

Install OPNsense Firewall in the cloud

OPNsense 20.x setup workflow for RackCorp Hybrid cloud

Summary:

Setting up OPNsense is easy if one has direct access bare metal, or has a desktop virtualisation where one can define internal NICs/networks, which can be used for the LAN side management.

However, since we are setting up in a hybrid public/private cloud, without a management terminal (VM) setup on the same subnet as the LAN network, we will not be able to manage and configure the OPNsense since the locked down WAN interface is the one exposed to the outside world. Additionally, limited configuration is provided through its's terminal shell.

We want to have some management ports (properly secured) exposed to the Internet.

For our hybrid cloud, we shall swap the public and private interfaces in OPNsense. This is the reverse of the expected setup flow. We do this because the LAN interface has a preset 'allow all' rule which lets us login to its management portal.

This will allow us to easily configure the system remotely via web browser and then we will change the settings back to the Public IP being on the WAN interface and private IP on the LAN interfaces.

The general steps to get OPNsense 20 running on RackCorp Hybrid are as follows:

Install ISO

Get access to Web GUI

Make firewall rule on WAN interface for remote management

Reassign/swap the LAN/WAN interfaces

Rekey in the correct IP address for the LAN/WAN interfaces

The WAN IP included in this guide is for example only. Please replace it with the one we have provided you

```
Starting DHCPv4 service...done.

You can now access the web GUI by opening
the following URL in your web browser:

    http://10.0.0.1

*** OPNsense.localdomain: OPNsense 20.1.6 (amd64/OpenSSL) ***

LAN (vtnet0)    -> v4: 10.0.0.1/24
WAN (vtnet1)    -> v4/DHCP4: 116.206.80.210/24

SSH:  SHA256 sALNA9gQ9chUqK0o0eTjNoYrWIIUbDZhBfmbzYJN07E (ECDSA)
SSH:  SHA256 0NKgH0nGIkyarnGc5Ug9196v9i+2qYD2vc1jDKsQ3nY (ED25519)
SSH:  SHA256 m1KHCBMdB0BjgIdlfaLCfS/pNn4zL1X5GB7Cp/dqopU (RSA)

0) Logout                      7) Ping host
1) Assign interfaces           8) Shell
2) Set interface IP address    9) pfTop
3) Reset the root password     10) Firewall log
4) Reset to factory defaults   11) Reload all services
5) Power off system            12) Update from console
6) Reboot system               13) Restore a backup

Enter an option: █
```

1. Install ISO

OPNsense assigns its Interfaces to NICs in the order they are assigned to in the RackCorp Portal, starting with LAN interface.

So let's 'swap' the interfaces so we can login to the management webpage:

1. Start off with the following configuration for the RackCorp Portal and OPNsense in your RackCorp VM

| RackCorp vNIC ID | RackCorp vNIC Label | IP | VLAN | OPNsense Interface |
|------------------|---------------------|----|------|--------------------|
|------------------|---------------------|----|------|--------------------|

| | | | | |
|--------------|----------------|---------------------------|---|---------------------|
| NIC 1 | Public | 116.206.80.210 /27 | <your assigned VLAN> Public VLAN1 for Demo | LAN (vtnet0) |
| NIC 2 | Private | 10.0.0.1 /24 | <your assigned VLAN> Public VLAN1 for Demo | WAN (vtnet1) |

Rackcorp portal will display green lights when the configuration is correct.

Setup your RackCorp VM with the networking from the above table.


- Don't forget to add the VLANs
- For demonstration, we have left the default vNIC labels. If the vNIC labels are confusing you could define them based on the interface, e.g. Private or Public combined with the end of the vNIC MAC address e.g. 33 or 34.

2. Follow the boot and installation instructions for the OPNsense 20.x using the ISO image file.

2.1 Mount the OPNsense Installer ISO in RackCorp and then boot the VM.

SUMMARY
CONTROL
STORAGE
NETWORK
VIRTUAL CONSOLE
BACKUPS
MEDIA
INSTALL
DISK STATS
CPU STATS
MEM STAT

NOTE: Depending on the option chosen below, you could end up destroying ALL data on your virtual server. Please make sure that you have definitely selected the CORRECT server. If you are unsure what you are doing, please submit a support ticket first. If a media is bootable, it will be set as the boot device upon restart.

 Your server must be running to mount any media or change boot settings.

BOOT DEVICE
(default - C)
CHANGE BOOT DEVICE >

VIRTUAL MEDIA
OPNsense 20.1
MOUNT MEDIA >
(To upload custom ISOs, please create a support ticket with the URL)

FLOPPY MEDIA
Windows VIRTIO Drivers Floppy (Jun 2011)
MOUNT MEDIA >

Rectangular Snip

2.2 A live environment is booted with optional installation.

Do not run interface assignment during boot if you are going to install to HD.

```

Starting PFLOG...done.
Syncing OpenVPN settings...done.
Starting NTP service...deferred.
Starting Unbound DNS...done.
Generating RRD graphs...done.
Configuring system logging...done.
>>> Invoking start script 'newwanip'
>>> Invoking start script 'freebsd'
>>> Invoking start script 'carp'
>>> Invoking start script 'cron'
Starting Cron: OK
>>> Invoking start script 'beep'
Root file system: /dev/gpt/rootfs
Fri May 15 01:42:31 UTC 2020

*** OPNsense.localdomain: OPNsense 20.1 (amd64/OpenSSL) ***

LAN (vtnet0)      -> v4: 192.168.1.1/24

HTTPS: SHA256 D8 FA 8E 37 F2 3B BB 0D 14 F1 F5 A6 D5 CF DA 99
              4F AE 93 84 93 DD 4B F9 70 B7 6F 41 33 88 FC 2B

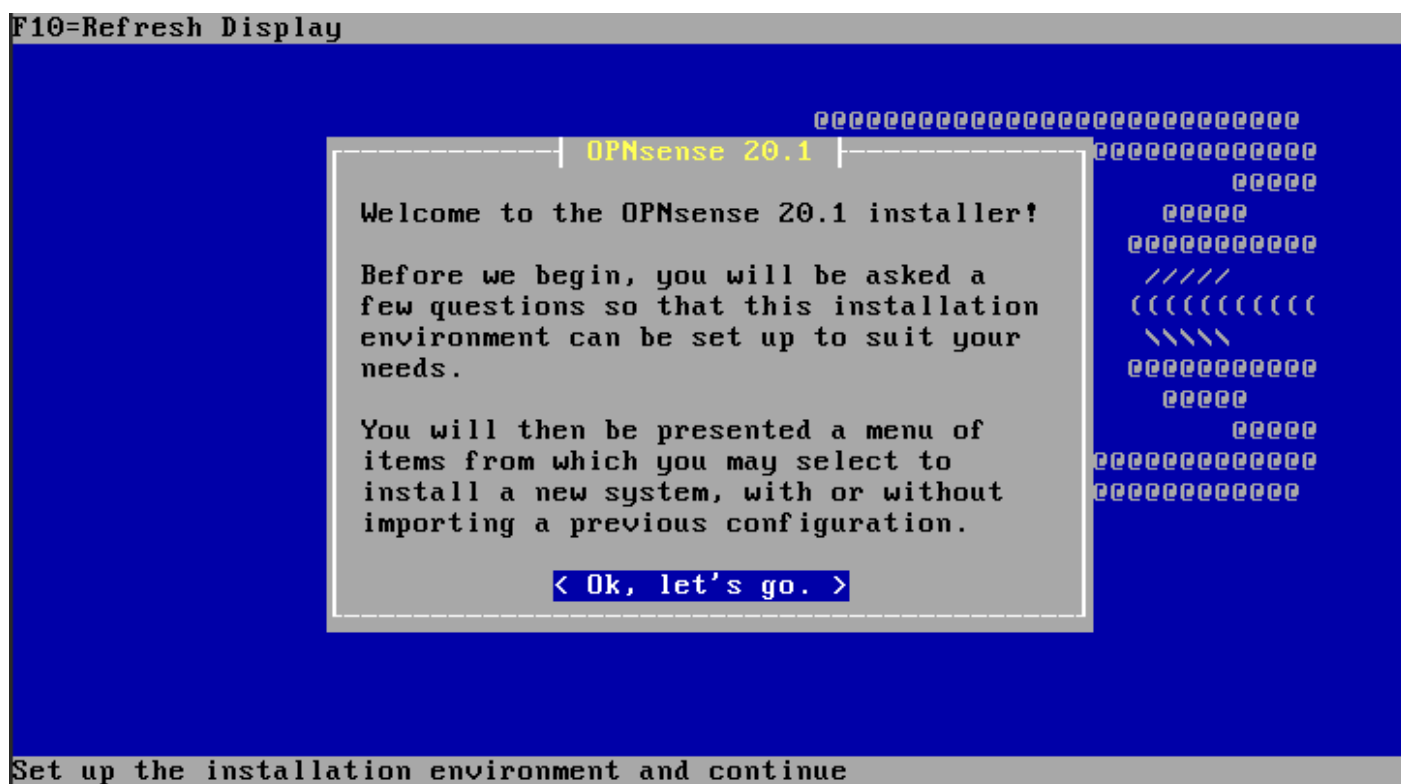
FreeBSD/amd64 (OPNsense.localdomain) (ttyv0)
login: █

```

2.3 Once booted, install the system to disk using the following

Login: **installer** password: **opnsense**

Follow the guided instructions to install to HDD. The defaults are fine for a single disk install. Once complete, follow the prompt to reboot the OPNsense install and EJECT the ISO from the RackCorp portal.



2. Get access to Web GUI

3. Opnsense has a built in wizard in the console menu that aids the user to setup their LAN NIC, WAN NIC, any tertiary NIC such as a DMZ or management NIC as well as IPv4/6 addressing and DHCP. Your Opnsense will have booted to this menu after install.

3.1 **SET INTERFACE IP** for **WAN**

Select **NONE**, this will clear the interface and let us re-assign.

3.2 **SET INTERFACE IP** for **LAN**

Select **116.206.80.210/27** as per table.

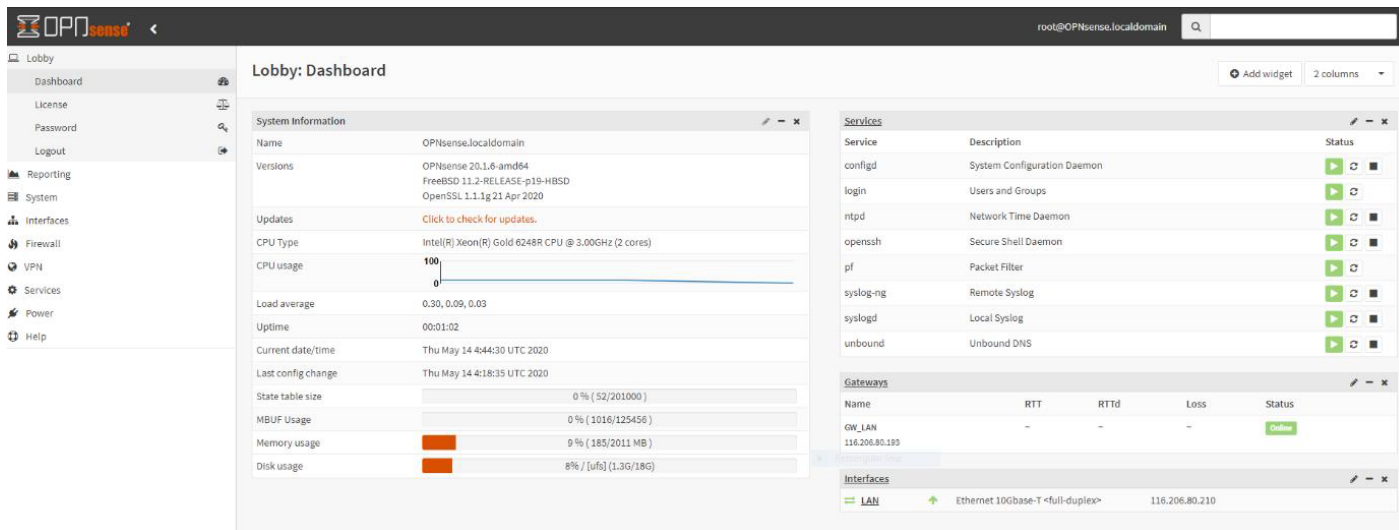
Since this example uses a 27 bit subnet, our gateway is .193 and our maximum host is .223.

For DNS use RackCorp NS1 110.232.116.249 or Google DNS 8.8.8.8

| Interface | LAN |
|--------------------------------------|------------------|
| DHCP | No |
| New LAN IP | 116.206.80.210 |
| Subnet | 27 |
| Gateway | 116.206.80.193 |
| Gateway as name server | No |
| IPv4 Name server | 8.8.88 |
| IPv6 LAN Interface via WAN Tracking: | No |
| IPv6 LAN Interface via DHCP: | No |
| IPv6 Address: | <enter> for none |
| LAN DHCP Server: | n |
| HTTP fallback for web GUI | n |

4. Once you have keyed in the LAN IP address, you should be able to access it via web browser. There will be an introductory setup wizard but be sure to skip the WAN setup page. Login to OPNsense web page. Click logo top left to skip configuration wizard.

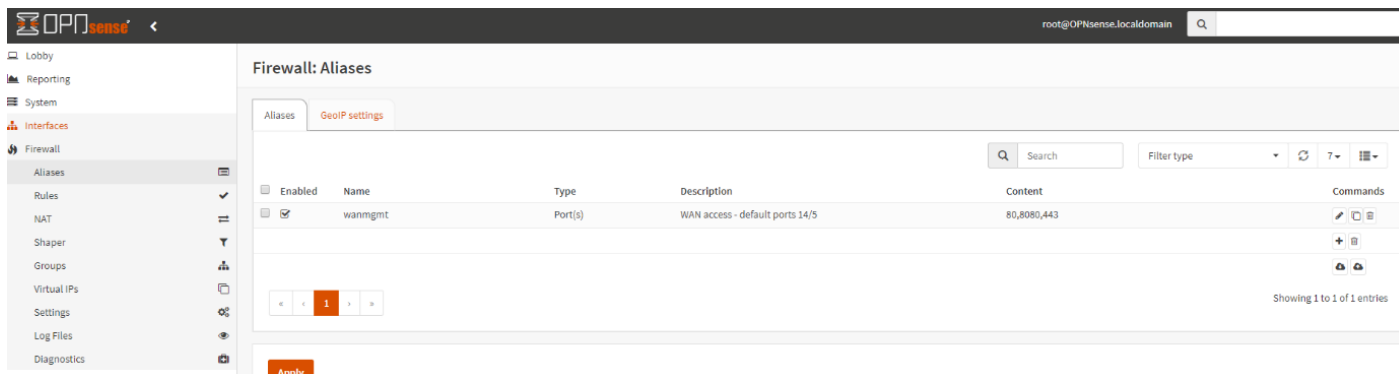
Once we have logged into the OPNsense management page, this is verification that we can access the system



3. Make firewall rule on WAN interface for remote management

5. Add an alias to define management ports. **Firewall-> Aliases**. We use ports **80, 443, 8080** in this example.

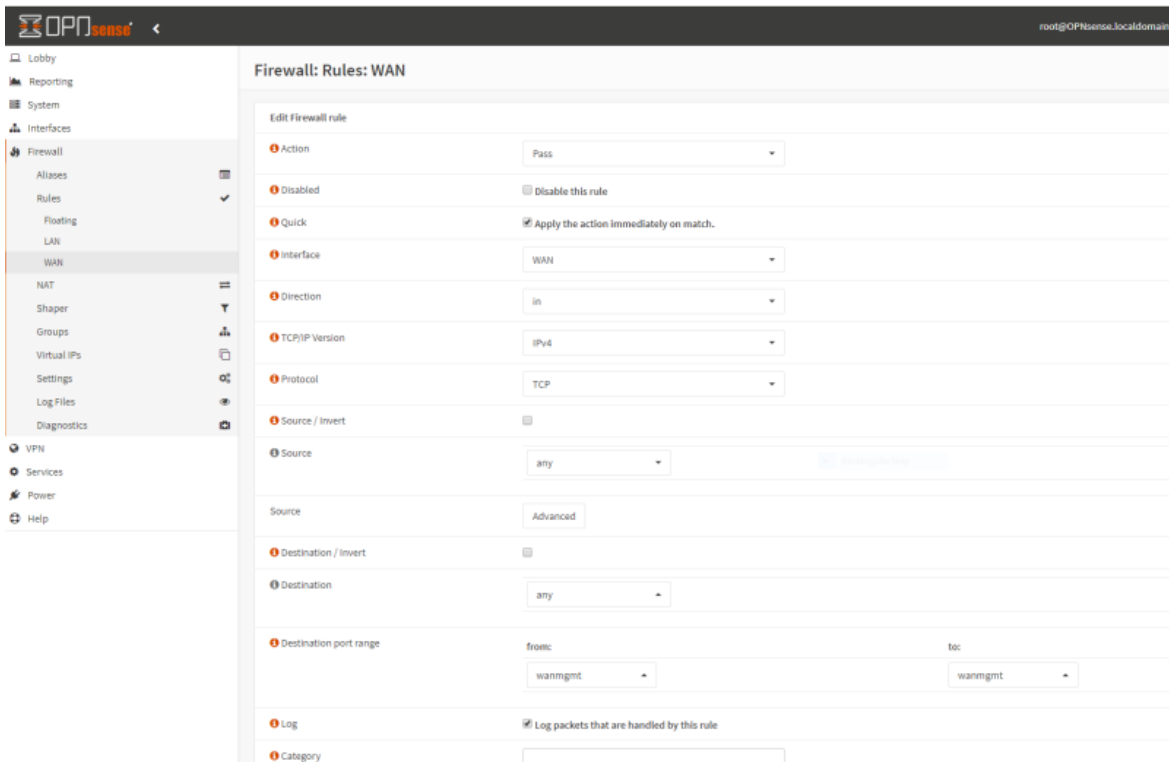
[Save]. [Apply]



6. Add WAN port forward rule to **Firewall -> Rules -> WAN**.

| | |
|--------------------------------------|---|
| Protocol: | TCP |
| Source Port: | Any |
| Destination port range Start: | <Your alias name> Scroll UP in the list to find it. |
| Destination port range End: | <Your alias name> Scroll UP in the list to find it. |
| Log Packets: | Enabled |

[Save]. [Apply].



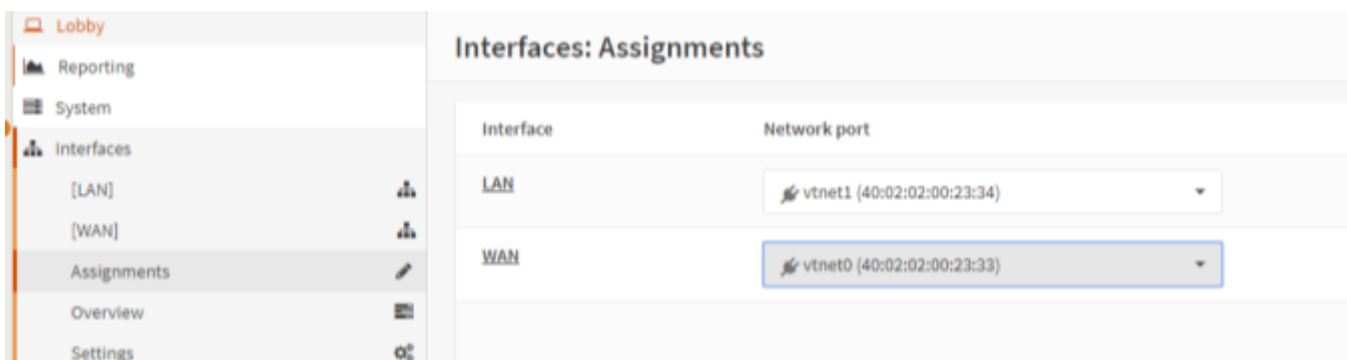
4. Reassign/swap the LAN/WAN interfaces

7. **Interfaces-> Assignments.** Compare the settings here versus Rackcorp portal

Where are we now: a LAN Interface with public IP set in OPNsense and WAN interface with no WAN IP set.

Since our Port Forward that will allow us to access management interface externally is now defined, we can swap the interfaces. You need to swap both the interfaces in OPNsense portal.

7.1 In OPNsense portal, **(Interfaces->Assignments)** Swap so that
 (LAN) -> VTNET1 RackCorp NIC 2
 (WAN) -> VTNET0 RackCorp NIC 1



Lobby

Reporting

System

Interfaces

[LAN]

[WAN]

Assignments

Overview

Settings

Interfaces: Assignments

| Interface | Network port |
|-----------|----------------------------|
| LAN | vtnet0 (40:02:02:00:23:33) |
| WAN | vtnet1 (40:02:02:00:23:34) |

[SAVE]

5. Rekey in the correct IP address for the LAN/WAN interfaces

8. Once you have swapped, OPNsense might forget the IP subnets and we need to re-key them into the console.

Re-key in the IP/subnets using option 2. Clear them if necessary with <ENTER NONE>

| | |
|--------------------------------------|------------------|
| Interface | LAN |
| Configure via DHCP | No |
| New LAN IP | 10.0.0.1 |
| Subnet | 24 |
| Gateway | <enter> for none |
| IPv6 LAN Interface via WAN Tracking: | N |
| IPv6 LAN Interface via DHCP6: | N |
| IPv6 Address: | <enter for none |
| LAN DHCP Server: | Y |
| SDHCP End Address: | 10.0.0.20 |
| Revert to HTTP as web GUI protocol | N |

| | |
|--------------------|-----|
| Interface | WAN |
| Configure via DHCP | N |

| | |
|---|------------------|
| New WAN IP | 116.206.80.210 |
| Subnet | 27 |
| Gateway | 116.206.0.193 |
| Gateway as name server | no |
| IPv4 Name server | 8.8.8.8 |
| IPv6 WAN Interface via DHCP6: | N |
| IPv6 Address: | <enter> for none |
| Revert to HTTP as web GUI protocol | N |

```
> 10.0.0.1

Subnet masks are entered as bit counts (like CIDR notation).
e.g. 255.255.255.0 = 24
     255.255.0.0   = 16
     255.0.0.0     = 8

Enter the new LAN IPv4 subnet bit count (1 to 32):
> 24

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

Configure IPv6 address LAN interface via WAN tracking? [Y/n] n
Configure IPv6 address LAN interface via DHCP6? [y/N] n

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

Do you want to enable the DHCP server on LAN? [y/N] y

Enter the start address of the IPv4 client address range: 10.0.0.10
Enter the end address of the IPv4 client address range: █
```

9. Once both LAN and WAN have been rekeyed, you should be able to log in to the OPNsense management portal via its WAN address and RackCorp vNIC status lights turn green.

NETWORK INTERFACES

| NIC | Status | Port Speed | VLANs | Uplink Port | Uplink Device | Action |
|--|--------------------------------------|------------|-----------|-------------|---------------|--------------------------|
| NIC 1 | ● | 20Mbit | 1(PUBLIC) | (virtual) | (virtual) | edit nic |
| NIC 2 | ● | 20Mbit | 1(PUBLIC) | (virtual) | (virtual) | edit nic |
| + ADD NIC | | | | | | |

IP ADDRESSES

| IP Address | Status | Interface | Role | Action |
|---|--------------------------------------|-----------|----------------------|--------|
| 116.206.80.210 | ● | NIC 1 | (primary IP address) | |
| 10.0.0.1 | ● | NIC 2 | (primary IP address) | |
| + ADD IP Address | | | | |

Dashboard | Lobby | OPNsense

116.206.80.210/index.php

root@OPNsense.localdomain

Dashboard
License
Password
Logout
Reporting
System
Interfaces
Firewall
VPN
Services
Power
Help

Lobby: Dashboard

Add widget
2 columns

System Information

| | |
|--------------------|--|
| Name | OPNsense.localdomain |
| Versions | OPNsense 20.1.6-amd64 FreeBSD 11.2-RELEASE-p19-HBSD OpenSSL 1.1.1g 21 Apr 2020 |
| Updates | Click to check for updates. |
| CPU Type | Intel(R) Xeon(R) Gold 6248R CPU @ 3.00GHz (2 cores) |
| CPU usage | <div><div></div></div> |
| Load average | 0.18, 0.30, 0.22 |
| Uptime | 00:15:38 |
| Current date/time | Thu May 14 10:01:04 UTC 2020 |
| Last config change | Thu May 14 9:58:00 UTC 2020 |
| State table size | 0 % (14/201000) |
| MBUF Usage | 1 % (2026/125456) |
| Memory usage | 12 % (254/2011 MB) |
| Disk usage | 8 % / [ufs] (1.3G/18G) |

Services

| Service | Description | Status |
|-----------|-----------------------------|--|
| configd | System Configuration Daemon | ▶ ↺ ■ |
| dhcpcd | DHCPv4 Server | ▶ ↺ ■ |
| login | Users and Groups | ▶ ↺ |
| ntpd | Network Time Daemon | ▶ ↺ ■ |
| openssh | Secure Shell Daemon | ▶ ↺ ■ |
| pf | Packet Filter | ▶ ↺ |
| syslog-ng | Remote Syslog | ▶ ↺ ■ |
| syslogd | Local Syslog | ▶ ↺ ■ |
| unbound | Unbound DNS | ▶ ↺ ■ |

Gateways

| Name | RTT | RTTd | Loss | Status |
|--------------------------|-----|------|------|--------|
| GW_LAN 116.206.80.193 | ~ | ~ | ~ | Online |
| WAN_DHCP 10.61.25.1 | ~ | ~ | ~ | Online |

Interfaces

| Interface | Speed | Link | IP Address |
|-----------|----------------------------------|--------------------------------------|----------------|
| LAN | Ethernet 10Gbase-T <full-duplex> | ↑ | 10.0.0.1 |
| WAN | Ethernet 10Gbase-T <full-duplex> | ↑ | 116.206.80.210 |

OPNsense (c) 2014-2020 Deciso B.V.

10. Follow our additional tasks for further configuration as required.

11. If you have problems with this procedure, select **(4) Reset Factory Settings** in the console menu. The OPNsense will reset itself, then shutdown. Restart the VM from RackCorp and try again.

11) Reload all services can also help

```
Starting DHCPv4 service...done.
Starting Unbound DNS...done.
Setting up gateway monitors...done.
Configuring firewall.....done.
Starting PFLOG...done.
Starting DHCPv4 service...done.

*** OPNsense.localdomain: OPNsense 20.1 (amd64/OpenSSL) ***

LAN (vtnet1)    -> v4: 10.0.0.1/24
WAN (vtnet0)    -> v4: 116.206.80.210/27

HTTPS: SHA256 EA 6C C7 4F A1 4E CE 5D E4 2F 2F FA 80 52 21 DB
              E7 A7 50 1A 6B 18 27 F1 9C 77 7E 79 5D 78 3E 62

0) Logout                      7) Ping host
1) Assign interfaces           8) Shell
2) Set interface IP address    9) pfTop
3) Reset the root password     10) Firewall log
4) Reset to factory defaults   11) Reload all services
5) Power off system            12) Update from console
6) Reboot system               13) Restore a backup

Enter an option: █
```

ADDITIONAL TASKS

Once your basic setup is running, it can be further configured to suit your requirements.

Consult your security policy on how to handle such appliance management.

Things to consider can be, of which many are industry best practice

- Considering adding a management network or 1 or more DMZ networks to the firewall for added functionality
- Use VPN functionality for management login instead of HTTP/S ports.
- Use VPN functionality for remote workers to be able to access enterprise content.
- If HTTP/S ports are desired for management via WAN/Internet, consider changing the port numbers and or whitelisting the OPNsense IP/URL to particular authorised management systems.
- Configure and test SSH access if necessary, bound by whitelisting, management interface or VPN tunnel.
- Install additional plugins, such as Wireguard VPN or other utilities via the plugins page to enhance the functionality of the firewall.

