The Geese Team Project

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IST 220: Networking and Telecommunications | Professor Giacobe

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Executive Summary

The subsequent information provided will demonstrate the network infrastructure necessary for Wawa, Inc., an American chain of convenience stores and gas stations, to connect fifteen sites in the Southeastern Florida area. These fifteen sites will be connected by a star topology powered by fiber optic cable provided by Verizon. Within these fifteen sites, there will be a main site, hereinafter referred to as “Corporate,” which will house operations concerning the CEO and day-to-day support. As necessary, Corporate will contain provisions for a multitude of other departments, such as HR and Finance. Both local sites and Corporate will provide wireless capabilities to customers and vendors through a guest network.

The pages following will detail particulars concerning health, safety, and privacy compliance laws, security requirements, and the infrastructure required to support fifteen sites, such as firewalls, routers, switches, and other related systems. There will be diagrams demonstrating the network design that would be functional for site-to-site connectivity, a design for a main site, and a design for local sites. All diagrams provided will be followed by a comprehensive explanation of its plan.

Description of Needs

Site-to-site

Connection:

- All sites in the area are connected to the main site through fiber optic Ethernet
- We're using fiber optic ethernet for connecting the Wawas together because of the reliable connection we can receive from it
- Allows for a lot of data to be sent quickly
- Secure connection, making it hard for someone to access the data without permission.
- Reliable for both short and long distances,
- Set up in a way that if one path has a problem, there is redundancy to keep the connection strong

Locations of sites:

1. 7705 FL-7, Parkland, FL 33067
2. 20 SW 12th Ave, Deerfield Beach, FL 33442
3. 2000 N State Rd 7, Margate, FL 33063
4. 3601 N Federal Hwy, Pompano Beach, FL 33064
5. 1 N Andrews Ave, Pompano Beach, FL 33069
6. 9400 W Commercial Blvd, Sunrise, FL 33351
7. 6191 Powerline Rd, Fort Lauderdale, FL 33309
8. **7105 W McNab Rd, North Lauderdale, FL 33068 (main site)**
9. 2 W Sunrise Blvd, Fort Lauderdale, FL 33311

10. 2620 W Broward Blvd, Fort Lauderdale, FL 33312

11. 2500 SW 64th Ave, Davie, FL 33317

12. 6350 Stirling Rd, Davie, FL 33024

13. 1600 S Hiatus Rd, Pembroke Pines, FL 33025

14. 1700 S Douglas Rd, Miramar, FL 33025

15. 2700 NW 183rd St, Miami Gardens, FL 33056

Main Site

Computer systems

- The first floor of our main site is where the manufacturing department (three computers), shipping and receiving department (six computers), conference/training room (one computer), and receptionist/night watchmen (one computer) are located. In total, the first floor has eleven computers all connected to one switch on their own subnet.
- The second floor of our main site is where the HR department (twenty computers) and R&D department (twenty computers) are located. In total, the second floor has forty computers all connected to one switch on their own subnet.
- The third floor of our main site is where the administrative office (ten computers) and finance department (fifteen computers) are located. In total, the third floor has twenty-five computers all connected to one switch on their own subnet.
- The basement of the main site is where the IT department (seven computers) and maintenance department (two computers) are located as well as the server farm and a separate DMZ server. The IT and maintenance departments are all connected to one switch on their own subnet, the DMZ server is connected to its own switch and subnet, and the server farm is connected to one switch on its own subnet. In total, the basement has nine computers and eleven servers with three different switches and subnets.
- All computer systems will be running on the Windows operating system, fit out with the Microsoft Office suite, Google Chrome as the default browser, Outlook and Slack for communication, OneDrive for file sharing, and Adobe Creative Cloud. Select departments such as Finance will have relevant software installed such as Intuit Quickbooks.

Wired setup

- All traffic goes through the router, which is connected to eight switches, sixteen firewalls, an authentication server, the fiber provided by the ISP, and one trunk port.
- The switches are connected to eighty-five computers for employees, twelve servers serving a variety of purposes (such as the DMZ server and ERP server), and four access points for wireless.
    - There is a VoIP server in the server farm providing access to the organization.
- Wired devices are connected by copper straight-through wiring.

Wireless setup

    - Guest wireless internet access is provided at the main site for public use, the SSID is “WawaGuest.”
        - There is one access point attached to the guest network.
    - Employees at the main site will connect to the “CorporateWawa” wireless network, which is on a separate subnet from the guest network.
        - There are three access points attached to the corporate network, one for each floor of the site.

Local site

Computer Systems

- Our local site includes two kitchen display systems. This is where the orders taken from the kiosks will show up for members of the kitchen staff to begin prepping the food.
- We have five self-serve ordering kiosks where customers can order their handmade food for pick up.
- Our three PCs are used for employees to clock in and out. These PCs can also be used for new hires to complete training.
- The PC's will run on the Windows operating system, fit out with the Microsoft Office suite, Google Chrome as the default browser, Outlook and Slack for communication, OneDrive for file sharing, and Adobe Creative Cloud.
- The two time clocks are being used to check the current time.
- The VoIP telephone is used to make and receive calls.
- We have included six registers and a POS system to check out customers.
- Three security cameras are being used to have surveillance over the building.
- Six printers are used to print off receipts.
- We have two wireless access points, one private and one public.

Wired Setup

- We have one centralized router that connects to three switches and one firewall.
- One switch is used for our main computer systems.
- One switch is used for public wifi and one for public.
- The router also connects to the ISP through a firewall.

- Wired devices are connected by copper straight-through wiring.

Wireless Setup

- There is one access point that gives public wifi on SSID public.
- Another access point is used for private wifi, SSID private, among the Wawa employees.

Security Requirements

Federal laws:

- **Fair Labor Standards Act (FLSA)**: Compliance with minimum wage, overtime pay, recordkeeping, and child labor standards.
    - The FLSA sets the minimum wage that must be paid to employees. They also set that employees must receive overtime pay at a rate of at least one and a half times their regular rate if they exceed 40 hours per workweek. The FLSA also sets rules on how many hours and the type of work a minor can do. They set recordkeeping requirements for employers so that they can maintain an accurate record of their employees' work hours.
    - This law is important to ensure that Wawa is standing in compliance with the federal standards regarding minimum wage, overtime, and any other labor-related activities.
- **Occupational Safety and Health Act (OSHA)**: Helps ensure a safe and healthy work environment for employees
    - OSHA sets the standards for workplace safety and health. OSHA requires employers such as Wawa to identify workplace hazards and how to control them. They also must conduct regular risk assessments to address any health and safety risks. Workplace injuries or illnesses also must be recorded under OSHA. Wawa would also be subject to inspection under OSHA to make sure regulations are being followed.

State and local employment laws:

- **State Minimum Wage:** Florida's minimum wage is $8.65 an hour as of 2022
- **State Minimum Employment Age**: Florida's minimum employment age is 14 years old.

Health and safety regulations:

- **Food and Drug Administration Regulations (FDA)**: Compliance with federal food safety standards and regulations
    - The FDA ensures that all food has proper labeling including accurate ingredient information, nutritional information, allergens, and any health claims. It also ensures that all food additives are approved substances. The FDA has many important regulations in place to keep establishments safe and that the food they are putting out is safe.
- **The Food Safety Modernization Act (FSMA)**: The FSMA aims to prevent foodborne illnesses by preventing cross-contamination in the workplace
- **Good Manufacturing Practices (GMP)**: Ensures that food products are produced, processed, packed, and held under sanitary conditions

Alcohol and tobacco laws:

- **Alcohol and Tobacco Tax and Trade Bureau Regulations (TTB):** Compliance with federal regulations for the sale of alcohol and tobacco.
    - TTB regulations require Wawa to obtain proper federal and state alcohol licenses to sell alcoholic beverages such as beer. They also must comply with the proper labeling and advertising rules for alcohol sales along with keeping a record of the production and sale of alcoholic beverages. The TTB requires Wawa to keep up with the renewal of permits and licenses to continue their sale of alcohol.

- **State Alcoholic Beverage Control Board Regulations**: Adhere to state-specific regulations on alcohol sales.
    - The state of Florida also has alcohol laws that Wawa has to follow such as the hours they can sell alcohol. In Florida, alcoholic beverages can be sold between 7 am and 3 am. You also have to be 21 years old to purchase alcohol in the state of Florida.

Consumer protection laws:

- **Federal Trade Commission Regulations (FTC)**: Compliance with federal laws on advertising, consumer rights, and fair business practices.
    - The FTC puts regulations in place to ensure fair competition and protect consumers. Wawa must comply with advertising rules which include truthful advertisements, accurate representation of products, prices, and promotions. FTC protects consumers by making sure consent is obtained for data collection along with secure data practice.

Financial and tax laws:

- **Internal Revenue Service Regulations (IRS)**: compliance with federal tax laws for businesses.
    - The IRS ensures accurate withholding, reporting, and payment of federal income tax, social security tax, and Medicare tax for employees. It also ensures a company, like Wawa, files federal income tax returns accurately and on time. Wawa must also keep all financial records including income and expense documentation for filing purposes.

- **Sales Tax**: Florida's state sales tax is 6%.
- **Corporate Income Tax**: Florida's corporate income tax rate is 4.45%.

Accessibility laws:

- **Americans with Disabilities Act (ADA)**: Ensure accessibility for individuals with disabilities, including physical accommodations and accessible facilities.
    - The ADA works to ensure that facilities, like Wawa, are accessible to individuals with disabilities. This includes ramps in stores, accessible restrooms, and designated parking areas. They are also required to train their staff to understand ADA requirements and how to assist customers along with allowing service animals in their buildings.

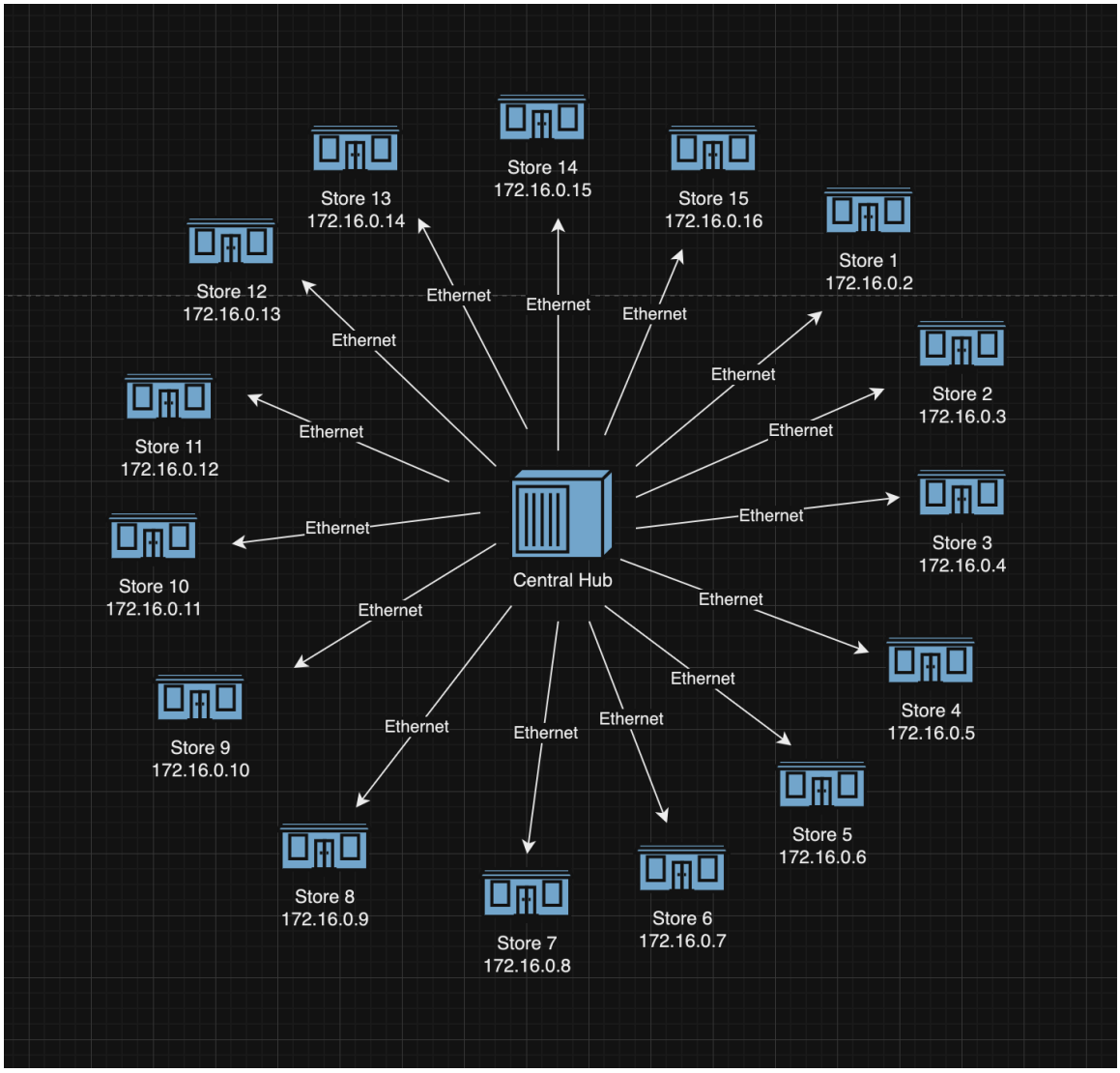
Intellectual property laws:

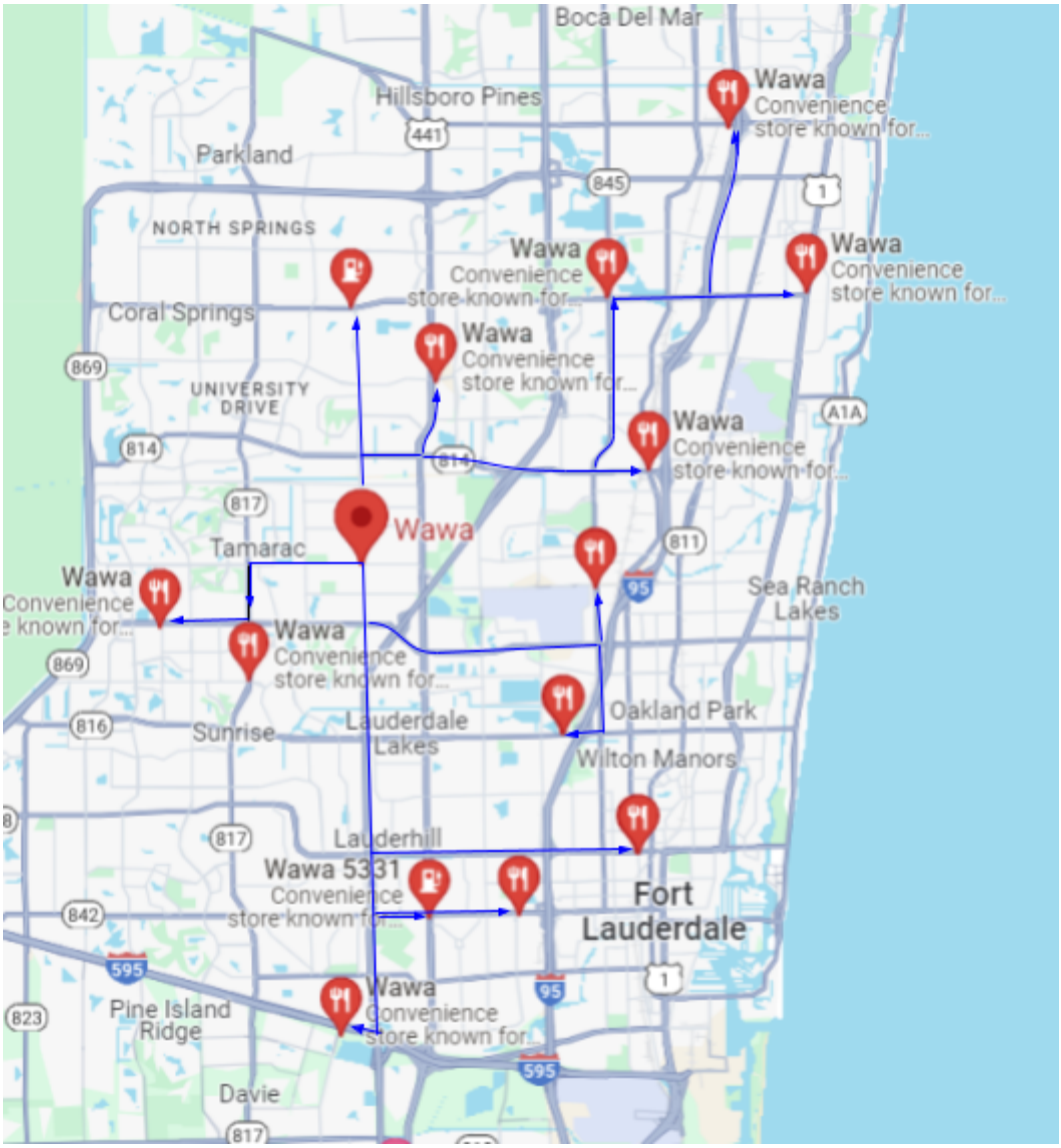
- **Trademark and Copyright Laws:** Protection of the Wawa brand, and other property.
    - This would include registering the brand name, logo, and other markings of Wawa as trademarks with the United States Patent and Trademark Office (USPTO). If Wawa creates any original content, it would need copyright protection, including registering it with the U.S. Copyright Office. Under these laws, Wawa would also be able to file patent applications for any new inventions or products. This would involve filing a patent application with the USPTO. All of these laws allow for the Wawa brand to be protected and not copied.
- **PCI-DSS - Payment Card Industry Data Security Standard:** Wawa is both a convenience store and food service retailer that does not typically handle HIPPA and FERPA. However, it does handle payments via card which makes it follow the PCI-DSS.

With this standard, Wawa needs to identify the systems and processes their store will use for cardholder data. PCI-DSS also requires strong encryptions for the transmission of cardholder data across public networks and at rest. They also must maintain a secure network infrastructure by implementing firewalls, secure configurations, and restrictions to access this data.

Network Design

Site-to-Site Diagrams





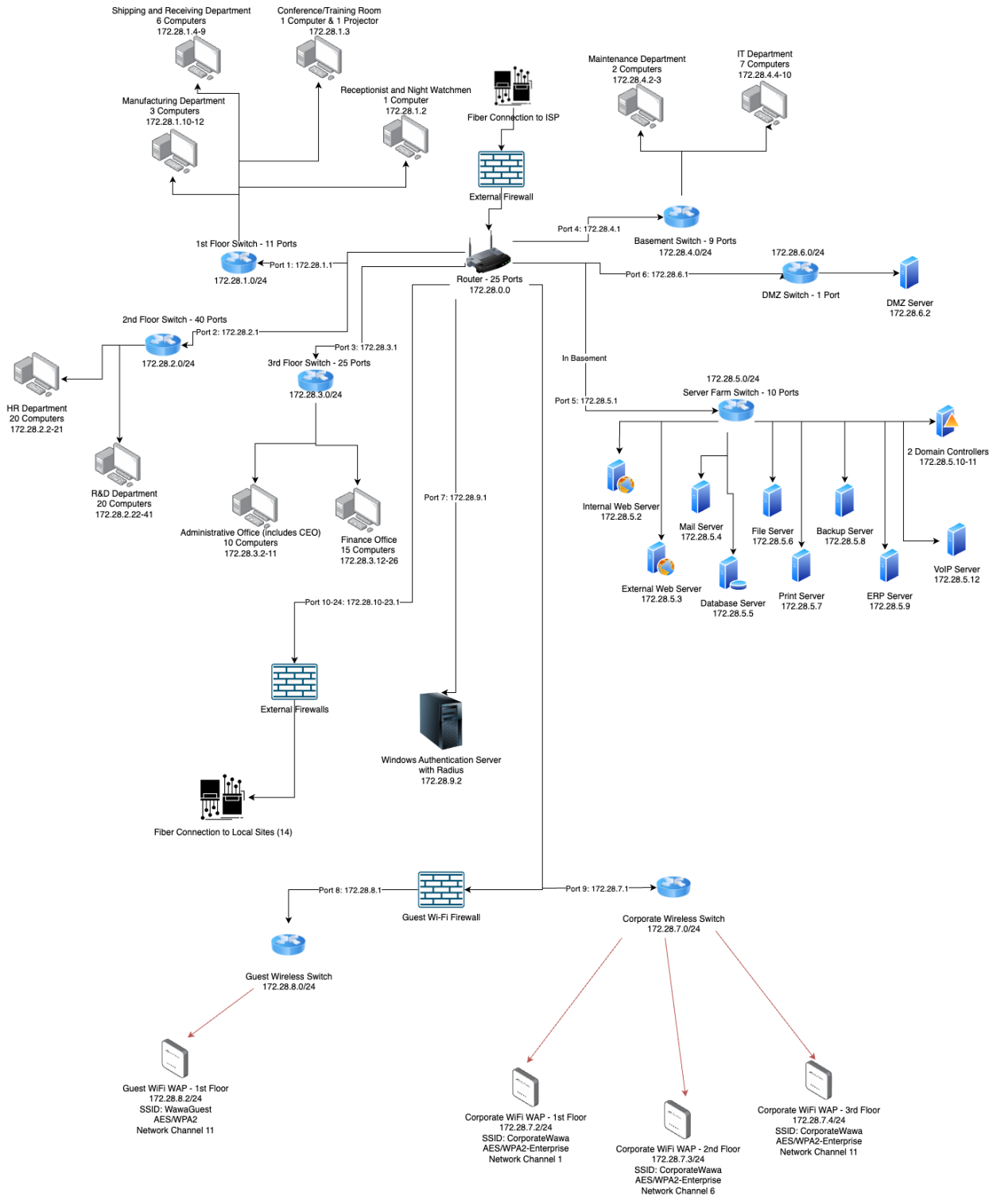
Site-to-Site Diagram Overview:

In this star network diagram, each Wawa store easily communicates to a central hub. This setup helps with managing things easily, lets the network grow if needed, and solves problems in one store without affecting others.

We chose to use fiber optic ethernet for connecting the different Wawa locations because it's reliable, meaning it provides a steady and dependable connection. Fiber also allows for a lot

of data to be sent quickly, which is important for businesses like Wawa which might need to transfer a large amount of information. It's secure too, making it harder for anyone to access the data without permission. Fiber is also good for both short and long distances, and it's set up in a way that if one path has a problem, there are backups to keep the connection strong. Overall, fiber gives Wawa a solid, fast, and safe way for all its locations to stay connected to the main headquarters. We used fiber optic modems and cables to protect them from environmental factors along with making sure electrical signals from the routers can be converted into optical signals in need for transmission over fiber optic cables.

Main Site Diagram

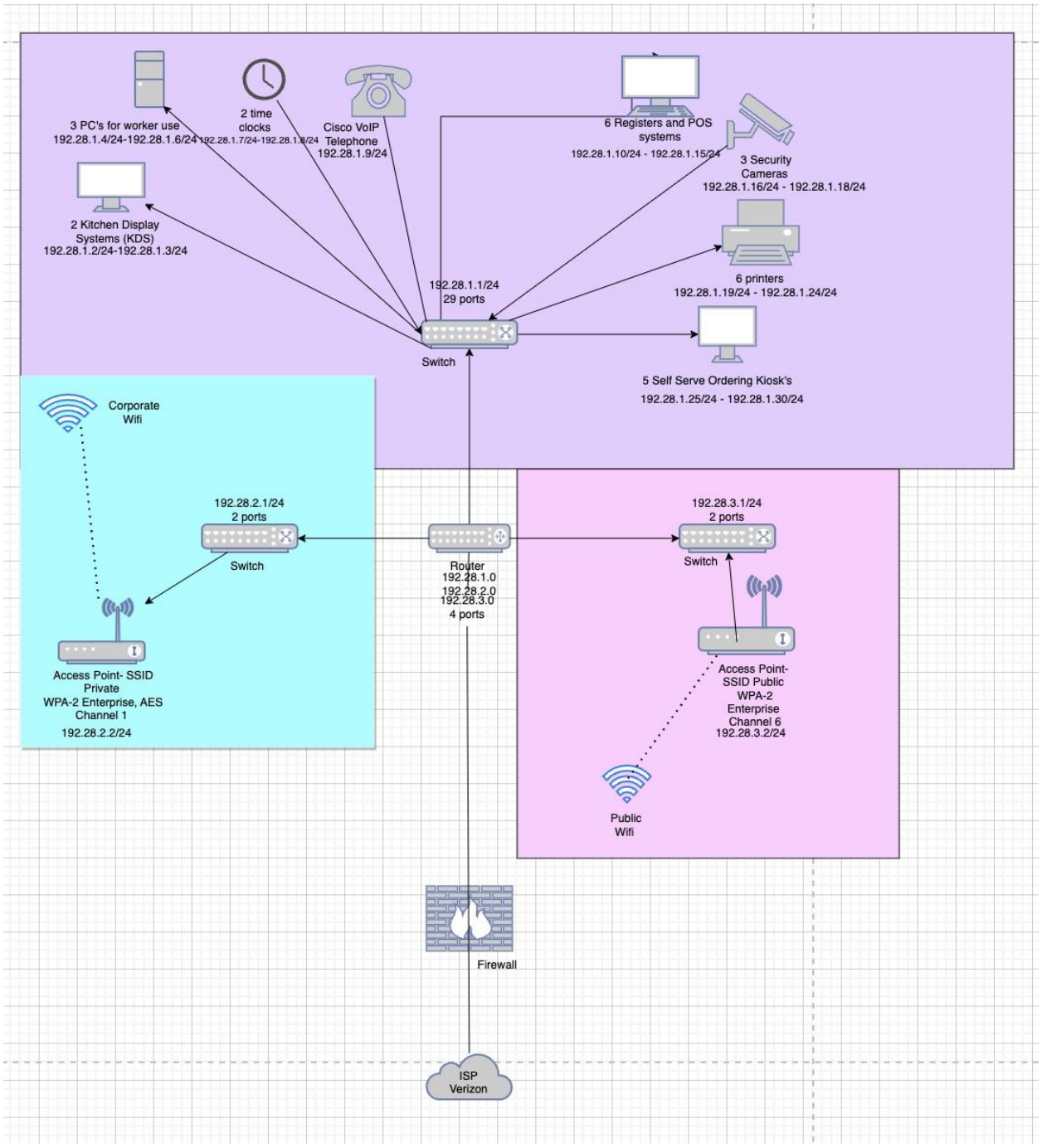


Main site diagram overview:

We created the main site with a total of four wireless access points, eight switches, and eleven servers. Each floor has one wireless access point all on the same subnet, plus one on the first floor for the guest wifi on a separate subnet. Guests will be able to connect to this network via a password provided by the receptionist that is changed each week. The wireless access points on each floor are configured to use different network channels to avoid interference. They also are configured with WPA2-Enterprise for the authentication protocol and AES for the encryption protocol. All of the wireless access points are connected to one switch on the same subnet. This switch will allow for the wireless access points and the router to communicate efficiently. Lastly, we have a Windows authentication server that all the wireless access points are connected to for authentication. This server is configured with the RADIUS server enabled for the Active Directory.

We segmented the wireless network to be separate from the wired network. The wireless network uses different switches and subnets for the wireless access points than the wired network. It also uses a Windows authentication server for them. The wireless network still connects to the same router as the wired network so they can all communicate.

Local site


3 PC's for worker use
192.28.1.4/24-192.28.1.6/24
2 time clocks
192.28.1.7/24-192.28.1.8/24
Cisco VoIP Telephone
192.28.1.9/24
6 Registers and POS systems
192.28.1.10/24 - 192.28.1.15/24
3 Security Cameras
192.28.1.16/24 - 192.28.1.18/24
2 Kitchen Display Systems (KDS)
192.28.1.2/24-192.28.1.3/24
192.28.1.1/24
29 ports
Switch
6 printers
192.28.1.19/24 - 192.28.1.24/24
5 Self Serve Ordering Kiosk's
192.28.1.25/24 - 192.28.1.30/24
Corporate Wifi
192.28.2.1/24
2 ports
Switch
Router
192.28.1.0
192.28.2.0
192.28.3.0
4 ports
192.28.3.1/24
2 ports
Switch
Access Point- SSID Private
WPA-2 Enterprise, AES
Channel 1
192.28.2.2/24
Access Point- SSID Public
WPA-2 Enterprise
Channel 6
192.28.3.2/24
Public Wifi
Firewall
ISP Verizon

Typical local site diagram overview:

Our typical local site diagram includes three switches, a centralized router, two wireless access points, and several devices. The first switch is on IP address 192.28.1.1/24, with twenty-nine ports: twenty-eight for the devices, and one for the router. The devices on this switch include: two kitchen display systems, three PCs, two time clocks, six registers, three security cameras, six printers, and five self-serve kiosks. All of these devices are connected to the switch using a copper straight-through wire. We also included a Cisco VoIP Telephone on this switch with a copper straight-through wire connection. The devices on this switch cover IPs 192.28.1.2/24 - 192.28.1.30/24.

The next switch is on IP address 192.28.2.1/24, with two ports. One for the WAP and one for the router. There is a WAP on this switch for corporate wifi that uses SSID. It uses WPA-2 Enterprise, AES, and is on channel 1. The IP address is 192.28.2.2/24.

The last switch is on 192.28.3.1/24 and has two ports, one for the WAP and one for the router. The WAP is for public wifi and uses SSID. It uses WPA-2 Enterprise, AES, and is on channel one. The IP address is 192.28.3.2/24.

Our router connects the three switches. The IP addresses are 192.28.1.0, 192.28.2.0, and 192.28.3.0. This router has four ports: three for each of the switches, and one for the connection to the ISP. We included a firewall between the ISP connection. All connections internally use a copper straight-through wire.

Security Apparatus

Firewalls: On the main site, there are fifteen firewalls facing externally and one internally. Fourteen of the external firewalls are on the connections to the local sites, preventing any unwanted traffic from getting into the main site's network. The other external firewall is facing the ISP connection. Additionally, there is a firewall facing the guest network, also preventing any unwanted traffic from getting in.

Encryptions: The router and access points use WPA2-Enterprise. WPA2-Enterprise uses 128-bit encryption keys and dynamic session keys to encrypt your data and ensure privacy on your network. WPA2-Enterprise also assigns a password to every device on the network increasing security.

Relevant servers: In the main site's server farm, the DMZ server contains the majority of network security operations and is also aided by the file server. The DMZ server hosts public-facing services, such as Wawa's website. The DMZ server ensures that access to internal corporate resources is controlled and secure. There are intrusion detection and prevention systems deployed in the DMZ to monitor network traffic for suspicious activities and unwanted interruptions. The DMZ server also provides VPN access, allowing only authorized users to connect to the internal network externally. Finally, the file server works in conjunction with the DMZ server, logging all data gathered from reporting by the DMZ.

Team Member Contributions

Sydney Black

Responsible for local site diagram, description of needs for local site, and local site diagram description.

Rohan Matta

Responsible for both of the site-to-site diagrams, the description of needs for the site-to-site diagram, and the locations of each site.

Cooper Arsenault

Responsible for both of the site-to-site diagrams and the description of needs for the site-to-site diagram.

Paul Thompson

Responsible for the executive summary, security apparatus, description of needs for the main site, and main site diagram.

Paul Kerlin

Responsible for the main site diagram, main site overview, and the main site description of needs for computer systems.

Samantha Santivasci

Responsible for local site diagram and the security requirements.

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