**Final Project**

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**Abstract**

In this paper, I provide details for a small business or home office network. I diagram the network, provide a legend, list the specifications and configuration of each piece of hardware for current use, documentation, and future purchase, and list the reasoning for such specifications.

*Keywords:* small business network, home office network, documentation, configuration, hardware

**Network Diagram**

Note: Printer and Wi-Fi Booster have both Physical and Wireless connection capabilities.

**Detailed Specifications**

**ISP Modem**

* Not much choice, it is given by the ISP.

**Router/Firewall**

* Brand- Cisco
* Model- RV160-K9-NA
* Cost- $125.11
* Ports- WAN 1 x RJ-45 SFP Gigabit Ethernet Combo; LAN 4 x RJ-45 Gigabit Ethernet
* Order-<https://www.newegg.com/p/N82E16833960338?Description=Cisco%20RV160%20VPN%20Router&cm_re=Cisco_RV160%20VPN%20Router-_-33-960-338-_-Product&quicklink=true>

**Switch**

* Brand- CISCO
* Model- CS250-16P-2G
* Ports- 16; 2 x Ethernet PoE Expansion Slot
* Cost- $330.22
* Order: <https://www.newegg.com/p/0XP-003P-02JZ6>

**Printer**

* Brand- HP
* Model- Color Laser Jet Pro MFP M283fdw
* Print Speed- 22ppm
* Resolution- 600 x 600 dpi
* Cost- $449.99
* Order: <https://www.hp.com/us-en/shop/pdp/hp-color-laserjet-pro-m283fdw>

**Low-End MS Windows Desktop**

* Brand- OptiPlex
* Model- 5480 All-in-One
* Processor- 10th Generation Intel Core i5-10500T (6-core, 12 MB Cache, 2.3GHz to 3.8 GHz, 35W)
* Operating System- Windows 10 Pro (English, French Spanish)
* Memory- 16 G, 2x8GB, DDR4 non-EEC Memory
* Hard Drive- M.2 128GB PCIe NVMe Class 35 Solid State Drive
* Additional Hard Drive- none
* Graphics Card- Intel Integrated Graphics
* Cost- $1269.00
* Order- <https://www.dell.com/en-us/work/shop/desktops-all-in-one-pcs/optiplex-5480-all-in-one-build-your-own/spd/optiplex-5480-aio/cto01o5480aious>

**High-End MS Windows Desktop**

* Brand- OptiPlex
* Model- 5480 All In One
* Cost- $1603.87
* Processor10th Generation Intel Core i7-10700T (8-core, 16MB cache, 2.0GHz to 4.5GHz, 35w)
* Memory- 32GB, 2x16GB, DDR4 non-EEC Memory
* Back Cover- Lockable Port Cover
* Order- <https://www.dell.com/en-us/work/shop/desktops-all-in-one-pcs/optiplex-5480-all-in-one-build-your-own/spd/optiplex-5480-aio/cto01o5480aious?configurationid=abbb8d1a-95a3-4484-9ee8-53bccb2ca504>

**Linux Desktop**

* Brand- Think Station
* Model- P330 Tiny
* Processor- 8th Generation Intel Core i5-8400
* Operating System- Windows 10 Home 64
* Memory- 8GB SO-DIMM DDR4 26666MHz
* External Monitor (Change)- Think Vision S22e-19 21.5-inch LED Backlit LCD Monitor (￡107.59 or $ 149.63)
* Cost- ￡928.39 ($1291.11)
* Order- <https://www.lenovo.com/gb/en/workstations/p-series/ThinkStation-P330-Tiny/p/30CFCTO1WWENGB0/customize>?

**Mac Desktop**

* Brand- Apple
* Model- iMac 21.inch
* Processor- 7th Generation i5 2.3GHz-3.6GHz
* Operating System- Mac OS
* Memory- 16GB 2133MHz DDR4
* Storage-1TB Fusion Drive
* Cost- $1299.00
* Order- [https://www.apple.com/shop/buy-mac/imac-imac/21.5-inch-2.3ghz-dual-core-processor-with-turbo-boost-up-to-3.6ghz-256gb#](https://www.apple.com/shop/buy-mac/imac-imac/21.5-inch-2.3ghz-dual-core-processor-with-turbo-boost-up-to-3.6ghz-256gb)

**Wi-Fi Booster**

* Brand- WiFi Range Extender
* Cost- $49.99
* Order- <https://www.amazon.com/Extender-1200Mbps-Wireless-Repeater-Devices%EF%BC%88KW1203M09%EF%BC%89/dp/B08TBC1VN3/ref=sr_1_1_sspa?dchild=1&keywords=wifi+booster&qid=1619403873&sr=8-1-spons&psc=1&smid=A1L70JVE3SH1KF&spLa=ZW5jcnlwdGVkUXVhbGlmaWVyPUE2WTAxVFkwNTBaUjkmZW5jcnlwdGVkSWQ9QTA4OTg4MjMxMTJWMzNWQUQ5TEomZW5jcnlwdGVkQWRJZD1BMDI1Mzc4MzFZWDVRNFlJMklNU00md2lkZ2V0TmFtZT1zcF9hdGYmYWN0aW9uPWNsaWNrUmVkaXJlY3QmZG9Ob3RMb2dDbGljaz10cnVl>

**Low-End MS Windows Laptop**

* Brand- Dell
* Model- Latitude 3190
* Cost- $619.00
* Order- <https://www.dell.com/en-us/work/shop/2-in-1-laptops-tablets/latitude-3190-laptop/spd/latitude-11-3190-laptop/bto006l319011us>

**High-End MS Windows Laptop**

* Brand- Dell
* Model- Alienware m17 Gaming
* Processor- 10th Generation Intel Core i7-10875H (8-Core, 16Mb Cache, up to 5.16GHz w/ Turbo Boost 2.0)
* Operating System-Windows 10 Pro 64-bit English
* Hard Drive- 1TB (2x 512GB PCIe m.2 SSD)
* Cost-$2699.00
* Order- [https://www.dell.com/en-us/work/shop/dell-laptops-and-notebooks/alienware-m17-r3-gaming-laptop/spd/alienware-m17-r3-laptop/wnm17r330ss](https://www.dell.com/en-us/work/shop/dell-laptops-and-notebooks/alienware-m17-r3-gaming-laptop/spd/alienware-m17-r3-laptop/wnm17r330ssb)

**Mac laptop**

* Brand- Apple
* Model- MacBook Pro 13-inch
* Processor-
* 2.0GHz quad-core 10th Generation Intel Core i5, Turbo Boost up to 3.8GHz
* Memory 16GB 3733MHz LPDDR4X
* Storage- 512GB SSD
* Cost- $1799.00
* Order- [https://www.apple.com/shop/buy-mac/macbook-pro/13-inch-space-gray-2.0ghz-intel-core-i5-quad-core-processor-with-intel-iris-plus-graphics-512gb#](https://www.apple.com/shop/buy-mac/macbook-pro/13-inch-space-gray-2.0ghz-intel-core-i5-quad-core-processor-with-intel-iris-plus-graphics-512gb)

**iPad Tablet**

* Brand- Apple
* Model- iPad Air Silver
* Add Engraving- Company Name (Free)
* Cost- $729.00
* Order- <https://www.apple.com/shop/buy-ipad/ipad-air/64gb-silver-wifi-cellular>

**iPhone Cellphone**

* Brand- Apple
* Model- iPhone SE 2020 Black
* Capacity- 64GB
* SIM-Free (activate for any phone company)
* Cost- $399.00
* Order- <https://www.apple.com/shop/buy-iphone/iphone-se/4.7-inch-display-64gb-black-unlocked>

**Configurations**

**ISP Modem**

* Mac- 64-ED-1F-71-1F-08
* IP- 192.168.50.1

**Router/firewall**

* Mac- 64-ED-1F-71-1F-08
* IP- 192.168.50.2
* Firewall- MAC Filtering

**Switch**

* Mac- C2-8B-59-87-AE-B6
* IP-192.168.50.3

**Printer**

* Mac- F5-7C-D5-AA-65-61
* IP-192.168.50.5
* Subnet Mask- 255.255.255.0

**Low-End MS Windows Desktop**

* Mac- 16-78-02-8A-F2-FE
* IP-192.168.50.171
* Subnet Mask- 255.255.255.0

**High-End MS Windows Desktop**

* Mac- 7B-07-6F-48-92-BA
* IP-192.168.50.153
* Subnet Mask- 255.255.255.0

**Linux Desktop**

* Mac- DF-22-71-2F-F5-71
* IP-192.168.50.243
* Subnet Mask- 255.255.255.0

**Mac Desktop**

* Mac- 83-D5-93-F1-40-C6
* IP-192.168.50.194
* Subnet Mask- 255.255.255.0

**Wi-Fi Booster**

* Mac- 9B-EE-B9-53-BD-BF
* IP-192.168.50.2

**Low-End MS Windows Laptop**

* Mac- C9-B4-C0-9B-10-C1
* IP-192.168.50.177
* Subnet Mask- 255.255.255.0

**High-End MS Windows Laptop**

* Mac- 44-CD-45-A2-5C-4C
* IP-192.168.50.42
* Subnet Mask- 255.255.255.0

**Mac laptop**

* Mac- B9-15-06-AD-EC-84
* IP-192.168.50.29
* Subnet Mask- 255.255.255.0

**iPad Tablet**

* Mac- A2-0F-94-94-17-46
* IP- 192.168.50.14
* Subnet Mask- 255.255.255.0

**iPhone Cellphone**

* Mac- EB-4E-58-CE-93-9F
* IP- 192.168.50.120
* Subnet Mask- 255.255.255.0

**Justification**

This network is a simple office layout with the devices specified for the final project requirements. It contains the modem/router provided by the ISP plus and additional router and switch to have enough ports for current and future hardware. I chose the 16-port switch because although an 8-port switch would be sufficient, the 16-port option was cheaper and it allowed for more growth.

The first device to connect to the network is printer. This printer has both wireless and wired connection possibilities for ease of access and optimal use. Because it is for business use, I supposed that a colored printer would be more useful than just a black and white printer. Another result from this logic the multi functions printer that has fax, scanner, copy, and printing abilities.

The first device connected to the switch is the lower-end MS Windows Desktop. The i5 Core processor is sufficient for lower-end use and the 2 memory cards are said to run slightly faster than one memory card. In all of the possible device configurations that have the option for additional software options would be a possible useful cost in getting each device according to the company standards.

The second device connected to the switch is the higher-end MS Windows Desktop. In this device, I added the i7 processor and more memory to improve speed and functionality. I also added a port lock to the back of this one because it was a very cheap additional security measure that was available.

The third device connected to the switch is the Linux Desktop. When buying a Linux desktop machine, it usually only orders the computer, and you have to purchase a monitor separately. In this configuration, it allowed an add-on for the monitor. I also chose the simpler, lower-end processor and memory options.

The fourth device connected to the switch is the Mac Desktop. I chose the iMac 21.5-inch device because it has a ethernet port built in, there is no need for an additional port changer. In this configuration, I added extra memory for better usage because Macs are often known for their graphics, video, and image editing capabilities which also takes up a lot of space while processing. I also chose the Fusion Drive because it came at no additional cost and, in some opinions, it is said it help speed up applications and processes.

The first device on the Wi-Fi Connection is the Wi-Fi Booster. This device simply allows the signal from the router to be amplified and allows better connections within the other Wi-Fi connected devices. The Wi-Fi Booster can be hooked to the network through a physical cable or through a Wi-Fi connection.

The second device on Wi-Fi is the apple iPhone. I chose the iPhone SE 2020 because it is one of my favorite devices. It is small, compact, and has the features of the older phones, however, it has the updates and quality of the newer phones. I also chose an iPhone because if the company has an data plan, it is more useful than a flip phone in this regard. I decided to keep it SIM-free, so any phone plan can be used.

The third device on Wi-Fi is the tablet. I chose an iPad because it can connect to the iPhone and Macs, and it also can utilize a data plan. I allowed for the additional engraving because it cost anything more and it allowed it the device to be marked as company property.

The fourth device on Wi-Fi is the Mac laptop. For this device, I chose the presets, because the default options are quite optimal for use and it was not necessary to add more memory or storage.

The fifth device on Wi-Fi is the lower-end MS Windows Laptop. This device has little configuring additions, but I chose the laptop package that has less quality overall because that was all that was required. I still chose a memory option greater than 4GB because 8GB is now the current cheapest action, even though it may not be the smallest.

The sixth device on Wi-Fi is the higher-end MS Windows Laptop. For this device, I added the i7 core, instead the default i5, and it came with 32 GB of memory because this laptop is optimized for gaming (large programs).