IT 315: Case Analysis

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Notes About Case Analysis

- Scale is 1 inch = 30 feet
- Basement I calculated to have 21 rooms
- First Floors has 19 rooms
- Second Floor has 20 rooms
- Third Floor has 21 rooms
- Assumed that total height of rooms and offices was about 30 feet
- Equipment room was placed on first floor to prevent equipment being damaged from flooding or any other basement issues. Telecomm closets were then placed on the basement, second, and third floors.
- Used a star topology to connect all the rooms/offices to each telecomm closet and then the telecom closets to the equipment room. (Exception is the first floor where all rooms and offices connected directly).
- Decided to go with cat6a cabling.
- Both the workgroup switches (24 and 48 port) are both one gigabit and the core switch is 10 gigabit to ensure it can handle the load.
- Kept telecom closets above or below equipment room to reduce cable needed.

(1) Cost and Plan for Cable, RJ45 Outlets, Wall Plates, and Patch Panels

Cost and Footage of Cable

- <u>Basement Cabling</u>
  - Telecomm Closet to Farthest Room = Up 20 ft + over 45 ft + over 270 ft + down 20 ft = 355 ft
  - Telecomm Closet to Shortest = Up 20 ft + over 30 ft + down 20 ft = 70ft
  - Average Cable = (355 ft + 70 ft) / 2 = 212.5 ft
  - Total Cable for Basement = 212.5 ft x 2 cables to each of the rooms x 21 rooms = 8,925ft

- <u>First Floor Cabling</u>
  - Telecomm Closet to Farthest Room = Up 20 ft + over 225 ft + over 60 ft + down 20 ft = 325 ft
  - Telecomm Closest to Shortest Room = Up 20 ft + over 30 ft + down 20 ft = 70 ft
  - Average Cable = (325 ft + 70 ft) / 2 = 197.5 ft
  - Total Cable for First Floor = 197.5 ft x 2 cables x 19 rooms = 7,505 ft

- Second Floor Cabling
  - Telecomm Closet to Farthest Room: up 20 ft + over 225 ft + over 45 ft + down 20 ft = 310 ft
  - Telecomm Closet to Shortest Room: up 20 ft + over 30 ft + down 20 ft = 70 ft
  - Average Cable: (310 ft + 70 ft) / 2 = 190 ft
  - Total Cable for Second Floor: 190 ft x 2 cables x 20 rooms = 7,600 ft

- Third Floor Cabling
  - Telecomm Closet to Farthest Room: Up 20 ft + over 228 ft + over 60 ft + down 20 ft = 328 ft
  - Telecomm Closet to Shortest Room: Up 20 ft + over 30 ft + down 20 ft = 70 ft
  - Average Cable: (328 ft + 70 ft) / 2 = 199 ft
  - Total Cable for Third Floor: 199 ft x 2 cables x 21 rooms = 8,358 ft

- Telecomm Closets to Equipment Room
  - Basement to First Floor: Up 20 ft + over 45 ft + Up 10 ft = 75 ft
  - Second Floor to First Floor: Down 20 ft (from switch to the ceiling of first floor) + down 20 ft (from ceiling of first floor to switch in equipment) = 40 ft
  - Third Floor to First Floor: Down 20 ft (from third floor switch to second floor ceiling) + down 30 ft (from second floor ceiling to first floor ceiling) + down 20 ft (first floor ceiling to switch) = 70 ft
  - Total from Telecomm Closets to Equipment Room: 75 ft + 40 ft + 70 ft = 185 ft

- Total Amount of Cable
  - 8,925 ft + 7,505 ft + 7,600 ft + 8,358 ft + 185 ft = 32,573 ft

- Total Cost of Cat6a Cable
  - **33 units of Cat6a cable (1000ft per unit) x $141.00 (includes bulk discount) = $4,653**
  - https://www.cablewholesale.com/products/network-phone/cat-6-cable/product-10x8-021th.php

Cost and Set-Up of Patch Panels

- Patch Panels
  - Basement Floor: (1) 48 port patch panel. 42 cables from rooms
  - First Floor: (1) 48 port patch panel. 38 cables from rooms + 3 cables from each telecom closet = 41 connections
  - Second Floor: (1) 48 port patch panel. 40 cables + 1 to equipment room.
  - Third Floor: (1) 48 port patch panel. 42 cables + 1 to equipment room.
  - Order one extra just in case a floor needs it.
  - **Total: (5) 48 port patch panel x $58.80 = $294**
  - https://www.cablesandkits.com/ethernet/patch-panels/cat6-patch-panels/cat648-110panel/pro-8388/?utm_campaign=(ROI)+Smart+Shopping+-+Big+4+-+Ethernet&utm_source=adwords&utm_medium=ppc&utm_term=&hsa_kw=&hsa_acc=1821731459&hsa_grp=&hsa_ad=&hsa_mt=&hsa_ver=3&hsa_net=adwords&hsa_tgt=&hsa_cam=18188851911&hsa_src=x&gclid=CjwKCAjwg5uZBhATEiwAhhRLHo3seuPWGq4JdxCyGs33Wn1XSozgajRYVK8DVMJsFLSqkxKUQwIfrRoC3OQQAvD_BwE

Cost of RJ45 Outlets, Wall Plates, and Connectors

- RJ 45 Wall Plates
  - 81 rooms total x 1 wall plate each room = 81 wall plates
  - 81 wall plates x $0.60 = $48.60
  - Decided to go with a 4 port wall plate in case the school needs to expand or add new connections such as printers, computers, etc..
  - https://www.cablesandkits.com/ethernet/wall-plates/4-port-white/pro-1000/

- RJ45 Outlets (Keystone Jack)
  - 81 rooms x at least 2 outlets per wall plate = 162
  - 162 outlets x $2.47 = $400.14
  - https://www.parts-express.com/Cat-6A-Keystone-Jack-Blue-75138?quantity=1&srsltid=AYJSbAfCw3BqhfxnqbROQZxcDgs6vOQtcs23CoOguxW39OFJc0kkHWqaUJw

- RJ45 Connectors
  - 81 rooms x 2 cables each x 2 ends each = 324 connectors
  - Plus, the 3 connections from telecom closets to equipment room = 324 + 6 = 330
  - 7 units (50 pack) x $28.99 = $202.93

- https://www.tradeinn.com/techinn/en/startech-cat6-rj45-modular-plug-connector-50-units/137834623/p?utm_source=google_products&utm_medium=merchant&id_producte=11907473&country=us

- Total Cost
  - **$48.60 + $400.14 + $202.93 = $651.67**

(2) Budget and Plan of Patch Cables and Managed Switches

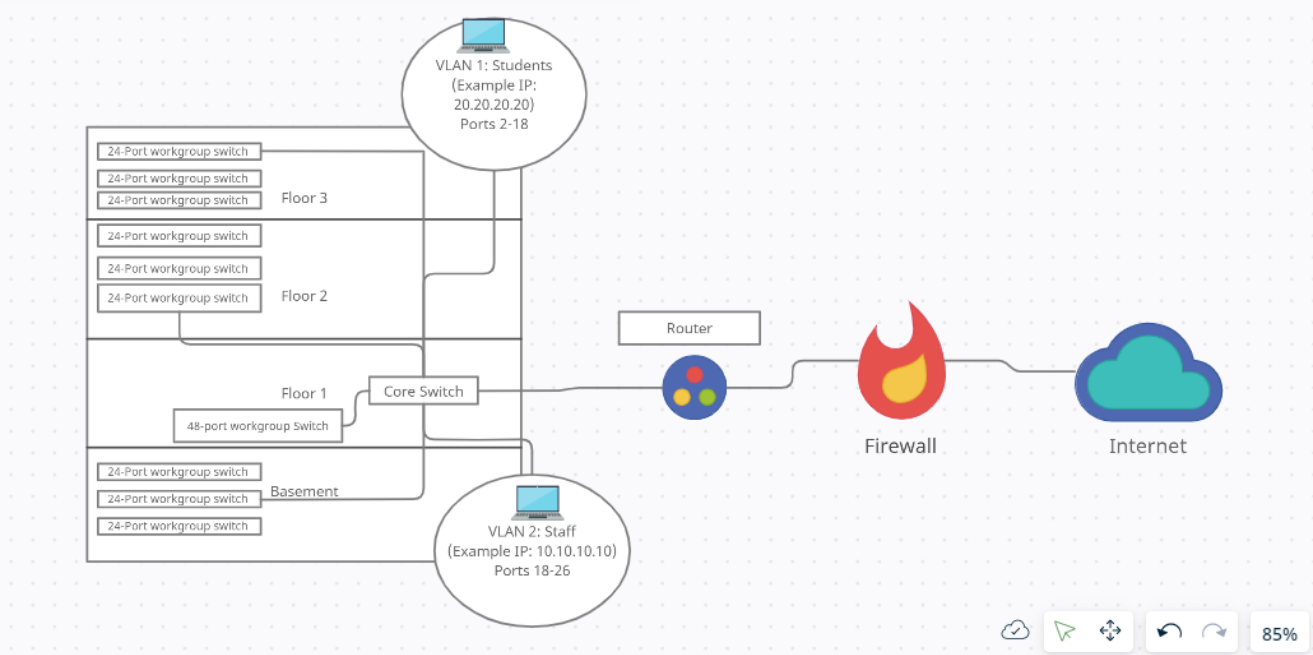
- Managed Switches
  - Basement: (3) 24-port managed workgroup switches. 43 connections x .20 = 9. Need at least 52 ports (43 + 9)
  - First Floor: (1) 48-port managed workgroup switch. 39 connections x .20 = 8. So need at least 42 ports (34 + 8). & (1) 26-port managed core switch to connect all the workgroup switches.
  - Second Floor: (3) 24-port managed workgroup switch. 41 connections x .20 = 8. Need at least 48 ports (40 + 8). Add another switch just in case.
  - Third Floor: (3) 24-port managed workgroup switch. 43 x .20 = 9. Need at least 51 ports (42 + 9)
  - Total 24-port Workgroup Switches: 9 x $159 = $ 1,431
  - https://www.fs.com/products/129516.html?country=US&currency=USD&languages=English&paid=google_shopping&utm_country=9008492&gclid=Cj0KCQiAkMGcBhCSARIsAIW6d0Bb4uU-C1nZSSUgzZOg1gsPi5k2yXW3c5wKTk4_NiUvovdxesS0TysaAkViEALw_wcB
  - Total 48-port Workgroup Switches: 1 x $367.66 = $367.66
  - https://www.newegg.com/p/0XP-001U-000V1?Description=48%20port%20gigabit%20switch&cm_re=48_port%20gigabit%20switch-_-0XP-001U-000V1-_-Product
  - Total 26-port Core Switches: 1 x $1,169.99 = $1,169.99
  - https://www.newegg.com/p/0XP-001U-000V1?Description=48%20port%20gigabit%20switch&cm_re=48_port%20gigabit%20switch-_-0XP-001U-000V1-_-Product
  - **Total Cost of Switches: $1,431 + $367.66 + $1,169.99 = $2,968.65**

- Patch Cables
  - Total Connections: 43 + 39 + 41 + 43 = 166 patch cables needed
  - **166 x $1.28 = $212.48**
  - Snagless, 6 inches, doesn't need to be very long since switch and patch panel near each other.

- https://www.discount-low-voltage.com/6-inch-cat6-patch-cable-blue?gclid=Cj0KCQiAkMGcBhCSARIsAIW6d0DBNSswvZa9GnLUgXfs317qs7SXGHdm0ooHkYiWMQNDlBqSmLzMlPwaAoIeEALw_wcB

(3) Plan and Budget for Firewall and securing Maury Traffic

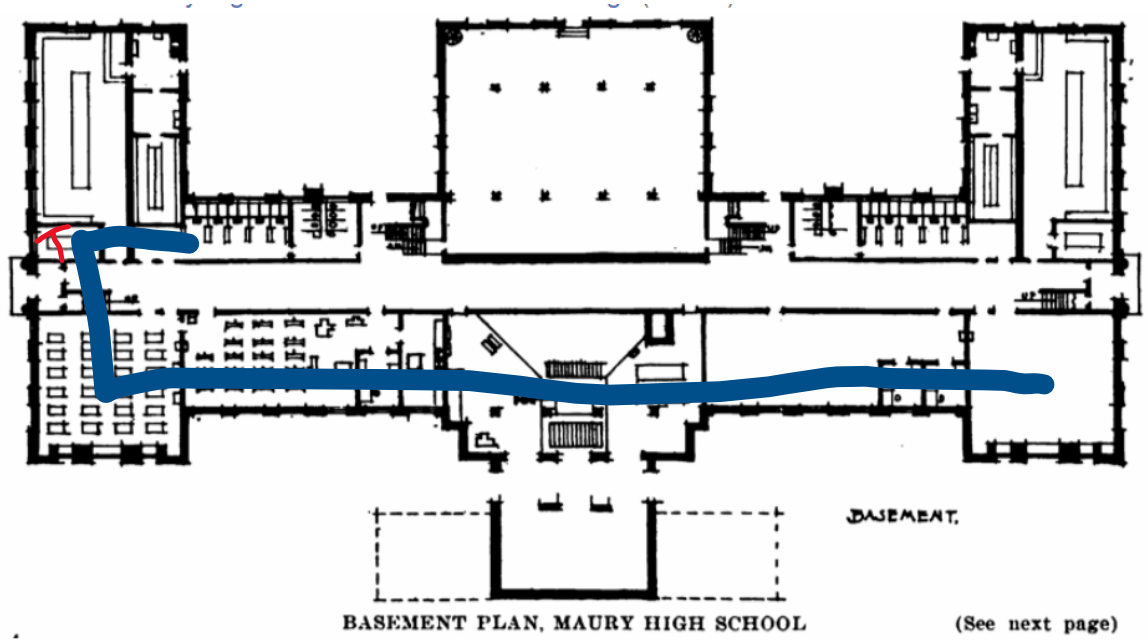
- Firewall to support at least 500 users, does packet filtering, anti-malware, anti-spyware, and more. It inspects incoming and outgoing traffic and can block either type of traffic.
- **Cost = $1,316**
- https://www.cdw.com/product/sonicwall-tz600-security-appliance/3724757
- Install and Intrusion Detection System – Snort Opensource. Helps to detect intrusions as well as prevent them.
- **Cost = $399**
- https://www.snort.org/products
- Router – High speed, scalable, and built in firewall = **$2,500**
- https://networkoutlet.com/products/a901-6cz-ft-a-cisco-asr-901-10g-router-ethernet-tdm-interfaces-ac?variant=31457259618384&currency=USD&utm_medium=product_sync&utm_source=google&utm_content=sag_organic&utm_campaign=sag_organic&gclid=Cj0KCQiAkMGcBhCSARIsAIW6d0DZsBzZT8T1uy90YetFpZmyAwBpSkhoEIkJOBvm9pRwHnJ_tUfSCM8aAt7wEALw_wcB



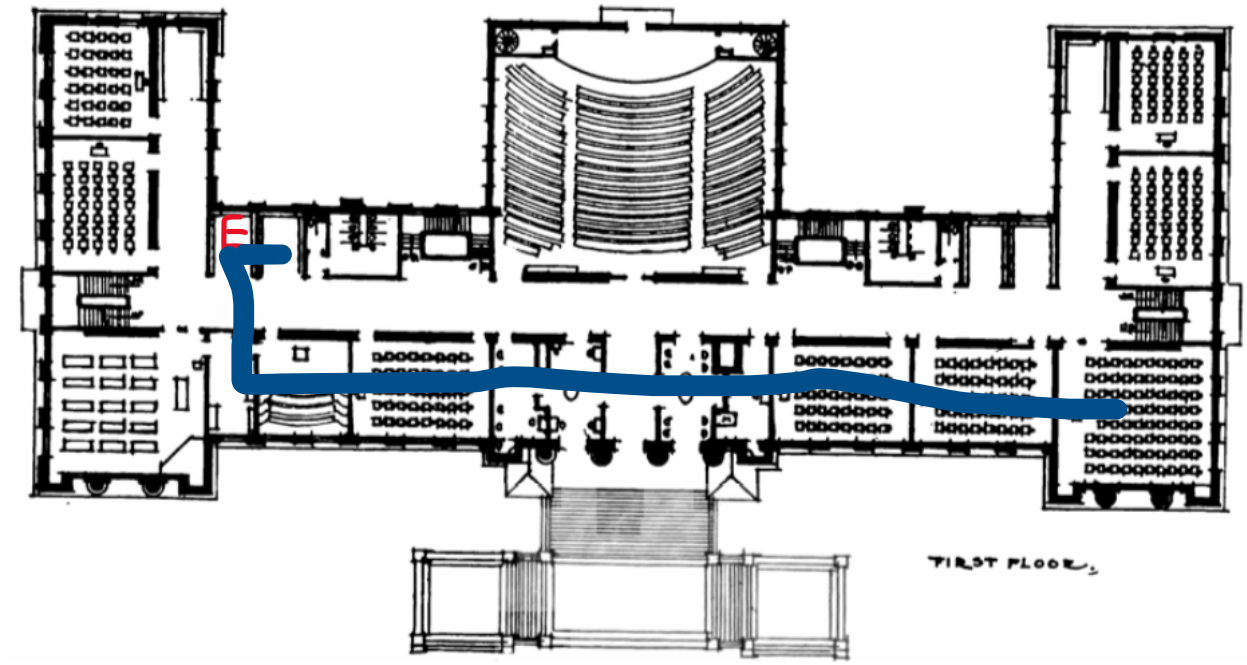
(4) Total Estimated Cost of Project

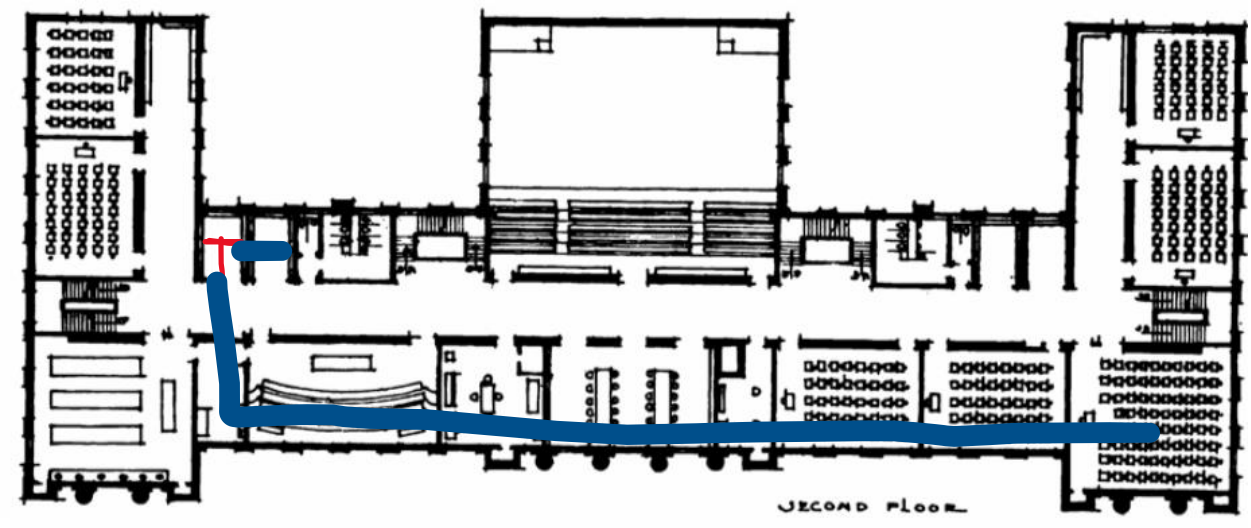
- Cable: **$4,653 +** 48-port patch panels: **$294 +** RJ45 Equipment: **$651.67 +** Managed Switches: **$2,968.65 +** Patch Cables: $**212.48 +** Firewalls and IDS: **$1715 +** Router: **$2,500**
- **TOTAL COST ESTIMATE = $12,049.13 (not including labor costs)**
- **Estimate with labor costs = $ 12,049.13 + $12,000 = 24,049.13**

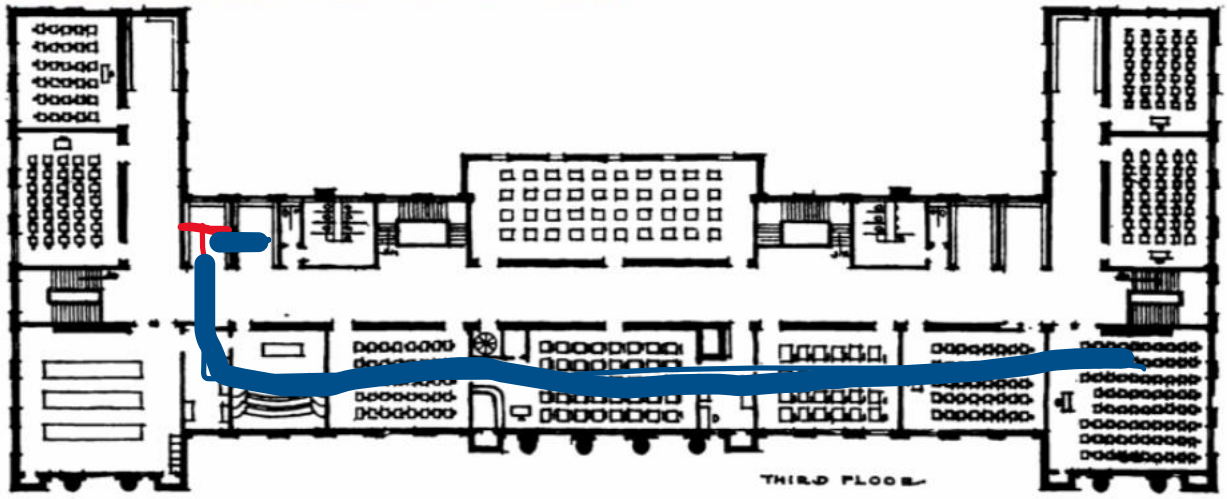
(5) Diagrams



BASEMENT PLAN, MAURY HIGH SCHOOL (See next page)




SECOND FLOOR


THIRD FLOOR