Team 27

Proposal for Retrofit of Data Center

Introduction

In response to our big data analytics company's requirement for a state-of-the-art data center capable of withstanding a variety of security threats and ensuring five-nines uptime, we propose a detailed retrofit of our current infrastructure. This proposal outlines our approach to refresh our hardware and software licenses, incorporate cutting-edge technologies, and implement best practices for business continuity and environmental sustainability.

Project Justification

Recent incidents, including DDoS attacks and power outages, have underscored the vulnerabilities in our existing infrastructure. By adopting next-generation technologies and strengthening our security posture, we will not only safeguard our assets but also reinforce our market position as a forward-thinking, reliable service provider.

Objectives

- To retrofit the existing data center with advanced technology, enhancing security, and operational efficiency
- To provide an ''out of band" solution
- Best-in-service power and cooling

Plan

1. Hardware and Software Upgrades:

- Networking and Security:

    Upgrade to Catalyst 9500 Series Switches and Cisco FirePOWER 4145 NGFWs, enhancing network performance and security. The firewall will also be up to date with PCI-DSS compliant controls set.

    Implement CISCO C9120AXI-B Access Points for CYOD, ensuring scalable and secure wireless access compliant with IEEE 802.11ac standards and Wave 2 specifications. We recommend CYOD over BYOD because the devices are configured with security protocols and ensure your company data is contained and protected.

- Software Licenses:

    Procure licenses for Bitdefender, McAfee Antivirus, and Zoom, enhancing cybersecurity and remote collaboration capabilities.

2. Methodologies for Addressing Business Needs:

- Engage stakeholders to refine requirements and conduct a gap analysis using methodologies.
- Also included is the staff needed to support this operation on the data center and maintain it.

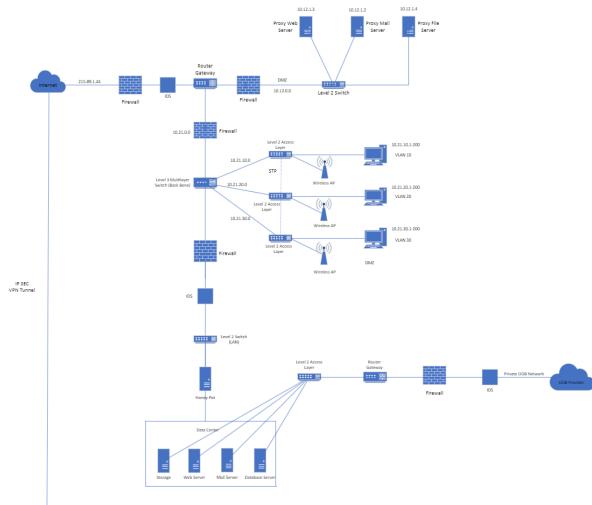3. Future Infrastructure and Service Operations:

- Adopt Software-Defined Networking (SDN) to unchain hardware and software layers, facilitating easier management.
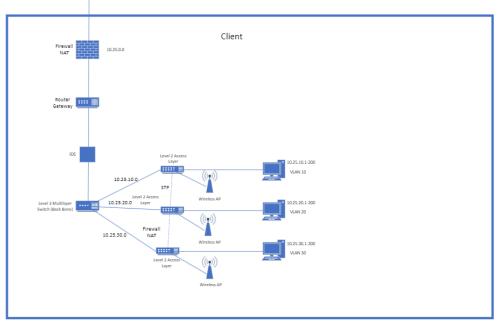- Plan for hybrid cloud integration with Federal Cloud, ensuring scalability and compliance.

4. Sustainability and Green Energy Initiatives:

- Implement energy-efficient hardware and cooling systems and explore renewable energy integration. This will be done by Novel Data Center Cooling and Control Save Energy and Optimize Utility provided by the office of energy efficiency & renewable energy.

5. Out-of-Band Solution:

- Develop a resilient out-of-band management network using Nuday network infrastructure managers for 100% availability, ensuring maintenance and monitoring without impacting production traffic. Nuday will provide us with an alternate solution for out-of-band.

Proxy Web Server 10.12.1.3
Proxy Mail Server 10.12.1.2
Proxy File Server 10.12.1.4

Router Gateway

Internet

215.89.1.44

Firewall

IDS

DMZ
10.12.0.0

Firewall

Level 2 Switch

Firewall
10.21.0.0

10.21.10.0

Level 2 Access Layer

10.21.10.1-200
VLAN 10

STP

Wireless AP

Level 3 Multilayer Switch (Back Bone)

10.21.20.0

Level 2 Access Layer

10.21.20.1-200
VLAN 20

Wireless AP

10.21.30.0

10.21.30.1-200
VLAN 30

Firewall

Level 2 Access Layer

Wireless AP

DMZ

IDS

IP SEC
VPN Tunnel

Level 2 Switch (LAN)

Level 2 Access Layer

Router Gateway

Firewall

IDS

Private OOB Network

OOB Provider

Honey Pot

Data Center

Storage   Web Server   Mail Server   Database Server

Client

Firewall NAT
10.25.0.0

Router Gateway

IDS

Level 2 Access Layer

10.25.10.0

10.25.10.1-200
VLAN 10

STP

Wireless AP

Level 3 Multilayer Switch (Back Bone)

Level 2 Access Layer

10.25.20.0

10.25.20.1-200
VLAN 20

Firewall NAT

Wireless AP

10.25.30.0

Level 2 Access Layer

10.25.30.1-200
VLAN 30

Wireless AP

Migration

- A phased retrofit approach, with critical system upgrades prioritized to minimize business disruption.
- Comprehensive testing and validation protocol, ensuring a seamless transition.

Time to Implement

- 1 Year Timeline:
    - Preparation and Planning: 6 months
    - Phases 1-3 Implementation: 1 month each
    - Testing and Validation: 2 months
- A crucial phase in this process is the site survey, which will help decide what to design and how to fit it into the available area without disrupting the current state of the network.
- The installation can start piece by piece with ground personnel and technicians once all equipment has been purchased and the cables are laid out ready for plug-ins.
- There will be a testing phase lasting 2-4 weeks once the plan is set in place, ensuring that the environment and network will function properly.
- Afterwards we step into the implementation phase, The real upgrading is carried out during this phase for 4 weeks each. To guarantee a smooth transition, the IT team will need to communicate with multiple departments and may need to upgrade hardware and software throughout the network.

Cost Detail					
Description	Cost	Per Unit	Description	Cost	Per Unit
Hardware			**Licenses**		
Core Switch: Catalyst 9500 60x25/50G + 4x400G	$ 40,996.00	ea	Bitdefender (VPN Services)	$ 79.99	Per Year
Firewall: Cisco FirePOWER 4145 NGFW 2 x NetMod Bays	$ 231,834.99	ea	McAfee Antivirus (Antivirus Software)	$ 49.99	Per User
Access Point: CISCO C9120AXI-B	$ 1,111.99	ea	Zoom (Video Conferencing)	$ 22.49	Per Month
Router: Cisco 4451	$ 7,725.00	ea	FISMA Low (Federal Cloud Computing Services)	$ 2,070.00	Per Month
WLAN Controller: Centralized Cisco 8500	$ 17,999.00	ea	VMWare (Virtualization and Cloud Computing)	$ 8,965.00	50 Users Per Year
Secuirty Cameras: GNS IP 4MP Matrix IR Turret Camera(5 cameras)	$ 1,145.00	per pack	AD Domain Servies (Directory Services)	$ 0.40	Per Hour
Backup Generator: Generac Protector QS Series 48kW Automatic Standby Generator	$ 17,217.00	ea	Windows Server 2022 (Server Operating System)	$ 568.99	Per Machine
Server: UCS 5108 Blade Server AC Chassis	$ 10,609.19	ea	Okta (2FA and Identity Management)	$ 6.00	Per User
Load Balancer: Barracuda Load Balancer Appliance 642 w/ 10GbE Fiber NICs	$ 18,240.00	ea	Zendesk Ticket System (Customer Support and Ticketing)	$ 19.00	Per User
Patch Panel: APC 48 Port Cat6	$ 476.99	ea	Avanan(Email Security)	$ 4.60	Per User
Access Switch: Cisco C9300X-48TX-E Catalyst 9300X Network Essentials Switch	$ 14,500.00	ea	Nagios (Network Monitoring)	$ 4,490.00	100 Max Nodes
Overhead Tray: 454 series flexible cable tray snake tray	$ 51.40	ea	AnyDesk (Remote Support)	$ 79.90	Per Month
Overhead Busway: Snake Tray Busway	$ 80.00	ea	Nuday Networks (Out-Of-Band Management)		
UPS: Vertiv Liebert GXT5 UPS 4900VA 208V	$ 7,510.00	ea			
PDU: APC by Schneider Electric Metered Rack AP8841 42-Outlets PDU	$ 776.99	ea	**Services**		
Server Rack: APC NetShelter SX Deep Rack Enclosure With Sides	$ 1,699.99	ea	ISP: AT&T 1GB connection	$300.00	Month
CRAC: Liebert DS, DS105A, 105kW	$ 15,000.00	ea	DRP	$ 10,000.00	Year
Server Enclosure: Dell PowerEdge M1000e Blade Enclosure	$ 555.00	ea	Test Penetration	$ 4,000.00	Starts
Distribution/Aggregation Switch: Cisco Catalyst 9500-24Q	$ 26,129.99	ea			
			Staff		
Installations/Cabels			Chief Inormation Officer	$ 165,136.00	
Installations cost in the building for Fiber	$ 20.00	ft	Chief Security Officer	$ 128,543.00	
Installations cost in the ground for Fiber	$ 100.00	ft	System Engineer Manager	$ 125,255.00	
Installations cost in the building for (UTP)	$ 2.00	ft	CyberSecurity Engineer	$ 106,200.00	
Installations cost in the ground for (UTP)	$ 50.00	ft	Cloud Secuilry Engineer	$ 116,765.00	
Fiber Optic Cable	$ 5.00	ft	Devops Manager	$ 91,554.00	
Unshielded Twisted Pair (UTP)	$ 1.00	ft	Network Engineer Manager	$ 71,887.00	
			Developers	$ 70,431.00	
			Operations Support Manager	$ 64,632.00	
			System Admin	$ 60,651.00	
			Network Admin	$ 57,512.00	
			Networks Operations Center(NOC) Techician	$ 37,891.00	
			Admin Assistant	$ 30,090.00	
			The Staff above the essential personal required		

Cost Detail

- Detailed cost breakdown including all hardware purchases, software licenses, and citing manufacturer's suggested retail prices (MSRP) where applicable.
- Please note that some of the costs may change over time, and some require contractor quotes that we are unable to gain access to.
- We estimate the entire retrofit of the datacenter will cost approximately $6 million based on our research. This cost is necessary to have hardware and software upgraded to the latest security standards.

Conclusion

Our proposal represents a comprehensive plan to overhaul our data center, aligning with the latest technological advancements and security standards. This initiative is not only a response to past challenges but a proactive measure to position our company for future growth and success. We seek the CIO and CFO's approval to proceed with this critical investment, ensuring our infrastructure's resilience, efficiency, and sustainability.

References/Links

Core Switch: Catalyst 9500 60x25/50G + 4x400G
https://www.cdw.com/product/cisco-catalyst-9500-network-advantage-switch-24-ports-managed-rac/4712836

Firewall: Cisco FirePOWER 4145 NGFW 2 x NetMod Bays
Cisco FirePOWER 4125 NGFW - security appliance - with 2 x NetMod Bays - FPR4125-NGFW-K9 - Firewalls & VPN - CDW.com

Access Point: CISCO C9120AXI-B
Cisco Catalyst 9120AXI - wireless access point - 802.15.4, Bluetooth, Wi-Fi 6 - C9120AXI-B - Wireless Access Points - CDW.com

Router: Cisco 4451
Cisco 4451-X Integrated Services Router - Cisco

WLAN Controller: Centralized Cisco 8500
https://www.cisco.com/site/us/en/products/networking/sdwan-routers/catalyst-8500-series-platforms/index.html?dtid=osscdc000283

Secuirty Cameras: GNS IP 4MP Matrix IR Turret Camera(5 cameras)
https://clienthub.getjobber.com/client_hubs/e5eb7589-9e28-4159-b21a-511a3660c330/quotes/31156375.html?comm_channel=sms&comm_type=quote_sent&utm_medium=sms&utm_source=twilio

Backup Generator: Generac Protector QS Series 48kW Automatic Standby Generator
Generac Power Systems - Protector Series Commercial Generators

Server: UCS 5108 Blade Server AC Chassis
https://www.cisco.com/c/en/us/support/servers-unified-computing/ucs-5108-blade-server-chassis/model.html

Load Balancer: Barracuda Load Balancer Appliance 642 w/ 10GbE Fiber NICs
https://www.barraguard.com/640-ADC-10GbE-Fiber.asp

Patch Panel: APC 48 Port Cat6
https://www.cdw.com/product/apc-48-port-cat6-network-patch-panel/1265870?cm_ven=acquirgy&cm_cat=bing&cm_pla=NA-NA-APC_PT&cm_ite=1265870&s_kwcid=AL!4223!10!73942429039415!15324329680&ef_id=85f7eeefd5bf18c2353688ec805af708:G:s&msclkid=85f7eeefd5bf18c2353688ec805af708&utm_source=bing&utm_medium=cpc&utm_campaign=APC%20SKU&utm_term=CAT6PNL-48&utm_content=APC%20Network%20Cable%20Accessories

Access Switch: Cisco C9300X-48TX-E Catalyst 9300X Network Essentials Switch
https://www.serversupply.com/NETWORKING/SWITCH/48%20PORT/CISCO/C9300X-48TX-E_355367.htm?gad_source=1&gclid=Cj0KCQjwqpSwBhClARIsADlZ_Tmx0dmHSnCkpVVR9hIHrVxQz6cGjgecIfAaY2P_-wpIya2FUQ3Xht8aAoG9EALw_wcB

Overhead Tray: 454 series flexible cable tray snake tray
https://www.snaketray.com/product-catalog/raised-floor-power-distribution/snake-bus/

Overhead Busway: Snake Tray Busway
https://www.snaketray.com/product-catalog/raised-floor-power-distribution/snake-bus/

UPS: Vertiv Liebert GXT5 UPS 4900VA 208V
Correkt Commerce | Online Marketplace

Server Rack: APC NetShelter SX Deep Rack Enclosure With Sides
APC NetShelter SX Deep Rack Enclosure With Sides - AR3100 - Racks & Cabinets - CDW.com

CRAC: Liebert DS, DS105A, 105kW
Liebert DS, DS105A, 105 kW | CRAC and Data Center Cooling Systems (vertiv.com)

Server Enclosure: Dell PowerEdge M1000e Blade Enclosure
https://www.servermonkey.com/default/refurbished-dell-poweredge-m1000e-blade-enclosure.html

Distribution/Aggregation Switch: Cisco Catalyst 9500-24Q

https://www.googleadservices.com/pagead/aclk?sa=L&ai=DChcSEwiIsp6Ih5iFAxV-Eq0GHbofCHMYABBYGgJwdg&gclid=Cj0KCQjwqpSwBhClARIsADlZ_TkI6Tp-4MMmzp0eIuHOeprDIW4_E1ncq-ba5daGPbmgnezcExms5iAaAt48EALw_wcB&ohost=www.google.com&cid=CAESVuD2KuuG4IWd7cgKgqbfOhqQ7fY7D798_loUu0HwrEyA8nwHnja3pT8U4xM282Eag-ybp06QWU3R31a6EOzPVBN0DwfWsDMZi-MfSpdzzEl8eyys7xF7&sig=AOD64_1gbX_Zt75OKqucNCqdJUul_FWD2g&q&adurl&ved=2ahUKEwioq5OIh5iFAxUNHEQIHSV6AocQ0Qx6BAgEEAE&nis=8

Bitdefender (VPN Services)

Protecting your cherished memories, confidential data, creative work, financial information (bitdefender.com)

McAfee Antivirus (Antivirus Software)

https://www.mcafee.com/consumer/en-us/landing-page/direct/sem/mtp-family/desktop/shopping.html?csrc=google&csrcl2=pla-shopping&cctype=desktop-brand&ccstype=&ccoe=direct&ccoel2=sem&pkg_id=521&affid=1490&cid=238396&utm_source=google&utm_medium=paidsearch&utm_campaign=en-us:shopping:NonBrand_(Smart)&utm_content=Ad_group&utm_term=&gad_source=1&gclid=Cj0KCQjwqpSwBhClARIsADlZ_TkU8OnJS7eaienPb33dTUfKWlavbo0pcnQkrjkMWtJ4i3jxwGSD76gaAoAMEALw_wcB&gclsrc=aw.ds

Zoom (Video Conferencing)

Plans & Pricing for Zoom Workplace | Zoom

FISMA Low (Federal Cloud Computing Services)

https://cloud.gov/pricing/

VMWare (Virtualization and Cloud Computing)

VMware Horizon Universal Subscription - (Core)Insighthttps://www.insight.com › Shop

AD Domain Servies (Directory Services)
https://azure.microsoft.com/en-in/pricing/details/microsoft-entra-ds/

Windows Server 2024 (Server Operating System)
https://www.trustedtechteam.com/collections/microsoft-windows-server-standard/products/microsoft-windows-server-2022-standard-16-core?_gl=1*idhy2v*_up*MQ..&gclid=Cj0KCQjwqpSwBhClARIsADlZ_TlkpxMC79TvOzufwQumdf-EzUezFNitHEU6TSw9NhUz98cxNk_xMkMaAm0vEALw_wcB

Okta (2FA and Identity Management)
https://www.okta.com/pricing/

Zendesk Ticket System (Customer Support and Ticketing)
https://www.zendesk.com/pricing/

Avanan(Email Security)
https://www.avanan.com/pricing

Nagios (Network Monitoring)
https://www.nagios.com/pricing-plans/

AnyDesk (Remote Support)
https://anydesk.com/en/pricing

Nuday Networks (Out-Of-Band Management)
Nuday Colocation offers Smart Out of Band Solutions | OOB Colocation

ISP: At&T 1GB connection
https://www.attsavings.com/lp/internet-%20plans?kbid=88449&utm_source=highspeedinternet.com&utm_medium=affiliate&_ga=2.224701786.130%208433760.1554494294-1716151648.155449429

DRP
https://www.atlantech.net/

Test Penetration
https://hacken.io/discover/how-much-does-penetration-test-cost-or-price-of-your-security/

Installations cost in the building for Fiber

https://thenetworkinstallers.com/blog/fiber-optic-installation-cost/

Installations cost in the ground for Fiber
https://thenetworkinstallers.com/blog/fiber-optic-installation-cost/

Installations cost in the building for (UTP)
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Fiber Optic Cable
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Unshielded Twisted Pair (UTP)
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