Network Design Proposal

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MedSys Innovations

2801 Founders Dr.

Raleigh NC, 27607

Mr. Jim Blackburn, Network Architect Dear Mr. Blackburn,

Technology is the biggest driving factor for innovation in the biotech industry. The importance of a robust, secure, and fast network cannot be overstated, at Cisco we understand your needs and the critical role that a well-designed network can play in day to day operations and the growth of a small organization like MedSys Innovations. With the understanding in mind, we are pleased to present our proposal for your network design tailored specifically to MedSys's needs and parameters.

Introduction

MedSys is a small biotechnology company in a recently renovated industrial building. This means the company has to be able to support in-person, hybrid, and remote employees indicating that a flexible network design is essential. We can assume the employees who only come to the office twice a month also have a company issued laptop. Given the industry of biotechnology, MedSys requires a network that prioritizes speed and security because day-to-day activities consist of data intensive processes. We can also assume that the servers have 24/7 runtime and remote and hybrid employees can work in either the 1st or 2nd floor. Because the company plans to expand in the coming years, it is safe to assume that the current network design will have to have capabilities that exceed its current needs to avoid constant upgrades and inconvenience associated with constantly upgrading network infrastructure. Considering the recent renovations, we can assume that each room in MedSys is properly climate controlled

meaning supplemental equipment like humidifiers to regulate electrical components won't be needed. We are also going to go off the assumption that more employees would be working on the second floor as the space is specifically designed with cubicles and offices, whereas the first floor has a reception desk and less room for work specific tasks. It can also be assumed that the recent renovations include holes within the walls and ceiling where wiring can be run through effectively.

Network Diagram
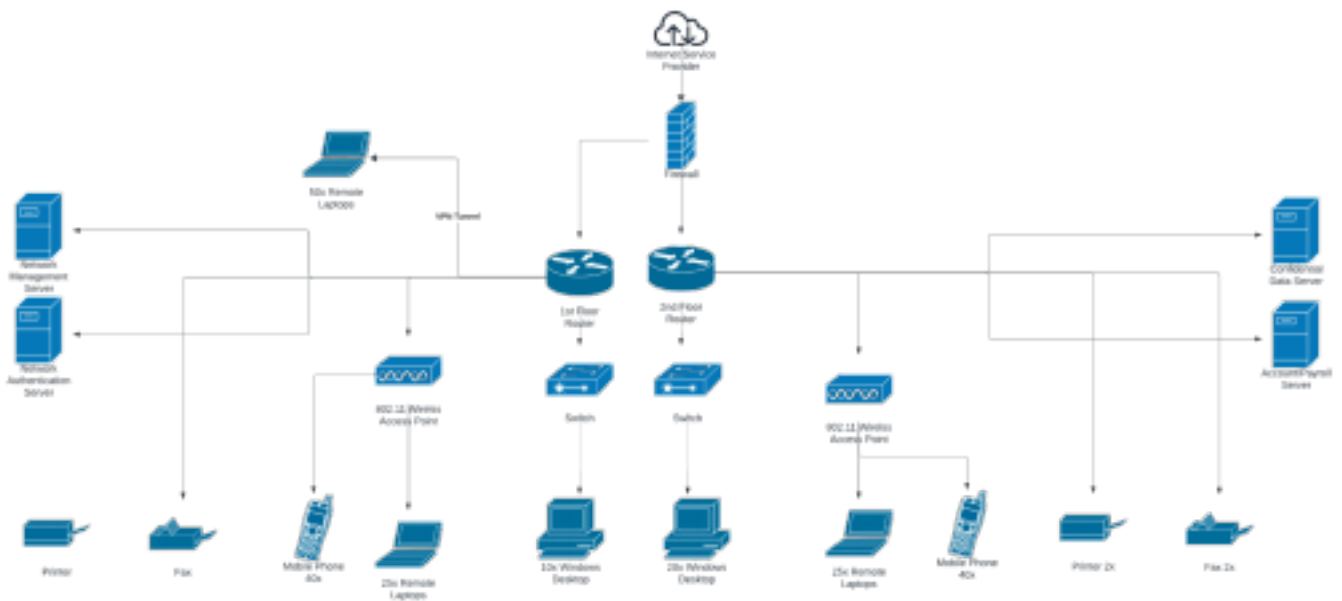
Design Narrative

  Breaking down the above network diagram we will go into the reasoning behind some of the decisions. One of the first things you will notice is that there are two routers, one for each floor. There are many reasons for this including, but not limited to: increased performance, reliability, network segmentation, and scalability.

  Regarding increased performance, two routers allow for reduced network traffic to each router, allowing for reduced data and network traffic congestion and ensure faster transfer speeds, which is an essential need for a biotech company where data needs to be readily available.

  Reliability comes from redundancy as if one router were to fail or be under maintenance the other router would temporarily be able to handle the traffic. You will also notice the respective routers can accommodate for all 80 employees mobile devices and 25 laptops each, this is an aspect of redundancy but also accounts for the potential

that all 80 employees are in the office at the same time.

Network segmentation is an important thing to consider when it comes to MedSys as confidential data needs to be handled and not all employees will have the same level of security clearance. Our network design takes into consideration these factors and thus, the 2nd floor router would handle more secure data such as confidential data and payroll information. This is also a physical consideration of security as to physically access the servers containing this sensitive data would be harder to access as malicious individuals would have to go through a physical challenge of getting to the second floor. The first floor router would handle more managerial servers which are the authentication and management servers as the employees in this department would be more likely located on the first floor. Network segmentation would also allow for more robust security measures to be installed on the second floor router containing more sensitive data. For example, both routers will utilize 802.11i protocol to handle connection to them. However, the first floor router can use just an employee username and password while the second floor router would require an employee username and password as well as a second layer of security such as an employee key card scan to allow access to only the highest of individual employees in the company.

Lastly, MedSys has expressed that they plan to grow over the next 5 years. A two router system allows for easier scalability, a two router system would handle the increased traffic more seamlessly. There wouldn't be a concern of compromising performance if MedSys's network infrastructure is already over designed for current capabilities.

You will also notice the use of a single switch and wireless access point for each floor. The philosophy behind this is to place both in centralized locations on both floors to allow best for wifi propagation as the material of the building is unknown and the chosen network standard below are reflective of this centralized location philosophy. The idea here is to have the fiber and signal radiated from the center of the building allowing for the best coverage in all areas of building and saving funds in the quantity of devices in turn trading it for quality of devices.

Speaking of capabilities, we are going to stick with the theme of over provisioning MedSys's network now to best align with their goals and prospects of expansion. When

it comes to wired connections, we believe using OM3 Fiber Optic is the best choice, specifically, 10BASE-SR. MedSys requires 1gb of network for wired connections currently, with 10BASE-SR 10gbs of transmission speed is supported which is more than enough to support the current operation. 10gbs also accounts again for MedSys intention to expand, and thus wouldn't require any wired upgrades for the foreseeable future. Furthermore, 10BASE-SR is being used because of the size of building, 10BASE-SR support for 300 meters of transmission before the loss of signal effectiveness, and the building on both floors is 500 square meters thus the need for intermediary switches to connect the router to clients wouldn't be needed.

Wireless capabilities are as follows, 802.11ac would be the standard utilized in wireless connections. 802.11ac allows for up to 6.9gbps as rated speeds but the common throughput is closer to 1.5 gbps which is more than enough for MedSys's current capabilities. 802.11ac also utilizes the 5ghz frequency and has greater channel availability which means increased performance.

Our design implements a next generation firewall because as a biotechnology company with sensitive data at stake, a next generation firewall would be required. A next generation firewall would have capabilities like application security and control, regulating employee's activity to avoid accidental data leaks and has increased external threat detection. Going more into security, a router would handle specifically a VPN tunnel for all remote devices as MedSys is dealing with a lot of sensitive information.

To supplement all of the new physical security measures going into MedSys, we will also suggest a training program regarding security. Employees at all levels will be briefed on security awareness and prevention to things like phishing attacks, and internal/external threats to network security. Bringing a sense of knowledge and awareness to security through proper training addresses the human aspect and social engineering concept of security. Ongoing training and quarterly tests are important things to consider implementing to ensure no sense of complacency and that all security rules are being followed.

Network Floor Plan with Infrastructure Layout
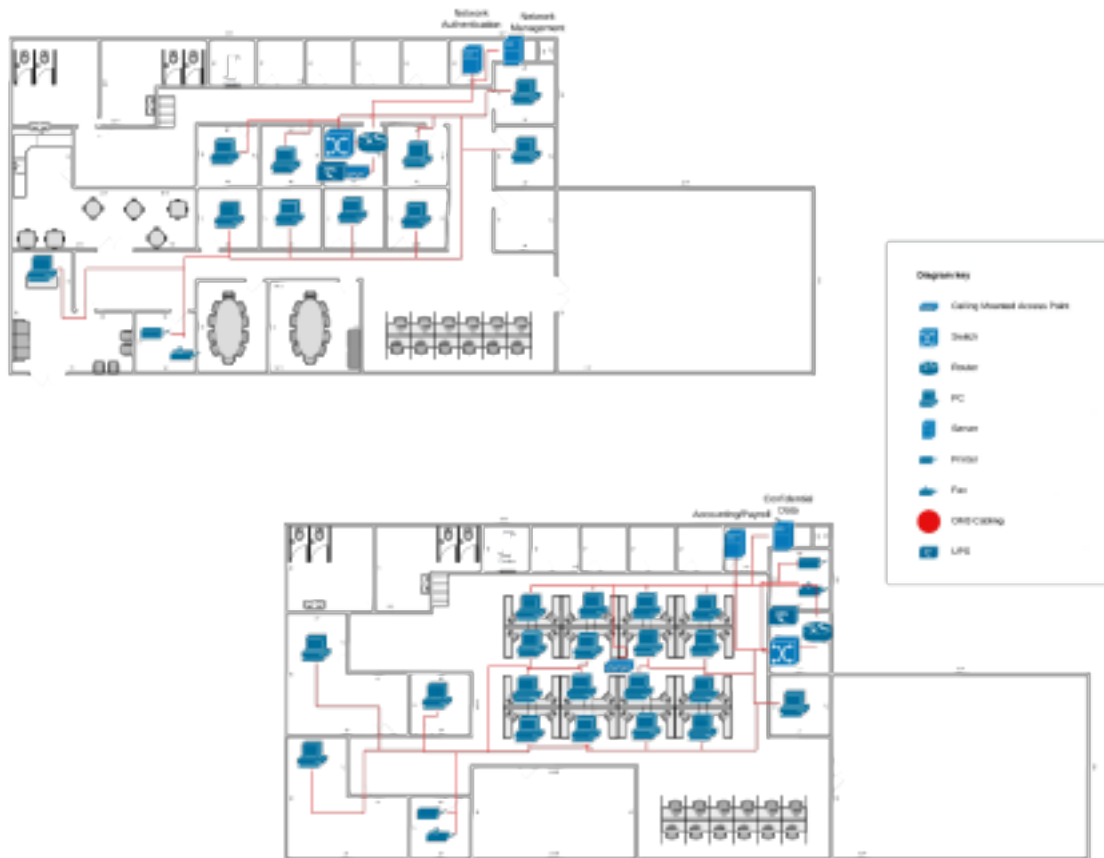
Proposed Products and Cost

All networking products will come from Cisco as we offer negotiable rates based on size of order, all rates depicted will be unit costs.

1. Firewall

      a. Vendor: Cisco

      b. Product Name: Cisco Secure Firewall Threat Defense Virtual c5.x large

      c. Technical Capabilities:

            i. Next Generation Firewall

                  1. URL Filtering

                  2. Advanced Malware Protection

                  3. Application Layer Attack Protection

                  4. Stateful inspect of network traffic

            ii. Fulfilled on Amazon Machine Image

                  1. Launches a virtual instance from the cloud

d. Reasoning:
   - i. Utilizing AWS for a firewall eliminates the need to buy infrastructure for a firewall
   - ii. Because the firewall is ran virtually, only one computer in the office is needed to run the firewall for the company
   - iii. For the size of MedSys a virtual run firewall allows the level of customization needed to secure sensitive data
   - iv. MedSys already is using cloud services so bundling this firewall with another service can be desirable
   - v. MedSys has access to 24/7 AWS support and Cisco support in the event of any trouble

e. Cost: **$4,500.00** Annually

f. Link:
   https://aws.amazon.com/marketplace/pp/prodview-agotwrhawevmc

2. Router

a. Vendor: Cisco

b. Product Name: ISR 1131X-8P

c. Technical Capabilities:
   - i. 802.11ax
   - ii. Built in dashboard for configuration
   - iii. 1.8gbps Throughput
   - iv. 680 mbps Encrypted Throughput
   - v. 4 WAN ports

d. Reasoning:
   - i. The product is considered under Cisco's small business routers which MedSys falls under because of the amount of employees and overall office side
   - ii. 1.8gbps throughput is triple of what is needed for MedSys so allows room for growth and additional devices and personnel
   - iii. Built in dashboard allows networking and security administrators in MedSys to customize the security measures easily
   - iv. 4 WAN ports allows for upgradability and more switches to be integrated into MedSys's systems
   - v. Support 802.11ax so the stated 802.11ac will be compatible with this router and allows room for upgrades

e. Cost: **$2,462.25 per**

f. Link:
   https://www.cisco.com/c/en/us/products/routers/router-selector.html?built_in_lan_ports=1-5_ports&oid=caten020272&target_deployments=s

mall_business

g. https://itprice.com/cisco-gpl/isr%201131x-8p

3. Switch

    a. Vendor: Cisco

    b. Product Name: CBS350-24T-4G

    c. Technical Capabilities:

        i. 24 Network Ports each at 1gb

        ii. Built in dashboard

        iii. 41.66 Million Packets per second

        iv. 56 gbps Capacity

        v. Supports IPv4 and IPv6

    d. Reasoning:

        i. 1gb ports are in compliance with requirements for MedSys 1gb/s wired connections

        ii. Built in dashboard allows for ease of deployment and management by administrators

        iii. Scalability with an increase in employees and devices

        iv. Security features that would be important to MedSys in ARP inspection and DHCP Snooping

        v. SSL which encrypts all HTTPS traffic which is important to MedSys's sensitive data

    e. Cost: **$379.00 per**

    f. Link: https://www.amazon.com/CISCO-DESIGNED-Business-CBS350-24T-4G-Protection/dp/B08KSX77VB

    g. https://www.cisco.com/c/en/us/products/collateral/switches/business-350-series-managed-switches/datasheet-c78-744156.html

4. Access Points

    a. Vendor: Cisco

    b. Product Name: Cisco Business 200 Series Access Points

    c. Technical Capabilities:

        i. MU-MIMO Functionality

        ii. 802.11ac

        iii. Compatible with CB100 Mesh extenders

    d. Reasoning:

        i. MIMO allows for increased performance, functionality and scalability

ii. Built in dashboard allows for ease of deployment and management by administrators

iii. Complies with stated intention of 802.11ac wireless standard iv. Access to Cisco support in case of issues

v. Compatible with CB100 Mesh extenders allows for range extension in case of building expansion

e. Cost:**$235 per**

f. Link: https://www.cisco.com/c/en/us/products/wireless/business-200-series-access-points/index.html

5. Server

a. Vendor: Dell

b. Product Name: PowerEdge T350 Tower Server

c. Technical Capabilities:

i. 1TB storage

ii. DDR 4 RAM

iii. 4.2 GHZ processor

iv. Tower server

d. Reasoning:

i. Flexible server that can meet all 4 of MedSys's server requirements ii. Tower server allows for ease of setup and server rooms are not crowded

iii. Redundant power supplies allow for reliability

e. Cost: **$1,109 per**

f. Link:https://www.dell.com/en-us/shop/servers-storage-and-networking/poweredge-t350-tower-server/spd/poweredge-t350/pe_t350_tm_vi_vp_sb?configurationid=a0cdb5eb-c79f-40c3-8c62-fef1e86f8952#features_section

6. Cabling

a. Vendor: FS

b. Product Name: LC UPC to LC UPC Duplex OM3 Multimode Riser (OFNR) 2.0mm Fiber Optic Patch Cable

c. Technical Capabilities:

i. OM3

ii. 850nm wavelength

iii. 10gbps speed

iv. Duplex fiber

v. 300m range

d. Reasoning:

i. OM3 allows for 10gbps speeds which leaves room for upgradability ii.

Bend resistant which is important in how the network floor plan is designed

    iii. 300m range allows for a single switch and router on each floor and ability to connect to all computers on the floor

    e. Cost: **$4.70 per meter**

    f. Link: https://www.fs.com/products/41730.html

7. UPS

    a. Vendor: FS

    b. Product Name: APC® Smart-UPS X 3000VA Rack/tower Convertible UPS, 8x C13+1x C19 IEC Outlets, Network Card and 1 Backup Battery Included

    c. Technical Capabilities:

        i. 230 output volts

        ii. Backup battery pack compatible

        iii. 208-230 input volts

    d. Reasoning:

        i. Adequate power for all networking devices

        ii. Able to handle 20-30% more than what's needed at MedSys iii. Backup battery allows for even more reliability

    e. Cost:**$3,759.00 per**

    f. Link:

    https://www.fs.com/products/192015.html?attribute=77468&id=2461177