India Henry
CYSE 495 - 31242
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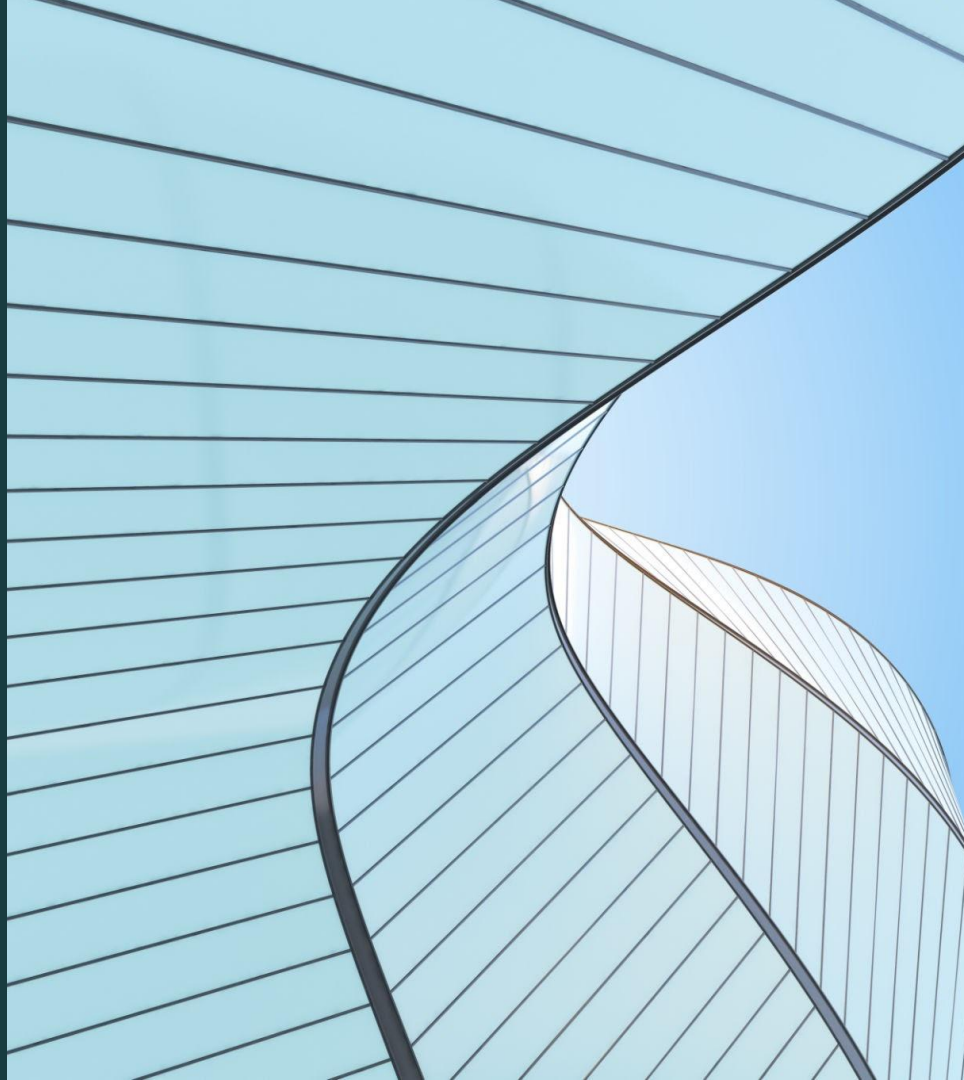
Case Analysis: Wiring Maury High School



Content Overview

Total Cost:	Hardware Cost:	Other Materials:
~ $21,619.00	~ $12,519.00	~ $9,100.00

This presentation will provide diagrams to show the proposed wiring plan for each floor of Maury High School. Following the wiring plan is a diagram for the proposed network configuration and the proposed firewall configuration. This presentation also includes a budget breakdown for the hardware as well as a budget for the proposed network.

Assumptions

- Maury High School is 95 meters
  - Key is 1 m = 6 cm
  - Fiber optic cables would be used from the central router to the switches
    - Fiber optic cables have longer runs, and are best for providing connectivity to the switches
  - Copper cables would be used to connect routers to switches - fiber optic completes the longer runs between switches and outlets
    - Copper cables have shorter runs, but are more cost effective and have low attenuation, or connectivity loss, in short runs
- Offices are on different floors than classrooms
  - Each floor has its own router - Basement and floor three for faculty/staff, floors one and two for students
  - Segmenting the connection allows for different firewall permissions based on the floor
  - Allows faculty to have a different permissions than students
  - Helps with traffic flow
  - Standard number of outlets is one per every 8 meters

Key For Diagrams & Topology Justification

Switch

Fiber

Router

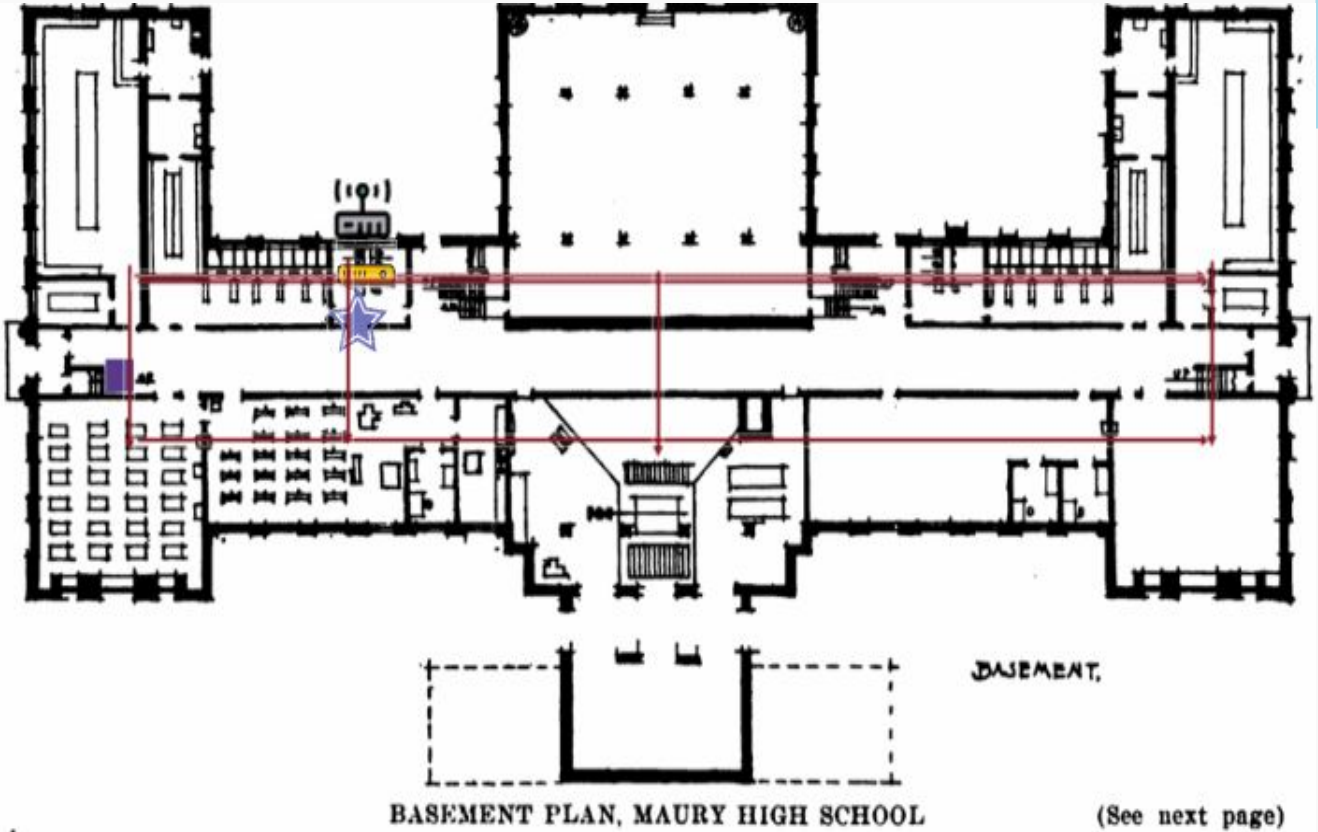
Telecommunications Rooms

Equipment Room

Stairwell

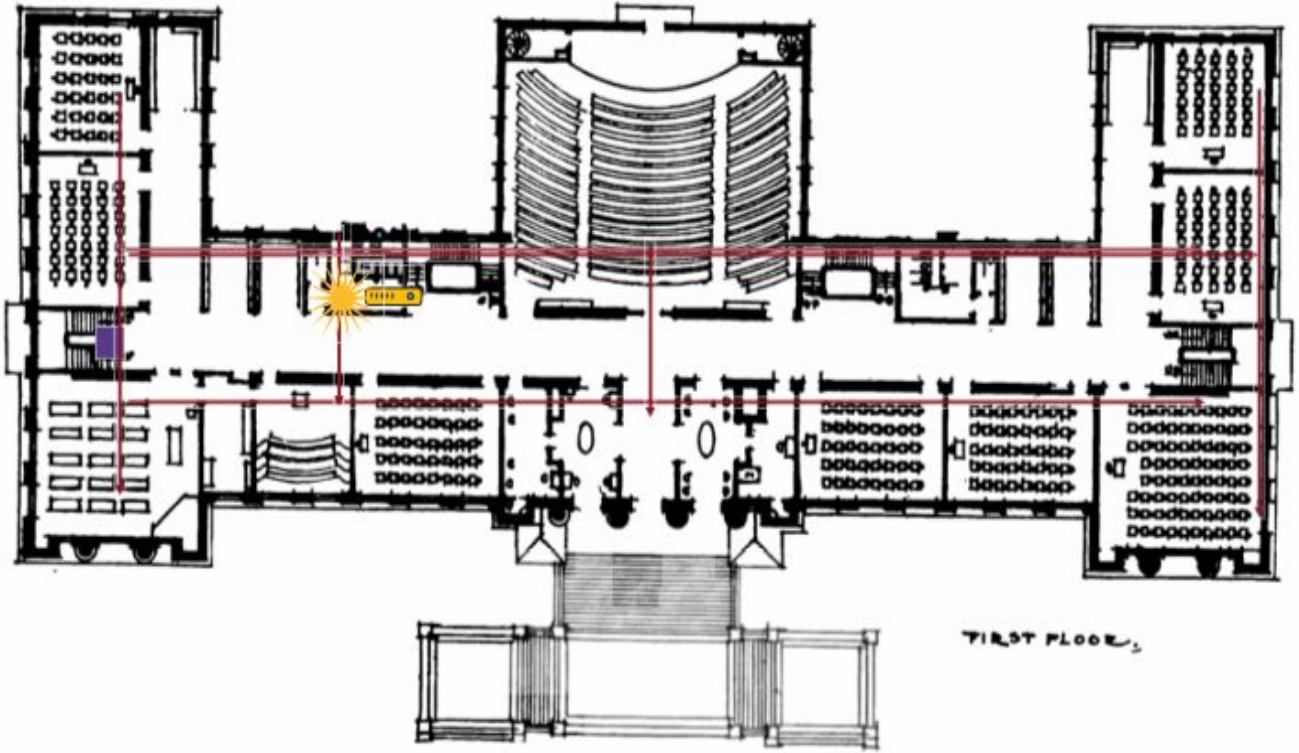
The proposed topology for the cable network is extended star; extended star topology allows for a router to connect to various switches, and the connection is able to extend from the switches to the devices in the room. While the proposed cables are fiber, having switches in the larger classrooms and offices helps to ensure connectivity in the larger spaces while also providing connection to the smaller spaces by extension.

Diagram for Basement



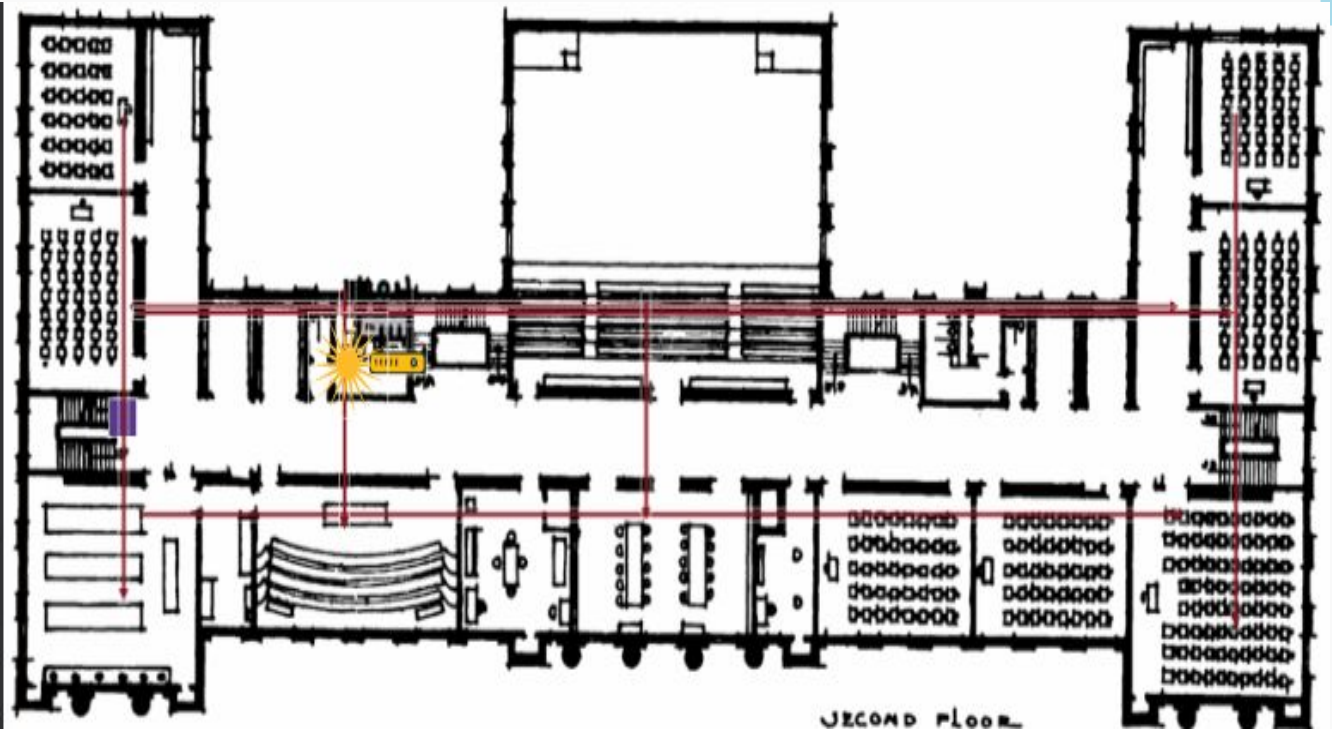
- The basement holds the only equipment room inside of the building
- This is where the backup switches would be found
  - 2 routers (one backup)
  - 2 switches (one backup)
- Approximately 350 m of fiber optic

Diagram for First Floor



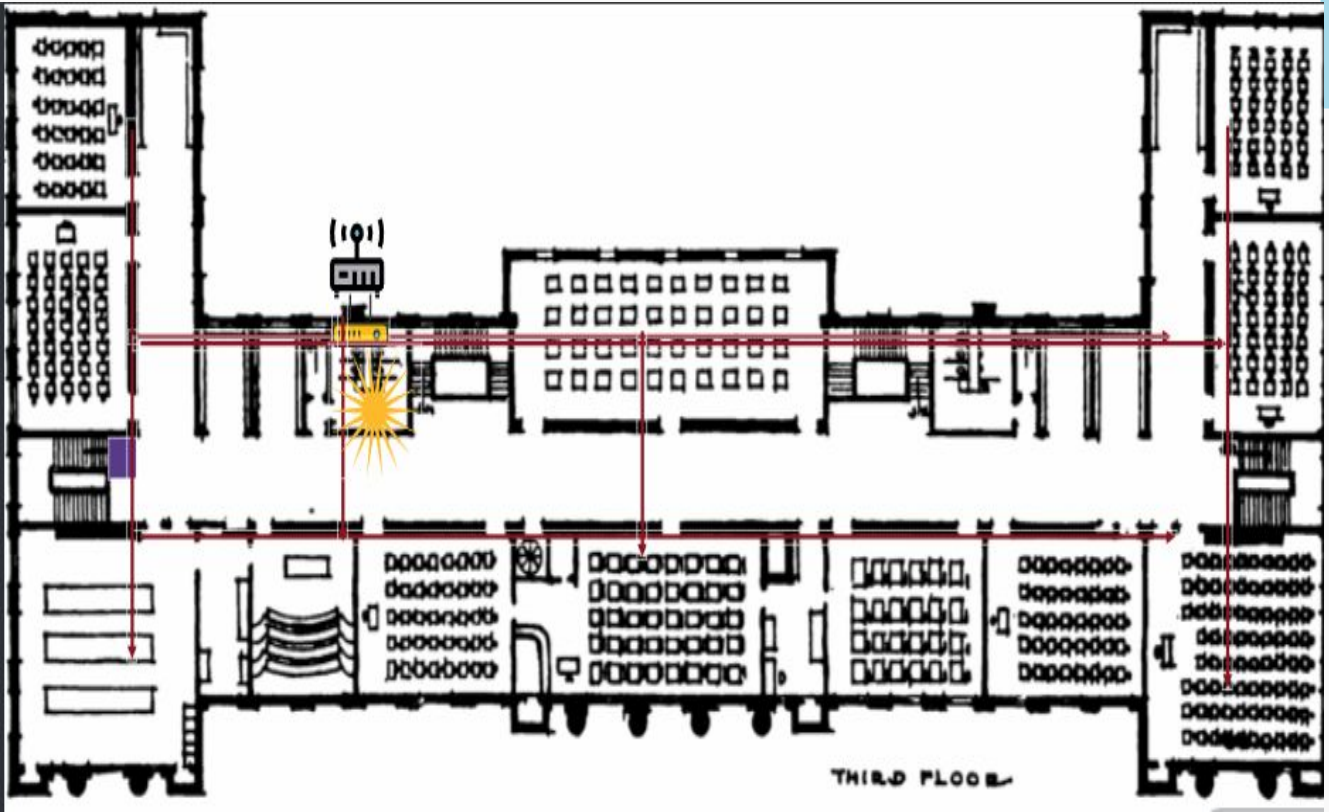
- Telecommunications room is right above equipment room
  - One router
  - Two switches
- Telecommunications room is placed a little off the stairwell to leave room for the classrooms
- Cabling intersects each other to provide a redundant connection
- Approximately 350 m of fiber optic cable

Diagram for Second Floor



- Telecommunications room right above the telecommunications room on floor one
  - Two routers (one backup)
  - Three switches (one backup)
- Fiber cable intersects each other for redundancy
- Approximately 350 m of fiber optic cable

Diagram for Third Floor



- Telecommunications room is directly above the other telecommunications rooms
  - One router
  - One switch
- Fiber cable intersects each other for redundancy
- Approximately 350 m of fiber optic cable

Key for Network Diagram / Network Configuration Assumptions

Workstation/Outlets

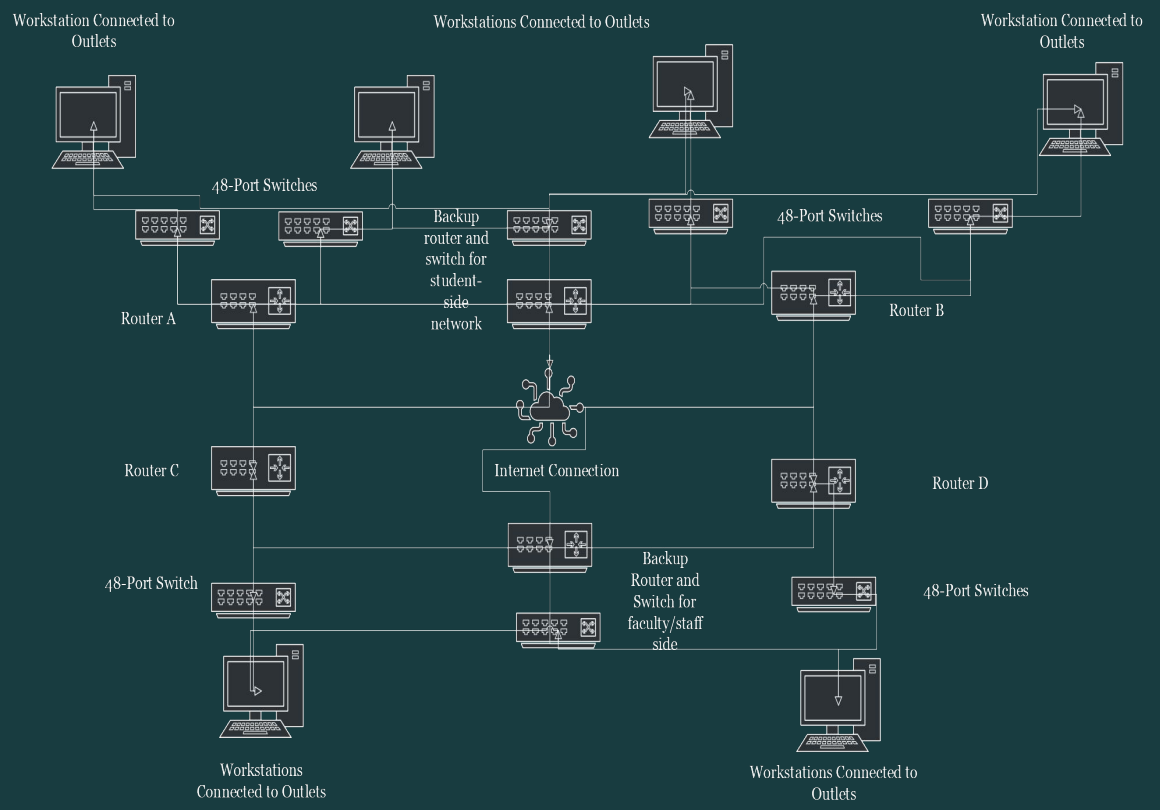
Switches

Routers

Internet Connection

- The school is segmented into floors for classrooms and floors for offices
    - The floors for classrooms have routers A and B because it is more likely they'll need more switches than the floors with offices, which have routers C and D
- The connection from the routers to the switches use copper cable because they are closer together
- The connection from the switches to the Outlets use fiber optic cables because they are longer runs
- Firewall hardware is connected to the routers

Network Configuration Diagram



- The network is build to hold 288 users
  - 6, 48-Port Switches
  - 2 backup switches - one for each firewall
- Symbol for outlets and workstations are combined
  - Some rooms may be computer labs
  - Others may only need outlets
- Segmented network
  - Routers A & B are the student network
  - Routers C & D are the faculty/staff network

Student-Side Firewall Configuration

LAN Interface Router A	LAN Interface Router B	LAN Interface Backup Router	WAN Interface
IP Address: 192.168.1.1 Subnet Mask: 255.255.255.0	IP Address: 192.168.2.1 Subnet Mask: 255.255.255.0	IP Address: 192.168.3.1 Subnet Mask: 255.255.255.0	IP Address: 10.254.50.188 Subnet Mask: 255.255.0.0 Gateway: 10.254.0.1

ID	Destination IP	Mask	Next Hop	Interface
Router A 1	192.168.1.0	255.255.255.252	192.168.1.x	LAN
Router A 2	10.254.50.0	255.255.255.252	10.254.50.188	WAN
Router A 3	0.0.0.0	0.0.0.0	10.254.50.188	WAN
Router B 1	192.168.2.0	255.255.255.252	192.168.2.x	LAN
Router B 2	10.254.50.0	255.255.255.252	10.254.50.188	WAN

Student-Side Firewall Configuration cont.

LAN Interface Router A	LAN Interface Router B	LAN Interface Backup Router	WAN Interface
IP Address: 192.168.1.1 Subnet Mask: 255.255.255.0	IP Address: 192.168.2.1 Subnet Mask: 255.255.255.0	IP Address: 192.168.3.1 Subnet Mask: 255.255.255.0	IP Address: 10.254.50.188 Subnet Mask: 255.255.0.0 Gateway: 10.254.0.1

ID	Destination IP	Mask	Next Hop	Interface
Router B 3	0.0.0.0	0.0.0.0	10.254.50.188	WAN
Backup 1	192.168.3.0	255.255.255.252	192.168.3.x	LAN
Backup 2	10.254.50.0	255.255.255.252	10.254.50.188	WAN
Backup 3	0.0.0.0	0.0.0.0	10.254.50.188	WAN

Faculty-Side Firewall Configuration

LAN Interface Router C	LAN Interface Router D	LAN Interface Backup Router	WAN Interface
IP Address: 192.168.4.1 Subnet Mask: 255.255.255.252	IP Address: 192.168.5.1 Subnet Mask: 255.255.255.252	IP Address: 192.168.6.1 Subnet Mask: 255.255.255.252	IP Address: 10.254.50.188 Subnet Mask: 255.255.0.0 Gateway: 10.254.0.1

ID	Destination IP	Mask	Next Hop	Interface
Router C 1	192.168.4.0	255.255.255.252	192.168.4.x	LAN
Router C 2	10.254.50.0	255.255.255.252	10.254.50.188	WAN
Router C 3	0.0.0.0	0.0.0.0	10.254.50.188	WAN
Router D 1	192.168.5.0	255.255.255.252	192.168.5.x	LAN
Router D 2	10.254.50.0	255.255.255.252	10.254.50.188	WAN
Router D 3	0.0.0.0	0.0.0.0	10.254.50.188	WAN

Faculty-Side Firewall Configuration

LAN Interface Router C	LAN Interface Router D	LAN Interface Backup Router	WAN Interface
IP Address: 192.168.4.1 Subnet Mask: 255.255.255.252	IP Address: 192.168.5.1 Subnet Mask: 255.255.255.252	IP Address: 192.168.6.1 Subnet Mask: 255.255.255.252	IP Address: 10.254.50.188 Subnet Mask: 255.255.0.0 Gateway: 10.254.0.1

ID	Destination IP	Mask	Next Hop	Interface
Backup 1	192.168.6.0	255.255.255.252	192.168.6.x	LAN
Backup 2	10.254.50.0	255.255.255.252	10.254.50.188	WAN
Backup 3	0.0.0.0	0.0.0.0	10.254.50.188	WAN

Budget Overview

Item	Amount	Price	Total Price
4600 ft, LC to LC, Pulling Eye Both Ends Fiber	1	~ $7,407.00	~ $7,407.00
100 ft Cat-5 Cables	2	~ $12.00	~ $24.00
Switches	8	~ $260.00	~ $1,560.00
Router	6	~ $180.00	~ $720.00
48-Port Patch Panel	8	~ $87.00	~ $696.00
Outlet and Wall Plate	700	~ $13.00	~ 9,100.00
Firewall	6	~ $352.00	~ 2,112.00
Total			~ $21,619.00