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IT 315

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Maury High School Case Analysis

For my setup, I will be using Cat6 cables and keystone jacks, and two-port keystone jack wall plates for all the rooms. I counted 70 rooms total, 10 rooms in the basement and 20 rooms on each of the three floors above. To determine the length of the cable runs, I measured the width of Maury High School on the floor plan on paper, from end to end, and I got 26cm. To convert the scale to actual measurements, and as instructed, assuming that Maury is 95m wide, I divided 9500cm by 26cm and got 365.4cm, then converted this to 3.65m, so that means 1cm on the scale represents 3.65m in actual measurement. I'm also going to assume that the ceilings are 10ft (3m) tall. I used the following formula to find the amount of cabling needed:

(Average of shortest and longest cable runs)(# of cables running to that room) = Total amount of cable that will be needed

As for the equipment setup, I placed a telecommunications equipment room in the basement that contains a 12-port core switch, a 24-port workgroup switch, and a 24-port patch panel that serves at least 20 outlets on that floor. Each of the three floors above have one telecommunications closet. These telecom closets contain one 48-port workgroup switch and one 48-port patch panel each, serving at least 40 outlets on each of these floors. The connections are as follows: fiber leads into the core switch in the equipment room, the core switch uplinks the connection to a workgroup switch in that same room via a 1ft patch cable, as well as to the other workgroup switches in the telecom closets in the above floors. The connections from the workgroup switches are then terminated at the patch panels with 1ft patch cables, and finally the cable from the patch panels will lead to the two RJ45 keystone outlets in each of the rooms, one in the front of the classroom and one in the back, covered with one-port keystone outlet wall plates.

To separate traffic, I will configure VLANs on each switch for administrators, staff, and students, that way it is cheaper than buying more switches to create subnets and dividing traffic that way. My plan for securing network traffic within Maury is via a hardware firewall. First, I will set up a hardware firewall that can identify suspicious activity through deep packet inspection, and further protect the network through other useful features (IPS,VPN, anti-malware, etc.). Furthermore, I will make use of the packet filtering firewall by implementing rules in an access control list that blocks packets from inappropriate/untrusted websites and allows packets from appropriate/trusted websites.

See the last pages for the floorplan and the network diagram.

# **Cabling**

Basement Floor:

Rooms - 10

Shortest Cable Run - (1.5cm)(3.65) = 5.48m

Longest Cable Run - (24cm)(3.65) = 87.6m

Cabling needed - (5.48m + 87.6m)/2 = 46.54m | (46.54m)(20 cables for 10 rooms) = 930.8m of cabling

RJ45 Keystone Jacks needed - (10)(2) = 20

Wall Plates needed - 20

Floor 1:

Rooms - 20

Shortest Cable Run - (1.5cm)(3.65) = 5.48m

Longest Cable Run - (25.3cm)(3.65) = 92.35m

Cabling needed - (5.48m + 92.35m)/2 = 48.92m | (48.92m)(40 cables for 20 rooms) = 1956.80m of cabling

RJ45 Keystone Jacks needed - (20)(2) = 40

Wall Plates needed - 40

Floor 2:

Rooms - 20

Shortest Cable Run - (1.5cm)(3.65) = 5.48m

Longest Cable Run - (25.3cm)(3.65) = 92.35m

Cabling needed - (5.48m + 92.35m)/2 = 48.92m | (48.92m)(40 cables for 20 rooms) = 1956.80m of cabling

RJ45 Keystone Jacks needed - (20)(2) = 40

Wall Plates needed - 40

Floor 3:

Rooms - 20

Shortest Cable Run - (1.5cm)(3.65) = 5.48m

Longest Cable Run - (25.3cm)(3.65) = 92.35m

Cabling needed - (5.48m + 92.35m)/2 = 48.92m | (48.92m)(40 cables for 20 rooms) = 1956.80m of cabling

RJ45 Keystone Jacks needed - (20)(2) = 40

Wall Plates needed - 40

Cabling from the equipment room to the telecom closets:

Telecom Closets - 3

Shortest Cable Run - (4.4cm)(3.65) = 16.06m + 3m(ceiling height) = 19.06m

Longest Cable Run - (4.4cm)(3.65) = 16.06m + 9m(ceiling height) = 25.06m

Cabling needed - (19.06m + 25.06m)/2 = 22.06m | (22.06m)(3 cables for 3 telecom closets) = 66.18m of cabling

Short cabling from switches to patch panels:

168 ports need 168 1ft (30cm) patch cables - (168)(30cm) = 5040cm (50.4m) needed*

*this includes extra cabling, just in case more connections are needed in the future

**Cabling Total: 6917.78m of Cat6 cable, 140x RJ45 Outlets and 140x Wall Plates**

Cabling Materials Budget:

6917.78m of Cat6 cable: 1000ft (305m) of Cat6 costs $162.64

(6917.78m)($162.64)/305m = $3688.88 of Cat6 cable

140 RJ45 Outlets: 6x Cat6 RJ45 Keystone Outlets 25-Pack = $215.94

140 Wall Plates: 14x 1-Port Keystone Jack Wall Plates 10-Pack = $153.86

**Total = $4058.68**

Equipment Materials Budget:

**Hardware Firewall**:

1xFortinet FortiGate 61F (10 x GE RJ45 ports (including 2 x WAN Ports, 1 x DMZ Port, 7 x Internal Ports), 128GB SSD onboard storage = $659.70

**Core Switch**:

1xCisco Catalyst 3750X-12S-E - switch - 12 ports - managed - rack-mountable = $6898.99

**Workgroup Switches:**

3xCISCO DESIGNED Business CBS350-48T-4G Managed Switch | 48 Port GE | 4x1G SFP = $2081.10

1xCISCO DESIGNED Business CBS350-24T-4G Managed Switch | 24 Port GE | 4x1G SFP = $505.99

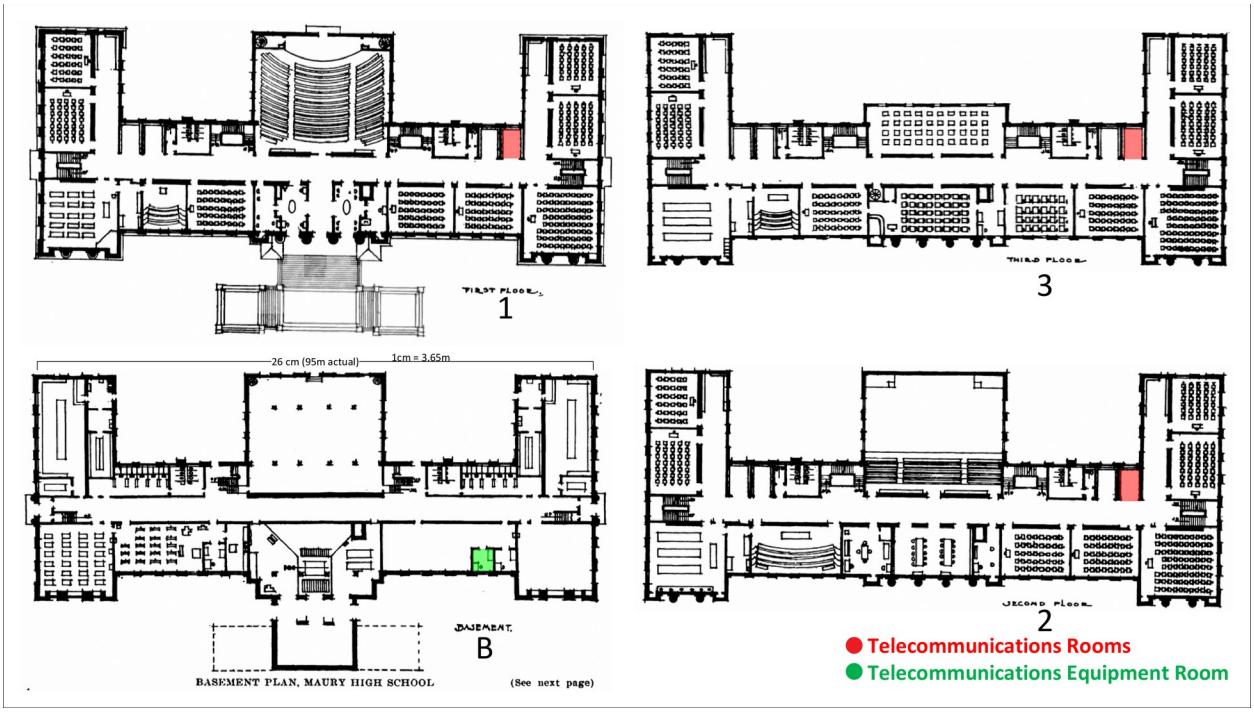
**Patch Panels:**

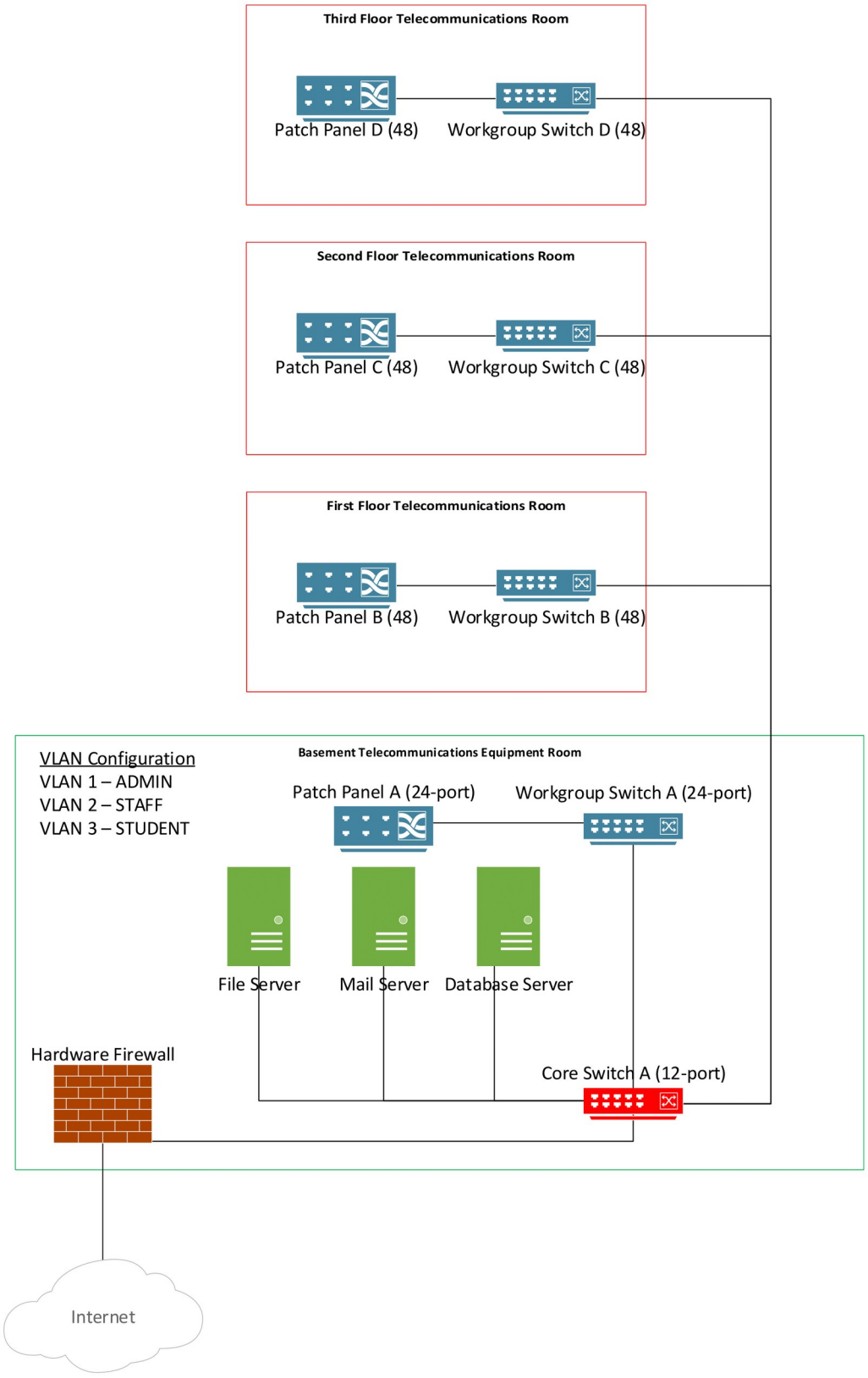
3xTRENDnet 48-Port Cat6 Unshielded Patch Panel = $209.97

1xTRENDnet 24-Port Cat6 Unshielded Patch Panel = $39.99

**Total = $10395.74**

**Sum of all equipment and materials = $14454.42 (w/o tax)**


FIRST FLOOR
1
THIRD FLOOR
3
26 cm (95m actual)
1cm = 3.65m
BASEMENT
B
BASEMENT PLAN, MAURY HIGH SCHOOL
(See next page)
SECOND FLOOR
2
Telecommunications Rooms
Telecommunications Equipment Room


Third Floor Telecommunications Room
Patch Panel D (48)
Workgroup Switch D (48)
Second Floor Telecommunications Room
Patch Panel C (48)
Workgroup Switch C (48)
First Floor Telecommunications Room
Patch Panel B (48)
Workgroup Switch B (48)
VLAN Configuration
VLAN 1 – ADMIN
VLAN 2 – STAFF
VLAN 3 – STUDENT
Basement Telecommunications Equipment Room
Patch Panel A (24-port)
Workgroup Switch A (24-port)
File Server
Mail Server
Database Server
Hardware Firewall
Core Switch A (12-port)
Internet