: yes (both)

2.4.1.17   Is the data being replicated encrypted between the source and destination arrays?
Response: yes

2.4.1.18   Does the replication technology support RPO goals of 15 minutes or less using asynchronous replication to a remote site? Response should detail any bandwidth or latency requirements to meet this goal.

Response: depends on rate of change, size of data and subscription of link (but possible)

2.4.1.19   Does the array have the capability to serve as a CAS/WORM device to replace optical storage systems? If so, what level of compliance does the CAS functionality provide?

Response: yes , but would recommend using another EMC product for that

2.4.1.20   The following sets of questions are explanation based, concerning the **Server Hardware** that may be proposed.

    a.   Do the servers support 16GB DIMMs?   YES   NO

    b.   Do the servers support 32GB DIMMs?   YES   NO

    c.   Do the proposed servers contain more than the required minimum of 192GB RAM per server?   YES   NO

2.4.2.1 What is the total available processing power of the servers in the proposed solution? Please provide a breakdown on core count, core speed and total processing power (GHZ) for the proposed servers.

Response: Each server will have two Intel Xeon X5675 3.06GHz 6 core processors. This will result in 36.72GHz per blade and 257.04GHz processing per site.

2.4.2.2 How many DIMMs can the servers in proposed solution hold (without add-ons)?

Response: 12

2.4.2.3 Are add-ons (drawers, trays, add-on blades, etc.) available to increase the number of DIMMs that can be installed in a server? If so, what is the maximum number of DIMMs that can be installed in the servers with any additional add-ons?

Response: No, a different model blade server would be required to hold more than 12 DIMMs.

2.4.2.4 What is the maximum RAM supported by the servers without add-ons Drawers, trays, etc.)? With add-ons?   Response: 192GB

2.4.2.5 What size and speed DIMMs are being used in the proposed server configuration? Response should provide a detailed description of the RAM layout utilized on the servers.

Response: Each server will have twelve DIMMs of 16GB DDR3-1333MHz RDIMM/PC3-10600/2R/Low-Dual Volt memory.

2.4.2.6 If proposing Rack Mount Servers: Response: ==N/A==

    2.4.2.6.1   How many available PCI-Express slots do the servers in the configuration have?

    2.4.2.6.2   What is the speed of the PCI-Express slots in the servers? Response should provide a detailed listing of the available PCI-e expansion slots and their speeds and note which are already populated.

2.4.2.7 If proposing Blade Servers:

    2.4.2.7.1   How many total slots are in the proposed chassis?

Response: ==8 slots per chassis, 2 chassis proposed==

    2.4.2.7.2   Are the blade chassis in this proposal equipped with all required power supplies, fans, and I/O modules/switches to support fully populating the blade chassis without additional cost beyond the purchase of the blade servers? Response: ==YES==

    2.4.2.7.3   How many slots are used by the servers included in this proposal?

Response: ==3 blades in one chassis, 4 blades in another chassis at each site==

2.4.3   The following sets of questions are explanation based, concerning the **Network Switches** that may be proposed.

    a.   Due to the core competency of the WVSTO staff as well as other WV state agencies we would prefer to continue utilizing Cisco networking equipment in our data center for Ethernet connectivity. Does the proposed solution include Cisco network equipment?   ==YES==   NO

    b.   Does the proposed solution include licenses for VMware distributed virtual switch modules to allow both the physical and virtual network infrastructure to be managed through a common interface (WHETEHR COMMAND LINE, BROWSER-BASED GUI, etc.)?   ==YES==   NO

    2.4.3.1 Does the network equipment for server connectivity in the proposed solution have expansion capabilities (port modules, etc.) and, are those expansion slots available for future use or populated as part of the proposed solution? If yes, response should detail the expansion capabilities of the proposed network switches.

Response: ==Yes, the following expansion modules are available:==
              ==16 port 1/10GE Ethernet and Fibre Channel over Ethernet (FCoE)==
              ==8 port Fibre Channel + 8 port 1/10GE Ethernet and FCoE==
              ==16 port Unified Port (Ethernet, FC or FCoE)==

    2.4.3.2 Does the proposed network equipment include, or have the capability to support, other network protocols, specifically FCoE (fiber channel over Ethernet) and iSCSI? If yes, response should outline any additional modules or license costs to enable the support of these protocols on the proposed network switches.

Response: ==Yes, for FCoE the following are required: storage license and one of the modules in question 2.4.3.1. For iSCSI, it is supported and no additional modules or licenses are needed.==

2.4.4   The following sets of questions are explanation based, concerning the **General Solution** that may be proposed.

   a.   Does the proposed solution include a centralized, unified monitoring system that gives overall status information about the hardware included in the solution (switches, storage and servers)?

Response: YES   NO   (WE HAVE INCLUDED SOLARWINDS IN THE DESIGN)

   b.   Does the proposed solution include a single point of contact for all support issues (hardware and software) when utilized to run a vSphere environment?   YES   NO

   c.   Does the proposed solution include direct OEM support from the vendors of each component utilized in the solution to allow escalation of support issues tot eh OEM technicians by either the WVSTO or our single point of support for the proposed solution?   YES   NO

   d.   Does the proposed solution include regular (quarterly or bi-annually), pre-tested and validated firmware updates direct from a single source to allow WVSTO to keep all hardware in the solution up-to-date without having to go through internal research, testing and validation of firmware as it is released by OEMs?   YES   NO

   e.   The proposed solution should take into consideration existing WVSTO licensing and should only include software licensing that is necessary to support the proposed solution that is not already owned by the WVSTO (see appendix for list of current VMware licensing). Have you taken existing WVSTO licensing into account and only included additional licenses, not already owned by the WVSTO in your proposed solution?   YES   NO

   2.4.4.1 Does the proposed solution ship as a single unit (all hardware racked, all internal power, network, SAN, and other cables connected) ready to connect to power and core networking equipment and begin deployment and configuration of storage, networking, and the vSphere environment?

Response: Yes, the VCE Vblock 300 FX includes all equipment already racked.

   2.4.4.2 The WVSTO would like to keep the network traffic for the hosts, the network traffic for hardware management and the storage network traffic separated. This serves a few proposes, the first being segregation of traffic with dedicated resources for each type of traffic, to try and ensure peak performance of the solution; the second being the ability to keep the management traffic on the high performance (gigabit0, but lower-cost switches that don't need the capabilities of the switches used to connect the VMware hosts to the network.

Response: Yes, we will utilize separate switching infrastructure for LAN and SAN traffic and QoS for parts of the design that utilize FCoE. Management traffic will be separated into its own VLAN/subnet, but will reside on the same physical switches as data traffic on the Nexus 5548s.

   2.4.4.2.1   Does the proposed solution include separate switch infrastructure for the hosts, the hardware management interfaces and storage (fiber channel) networks? If yes, response should provide some details on the internal network layout of the proposed solution and how it meets this goal. Response: Yes, redundant Cisco MDS9148 SAN switches will connect the storage to the servers. Cisco UCS Fabric Interconnects will connect the servers into the MDS9148 SAN switches.

2.4.4.3 Does the proposed solution include a centralized, unified management system that allows baseline configuration tasks to be performed? If it does, can the following tasks be performed through this management system? If so, response should outline the following capabilities to perform that function:

Response: Yes using the Cisco Tools

  2.4.4.3.1 Define VLANs available (trunked) into the network switches from the core network.

Response: <mark>The VLANs to trunk to the new switching infrastructure is to be determined, but the new switching infrastructure will support IEEE 802.1q trunking of VLANs from the core switch.</mark>

  2.4.4.3.2 Define storage available to the various vSphere clusters

Response: Any combination of block or file

  2.4.4.3.3 Deployment of operating systems such as (vSphere, Windows, etc.) to the physical servers included in the solution from the user-provided ISO images

Response: yes

  2.4.4.3.4 Creation of vCenter instances to mange vSphere hosts

Response: yes

  2.4.4.3.5 Does the management system provide any additional capabilities not outlined above? If is does, response should detail any notable capabilities.

Response:

2.5   Mandatory Requirements

Section 2.5   Affirm questions are answered with handwritten marks on a Xerox copy of the RFP document pages 36 - 42 starting on the following page.

Attachment B: Mandatory Specification Checklist

The mandatory requirements in Section 2.5 will be deliverables upon award of this RFP.

An affirmation to each requirement is required; if you cannot mark "yes or √" to each requirement, you will be considered non-responsive and disqualified.

2.5 Mandatory Requirements

The following mandatory requirements must be met by the Vendor as a part of the submitted proposal. Failure on the part of the Vendor to meet any of the mandatory specifications shall result in the disqualification of the proposal. The terms "must", "will", "shall", "minimum", "maximum", or "is/are required" identify a mandatory item or factor. Decisions regarding compliance with any mandatory requirements shall be at the sole discretion of the State.

2.5.1 Unified Storage Platform

2.5.1.1 The unified storage systems must allow presentation of storage through block and file level protocols and meet the following requirements for usable capacity.
Affirm: _____

2.5.1.1.1 The storage array for the production center must provide a minimum usable capacity of at least 17TB for virtualized servers in a dedicated physical or virtual storage pool.
Affirm: _____

2.5.1.1.2 The storage array for the production data center must provide a minimum useable capacity of 5 TB for NAS file shares in a dedicated physical or virtual storage pool.
Affirm: _____

2.5.1.1.3 The storage array for the production data center must provide a minimum useable capacity of 3 TB for virtual desktops in a dedicated physical or virtual storage pool.
Affirm: _____

2.5.1.1.4 The storage array for the disaster recovery data center must provide a minimum useable capacity of 17 TB for replicated virtual servers.
Affirm: _____

2.5.1.1.5 The storage array for the disaster recovery data center must provide a minimum useable capacity of 5 TB for replicated NAS file shares.
Affirm: _____

2.5.1.1.6 The storage array for the disaster recovery data center must provide a minimum useable capacity of 3 TB for replicated virtual desktops.
Affirm: _____

2.5.1.1.7 The storage array for the disaster recovery data center must provide a minimum additional useable capacity of 10 TB.
Affirm: _____

2.5.1.2 The proposed storage array must be a unified storage array that allows presentation of storage via block (Fibre Channel) and file (CIFS, NFS) protocols.
Affirm: _____

2.5.1.3   The proposed storage array must have a minimum of 4Gbps fibre channel connectivity to the SAN switch infrastructure.
          Affirm: _____

2.5.1.4   The proposed storage array must have two storage controllers for the block level protocol in an active/active configuration with at least two fibre channel connections to the SAN switch infrastructure providing a total of 4 paths to the storage array.
          Affirm: _____

2.5.1.5   The proposed storage array must have two filers for the file level protocols in an active/passive or active/active configuration with at least two (2) 1Gbps or two (2) 10Gbps Ethernet connections per filer to the network infrastructure.
          Affirm: _____

2.5.1.6   The proposed storage array for the production data center must provide a minimum of 20,000 IOPs dedicated to the virtualized server environment.
          Affirm: _____

2.5.1.7   The proposed storage array for the production data center must provide a minimum of 8,000 IOPs dedicated to the virtual desktop environment.
          Affirm: _____

2.5.1.8   The proposed storage array for the production data center must provide dedicated capacity to support NAS file shares for up 120 users and 3 TB of data.
          Affirm: _____

2.5.1.9   The proposed storage array for the disaster recovery site must provide a minimum of 60% of the total IOPs of the production storage array.
          Affirm: _____

2.5.1.10 The proposed storage array must support Solid State Drives (SSD) or Enterprise Flash Drives (EFD) (Tier 0).
          Affirm: _____

2.5.1.11 The proposed storage array must support high speed (10K and 15K RPM) Fibre Channel (FC) or Serial Attached SCSI (SAS) drivers (Tier 1 and Tier 2).
          Affirm: _____

2.5.1.12 The proposed storage array must support 7.2K RPM near-line SAS or ATA drives (Tier 3).
          Affirm: _____

2.5.1.13 The proposed storage array must support virtual (thin) provisioning for volumes presented via block level (FC) protocol.
          Affirm: _____

2.5.1.14 The unified storage systems must support the ability to do snapshots and clones of volumes presented via block level protocols. It must also support the ability to do snapshots of the file systems presented via file level protocols.
          Affirm: _____

2.5.1.15 The proposed storage array must include the ability to make clones of volumes presented via block-level (FC) protocol.

Affirm: _____

2.5.1.16 The proposed storage array must include the ability to take snapshots of volumes presented via block-level (FC) protocol.
Affirm: _____

2.5.1.17 The proposed storage array must include the ability to take snapshots of file systems presented via file-level protocols (CIFS, NFS).
Affirm: _____

2.5.1.18 The proposed storage array must include IP-based, asynchronous replication for the storage presented via block level (FC) protocol.
Affirm: _____

2.5.1.19 The proposed storage array must include IP-based, asynchronous replication for the file systems presented via file level (CIFS, NFS) protocols.
Affirm: _____

2.5.1.20 The proposed storage array must have the capability to support data-at-rest encryption.
Affirm: _____

2.5.1.21 The proposed storage array must have a single, unified management tool that allows the configuration and monitoring of all features and functionality of the array.
Affirm: _____

2.5.1.22 The proposed storage array must support all of the primitives defined in the VMware vSphere API for Array Integration (VAAI) specifications for vSphere 5.0 for storage presented via block level (FC) protocol.
Affirm: _____

2.5.1.23 The proposed storage array must include full, active-active, load balanced multi-path support for connected VMware vSphere 5.0 hosts (not the default most recently used or round robin provided by VMware).
Affirm: _____

2.5.1.24 The proposed storage array must include plug-ins for VMware vCenter to enable the creation and management of LUNs (from assigned storage pools) for the vSphere environment to ensure proper alignment and optimization of the LUNs.
Affirm: _____

2.5.1.25 The proposed array must include replication technology that integrates with VMware Site Recovery Manager (SRM) 5.0 to allow SRM to leverage the native replication technologies of the array to copy data to the disaster recovery site.
Affirm: _____

2.5.1.26 The proposed array must have the capability to enable call-home functionality for sending hardware alerts to the OEM when failures are detected on the array to enable rapid, pro-active response from technical support to replace or repair defective hardware.
Affirm: _____

2.5.1.27 The unified storage systems must have an expected product life of at least 5 years.
Affirm: _____

2.5.1.28 The unified storage systems must include 5 years of support with a guaranteed response time of 4 hours and 24x7x365 availability coverage.
Affirm: ___✓___

2.5.2   Fibre Channel Switches

2.5.2.1   The proposed solution shall include two independent fibre channel switches at each site.
· Affirm: ___✓___

2.5.2.2   The fibre channel switches must have autosensing 8 Gbps ports (support 8/4/2 Gbps).
Affirm: ___✓___

2.5.2.3   The proposed fibre channel switches must have management capabilities via a command line interface (telnet/SSH).
Affirm: ___✓___

2.5.2.4   The proposed fibre channel switches must have a browser-based management interface.
Affirm: ___✓___

2.5.2.5   The proposed fibre channel switches must include some internal diagnostics.
Affirm: ___✓___

2.5.2.6   The proposed fibre channel switches must include native alerting and reporting (without the need for a monitoring server).
Affirm: ___✓___

2.5.2.7   The proposed fibre channel switches must include a native way to display performance metrics.
Affirm: ___✓___

2.5.2.8   The proposed fibre channel switch configuration must support non-disruptive firmware upgrades.
Affirm: ___✓___

2.5.2.9   The proposed fibre channel switches must have the capability to be either an NPV edge device or an NPIV core device.
Affirm: ___✓___

2.5.2.10 The proposed fibre channel switches must have the capability to support multiple fabric environments in a single physical switch.
Affirm: ___✓___

2.5.2.11 The proposed fibre channel switches must support aggregated ISL (inter-switch link) connectivity; i.e., several physical ISLs behaving as one virtual ISL.
Affirm: ___✓___

2.5.2.12. The proposed fibre channel switches must support traffic engineering using FSPF.
Affirm: ___✓___

2.5.2.13 The fibre channel switches must have at least 12 ports active each.
Affirm: ___✓___

2.5.2.14 The fibre channel switches must have at least 24 ports total each.

Affirm: _____

2.5.2.15 The fibre channel switches must have redundant power supplies and fans.
Affirm: _____

2.5.2.16 The fibre channel switches must have an expected product life of at least 5 years.
Affirm: _____

2.5.2.17 The fibre channel switches must include 5 years of support with a guaranteed response time of 4 hours and 24x7x365 coverage.
Affirm: _____

2.5.3 Network Switches

2.5.3.1 The network switch(es) must support both 10Gbps and 1Gbps connectivity.
Affirm: _____

2.5.3.2 The network switch(es) must have a minimum of 16 ports available for connection of additional network devices not included in the proposed solution.
Affirm: _____

2.5.3.3 The network switch(es) must have redundant power supplies and fans.
Affirm: _____

2.5.3.4 The network switch(es) used for server connectivity must include layer 3 support (if a dedicated management network is present it does not need to support layer 3).
Affirm: _____

2.5.3.5 The network switch(es) must support Link Aggregation Control Protocol (LACP): IEEE 802.3ad.
Affirm: _____

2.5.3.6 The network switch(es) must support VLAN trunking.
Affirm: _____

2.5.3.7 The network switch(es) must support IEEE 802.1Q VLAN encapsulation.
Affirm: _____

2.5.3.8 The network switch(es) must support Jumbo Frames on all ports (up to 9216 bytes).
Affirm: _____

2.5.3.9 The network switch(es) must support CLI management (console, telnet and/or SSH).
Affirm: _____

2.5.3.10 The network switch(es) must support SNMP.
Affirm: _____

2.5.3.11 The network switches must have an expected product life of at least 5 years.
Affirm: _____

2.5.3.12 The network switches must include 5 years of support with a guaranteed response time of 4 hours and 24x7x365 coverage.
Affirm: _____

2.5.4 Server Hardware

2.5.4.1 There must be at least 7 identically configured servers per site (production and DR), 14 servers in total.
Affirm: ✓

2.5.4.2 The proposed servers must be dual CPU socket servers.
Affirm: ✓

2.5.4.3 The proposed servers must use 6-core Intel 5600 series or 10-core Intel E7 series processors or superior.
Affirm: ✓

2.5.4.4 Each server must have at least 192GB of RAM installed with all RAM running at full clock speed (no clock speed step down across memory channels).
Affirm: ✓

2.5.4.5 Each server must include a minimum of two (2) 10Gbps network connections.
Affirm: ✓

2.5.4.6 Each server must include a minimum of two (2) 8Gbps fibre channel (SAN) connections.
Affirm: ✓

2.5.4.7 The servers must include remote management capabilities (DRAC, iLO or equivalent).
Affirm: ✓

2.5.4.8 The servers must have fully redundant internal components (power supplies, fans, etc.).
Affirm: ✓

2.5.4.9 The servers must have an expected product life of at least 5 years.
Affirm: ✓

2.5.4.10 The servers must include 5 years of support with a guaranteed response time of 4 hours and 24x7x365 coverage.
Affirm: ✓

2.5.5 Rack Mount Servers (If this solution is proposed)

2.5.5.1 All of the PCI-Express slots in the servers must run at a minimum of 4x speed.
Affirm: N/A

2.5.5.2 The servers must have at least two available PCI-Express slots for expansion capabilities.
Affirm: N/A

2.5.6 Blade Servers (If this solution is proposed)

2.5.6.1 In the proposed blade solution the individual blade servers at each site must be split as evenly as possible across two blade chassis (elimination of single point of failure and provide extra expansion capabilities through number of available slots for blades).
Affirm: ✓

2.5.6.2   Each blade chassis must include fully redundant I/O and management modules.
Affirm: _____

I certify that the proposal submitted meets or exceeds all the mandatory specifications of this Request for Proposal. Additionally, I agree to provide any additional documentation deemed necessary by the State of West Virginia to demonstrate compliance with said mandatory specifications.

SyCom Technologies
(Company)

Phil O'Neal, Account Manager
(Representative Name, Title)

804-474-5240 / 804-262-5157
(Contact Phone/Fax Number)

4/6/12
(Date)

SECTION C : Attachment C

A whiteboard design collaboration session was performed by a team of **SyCom** VCE engineers. A photo was taken of the solution as work in progress; to display the level of effort **SyCom** has discussed the proper configuration for the WVSTO RFP. A similar session will be provided during the Oral presentation phase of the RFP award process.

W V Treas. — RFP

4 -50% — Andrew 2.4.2.1 — 2.4.3.2   2.4.4, 24.4.5

5 — 0% — but not much effort req.
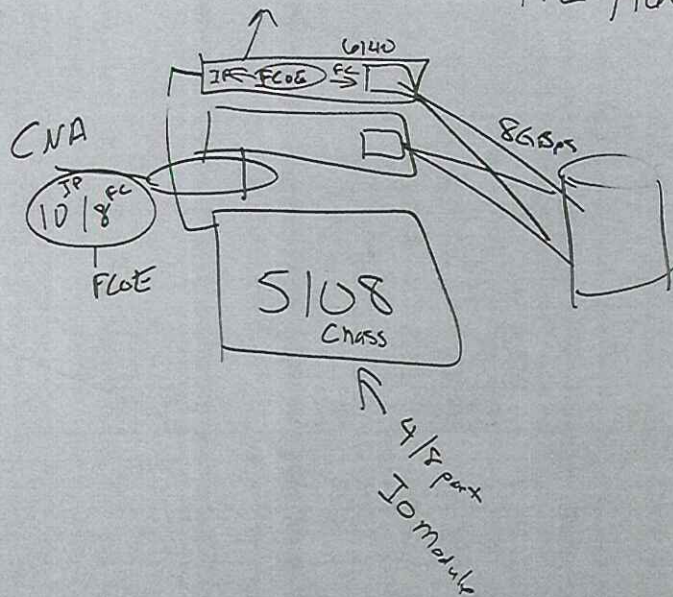
mpleted BoM's — Need to involve VCE or Roger Coulat

stall — part of VCE price

B200 M2'S

2 x 5649 / 6 core

192 / 16GB Dims

The PVDM, WIC
& headset disconnect
were ordered today.

VBlock 300 FX

CNA

JP FC
10 / 8

FCoE

5108
Chass

6140

IF FCoE SS

8GBps

4/8 port
IO Module

RecoverPoint   Per Site

3GB — Repository = 1 per cluster / 2 clusters

5GB min. — Journal = 1 per protected sets

? min — Replicated volumes = protected data size — min

W I

Attachment C: Cost Sheet

Cost information is to be inserted below based on mandatory requirements, project objectives and goals as detailed in the Request for Proposal. <u>This sheet must be submitted in a separately sealed envelope.</u> <u>"Cost" should be clearly marked on the sealed envelope along with the RFP document # STO12007.</u>

Invoices and Progress Payments: The Vendor shall submit invoices, in arrears, in an acceptable format to the Agency at the address on the face of the purchase order labeled "Invoice To". Payment will be made upon delivery, acceptance and testing of all equipment.

The agency is requesting an all-inclusive, total cost that includes the items below:

As indicated in Section 2.1, there will be two different delivery locations. All freight and handling is to be included in the proposed cost and not billed as a separate item on the invoice(s); FOB Destination, Freight Prepaid are the preferred terms. Delivery should be made within 30 days after contract award.

Per Section 5.5: Term of Contract and Renewals: This contract will be effective upon award and shall extend for the period of one (1) year, at which time the contract may, upon mutual consent, be renewed. Such renewals are for a period of one (1) year with a maximum of up to four, one (1) year renewal periods.

A.   All Equipment (agency requests an equipment listing being proposed to be a part of response)
     ALL equipment must have an expected product life of at least 5 years. Extended warranty costs must be included to attain this requirement if the manufacturer does not offer a standard full 5 year warranty.

     Total Cost of All Equipment: $ ___*Intentionally left Blank*___

B.   Maintenance and Support shall include:
     All equipment/systems must include 5 years of support with a guaranteed response time of 4 hours and 24x7x365 availability coverage, and include all firmware updates.

     Support Cost for Year One: $_____

     Support Cost for Year Two: $_____

     Support Cost for Year Three: $_____

     Support Cost for Year Four: $_____

     Support Cost for Year Five: $_____

C.   TOTAL COST FOR EQUIPMENT AND SUPPORT YEARS 1 – 5 $_____

The Vendor, who has lowest cost for initial equipment costs, including any extended warranty to achieve a minimum product life of 5 years, and lowest support costs for each year of Support, will be allocated the most points in accordance with the evaluation criteria described in Section 4.2 of the RFP.

Appendix A

SEE "COST" Sealed envelope.

RFQ No. _STO12007_

STATE OF WEST VIRGINIA
Purchasing Division

PURCHASING AFFIDAVIT

West Virginia Code §5A-3-10a states: No contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and the debt owed is an amount greater than one thousand dollars in the aggregate.

DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Debtor" means any individual, corporation, partnership, association, limited liability company or any other form or business association owing a debt to the state or any of its political subdivisions. "Political subdivision" means any county commission; municipality; county board of education; any instrumentality established by a county or municipality; any separate corporation or instrumentality established by one or more counties or municipalities, as permitted by law; or any public body charged by law with the performance of a government function or whose jurisdiction is coextensive with one or more counties or municipalities. "Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceed five percent of the total contract amount.

EXCEPTION: The prohibition of this section does not apply where a vendor has contested any tax administered pursuant to chapter eleven of this code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

Under penalty of law for false swearing (*West Virginia Code* §61-5-3), it is hereby certified that the vendor affirms and acknowledges the information in this affidavit and is in compliance with the requirements as stated.

WITNESS THE FOLLOWING SIGNATURE

Vendor's Name: _SyCom Technologies, LLC_

Authorized Signature: _Ken Steel, Jr._   Date: _4/5/2012_

State of _Virginia_

County of _Henrico_, to-wit:

Taken, subscribed, and sworn to before me this _5_ day of _April_, 20_12_.

My Commission expires _6/30/2013_, 20_13_.

AFFIX SEAL HERE   NOTARY PUBLIC _V M Elliot_

Reg# 270152

3.5   Purchasing Affidavit

Section 3.5   State of West Virginia, Purchasing Division, **PURCHASING AFFIDAVIT,** a Xerox copy of the RFP document page 53 is executed on the following page.

3.6   Vendor Preference Certificate

Section 3.6   State of West Virginia, **VENDOR PREFERENCE CERTIFICATE**, a Xerox copy of the RFP document page 52 is executed on the following page, followed by copies of the 2008 - 2012 certificates for the previous four (4) years of enforce WV Worker's Compensations Insurance by SyCom's parent company SEC Computer Company.

Rev. 09/08

State of West Virginia
VENDOR PREFERENCE CERTIFICATE

Certification and application* is hereby made for Preference in accordance with *West Virginia Code*, §5A-3-37. (Does not apply to construction contracts). *West Virginia Code*, §5A-3-37, provides an opportunity for qualifying vendors to request (at the time of bid) preference for their residency status. Such preference is an evaluation method only and will be applied only to the cost bid in accordance with the *West Virginia Code*. This certificate for application is to be used to request such preference. The Purchasing Division will make the determination of the Resident Vendor Preference, if applicable.

1. ✓ **Application is made for 2.5% resident vendor preference for the reason checked:**
   ✓ Bidder is an individual resident vendor and has resided continuously in West Virginia for four (4) years immediately preceding the date of this certification; or,
   ___ Bidder is a partnership, association or corporation resident vendor and has maintained its headquarters or principal place of business continuously in West Virginia for four (4) years immediately preceding the date of this certification; or 80% of the ownership interest of Bidder is held by another individual, partnership, association or corporation resident vendor who has maintained its headquarters or principal place of business continuously in West Virginia for four (4) years immediately preceding the date of this certification; or,
   ___ Bidder is a nonresident vendor which has an affiliate or subsidiary which employs a minimum of one hundred state residents and which has maintained its headquarters or principal place of business within West Virginia continuously for the four (4) years immediately preceding the date of this certification; or,

2. ___ **Application is made for 2.5% resident vendor preference for the reason checked:**
   Bidder is a resident vendor who certifies that, during the life of the contract, on average at least 75% of the employees working on the project being bid are residents of West Virginia who have resided in the state continuously for the two years immediately preceding submission of this bid; or,

3. ___ **Application is made for 2.5% resident vendor preference for the reason checked:**
   Bidder is a nonresident vendor employing a minimum of one hundred state residents or is a nonresident vendor with an affiliate or subsidiary which maintains its headquarters or principal place of business within West Virginia employing a minimum of one hundred state residents who certifies that, during the life of the contract, on average at least 75% of the employees or Bidder's affiliate's or subsidiary's employees are residents of West Virginia who have resided in the state continuously for the two years immediately preceding submission of this bid; or,

4. ✓ **Application is made for 5% resident vendor preference for the reason checked:**
   ✓ Bidder meets either the requirement of both subdivisions (1) and (2) or subdivision (1) and (3) as stated above; or,

5. ___ **Application is made for 3.5% resident vendor preference who is a veteran for the reason checked:**
   Bidder is an individual resident vendor who is a veteran of the United States armed forces, the reserves or the National Guard and has resided in West Virginia continuously for the four years immediately preceding the date on which the bid is submitted; or,

6. ___ **Application is made for 3.5% resident vendor preference who is a veteran for the reason checked:**
   Bidder is a resident vendor who is a veteran of the United States armed forces, the reserves or the National Guard, if, for purposes of producing or distributing the commodities or completing the project which is the subject of the vendor's bid and continuously over the entire term of the project, on average at least seventy-five percent of the vendor's employees are residents of West Virginia who have resided in the state continuously for the two immediately preceding years.

Bidder understands if the Secretary of Revenue determines that a Bidder receiving preference has failed to continue to meet the requirements for such preference, the Secretary may order the Director of Purchasing to: (a) reject the bid; or (b) assess a penalty against such Bidder in an amount not to exceed 5% of the bid amount and that such penalty will be paid to the contracting agency or deducted from any unpaid balance on the contract or purchase order.

By submission of this certificate, Bidder agrees to disclose any reasonably requested information to the Purchasing Division and authorizes the Department of Revenue to disclose to the Director of Purchasing appropriate information verifying that Bidder has paid the required business taxes, provided that such information does not contain the amounts of taxes paid nor any other information deemed by the Tax Commissioner to be confidential.

Under penalty of law for false swearing (West Virginia Code, §61-5-3), Bidder hereby certifies that this certificate is true and accurate in all respects; and that if a contract is issued to Bidder and if anything contained within this certificate changes during the term of the contract, Bidder will notify the Purchasing Division in writing immediately.

Bidder: _SyCom Technologies_   Signed: _W.S. Porter_

Date: _4/6/12_   Title: _Account Manager_

Check any combination of preference consideration(s) indicated above, which you are entitled to receive.

![Brickstreet Insurance logo]

Brickstreet
INSURANCE
400 Quarrier Street   Charleston, WV 25301-2010

PRODUCER:

BrickStreet Mutual Insurance Company
400 Quarrier Street
Charleston, WV 25301-2010

CERTIFICATE HOLDER:

SEC COMPUTER COMPANY
PO BOX 70909
RICHMOND VA 23255-0000

INSURED:

SEC COMPUTER COMPANY
PO BOX 70909
RICHMOND VA 23255-0000

CERTIFICATE OF INSURANCE

The policy of insurance listed below has been issued to the insured named above for the policy period and coverage indicated. This certificate is issued as a matter of information only and confers no rights upon the certificate holder. This certificate does not amend, extend or alter the coverage afforded by the policy below. Coverage is contingent on the insured's compliance with policy conditions and premium payment.

If the policy is canceled before the expiration date, BrickStreet Mutual Insurance Company will endeavor to mail a written notice to the certificate holder within 30 days of cancelation. Failure to mail the notice shall impose no obligation or liability of any kind upon BrickStreet Mutual Insurance Company.

POLICY NUMBER: WC10016194-05   **DATE CERTIFICATE ISSUED: 12/08/2008**

POLICY EFFECTIVE DATE: 12/02/2008   **POLICY EXPIRATION DATE: 12/02/2009**

WORKERS COMPENSATION AND EMPLOYERS LIABILITY

LIMITS / COVERAGE

[X] WORKERS COMPENSATION - STATUTORY LIMITS
[X] EMPLOYERS LIABILITY LIMITS:

BODILY INJURY BY ACCIDENT:	$100,000	EACH ACCIDENT
BODILY INJURY BY DISEASE:	$500,000	POLICY LIMIT
BODILY INJURY BY DISEASE:	$100,000	EACH EMPLOYEE

[   ] WV BROAD FORM EMPLOYERS LIABILITY ENDORSEMENT -
       COVERAGE FOR WV CODE 23-4-2(d)(2)(ii)

[   ] FEDERAL COAL MINE HEALTH AND SAFETY ACT COVERAGE ENDORSEMENT –
       COVERAGE FOR WV CODE 23-4b-1 - FEDERAL BLACK LUNG COVERAGE

SPECIAL PROVISIONS IF ANY:

COI-1

Brickstreet
INSURANCE

400 Quarrier Street   Charleston, WV 25301-2010

**WORKERS COMPENSATION
AND
EMPLOYERS LIABILITY POLICY**

INFORMATION PAGE WC 00 00 01 (A)

RENEWAL OF POLICY NUMBER: WC10016194-05
POLICY NUMBER: WC10016194-06

INSURER: BRICKSTREET MUTUAL INSURANCE COMPANY

1.   **INSURED:**   **PRODUCER:**
        SEC COMPUTER COMPANY   BRICKSTREET MUTUAL INSURANCE
        PO BOX 70909   COMPANY
        RICHMOND, VA 23255-0000   400 QUARRIER STREET
                                                                CHARLESTON, WV 25301-2010

Insured is a(n) DOMESTIC CORPORATION

Other work places and identification numbers are shown in the schedule(s) attached.

2.   The policy period is from   12/02/2009 to 12/02/2010   12:01 A.M. at the insured's mailing address.

3.   **A.**   **WORKERS COMPENSATION INSURANCE:** Part One of the policy applies to the Workers
        Compensation Law of the state(s) listed here:

        WEST VIRGINIA

        B.   **EMPLOYERS LIABILITY INSURANCE:** Part Two of the policy applies to work in each state listed in item
        3.A. The limits of our liability under Part Two are:

        Bodily Injury by Accident: $100,000   Each Accident
        Bodily Injury by Disease: $500,000   Policy Limit
        Bodily Injury by Disease: $100,000   Each Employee

        C.   **OTHER STATES INSURANCE:** Part Three of the policy applies to the states, if any, listed here:

        See West Virginia Limited Other States Insurance Endorsement WC 99 03 05

        D.   This policy includes these endorsements and schedules:

        SEE LIST OF ENDORSEMENTS - EXTENSION OF INFORMATION PAGE

4.   The premium for this policy will be determined by our Manuals of Rules, Classifications, Rates and Rating Plans.
        All required information is subject to verification and change by audit to be made in accordance with Part Five of
        the Policy.

DATE OF ISSUE: 12/08/2009
ISSUING OFFICE: Charleston, WV
PRODUCER: BRICKSTREET MUTUAL INSURANCE COMPANY

Brickstreet
INSURANCE

400 Quarrier Street Charleston, WV 25301-2010

WORKERS COMPENSATION
AND
EMPLOYERS LIABILITY POLICY

INFORMATION PAGE WC 00 00 01 (A)

RENEWAL OF POLICY NUMBER: WC10016194-06
POLICY NUMBER: WC10016194-07

INSURER: BRICKSTREET MUTUAL INSURANCE COMPANY

1.	**INSURED:**	**PRODUCER:**

INSURED:
SEC COMPUTER COMPANY
PO BOX 70909
RICHMOND, VA 23255-0000

PRODUCER:
BRICKSTREET MUTUAL INSURANCE
COMPANY
400 QUARRIER STREET
CHARLESTON, WV 25301-2010

Insured is a(n) DOMESTIC CORPORATION

Other work places and identification numbers are shown in the schedule(s) attached.

2. The policy period is from   12/02/2010 to 12/02/2011 12:01 A.M. at the insured's mailing address.

3. **A.** **WORKERS COMPENSATION INSURANCE:** Part One of the policy applies to the Workers Compensation Law of the state(s) listed here:

WEST VIRGINIA

B. **EMPLOYERS LIABILITY INSURANCE:** Part Two of the policy applies to work in each state listed in item 3.A. The limits of our liability under Part Two are:

Bodily Injury by Accident: $100,000   Each Accident
Bodily Injury by Disease: $500,000   Policy Limit
Bodily Injury by Disease: $100,000   Each Employee

C. **OTHER STATES INSURANCE:** Part Three of the policy applies to the states, if any, listed here:

"Part Three of the policy applies to the states, if any, listed here: All states and U.S. territories except, North Dakota, Ohio,Washington, Wyoming, Puerto Rico,   and the U.S. Virgin Islands, and states designated in Item 3.A. of the Information Page. "

D. This policy includes these endorsements and schedules:

SEE LIST OF ENDORSEMENTS - EXTENSION OF INFORMATION PAGE

4. The premium for this policy will be determined by our Manuals of Rules, Classifications, Rates and Rating Plans. All required information is subject to verification and change by audit to be made in accordance with Part Five of the Policy.

DATE OF ISSUE: 12/03/2010
ISSUING OFFICE: Charleston, WV
PRODUCER: BRICKSTREET MUTUAL INSURANCE COMPANY

Brickstreet
INSURANCE

400 Quarrier Street   Charleston, WV 25301-2010

WORKERS COMPENSATION
AND
EMPLOYERS LIABILITY POLICY

INFORMATION PAGE WC 00 00 01 (A)

RENEWAL OF POLICY NUMBER: WC10016194-07
POLICY NUMBER: WC10016194-08

INSURER: BRICKSTREET MUTUAL INSURANCE COMPANY

1. **INSURED:**
    SEC COMPUTER COMPANY
    PO BOX 70909
    RICHMOND, VA 23255-0000

    PRODUCER:
    BRICKSTREET MUTUAL INSURANCE COMPANY
    400 QUARRIER STREET
    CHARLESTON, WV 25301-2010

    Insured is a(n) DOMESTIC CORPORATION

    Other work places and identification numbers are shown in the schedule(s) attached.

2. The policy period is from   12/02/2011 to 12/02/2012 12:01 A.M. at the insured's mailing address.

3. **A.**   **WORKERS COMPENSATION INSURANCE:** Part One of the policy applies to the Workers Compensation Law of the state(s) listed here:

    WEST VIRGINIA

    B.   **EMPLOYERS LIABILITY INSURANCE:** Part Two of the policy applies to work in each state listed in item 3.A. The limits of our liability under Part Two are:

Bodily Injury by Accident:	$100,000	Each Accident
Bodily Injury by Disease:	$500,000	Policy Limit
Bodily Injury by Disease:	$100,000	Each Employee

    C.   **OTHER STATES INSURANCE:** Part Three of the policy applies to the states, if any, listed here:

    "Part Three of the policy applies to the states, if any, listed here: All states and U.S. territories except, North Dakota, Ohio,Washington, Wyoming, Puerto Rico,   and the U.S. Virgin Islands, and states designated in Item 3.A. of the Information Page. "

    D.   This policy includes these endorsements and schedules:

    SEE LIST OF ENDORSEMENTS - EXTENSION OF INFORMATION PAGE

4. The premium for this policy will be determined by our Manuals of Rules, Classifications, Rates and Rating Plans. All required information is subject to verification and change by audit to be made in accordance with Part Five of the Policy.

DATE OF ISSUE: 12/02/2011
ISSUING OFFICE: Charleston, WV
PRODUCER: BRICKSTREET MUTUAL INSURANCE COMPANY

Vendor Differentiator: **TECHNICAL SERVICES BRIEF**

SyCom Operational IT Support Services at no charge for the first 12 months of contracted service included with the award of FRP# STO12007. TAC/NOC/MSS support details on the following two pages.

SyCom's
Network Operations Center

Prepared for:
West Virginia State Treasury Office
Included in RFP# STO12007

<mark>Vendor differentiator</mark>

Operational IT Support Services

Overview

<mark>West Virginia State Treasury is being provided outsourced IT Operations support for the first 12 months of contracted RFP services, as part of the SyCom response to RFP# STO12007.</mark> SyCom proposes to provide a managed 8x5 support services model to include technical assistance (TAC) for escalated Level 2 support, centralized monitoring (NOC) for IT infrastructure, and remote administration and management of hardware and software (MSS).

Each component of this solution suite is independent of the others.

Technical Assistance (TAC) Key Features

- This Level-2 support services <mark>is in addition to</mark> the support provided by the OEM TAC and warranty terms and conditions included with the new hardware and software purchase. The SyCom TAC team is served by a consistent small number of Level-2 certified technicians that will know the WVSTO environment and staff, and will operate as part of the WVSTO team on technical issues. A warm transfer will be made to the manufacturers' Level-3 support if required
- 8x5 response to network alarms and remote remediation
- Escalation point for HelpDesk for system-wide issues or when Level-2 technical expertise is required
- Coordinate with 3rd party technology providers and manufacturers (e.g. Internet provider, IBM, Cisco) when technology issues occur
- Process RMA tickets for warranty replacement of failed components (within SLA of vendor support agreement; e.g. Cisco Smartnet, HP CarePacks, etc.)

Remote Monitoring (NOC) Key Features

- 8x5 monitoring of network devices and links, servers to include system resources, key interfaces, service functionality, thresholds, and environmental conditions
- Analyze system, server, application, network, and input/output device performance and network health to ensure reliability, identify abuse, and virus-like activity
- Monitoring will include operational status, alerting and historical reporting of each connected device
- Client & TAC Response Team notification during normal business hours once critical alarms and syslog events are detected and validated
- Monthly performance and capacity reporting to include bandwidth and system resource utilization, Ad hoc reporting requests
- Custom alert thresholds founded on baselines and expected performance of devices

lanaged Support Services (MSS) for Datacenter and Network

- Remote administration of all devices to include Moves, Adds, and Changes (e.g. route add, VLANs, etc.)
- Device configuration backups with storage offsite. Enterprise data backup configuration and management.
- Datacenter and Network asset management, including maintenance of server and network component inventory and related documentation and technical specifications information
- Manage configuration settings and security access-list for network devices
- Preventive maintenance and patching
- Best practices quarterly review with strategic planning recommendations

West Virginia State Treasury Responsibilities

- Maintain proper licensing and warranty support from manufactures for equipment covered under SyCom support
- Provide and maintain remote access and connectivity

Datacenter and Network Equipment Included:

Device Type	Quantity	Device Type	Quantity
UCS Type B	2	EMC SAN	2
Virtual Servers, VMware	14	Network Switches	8

Solution Components Pricing

		Monthly Price
TAC (level 2)	Technical assistance: includes devices of type and quantity listed in the table above.	$1,437
NOC Monitor	Monitor 8x5: includes devices of type and quantity listed in the table above.	$1,309
MSS Managed Support Datacenter / Network	8x5 administration of network and datacenter equipment listed in the table above.	$1,190
	Total Monthly Recurring Value	$3,936

The West Virginia State Treasurer's office has the option of upgrading the above Operational IT Support Services for the first 12 months of support to a 24x7 support services model for a monthly recurring fee of $694.00, or continue the 8x5 support services model in month 13 forward for the Total Monthly Recurring Charge of $3,936, to be contracted for and invoiced for separately ($4,630 monthly for 24x7 support).