Homework #3 Solution

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Network Administration 1

1. (10%)

Acquire the MAC address of 140.112.31.216 by checking the ARP table in the switch, and enter the port of interface by checking different MAC tables till the interface of that MAC address is an end user instead of a switch.

```
Command example:
core-switch# sh ip arp 140.112.31.216
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  140.112.31.216          4  10dd.b1a0.0016  ARPA   Vlan1

core-switch# show mac address-table address 10dd.b1a0.0016
   1    10dd.b1a0.0016    DYNAMIC    Po1

core-switch# sh int status | inc Po1
Po1       To 1F-A          connected    trunk      a-full a-1000

core-switch# sh clu mem
1  0000.0000.0000  2000Private  Gi1/0/24 1   1   0  Gi4/0/5  7   Up
2  10dd.b1a0.0016  1F-A         Gi1/0/49 1   1   0  Gi1/0/26 11  Up
3  1111.1111.1111  1F-B         Gi1/0/49 1   1   0  Gi1/0/27 12  Up

core-switch# rc 2
1F-A# show mac address-table address 10dd.b1a0.0016
...
...repeat the above steps
```

2. (30%)

Open the switch0 CLI:

```
switch> en
switch# conf t
switch(config)# hostname CiscoLab
CiscoLab(config)# no ip domain-lookup
CiscoLab(config)# enable password CISCO
CiscoLab(config)# service password-encryption
CiscoLab(config)# vlan 10
CiscoLab(config-vlan)# exit
CiscoLab(config)# vlan 20
CiscoLab(config-vlan)# exit
CiscoLab(config)# vlan 99
CiscoLab(config-vlan)# exit
CiscoLab(config)# int range Fa0/1-2
```

```
CiscoLab(config-if-range)# switchport mode access
CiscoLab(config-if-range)# switchport access vlan 10
CiscoLab(config-if-range)# exit
CiscoLab(config)# int range Fa0/3-4
CiscoLab(config-if-range)# switchport mode access
CiscoLab(config-if-range)# switchport access vlan 20
CiscoLab(config-if-range)# exit
CiscoLab(config)# int range Fa0/5
CiscoLab(config-if)# switchport mode access
CiscoLab(config-if)# switchport access vlan 99
CiscoLab(config-if)# exit
CiscoLab(config)# int vlan99
CiscoLab(config-if)# ip address 192.168.99.1 255.255.255.0
CiscoLab(config-if)# exit
CiscoLab(config)# line vty 0 4
CiscoLab(config-line)# password cisco
CiscoLab(config-line)#  login
CiscoLab(config)# exit
CiscoLab# write mem
```

3. (10%)

(a) (2%) Yes, PC2 should be able to ping PC3. We should see the configuration of the cisco to make sure if the settings work. If PC2 cannot ping PC3, use the command `sh ru` to check the vlan configuration. If there is no record of vlan settings, you may make a mistake during the configuration process.

(b) (4%) Inter-VLAN Routing
Assume there are two VLANs, VLAN 1 (Interface F0/2) and VLAN 2 (Interface F0/3), on the same switch. Make two machines be under F0/2 and F0/3, respectively. Since VLAN 1 (192.168.0.0/24) and VLAN 2 (192.168.1.0/24) belong to different network segments, we need a router responsible for Inter-VLAN routing. Use Trunking (IEEE 802.1Q or Cisco ISL) to connect the router and the switch, and then create sub-interfaces in the router such that each sub-interface corresponds to a VLAN on the switch.

Connection:
Router F0/0 —— <802.1q/ISL Trunk> —— Switch F0/1
Switch F0/2 <- PC1
Switch F0/3 <- PC2

Createg a sub-interface for each VLAN. The IP addresses of two sub-interfaces will be served as gateways of VLAN 1 and VLAN 2, respectively.

Router:
interface F0/0
ip address 192.168.0.254 255.255.255.0

interface F0/0.2
encapsulation dot1q 2
ip address 192.168.1.254 255.255.255.0

Switch:
interface F0/1
switchport trunk encapsulation dot1q (No need for Cat.2950)
switchport mode trunk

interface F0/2
switchport mode access
switchport access vlan 1

interface F0/3
switchport mode access
switchport access vlan 2

(c) (4%) Ans: "MayIeatEat?"
(Ref: https://www.m00nie.com/type-7-password-tool/ & choose the option "decrypt")

Network Administration 2

1. Set up 3 VLAN interfaces on LAN. (`VLAN5`, `VLAN8` and `VLAN99`)
   - Remember to use `static IPv4`.
   - Size of netmask should be less than 31.
   - Remember to enable the interface.
2. Enable DHCP servers in 3 VLAN interfaces. (Services -> DHCP server)
3. Rules:
   - `VLAN5`:
     (a) BLOCK any to `VLAN99 net`
     (b) BLOCK any to `this firewall` in 22 and 443 port
     (c) PASS any to any
   - `VLAN8`:
     (a) BLOCK any to `VLAN99 net`
     (b) BLOCK any to `this firewall` in 22 and 443 port
     (c) PASS any to any
   - `VLAN99`:
     (a) PASS any to `VLAN5 net`
     (b) PASS any to `VLAN8 net`
     (c) PASS any to `140.112.30.32` in 22 (ssh) port
     (d) PASS any to any in 53 (DNS) port
     (e) PASS any to `this firewall` in 22 (ssh) port and 443 (https) port

To achieve the subtask 6, do nothing in NAT settings of pfsense.