Network Design Project – Part 3

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3/31/2023

WW Networking

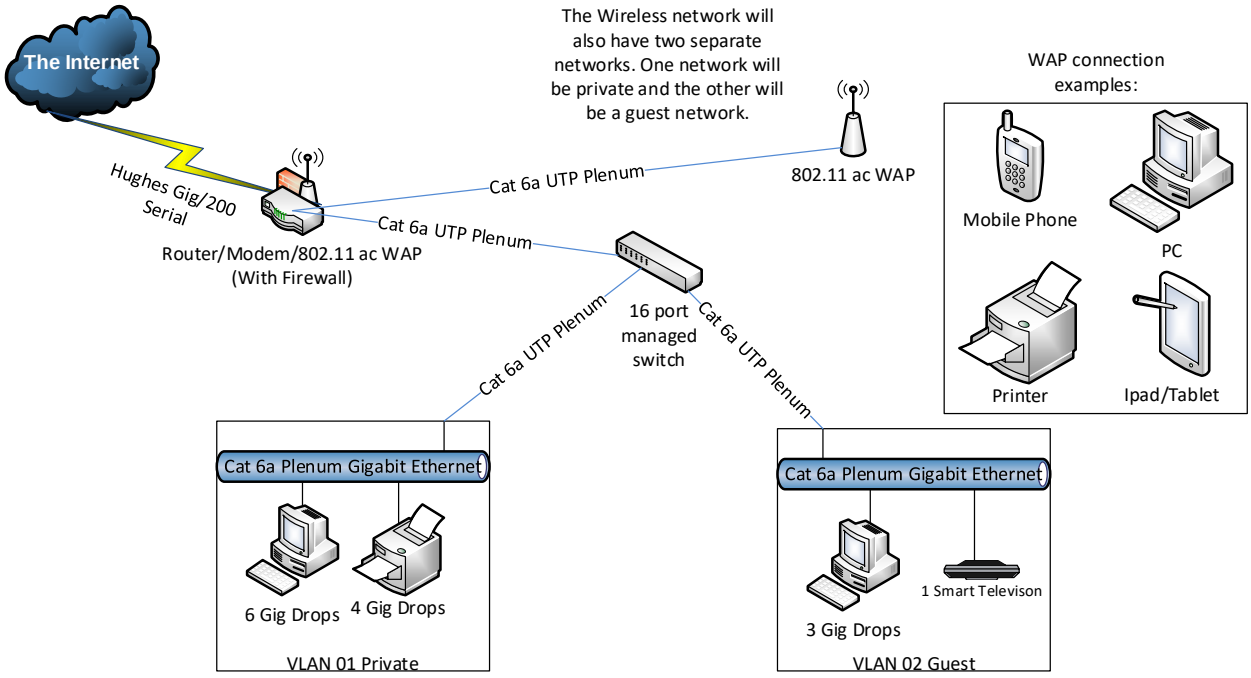
Executive Summary

- **Overview**
  - This network is going to be installed in your apartment for utilization while you are attending college. While it is only going to be in use for a few years, the network is still going to be a fast network that will be able to support LAN parties and guests while remaining secure. The installation will be simple and should not take more than a month.
- **Current Situation**
  - The current network is very simple. It includes two laptops, two workstations, and a network printer. The only piece of hardware on the network is a wireless router with a built-in cable modem. While this network is usable, it is insufficient for the Davis brothers' needs for high-speed gaming and data analysis.
- **Objective**
  - The new network is going to be suitable for LAN parties, multiple guests, high-speed gaming, and data analysis. It will also be much more secure than the previous network because there will be a guest network and a private network.
- **Proposed System**
  - Higher speeds on the network will be attainable through a wired network instead of a wireless network. The cabling used will be able to support the gigabit internet provided by the ISP. The network will also have higher security because neighboring apartments will not be able to access the new network, and it will be password protected as well as encrypted.
- **Summary of Recommendations**
  - To keep network security to a maximum, routinely changing the network password is strongly recommended. A potential hardware upgrade that would allow for future expansion would be to use a twenty-four-port switch instead of a sixteen-port switch. The sixteen-port switch will satisfy the needs of the network, but if the network is going to expand much, the switch might need an upgrade.
  - This network will be able to fulfill all of your requests, including high-speed internet, network security, a budget under 5,000 dollars, and installation during the month of July. Cabling will run through the apartment's plenum space and connect to all of the telecom boxes in the apartment. The rack equipment will also be easily accessible in the demarc, which will be between bedroom B and bath B.

Logical Design

The logical diagram shows how the network moves across the different connections throughout the design. The connection begins at the internet service provider (ISP) with a wired connection of 1 gigabit per second and goes to a router/modem/switch/wireless access point (WAP). From there, the second 802.11 ac WAP that you requested will be in bedroom A, and the

router will also connect to a 16-port managed switch, which will provide 1 gigabit per second (Gbps) connection to the telecom boxes throughout the apartment.



1Gig/200Mbps is the fastest internet available in the Stephenville area, and it will satisfy your request for LAN party abilities. It will be a serial connection from an internet service provider connecting to the demarc. However, please note that the router could reduce the speed to the ISP. The router in this diagram also serves as a modem and an 802.11ac wireless access point and has a firewall. This type of router prevents the need for separate pieces of equipment. It is also going to be connected to a second 802.11ac WAP, as you requested. The wireless network will also be encrypted to prevent your neighbors from connecting to it, and it will provide many connection possibilities. A sixteen-port managed switch is also connected to the router to provide two separate VLANs. VLAN 01 is a private network, and VLAN 02 is a guest network. Both are password accessible and should provide an extra layer of privacy. There are also two extra ports on the switch in case of a port failure. All the cabling used in the diagram is Cat 6a UTP plenum cabling. This type of cable is safe for the plenum space in the ceiling, and it also utilizes the Cat 6a cabling capabilities, which can support 1 Gbps.

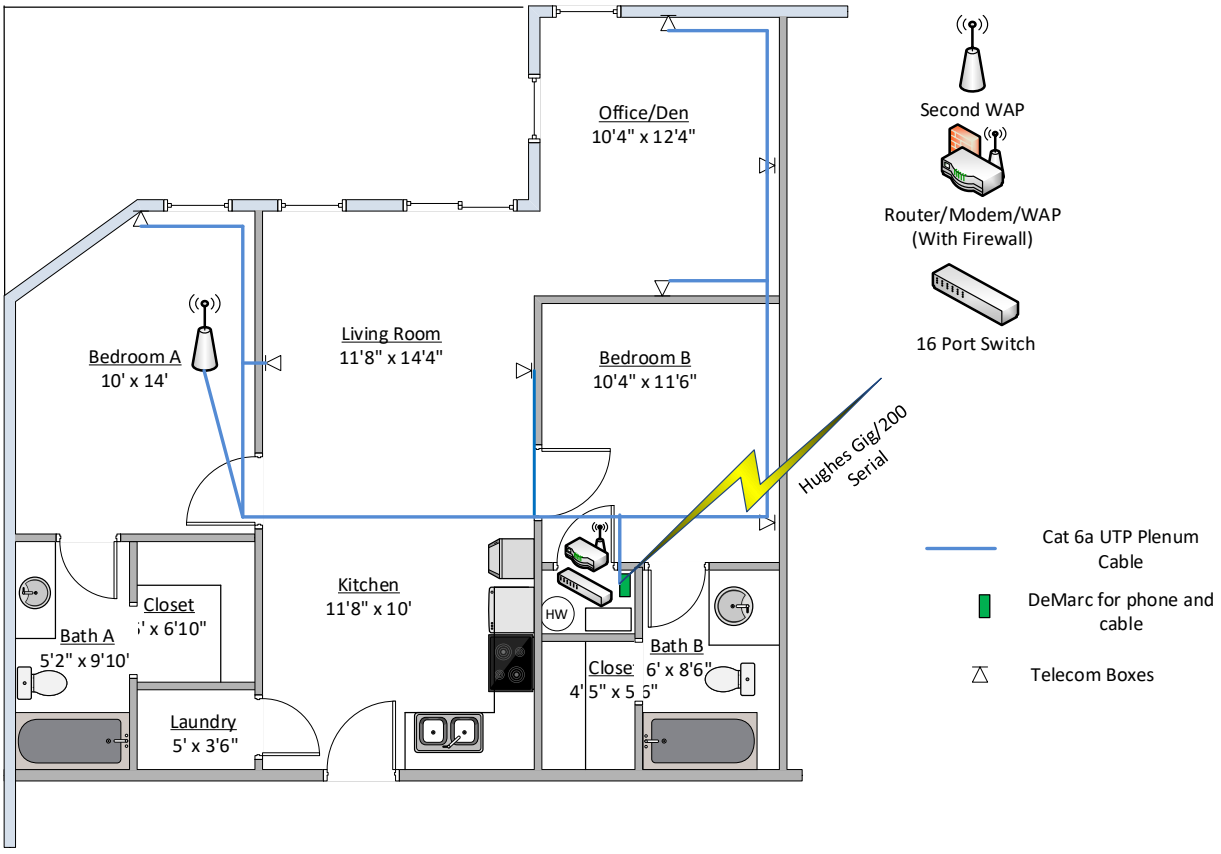
- Definition of Groups and Users
  - The primary users will utilize the private network on both the wired and wireless networks. This group is reserved for the Davis Brothers only.
  - The secondary users will utilize the guest network on both the wired and wireless networks. This group is for other people connected to the network.
    - The wired guest network will use four drops and will allow multiple guests to log on to it. However, the connection will require a password that you will have to provide. It is also important to change your network password frequently to provide the best security and prevent unwanted connections to the network.
    - The guest wireless network will work in the same way. You will need to provide guests with a password for them to log onto the network.

- **Description of Rights and Permissions**
  - Members of the primary user group will have full access to everything on the network, including passwords and the ability to change the configuration of the network equipment.
  - Members of the secondary user group can use the network services on their devices if they have the password, but they will not have the ability to change any of the configurations on the network.

Physical Design

The physical design shows the layout of the apartment and where all the cabling and network equipment is.

- The design shows the cabling, the second WAP, and the rack along with the 16-port switch and the router/modem/switch/WAP in the demarc. The demarc is in the closet between bathroom B and bedroom B, as you requested. It will serve as the connection point between the network and the ISP. A mounted rack will be there to hold the rest of the network components. Each telecom box will receive two wired connections. The diagram indicates the placement of all the wiring.
- The wireless network will start at the router/modem/switch/WAP, and a cable will run to the second WAP that you requested in bedroom A. We would recommend that the WAP be placed in the center of the ceiling or close to the living room wall to cover the greatest area in the apartment.
- All the wiring will be run over walls where possible to ensure safety and easier repairs, and the cabling will also avoid all water walls to prevent electrical issues.
- **Physical Layout**



- **Hardware Resources Needed Including Costs (Brands, model, etc.)**
  - Hardware Specifications and Pricing
    - The following diagrams show the equipment for the new network. The hardware for this design includes the cabling equipment and the rack equipment. There is a description of the installation process below.
    - The first step is to install the cabling, which uses J hooks every three feet to support the cable. The cable will run to every telecom box, where a wall jack and a two-hole wall plate will be attached. Cabling will also reach the second WAP in bedroom A.
    - Next, we will install a wall-mounted rack in the demarc. In the rack, a sixteen-port Cat 6a patch panel will connect all the cable runs. We will also label each drop on the patch panel. There will also be a surge protector and wire control panel in the rack.
    - Next, a sixteen-port managed switch will connect to each patch panel port using fourteen two-foot patch cables. Then, another patch cable will connect to the WAP. All excess wiring will be in the wiring control panel.
    - Finally, the router/modem/switch/WAP will connect to the managed switch along with the uninterrupted power supply (UPS). The router will link the network to the internet service provider. We will also provide a six-foot patch cable for each of the fourteen drops.

Equipment list						
Equipment and Components Required						
Part	***Manufacturer***	***Description***	***Cost***	***Per***	***Quantity***	***Total***
Cat 6a UTP Plenum Cable	Monoprice	Cat6A 500ft Blue CMP UL Bulk Cable, UTP	240.89	each	2	481.78
Wall Jacks	Networx	CAT6A SpeedTerm™ Keystone Jack 90 Degree	3.13	each	14	43.82
Wall Plates	ICC Networking	ICC Flat Keystone Wall Plate-Single Gang-2 Port	2.85	each	7	19.95
2 ft Patch Cable Cat 6a	Cable Leader	2ft Slim Cat6a 28AWG UTP Ethernet Network Patch Cable, Blue	1.80	each	17	30.60
6 ft Patch Cable Cat 6a	Cable Leader	6ft Cat6a 600 MHz UTP Snagless Ethernet Network Patch Cable, Blue	2.37	each	14	33.18
J-hooks		ICC J-Hooks in 25 Pack	25.99	each	5	129.95
Patch Panel	Tasharina Corp	16 Ports Cat6A Rackmount Unsheilded RJ45 Ethernet	47.49	each	1	47.49
Rack	Networx	6U Wall Mount Cabinet - 101 Series, 18 Inches Deep, Flat Packed	139.47	each	1	139.47
Power Strip	APC	APC Essential Surgearrest PE66 - surge protector	16.99	each	1	16.99
Router/Firewall/WAP etc	Linksys	WRT3200ACM Linksys Wireless Router 4-Ports Switch Gige 802.11a/b/g/n/ac Dual Band	267.83	each	1	267.83
WAP	Cisco	Cisco Business 140AC - WAP - Wi-Fi 5	100.99	each	1	100.99
Switch - 1Gig/200Mb	Cisco	Cisco Business CBS220-16T-2G 16p Ge 2x1g Sfp Smart Switch	295.00	each	1	295.00
UPS	APC	APC Back-UPS ES 550 - UPS - 330 Watt - 550 VA	111.99	each	1	111.99
Wire Ties	JEWOSTER	50 PCS Reusable Fastening Cable Ties, 8 Inch Premium Adjustable Cord Ties	4.98	each	1	4.98
Wire Control	Networx	1U Cable Management Duct	12.34	each	1	12.34
				Pck		0.00
					Sub total parts	1736.36
				State Tax	0.0825	143.25
					Total Parts	1879.61

- Labor Pricing
  - Labor is divided into two parts, pulling the wire and installing the rack and its components. The pricing for labor is $100.00 per pull for the cabling and $150.00 per hour for the rack installation. There are fourteen runs for the drops and one run for the second WAP. For each drop, we will also need to cut a hole for the wall jack and screw on the wall plate. For the rack installation, it will take about four hours to install the rack and all its components, meaning that rack installation will cost around $600.00.

Labor					
Application	***Description***	***Cost***	***Per***	***Quantity***	***Total***
Cable Installation	Pull cable from rack to drops, install wall jacks and plates, punch down on rack, and test each cable run.	100.00	Pull	15	1500.00
Rack installation	Install and test the rack and all of the equipment in the rack.	150.00	hour	4	600.00
				Total Labor	2100.00

- Total Cost
  - The total cost, including equipment and installation, is approximately $3979.61. It is about a thousand dollars under your price range, which will allow you to pay for recurring expenses more easily.
  - This price also includes our professional work, meaning that you will not have to do much to manage the network besides changing the password.
- Recurring Expenses
  - As previously mentioned, there will be recurring expenses. To get gigabit ethernet in this type of apartment in the Stephenville area, an internet service provider (ISP) is required. We suggest using Vyve because they are one of the only ISPs to provide gigabit ethernet in your area. Your network will easily support this type of connection, and it can get even faster by upgrading the router and the switch. The price for one year of recurring expenses is in the following diagram.

Recurring Expence						
Service	*Vendor/*					
Name	*Manufacturer*	*Description*	*Cost*	*Unit*	*Quantity*	*Total*
Vyve Gig	Vyve	Vyve provides speeds of up to 1Gbps in Stephenville	79.99	Month	12	959.88
Router	N/A	The router is not provided by the ISP.	0	Month	12	0.00
						959.88

System Installation, Implementation, and Management

- **Description**
  - If you choose to do business with us, we plan to begin installation in the first week of July 2023. This date aligns with your request in the RFP.
    - We would like to do a walkthrough of your apartment sometime around June 15 to get an idea of the space we are working with. That way, we will be able to formulate a plan to install the network as quickly and as easily as possible.
    - In order to begin the installation on time, we plan to start ordering the components on June 23, but we will wait a day or two before ordering the more expensive equipment to prevent possible damage or theft. We do not want to leave them at the worksite.
    - Installation of the cabling, which includes pulling the wire and terminating the boxes, should be finished by July 3. On that same day, we plan to begin the rack installation. It should not take more than a few hours, but the rack installation could run into some of July 4.
    - On Monday, July 7, we plan to configure the WAPs and the switch and test the network connection throughout the apartment. We hope to do another walkthrough on July 8 and July 9, where we welcome you to join us and point out anything that does not meet your satisfaction and create a punch list.
    - The final walkthrough will take place on July 10, and we want to ensure that you are satisfied with the installation. We will also have finished the punch list items by this time. When you have signed off on the contract, everything should be ready for our departure.
    - The network should be complete and fully operational on July 11.
- **Installation Schedule**
  - The diagram below shows the installation timeline.

Timeline										On Site												
6/23/2023 through 7/11/2023																						
			23-Jun																			
Preliminary walk-through	15-Jun																					
Hardware Cost Received		16-Jun																				
Order Parts																						
Cat 6a wire			23-Jun				27-Jun															
Patch Panel			23-Jun				27-Jun															
Rack			23-Jun				27-Jun															
Wall Plates			23-Jun				27-Jun															
Wall Jacks			23-Jun				27-Jun															
J Hooks			23-Jun				27-Jun															
cat 6a patch Cable(2ft)			23-Jun				27-Jun															
cat 6a patch Cable(6ft)			23-Jun				27-Jun															
Parts Delivered										30-Jun												
Wire Installation																						
Pull wire											1-Jul	2-Jul										
Terminate Boxes												2-Jul	3-Jul									
Order Parts																						
Switch				24-Jun							1-Jul											
UPS				24-Jun							1-Jul											
Power Bar				24-Jun							1-Jul											
Parts Delivered												2-Jul										
Rack Installation																						
Mounting Rack													3-Jul	4-Jul								
Add Patch Panel to Rack													3-Jul	4-Jul								
Punch Down Rack													3-Jul	4-Jul								
Add Rack Components														4-Jul								
Testing																	7-Jul					
Walk Through																		8-Jul				
PunchList Start																			9-Jul			
Final Walkthrough																				10-Jul		
Complete																					11-Jul	