

Subnetting My Home

Why subnetting?

- Subnetting is a way to make your network more secure. It separates the networks into different sub-sections (subnetworks)
- Subnetting creates a network of devices to function as their own network.
 - It is a way of making your network more efficient and secure by separating networks and making shorter routes.

How to subnet

- In order to subnet, one must understand binary first, and how it is connected to your subnet mask.
- Binary code is how computers read everything, in a series of 1s and 0s
- Most home networks have a subnet mask of 255.255.255.0, which gives you 253 IP addresses to work with
- In binary, that is written as:
 - 11111111.11111111.11111111.00000000
- Binary is written on an 8-bit octet, which reads as 128, 64, 32, 16, 8, 4, 2, 1
- All of the 8 bit octet numbers added up equal 255, which is why it is written as "11111111" in binary

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- There is a second 8 bit octet that is used for subnet mask addresses. It is the same as the other except all the numbers are multiplied by two, which reads as:
 - 256, 128, 64, 32, 16, 8, 4, 2
 - The 1s represent "network bits" and the 0s are classified as "host bits"
 - Network bits represent which part of the 8-bit octet are "on" and host bits represent which part of the octet are "off"
 - Depending on where the 1s and 0s are placed, determines which 8-bit octet numbers will be added up to get the number in your address
 - In order to create more networks (subnets) we need more network bits
 - If I wanted to create 4 networks, I would use the 8 bit octet used for network addresses to get to the number of networks I'd want to create
 - In this case, I would add two 1s (256, 128, 64, 32, 16, 8, 4, 2) to the final octet in my subnet mask address to the beginning of the octet, so the new subnet mask address would read in binary as:
 - 11111111.11111111.11111111.11000000
 - On your screen, it would read as:
 - 255.255.255.192
 - We arrive at the number 192 because $128 + 64 = 192$

- Due to the fact that the router would need to see the entire range of devices, the gateway needs to be set to 255.255.255.0
 - If the gateway was not set to 255.255.255.0, then every device outside the range of 192.168.1.1-.63 would not be able to connect to the internet, since the router is not in any of those subnets

Understanding the new network increments

- This new network is now subnetted, but how do you know how the network will be separated(incremented)?
- The network increment can be determined by the final bit you have in your octet, which in this case is "64"
- My router's private IP address in this case is 192.168.1.1
- Since the router already has this address the first subnet increment would be from the addresses of 192.168.1.2 - 192.168.1.63
- This would keep going up until the final 8-bit octet is 255, so the subnetwork increments would read as:
 - 192.168.1.2 - 192.168.1.63
 - 192.168.1.64 - 192.168.1.127
 - 192.168.1.128 - 192.168.1.191
 - 192.168.1.192 - 192.168.1.255

How to apply this knowledge on a Macbook

1. Enter in your router's IP address into your browser
2. Once in, go to your "Network Connections" tab
3. Click on the home router and click settings
4. Go to the "subnet mask" section and change it from 255.255.255.0 to 255.255.255.192
5. Scroll down to the "End IPv4 Address" section and change that address to 192.168.1.63
6. Change the subnet gateway to 255.255.255.0
7. Click Apply
8. Now, go to your device of choice, and open the settings tab
9. Click on the "wifi" section and then click on the settings tab within the wifi page
10. Change the IP address and change it to the subnet of your choice.
 - a. For example, if you wanted to place your laptop in the second increment, you would change this IP address to somewhere in between 192.168.1.64 - 192.168.1.127
11. Then, switch the subnet mask to the address you entered in if it has not already changed

