# PART 2: pfSense Configuration in the ESXI for networking and firewall

**PfSense** is a FreeBSD based open source firewall solution. The distribution is free to install on one's own equipment or the company behind pfSense, NetGate, sells pre-configured firewall appliances.

The required hardware for pfSense is very minimal and typically an older home tower can easily be re-purposed into a dedicated pfsense Firewall. For those looking to build or purchase a more capable system to run more of pfSense's advanced features, there are some suggested hardware minimums

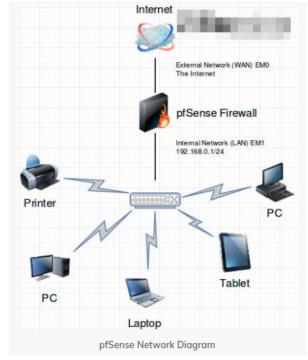
#### **Hardware Minimums**

- 500 mhz CPU
- 1 GB of RAM
- 4GB of storage
- 2 network interface cards

### **Suggested Hardware**

- 1GHz CPU
- 1 GB of RAM
- 4GB of storage
- · 2 network interface cards

pfSense is often frustrating for users new to firewalls. The default behavior for many firewalls is to block everything, good or bad. This is great from a security standpoint but not from a usability standpoint. Before starting into the installation, it is important to conceptualize the end goal before beginning the configurations.



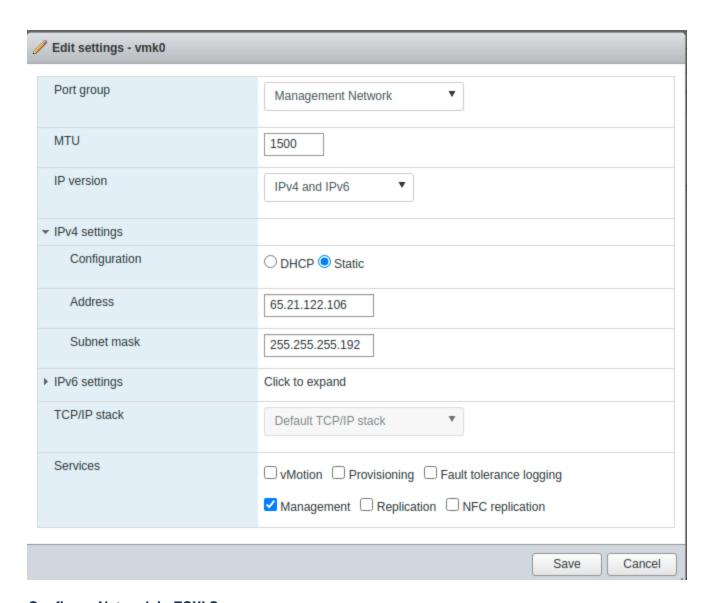
### **Downloading pfSense**

Regardless of which hardware is chosen, installing pfSense to the hardware is a straightforward process but does require the user to pay close attention to which network interface ports will be used for which purpose (LAN, WAN, Wireless, etc).

Part of the installation process will involve prompting the user to begin configuring LAN and WAN interfaces. The author suggests only plugging in the WAN interface until pfSense has been configured and then proceed to finish the installation by plugging in the LAN interface.

The first step is to obtain the pfSense software from https://www.pfsense.org/download/ .

once you download the ISO image, then push this ISO image to the Datastore of ESXI hypervisor through the ESXI web interface.



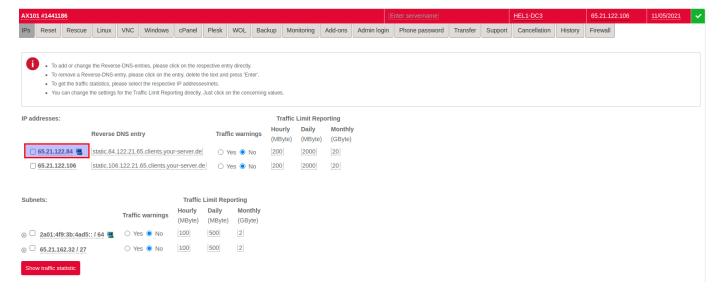
# **Configure Network in ESXI Server**

We have to configure the Network in such a way that the pfsense can use it.

### Step 1

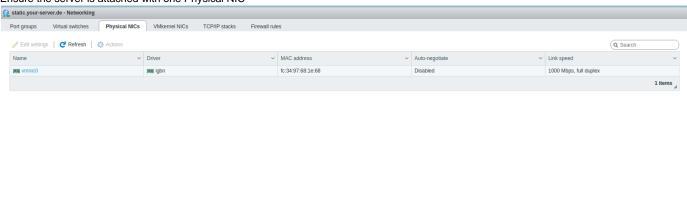
Ensure that we have an additional single IP Address attached to the server.

Additional IP Address that we had Ordered



### Step 2

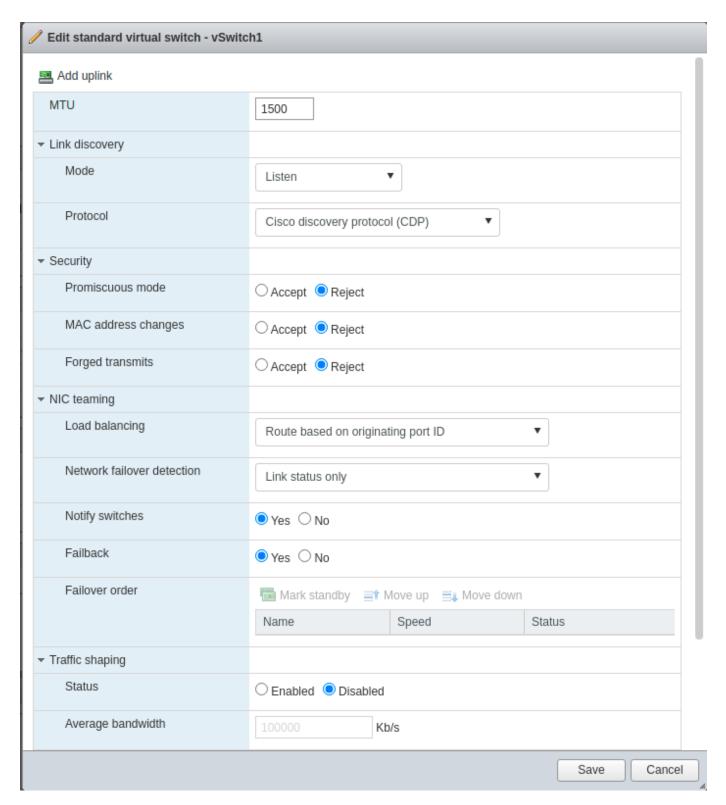
Ensure the server is attached with one Physical NIC



### Step 3

Go to Virtual Switch tab, initially you have only one vswitch (vSwitch0), so create one more vSwitch with the following configuration.

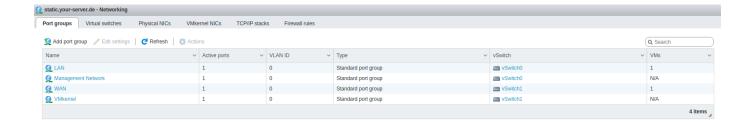




After configuring the vSwitch, click save button to save the changes.

### Step 4

Go to port group tab. initially you may have only 2 port group. so just create the remaining port group for your WAN and LAN configuration.



Port Group: LAN

# Edit port group - LAN Name VLAN ID 0 Virtual switch vSwitch0 Security Promiscuous mode ○ Accept ○ Reject ● Inherit from vSwitch MAC address changes ○ Accept ○ Reject ● Inherit from vSwitch Forged transmits ○ Accept ○ Reject ● Inherit from vSwitch ▼ NIC teaming Load balancing Inherit from vSwitch Network failover detection Inherit from vSwitch Notify switches ○ Yes ○ No ● Inherit from vSwitch Failback ○ Yes ○ No ● Inherit from vSwitch Override failover order ○ Yes ● No Failover order 📠 Mark standby 🛛 Mark unused 📑 Move up 🗐 Move down Name Speed Status 1000 Mbps, full duplex m vmnic0 Active ▼ Traffic shaping Status ○ Enabled ○ Disabled ● Inherit from vSwitch Average bandwidth Kb/s Save Cancel

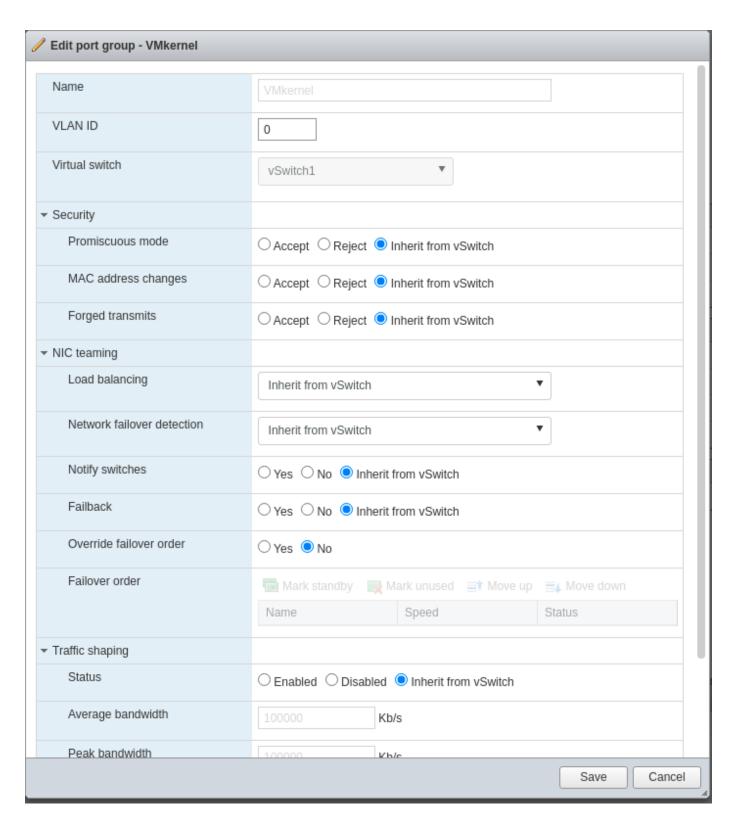
Port Group : Management Network

Name	Management Network		
	Management Network		
VLAN ID	0		
Virtual switch	vSwitch0 ▼		
▼ Security			
Promiscuous mode	○ Accept ○ Reject ● Inherit from vSwitch		
MAC address changes	○ Accept ○ Reject ● Inherit from vSwitch		
Forged transmits	○ Accept ○ Reject ● Inherit from vSwitch		
▼ NIC teaming			
Load balancing	Route based on originating port ID ▼		
Network failover detection	Link status only		▼
Notify switches	● Yes ○ No ○ Inherit from vSwitch		
Failback	● Yes ○ No ○ Inherit from vSwitch		
Override failover order	● Yes ○ No		
Failover order	Mark standby	Mark unused ≡ Move up	<b>≡</b> ↓ Move down
	Name	Speed	Status
	vmnic0	1000 Mbps, full duplex	Active
▼ Traffic shaping			
Status	○ Enabled ○ Disabled ● Inherit from vSwitch		
Average bandwidth	100000 K	b/s	
			Save Cancel

Port Group : WAN

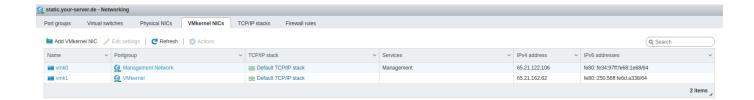
/ Edit port group - WAN			
Name	WAN		
	WAIN		
VLAN ID	0		
Virtual switch	vSwitch1 ▼		
▼ Security			
Promiscuous mode	○ Accept ○ Reject ● Inherit from vSwitch		
MAC address changes	○ Accept ○ Reject ● Inherit from vSwitch		
Forged transmits	○ Accept ○ Reject ● Inherit from vSwitch		
▼ NIC teaming			
Load balancing	Inherit from vSwitch ▼		
Network failover detection	Inherit from vSwitch ▼		
Notify switches	○ Yes ○ No ● Inherit from vSwitch		
Failback	○ Yes ○ No ● Inherit from vSwitch		
Override failover order	○ Yes ● No		
Failover order	Mark standby Mark unused ≣↑ Move up ≡↓ Move down		
	Name Speed Status		
▼ Traffic shaping			
Status	○ Enabled ○ Disabled ● Inherit from vSwitch		
Average bandwidth	100000 Kb/s		
Peak bandwidth	100000 Kh/e		
	Save Cancel		

Port Group : VMkernel

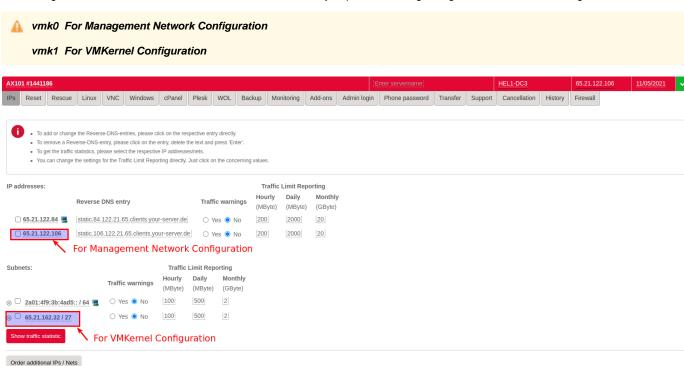


Step 5

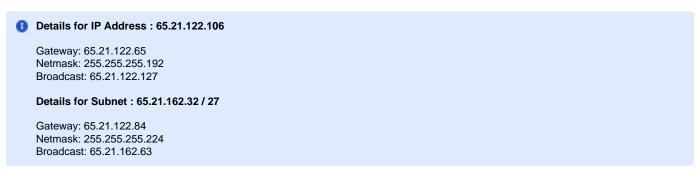
Move to VMkernel NIC's tab and configure the 2 NIC's with the following configuration.



I am adding the hetzner ui screenshot here for the reference, this may required for finding the right IP Address for the configuration.

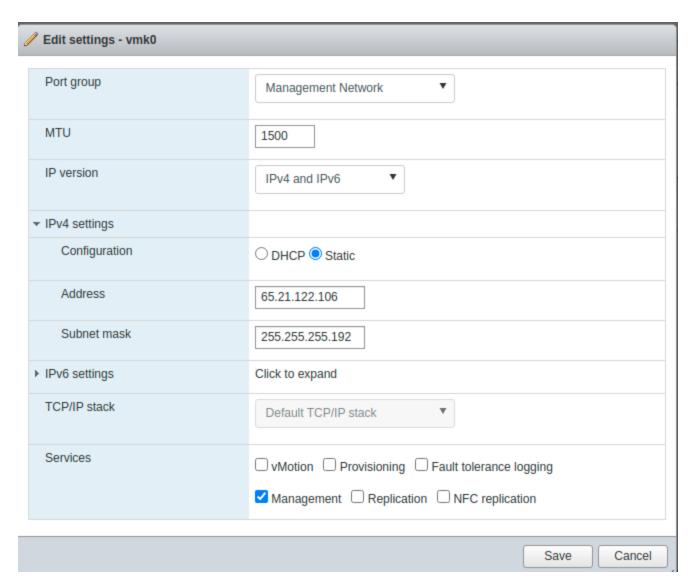


Move your cursor on top of these two IP Address. you will get the following details. this is also you may required for configure.

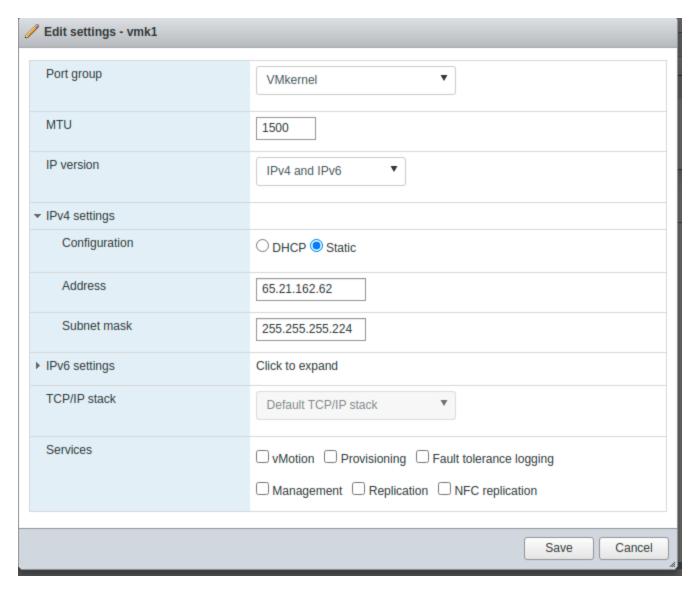


Choose any one of the IP address from the subnet, in here we are choosing 65.21.162.62 (The last usable IP Address in this subnet)

vmk0 (Management Network Configuration)



vmk1 (VMKernel Configuration)



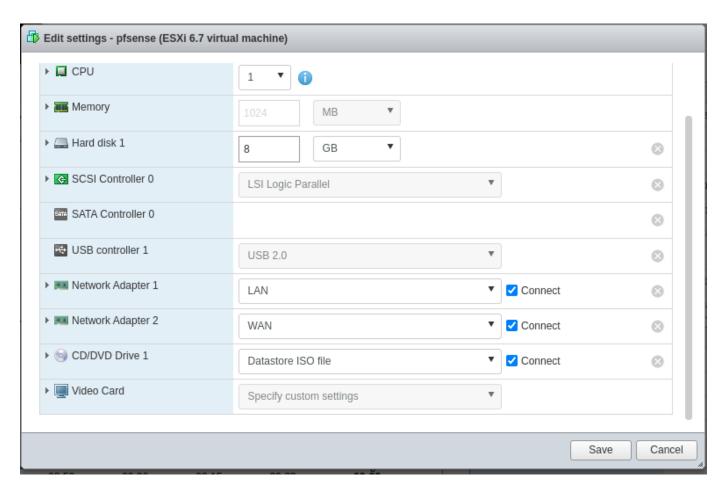
Step 6

### Installation of pfSense

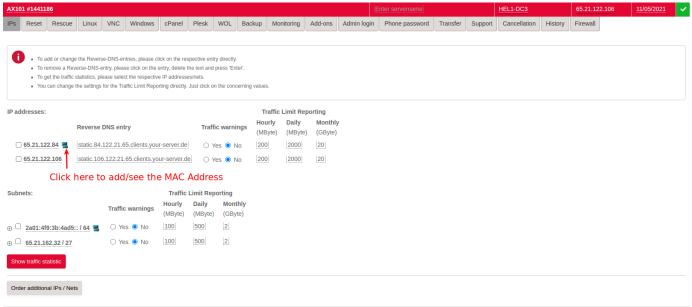
Create the VM in ESXI with the hardware requirement as mentioned above.

We must need two eth port for the Server, that's why we purchased additional single IP address

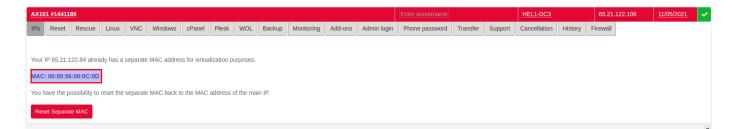
for adding the NIC's to the vm, we have to add 2 NIC's. noe for LAN and another one for WAN.



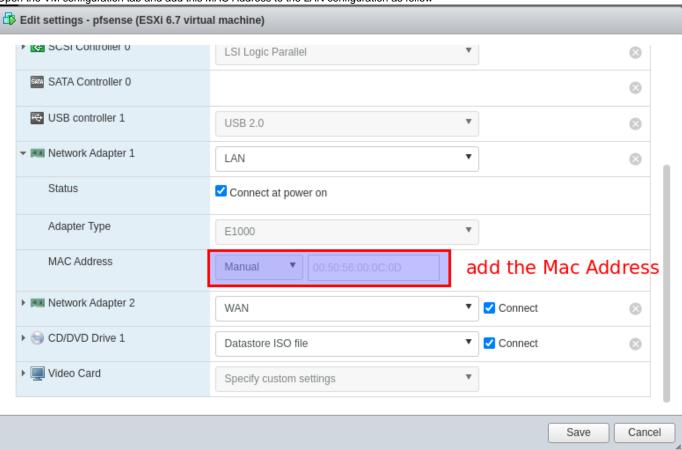
Configure the LAN with the manual configuration of MAC Address. you can find the MAC Address of the secondary IP Address we had ordered form hetzner ui



You will see the MAC Address as follow



Open the VM configuration tab and add this MAC Address to the LAN configuration as follow



Step 7

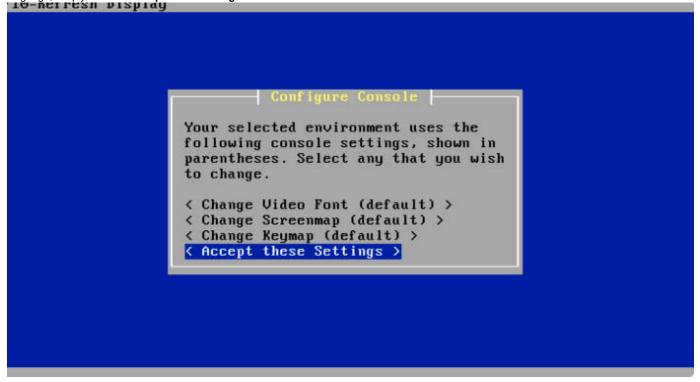
Save this configuration and start the vm to boot it



At this screen, either allow the timer to run out or select 1 to proceed booting into the installer environment.

#### Step 8

Once the installer finishes booting, the system will prompt for any changes desired in the keyboard layout. If everything shows in a native language, simply click on 'Accept these Settings'.



#### Step 9

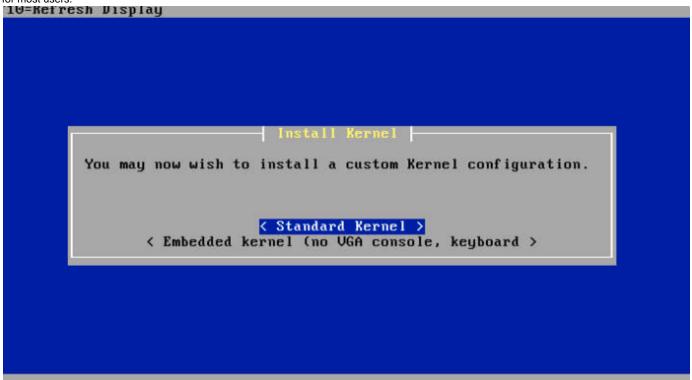
The next screen will provide the user with the option of a 'Quick/Easy Install' or more advanced install options. For the purposes of this guide, it is suggested to simply use the 'Quick/Easy Install' option.



The next screen will simply confirm that the user desires to use the 'Quick/Easy Install' method which won't ask as many questions during the installation.

#### Step 10

The first question that is likely to be presented will ask about which kernel to install. Again, it is suggested that the 'Standard Kernel' be installed for most users.



#### Step 11

When the installer has finished this stage, it will prompt for a reboot. Be sure to remove the installation media as well so the machine doesn't boot back into the installer.



Once it booted, the PFSense vm will up and running.

### Configure pfSense Server



🛕 NOTE: The IP Address showing in the following screenshots may not be the right IP Address taht we attached to the vm. (taking this snapshot from somewhere for reference purpose)

### Step 1

After the reboot, and the removal of the CD/USB media, pfSense will reboot into the newly installed operating system. By default, pfSense will pick an interface to set-up as the WAN interface with DHCP and leave the LAN interface unconfigured.

```
Generating KKD graphs...done.
tarting syslog...done.
tarting CRON... done.
ofSense (pfSense) 2.3.4-RELEASE amd64 Wed May 03 15:13:29 CDT 2017
Bootup complete
reeBSD/amd64 (pfSense.localdomain) (ttyv0)

«** Welcome to pfSense 2.3.4-RELEASE (amd64 full-install) on pfSense ***

WAN (wan)
                               -> v4/DHCP4: 192.168.1.48/24
                -> em0
LAN (lan)
                               ->
                 ->
                   em1
                                       9) pfTop
0) Logout (SSH only)
1) Assign Interfaces
                                      10) Filter Logs
2) Set interface(s) IP address
                                      11) Restart webConfigurator
3) Reset webConfigurator password
                                      12) PHP shell + pfSense tools
                                      13) Update from console
4) Reset to factory defaults
                                      14) Enable Secure Shell (sshd)
Reboot system
6) Halt system
                                      15) Restore recent configuration
7) Ping host
                                      16) Restart PHP-FPM
8) Shell
```

# inter an option:

### Step 2

While pfSense does have a web based graphical configuration system, it is only running on the LAN side of the firewall but at the moment, the LAN side will be unconfigured. The first thing to do would be to set an IP address on the LAN interface.

To do this follow these steps:

- Take note of which interface name is the WAN interface (em0 above).
- Enter '1' and press the 'Enter' key.
- Type 'n' and press the 'Enter' key when asked about VLANs.
- Type in the interface name recorded in step one when prompted for the WAN interface or change to the proper interface now. Again this example, 'em0' is the WAN interface as it will be the interface facing the Internet.
- The next prompt will ask for the LAN interface, again type the proper interface name and hit the 'Enter' key. In this install, 'em1' is the LAN interface.
- pfSense will continue to ask for more interfaces if they are available but if all interfaces have been assigned, simply hit the 'Enter' key again.
- pfSense will now prompt to ensure that the interfaces are assigned properly.

```
The interfaces will be assigned as follows:

JAN -> em0
LAN -> em1

Do you want to proceed [y|n]?
```

- If the interfaces are correct, type 'y' and hit the 'Enter' key.
- The next step will be to assign the interfaces the proper IP configuration. After pfSense returns to the main screen, type '2' and hit the 'E nter' key. (Be sure to keep track of the interface names assigned to the WAN and LAN interfaces).

\*NOTE\* For this install the WAN interface can use DHCP without any problems but there may be instances where a static address would be required. The process for configuring a static interface on the WAN would be the same as the LAN interface that is about to be configured.

Type '2' again when prompted for which interface to set IP information. Again 2 is the LAN interface in this walk through.

```
Available interfaces:
1 - WAN (em0 - dhcp)
2 - LAN (em1 - static)
Enter the number of the interface you wish to configure: 2
```

When prompted, type the IPv4 address desired for this interface and hit the 'Enter' key. This address should not be in use anywhere else on the network and will likely become the default gateway for the hosts that will be plugged into this interface.

```
Enter the new LAN IPv4 address. Press <ENTER> for none:
> 192.168.0.1
```

The next prompt will ask for the subnet mask in what is known as prefix mask format. For this example network a simple /24 or 255.255.255.0 will be used. Hit the 'Enter' key when done.

The next question will ask about an 'Upstream IPv4 Gateway'. Since the LAN interface is currently be configured, simply hit the 'Enter' key.

```
For a WAN, enter the new LAN IPv4 upstream gateway address.
For a LAN, press <ENTER> for none:
```

The next prompt will ask to configure IPv6 on the LAN interface. This guide is simply using IPv4 but should the environment require IPv6, it can be configured now. Otherwise, simply hitting the 'Enter' key will continue.

```
Enter the new LAN IPv6 address. Press <ENTER> for none:
```

The next question will ask about starting the DHCP server on the LAN interface. Most home users will need to enable this feature. Again this may need to be adjusted depending on the environment.

This guide assumes that the user will want the firewall to provide DHCP services and will allocate 51 addresses for other computers to obtain an IP address from the pfSense device.

```
Do you want to enable the DHCP server on LAN? (y/n) y
Enter the start address of the IPv4 client address range: 192.168.0.100
Enter the end address of the IPv4 client address range: 192.168.0.150
Disabling IPv6 DHCPD...
```

The next question will ask to revert pfSense's web tool to the HTTP protocol. It is strongly encouraged NOT to do this as the HTTPS protocol will provide some level of security to prevent disclosure of the admin password for the web configuration tool.

```
Do you want to revert to HTTP as the webConfigurator protocol? (y/n) n
```

Once the user hits 'Enter', pfSense will save the interface changes and start the DHCP services on the LAN interface.

```
Please wait while the changes are saved to LAN...

Reloading filter...

Reloading routing configuration...

DHCPD...

The IPv4 LAN address has been set to 192.168.0.1/24

You can now access the webConfigurator by opening the following URL in your web prowser:

https://192.168.0.1/
```

Now you can access the pfSense web ui from outside

