**Network Masks Lab**Theron Rabe, Jeffrey Moon

**Purpose:**  
To understand the uses and implications of network masks on communication between hosts on separate network segments.

**Equipment / Supplies Used:**Lab Computers  
Windows 7  
VMWare / Ubuntu 13.14

**Methodology:**

To demonstrate network masks we put two hosts that shared a physical segment on two separate subnets. We then attempted to ping the default gateway of the first subnet from a node within the first and second subnet.  
  
We then altered the subnet masks of the laptop and PC so they resided on the same subnet and attempted to ping each node from each other node.  
  
Finally, we set one node on the same subnet as the other node. One node, however, was part of a much smaller subnet. We then attempted the pings between nodes once more.

**Raw Data:**

Linux’s Ethernet interface: eth0  
After sudo route delete default eth0  
-No default gateway in routing table

Ping to 192.168.102.1:  
From 192.168.102.187 : Success  
From 192.168.103.188 : Fail  
  
After Linux change:  
-192.168.102 is now unreachable  
-Able to ping laptop (192.168.103.188)

192.168.103.187/23  
-Still pings laptop  
-Doesn’t ping windows

Difference: No, can still ping those on same physical network, but different segments do not ping.  
Windows (255.255.254.0), no change (same result as previous test)

Forming subnets:  
192.168.0.0  
11111111.11111100.00000000.00000000  
  
4 class-c addresses  
192.168.0.0/26  
192.168.0.64/26  
192.168.0.128/26  
192.168.0.192/26  
  
After subnetting, responds to all ping  
Larger nets don’t see subnets

16 class-c addresses  
192.168.0.0/28  
192.168.0.16/28  
192.168.0.32/28 etc  
  
128 class-c addresses  
192.168.0.0/31  
192.168.0.2/31  
192.168.0.4/31 etc

**Analysis of Results:**

When the nodes were part of separate subnets, they were not able to talk directly. Instead, they had to communicate through the router. Thus, only the router’s IP was in the ARP cache upon examination. This is because the individual nodes think that they are on separate networks.

When we put the Ubuntu node on a broader subnet, it was able to ping the Windows node directly, leaving the Windows node in the Ubuntu’s ARP cache. The Windows node, however, was not able to ping the Ubuntu node directly. It, again, had to communicate through the router. Thus, broader nets don’t see subnets within themselves.

We further tested this by forming subnets within the WSU CIDR block. When we put nodes on separate subnets, they were still able to ping each other.

**Lessons Learned and Other Observations**

A number of lessons were learned through this lab, even beyond its intended scope. One such lesson was: when it comes to networking, expect configuration to take at least as long as the actual experimentation and data collection. If it doesn't take longer, you probably aren't yet frustrated enough to begin.

We also realized the significance of CIDR, and the use of masks for subnetting. It offers a great deal of flexibility over traditional classed addressing, especially in its ability to alter how traffic is routed within a network. By partitioning addresses into net id and host id without respect to octet boundaries, a variety of subnetting/supernetting options become availalable.

Multiple networks or subnetworks may coexist on a single physical segment without interfering with one another's behavior.