**Unit 2 Subnetting Lab 1**

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

When networks were first used all hosts on the network were allocated hostnames such as PC 1 or admin\_PC but it was soon discovered that it was hard to keep track of all of these names and then routing across a WAN was almost impossible.

An “RFC” (Request For Comment) was submitted which suggested that we could allocate numbers to hosts on networks instead of hostnames.  The current implementation of this scheme is IP version 4 although IPv6 is now replacing this.

The idea is that every address would be made up from four groups of eight binary numbers.  Each group of eight binary numbers is known as an octet.  Because we struggle to write numbers out in binary we usually convert them into decimal but computers and network devices still see all numbers in binary because they can only recognize on and off signals so either a 0 or a 1.

How it Works

Each number you allocate to a host on your network will be in groups of four separated by a dot e.g. 192.168.1.23.  This was working just fine until somebody realized that we needed to identify which parts of the address were for the network and which were for the host on the network.  To deal with this we began to add subnet masks to IP addresses.

Every network has two reserved numbers that are not used or assigned to a host. These reserved numbers are always the first and the last value in the network series. A “Class-C” IP address that is not subnetted always starts with “0” and ends with “255”. That mean that these two values are the reserved values. The first value is always the “Network Number”, and the last value is always the “Broadcast Number”. So in a series of “0” to “255”, the “0” is the “network Number” and the “255” is the “Broadcast Number” for that network series. All of the values between them from “1” to “254” are assignable values that can be issued to hosts.

You must use subnet masks even if you only use a basic IP numbering scheme on your network.  The rules are that 255.0.0.0 is used for Class A addresses 255.255.0.0 is for Class B and 255.255.255.0 is for Class C addresses.  The 255 tells the router that this part of the address is reserved for the network portion of the address.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Network | Host | Host | Host |
| Class A | 255 | 0 | 0 | 0 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Network | Network | Host | Host |
| Class B | 255 | 255 | 0 | 0 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Network | Network | Network | Host |
| Class C | 255 | 255 | 255 | 0 |

But it Still Wasn’t Enough

When this addressing scheme was devised nobody could have predicted the exponential growth of PC use in companies and then homes all over the world.  Instead of only huge companies paying millions for a huge computing device now most people could afford them and they were big enough to put into a box and carry home.

Class C 192.168.1.0 255.255.255.0 means you can only use the last octet for host addresses on your network.  You are not allowed to use 0 at the beginning because that is your subnet number.  You are not allowed to use 255 on the end because that tells the network that it is a broadcast so here are your allowed host numbers.

Anything from 192.168.1.1 to 192.168.1.254 you can only have one large network with 254 hosts.   Imagine 254 hosts all passing huge amounts of traffic across the network. That creates one very large collision domain.

**Subnetting Lab 1 Exercise**

Given an non-subnetted IP address of 192.168.3.5 “Identify the following”:

Class: \_\_\_\_\_\_\_

Mask: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Network Address: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Broadcast Address: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_