NetShark Innovators (Group 5)
Joshua Marzan
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Project Scope

Our scope of work will be constrained to only one medical facility (Providence Medical Center). Executives, shareholders, and the board of directors should expect the project to be completed by the 18 month mark - by the end of February 2025 as we are essentially spearheading an overhaul of the network for the entire facility. Over the course of these 18 months, there will be several phases dedicated to the project's progress including assessing the network's current state and identifying areas for improvement, proposing a design and upgrade scheme, infrastructure upgrading (cabling, network devices), VLAN implementation and network segmentation, and providing documentation to the eventual IT staff for monitoring purposes and providing user training for the staff that will use the network.

Our Objective

Equipping Providence Medical Center with a computer network that will best suit the needs of the modern hospital: reliable network and wireless connection, compartmentalized network topology for ease of traffic flow, high availability across all locations of the campus, and most importantly- a secure network.

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Main deliverables:

- Network design proposal and enhancement plan
- A training program for staff to provide user security training
- A secure network that will protect sensitive information including patient data and research
- A redundant network that achieves four-nines (99.99%) availability so critical operations will never be halted and essential medical technology stays functional
- A network with more efficient data flow
- A network that will be accessible throughout the various locations of Providence Medical Center
- Training materials for IT staff that will oversee support after implementation
- A suite of monitoring tools that can provide visibility and observability on the network's health.

Initial Project Timeline (subject to change)

Phase 1 (Months 1-2): Current Network Assessment and Design Proposal

Phase 2 (Months 2-5): Core Network Infrastructure Upgrades (includes placement)

Phase 3 (Months 5-7): VLAN Implementation/Network Segmentation

Phase 4 (Months 7-9): Wireless Network Enhancement/Assessment

Phase 5 (Months 9-12): Network Monitoring Implementation/Identifying Observability Gaps

Phase 6 (Months 12-15): Providing Documentation and Training Program

Technical Requirements: (align with business goals, limit by financial constraints)

Scalability: user data, devices on networks, more sites

Availability: network redundancy across all major switches, seco, diesel generators powering server room in case of outages, SD-WAN to transfer traffic in case of outage

Network Performance: 5Gbps bandwidth to allow for video calls, EHR search/transfer, real time image transfer (XRay/MRI), administrative work. 2nd ISP for network critical services and devices (DC, FS, App Servers, Web Servers)

Security: HIPAA/ePHI framework, best practice for patching

a. Encryption: electronic health records (EHR) [1], patient monitoring devices, wireless
b. Access Control: accessing EHR, network resources, data files based on the principle of least privilege
c. Monitoring: server and database access, WLAN access, network
d. Employee Training: Cybersecurity training, KnowBe4 phishing attempts
e. Endpoint Protection: SentinelOne IPS Software, Fortinet Firewalls

f. Physical Security: locking ports, restricting access to server room, keycard access
g. Quarterly Meetings with IT Team: Pen Testing, improving security, planning out meetings

Manageability: track network changes (PD100), implementing patching schedule

Adaptability: avoid incorporating elements that are hard to implement later

Affordability: max traffic for financial cost = best redundancy to save lives

Feasibility Analysis

Budget

Taking into consideration the extent of overhauling that will be done, the budget for $8 million. This includes the cost of hardware, implementation of equipment, software licensing, contractors working on the project, and other miscellaneous items. For a network that is being revamped to improve network performance and improve all-around security, this is feasible especially considering how much is spent on maintaining IT operations in this kind of environment.

Legal and Compliance Considerations

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Accounting for the fact that we will be handling patient data and research information, we will need to make sure our design meets HIPAA regulations and is compliant with the ePHI framework. HIPAA regulations outline that there are 18 various demographics that can identify a patient ranging from name, addresses, social security numbers, medical records, emails and much more. With hashing out access controls, security, and encryption - we can ensure this project will be feasible in this regard.

Risk Assessment

With handling such data and working in a facility where availability of services is paramount, several risks must be addressed and considered in the design scheme. Risks that have been identified that could have detrimental effects on availability are physical access control, cybersecurity threats, natural disasters (due to location in FL).

Market Research

According to Definitive Healthcare, the average IT operating expense budget across over 4600 hospitals is approximately $7.8 million. Given the kind of project we are undertaking and the size of the facility, our budget falls right into this ballpark and will be sufficient for the various tasks that need to be completed.

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Technical/Resource Feasibility

The technical requirements have been outlined in our scope of work and they coincide with what we need in regards to resources to ensure this project's completion will be feasible. Given the nature of what we are working with, we will need to make sure our network is available, secure, redundant, and able to be monitored and patched with efficiency. This means we will need to have the best devices/equipment to implement with the network, sufficient encryption to ensure data remains secure and also ensure that the network performance remains optimal (the monitoring aspect). With the selection of devices we will have at our disposal and the cooperation of our partners (ISPs, Dynatrace, Splunk, various contractors) we can ensure the technical aspect of this project is feasible.

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Feasibility Report

With the several aspects of this project considered, we at NetShark Innovators wholeheartedly believe this project is feasible and will be able to be completed within the 18-month deadline. As stated above, we have a plan to provide a suite of deliverables that will ensure increased network performance, increased security, a redundant and available network along with tools for monitoring and training to support it, and a program that will be used to educate the staff on best practices to use when utilizing the network.

Sources:

https://research.aimultiple.com/data-encryption-in-healthcare/