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CSCI 651
Homework 5 Report

Task 1 - Subnet Definitions

This is outlined in more detail in task1.txt.

LAN A:

Subnet Mask: 255.255.255.192/26

Network Address: 20.10.172.128

Smallest IP Available: 20.10.172.129

Largest IP Available: 20.10.172.190

LAN B:

Subnet Mask: 255.255.255.128/25

Network Address: 20.10.172.0

Smallest IP Available: 20.10.172.1

Largest IP Available: 20.10.172.126

LAN C:

Subnet Mask: 255.255.255.224/27

Network Address: 20.10.172.192

Smallest IP Available: 20.10.172.193

Largest IP Available: 20.10.172.222

Task 2 - Subnet Creation

This task was to create the routers, switches, and hosts for each LAN, as well as connect the hosts, switches, and routers within each LAN. We expect all the nodes of LAN A to be able to reach each other, but not the nodes in LAN B or C. The `pingall` command shows us this is true. hXY represents a host in LAN X, numbered Y. rX represents the router in LAN X.

```
mininet> pingall
*** Ping: testing ping reachability
hA1 -> hA2 X X X X rA X X
hA2 -> hA1 X X X X rA X X
hB1 -> X X hB2 X X X rB X
hB2 -> X X hB1 X X X rB X
hC1 -> X X X X hC2 X X rC
hC2 -> X X X X hC1 X X rC
rA -> hA1 hA2 X X X X X X
rB -> X X hB1 hB2 X X X X
rC -> X X X X hC1 hC2 X X
*** Results: 75% dropped (18/72 received)
```

Task 3 - Inter Subnet Communication

This task was to create routes between each host and router outside its own LAN, and to create routes between each router (LAN). We do this by creating routes from each host to each other router, and from each router to other routers, as well as any links or other prerequisites required for these routes.

This is the result of the `pingall` command - we can see that every node can reach all other nodes.

```
mininet> pingall
*** Ping: testing ping reachability
hA1 -> hA2 hB1 hB2 hC1 hC2 rA rB rC
hA2 -> hA1 hB1 hB2 hC1 hC2 rA rB rC
hB1 -> hA1 hA2 hB2 hC1 hC2 rA rB rC
hB2 -> hA1 hA2 hB1 hC1 hC2 rA rB rC
hC1 -> hA1 hA2 hB1 hB2 hC2 rA rB rC
hC2 -> hA1 hA2 hB1 hB2 hC1 rA rB rC
rA -> hA1 hA2 hB1 hB2 hC1 hC2 rB rC
rB -> hA1 hA2 hB1 hB2 hC1 hC2 rA rC
rC -> hA1 hA2 hB1 hB2 hC1 hC2 rA rB
*** Results: 0% dropped (72/72 received)
```

I also displayed pinging directly between two hosts, A1 and C2. Here are the first three ping results for that command.

```
mininet> hA1 ping hC2
PING 20.10.172.195 (20.10.172.195) 56(84) bytes of data.
64 bytes from 20.10.172.195: icmp_seq=1 ttl=62 time=3.83 ms
64 bytes from 20.10.172.195: icmp_seq=2 ttl=62 time=2.45 ms
64 bytes from 20.10.172.195: icmp_seq=3 ttl=62 time=2.95 ms
```

I also ran the `traceroute` command between these two nodes. Below is the output for that command. We see that it first goes to 20.10.172.129, which is the IP for router A. We then see it go to 20.10.100.6, which is the gateway that router A access router C through. Finally, we see that it reaches 20.10.172.195, which is the IP address of host C2. This is the expected path for this `traceroute` output.

```
mininet> hA1 traceroute hC2
traceroute to 20.10.172.195 (20.10.172.195), 30 hops max, 60 byte packets
 1  20.10.172.129 (20.10.172.129)  77.929 ms  89.688 ms  89.867 ms
 2  20.10.100.6 (20.10.100.6)  90.060 ms  90.243 ms  90.440 ms
 3  20.10.172.195 (20.10.172.195)  185.880 ms  199.294 ms  200.606 ms
```