



# **Security Gateway Manual**

***SG-3100***

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**Feb 06, 2026**

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This Quick Start Guide covers the first time connection procedures for the [Netgate® 3100 Firewall Appliance](#) and will provide the information needed to keep the appliance up and running.

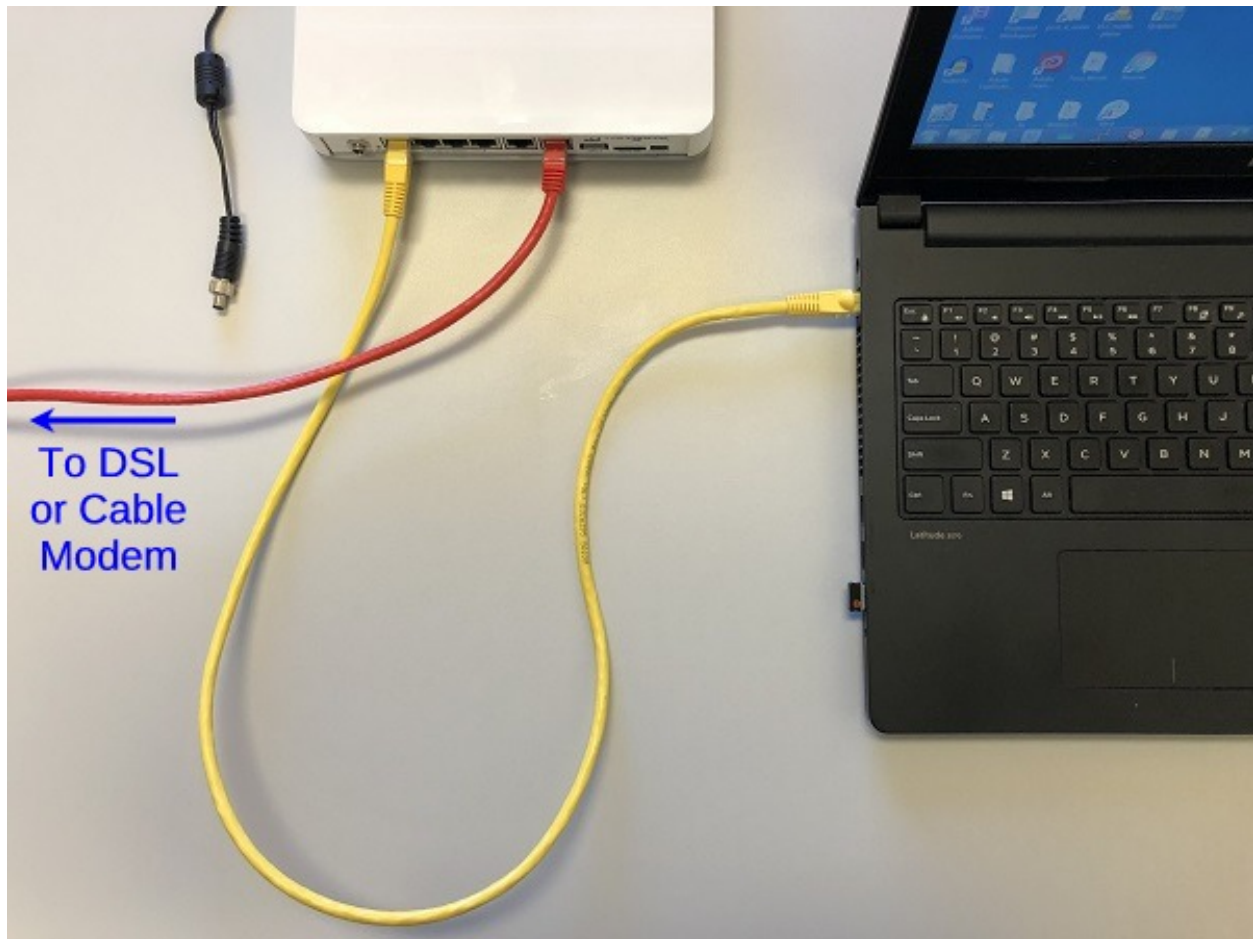
## **OUT OF THE BOX**

### **1.1 Getting Started**

The basic firewall configuration begins with connecting the Netgate® appliance to the Internet. The Netgate appliance should be unplugged at this time.

Connect one end of an Ethernet cable to the WAN port (shown in the *Input and Output Ports* section) of the Netgate appliance. The other end of the same cable should be inserted into a LAN port on the ISP Customer Premise Equipment (CPE) device, such as a cable or fiber router. If the CPE device provided by the ISP has multiple LAN ports, any LAN port should work in most circumstances.

Next, connect one end of a second Ethernet cable to the LAN port (shown in the *Input and Output Ports* section) of the Netgate appliance. Connect the other end to the computer.



### 1.1.1 What next?

To connect to the GUI and configure the firewall in a browser, continue on to *Initial Configuration*.

To connect to the console and make adjustments before connecting to the GUI, see *Connecting to the USB Console*.

**Warning:** The default IP Address on the LAN subnet on the Netgate firewall is 192.168.1.1/24. The same subnet **cannot** be used on both WAN and LAN, so if the default IP address on the ISP-supplied modem is also 192.168.1.1/24, **disconnect the WAN** interface until the LAN interface on the firewall has been renumbered to a different subnet (like 192.168.2.1/24) to avoid an IP Address conflict.

To change an interface IP address, choose option 2 from the *Console Menu* and walk through the steps to change it, or from the GUI, go through the Setup Wizard (opens at first boot, also found at **System > Setup Wizard**) and change the IP address on Step 5. Complete the Wizard and save the changes.

## 1.2 Initial Configuration

Plug the power cable into the power port (shown in the *Input and Output Ports* section) to turn on the Netgate® Firewall. Allow 4 or 5 minutes to boot up completely.

**Warning:** If the ISP Customer Premise Equipment (CPE) on WAN (e.g. Fiber or Cable Router) has a default IP Address of 192 . 168 . 1 . 1, disconnect the Ethernet cable from the WAN port on the Netgate 3100 Security Gateway before proceeding.

Change the default LAN IP Address of the device during a later step in the configuration to avoid having conflicting subnets on the WAN and LAN.

### 1.2.1 Connecting to the Web Interface (GUI)

1. From the computer, log into the web interface

Open a web browser (Google Chrome in this example) and enter 192 . 168 . 1 . 1 in the address bar. Press Enter.

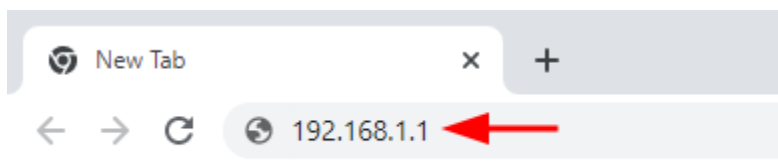


Fig. 1: Enter the default LAN IP address in the browser

2. A warning message may appear. If this message or similar message is encountered, it is safe to proceed. Click the **Advanced** Button and then click **Proceed to 192.168.1.1 (unsafe)** to continue.
3. At the **Sign In** page, enter the default pfSense® Plus username and password and click **Next**.
  - Default Username: **admin**
  - Default Password: **pfsense**

### 1.2.2 The Setup Wizard

This section steps through each page of the Setup Wizard to perform the initial configuration of the firewall. The wizard collects information one page at a time, but it does not make any changes to the firewall until the wizard is completed.

**Tip:** The wizard can be safely stopped at any time for those who wish to perform the configuration manually or restore an existing backup ([Backup and Restore](#)).

To stop the wizard, navigate away from the wizard pages by clicking the logo in the upper left of the page or by choosing an entry from one of the menus.

**Note:** Ignore the warning at the top of each wizard page about resetting the **admin** account password. One of the steps in the Setup Wizard is to change the default password, but the new password is not applied until the end of the wizard.



## Your connection is not private

Attackers might be trying to steal your information from **192.168.1.1** (for example, passwords, messages, or credit cards). [Learn more](#)

NET::ERR\_CERT\_AUTHORITY\_INVALID



To get Chrome's highest level of security, [turn on enhanced protection](#)

Hide advanced



1

Back to safety

This server could not prove that it is **192.168.1.1**; its security certificate is not trusted by your computer's operating system. This may be caused by a misconfiguration or an attacker intercepting your connection.

[Proceed to 192.168.1.1 \(unsafe\)](#)



2

Fig. 2: Example certificate warning message

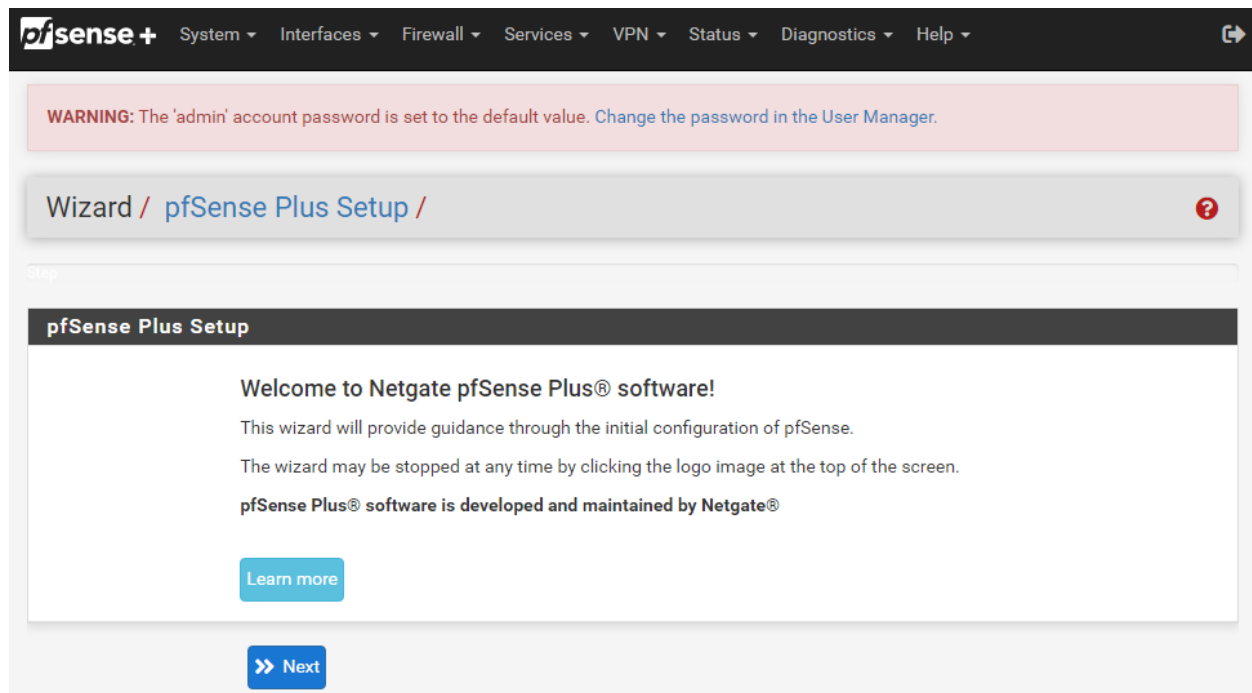


Fig. 3: Setup Wizard starting page

1. Click **Next** to start the **Setup Wizard**.
2. Click **Next** after reading the information on **Netgate Global Support**.
3. Use the following items as a guide to configure the options on the **General Information** page:

**Hostname**

Any desired hostname name can be entered to identify the firewall. For the purposes of this guide, the default hostname `pfsense` is used.

**Domain**

The domain name under which the firewall operates. The default `home.arpa` is used for the purposes of this tutorial.

**DNS Servers**

For purposes of this setup guide, use the Google public DNS servers (`8.8.8.8` and `8.8.4.4`).

---

**Note:** The firewall defaults to acting as a resolver and clients will not utilize these forwarding DNS servers. However, these servers give the firewall itself a way to ensure it has working DNS if resolving the default way does not work properly.

---

Type in the DNS Server information and Click **Next**.

4. Use the following information for the **Time Server Information** page:


**Time Server Hostname**

Use the default time server address. The default hostname is suitable for both IPv4 and IPv6 NTP clients.

**Timezone**

Select a geographically named time zone for the location of the firewall.



Wizard / pfSense Plus Setup / General Information 

Step 2 of 9

**General Information**

On this screen the general pfSense Plus parameters will be set.

Hostname	<input type="text" value="pfSense"/> EXAMPLE: myserver
Domain	<input type="text" value="home.arpa"/> EXAMPLE: mydomain.com
The default behavior of the DNS Resolver will ignore manually configured DNS servers for client queries and query root DNS servers directly. To use the manually configured DNS servers below for client queries, visit Services > DNS Resolver and enable DNS Query Forwarding after completing the wizard.	
Primary DNS Server	<input type="text" value="8.8.8.8"/>
Secondary DNS Server	<input type="text" value="8.8.4.4"/>
Override DNS	<input checked="" type="checkbox"/> Allow DNS servers to be overridden by DHCP/PPP on WAN

>> Next

Fig. 4: **General Information** page in the Setup Wizard

For this guide, the Timezone will be set to America/Chicago for US Central time.

Wizard / pfSense Plus Setup / Time Server Information

Step 3 of 9

### Time Server Information

Please enter the time, date and time zone.

Time server hostname	<input type="text" value="2.pfsense.pool.ntp.org"/>
Enter the hostname (FQDN) of the time server.	
Timezone	<input type="text" value="America/Chicago"/>

>> Next

Fig. 5: Time Server Information page in the Setup Wizard

Change the Timezone and click **Next**.

5. Use the following information for the **Configure WAN Interface** page:

The WAN interface is the external (public) IP address the firewall will use to communicate with the Internet.

**DHCP** is the default and is the most common type of WAN interface for home fiber and cable modems.

**Default settings** for the other items on this page should be acceptable for normal home users.

Default settings should be acceptable. Click **Next**.

6. Configuring LAN IP Address & Subnet Mask. The default LAN IP address of 192.168.1.1 and subnet mask of 24 is usually sufficient.

---

**Tip:** If the CPE on WAN (e.g. Fiber or Cable Modem) has a default IP Address of 192.168.1.1, the Ethernet cable should be disconnected from the WAN port on the Netgate 3100 Security Gateway before starting.

Change the default LAN IP Address of the device during this step in the configuration to avoid having conflicting subnets on the WAN and LAN.

---

7. Change the **Admin Password**. Enter the same new password in both fields.
8. Click **Reload** to save the configuration.
9. After a few seconds, a message will indicate the Setup Wizard has completed. To proceed to the pfSense® Plus dashboard, click **Finish**.

---

**Note:** This step of the wizard also contains several useful links to Netgate resources and methods of obtaining assistance with the product. Be sure to read through the items on this page before finishing the wizard.

---

Wizard / pfSense Plus Setup / Configure WAN Interface ?

Step 4 of 9

**Configure WAN Interface**

On this screen the Wide Area Network information will be configured.

SelectedType

**General configuration**

MAC Address

This field can be used to modify ("spoof") the MAC address of the WAN interface (may be required with some cable connections). Enter a MAC address in the following format: xx:xx:xx:xx:xx:xx or leave blank.

MTU

Set the MTU of the WAN interface. If this field is left blank, an MTU of 1492 bytes for PPPoE and 1500 bytes for all other connection types will be assumed.

MSS

If a value is entered in this field, then MSS clamping for TCP connections to the value entered above minus 40 (TCP/IP header size) will be in effect. If this field is left blank, an MSS of 1492 bytes for PPPoE and 1500 bytes for all other connection types will be assumed. This should match the above MTU value in most all cases.

Fig. 6: Configure WAN Interface page in the Setup Wizard

### 1.2.3 Finishing Up

After completing or exiting the wizard, during the first time loading the **Dashboard** the firewall will display a notification modal dialog with the **Copyright and Trademark Notices**.

Read and click **Accept** to continue to the dashboard.

If the Ethernet cable was unplugged at the beginning of this configuration, reconnect it to the WAN port now.

This completes the basic configuration for the Netgate appliance.

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Accept

Fig. 7: Copyright and Trademark Notices

## 1.3 pfSense Plus Software Overview

This page provides an overview of the pfSense® Plus dashboard and navigation. It also provides information on how to perform frequent tasks such as backing up the pfSense® Plus software and connecting to the Netgate firewall console.

### 1.3.1 The Dashboard

pfSense® Plus software is highly configurable, all of which can be done through the dashboard. This orientation will help to navigate and further configure the firewall.

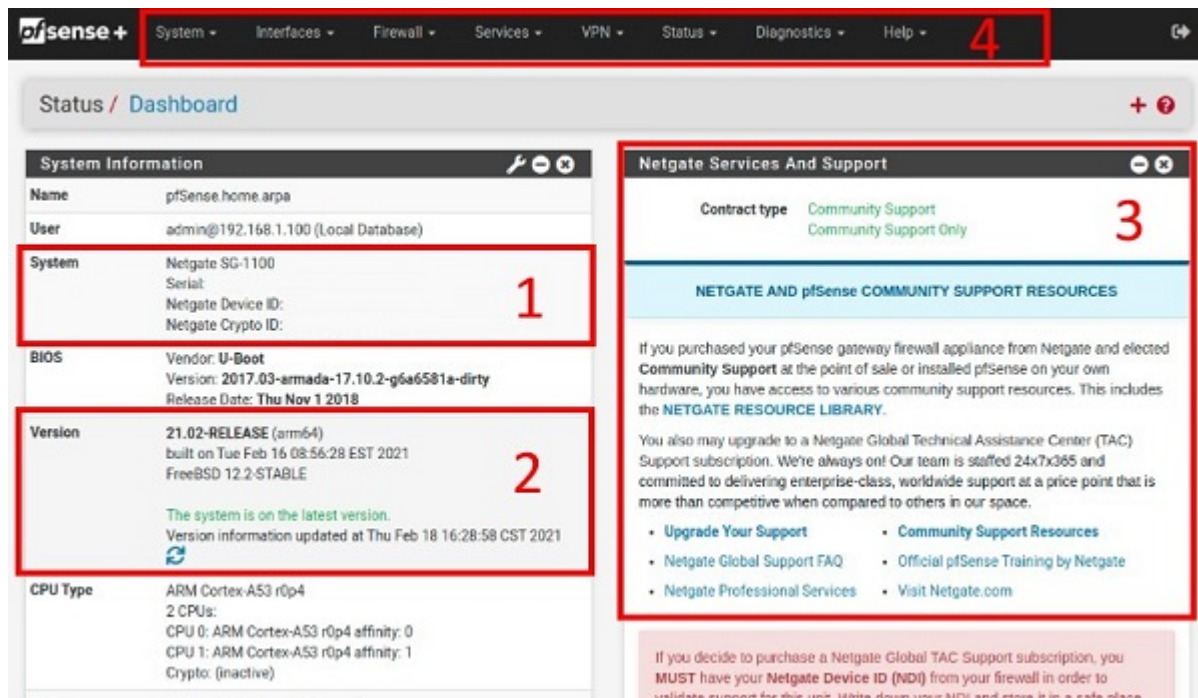


Fig. 8: The pfSense® Plus Dashboard

#### Section 1

Important system information such as the model, Serial Number, and Netgate Device ID for this Netgate firewall.

#### Section 2

Identifies what version of pfSense® Plus software is installed, and if an update is available.

#### Section 3

Describes Netgate Service and Support.

#### Section 4

Shows the various menu headings. Each menu heading has drop-down options for a wide range of configuration choices.

### 1.3.2 Re-running the Setup Wizard

To re-run the Setup Wizard, navigate to **System > Setup Wizard**.

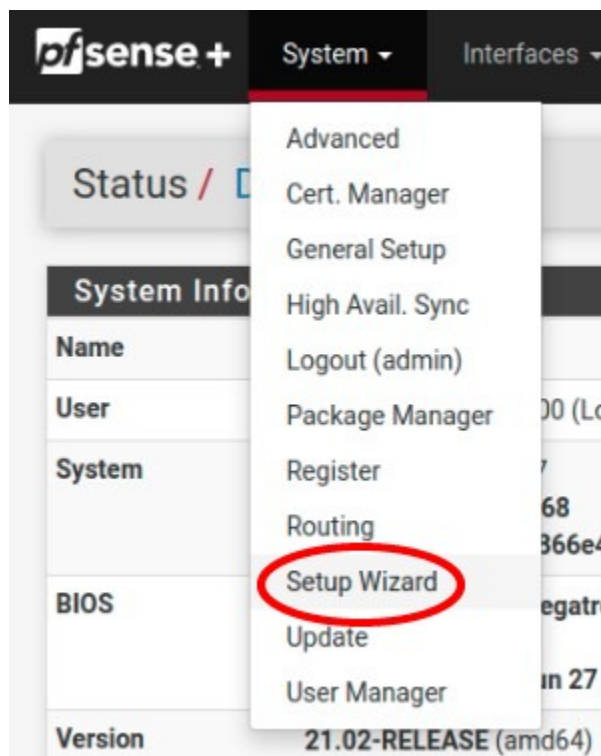


Fig. 9: Re-run the Setup Wizard

### 1.3.3 Backup and Restore

It is important to back up the firewall configuration prior to updating or making any configuration changes. From the menu at the top of the page, browse to **Diagnostics > Backup/Restore**.

Click **Download configuration** as **XML** and save a copy of the firewall configuration to the computer connected to the Netgate firewall.

This backup (or any backup) can be restored from the same screen by choosing the backed up file under **Restore Configuration**.

---

**Note:** Auto Config Backup is a built-in service located at **Services > Auto Config Backup**. This service will save up to 100 encrypted backup files automatically, any time a change to the configuration has been made. Visit the [Auto Config Backup](#) page for more information.

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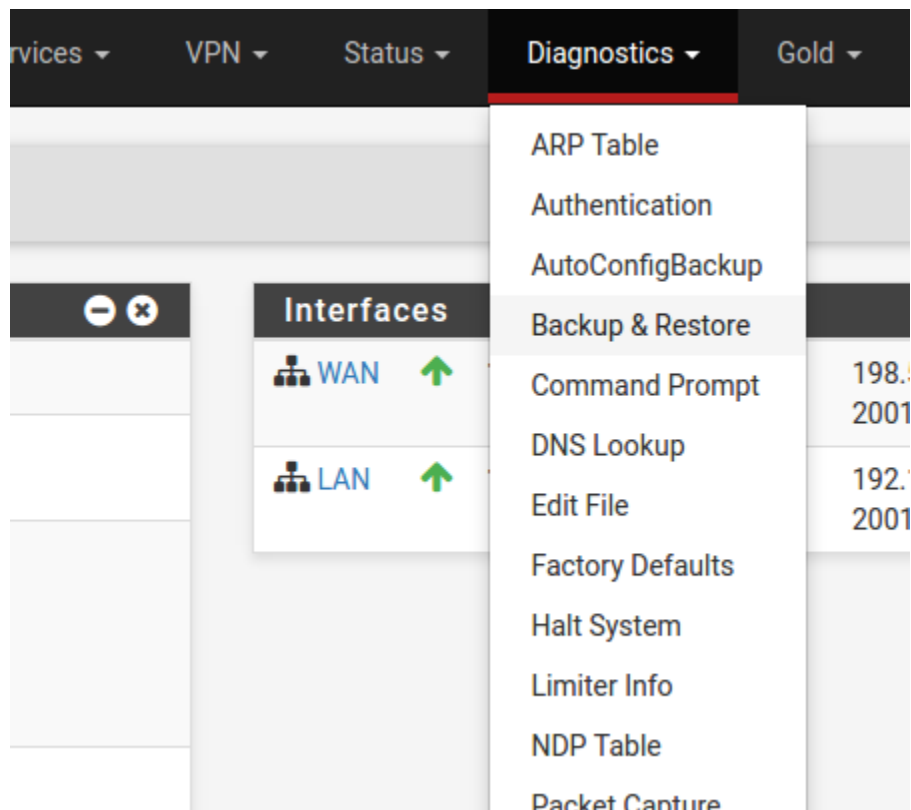


Fig. 10: Backup &amp; Restore

Backup & Restore    Config History

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### Backup Configuration

Backup area	All ▼
Skip packages	<input type="checkbox"/> Do not backup package information.
Skip RRD data	<input checked="" type="checkbox"/> Do not backup RRD data (NOTE: RRD Data can consume 4+ megabytes of config.xml space!)
Encryption	<input type="checkbox"/> Encrypt this configuration file.

[Download configuration as XML](#)

Fig. 11: Click Download configuration as XML

### 1.3.4 Connecting to the Console

There are times when accessing the console is required. Perhaps GUI console access has been locked out, or the password has been lost or forgotten.

**See also:**

*Connecting to the USB Console.* Cable is required.

---

**Tip:** To learn more about getting the most out of a Netgate appliance, sign up for a [pfSense Plus Software Training](#) course or browse the extensive [Resource Library](#).

---

### 1.3.5 Updates

When a new version of pfSense Plus software is available, the device will indicate the availability of the new version on the System Information dashboard widget. Users can perform a manual check as well by visiting **System > Update**.

Users can initiate an upgrade from the **System > Update** page as needed.

For more information, see the [Upgrade Guide](#).

## 1.4 Input and Output Ports

### 1.4.1 Rear Side



Fig. 12: Rear side view of the Netgate 3100 Firewall Appliance  
The items in this image are described by entries in *Routed Ethernet*, *Switched Ethernet*, and *Other Ports*.

#### Routed Ethernet

Interface Name	Port Name	Port Type
WAN	mvneta2	RJ-45
OPT1	mvneta0	RJ-45



Table 1: RJ-45 LEDs Configuration

LED Pattern	Description
Left LED only green	Flashes with <b>1Gb</b> traffic, solid with link.
Both LEDs green	Both flash with <b>100Mb</b> traffic, solid with link.
Right LED only green	Flashes with <b>10Mb</b> traffic, solid with link.

## Switched Ethernet

Interface Name	Port Name	Port Type
LAN1	mvneta1	RJ-45
LAN2	mvneta1	RJ-45
LAN3	mvneta1	RJ-45
LAN4	mvneta1	RJ-45

The four LAN Ethernet ports are switched ports. By default, all of these ports act as a single switch uplinked to the LAN interface on the firewall.

---

**Note:** For more details on how the switch operates, see [Switch Overview](#).

For instructions on how to configure the switch see [Configuring the Switch Ports](#).

---

Table 2: RJ-45 LEDs Configuration

LED Pattern	Description
Both LEDs green	Left Flashes with <b>1 Gb</b> traffic, solid with link.
Left LED only green	Left flashes with <b>100 Mb</b> traffic, solid with link.
Right LED only green	Left Flashes with <b>10 Mb</b> traffic, solid with link.

---

**Note:** Prior to pfSense® software version 2.4.3, the switched Ethernet ports on the SG-3100 did not negotiate auto MDI-X and required crossover cable unless the client-side connection was compatible with auto MDI-X. This was resolved with 2.4.3 and later versions and a crossover cable is no longer required.

---

**Warning:** The LAN ports do not implement the Spanning Tree Protocol (STP). Two or more ports connected to another Layer 2 switch, or connected to 2 or more different interconnected switches, could create a flooding loop between the switches. This can cause the router to stop functioning until the loop is resolved.

## Other Ports

1. Power
  - 12VDC 3.33A with threaded locking connector
  - Power Consumption 5W (idle)
2. Recessed Reset Button (performs a hard reset, immediately turning the system off)
3. USB 3.0 Port
4. Micro SIM
5. *Mini-USB Serial Console*

**Warning:** A hard reset of the system *could* cause data corruption and should be avoided. Halt or reboot the system through the console menu or the GUI to avoid data corruption.

## USB Ports

USB ports on the device can be used for a variety of purposes.

The primary use for the USB ports is to install or reinstall the operating system on the device. Beyond that, there are numerous USB devices which can expand the base functionality of the hardware, including some implemented by add-on packages. For example, UPS/Battery Backups, Cellular modems, GPS units, and storage devices. Though the operating system also includes drivers for wired and wireless USB network devices, these are not ideal and should be avoided.

### 1.4.2 Front Side



Fig. 13: Front view of the Netgate 3100 Firewall Appliance

## LED Patterns

Description	LED Pattern
Boot in Process	Circle, then square, then diamond all rapidly flash blue
Boot Completed/Ready	Diamond slowly flashes blue
Upgrade Available	Square slowly flashes orange
Upgrade in Progress	Square slowly flashes orange

## 1.5 Hardware Specifications



Category	Description
CPU	ARM v7 Cortex-A9 @ 1.6 GHz with NEON SIMD and FPU
CPU Cores	Dual Core
Networking	Two 1 Gigabit Ethernet Ports, configured as dual WAN or one WAN one LAN plus four-port 1 Gbps Marvell 88E6141 switch, uplinked at 2.5 Gbps to the third port on the SoC for LAN.
Storage	8 GB eMMC Flash onboard, upgradable to 32 GB M.2 SATA SSD
Memory	2 GB DDR4L
Expansion	2x M.2 'B' key sockets (SSD, LTE) 1x M.2 'E' key socket (2230 form factor) for WiFi / Bluetooth 1x miniPCIe (WiFi) microSIM
Console Port	MiniUSB (console cable included)
USB Ports	1x 3.0 port
LED	3 user-controllable full-color RGB LEDs
Enclosure	Desktop 1.56" tall x 7" deep x 8" wide
Form Factor	Standard mini-ITX 170mm x 170mm
Cooling	Passive (no fan)
Power	External ITE P/S AC/DC 100-240V, 50-60 Hz, 12V 3.33A,

## 1.6 Safety and Legal

### 1.6.1 Safety Notices

1. Read, follow, and keep these instructions.
2. Heed all warnings.
3. Only use attachments/accessories specified by the manufacturer.

**Warning:** Do not use this product in location that can be submerged by water.

**Warning:** Do not use this product during an electrical storm to avoid electrical shock.

### 1.6.2 Electrical Safety Information

1. Compliance is required with respect to voltage, frequency, and current requirements indicated on the manufacturer's label. Connection to a different power source than those specified may result in improper operation, damage to the equipment or pose a fire hazard if the limitations are not followed.
2. There are no operator serviceable parts inside this equipment. Service should be provided only by a qualified service technician.
3. This equipment is provided with a detachable power cord which has an integral safety ground wire intended for connection to a grounded safety outlet.
  - a) Do not substitute the power cord with one that is not the provided approved type. If a 3 prong plug is provided, never use an adapter plug to connect to a 2-wire outlet as this will defeat the continuity of the grounding wire.
  - b) The equipment requires the use of the ground wire as a part of the safety certification, modification or misuse can provide a shock hazard that can result in serious injury or death.
  - c) Contact a qualified electrician or the manufacturer if there are questions about the installation prior to connecting the equipment.
  - d) Protective grounding/earthing is provided by Listed AC adapter. Building installation shall provide appropriate short-circuit backup protection.
  - e) Protective bonding must be installed in accordance with local national wiring rules and regulations.

**Warning:** To help protect your Netgate appliance from sudden, transient increases and decreases in electrical power, use a surge suppressor, line conditioner, uninterruptible power supply (UPS) or a combination of those devices.

Failure to take such precautions could result in premature failure, and/or damage to your Netgate appliance, which is not covered under the product warranty. Such an event may also present the risk of electric shock, fire, or explosion.

### 1.6.3 FCC Compliance

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

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**Note:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment.

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### 1.6.4 Industry Canada

This Class B digital apparatus complies with Canadian ICES-3(B). Cet appareil numérique de la classe B est conforme à la norme NMB-3(B) Canada.

### 1.6.5 Australia and New Zealand

This is an AMC Compliance level 2 product. This product is suitable for domestic environments.

### 1.6.6 CE Marking

CE marking on this product represents the product is in compliance with all directives that are applicable to it.

### 1.6.7 RoHS/WEEE Compliance Statement

#### English

European Directive 2002/96/EC requires that the equipment bearing this symbol on the product and/or its packaging must not be disposed of with unsorted municipal waste. The symbol indicates that this product should be disposed of separately from regular household waste streams. It is your responsibility to dispose of this and other electric and electronic equipment via designated collection facilities appointed by the government or local authorities. Correct disposal and recycling will help prevent potential negative consequences to the environment and human health. For more detailed information about the disposal of your old equipment, please contact your local authorities, waste disposal service, or the shop where you purchased the product.

#### Deutsch

Die Europäische Richtlinie 2002/96/EC verlangt, dass technische Ausrüstung, die direkt am Gerät und/oder an der Verpackung mit diesem Symbol versehen ist, nicht zusammen mit unsortiertem Gemeindeabfall entsorgt werden darf. Das Symbol weist darauf hin, dass das Produkt von regulärem Haushaltsmüll getrennt entsorgt werden sollte. Es liegt in Ihrer Verantwortung, dieses Gerät und andere elektrische und elektronische Geräte über die dafür zuständigen und von der Regierung oder örtlichen Behörden dazu bestimmten Sammelstellen zu entsorgen. Ordnungsgemäßes Entsorgen und Recyceln trägt dazu bei, potentielle negative Folgen für Umwelt und die menschliche Gesundheit zu vermeiden. Wenn Sie weitere Informationen zur Entsorgung Ihrer Altgeräte benötigen, wenden Sie sich bitte an die örtlichen Behörden oder städtischen Entsorgungsdienste oder an den Händler, bei dem Sie das Produkt erworben haben.

## Español

La Directiva 2002/96/CE de la UE exige que los equipos que lleven este símbolo en el propio aparato y/o en su embalaje no deben eliminarse junto con otros residuos urbanos no seleccionados. El símbolo indica que el producto en cuestión debe separarse de los residuos domésticos convencionales con vistas a su eliminación. Es responsabilidad suya desechar este y cualesquiera otros aparatos eléctricos y electrónicos a través de los puntos de recogida que ponen a su disposición el gobierno y las autoridades locales. Al desechar y reciclar correctamente estos aparatos estará contribuyendo a evitar posibles consecuencias negativas para el medio ambiente y la salud de las personas. Si desea obtener información más detallada sobre la eliminación segura de su aparato usado, consulte a las autoridades locales, al servicio de recogida y eliminación de residuos de su zona o pregunte en la tienda donde adquirió el producto.

## Français

La directive européenne 2002/96/CE exige que l'équipement sur lequel est apposé ce symbole sur le produit et/ou son emballage ne soit pas jeté avec les autres ordures ménagères. Ce symbole indique que le produit doit être éliminé dans un circuit distinct de celui pour les déchets des ménages. Il est de votre responsabilité de jeter ce matériel ainsi que tout autre matériel électrique ou électronique par les moyens de collecte indiqués par le gouvernement et les pouvoirs publics des collectivités territoriales. L'élimination et le recyclage en bonne et due forme ont pour but de lutter contre l'impact néfaste potentiel de ce type de produits sur l'environnement et la santé publique. Pour plus d'informations sur le mode d'élimination de votre ancien équipement, veuillez prendre contact avec les pouvoirs publics locaux, le service de traitement des déchets, ou l'endroit où vous avez acheté le produit.

## Italiano

La direttiva europea 2002/96/EC richiede che le apparecchiature contrassegnate con questo simbolo sul prodotto e/o sull'imballaggio non siano smaltite insieme ai rifiuti urbani non differenziati. Il simbolo indica che questo prodotto non deve essere smaltito insieme ai normali rifiuti domestici. È responsabilità del proprietario smaltire sia questi prodotti sia le altre apparecchiature elettriche ed elettroniche mediante le specifiche strutture di raccolta indicate dal governo o dagli enti pubblici locali. Il corretto smaltimento ed il riciclaggio aiuteranno a prevenire conseguenze potenzialmente negative per l'ambiente e per la salute dell'essere umano. Per ricevere informazioni più dettagliate circa lo smaltimento delle vecchie apparecchiature in Vostro possesso, Vi invitiamo a contattare gli enti pubblici di competenza, il servizio di smaltimento rifiuti o il negozio nel quale avete acquistato il prodotto.

## 1.6.8 Declaration of Conformity

### Česky[Czech]

NETGATE tímto prohlašuje, e tento NETGATE device, je ve shod se základními požadavky a dle příslušných ustanovení směrnice 1999/5/ES.

### Dansk [Danish]

Undertegnede NETGATE erklærer herved, at følgende udstyr NETGATE device, overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.

### Nederlands [Dutch]

Hierbij verklaart NETGATE dat het toestel NETGATE device, in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG. Bij deze verklaart NETGATE dat deze NETGATE device, voldoet aan de essentiële eisen en aan de overige relevante bepalingen van Richtlijn 1999/5/EC.

### English

Hereby, NETGATE , declares that this NETGATE device, is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

### Eesti [Estonian]

Käesolevaga kinnitab NETGATE seadme NETGATE device, vastavust direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.

### Suomi [Finnish]

NETGATE vakuuttaa täten että NETGATE device, tyypinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen. Français [French] Par la présente NETGATE déclare que l'appareil Netgate, device est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE.

### Deutsch [German]

Hiermit erklärt Netgate, dass sich diese NETGATE device, in Übereinstimmung mit den grundlegenden Anforderungen und den anderen relevanten Vorschriften der Richtlinie 1999/5/EG befindet". (BMW)

### Ελληνικά [Greek]

ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ ΝΕΤΓΑΤΕ ΔΗΛΩΝΕΙ ΟΤΙ ΝΕΤΓΑΤΕ device, ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΠΙΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1995/5/ΕΚ.

### Magyar [Hungarian]

Alulírott, NETGATE nyilatkozom, hogy a NETGATE device, megfelel a vonatkozó alapvető követelményeknek és az 1999/5/EC irányelv egyéb előírásainak.

### Íslenska [Icelandic]

Hér me l sir NETGATE yfir ví a NETGATE device, er í samræmi við grunnkröfur og a rar kröfur, sem ger ar eru í tilskipun 1999/5/EC.



**Italiano [Italian]**

Con la presente NETGATE dichiara che questo NETGATE device, è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.

**Latviski [Latvian]**

Ar o NETGATE deklar , ka NETGATE device, atbilst Direkt vas 1999/5/EK b tiskaj m pras b m un citiem ar to saist tajiem noteikumiem.

**Lietuviškai [Lithuanian]**

NETGATE deklaruoja, kad šis NETGATE įrenginys atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas.

**Malti [Maltese]**

Hawnhekk, Netgate, jiddikjara li dan NETGATE device, jikkonforma mal- ti ijjiet essenzjali u ma provvedimenti o rajn rilevanti li hemm fid-Dirrettiva 1999/5/EC.

**Norsk [Norwegian]**

NETGATE erklærer herved at utstyret NETGATE device, er i samsvar med de grunnleggende krav og øvrige relevante krav i direktiv 1999/5/EF.

**Slovensky [Slovak]**

NETGATE t mto vyhlasuje, e NETGATE device, sp a základné po iadavky a v etky príslu né ustanovenia Smernice 1999/5/ES.

**Svenska [Swedish]**

Härmed intygar NETGATE att denna NETGATE device, står I överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.

**Español [Spanish]**

Por medio de la presente NETGATE declara que el NETGATE device, cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.

**Polski [Polish]**

Niniejszym, firma NETGATE o wiadcza, e produkt serii NETGATE device, spełnia zasadnicze wymagania i inne istotne postanowienia Dyrektywy 1999/5/EC.

**Português [Portuguese]**

NETGATE declara que este NETGATE device, está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.

**Română [Romanian]**

Prin prezenta, NETGATE declară că acest dispozitiv NETGATE este în conformitate cu cerințele esențiale și alte prevederi relevante ale Directivei 1999/5/CE.

**1.6.9 Disputes**

ANY DISPUTE OR CLAIM RELATING IN ANY WAY TO YOUR USE OF ANY PRODUCTS/SERVICES, OR TO ANY PRODUCTS OR SERVICES SOLD OR DISTRIBUTED BY RCL OR ESF WILL BE RESOLVED BY BINDING ARBITRATION IN AUSTIN, TEXAS, RATHER THAN IN COURT. The Federal Arbitration Act and federal arbitration law apply to this agreement.

THERE IS NO JUDGE OR JURY IN ARBITRATION, AND COURT REVIEW OF AN ARBITRATION AWARD IS LIMITED. HOWEVER, AN ARBITRATOR CAN AWARD ON AN INDIVIDUAL BASIS THE SAME DAMAGES AND RELIEF AS A COURT (INCLUDING INJUNCTIVE AND DECLARATORY RELIEF OR STATUTORY DAMAGES), AND MUST FOLLOW THE TERMS OF THESE TERMS AND CONDITIONS OF USE AS A COURT WOULD.

To begin an arbitration proceeding, you must send a letter requesting arbitration and describing your claim to the following:

Rubicon Communications LLC  
Attn.: Legal Dept.  
4616 West Howard Lane, Suite 900  
Austin, Texas 78728  
[legal@netgate.com](mailto:legal@netgate.com)

The arbitration will be conducted by the American Arbitration Association (AAA) under its rules. The AAA's rules are available at [www.adr.org](http://www.adr.org). Payment of all filing, administration and arbitrator fees will be governed by the AAA's rules.

We each agree that any dispute resolution proceedings will be conducted only on an individual basis and not in a class, consolidated or representative action. We also both agree that you or we may bring suit in court to enjoin infringement or other misuse of intellectual property rights.

### 1.6.10 Applicable Law

By using any Products/Services, you agree that the Federal Arbitration Act, applicable federal law, and the laws of the state of Texas, without regard to principles of conflict of laws, will govern these terms and conditions of use and any dispute of any sort that might arise between you and RCL and/or ESF. Any claim or cause of action concerning these terms and conditions or use of the RCL and/or ESF website must be brought within one (1) year after the claim or cause of action arises. Exclusive jurisdiction and venue for any dispute or claim arising out of or relating to the parties' relationship, these terms and conditions, or the RCL and/or ESF website, shall be with the arbitrator and/or courts located in Austin, Texas. The judgment of the arbitrator may be enforced by the courts located in Austin, Texas, or any other court having jurisdiction over you.

### 1.6.11 Site Policies, Modification, and Severability

Please review our other policies, such as our pricing policy, posted on our websites. These policies also govern your use of Products/Services. We reserve the right to make changes to our site, policies, service terms, and these terms and conditions of use at any time.

### 1.6.12 Miscellaneous

If any provision of these terms and conditions of use, or our terms and conditions of sale, are held to be invalid, void or unenforceable, the invalid, void or unenforceable provision shall be modified to the minimum extent necessary in order to render it valid or enforceable and in keeping with the intent of these terms and conditions. If such modification is not possible, the invalid or unenforceable provision shall be severed, and the remaining terms and conditions shall be enforced as written. Headings are for reference purposes only and in no way define, limit, construe or describe the scope or extent of such section. Our failure to act with respect to a breach by you or others does not waive our right to act with respect to subsequent or similar breaches. These terms and conditions set forth the entire understanding and agreement between us with respect to the subject matter hereof, and supersede any prior oral or written agreement pertaining thereto, except as noted above with respect to any conflict between these terms and conditions and our reseller agreement, if the latter is applicable to you.

### 1.6.13 Limited Warranty

#### **DISCLAIMER OF WARRANTIES AND LIMITATION OF LIABILITY**

THE PRODUCTS/SERVICES AND ALL INFORMATION, CONTENT, MATERIALS, PRODUCTS (INCLUDING SOFTWARE) AND OTHER SERVICES INCLUDED ON OR OTHERWISE MADE AVAILABLE TO YOU THROUGH THE PRODUCTS/SERVICES ARE PROVIDED BY US ON AN "AS IS" AND "AS AVAILABLE" BASIS, UNLESS OTHERWISE SPECIFIED IN WRITING. WE MAKE NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, AS TO THE OPERATION OF THE PRODUCTS/SERVICES, OR THE INFORMATION, CONTENT, MATERIALS, PRODUCTS (INCLUDING SOFTWARE) OR OTHER SERVICES INCLUDED ON OR OTHERWISE MADE AVAILABLE TO YOU THROUGH THE PRODUCTS/SERVICES, UNLESS OTHERWISE SPECIFIED IN WRITING. YOU EXPRESSLY AGREE THAT YOUR USE OF THE PRODUCTS/SERVICES IS AT YOUR SOLE RISK.

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## HOW-TO GUIDES

### 2.1 Connecting to the USB Console

This guide shows how to access the serial console which can be used for troubleshooting and diagnostics tasks as well as some basic configuration.

There are times when directly accessing the console is required. Perhaps GUI or SSH access has been locked out, or the password has been lost or forgotten.

#### 2.1.1 USB Serial Console Device

This device uses a **Silicon Labs CP210x USB-to-UART Bridge** which provides access to the console. This device is exposed via the **USB Mini-B (5-pin)** port on the appliance.

##### Install the Driver

If needed, install an appropriate **Silicon Labs CP210x USB to UART Bridge** driver on the workstation used to connect with the device.

##### Windows

There are drivers available for Windows [available for download](#).

##### macOS

There are drivers available for macOS [available for download](#).

For macOS, choose the **CP210x VCP Mac** download.

##### Linux

There are drivers available for Linux [available for download](#).

##### FreeBSD

Recent versions of FreeBSD include this driver and will not require manual installation.

## Connect a USB Cable

Next, connect to the console port using the cable that has a **USB Mini-B (5-pin)** connector on one end and a **USB Type A** plug on the other end.

Gently push the **USB Mini-B (5-pin)** plug end into the console port on the appliance and connect the **USB Type A** plug into an available USB port on the workstation.

---

**Tip:** Be certain to gently push in the **USB Mini-B (5-pin)** connector on the device side completely. With most cables there will be a tangible “click”, “snap”, or similar indication when the cable is fully engaged.

---

## Apply Power to the Device

On some hardware, the USB serial console port may not be detected by the client operating system until the device is plugged into a power source.

If the client OS does not detect the USB serial console port, connect the power cord to the device to allow it to start booting.

If the USB serial console port appears without power applied to the device, then the best practice is to wait until the terminal is open and connected to the serial console before powering on the device. That way the client can view the entire boot output.

## Locate the Console Port Device

The appropriate console port device that the workstation assigned as the serial port must be located before attempting to connect to the console.

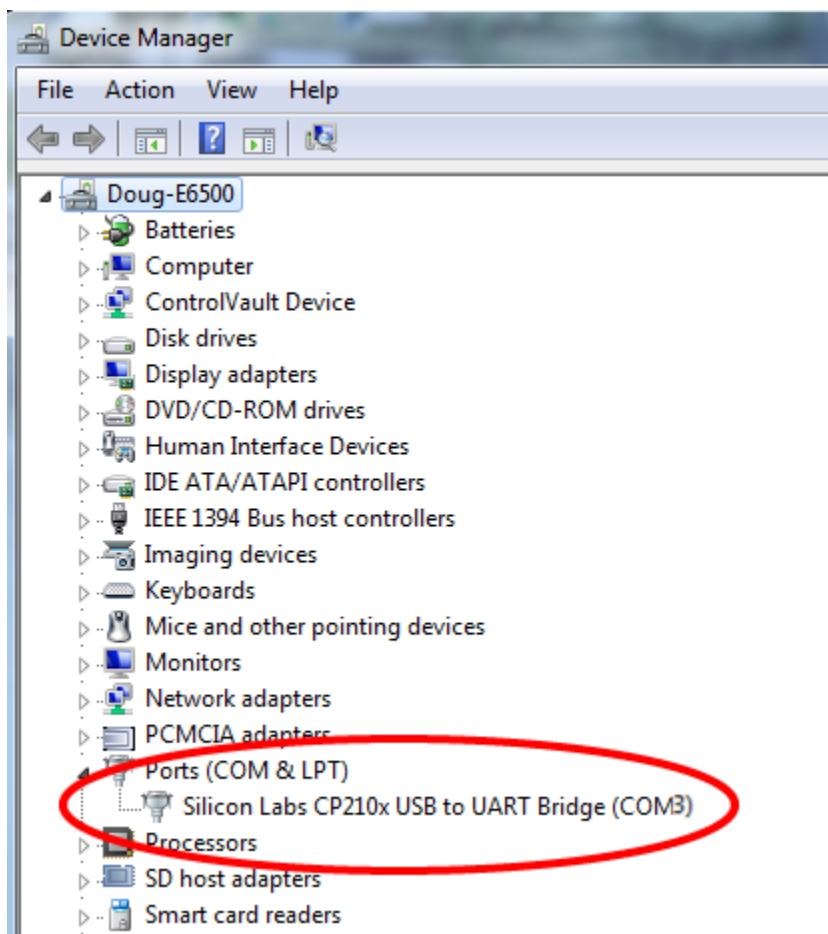
---

**Note:** Even if the serial port was assigned in the BIOS, the workstation OS may remap it to a different COM Port.

---

### Windows

To locate the device name on Windows, open **Device Manager** and expand the section for **Ports (COM & LPT)**. Look for an entry with a title such as **Silicon Labs CP210x USB to UART Bridge**. If there is a label in the name that contains COMX where X is a decimal digit (e.g. COM3), that value is what would be used as the port in the terminal program.



#### macOS

The device associated with the system console is likely to show up as, or start with, `/dev/cu.usbserial-<id>`.

Run `ls -l /dev/cu.*` from a Terminal prompt to see a list of available USB serial devices and locate the appropriate one for the hardware. If there are multiple devices, the correct device is likely the one with the most recent timestamp or highest ID.

#### Linux

The device associated with the system console is likely to show up as `/dev/ttyUSB0`. Look for messages about the device attaching in the system log files or by running `dmesg`.

---

**Note:** If the device does not appear in `/dev/`, see the note above in the driver section about manually loading the Linux driver and then try again.

---

#### FreeBSD

The device associated with the system console is likely to show up as `/dev/cuaU0`. Look for messages about the device attaching in the system log files or by running `dmesg`.

---

**Note:** If the serial device is not present, ensure the device has power and then check again.

---

## 2.1.2 Launch a Terminal Program

Use a terminal program to connect to the system console port. Some choices of terminal programs:

Windows

For Windows the best practice is to run *PuTTY on Windows* or *SecureCRT*. An example of how to configure PuTTY is below.

**Warning:** Do not use **HyperTerminal**.

macOS

For macOS the best practice is to run GNU *screen*, or *cu*. An example of how to configure GNU *screen* is below.

Linux

For Linux the best practices are to run GNU *screen*, *PuTTY on Linux*, *minicom*, or *dterm*. Examples of how to configure PuTTY and GNU *screen* are below.

FreeBSD

For FreeBSD the best practice is to run GNU *screen* or *cu*. An example of how to configure GNU *screen* is below.

### Client-Specific Examples

#### PuTTY on Windows

- Open PuTTY and select **Session** under **Category** on the left-hand side.
- Set the **Connection type** to **Serial**
- Set **Serial line** to the *console port determined previously*
- Set the **Speed** to 115200 bits per second.
- Click the **Open** button

PuTTY will then display the console.

#### PuTTY on Linux

- Open PuTTY from a terminal by typing `sudo putty`

**Note:** The `sudo` command will prompt for the local workstation password of the current account.

- Set the **Connection type** to **Serial**
- Set **Serial line** to `/dev/ttyUSB0`
- Set the **Speed** to 115200 bits per second
- Click the **Open** button

PuTTY will then display the console.



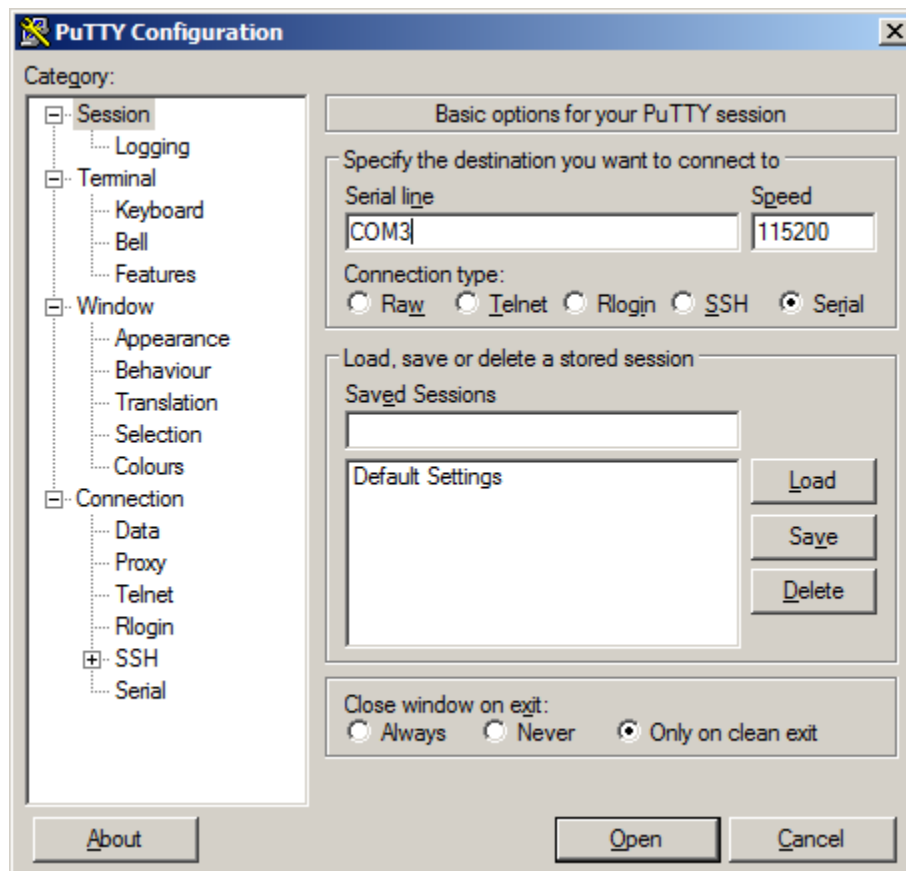


Fig. 1: An example of using PuTTY on Windows

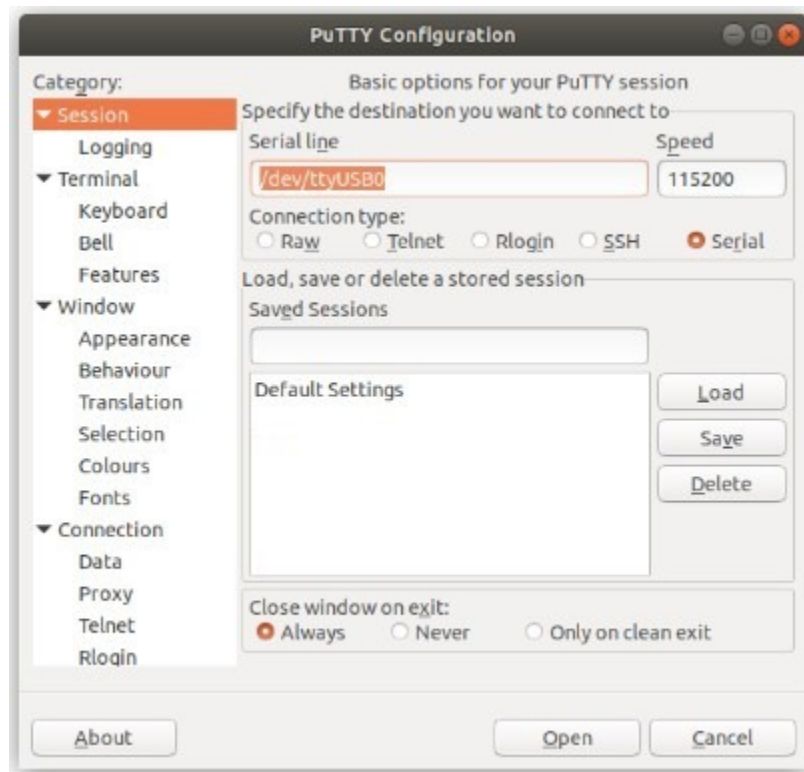


Fig. 2: An example of using PuTTY on Linux

## GNU screen

In many cases `screen` may be invoked simply by using the proper command line, where `<console-port>` is the console port that was located above.

```
$ sudo screen <console-port> 115200
```

---

**Note:** The `sudo` command will prompt for the local workstation password of the current account.

---

If portions of the text are unreadable but appear to be properly formatted, the most likely culprit is a character encoding mismatch in the terminal. Adding the `-U` parameter to the `screen` command line arguments forces it to use UTF-8 for character encoding:

```
$ sudo screen -U <console-port> 115200
```

## Terminal Settings

The settings to use within the terminal program are:

**Speed**

115200 baud, the speed of the BIOS

**Data bits**

8

**Parity**

None

**Stop bits**

1

**Flow Control**

Off or XON/OFF.

**Warning:** Hardware flow control (RTS/CTS) **must** be disabled.

## Terminal Optimization

Beyond the required settings there are additional options in terminal programs which will help input behavior and output rendering to ensure the best experience. These settings vary location and client, and may not be available in all clients or terminals.

These are:

**Terminal Type**

xterm

This setting may be under Terminal, Terminal Emulation, or similar areas.

**Color Support**

ANSI colors / 256 Color / ANSI with 256 Colors

This setting may be under Terminal Emulation, Window Colors, Text, Advanced Terminfo, or similar areas.

**Character Set / Character Encoding**

UTF-8

This setting may be under Terminal Appearance, Window Translation, Advanced International, or similar areas. In GNU screen this is activated by passing the -U parameter.

**Line Drawing**

Look for and enable setting such as “Draw lines graphically”, “Use Unicode graphics characters”, and/or “Use Unicode line drawing code points”.

These settings may be under Terminal Appearance, Window Translation, or similar areas.

**Function Keys / Keypad**

Xterm R6

In Putty this is under **Terminal > Keyboard** and is labeled **The Function Keys and Keypad**.

**Font**

For the best experience, use a modern monospaced Unicode font such as DejaVu Sans Mono, Liberation Mono, Monaco, Consolas, Fira Code, or similar.

This setting may be under Terminal Appearance, Window Appearance, Text, or similar areas.

### 2.1.3 What's Next?

After connecting a terminal client, it may not immediately see any output. This could be because the device has already finished booting, or it may be that the device is waiting for some other input.

If the device does not yet have power applied, plug it in and monitor the terminal output.

If the device is already powered on, try pressing **Space**. If there is still no output, press **Enter**. If the device was booted, it may re-display the console menu or login prompt, or produce other output indicating its status.

From the console, a variety of things are possible, such as changing interface addresses. There is a [full explanation of every console menu option in the pfSense software documentation](#).

### 2.1.4 Troubleshooting

#### Serial Device Missing

With a USB serial console there are a few reasons why the serial port may not be present in the client operating system, including:

##### No Power

Some models require power before the client can connect to the USB serial console.

##### USB Cable Not Plugged In

For USB consoles, the USB cable may not be fully engaged on both ends. Gently, but firmly, ensure the cable has a good connection on both sides.

##### Bad USB Cable

Some USB cables are not suitable for use as data cables. For example, some cables are only capable of delivering power for charging devices and not acting as data cables. Others may be of low quality or have poor or worn connectors.

The ideal cable to use is the one that came with the device. Failing that, ensure the cable is of the correct type and specifications, and try multiple cables.

##### Wrong Device

In some cases there may be multiple serial devices available. Ensure the one used by the serial client is the correct one. Some devices expose multiple ports, so using the incorrect port may lead to no output or unexpected output.

##### Hardware Failure

There could be a hardware failure preventing the serial console from working. Contact Netgate TAC for assistance.

#### No Serial Output

If there is no output at all, check the following items:

##### USB Cable Not Plugged In

For USB consoles, the USB cable may not be fully engaged on both ends. Gently, but firmly, ensure the cable has a good connection on both sides.

##### Wrong Device

In some cases there may be multiple serial devices available. Ensure the one used by the serial client is the correct one. Some devices expose multiple ports, so using the incorrect port may lead to no output or unexpected output.

### Wrong Terminal Settings

Ensure the terminal program is configured for the correct speed. The default BIOS speed is 115200, and many other modern operating systems use that speed as well.

Some older operating systems or custom configurations may use slower speeds such as 9600 or 38400.

### Device OS Serial Console Settings

Ensure the operating system is configured for the proper console (e.g. `ttys1` in Linux). Consult the various operating installation guides on this site for further information.

### PuTTY has issues with line drawing

PuTTY generally handles most cases OK but can have issues with line drawing characters on certain platforms.

These settings seem to work best (tested on Windows):

#### Window

**Columns x Rows**  
80x24

#### Window > Appearance

**Font**  
*Courier New 10pt or Consolas 10pt*

#### Window > Translation

**Remote Character Set**  
*Use font encoding or UTF-8*

**Handling of line drawing characters**  
*Use font in both ANSI and OEM modes or Use Unicode line drawing code points*

#### Window > Colours

**Indicate bolded text by changing**  
The colour

### Garbled Serial Output

If the serial output appears to be garbled, missing characters, binary, or random characters check the following items:

#### Flow Control

In some cases flow control can interfere with serial communication, causing dropped characters or other issues. Disabling flow control in the client can potentially correct this problem.

On PuTTY and other GUI clients there is typically a per-session option to disable flow control. In PuTTY, the **Flow Control** option is in the settings tree under **Connection**, then **Serial**.

To disable flow control in GNU Screen, add the `-ixon` and/or `-ixoff` parameters after the serial speed as in the following example:

```
$ sudo screen <console port> 115200,-ixon
```

#### Terminal Speed

Ensure the terminal program is configured for the correct speed. (See [No Serial Output](#))

#### Character Encoding

Ensure the terminal program is configured for the proper character encoding, such as **UTF-8** or **Latin-1**, depending on the operating system. (See [GNU Screen](#))

## Serial Output Stops After the BIOS

If serial output is shown for the BIOS but stops afterward, check the following items:

### Terminal Speed

Ensure the terminal program is configured for the correct speed for the installed operating system. (See [No Serial Output](#))

### Device OS Serial Console Settings

Ensure the installed operating system is configured to activate the serial console and that it is configured for the proper console (e.g. `ttys1` in Linux). Consult the various operating installation guides on this site for further information.

### Bootable Media

If booting from a USB flash drive, ensure that the drive was written correctly and contains a bootable operating system image.

## 2.2 Reinstalling pfSense Plus Software

1. Please [open a TAC ticket](#) to request access to the Plus firmware by selecting **Firmware Access** as the **General Problem** and then select **Netgate 3100** for the platform. Include the Netgate Device ID (NDI) and serial number in the ticket to expedite access.

Once the ticket is processed, the latest stable version of the firmware will be attached to the ticket, with a name such as:

`pfSense-plus-Netgate-3100-recovery-25.11.1-RELEASE-armv7.img.gz`

---

**Note:** pfSense® Plus is preinstalled on Netgate appliances, which is optimally tuned for Netgate hardware and contains features that cannot be found elsewhere, such as ZFS Boot Environments, OpenVPN DCO, and the [AWS VPC Wizard](#).

---

2. Write the image to a USB memstick (8GB or larger).

#### See also:

Locating the image and writing it to a USB memstick is covered in detail under [Writing Flash Drives](#).

---

**Tip:** Remove and reinsert the memstick and the workstation will see a FAT partition on the drive. Place a configuration backup file on this drive as `config.xml` to restore later using the External Configuration Locator.

---

3. [Connect to the console port](#) of the Netgate device.
4. Insert the memstick into the USB port and boot the system.

---

**Tip:** The best practice is to connect to the **console**, **turn off** the device gracefully by using the **Halt system** option from the console and removing power once the shutdown procedure completes, then **insert** the USB memstick and **boot** the device.

Starting the recovery process requires **interrupting the boot process** very soon after the boot process begins, so having an active console connection before booting is important.

---

5. When prompted, press any key to stop the autoboot process.

```

Board: Rogue-1
SoC:   MV88F6820 Rev A0
       running 2 CPUs
CPU:   ARM Cortex A9 MPCore (Rev 1) LE
       CPU 0
       CPU    @ 1600 [MHz]
       L2     @ 800 [MHz]
       TClock @ 250 [MHz]
       DDR4   @ 800 [MHz]
       DDR4 32 Bit Width, FastPath Memory Access, DLB Enabled, ECC Disabled
DRAM:  2 GiB
MMC:   mv_sdh: 0
DBG: Calling spi_flash_probe from env_relocate_spec()
SF: Probing bus 0 cs 0 @ 200000000Hz mode 3
SF: Detected N25Q128 with page size 64 KiB, total 16 MiB
PCI-e 0: Detected No Link.
PCI-e 1: Detected No Link.
USB2.0 0: Host Mode
USB3.0 1: Host Mode

Map:   Code:           0x7fedc000:0x7ff975a8
       BSS:           0x7ffef600
       Stack:         0x7f4cbf20
       Heap:          0x7f4cc000:0x7fedc000
       U-Boot Environment: 0x00100000:0x00110000 (SPI)

Board configuration detected:
Net:
| port | Interface | PHY address |
|-----|-----|-----|
| egiga0 | RGMII | 0x00 |
| egiga1 | RGMII | 0x01 |
| egiga2 | SGMII | In-Band |
egiga0 [PRIME], egiga1, egiga2
Hit any key to stop autoboot: 2

```

6. Type `run recovery` at the `Marvell>>` prompt and press `Enter`.

```

SoC:  MV88F6820 Rev A0
      running 2 CPUs
CPU:  ARM Cortex A9 MPCore (Rev 1) LE
      CPU 0
      CPU @ 1600 [MHz]
      L2 @ 800 [MHz]
      TClock @ 250 [MHz]
      DDR4 @ 800 [MHz]
      DDR4 32 Bit Width, FastPath Memory Access, DLB Enabled, ECC Disabled
DRAM:  2 GiB
MMC:   mv_sdh: 0
DBG: Calling spi_flash_probe from env_relocate_spec()
SF: Probing bus 0 cs 0 @ 200000000Hz mode 3
SF: Detected N25Q128 with page size 64 KiB, total 16 MiB
PCI-e 0: Detected No Link.
PCI-e 1: Detected No Link.
USB2.0 0: Host Mode
USB3.0 1: Host Mode

Map:   Code:           0x7fedc000:0x7ff975a8
      BSS:           0x7ffef600
      Stack:         0x7f4cbf20
      Heap:          0x7f4cc000:0x7fedc000
      U-Boot Environment: 0x00100000:0x00110000 (SPI)

Board configuration detected:
Net:
| port | Interface | PHY address |
|-----|-----|-----|
| egiga0 | RGMII | 0x00 |
| egiga1 | RGMII | 0x01 |
| egiga2 | SGMII | In-Band |
egiga0 [PRIME], egiga1, egiga2
Hit any key to stop autoboot: 0
Marvell>> run recovery

```

---

**Note:** If the device does not boot after issuing this command, enter `usb reset` and then try `run recovery` again. Some USB drives require an extra reset to fully initialize.

---

7. Enter the destination device or press the `Enter` key to accept the default value.

---

**Note:** The onboard eMMC flash memory is always `mmc0`. If an M.2 SATA drive is installed in either slot, it will be `ada0`.

---

**Warning:** Only one M.2 SATA slot can be populated with a storage device. The device is not capable of utilizing two M.2 SATA drives simultaneously.

8. Type `y` then press the `Enter` key to confirm the choice.
9. Wait for the installation to complete.
10. Once the installation has completed, remove the memstick, and cycle the power (unplug the Netgate 3100 and plug it back in) to reboot the Netgate 3100.



```
-main/obj/armv7/6wQk1ZIQ/var/jenkins/workspace/pfSense-Plus-snapshots-23_01-main
/sources/FreeBSD-src-plus-RELENG_23_01/arm.armv7/sys/ARMADA38X

Welcome to FreeBSD!

Release Notes, Errata: https://www.FreeBSD.org/releases/
Security Advisories:  https://www.FreeBSD.org/security/
FreeBSD Handbook:     https://www.FreeBSD.org/handbook/
FreeBSD FAQ:          https://www.FreeBSD.org/faq/
Questions List:       https://www.FreeBSD.org/lists/questions/
FreeBSD Forums:       https://forums.FreeBSD.org/

Documents installed with the system are in the /usr/local/share/doc/freebsd/
directory, or can be installed later with:  pkg install en-freebsd-doc
For other languages, replace "en" with a language code like de or fr.

Show the version of FreeBSD installed:  freebsd-version ; uname -a
Please include that output and any error messages when posting questions.
Introduction to manual pages:  man man
FreeBSD directory layout:      man hier

To change this login announcement, see motd(5).
Netgate 3100 firmware recovery
Serial: 1137170723

This will install the standard firmware and will erase all the existing
contents of the destination device permanently.

eMMC device: mmc0
M.2 device: ada0

Type the name of the destination device (mmc0,ada0) or press the Enter key to
install on mmc0: ada0
```

```
Questions List:      https://www.FreeBSD.org/lists/questions/
FreeBSD Forums:     https://forums.FreeBSD.org/

Documents installed with the system are in the /usr/local/share/doc/freebsd/
directory, or can be installed later with:  pkg install en-freebsd-doc
For other languages, replace "en" with a language code like de or fr.

Show the version of FreeBSD installed:  freebsd-version ; uname -a
Please include that output and any error messages when posting questions.
Introduction to manual pages:  man man
FreeBSD directory layout:      man hier

To change this login announcement, see motd(5).
Netgate 3100 firmware recovery
Serial: 1137170723

This will install the standard firmware and will erase all the existing
contents of the destination device permanently.

eMMC device: mmc0
M.2 device: ada0

Type the name of the destination device (mmc0,ada0) or press the Enter key to
install on mmc0: ada0

Selected M.2 device: ada0

Are you sure you want to continue ? (y/N) y

Erasing the M.2 contents...
Writing the firmware to M.2...
(this may take a few minutes to complete)
```

---

**Tip:** If the FAT partition on the memstick contains a configuration file to restore using the ECL method, leave the memstick plugged in while cycling the power.

---

```
stat: No such file or directory
Done!

The system will halt now, please power off and remove the firmware
recovery storage device.

Shutdown NOW!
shutdown: [pid 1150]

FreeBSD/arm (3100-recovery) (ttyu0)

Apr  6 13:21:00 3100-recovery shutdown[1150]: halt by root:
Stopping cron.
Waiting for PIDS: 1086.
Stopping devd.
Waiting for PIDS: 853.
Writing entropy file: .
Writing early boot entropy file: .
Terminated
.
Apr  6 13:21:01 3100-recovery syslogd: exiting on signal 15
Waiting (max 60 seconds) for system process `vnlrn' to stop... done
Waiting (max 60 seconds) for system process `syncer' to stop...
Syncing disks, vnodes remaining... 0 0 0 done
All buffers synced.
Uptime: 7m53s

The operating system has halted.
Power cycle or reset to reboot.
```

**See also:**

For information on restoring from a previously saved configuration, go to [Backup and Restore](#).

**Caution:** If this device contains multiple disks, such as when adding an SSD to an existing system which previously used MMC, additional steps may be necessary to ensure the device boots from and uses the correct disk. Furthermore, having separate installations of the software on different disks is a known source of problems. For example, the kernel could boot from one disk while the root filesystem is loaded from another, or they could contain conflicting ZFS pools.

In some cases it is possible to adjust the BIOS boot order to prefer the new disk, but the best practice is to wipe the old disk to remove any chance of the previous installation causing boot issues or conflicts.

For information on how to wipe the old disk, see [Multiple Disk Boot Issues](#).

## 2.3 M.2 SATA Installation

The SG-3100 has built-in onboard eMMC storage. Optionally, an M.2 SATA drive could be installed as an upgrade or to bypass the onboard eMMC flash memory.

**Warning: Before proceeding:**

1. Backup the configuration file, if possible.
2. Unplug the system for at least 60 seconds to ensure all phantom power has dissipated.
3. Anti-static protection must be used throughout this procedure.
4. Any hardware damage incurred during this procedure is **not covered** by the hardware warranty.

---

**Note:** pfSense® Plus must be reinstalled on the M.2 SATA drive. By default, the M.2 SATA drive will then be the first drive recognized by pfSense® Plus software.

---

---

**Note:** The SG-3100 is not compatible with NVMe drives.

---

The SG-3100 has two slots capable of installing M.2 SATA drives, **J10** and **J11**.

**J10**

The **J10** connector is for a 2280 (22mm x 80mm) M.2 SATA **only**.

The 80mm standoff cannot be moved.

**J11**

The **J11** connector is for a 2242 (22mm x 42mm) M.2 SATA drive, **or** it can be used for a cellular card in conjunction with a microSIM card.

The 42mm standoff is also permanent and cannot be moved.

---

**Note:** For more information on Cellular Configuration in pfSense® Plus software, please visit the [pfSense Documentation page](#).

---

This installation example uses the **J11** M.2 SATA slot with a 2242 M.2 SATA Drive. The procedures to install a 2280 M.2 SATA Drive in the **J10** slot is identical.

1. Turn the system over carefully to avoid scratching the top of the system. Remove the four (4) **T10 Torx** screws as indicated below.
2. Turn system upright and carefully remove the cover. Set the cover off to the side and keep it upright, so the top is not scratched. Identify where the M.2 SATA drive slot is located and remove the screw from the standoff.
3. After the screw has been removed, insert the M.2 SATA drive into the slot at about a 30° angle.

**Warning:** The M.2 SATA card is keyed. Do not force it into the slot.

4. Gently push down the M.2 SATA card and replace the screw into the standoff.
5. Place the cover back on and turn the SG-3100 over. Replace the four (4) **T10 Torx** case screws. Be careful not to cross thread the screws.

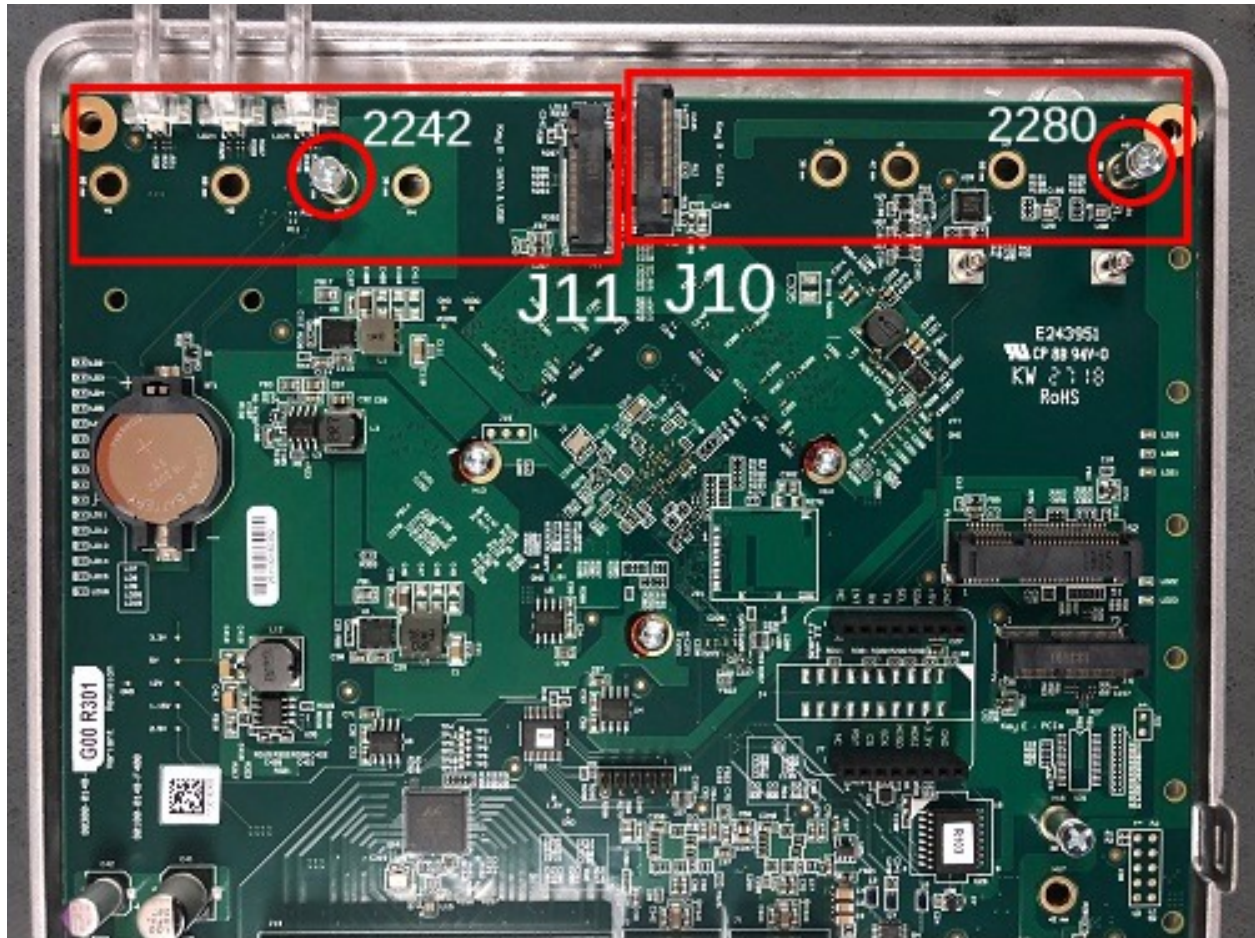


Fig. 3: SG-3100 M.2 SATA Locations





Fig. 4: Removing the SG-3100 Case Screws

6. Reinstall the pfSense® Plus software on the new M.2 SATA drive.

**See also:**

*Reinstalling pfSense Plus Software*

1. Ensure the system is set to boot from the M.2 disk.

When prompted, press any key to stop the autoboot process. This will present a **Marvell>>** prompt.

---

**Tip:** For assistance with this configuration, [open a TAC ticket](#).

---

- Run `printenv` and inspect the contents of the current environment for the contents of the `bootcmd` variable.

```
Marvell>> printenv
[...]
bootcmd=run setLED; run emmcboot;
[...]
```

---

**Tip:** Copy/paste or save the `printenv` output to a text file for future reference.

---

- If the `bootcmd` references `emmcboot`, it must be changed to `m2boot` instead:

```
Marvell>> setenv bootcmd 'run setLED; run m2boot;'
```

- Save the changes to the environment:

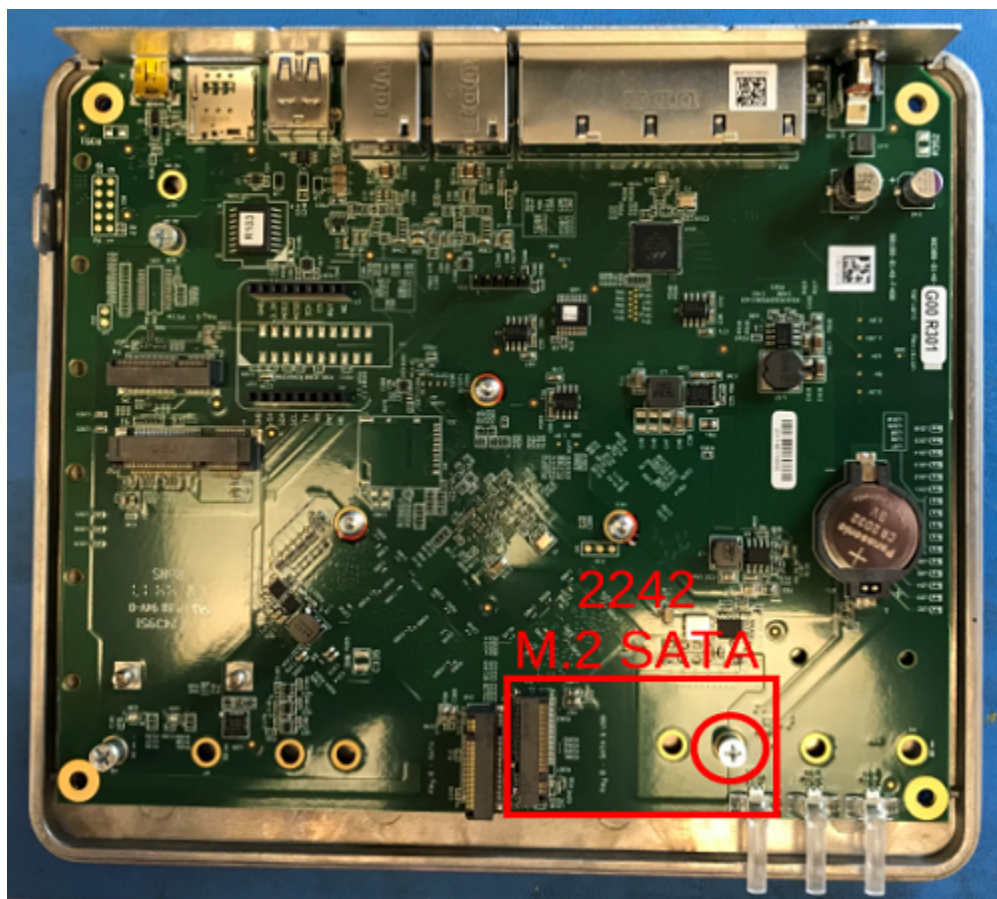


Fig. 5: M.2 SATA Location and Screw



Fig. 6: M.2 SATA Location and Screw Close-up





Fig. 7: Insert the M.2 SATA Drive at about a 30° Angle

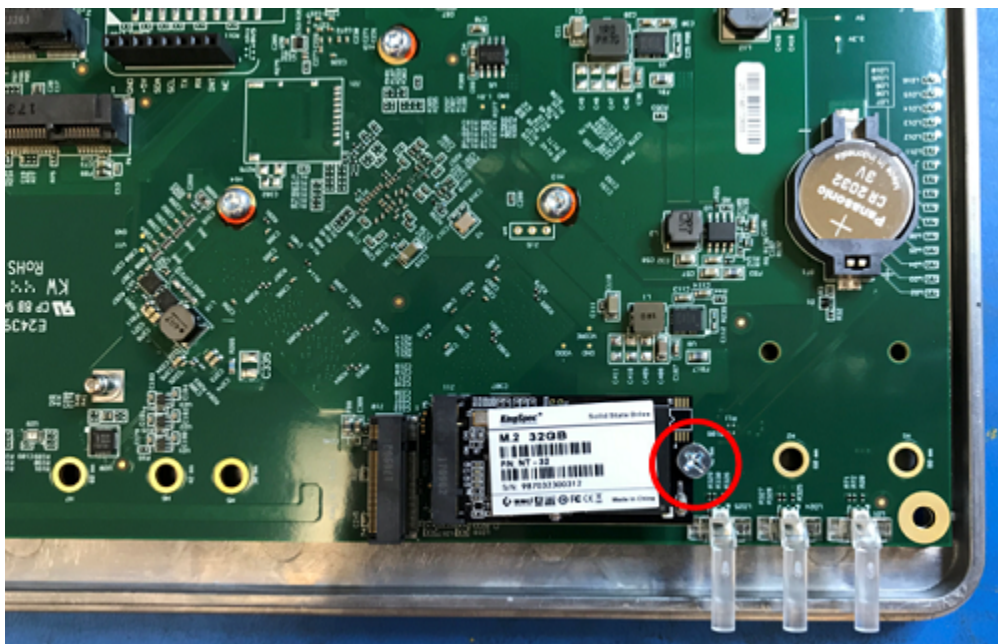


Fig. 8: The M.2 SATA Drive Installed



```
Marvell>> saveenv
```

- Now reboot the device again, and it should start from the M.2 disk:

```
Marvell>> reset
```

2. Restore the pfSense software configuration backup if one is available.

**See also:**

For information on restoring from a previously saved configuration, see [Backup and Restore](#).

**Warning:** When adding an SSD in this way the system will now contain multiple disks. If the eMMC still contains an active installation of an operating system, this can lead to problems. For example, the kernel could boot from one disk while the root filesystem is loaded from another.

Though the procedure above sets the device to boot from M.2, the best practice is to wipe the old disk to remove any chance of the previous installation causing boot issues or conflicts.

For information on how to wipe the old disk, see [Multiple Disk Boot Issues](#).

**Tip:** If the new drive is compatible with S.M.A.R.T. it may be possible to view detailed drive status information and run tests from **Diagnostics > S.M.A.R.T. Status**.

See [S.M.A.R.T. Hard Disk Status](#) for details.

## 2.4 Configuring the Switch Ports

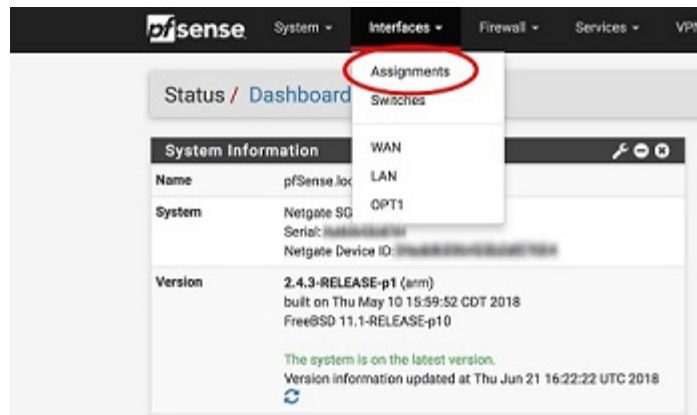
This optional guide shows the steps required to configure the 4 switched Ethernet ports as discrete ports.

The following attributes are used in this configuration guide but can be changed to suit other requirements:

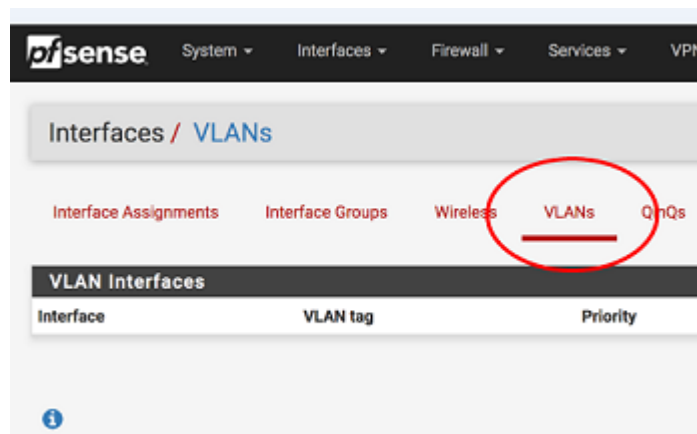
- SG-3100 Ethernet Port: **LAN4**
- IP Address Assignment: **192.168.100.1/24**
- VLAN Tag: **4084** (VLAN tags should be **4081-4084** for LAN Ports 1-4)

**Note:** When connecting to the GUI, do NOT connect to any port being configured during this procedure or the device will lose connectivity to the GUI.

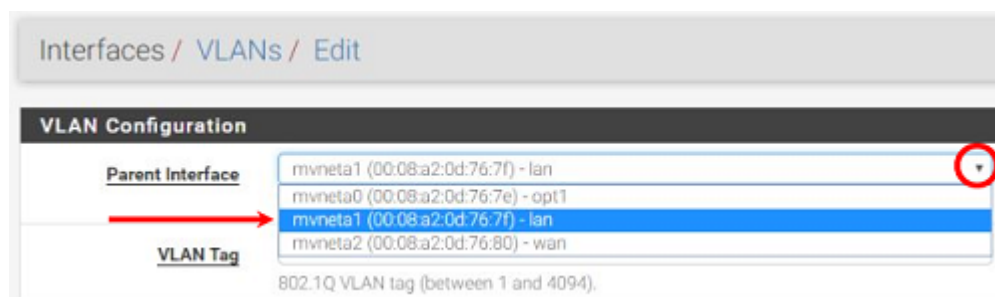
1. Open the pfSense® Plus software GUI and log in.
2. From the menu, navigate to **Interfaces > Assignments**.



3. Go to the VLANs tab.



4. In the lower right-hand corner of the screen, click + Add.
5. Choose **mvneta1 (MAC Address) - lan** from the **Parent Interface** drop-down menu.



6. Set the **VLAN Tag** to **4084**. Type **LAN port 4** as the **Description**. Click **Save**.

Interfaces / VLANs / Edit

### VLAN Configuration

**Parent Interface** mvneta1 (00:08:a2:0d:76:7f) - lan  
Only VLAN capable interfaces will be shown.

**VLAN Tag** 4084  
802.1Q VLAN tag (between 1 and 4094).

**VLAN Priority** 0  
802.1Q VLAN Priority (between 0 and 7).

**Description** Lan port 4  
A group description may be entered here for

**Save**

**Note:** This guide uses 4084 as an example. The value for the tags must be unique for each VLAN and must be between 1 and 4094. Avoid using values that are already in use. Best practice is not to use 1.

- Go to the **Interface Assignments** tab.
- Ensure **Available network ports:** is correct. It is *VLAN 4084 on mvneta1 - lan (LAN port 4)* in this example. Click on **+ Add**.

Interface Assignments | Interface Groups | Wireless | VLANs | QoS | PPPs | GREs | GIFs | Bridges | LAGGs

Interface	Network port
WAN	mvneta2 (00:08:a2:0d:76:80)
LAN	mvneta1 (00:08:a2:0d:76:7f) <span>Delete</span>
OPT1	mvneta0 (00:08:a2:0d:76:7e) <span>Delete</span>
Available network ports:	VLAN 4084 on mvneta1 - lan (LAN port 4) <span>+ Add</span>

**Save**

- Click on **OPT2**. This is the Interface that matches the new VLAN being created.

Interfaces / Interface Assignments

Interface has been added.

Interface Assignments   Interface Groups   Wireless   VLANs

Interface	Network port
WAN	mvneta2 (00:08:a2:0d:76:80)
LAN	mvneta1 (00:08:a2:0d:76:7f)
OPT1	mvneta0 (00:08:a2:0d:76:7e)
OPT2	VLAN 4084 on mvneta1 - lan (Lan port 4)

Save

10. Check the **Enable Interface** check-box.

11. Change the **IPv4 Configuration Type** from None to **Static IPv4**.

Interfaces / OPT2

General Configuration

Enable ☒ Enable interface

Description

Enter a description (name) for the interface here.

IPv4 Configuration Type

IPv6 Configuration Type

MAC Address

12. Scroll down and make the IPv4 Address 192.168.100.1/24 (in this example).

Static IPv4 Configuration

IPv4 Address  /

IPv4 Upstream gateway

+ Add a new gateway

13. Click **Save**.

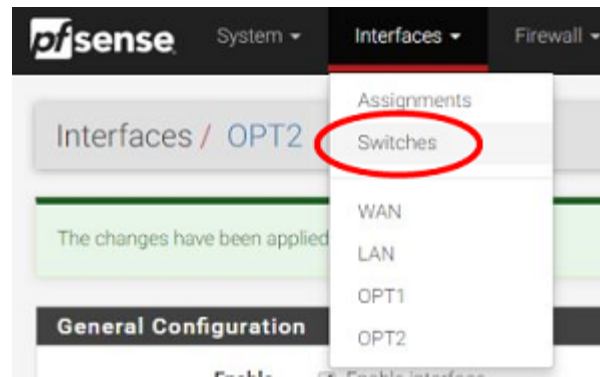
14. Click **Apply Changes**.

Interfaces / OPT2

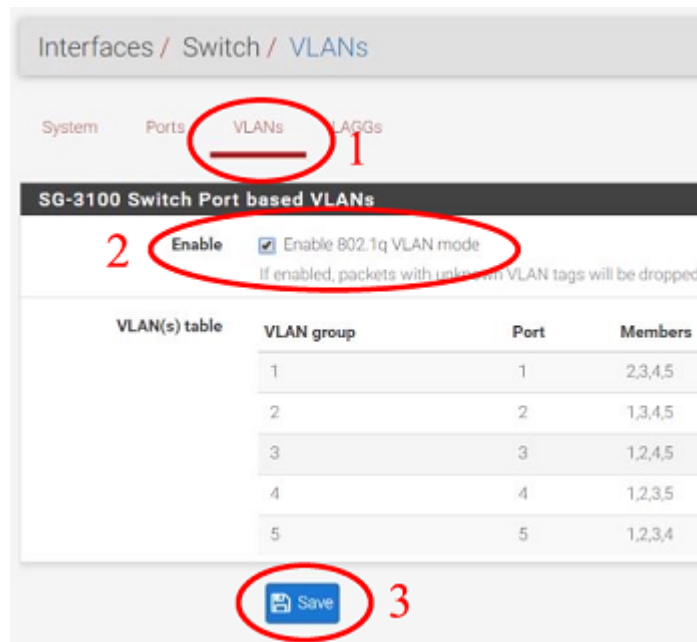
The OPT2 configuration has been changed.  
The changes must be applied to take effect.  
Don't forget to adjust the DHCP Server range if needed after applying.

Apply Changes

15. Go to **Interfaces > Switches**.



16. Go to the **VLANs** tab. Click in the **Enable 802.1q VLAN mode** check-box and click **Save**.



The table will change to reflect the new mode.

17. Click + **Add Tag**.

Interfaces / Switch / VLANs

System Ports **VLANs** LAGGs

**SG-3100 Switch 802.1Q VLANs**

**Enable** ☒ Enable 802.1q VLAN mode  
If enabled, packets with unknown VLAN tags

VLAN(s) table	VLAN group	VLAN tag
	0	1

18. Type 4084 for the **VLAN Tag** and 4 for **Member(s)**. This represents LAN4 (port 4) and tagged should be **unchecked**.

**Vlan properties**

VLAN tag   
Enter a VLAN ID number (that is not already in use.)

Description   
A description may be entered here for administrative reference (not parsed).

Member(s)  ☐ tagged

19. Click + **Add Member** to add the LAN Uplink, 5. This member should be **tagged** as shown.

Member(s)  ☐ tagged

☒ tagged

20. Click **Save**.

21. Click on  beside VLAN group 0.

**SG-3100 Switch 802.1Q VLANs**

**Enable** ☒ Enable 802.1q VLAN mode  
If enabled, packets with unknown VLAN tags will be dropped.

VLAN(s) table	VLAN group	VLAN tag	Members	Description	Action
	0	1	1,2,3,4,5	Default System VLAN	
	1	4084	4,5x		

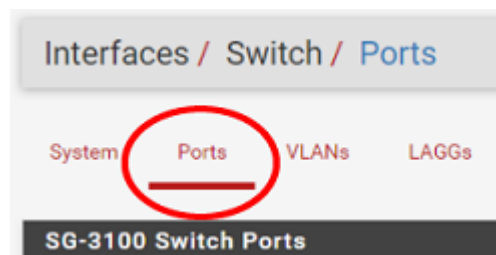
22. Click **Delete** beside Member(s) 4. This will remove LAN4 from this VLAN group.

Description:   
A description may be entered here for administrative reference (not parsed).

Member(s)		
<input type="text" value="1"/>	tagged	<input type="button" value="Delete"/>
<input type="text" value="2"/>	tagged	<input type="button" value="Delete"/>
<input type="text" value="3"/>	tagged	<input type="button" value="Delete"/>
<input type="text" value="4"/>	tagged	<input type="button" value="Delete"/>
<input type="text" value="5"/>	tagged	<input type="button" value="Delete"/>

23. Click **Save**.

24. Go to the **Ports** tab.



25. Click on **Port VID 1** beside **LAN4**. Backspace through 1 and insert 4084, the new VLAN ID.

SG-3100 Switch Ports				
Port #	Port name	Port VID	Flags	State
1	LAN 1	1		FORWARDING
2	LAN 2	1		FORWARDING
3	LAN 3	1		FORWARDING
4 →	LAN 4	4084		FORWARDING
5	LAN Uplink	1	HOST	FORWARDING

26. Click **Save**.

This completes the configuration of a discrete port on the SG-3100.

By default, all traffic is blocked. Create the appropriate [firewall rules](#) to allow the traffic. Go to **Firewall > Rules** and then the **OPT2** tab (in this example) to configure the firewall rules.

Enable DHCP if necessary by going to **Services > DHCP Server, OPT2** tab (for this example).

## 2.5 Configuring an OPT interface as an additional WAN

**Note:** The default configuration of the Netgate 3100 includes one assigned OPT port which is separate from the switch. The switch ports may also be configured as additional discrete OPT ports, see [Switch Overview](#) for details.

This guide configures an OPT port as an additional WAN type interface. These interfaces connect to upstream networks providing connectivity to the Internet or other remote destinations.

**See also:**

[Multi-WAN documentation](#)

### Configuring an additional WAN

- *Requirements*
- *Assign the Interface*
- *Interface Configuration*
- *Outbound NAT*
  - *Automatic or Hybrid Outbound NAT*
  - *Manual Outbound NAT*
- *Firewall Rules*
- *Gateway Groups*
- *DNS*
- *Setup Policy Routing*
- *Dynamic DNS*
- *VPN Considerations*
- *Testing*

### 2.5.1 Requirements

- This guide assumes the underlying interface is already present (e.g. physical port, VLAN, etc.).
- The WAN configuration type and settings must be known before starting. For example, this might be an IP address, subnet mask, and gateway value for static addresses or credentials for PPPoE.



## 2.5.2 Assign the Interface

- Navigate to **Interfaces > Assignments**

Look at list of current assignments. If the interface in question is already assigned, there is nothing to do. Skip ahead to the interface configuration.

- Pick an available interface in **Available network ports**

If there are no available interfaces, then one may need to be created first (e.g. VLANs).

- Click  **Add**

The firewall will assign the next available OPT interface number corresponding to the internal interface designation. For example, if there are no current OPT interfaces, the new interface will be **OPT1**. The next will be **OPT2**, and so on.

---

**Note:** As this guide does not know what that number will be on a given configuration, it will refer to the interface generically as **OPTx** and the customized name **WAN2**.

---

The newly assigned interface will have its own entry under the **Interfaces** menu and elsewhere in the GUI.

## 2.5.3 Interface Configuration


The new interface must be enabled and configured.

- Navigate to **Interfaces > OPTx**
- Check **Enable interface**
- Set custom name in the **Description**, e.g. WAN2
- Set IP address and CIDR for static, or DHCP/PPPoE/etc.

**See also:**

[IPv4 Configuration Types](#)

- Create a Gateway if this is a static IP address WAN:

- Click  **Add a New Gateway**

- Configure the gateway as follows:

**Default**

Check if this new WAN should be the default gateway.

**Gateway Name**

Name it the same as the interface (e.g. WAN2), or a variation thereof.

**Gateway IPv4**

The IPv4 address of the gateway inside the same subnet.

**Description**

Optional text describing the purpose of the gateway.

- Click  **Add**

- Ensure the new gateway is selected as the **IPv4 Upstream Gateway**

- Check **Block private networks**

This will block private network traffic on the interface, though if the firewall rules for this WAN are not permissive, this may be unnecessary.

- Check **Block bogon networks**

This will traffic from bogus or unassigned networks on the interface, though if the firewall rules for this WAN are not permissive, this may be unnecessary.

- Click **Save**

- Click **Apply Changes**

The presence of a selected gateway in the interface configuration causes the firewall to treat the interface as a *WAN type* interface. This is manual for static configurations, as above, but is automatic for dynamic WANs (e.g. DHCP, PPPoE).

The firewall applies outbound NAT to traffic exiting WAN type interfaces but does not use WAN type interface networks as a source for outbound NAT on other interfaces. Firewall rules on WAN type interfaces get **reply-to** added to ensure traffic entering a WAN exits the same WAN, and traffic exiting the interface is nudged toward its gateway. The DNS Resolver will not accept queries from clients on WAN type interfaces without manual ACL entries.

**See also:**

[Interface Configuration](#)

## 2.5.4 Outbound NAT

For clients on local interfaces to reach the Internet from private addresses to destinations through this WAN, the firewall must apply Outbound NAT on traffic leaving this new WAN.

- Navigate to **Firewall > NAT, Outbound** tab
- Check the current outbound NAT mode and follow the section below which matches the mode.

### Automatic or Hybrid Outbound NAT


If the mode is set to **Automatic** or **Hybrid**, then this may not need further configuration.

Ensure there are rules for the new WAN listed as an **Interface** in the **Automatic Rules** at the bottom of the page. If so, skip ahead to the next section to configure Firewall Rules.

### Manual Outbound NAT

If the mode is set to **Manual**, create a new rule or set of rules to cover the new WAN.

If there are existing rules in the **Mappings** table, they can be copied and adjusted to use the new WAN. Otherwise, create them manually:

- Click  to add a new rule at the top of the list.
- Configure the rule as follows:

**Interface**

Choose the new WAN interface (e.g. **WAN2**)

**Address Family**

*IPv4*

**Protocol***Any***Source**

Either choose *LAN Subnets*, which will automatically reference any networks on the LAN interface, or choose *Network or Alias* and manually fill in the LAN subnet, e.g. 192.168.1.0/24.

If there are multiple local networks, create rules for each or use other methods such as aliases or CIDR summarization to cover them all.

**Destination***Any***Translation Address**

WAN2 Address (or the custom name of the new WAN interface)

**Description**

Text describing the rule, e.g. LAN outbound on WAN2

- Click **Save**
- Click **Apply Changes**

Repeat as needed for additional local networks.

## 2.5.5 Firewall Rules

By default, there are no rules on the new interface, so the firewall will block all traffic. This is ideal for a WAN, so is safe to leave as-is. Adding services on the new WAN, such as VPNs, may require rules, but those should be handled on a case-by-case basis.


**Warning:** Do not add any blanket “allow all” style rules on any WAN.

### 2.5.6 Gateway Groups

Gateway Groups do not control traffic directly, but can be used in other places, such as firewall rules and service bindings, to influence how those areas use gateways.

For most scenarios it helps to create three gateway groups to start with: **PreferWAN**, **PreferWAN2**, and **LoadBalance**:

- Navigate to **System > Routing, Gateway Groups** tab

- Click  **Add** to create a new gateway group
- Configure the group as follows:

**Group Name**

PreferWAN


**Gateway Priority**


Gateway for WAN on **Tier 1**, Gateway for WAN2 on **Tier 2**

**Description**

Prefer WAN, fail to WAN2

- Click **Save**

- Click  **Add** to create another gateway group
- Configure the group as follows:
  - Group Name**  
PreferWAN2
  - Gateway Priority**  
Gateway for WAN on **Tier 2**, Gateway for WAN2 on **Tier 1**
  - Description**  
Prefer WAN2, fail to WAN
- Click **Save**

- Click  **Add** to create another gateway group
- Configure the group as follows:
  - Group Name**  
LoadBalance
  - Gateway Priority**  
Gateways for WAN and WAN2 both on **Tier 1**
  - Description**  
Load Balance Connections on WAN and WAN2

---

**Note:** Rules using this group enable connection-based load balancing, not per-packet load balancing.

Rules using this group will also have failover style behavior as WANs which are down are removed from load balancing.

---

- Click **Save**
- Click **Apply Changes**

Now set the default gateway to a failover group:

- Navigate to **System > Routing, Gateways** tab
- Set **Default gateway IPv4** to *PreferWAN*
- Click **Save**
- Click **Apply Changes**

---

**Note:** This is important for failover from the firewall itself so it always has outbound access. While this also enables basic failover for client traffic, it's better to use policy routing rules to control client traffic behavior.

---

## 2.5.7 DNS

DNS is critical for Internet access, and it is important to ensure the firewall can always resolve hostnames using DNS even when running on a secondary WAN.

The needs here depend upon the configuration of the DNS Resolver or Forwarder.

If the DNS Resolver is in its default resolver mode, then default gateway switching will be sufficient to handle failover in most cases, though it may not be as reliable as using forwarding mode.

If the DNS Resolver is in forwarding mode or the firewall is using the DNS Forwarder instead, then maintaining functional DNS requires manually configuring gateways for forwarding DNS servers.

- Navigate to **System > General Setup**
- Add at least one DNS server for each WAN in the **DNS Server Settings** section, ideally two or more. Click



**Add DNS Server** to create additional rows.

Each entry should be configured as follows:

### Address

The IP address of a DNS server.

Each server address **must be unique**, the same server **cannot** be listed more than once.

### DNS Hostname

Leave this field blank unless the server will be contacted using DNS over TLS through the DNS Resolver. In this case, enter the FQDN of the DNS server, so its name can be validated against its TLS certificate.

### Gateway

Select a gateway for each DNS server, corresponding to the WAN through which the firewall can reach the DNS server.

For public DNS servers such as CloudFlare or Google, either WAN is OK, but if either WAN uses DNS servers from a specific ISP, ensure those exit the appropriate WAN.

---

**Note:** If the gateway drop-down does not appear next to each DNS server, then the firewall does not have more than one gateway configured for any address family. Double-check the gateway settings for all WAN interfaces.

---

- Uncheck **DNS Server Override**

This will tell the firewall to use the DNS servers entered on this page and to ignore servers provided by dynamic WANs such as DHCP or PPPoE. Occasionally these providers may push conflicting DNS server information, so the best practice is to assign the DNS servers manually.

- Click **Save**

---

**Note:** If the DNS Resolver has specific outgoing interfaces selected in its configuration, select the new WAN there well as well.

---


## 2.5.8 Setup Policy Routing

Policy routing involves setting a gateway on firewall rules which direct matching traffic out specific WANs or failover groups.

In simple cases (one LAN, no VPNs) the only requirement to configure policy routing is to add a gateway to existing rules.

- Navigate to **Firewall > Rules, LAN** tab
- Edit the default pass rule for the LAN
- Click **Display Advanced**
- Set the **Gateway** to one of the gateway groups based on the desired LAN client behavior.  
For example, pick *PreferWAN*, so clients use WAN and then if WAN fails, they use WAN2.
- Click **Save**
- Click **Apply Changes**

If there are other local networks or VPNs which clients on LAN must reach, add rules **above** the default pass rules to pass local traffic without a gateway set:

- Navigate to **Firewall > Rules, LAN** tab
- Click  to add a new rule at the **top** of the list
- Configure the rule as follows:

**Action**

*Pass*

**Interface**

*LAN*

**Protocol**

*Any*

**Source**

*LAN subnets*

**Destination**

The other local subnet, VPN network, or an alias of such networks.

**Description**

Pass to local and VPN networks

**Do not** set a gateway on this rule.

- Click **Save**
- Click **Apply Changes**

## 2.5.9 Dynamic DNS

Dynamic DNS provides several benefits for multiple WANs, particularly with VPNs. If the firewall does not already have one or more Dynamic DNS hostnames configured, consider signing up with a provider and creating one or more.

It is a good practice to have a separate DNS entry for each WAN and a shared entry for failover, or one per failover group. If that is not viable, at least have one for the most common needs.

The particulars of configuring Dynamic DNS entries vary by provider and are beyond the scope of this document.

## 2.5.10 VPN Considerations

IPsec can use a gateway group as an as interface, but needs a dynamic DNS hostname as companion. The remote peer would need to use the Dynamic DNS hostname as the peer address of this firewall instead of an IP address. Because this relies on DNS, failover can be slow.

WireGuard does not bind to an interface, but can work with Multi-WAN. It will respond from WAN2 if client contacts WAN2, but when initiating it will always use the current default gateway. Static routes can nudge traffic for a specific peer out a specific WAN.

OpenVPN can use a gateway group as an interface for clients or servers. Client behavior is OK and should match default failover behavior configured on the group. For servers, it is better to bind the server to localhost and use port forwards from each WAN to localhost. Remote clients can then have multiple remote entries and contact each WAN as needed at any time.

## 2.5.11 Testing

Methods for testing depend on the type of WANs and gateway groups in use.

- For most WANs, a better test is to unplug the **upstream** connection from the ISP Customer Premise Equipment (CPE). This more accurately simulates a typical type of upstream connectivity failure. Do not power off the CPE or unplug the connection between the firewall and the CPE. While this may work, it's a much less common scenario and can behave differently.
- For testing load balancing, use cURL or multiple browsers/sessions when checking the IP address multiple times. Refreshing the same browser window will reuse a connection to the server and is not helpful for testing connection-based load balancing.

## 2.6 Configuring an OPT interface as an additional LAN

---

**Note:** The default configuration of the Netgate 3100 includes one assigned OPT port which is separate from the switch. The switch ports may also be configured as additional discrete OPT ports, see [Switch Overview](#) for details.

---

This guide configures an OPT port as an additional LAN type interface. These local interfaces can perform a variety of tasks, such as being a guest network, DMZ, IOT isolation, wireless segment, lab network, and more.

### Configuring an additional LAN

- [Requirements](#)
- [Assign the Interface](#)

- *Interface Configuration*
- *DHCP Server*
- *Outbound NAT*
  - *Automatic or Hybrid Outbound NAT*
  - *Manual Outbound NAT*
- *Firewall Rules*
  - *Open*
  - *Isolated*
- *Other Services*

## 2.6.1 Requirements

- This guide assumes the underlying interface is already present (e.g. physical port, VLAN, etc.).
- Choose a new local subnet to use for the additional LAN type interface. This example uses 192.168.2.0/24.

## 2.6.2 Assign the Interface

The first step is to assign an OPT interface.

- Navigate to **Interfaces > Assignments**

Look at list of current assignments. If the interface in question is already assigned, there is nothing to do. Skip ahead to the interface configuration.

- Pick an available interface in **Available network ports**

If there are no available interfaces, then one may need to be created first (e.g. VLANs).

- Click  **Add**

The firewall will assign the next available OPT interface number corresponding to the internal interface designation. For example, if there are no current OPT interfaces, the new interface will be **OPT1**. The next will be **OPT2**, and so on.

---

**Note:** As this guide does not know what that number will be on a given configuration, it will refer to the interface generically as **OPTx**.

---

The newly assigned interface will have its own entry under the **Interfaces** menu and elsewhere in the GUI.



### 2.6.3 Interface Configuration

The new interface must be enabled and configured.

- Navigate to **Interfaces > OPTx**
- Check **Enable interface**
- Set custom name in the **Description**, e.g. GUESTS, DMZ, etc.
- Set the **IPv4 Address** and CIDR mask for the new LAN

For this example, 192.168.2.1/24.

- **Do not** add or choose an **IPv4 Upstream gateway**
- Uncheck **Block private networks**

This interface is a private network, this option would prevent it from functioning.

- Uncheck **Block bogon networks**

The rules on this interface should only allow traffic from the subnet on the interface, making this option unnecessary.

- Click **Save**
- Click **Apply Changes**

The lack of a selected gateway in the interface configuration causes the firewall to treat the interface as a *LAN type* interface.

The firewall uses LAN type interfaces as sources of outbound NAT traffic but does not apply outbound NAT on traffic exiting a LAN. The firewall does not add any extra properties on firewall rules to influence traffic behavior. The DNS Resolver will accept queries from clients on LAN type interfaces.

**See also:**

[Interface Configuration](#)

### 2.6.4 DHCP Server

Next, configure DHCP service for this local interface. This is a convenient and easy way assign addresses for clients on the interface, but is optional if clients will be statically addressed instead.

This configuration varies slightly depending on the DHCP server and version.

**See also:**

[DHCPv4 Configuration](#)

- Navigate to **Services > DHCP Server, OPTx** tab (or the custom name)
- Check **Enable**
- Configure the **Address Pool Range**, e.g. from 192.168.2.100 to 192.168.2.199

This sets the lower (**From**) and upper (**To**) bound of automatic addresses assigned to clients.

- The rest of the settings can be left at defaults
- Click **Save**

## 2.6.5 Outbound NAT

For clients on this interface to reach the Internet from private addresses, the firewall must apply Outbound NAT for the new subnet.

- Navigate to **Firewall > NAT, Outbound** tab
- Check the current outbound NAT mode and follow the section below which matches the mode.


### Automatic or Hybrid Outbound NAT

If the mode is set to **Automatic** or **Hybrid**, then this likely does not need further configuration.

Ensure the new LAN subnet is listed as a **Source** in the **Automatic Rules** at the bottom of the page. If so, skip ahead to the next section to configure Firewall Rules.

### Manual Outbound NAT

If the mode is set to **Manual**, create a new rule or set of rules to cover the new subnet.

- Click  to add a new rule at the top of the list
- Configure the rule as follows:

**Interface**

Choose the WAN interface. If there is more than one WAN interface, add separate rules for each WAN interface.

**Address Family**

*IPv4*

**Protocol**

*Any*

**Source**

Either choose *OPTx Subnets*, which will automatically reference the new interface, or choose *Network or Alias* and manually fill in the new subnet, e.g. 192.168.2.0/24.

**Destination**

*Any*

**Translation Address**

*WAN Address* (or the customized name matching the WAN/egress interface)

**Description**

Text describing the rule, e.g. Guest LAN outbound on WAN

- Click **Save**
- Click **Apply Changes**

Alternately, clone existing NAT rules and adjust as needed to match the new LAN.

## 2.6.6 Firewall Rules

By default, there are no firewall rules on the new interface, so the firewall will block all traffic. This is not ideal for a LAN as generally speaking, the clients on this LAN will need to contact hosts through the firewall.


Rules for this interface can be found under **Firewall > Rules**, on the **OPTx** tab (or the custom name, e.g. **GUESTS**).

There are two common scenarios administrators typically choose for local interfaces: Open and Isolated

### Open

On an open LAN, hosts in that LAN are free to contact any other host through the firewall. This might be a host on the Internet, across a VPN, or on another local LAN.

In this case a simple “allow all” style rule for the interface will suffice.

- Navigate to **Firewall > Rules**, on the **OPTx** tab (or the custom name)
- Click  to add a new rule at the top of the list
- Configure the rule as follows:

**Action**

*Pass*

**Interface**

*OPTx* (or the custom name) should already be set by default

**Protocol**

*Any*

**Source**

*OPTx subnets* (or the custom name)

**Destination**

*Any*

**Description**

Text describing the rule, e.g. Default allow all from OPTx

- Click **Save**
- Click **Apply Changes**

### Isolated

In an isolated local network, hosts on the network cannot contact hosts on other networks unless explicitly allowed in the rules. Hosts can still contact the Internet as needed in this example, but that can also be restricted with additional rules.

This scenario is common for locked down networks such as for IOT devices, a DMZ with public services, untrusted Guest/BYOD networks, and other similar scenarios.

**Warning:** A full set of reject rules as described in this example is the best practice. Do not rely on shortcuts such as using policy routing to isolate clients.

## Create a Private Networks Alias

Create an alias using all RFC 1918 networks (listed in the example below) or at least an alias containing the local/private networks on this firewall, such as VPNs. Using all RFC 1918 networks is a safer practice.

- Navigate to **Firewall > Aliases**

- Click  **Add**

- Configure the alias as follows:

**Name**

PrivateNets

**Description**

Private Networks

**Type**

Network(s)

- Add entries for:
  - 192.168.0.0/16
  - 172.16.0.0/12
  - 10.0.0.0/8
- Click **Save**


## Add Firewall Rules

With the alias in place, the next task is to create firewall rules for the interface.

- Navigate to **Firewall > Rules**, on the **OPTx** tab (or the custom name)

## Allow DNS

Add rule to allow DNS requests from local clients to the firewall itself or other DNS servers.

- Click  **Add** to add a new rule at the bottom of the list.
- Configure the rule as follows:

**Action**

Pass

**Interface**

OPTx (or the custom name)

**Protocol**

TCP/UDP

**Source**

OPTx subnets (or the custom name)

**Destination**

*This Firewall (self)*

If clients are configured to query DNS servers other than this firewall, create rules using those as the destination instead.

**Destination Port Range**

Select the *DNS (53)* entry or choose *Other* and manually enter 53

To allow DNS over TLS, create a separate rule using the *DNS over TLS* entry or manually enter port 853.


**Description**

Text describing the rule, e.g. Allow clients to resolve DNS through the firewall

- Click **Save**

**Allow ICMP to the Firewall**

Add a rule to allow ICMP traffic from local devices to the firewall.

- Click  to add a new rule at the bottom of the list.
- Configure the rule as follows:

**Action**

*Pass*

**Interface**

*OPTx* (or the custom name)

**Protocol**

*ICMP*

**ICMP Subtype**

*Any*

---

**Tip:** While ICMP is useful, some network administrators prefer to limit the allowed ICMP types to *Echo Request* only. This allows devices to use ICMP ping for diagnostic purposes, but no other types of ICMP traffic.

---

**Source**

*OPTx subnets* (or the custom name)

**Destination**

*This Firewall (self)*


**Description**

Allow client ICMP to the firewall

- Click **Save**

## Reject Other Firewall-bound Traffic

Add rule to reject any other traffic to the firewall to ensure users on this interface cannot connect to management services such as the GUI, SSH, and so on.


- Click  to add a new rule at the bottom of the list.
- Configure the rule as follows:

**Action***Reject***Interface***OPTx (or the custom name)***Protocol***Any***Source***Any***Destination***This Firewall (self)***Description***Reject all other traffic to the firewall*

- Click **Save**

## Reject Private Traffic

Add rule to reject traffic from this network to all other private networks.


- Click  to add a new rule at the bottom of the list.
- Configure the rule as follows:

**Action***Reject***Interface***OPTx (or the custom name)***Protocol***Any***Source***Any***Destination***Address or Alias, PrivateNets (the alias created earlier)***Description***Reject all other traffic to private networks*

- Click **Save**

## Allow Other Traffic

Add rule to allow traffic from this interface network to any other destination, which enables clients on this interface to reach the Internet and/or other remote public networks.

- Click  to add a new rule at the bottom of the list.
- Configure the rule as follows:

**Action**

*Pass*

**Interface**

*OPTx (or the custom name)*

**Protocol**

*Any*

**Source**

*OPTx subnets (or the custom name)*

**Destination**

*Any*

**Description**

Default allow all from OPTx

- Click **Save**

## Apply Changes

With the rules all in place, click **Apply Changes** to finish and activate the new rules.

The rules should look similar to the following figure:

Rules (Drag to Change Order)											
<input type="checkbox"/>	States	Protocol	Source	Port	Destination	Port	Gateway	Queue	Schedule	Description	Actions
Exceptions to Local Blocks											
<input type="checkbox"/>	✓	0/0 B	IPv4 TCP/UDP	OPTx subnets	*	This Firewall (self)	53 (DNS)	*	none	Allow clients to resolve DNS through the firewall	
<input type="checkbox"/>	✓	0/0 B	IPv4 ICMP any	OPTx subnets	*	This Firewall (self)	*	*	none	Allow client ICMP to the firewall	
Block to protected local networks											
<input type="checkbox"/>	✗	0/0 B	IPv4 *	*	*	This Firewall (self)	*	*	none	Reject all other traffic to the firewall	
<input type="checkbox"/>	✗	0/0 B	IPv4 *	*	*	PrivateNets	*	*	none	Reject all other traffic to private networks	
General pass rules											
<input type="checkbox"/>	✓	0/0 B	IPv4 *	OPTx subnets	*	*	*	*	none	Default allow all from OPTx	
Add            Add            Delete            Toggle            Copy            Save            Separator											

Fig. 9: Example firewall rules for isolated LAN type segment

**Tip:** Rule separators are useful for documenting a ruleset in place.

Similar to the isolated network scenario, it is also possible to be much more strict with rules to only allow specific outbound ports. When creating this type of configuration,

## 2.6.7 Other Services

In most cases the above configuration is sufficient and clients on the new LAN can now obtain an address and reach the Internet. However, there may be other custom settings which need accounted for when adding a new local interface:

- If the DNS resolver has specific interface bindings, add the new interface to the list.
- If using ALTQ traffic shaping, re-run the shaper wizard to include this new LAN type interface.
- Consider using captive portal to control access the interface

## 2.7 Factory Reset Procedure

The Netgate 3100 firewall appliance does not have a hardware button to reset the configuration to factory defaults. On this device it is still possible to perform a [Factory Reset from GUI or Console](#).

**Warning:** On this hardware the button labeled “Reset” **does not** reset the pfSense software configuration. The “Reset” button immediately performs a hardware reset, which is similar to a cold boot or power cycle.

**See also:**

- [Factory Reset from GUI or Console](#)

The linked document has complete details, but the procedure can be summarized as follows:

Reset from the console:

- [Connecting to the USB Console](#) or SSH
- Choose menu option 4 to reset to factory defaults
- Confirm the action and allow the appliance to reboot

Reset from the GUI:

- Navigate to **Diagnostics > Factory Defaults** to perform the reset.



## REFERENCES

### 3.1 Switch Overview

This document is an overview of how the switch operates and its capabilities.

**See also:**

For instructions on how to configure the switch ports, see *Configuring the Switch Ports*.

**Warning:** The switch ports do not support the Spanning Tree Protocol (STP). Two or more ports connected to another Layer 2 switch, or connected to 2 or more different interconnected switches, could create a flooding loop between the switches. This can cause the router to stop functioning until the loop is resolved.

**Warning:** The switch is limited to a total maximum of 128 separate VLANs.

#### 3.1.1 Interface Links

The four LAN ports on the Netgate 3100 are connected internally to a switch.

In addition to the four physical ports there is also an internal switch port (Port 5) which acts as an uplink, and the `mvneta1` interface which is the corresponding operating system interface for the switch uplink.

The internal uplink port operates at 2.5 Gbps and connects the switch to the SoC. From the perspective of the operating system, the only port is the `mvneta1` interface which also runs at the same 2.5 Gbps speed.

#### 3.1.2 Port Mode

By default, the switch is in **Port VLAN Mode**. The four LAN ports are configured on the same network which feeds into the LAN interface. These four switch ports are customizable and each can be configured to act as an independent switches or in groups.

In Port VLAN Mode, any and all VLAN tags are allowed on all ports. No VLAN tags are added or removed. Think of it as a dummy switch that retains VLAN tags on frames, if present. This mode is useful when there are numerous VLANs on a network and the goal is to physically segment the switch, while allowing the same VLANs on all segments of the switch.

In **Port VLAN Mode**, rather than specifying which interfaces are associated to a VLAN, the configuration can specify which physical ports form a switch.

### 3.1.3 802.1q VLAN Mode

It is also possible to enable 802.1q VLAN mode instead of the default port mode.

Using VLANs, these four switch ports are customizable and each can be configured to act as independent interfaces. For example, all of these configurations are possible:

- LAN1-4 dedicated as a LAN switch
- LAN1-2 configured as a switch for LAN A and LAN3-4 configured as a switch for LAN B
- LAN1-4 configured as individual network interfaces
- LAN1-2 configured as a switch for LAN A, LAN3 configured for WAN B, and LAN4 configured for WAN C.

Each of the switch ports (LAN1-4 and Port 5) are VLAN aware interfaces. They are capable of functioning as a standard access or trunk port:

**Access Port:**

Adds a VLAN tag to inbound untagged traffic

**Trunk Port:**

Allows tagged traffic containing specified VLAN IDs

When switching from Port VLAN mode to 802.1q VLAN mode there is no default configuration. See *Configuring the Switch Ports* for details on configuring this mode.

## 3.2 Additional Resources

### 3.2.1 Netgate Training

Netgate training offers training courses for increasing your knowledge of pfSense® Plus products and services. Whether you need to maintain or improve the security skills of your staff or offer highly specialized assistance and improve your customer satisfaction; Netgate training has got you covered.

<https://www.netgate.com/training>

### 3.2.2 Resource Library

To learn more about how to use Netgate appliances and for other helpful resources, make sure to browse the Netgate Resource Library.

<https://www.netgate.com/resources>

### 3.2.3 Professional Services

Netgate TAC does not cover more complex tasks such as CARP configuration for redundancy on multiple firewalls or circuits, network design, and conversion from other firewalls to pfSense® Plus software. These items are offered as professional services and can be purchased and scheduled accordingly.

<https://www.netgate.com/our-services/professional-services.html>

### 3.2.4 Community Options

Customers who elected not to get a [Netgate TAC](#) plan, can seek assistance from the active and knowledgeable pfSense software community on the Netgate forum.

<https://forum.netgate.com/>

## 3.3 Warranty and Support

- One year manufacturer's warranty.
- Please contact Netgate for warranty information or view the [Product Lifecycle](#) page.
- All Specifications subject to change without notice

For support information, view [support plans](#) offered by Netgate.

**See also:**

For more information on how to use pfSense® Plus software, see the [pfSense Documentation](#) and [Resource Library](#).