Seamus Company Network Infrastructure Refresh

Network Infrastructure rebuilD

Damian Yates

2020

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## Problem Overview

The Seamus Renton Office and satellite offices are currently utilizing equipment and routing protocols that do not meet the anticipated data flow needs of the new applications and hardware solutions to be implemented next year. This response to RFP will address both the deployment and migration of Seamus Corporation current operations to the newly deployed Seamus Corporation Infrastructure. The primary goal of this migration to the new infrastructure is to ensure that Seamus Corporation will be able to meet the networking needs of the new processes, software, and hardware that will be deployed next year.

After a review of the existing infrastructure environment, Damian J. Yates, LLC engineers have developed a plan to replace and configure both the core infrastructure and distributed elements at the various remote sites. To ensure minimal operational interference, engineers have requested several windows for maintenance in which all disruptive processes will occur leaving all services and functions of the company intact at all other times.

This RFP will be the 10th of its kind that Damian J. Yates, LLC, if awarded, will have completed in the 15 years it has been in service to the Puget Sound Northwest education and non-profit organizations. Damian J. Yates, LLC estimates that this project will cost Seamus $193,000 which includes 104 man hours provided by Damian J. Yates LLC, all anticipated hardware, cabling, as well as 2 year replacement warranty of the hardware. Damian J. Yates, LC commits 90 days of support to Seamus at no cost after the completion of the project. This service is provided to every RFP customer to ensure that all services are provided as proposed in the RFP and to fill the support void left at the end of most projects.

Upon completion of this network augmentation, Seamus Corporation will be prepared for the new hardware, software, and processes to be implemented to support the new Seamus Operations. All core network functions will be operating across the new Seamus Infrastructure. Legacy applications and operations in the process of being redeveloped for use with the new Seamus Operations will continue to operate on a skeleton of the old Seamus network with a clear turn down date of December 2020. At that point, all Seamus operations will be operating on the new Seamus infrastructure.

## Proposed Solution

Currently, Seamus Corporation operations is working on equipment that reached end of life over 10 years ago. Though this is a testament to the resilience and professional care given to the company’s infrastructure, this equipment will not meet the needs of Seamus Corporation move to operational practices, equipment and software. This solution will allow Seamus Corporation to continue its existing operations during its migration to the new hardware and processes while building the new infrastructure. To ensure that operations continue uninterrupted during the network Infrastructure update, the routing protocol currently, EIGRP, which is a Cisco proprietary routing protocol will need to be changed to OSPF. This change will allow for proper routing of network communications between the older hardware supporting legacy Seamus operations and the new hardware that will be used for the new Seamus Operations.

## Justification and Proposal Highlights

Damian J. Yates, LLC presents this response to RFP knowing that they are proposing a solution to modernize Seamus Corporation aging infrastructure. Damian J. Yates, LLC looks forward to adding Seamus Corporation to its portfolio of satisfied clients spanning its 15 years of service and experience to the Seattle Area. As Seamus is working to modernize their processes, services, software, and hardware, they realize that the need to improve its network capacity and required availability to support their vision. This response to the RFP provides Seamus Corporation with a solution that will modernize the infrastructure, increase its network capacity, throughput, and availability. In addition, the new infrastructure provides a way forward for future growth and acquisitions. This project will be led by a senior engineer with industry certifications and at least 3 successful enterprise while employed with the firm. This deployment will completely replace Core and Satellite Infrastructure components with new hardware. Realizing the need to invest in the augmentation of the infrastructure of Seamus Corporation before implementing its vision to modernize its operations will provide a high ROI as this decision will impact all aspects of operations from the corporate office to the remote worker.

## Related Works Review

As Seamus Corporation is working to modernize its use of technology the choice to utilize technology that adheres to Open Standard. Moving from the cisco dependent routing protocol (EIGRP) to OSPF is the first step in this journey. Since the IETF has established OSPF as the standard for interior routing (Conde, 2016), just about every layer 2 device manufacturer supports the protocol. The current infrastructure environment is currently capable of multiple routing protocols but due to the use of EIGRP and the Seamus Corporation desire to purchase of nonproprietary hardware, redesigning the entire infrastructure will provide a greater ROI than many of the alternative choices. The selection of Juniper hardware was due to its cost as well as its ability to accommodate the move to OSPF while ensuring that Seamus has the bandwidth and throughput capacity for the new processes and will place the company in a better position for future upgrades and purchases of infrastructure hardware.

The Seamus network currently functions as a “Collapsed Core” design. This was not by design but due to many network mergers over time. Multiple domains and VLANS (Virtual Local Area Networks) have converged to create what is known as the Seamus Infrastructure. In smaller infrastructures, a collapsed core design keeps management and routing inside the Distribution/Aggregation layer of a network and allows for routing and access changes to be controlled downstream from the core router or switch. The new Infrastructure design requires the segregation of functions within the network into 3 zones. Access Layer, “which provides user access to the network”. Distribution Layer, “which provides policy-based connectivity and controls the boundary between the access and core layers.” Core Layer, this layer “provides fast transport between the distribution switches within the enterprise campus” ( Cisco Networking Academy, 2014)

The implementation of SNMP within the infrastructure of the Seamus network will allow for the requested ability to monitor, report and alert on the health of the infrastructure. However, due to a known vulnerability that “allows attackers to read and modify any SNMP object”, special care needs to be taken to secure each device to be monitored (Taschner & Warren, 2008). Currently, the Seamus engineers and technicians respond to faults within the network and resolves the issue without a firm understanding of why the fault occurred or able to determine what steps to take to prevent a future iteration of the fault. SNMP will provide real-time and archive performance metrics, access list violations, as well as a record of changes that are made.

## Goals, Objectives, and Deliverables

Upon completion of project, networking assets will be utilizing the Open Shortest Path First version 3 (OSPFv3) routing protocol from the core layer downstream to the access layer (Coltun, Ferguson, Moy, & Lindem, 2008). All new hardware will be installed, tested and configured for use. All EOL hardware will be removed and stored for decommissioning by Seamus Corporation.

### Distribute Collapsed Network

(Start Day 1. ETC 7 – 14 days dependent on production downtime availability)

During this phase, engineers will work to break-out the collapsed network into individual operating domains in preparation of the switch over to OSPFv3.

*Phase 1 – Part 1A (****PRODUCTION AFFECTING)****:* Install New Hardware and segregate routing layers. Split up the pseudo “collapsed core” infrastructure to allow networking assets to function within their own operating domain (OSPF Area).

*Deliverable – Old hardware will be relocated to secondary rack and consolidated for legacy support. New hardware staged for deployment and configuration.*

*Part 1B (****PRODUCTION AFFECTING)****: Establish* redundant connections to and from core and distribution networking equipment.

*Deliverable – New Hardware will be installed and configured for high availability and the OSPF Routing*

*Part 2A (****PRODUCTION AFFECTING):*** Redistribute the existing EIGRP routes to OSPFv3 routing protocol for Corporate office network equipment.

*Deliverable –* Corporate routers will update route information via OSPF.

*Part 2B (****PRODUCTION AFFECTING):*** Redistribute the existing EIGRP routes to OSPFv3 routing protocol for Snoqualmie office network equipment.

*Deliverable –* Remote office router will update routing information via OSPF.

*Part 2C (****PRODUCTION AFFECTING):*** Redistribute the existing EIGRP routes to OSPFv3 routing protocol for Puyallup office network equipment.

*Deliverable –* Remote office router will update routing information via OSPF.

*Part 2D (****PRODUCTION AFFECTING):*** Redistribute the existing EIGRP routes to OSPFv3 routing protocol for Auburn office network equipment.

*Deliverable –* Remote office router will update routing information via OSPF.

*Part 2E (****PRODUCTION AFFECTING):*** Redistribute the existing EIGRP routes to OSPFv3 routing protocol for Olympia office network equipment.

*Deliverable –* Remote office router will update routing information via OSPF.

*Phase 2 – Part1A (****PRODUCTION AFFECTING):*** Cleanup and consolidate VLAN/Subnet databases across network.

*Deliverable –* VLAN databases will be consolidated to Core Distribution Layer.

*Part1B* ***(PRODUCTION AFFECTING):*** Migrate all VLAN/Subnets to Firewall stack.

*Deliverable –* VLAN database functions transferred to redundant firewall stack.

### Validate High Availability between Core and IDF’s

(Start after Project Series 1, Phase 1B Completion. ETC 1 – 3 days, dependent on downtime availability)

This phase will require engineers to coordinate simulated failures to network links between MDF Core switch and IDF switches throughout the company.

Phase 1 – ***(PRODUCTION AFFECTING):*** Validate redundancy at the core and distribution layer.

*Deliverable –* Network operations will remain functional with 1 link between Core Switch and IDF switches being offline.

### Validate High Availability Core, Firewall Stacks and Remote Sites

(Start after Project Series 2, Phase 1B Completion. ETC 1 – 3 days, dependent on downtime availability)

This phase will encompass the engineers coordinating managed outages between HQ and all remote sites. Engineers will also migrate wireless controller over to new infrastructure and establish monitoring of the network.

Phase 1 – ***(PRODUCTION AFFECTING):*** Validate load balancing and failover services between core and firewall devices.

*Deliverable – Network operations continue despite loss of communications across one link between Core and Firewall.*

Phase 2 – ***(PRODUCTION AFFECTING):*** Validate failover services between firewall and remote site IDF’s.

*Deliverable – Network operations continue despite loss of communications across any one link between a Remote site and the Firewall.*

Phase 3 – **(*PRODUCTION AFFECTING):*** Migrate *Wireless LAN Controller* from old Infrastructure to the virtual interfaces on firewall.

*Deliverable – All wireless communications will traverse new infrastructure.*

Phase 4 – ***(NON-PRODUCTION AFFECTING):*** Implement SMNPv3 on each network device and disable any/all older protocol versions. SNMPv3 is a system monitoring protocol.

*Deliverable – Alerting and Monitoring of the network is now possible.*

### Decommission old hardware

(Start after Project Series 3, Phase 4 Completion. ETC 1 – 3 days, no impact on production operations)

All out of band hardware will be decommissioned per Seamus Corporation policy at this point of the project.

Phase 1 – Devices either passed or nearing the end-of-life/end-of-support date will begin decommissioning per Seamus Corporation existing technology refresh policies. Reference “In Use Equipment EOL” table below

*Deliverable –* Old hardware from Seamus previous infrastructure will have its footprint reduced by 75%. Legacy hardware that remains will be decommissioned 365 days after the completion of this RFP.

### Document and Diagram New Seamus Infrastructure

(Start after Project Series 3, Phase 4 Completion. ETC 7 – 10 days, no impact on production operations)

*Deliverable –* Diagram of Physical layout of Seamus Network Infrastructure

*Deliverable –* Diagram of Logical layout of Seamus Network Infrastructure

*Deliverable –* Diagram of Physical layout of Seamus Power Distribution Infrastructure

*Deliverable –* Diagram of Logical layout of Seamus Power Distribution Infrastructure

*Deliverable –* Diagram of Physical layout of Seamus Network Infrastructure Wiring

*Deliverable –* Diagram of Port Map of all Switch, Router, Firewall, Dmarc and IDF ports.

# Project Timeline

Project Start date is tentatively set for December 02, 2020. Timeline is as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| **Start Date** | **End Date** | **Deliverable** | **Duration** |
| 12-02-2020 | 12-04-2020 | Install all Hardware and Segregate routing layers | 3 days |
| 12-05-2020 | 12-06-2020 | *Establish* redundant connections to and from core and distribution networking equipment | 1 day |
| 12-09-2020 | 12-11-2020 | Redistribute the existing EIGRP routes to OSPFv3 routing protocol | 3 days |
| 12-11-2020 | 12-12-2020 | Cleanup and consolidate VLAN/Subnet databases across network | 1 day |
| 12-12-2020 | 12-13-2020 | Migrate all VLAN/Subnets to Firewall stack | 2 days |
| 12-16-2020 | 12-17-2020 | Validate redundancy at the core and distribution layer | 1 days |
| 12-17-2020 | 12-18-2020 | Validate load balancing and failover services between core and firewall devices | 1 days |
| 12-18-2020 | 12-20-2020 | Validate failover services between firewall and remote site IDF’s | 2 days |
| 12-19-2020 | 12-20-2020 | Migrate *Wireless LAN Controller* from old Infrastructure to the virtual interfaces on firewall | 1 day |
| 12-30-2020 | 12-31-2020 | Implement SMNPv3 | 2 days |
| 01-01-2021 | 01-10-2021 | Document and Diagram New Seamus Infrastructure | 10 days |

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# Resources and Costs

Listed below is the equipment and man hours that will be required for Damian J. Yates, LLC to complete project and description of equipment within the timeline provided in the RFP. All hardware will need to be onsite and staged in the data center at HQ for proper deployment and distribution to remote sites by personnel of Damian J. Yates, LLC for installation and configuration.

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Price** | **Vendor** | **Description** |
| Fortigate 900D Firewall x3 | 23,000.00 | CDW | Proposed Firewalls to replace Cisco Hardware |
| Juniper EX4600 G/S x8 | 106,400.00 | CDW | Layer 2 Capable switches to replace Cisco Hardware |
| Mini Gbic SFPs x200 | 35,800.00 | CDW | Transceivers needed for Gigabit RJ45 connections to switches |
| SFFP 10GB x 18 | 6,984.00 | CDW | Transceivers needed for 10 Gigabit RJ45 connections between switches, routers and firewalls |
| Cat6 RJ45 Patch Cables x 200 | 2,400.00 | CDW | Certified Network cabling for connecting servers, switches and patch panels to each other |
| Multi-Mode Fiber Optic cable x18 | 432.00 | CDW | Certified Fiber cabling used to connect uplinks to switches, routers and firewalls. |
| Man Hours x 104 | 18,200.00 | Damian Yates | Man hours needed to complete project by Damian J. Yates, LLC |
| **Estimate Total:** | **193,216.00** |  |  |

# End of Project Results

Upon completion of this project, Seamus Corporation will begin the new year with a brand new highly available and efficient network. Network efficiency, throughput and resilience will be increased by an estimated factor of 10. Seamus Corporation will no longer suffer from outages caused by a single failure within the infrastructure. Damian J. Yates, LLC will remain available to Seamus Corporation for 90 days after the project completion to address any unforeseen issues that may arise and to collect metrics on the performance of the network on a weekly basis. At the end of the 90 days, Damian J. Yates, LLC will present Seamus Corporation a comprehensive report on the performance of the network since its inception and use on Jan 1, 2020. This report, we anticipate, will show nominal network stress, flawless test failover transitions, and prompt and descriptive fault alerts via SNMP. Because Seamus Corporation has no prior metrics, Damian J. Yates, LLC will make itself available once more to provide a benchmark comparison of network flow and operations prior to its implementation of its new operations processes, hardware and software installation and again after 60 days of data collection. It is with this report Damian J. Yates, LLC will show that the investment made in the new infrastructure meets, and hopefully exceeds the anticipated ROI.

# Works Cited

Cisco Networking Academy. (2014, 05 09). *Cisco Networking Academy Connecting Networks Companion Guide: Hierarchical Network Design*. From Cisco Press: http://www.ciscopress.com/articles/article.asp?p=2202410&seqNum=4

Coltun, R., Ferguson, D., Moy, J., & Lindem, A. (2008, July). *RFC 5340 - OSPF for IPv6 .* Wilmington, DE: IETF. From https://datatracker.ietf.org/doc/rfc5340/?include\_text=1

Taschner, C., & Warren, D. (2008, 06 10). *SNMPv3 improper HMAC validation allows authentication bypass.* From CERT Coordination Center: https://www.kb.cert.org/vuls/id/878044/



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| Smart Phone |
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| Damian J. Yates |
| User |

JoAnn Miller, Supply Chain Department  
Seamus Corporation

650 N South Street  
Dellburg, WI 99999

Dear **JoAnn Miller**,

Damian J. Yates, LLC and its staff would like to thank you for presenting us the opportunity and honor to reply to your request for proposal to upgrade and enhance your existing network infrastructure. Enclosed you will find a comprehensive plan to replace existing hardware with current technologies that will be capable of supporting the changes to your operations and anticipated increase in web visitors and customers to your public facing web servers. Our certified staff only focus will be on this RFP for the entirety of its implementation. We are committed to meeting each objective on time and on budget or better. Upon completion of the project, your staff and customers will observe zero down time or interruptions outside of the planned maintenance windows. Our goal is your complete satisfaction with a hint of astonishment.

Most large companies will split their attention between multiple projects during the same period of time, Damian J. Yates, LLC and its staff devotes the entire staff to one project at a time to ensure no conflict of schedules, readily available resources at all times, and to have the ability to respond quickly to any unforeseen difficulties that may pop up during the project. It is this difference that we try to differentiate ourselves from other providers and hope that you find an added value in the level of service we look forward to providing you and your staff.

Warm regards,

Damian J. Yates

Owner