## Unit 4 Subnetting Lab 4

Read the lab details listed below, and then answer the questions listed in the lab exercise.

“EMS” Simplified Method Class B

In subnetting a Class B address, the process is the same in creating the cheat sheet chart that we did in a Class C address. The added difference is that now we are using the third octet as well as the forth octet that was used in the Class C address. This is because the first two octet are the network values and now, the last two Octets are the Host values as shown here: 172.16. **3 . 5**

Network **Host**

Below we see the Class B Subnetting Guide created the same way we did in the Class C Subnetting Guide.

Class B Subnetting Guide

**Groups:**  128 64 32 16 8 4 2 1

**1. IP’s:** 32768 16384 8192 4096 2048 1024 512 256 128 64 32 16 8 4 2 1

**2. Hosts:** 32766 16382 8190 4094 2046 1022 510 254 126 62 30 14 6 2 0

**3. Subnets:** 0 2 6 14 30 62 126 254 510 1022 2046 4094 8190 16382 32766

The steps to create a Class B Subnetting Guide is to continue line/row 1 by multiplying each value by two from right to left. Line 1 is still the number of IP addresses in total in each new subnet. Step 2 for line/row 2 we again subtract two out of each value which is the 2 reserved IP addresses, the network address and the network broadcast which is again the first and last value in the subnet range. The 3rd step is to again take the (0) zero from the right and place it under the last value on the left. Continue that process until line/row 3 is the reverse of line/row 2 as shown in the above Class B Subnetting Guide. The final step is to place the value of each bit place in the 3rd octet by starting with 1 above the 256 in Line 1 and continue in multiples of two until each place has a value from 1 to 128. These are now the groups of ranges that are in each subnet for a Class B subnetted address.

Remember that using this Cheat-Sheet Guide gives you the usable numbers available for the creation of subnetworks and hosts. The numbers on line 2 are the numbers of usable Hosts. The numbers on line 3 are again the number of usable subnetworks. That is because we removed both the network IP and broadcast IP from each out of line 1.

We subnet a Class B with this guide by again giving up bits from left to right starting with the 128 bit on the far left in the 3rd Octet and moving right to get the subnet range we want. If we want 1000 host computers on each of the 60 subnetworks, we would give up the 128, the 64, the 32, the 16, the 8 and the 4 bit values of line 1. That means we would borrow those 6 bits. We would identify this by drawing a line down from the 4 past the 1022 to the 62 as indicated in the example below.

We started with the default mask of 255.255.0.0. To get the new subnet mask we simply add the values of each borrowed bit from left to right on line 1. If we add 128, 64, 32, 16, 8, and 4. We get 252. The new subnet mask is 255.255.252.0

To get the subnet mask, simply add the values of each bit we used to create the subnet.

**Groups:** 128 64 32 16 8 **4** | 2 1

**1. IP’s** : 32768 16384 8192 4096 2048 **1024** | 512 256 128 64 32 16 8 4 2 1

**2. Hosts:** 32766 16382 8190 4094 2046 **1022** | 510 254 126 62 30 14 6 2 0

**3. Subnets:** 0 2 6 14 30 **62** | 126 254 510 1022 2046 4094 8190 16382 32766

If we wanted to create a subnet with 30 hosts on each of 2046 subnetworks as indicated above, we would borrow all the bits of the 3rd octet and the first three bits of the 4th octet, (always from the left) or 11 bits.

We would get the subnet mask by adding the values of the 8 bits in the 3rd octet (or 255) and those we used in the 4th Octet (or 128 + 64 + 32 = 224) for a subnet mask of 255.255.255.224

Notice the number 4 in the groups column, this gives us the groupings value of four ranges of 0 to 255 in the 4th octet that will be used for each of our new Class B subnets. Each subnet is in groups of four, as indicated by Table 2 below. The first and last subnets are unavailable for use due to the use of the first subnet 0 as the network value and the last subnet 255 as the broadcast value.

**Table 2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Subnet** | **3rd Octet** | **Network Number** | **4th Octet Host IP Range** | **Assignable IP Range** |
| Subnet 1 | 0.  1.  2.  3. | 172.16.0.  172.16.1.  172.16.2.  172.16.3. | 0-----------255  0-----------255  0-----------255  0-----------255 | 1----255 0 is the Network Value  0----255  0----255  0----254 255 is the Broadcast Value |
| Subnet 2 | 4.  5.  6.  7. | 172.16.4.  172.16.5.  172.16.6.  172.16.7. | 0-----------255  0-----------255  0-----------255  0-----------255 | 1----255 0 is the Network Value  0----255  0----255  0----254 255is the Broadcast Value |
| Subnet 3 | 8.  9.  10.  11. | 172.16.8.  172.16.9.  172.16.10.  172.16.11. | 0-----------255  0-----------255  0-----------255  0-----------255 | 1----255 0 is the Network Value  0----255  0----255  0----254 255 is the Broadcast Value |
| Subnet 4 | 12.  13.  14.  15. | 172.16.12.  172.16.13.  172.16.14.  172.16.15. | 0-----------255  0-----------255  0-----------255  0-----------255 | 1----255 0 is the Network Value  0----255  0----255  0----254 255 is the Broadcast Value |

This continues until all 256 values from 0 to 255 are used in the 3rd octet vertically. Notice that the 4th octet values are read horizontally from 0 to 255 where the 3rd Octet is read vertically from 0 to 255. Table 2 stopped at Subnet 4, but in reality goes on to subnet 64 with four groups in each subnet.

These same processes for Class B is applied depending on what your needs are in the number of hosts and the number of networks needing subnet addresses. If we had wanted 2000 hosts on each of the 30 networks, we would have taken bits down to the 8 and the groups would have been in groups of eight. Again, this is applied accordingly to your needs.

## Subnetting Lab 4 Exercise

Using this method of subnetting and using the Class B Subnetting Guide, answer the following:

Given an IP address of 172.16.0.1 use the guide to get 4000 hosts on each of your 12 networks:

1. What Class is this IP address? \_\_\_\_\_
2. How many bits would you borrow or take? \_\_\_\_\_\_\_
3. What subnet mask would you generate? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. What is the first subnetwork range created? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. What is the last subnetwork range created? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Given an IP address of 172.16.1.1 use the guide to get 2000 hosts on each of your 25 networks:

1. What Class is this IP address? \_\_\_\_\_
2. How many bits would you borrow or take? \_\_\_\_\_\_\_
3. What subnet mask would you generate? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. What is the first subnetwork range created? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. What is the last subnetwork range created? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Given an IP Address of 172.16.2.1 use the guide to get 8000 hosts on each of your 5 networks:

1. What Class is this IP address? \_\_\_\_\_
2. How many bits would you borrow or take? \_\_\_\_\_\_\_
3. What subnet mask would you generate? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. What is the first subnetwork range created? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. What is the last subnetwork range created? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_