# IT 2035C Network Infrastructure Management

## Design Scenario 2: Harriet’s Fruit and Chocolate Company

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Harriet’s Fruit and Chocolate Company was established in 1935 in the Pacific Northwest of the United States to ship gift baskets of locally grown peaches and pears to customers in the United States. The company also makes chocolates and baked goods to include in the gift baskets. It has grown extensively over the years and is currently one of the biggest companies in the Pacific Northwest.

Harriet’s descendants, who still run the company, have identified a need to immediately report when fruit is starting to ripen and should be placed in cold storage. Employees in the marketing department have identified a need to access inventory data for the fruit in the orchards and in cold storage. With this data, they can design and sell gift-basket products that take advantage of the ripe fruit. This data must also be fed into e-commerce applications so that web orders can correctly specify product availability.

As the network designer for this company, you have been charged with selecting network technologies to reach the orchards and cold storage buildings. Each of the six orchards has a shack with one or two standalone PCs and a printer. The three cold storage buildings are huge warehouses that include a few standalone PCs and printers. The local telephone company has suggested that you lease fractional T1 lines, but these links are expensive and possibly beyond your budget. Wireless technologies are also possible, but you have heard that fruit trees, especially full-grown trees that are tall and leafy, can absorb a wireless radio frequency (RF) signal. You have also heard that the cold storage buildings have ice hazards making it hard to install equipment. But you will not let these challenges faze you.

1. **List three specific business goals for Harriet’s Fruit and Chocolate Company. What are some constraints that will affect these goals? Be specific about this company.**

1.) Improve Supply Chain Efficiency: (Shorten product development cycle)

Inventory tracking and product distribution is vital to reducing waste while also meeting customer demand. The biggest constraint to this is the requirement for data access across all six of the orchard shacks and the three cold storage facilities, hence the need for a well-connected network.

2.) Enhance E-commerce Capabilities: (Improve communications)

The company must ensure that inventory data is seamlessly integrated into its online ordering system, requiring a reliable and secure network infrastructure. This implementation must support real-time inventory updates to prevent overselling or stock discrepancies, while also ensuring fast and secure transactions for customers.

3.) Cost-Effective Expansion of Operations: (Reduce operating costs)

Budget limitations may restrict the adoption of high-cost network solutions, requiring the company to explore alternative technologies that can still support business operations effectively. For this to be achieved, Harriet’s Fruit and Chocolate Company has to focus primarily on cost-efficient networking solutions that can offer scalability while still being reliable with being a heavy upfront investment for the company. This could be things such as cloud-based services, and prioritizing hybrid wired and wireless networks.

1. **List three technical goals for Harriet’s Fruit and Chocolate Company. What tradeoffs might you need to make to meet these goals? Be specific.**

1.) Reliable Network Communication:

A stable and high-speed network is necessary for real-time inventory tracking and communication between locations. A tradeoff may be choosing between a fully wired network, which offers reliability but is costly and difficult to install in orchards, and a wireless solution, which is more flexible but may be less reliable due to interference.

2.) Data Access:

Most of the employees will need secure remote access to inventory and the order management systems that Harriet’s Fruit and Chocolate Company uses. The biggest tradeoff here is the struggle of balancing security measures, like multi-factor authentication and encryption, without preventing employees from having access.

3.) Optimizing Bandwidth for Business Operations:

Harriet’s Fruit and Chocolate Company needs to ensure that their business applications, such as inventory management and POS systems have priority over other non-essential devices taking up network traffic. The biggest tradeoff with this will be enforcing strict network polices, which will improve performance and allow employees uninterpreted access

1. **What investigation will you do with regard to the physical infrastructure of the orchards, the orchard shacks, and the cold storage buildings?**   
   **Note: How do environmental conditions influence technology?**

Whilst conducting a site survey to assess the physical layout and environmental conditions of the orchards, shacks, and cold storage buildings. We will attempt to Identify any potential obstructions for wireless signals, such as tree density, metal structures, and storage conditions. Evaluating existing power sources and cabling options to determine feasibility for other wired solutions. Also considering environmental factors like extreme temperatures in cold storage that could affect hardware performance.

Orchards:

Due to the large outdoor environment causes the installation of any wired connections is going to be costly and a bit impractical. Wireless access points with additional weatherproofing enclosures and signal booster should work yet may require additional coverage.

Orchard Shacks:

Each of these 6 locations serve as the primary workstations for employees for managing inventory and reporting field operations. Thus power sources, structural stability of the shacks and environmental factors such as trees and the land all must be accounted for during the set up for wireless connections.

Cold Storage Buildings:

All three of these buildings each require stable and high-speed connections for maintaining inventory tracking and temperature monitoring of products. Wired connections are preferred to give those high-speed connections. We also need the network hardware to be protected against the extreme temperatures in these buildings.

1. **Compare the advantages and disadvantages of using wireless verses a wired access technology. Will a wireless solution support the network requirements? Defend your answer.**   
    When looking at wireless vs. wired there are some differences. Wireless may have a lower upfront cost, but it could require repeaters and signal boosters which would raise the cost. Wired would be more expensive upfront, but a more stable option. When it comes to installation, wireless is easier. However, tree interference is a big possibility. With wired it is more complicated because digging for the cables throughout the orchards would be more laboring and expensive. With scalability, wireless is easier to expand. We would just need to add more access points or repeaters. Wired again is more expensive and more laboring depending on where the expansion is needed. Wireless requires more maintenance. We would need to monitor for interference and potential adjustments. Batteries or solar power may need to be explored for more remote access points. Wired requires less maintenance because once it is installed, fiber optic cables have a long lifespan. As long as this isn't an area that experiences earthquakes. Security is always a big concern no matter the situation. Wireless is more vulnerable due to interception and unauthorized access. It would require encryption and strong authentication. Wired is a bit more secure due to the fact that physical access is needed to tap into the network.

Wireless alone will not be a good option. The interference from fruit trees could cause some challenges. Trees, especially fully grown fruit trees, can absorb or even block radio frequencies. This would reduce signal quality. The warehouses hold their own challenges as well. Thick insulation and metal walls may block wireless signals. There is also bigger security risks with wireless networks. They are more susceptible to unauthorized access and will require a lot of encryptions. A hybrid option may be what is best for this problem when we balance cost and reliability.

1. **What security concerns should you bring up as you design the network upgrade? Explain.**

One security concern would have been physical security. We want to protect all networking equipment from theft or damage. Having the means to properly secure hardware in well-kept and locked enclosures, while also restricting physical access for authorized personal only will help mitigate this risk

We also want to encrypt all network communications, especially if we go with the wireless option. Encrypting ensures that the sensitive data that Harriet’s Fruit and Chocolate Company has remains protected from any potential threats and bad actors.

Using strong authentication for remote access to inventory data is very important. We do not want unauthorized access to the data. Implementing multi-factor authentication for remote access is necessary in preventing unauthorized users from accessing customer data and inventory.

Continuously monitor the network for potential threats and vulnerabilities. This can be accomplished with the use of intrusion detection systems and regular security audits, which can help us identify potential security vulnerabilities and threats that may emerge.

Teamwork

This submission was completed as a team effort by Samuel Hazlett and Beka Martain, our team member Sidi Mohammed has yet to respond to any attempt of contact by both team members since the first week of the semester. We have notified the professor.