



# **Security Gateway Manual**

*XG-7100*

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**Oct 21, 2020**

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This Quick Start Guide covers the first time connection procedures for the Netgate® XG-7100 Desktop Firewall Appliance and will provide the information needed to keep the appliance up and running.

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**Tip:** Before getting started, we recommend downloading the [PDF version of the Product Manual](#) and the [PDF version of the pfSense Documentation](#) in case you lose Internet access.

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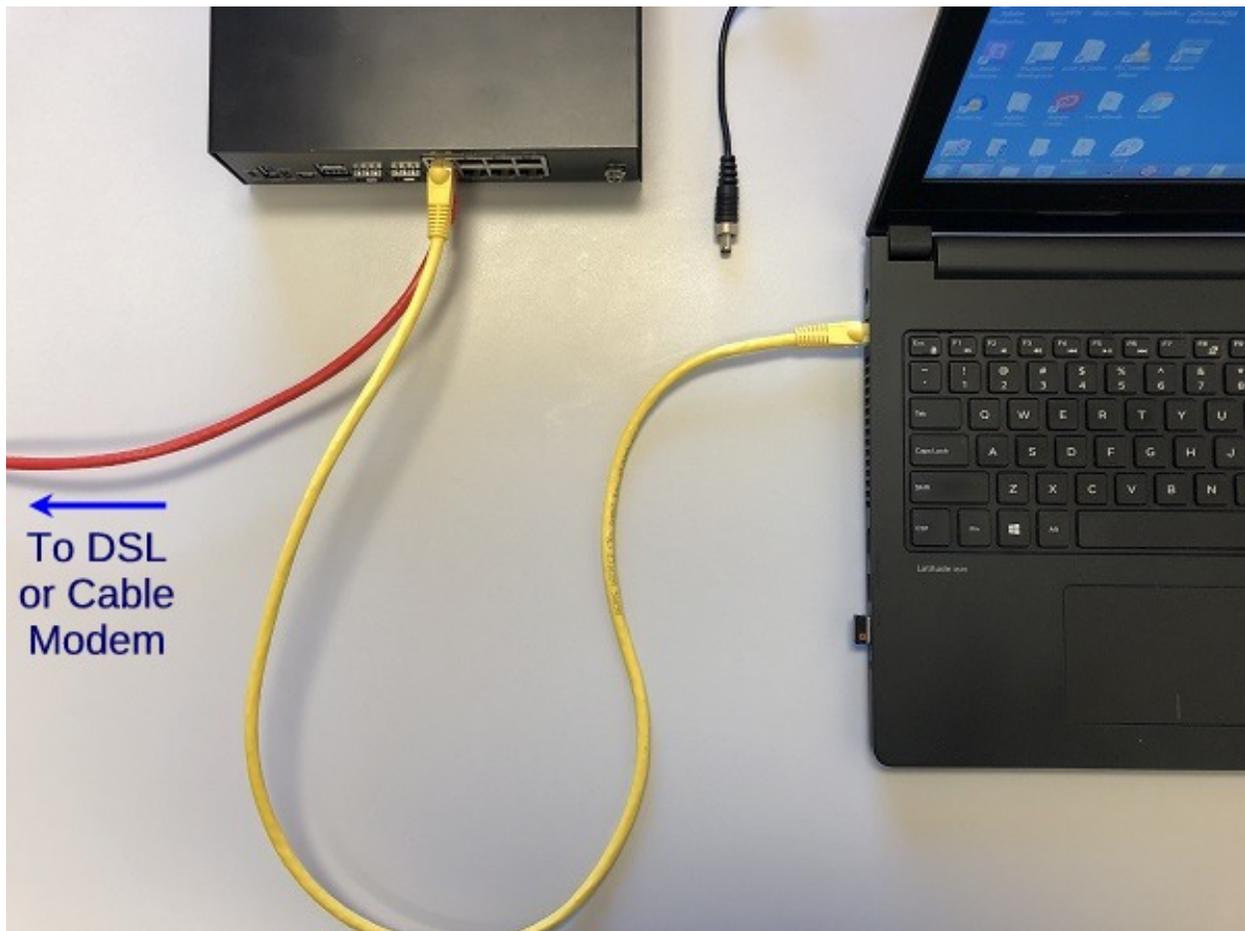
## OUT OF THE BOX

### 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 port of the Cable or DSL modem. The modem provided by the ISP should have multiple LAN ports. Any port should work.

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.



**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**).

## 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 your DSL or Cable Modem has a default IP Address of 192.168.1.1, please disconnect the Ethernet cable from the ETH1 port on your XG-7100 Netgate Security Gateway before proceeding. You will need to change the default IP Address of the device during a later step in the configuration.

1. From the computer, log into the Web Interface

Open a web browser (Google Chrome in this example) and type in 192.168.1.1 on the address bar. Press Enter.



Fig. 1: Enter the Default LAN IP Address

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

### 1.2.1 The Setup Wizard

The following steps will step through the Setup Wizard for the initial configuration of the firewall.

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**Note:** Ignore the warning to reset the 'admin' account password. One of the steps in the Setup Wizard is to change the default password.

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1. Click **Next** to start the Setup Wizard.
2. Click **Next** after you have read the information on Netgate Global Support.
3. On the General Information page, use the following as a guide to configure the firewall.

**Hostname:** Any desired name can be entered. For the purposes of this guide, the default hostname `pfsense` is used.

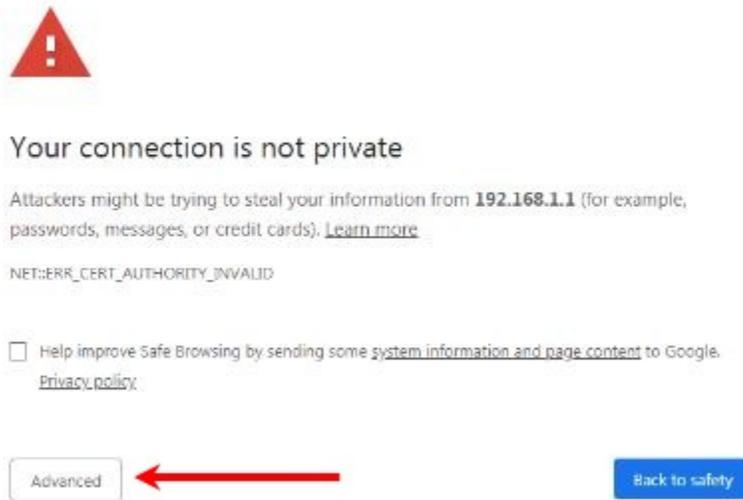


Fig. 2: Click **Advanced** and then **Proceed to 192.168.1.1 (unsafe)**

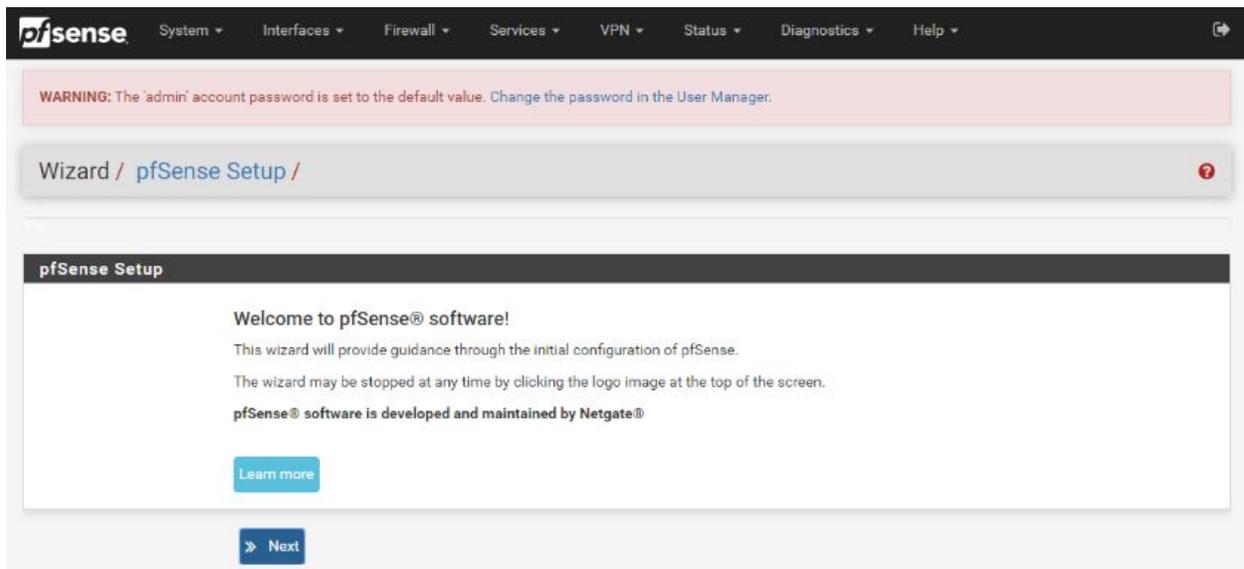


Fig. 3: Click **Next**

**Domain:** The default `localdomain` 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).

The screenshot shows the pfSense Setup Wizard at the 'General Information' step. The page title is 'Wizard / pfSense Setup / General Information'. Below the title bar, it says 'Step 2 of 9'. The main content area is titled 'General Information' and contains the following fields and options:

- Hostname:** A text input field containing 'pfSense'. Below it, the text 'EXAMPLE: myserver' is displayed.
- Domain:** A text input field containing 'localdomain'. Below it, the text 'EXAMPLE: mydomain.com' is displayed.
- Primary DNS Server:** A text input field containing '8.8.8.8'.
- Secondary DNS Server:** A text input field containing '8.8.4.4'.
- Override DNS:** A checkbox that is checked. Below it, the text 'Allow DNS servers to be overridden by DHCP/PPP on WAN' is displayed.

At the bottom of the form, there is a blue button with a right-pointing arrow and the text 'Next'.

Fig. 4: Type in the DNS Server information and Click **Next**

- Use the following information for the Time Server Information page.

**Time Server Hostname:** Use the default pfSense time server address.

**Timezone:** Select the time zone for the location of the firewall. For this guide, the Timezone will be set to `America/Chicago` for US Central time.

- The WAN interface is the Public IP address the network will use to communicate with the Internet. Use the following information for the WAN configuration page.

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

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

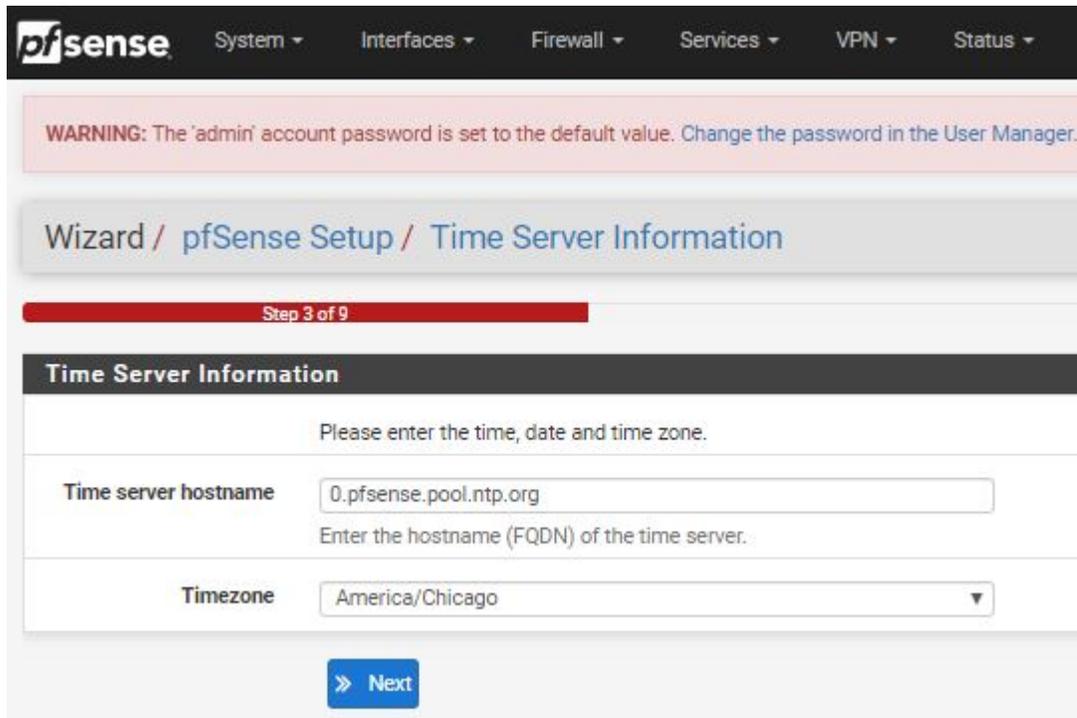
- Configuring LAN IP Address & Subnet Mask. The default LAN IP address of `192.168.1.1` and subnet mask of `24` is usually sufficient.

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**Tip:** If your DSL or Cable Modem has a default IP Address of `192.168.1.1`, change the IP Address of your XG-7100 Netgate Security Gateway to a different subnet, such as `192.168.2.1` with a subnet mask of `24` to avoid an IP Address conflict.

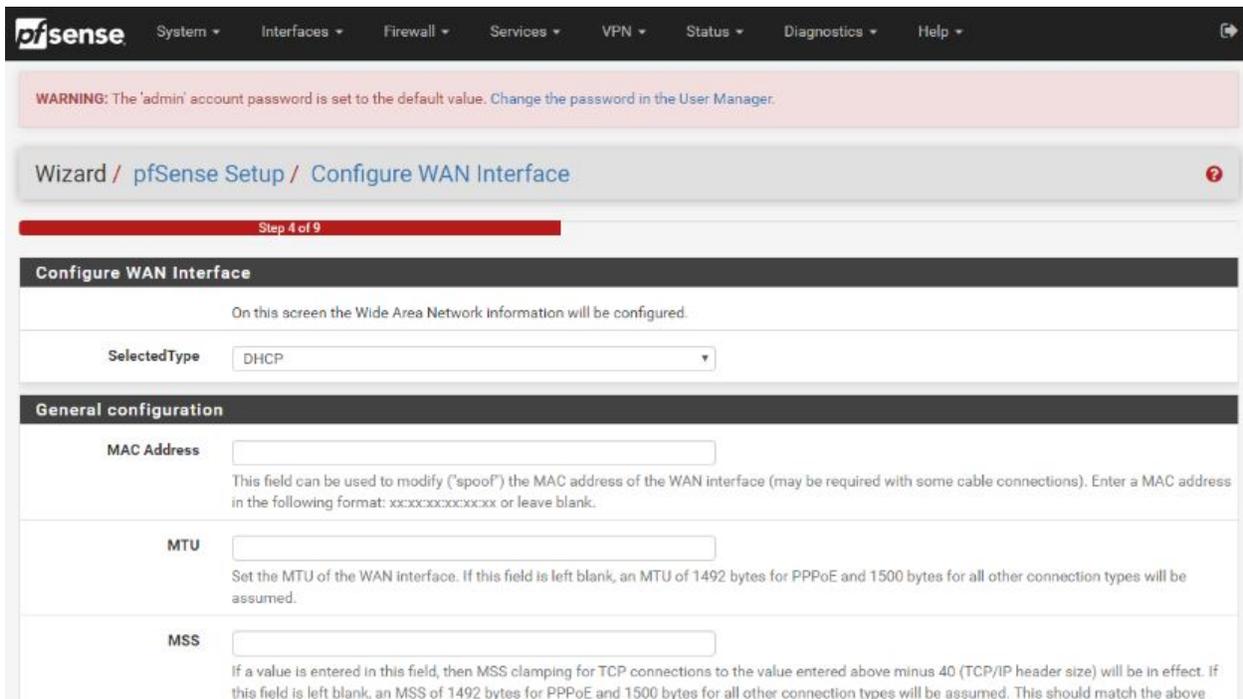
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- Change the **Admin Password**. Enter the same password in both fields.
- Click `Reload` to save the configuration.
- After a few seconds, a message will indicate the Setup Wizard has completed. To proceed to the pfSense dashboard, click `Finish`.



The screenshot shows the pfSense web interface. At the top, there is a navigation menu with items: System, Interfaces, Firewall, Services, VPN, and Status. Below the menu is a warning message: "WARNING: The 'admin' account password is set to the default value. Change the password in the User Manager." The main content area is titled "Wizard / pfSense Setup / Time Server Information" and indicates "Step 3 of 9". The section is titled "Time Server Information" and contains the instruction: "Please enter the time, date and time zone." There are two input fields: "Time server hostname" with the value "0.pfsense.pool.ntp.org" and a sub-instruction "Enter the hostname (FQDN) of the time server.", and "Timezone" with a dropdown menu set to "America/Chicago". A blue "Next" button is located at the bottom of the form.

Fig. 5: Change the Timezone and Click Next



The screenshot shows the pfSense web interface. At the top, there is a navigation menu with items: System, Interfaces, Firewall, Services, VPN, Status, Diagnostics, and Help. Below the menu is a warning message: "WARNING: The 'admin' account password is set to the default value. Change the password in the User Manager." The main content area is titled "Wizard / pfSense Setup / Configure WAN Interface" and indicates "Step 4 of 9". The section is titled "Configure WAN Interface" and contains the instruction: "On this screen the Wide Area Network information will be configured." There is a "SelectedType" dropdown menu set to "DHCP". Below this is a "General configuration" section with three input fields: "MAC Address" with a sub-instruction "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: xxx:xxx:xxx:xxx or leave blank.", "MTU" with a sub-instruction "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.", and "MSS" with a sub-instruction "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".

Fig. 6: Default Settings Should be Acceptable. Click Next

10. A final notification screen will appear stating that **NO COMMERCIAL DISTRIBUTION...** Click **Accept** to continue to the pfSense dashboard.



Fig. 7: Read and Click **Accept**

If you unplugged the Ethernet cable at the beginning of this configuration, reconnect it to the ETH1 port now.

This completes the basic configuration for the Netgate appliance.

## 1.3 pfSense Overview

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

### 1.3.1 The Dashboard

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

**Section 1** shows important system information such as the model, Serial Number, and Netgate Device ID for this Netgate firewall.

**Section 2** identifies what version of pfSense 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.

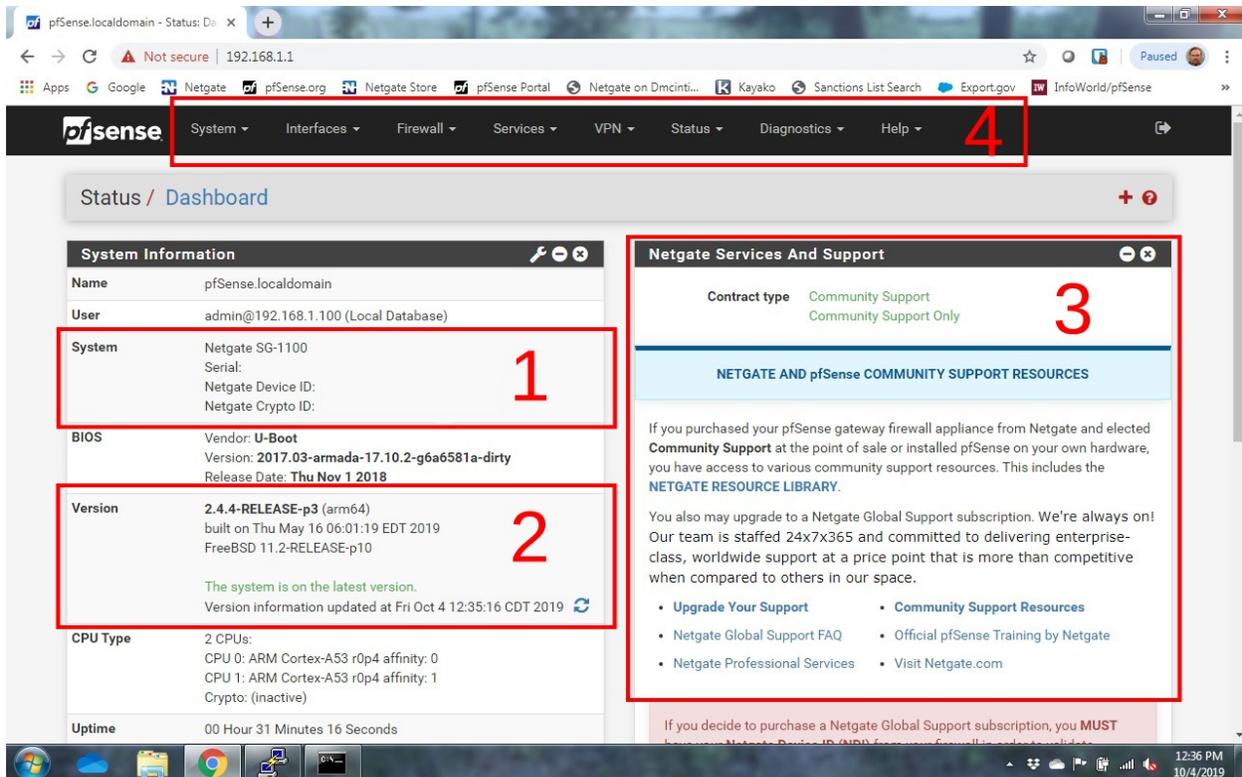


Fig. 8: The pfSense Dashboard

### 1.3.2 Re-running the Setup Wizard

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

### 1.3.3 Backup and Restore

It is important to backup 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.

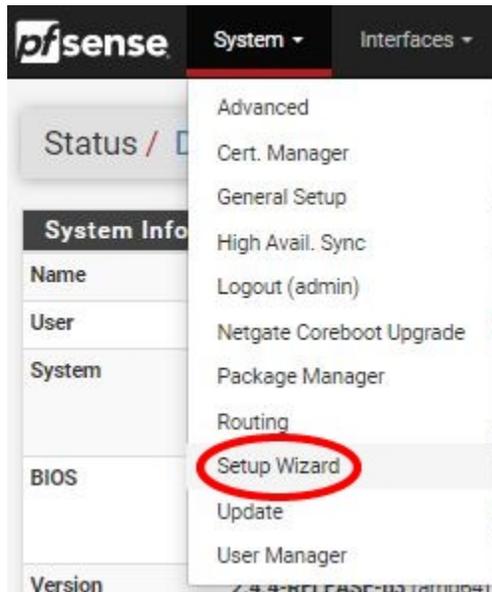


Fig. 9: Re-run the Setup Wizard

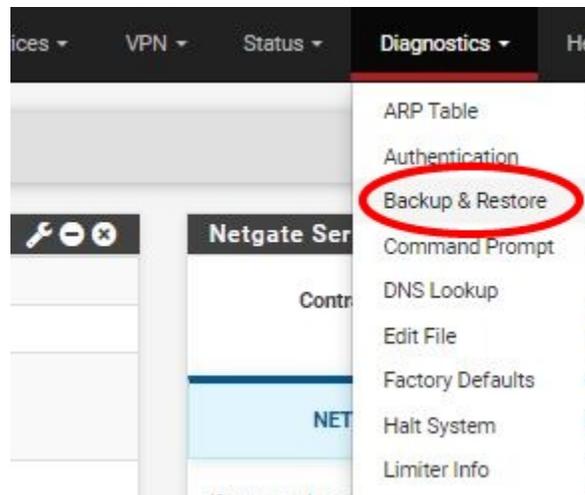


Fig. 10: Backup & Restore

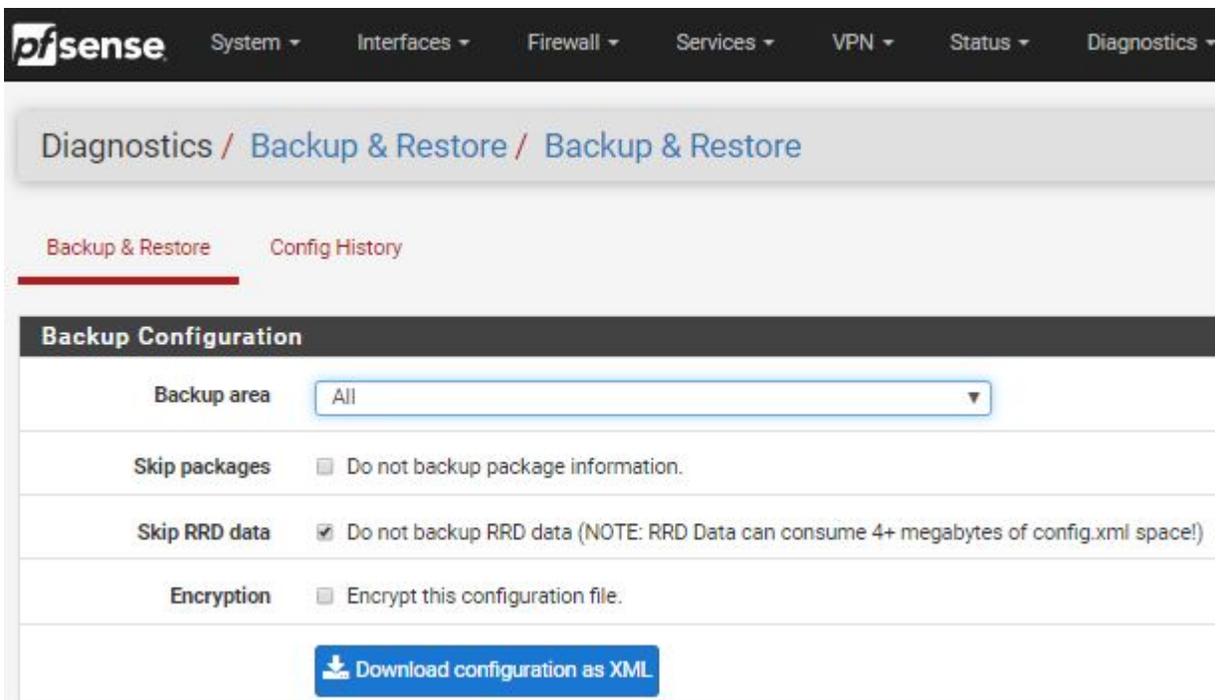


Fig. 11: Click Download configuration as XML

## 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:

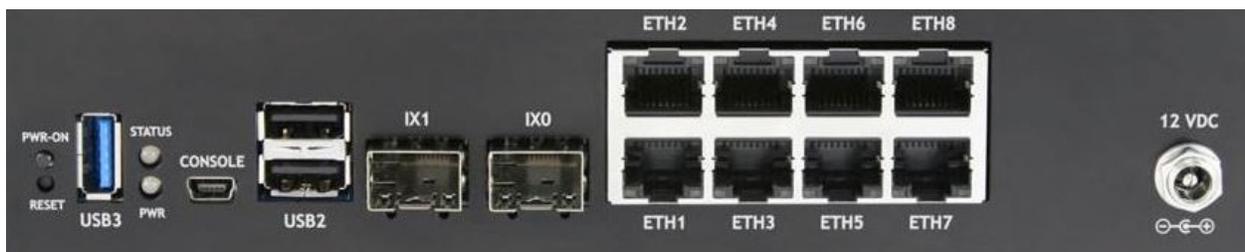
*Connecting to the Console Port* Connect to the console. Cable is required.

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

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## 1.4 Input and Output Ports



### 1.4.1 Networking Ports

Interface Name	Port Name	Port Type	Port Speed
WAN	ETH1	RJ-45	1 Gbps
LAN	ETH2-ETH8	RJ-45	1 Gbps
OPT1	IX0	SFP+	10 Gbps
OPT2	IX1	SFP+	10 Gbps

#### RJ-45 Ethernet Ports

ETH1-8 are **switched ports** sharing 5 Gbps (2x 2.5 Gbps) to the Intel SoC. These ports can be isolated as an independent interface with the configuration of VLAN tagging as shown in *Switch Ports Overview*.

**Warning:** LAGG has limited support currently on the ethernet switchports (Load Balance mode only). For more information, review the [Switch LAGG](#) section of the XG-7100 Switch Overview page.

**Warning:** The LAN 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.

#### SFP+ Ethernet Ports

IX0-IX1 are discrete ports, each with dedicated 10 Gbps back to the Intel SoC.

**Warning:** The `ix(4)` driver used for ports IX0-IX1 does not support ALTQ traffic shaping directly. Limiters or tagged VLAN interfaces may be used for ALTQ traffic shaping.

**Warning:** There is an [Intel-supplied driver issue](#) for the C3000, preventing 1Gbps and 10Gbps copper modules from being recognized on the SFP+ ports. Copper modules are not supported.

#### Compatible SFP/SFP+ Modules

Below are some general guidelines for compatible SFP/SFP+ modules:

- Intel-branded SFP+ SR/LR Dual Speed (1G/10G) optical modules.
- Intel-branded SFP+ DA twin-ax cables that comply with SFF-8431 v4.1 and SFF-8472 v10.4 specifications. **Note:** Limited to 10G link speed (no 1G support).
- Third party SFP+ DA twin-ax cables that comply with SFF-8431 v4.1 and SFF-8472 v10.4 specifications. **Note:** Limited to 10G link speed (no 1G support).
- SFP+ AoCs (Active optical Cables). **Note:** Limited to 10G link speed (no 1G support).
- Third party SFP+ SR/LR dual speed 1G/10G) optical modules
- SFP+ active copper cables

- 1000BASE-SX / 1000BASE-LX optical modules

Specific known-working modules include:

Model / Part Number	Description
Finisar FTLF1318P3BTL	1000BASE-LX and 1G Fibre Channel (1GFC) 10km Industrial Temperature Gen 3 SFP Optical Transceiver
Finisar FTLX1471D3BCL	10Gb/s 10km Single Mode Datacom SFP+ Transceiver
Intel FTLX8571D3BCV-IT	1G/10G Dual Rate SFP Fiber Optical Transceiver Module
Finisar FTLX8574D3BCL	10GBASE-SR/SW 400m Multimode Datacom SFP+ Optical Transceiver
Finisar FTLF8519P3BNL	1000BASE-SX and 2G Fibre Channel (2GFC) 500m Extended Temperature SFP Optical Transceiver <b>Note:</b> Links at 1G, 2G is not supported

## 1.4.2 Other Ports, Buttons, and Indicators

- Semi-recessed Power (PWR) (performs a graceful shutdown of pfSense® software)
- Recessed Reset Button (performs a hard reset, immediately turning the system off)
- 1x USB 3.0
- Status LED
- Power (PWR) LED (green when powered on, red after a graceful shutdown)
- Console (Mini-USB)
- 2x USB 2.0
- Power
  - Power Consumption 20W (idle)

**Note:** When a graceful shutdown is performed, the XG-7100 Power (PWR) LED will turn red but will stay lit. The Ethernet activity LEDs will turn off. The power supply fan will continue to run. Turning off the rocker switch on the back of the power supply will eliminate all power to the system.

The power button should be depressed 3-5 seconds to initiate a graceful shutdown or to power on the device when the PWR LED is red.

**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 webConfigurator to avoid data corruption.

## 1.5 Safety and Legal

### 1.5.1 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.

### 1.5.2 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.

### 1.5.3 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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### 1.5.4 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.

### 1.5.5 Australia and New Zealand

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

### 1.5.6 CE Marking

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

### 1.5.7 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.

## 1.5.8 Declaration of Conformity

### Česky[Czech]

NETGATE tímto prohlašuje, že tento NETGATE device, je ve shodě se základními požadavky a dále s ostatními ustanoveními 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, tyyppinen 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 ΛΟΠΙΕΣ 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 relevanti 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.

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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.

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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.

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## HOW-TO GUIDES

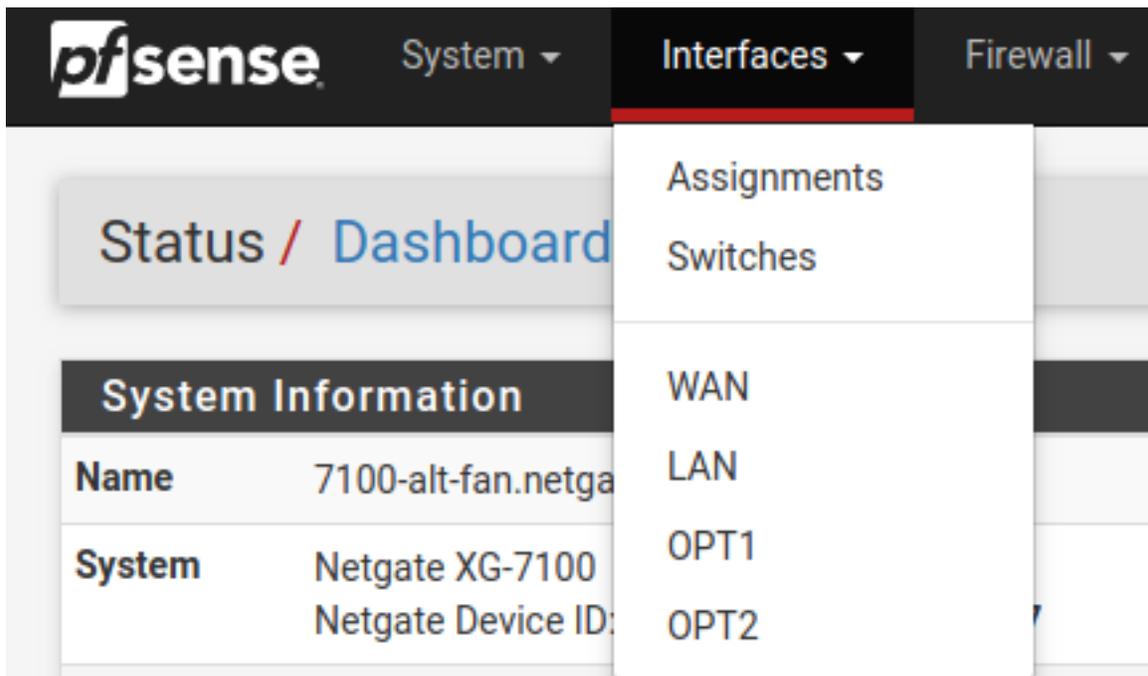
### 2.1 Configuring the Switch Ports

**See also:**

For an overview of how the switch ports are set up, see *Switch Ports Overview*.

#### 2.1.1 Switch Section

From the pfSense® webGUI, there is a menu option called **Switches** under the Interfaces drop-down. This section contains switch specific configuration options.



Selecting **Switches** from the drop-down will bring up the Switch page with four sections:

## System

Switch System					
Type	Ports	VLAN groups	LAGG groups	VLAN Mode	Capabilities
Marvell 6000 series switch	11	128	16	DOT1Q	PORT,DOT1Q,PORTS_MASK,LAGG,PSTATE

Fig. 1: Information on the Marvell 6000 switch

## LAGGs

XG-7100 Switch LAGGs				
LAGG(s) table	LAGG group	Members	Description	Action
0		9,10		

Fig. 2: Information on members of the switch LAG

## Ports

Information on switchport status and port names. If **802.1q** is enabled, this section can also be used to specify the native VLAN ID for each port. The Port VID defined will be used to tag inbound untagged traffic.

## VLANs

Enable/Disable 802.1q VLAN mode. Configure VLAN access/trunk interfaces with 802.1q or configure port groups with **Port VLAN Mode**.

### 2.1.2 Interfaces Section

There is also relevant configurations under **Interfaces -> Assignments**.

Interfaces / Switch / Ports ?

System Ports VLANs LAGGs

XG-7100 Switch Ports						
Port #	Port name	Port VID	Flags	State	Media	Status
1	ETH1	4090		FORWARDING	Ethernet autoselect (1000baseT <full-duplex>)	Active
2	ETH2	4091		FORWARDING	Ethernet autoselect (none)	No Carrier
3	ETH3	4091		FORWARDING	Ethernet autoselect (none)	No Carrier
4	ETH4	4091		FORWARDING	Ethernet autoselect (none)	No Carrier
5	ETH5	4091		FORWARDING	Ethernet autoselect (none)	No Carrier
6	ETH6	4091		FORWARDING	Ethernet autoselect (none)	No Carrier
7	ETH7	4091		FORWARDING	Ethernet autoselect (none)	No Carrier
8	ETH8	4091		FORWARDING	Ethernet autoselect (none)	No Carrier
9	Uplink 2	1	HOST	FORWARDING	Ethernet 2500Base-KX <full-duplex>	Active
10	Uplink 1	1	HOST	FORWARDING	Ethernet 2500Base-KX <full-duplex>	Active

Fig. 3: 802.1q enabled (default)

System Ports VLANs LAGGs

XG-7100 Switch Ports						
Port #	Port name	Flags	State	Media	Status	
1	ETH1		DISABLED	Ethernet autoselect (1000baseT <full-duplex>)	Active	
2	ETH2		DISABLED	Ethernet autoselect (none)	No Carrier	
3	ETH3		DISABLED	Ethernet autoselect (none)	No Carrier	
4	ETH4		DISABLED	Ethernet autoselect (none)	No Carrier	
5	ETH5		DISABLED	Ethernet autoselect (none)	No Carrier	
6	ETH6		DISABLED	Ethernet autoselect (none)	No Carrier	
7	ETH7		DISABLED	Ethernet autoselect (1000baseT <full-duplex>)	Active	
8	ETH8		DISABLED	Ethernet autoselect (1000baseT <full-duplex>)	Active	
9	Uplink 2	HOST	DISABLED	Ethernet 2500Base-KX <full-duplex>	Active	
10	Uplink 1	HOST	DISABLED	Ethernet 2500Base-KX <full-duplex>	Active	

Fig. 4: Port VLAN Mode

Interfaces / Switch / VLANs

System Ports **VLANs** LAGGs

**XG-7100 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		Default System VLAN	
	1	4090	1,9t,10t	WAN	
	2	4091	2,3,4,5,6,7,8,9t,10t	LAN	

Save Add Tag

Fig. 5: 802.1q enabled (default)

System Ports **VLANs** LAGGs

**XG-7100 Switch Port based VLANs**

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

VLAN(s) table	VLAN group	Port	Members	Description	Action
	1	1	2,3,4,5,6,7,8,9,10	Default System VLAN	
	2	2	1,3,4,5,6,7,8,9,10	Default System VLAN	
	3	3	1,2,4,5,6,7,8,9,10	Default System VLAN	
	4	4	1,2,3,5,6,7,8,9,10	Default System VLAN	
	5	5	1,2,3,4,6,7,8,9,10	Default System VLAN	
	6	6	1,2,3,4,5,7,8,9,10	Default System VLAN	
	7	7	1,2,3,4,5,6,8,9,10	Default System VLAN	
	8	8	1,2,3,4,5,6,7,9,10	Default System VLAN	
	9	9	1,2,3,4,5,6,7,8,10	Default System VLAN	
	10	10	1,2,3,4,5,6,7,8,9	Default System VLAN	

Fig. 6: Port VLAN Mode

## Interface Assignments

Under **Interface Assignments**, notice **LAGG0 (UPLINK)** is displayed as an available port but is not enabled in the list of interfaces. This is because the default configuration is only expecting VLAN tagged traffic so the VLAN child interface **4090** and **4091** are enabled instead.

The screenshot shows the 'Interface Assignments' configuration page. The navigation tabs include Interface Assignments, Interface Groups, Wireless, VLANs, QinQs, PPPs, GREs, GIFs, Bridges, and LAGGs. The main content area has two columns: 'Interface' and 'Network port'. The interfaces listed are WAN, LAN, OPT1, and OPT2. Below these is the 'Available network ports' section, which shows 'LAGG0 (UPLINK)' as an available option with an 'Add' button. A 'Save' button is located at the bottom left.

Interface	Network port	Actions
WAN	VLAN 4090 on lagg0 (WAN)	
LAN	VLAN 4091 on lagg0 (LAN)	Delete
OPT1	ix0 (00:08:a2:0d:5b:01)	Delete
OPT2	ix1 (00:08:a2:0d:5b:02)	Delete
Available network ports:	LAGG0 (UPLINK)	Add

## VLANs

Under VLANs, the default WAN and LAN VLAN can be seen. Additional VLAN networks that will be used by the switch should be defined here with **lagg0** as the parent interface.

Any additional VLAN interface added to the switch should also be added, enabled, and configured under Interface Assignments. Firewall rules will also be needed for new interfaces added.

The screenshot shows the 'VLANs' configuration page. The navigation tabs include Interface Assignments, Interface Groups, Wireless, VLANs, QinQs, PPPs, GREs, GIFs, Bridges, and LAGGs. The main content area has a table titled 'VLAN Interfaces'.

Interface	VLAN tag	Priority	Description	Actions
lagg0	4090		WAN	
lagg0	4091		LAN	

## LAGGs

Under LAGGs, the default **lagg0** containing **ix2** and **ix3** can be seen. The **lagg0** interface should not be modified.

The screenshot shows the 'LAGGs' configuration page. The navigation tabs include Interface Assignments, Interface Groups, Wireless, VLANs, QinQs, PPPs, GREs, GIFs, Bridges, and LAGGs. The main content area has a table titled 'LAGG Interfaces'.

Interface	Members	Description	Actions
LAGG0	ix2,ix3	UPLINK	

## 2.1.3 Switch Configuration Examples

### Dedicated LAN switch

In this scenario, SFP+ port ix0 will be configured as the WAN interface. ETH1-8 will be configured as a LAN switch.

For this specific example, I'll perform the WAN interface reassignment over console. Re-assigning the WAN can be done from the webGUI as well.

This is what the default interface assignments look like on a XG-7100 without an add-on NIC:

```
*** Welcome to pfSense 2.4.3-RELEASE (amd64) on pfSense ***

WAN (wan)      -> lagg0.4090 -> v4/DHCP4: 10.10.30.18/24
LAN (lan)      -> lagg0.4091 -> v4: 192.168.1.1/24
OPT1 (opt1)    -> ix0      ->
OPT2 (opt2)    -> ix1      ->

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

Enter an option: █
```

In this example, ix0 will be WAN, so select option 1 to re-assign WAN from lagg0.4090 to ix0:

```
Enter an option: 1

Valid interfaces are:

ix0      00:a0:c9:00:00:00 (down) Intel(R) PR0/10GbE PCI-Express Network Driver,
ix1      34:12:78:56:01:01 (down) Intel(R) PR0/10GbE PCI-Express Network Driver,
ix2      00:a0:c9:00:00:02 (down) Intel(R) PR0/10GbE PCI-Express Network Driver,
ix3      00:a0:c9:00:00:02 (down) Intel(R) PR0/10GbE PCI-Express Network Driver,

Do VLANs need to be set up first?
If VLANs will not be used, or only for optional interfaces, it is typical to
say no here and use the webConfigurator to configure VLANs later, if required.

Should VLANs be set up now [y|n]? █
```

No additional VLANs are needed for this, so enter n to continue.

Input ix0 as the new WAN interface name:

```
Should VLANs be set up now [y|n]? n

VLAN interfaces:

lagg0.4090      VLAN tag 4090, parent interface lagg0
lagg0.4091      VLAN tag 4091, parent interface lagg0

If the names of the interfaces are not known, auto-detection can
be used instead. To use auto-detection, please disconnect all
interfaces before pressing 'a' to begin the process.

Enter the WAN interface name or 'a' for auto-detection
(ix0 ix1 ix2 ix3 lagg0.4090 lagg0.4091 or a): █
```

Input the same default LAN interface of **lagg0.4091** for the LAN interface name and press Enter to complete the interface reassignment:

```
Enter the WAN interface name or 'a' for auto-detection
(ix0 ix1 ix2 ix3 lagg0.4090 lagg0.4091 or a): ix0

Enter the LAN interface name or 'a' for auto-detection
NOTE: this enables full Firewalling/NAT mode.
(ix1 ix2 ix3 lagg0.4090 lagg0.4091 a or nothing if finished): lagg0.4091

Optional interface 1 description found: OPT1
Enter the Optional 1 interface name or 'a' for auto-detection
(ix1 ix2 ix3 lagg0.4090 a or nothing if finished):

The interfaces will be assigned as follows:

WAN  -> ix0
LAN  -> lagg0.4091

Do you want to proceed [y|n]? █
```

The interface assignments should show like this now:

```

*** Welcome to pfSense 2.4.3-RELEASE (amd64) on pfSense ***

WAN (wan)      -> ix0          -> v4/DHCP4: 10.10.50.111/24
LAN (lan)      -> lagg0.4091 -> v4: 192.168.1.1/24

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

Enter an option: █

```

At this point SFP+ port **ix0** is now configured as the WAN interface. The LAN interface is still configured the same as the default. Next, the switch will need to be updated so that ETH1 (previously WAN) acts the same as ETH2-8. This will be done from the webGUI.

From the webGUI, pull up the Switch VLAN configuration under **Interfaces -> Switches -> VLANs**:

System Ports **VLANs** LAGGs

XG-7100 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		Default System VLAN	
1		4090	1,9t,10t	WAN	
2		4091	2,3,4,5,6,7,8,9t,10t	LAN	

VLAN 4090 is no longer needed since **WAN** is dedicated to **ix0** now. You can either select on the row containing **4090** to delete this entry, or click to remove port 1 as a member:

Interfaces / Switch / VLANs / Edit

**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	Action
<input type="text" value="1"/>	<input type="checkbox"/> tagged	
<input type="text" value="9"/>	<input checked="" type="checkbox"/> tagged	
<input type="text" value="10"/>	<input checked="" type="checkbox"/> tagged	

For this example, I simply removed VLAN 4090 from the switch with . Now edit the VLAN 4091 entry to include Member 1 as shown below:

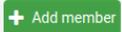
Interfaces / Switch / VLANs / Edit 

**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	Action
<input type="text" value="2"/>	<input type="checkbox"/> tagged	
<input type="text" value="3"/>	<input type="checkbox"/> tagged	
<input type="text" value="4"/>	<input type="checkbox"/> tagged	
<input type="text" value="5"/>	<input type="checkbox"/> tagged	
<input type="text" value="6"/>	<input type="checkbox"/> tagged	
<input type="text" value="7"/>	<input type="checkbox"/> tagged	
<input type="text" value="8"/>	<input type="checkbox"/> tagged	
<input type="text" value="9"/>	<input checked="" type="checkbox"/> tagged	
<input type="text" value="10"/>	<input checked="" type="checkbox"/> tagged	
<input type="text" value="1"/>	<input type="checkbox"/> tagged	

Next, update the PVID for ETH1 so that it uses VLAN 4091 rather than the old VLAN 4090. To do this, click on the **Ports** tab and click on the 4090 Port VID to modify it:

Interfaces / Switch / Ports ?

System Ports VLANs LAGGs

XG-7100 Switch Ports						
Port #	Port name	Port VID	Flags	State	Media	Status
1	ETH1	4090		FORWARDING	Ethernet autoselect (1000baseT <full-duplex>)	Active
2	ETH2	4091		FORWARDING	Ethernet autoselect (none)	No Carrier
3	ETH3	4091		FORWARDING	Ethernet autoselect (none)	No Carrier
4	ETH4	4091		FORWARDING	Ethernet autoselect (none)	No Carrier
5	ETH5	4091		FORWARDING	Ethernet autoselect (none)	No Carrier
6	ETH6	4091		FORWARDING	Ethernet autoselect (none)	No Carrier
7	ETH7	4091		FORWARDING	Ethernet autoselect (1000baseT <full-duplex>)	Active
8	ETH8	4091		FORWARDING	Ethernet autoselect (1000baseT <full-duplex>)	Active
9	Uplink 2	1	HOST	FORWARDING	Ethernet 2500Base-KX <full-duplex>	Active
10	Uplink 1	1	HOST	FORWARDING	Ethernet 2500Base-KX <full-duplex>	Active

Then click on **Save**:

Port VIDs updated. ✕

XG-7100 Switch Ports						
Port #	Port name	Port VID	Flags	State	Media	Status
1	ETH1	4091		FORWARDING	Ethernet autoselect (1000baseT <full-duplex>)	Active

At this point, everything should be configured properly. ETH1-8 will act as a single LAN switch. One final step that should be performed is to remove the old VLAN 4090 from pfSense. So far VLAN 4090 was only removed from the switch. To remove the old VLAN, go to **Interfaces -> Assignments -> VLANs** and use  on the 4090 row to remove this VLAN interface:

Interfaces / VLANs

Interface Assignments Interface Groups Wireless VLANs QinQs PPPs GREs GIFs Bridges LAGGs

VLAN Interfaces				
Interface	VLAN tag	Priority	Description	Actions
lagg0	4090		WAN	 
lagg0	4091		LAN	 

### Two LAN switches

In this scenario, the LAN switch from the previous example will be split into two LAN switches.

A new LAN network should be created in pfSense first. Similar to the existing LAN interface, another VLAN interface should be used so the switch can segment traffic appropriately.

Create a new VLAN with **lagg0** as the parent under **Interfaces -> Assignments -> VLANs**:

Interfaces / VLANs / Edit

**VLAN Configuration**

**Parent Interface**    
Only VLAN capable interfaces will be shown.

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

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

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

Once the VLAN has been created, it should look something like this:

Interfaces / VLANs

Interface Assignments   Interface Groups   Wireless   **VLANs**   QinQs   PPPs   GREs   GIFs   Bridges   LAGGs

**VLAN Interfaces**

Interface	VLAN tag	Priority	Description	Actions
lagg0	4091		LAN	
lagg0	4081		OFFICE LAN	

Add, enable, and configure the VLAN interface under Interfaces Assignments:

Interface Assignments   Interface Groups   Wireless   **VLANs**   QinQs   PPPs   GREs   GIFs   Bridges   LAGGs

Interface	Network port	Actions
WAN	<input type="text" value="ix0 (00:08:a2:0d:5b:01)"/>	
LAN	<input type="text" value="VLAN 4091 on lagg0 (LAN)"/>	Delete
Available network ports:	<input type="text" value="VLAN 4081 on lagg0 (OFFICE LAN)"/>	Add

Save

Interfaces / OPT1

### General Configuration

<b>Enable</b>	<input checked="" type="checkbox"/> Enable interface
<b>Description</b>	<input type="text" value="OFFICE-LAN"/> Enter a description (name) for the interface here.
<b>IPv4 Configuration Type</b>	<input type="text" value="Static IPv4"/>
<b>IPv6 Configuration Type</b>	<input type="text" value="None"/>
<b>MAC Address</b>	<input type="text" value="xx:xx:xx:xx:xx:xx"/> This field can be used to modify ("spoof") the MAC address of this interface. Enter a MAC address in the following format: xx:xx:xx:xx:xx:xx or leave blank.
<b>MTU</b>	<input type="text"/> If this field is blank, the adapter's default MTU will be used. This is typically 1500 bytes but can vary in some circumstances.
<b>MSS</b>	<input type="text"/> 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 used.
<b>Speed and Duplex</b>	<input type="text" value="Default (no preference, typically autoselect)"/> Explicitly set speed and duplex mode for this interface. WARNING: MUST be set to autoselect (automatically negotiate speed) unless the port this interface connects to has its speed and duplex mode set.

### Static IPv4 Configuration

<b>IPv4 Address</b>	<input type="text" value="192.168.2.1"/> / <input type="text" value="24"/>
<b>IPv4 Upstream gateway</b>	<input type="text" value="None"/> <a href="#">+ Add a new gateway</a> If this interface is an Internet connection, select an existing Gateway from the list or add a new one using the "Add" button. On local area network interfaces the upstream gateway should be "none". Gateways can be managed by <a href="#">clicking here</a> .

Also create any necessary firewall rules under **Firewall -> Rules**.

Now that pfSense knows of this new VLAN network, configure the switch so that ETH1-4 use the new network. To do this, go to **Interfaces -> Switches -> VLANs** and click the **Add Tag** button. Input the VLAN tag for the new network (same as the VLAN ID configured in the previous steps) and add ETH1-4 and PORT9-10 (uplinks) as members. Be sure **9** and **10** are marked as **tagged**:

Interfaces / Switch / VLANs / Edit

**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	Action
<input type="text" value="1"/>	<input type="checkbox"/> tagged	
<input type="text" value="2"/>	<input type="checkbox"/> tagged	
<input type="text" value="3"/>	<input type="checkbox"/> tagged	
<input type="text" value="4"/>	<input type="checkbox"/> tagged	
<input type="text" value="9"/>	<input checked="" type="checkbox"/> tagged	
<input type="text" value="10"/>	<input checked="" type="checkbox"/> tagged	

Save Add member

Once this is done, delete the untagged members 1,2,3,4 from **VLAN group 2** and click the **Save** button. The final result should look like this:

Interfaces / Switch / VLANs

System Ports **VLANs**

**XG-7100 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		Default System VLAN	
	1	4081	1,2,3,4,9t,10t	OFFICE LAN	
	2	4091	5,6,7,8,9t,10t	LAN	

Save Add Tag

Lastly, update the Port VIDs to use the new 4081 VLAN rather than 4091 on ETH1-4 and click **Save**:

Interfaces / Switch / Ports ?

System Ports VLANs LAGGs

Port VIDs updated. ✕

XG-7100 Switch Ports						
Port #	Port name	Port VID	Flags	State	Media	Status
1	ETH1	4081		FORWARDING	Ethernet autoselect (1000baseT <full-duplex>)	Active
2	ETH2	4081		FORWARDING	Ethernet autoselect (none)	No Carrier
3	ETH3	4081		FORWARDING	Ethernet autoselect (none)	No Carrier
4	ETH4	4081		FORWARDING	Ethernet autoselect (none)	No Carrier
5	ETH5	4091		FORWARDING	Ethernet autoselect (none)	No Carrier
6	ETH6	4091		FORWARDING	Ethernet autoselect (none)	No Carrier
7	ETH7	4091		FORWARDING	Ethernet autoselect (none)	No Carrier
8	ETH8	4091		FORWARDING	Ethernet autoselect (none)	No Carrier
9	Uplink 2	1	HOST	FORWARDING	Ethernet 2500Base-KX <full-duplex>	Active
10	Uplink 1	1	HOST	FORWARDING	Ethernet 2500Base-KX <full-duplex>	Active

Click a Port VID to edit Save

Now ETH1-4 act as a switch for the VLAN 4081 LAN and ETH5-8 act as a switch for the VLAN 4091 LAN.

### Trunking VLAN tagged traffic

For expanding on the previous example, let's assume there is a management VLAN of 4000 where devices are already tagged on this VLAN prior to hitting pfSense. Devices on this VLAN may come through on ETH8 but there may also be untagged client traffic.

First, create the management VLAN of 4000 in pfSense using the same steps in the previous example (up to the switch configuration part). Next, add the VLAN to the switch under **Interfaces -> Switches -> VLANs**. ETH8 and PORT9-10 should be added as members and all three will be marked as **tagged**:

Interfaces / Switch / VLANs / Edit

**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	Action
<input type="text" value="8"/>	<input checked="" type="checkbox"/> tagged	Delete
<input type="text" value="9"/>	<input checked="" type="checkbox"/> tagged	Delete
<input type="text" value="10"/>	<input checked="" type="checkbox"/> tagged	Delete

Once it's added, the final result should look like this:

Interfaces / Switch / VLANs ?

System   Ports   **VLANs**

**XG-7100 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		Default System VLAN	
	1	4081	1,2,3,4,9t,10t	OFFICE LAN	
	2	4091	5,6,7,8,9t,10t	LAN	
	3	4000	8t,9t,10t	EXISTING-VLAN	

Untagged traffic on ETH8 will be assigned a VLAN ID of 4091. ETH8 and the uplinks will also accept traffic that has already been tagged with a VLAN ID of 4000 as well.

## 2.2 Connecting to the Console Port

There are times when directly accessing the console is required. Perhaps webGUI or SSH access has been locked out, or the password has been lost or forgotten. This guide shows how to regain access directly through the console.

### 2.2.1 Install the Driver

A **Silicon Labs CP210x USB-to-UART Bridge** driver is used to provide access to the console, which is exposed via the **USB Mini-b (5-pin)** port on the appliance.

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

#### Windows

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

#### Mac OSX

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

For Mac, choose the **Macintosh OSX** 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.

## 2.2.2 Connect a USB Cable

Next, locate an appropriate USB cable that has a **USB Mini-b (5-pin)** connector on one end and a regular **USB Type A** plug on the other end. These cables are commonly used with smaller USB peripherals such as GPS units, cameras, and so on.

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 system side completely. With most cables there will be a tangible “click”, “snap”, or similar indication when the cable is fully engaged.

---

## 2.2.3 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.

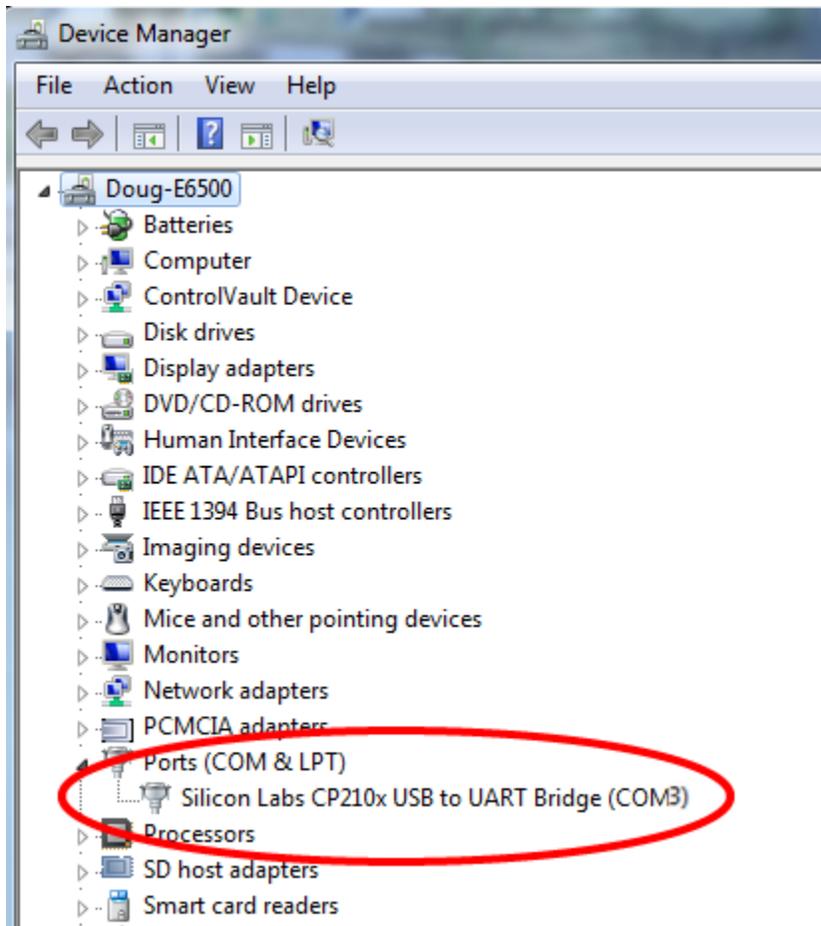
---

**Note:** Even if the serial port was assigned in the BIOS, the workstation’s 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.



#### Mac OSX

The device associated with the system console is likely to show up as **`/dev/cu.SLAB_USBtoUART`**.

#### 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`.

## 2.2.4 Launch a Terminal Program

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

Windows

For Windows it is recommended to run *PuTTY in Windows* or *SecureCRT*. An example of how to configure Putty is below.

**Warning:** Do not use **Hyperterminal**.

Mac OSX

For Mac OSX it is recommended to run *screen*, or *cu*. An example of how to configure screen is below.

Linux

For Linux it is recommended to run *screen*, *PuTTY in Linux*, *minicom*, or *dterm*. An example of how to configure Putty and screen is below.

FreeBSD

For FreeBSD it is recommended to run *screen* or *cu*. An example of how to configure screen is below.

### Client-Specific Examples

#### PuTTY in Windows

Open PuTTY and select **Session** under **Category** on the left hand side. Next, set the **Connection type** to **Serial**. Then, set **Serial line** to the console port that was located above, in *Locate the Console Port Device*, and the **Speed** to 115200 bits per second.

Click the **Open** button and the console screen will be displayed.

#### PuTTY in Linux

Open PuTTY from a terminal by typing **sudo putty**. Next, set the **Connection type** to **Serial**. Then, set **Serial line** to **/dev/ttyUSB0** and the **Speed** to 115200 bits per second.

Click the **Open** button and the console screen will be displayed.

#### 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
```

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
```

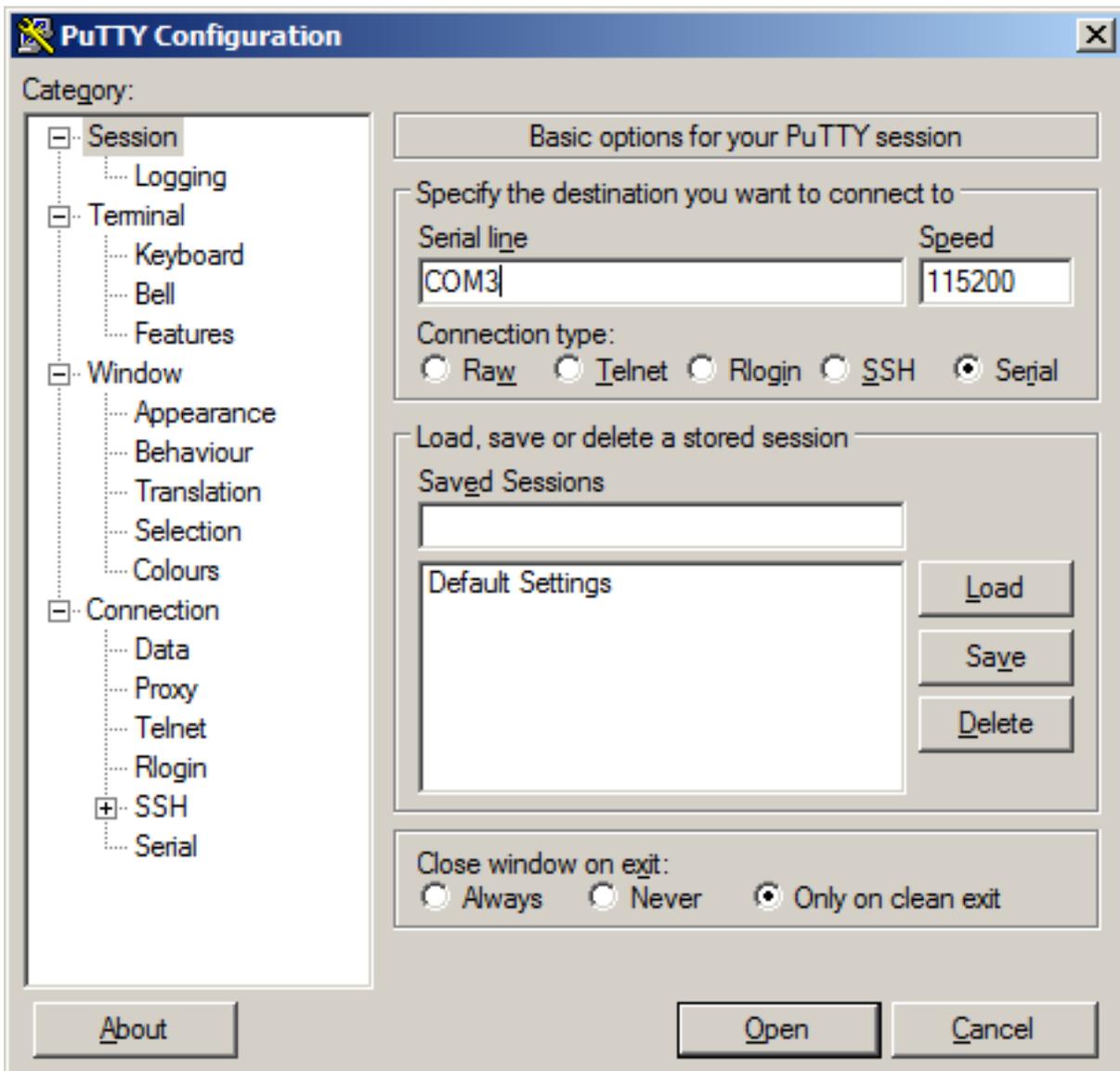


Fig. 7: An example of using PuTTY in Windows.



Fig. 8: An example of using PuTTY in Linux.

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

## 2.2.5 Troubleshooting

### No Serial Output

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

- Ensure the cable is correctly attached and fully inserted
- Ensure the terminal program is using the correct port
- 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**.
- Ensure the operating system is configured for the proper console (e.g. `ttys1` in Linux). Consult the various operating install 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*

**Window > Translation 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, binary, or random characters check the following items:

- Ensure the terminal program is configured for the correct speed. (See *No Serial Output*)
- 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:

- Ensure the terminal program is configured for the correct speed for the installed operating system. (See *No Serial Output*)
- Ensure the installed operating system is configured to activate the serial console.
- Ensure the installed operating system is configured for the proper console (e.g. `ttys1` in Linux). Consult the various operating install guides on this site for further information.
- If booting from a USB flash drive, ensure that the drive was written correctly and contains a bootable operating system image.

## 2.3 Reinstalling pfSense Software

1. Please [open a support ticket](#) to request access to the factory firmware by selecting **Firmware Access** as the **General Problem** and then select **Netgate XG-7100 Desktop** for the platform. Make sure to include the 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:

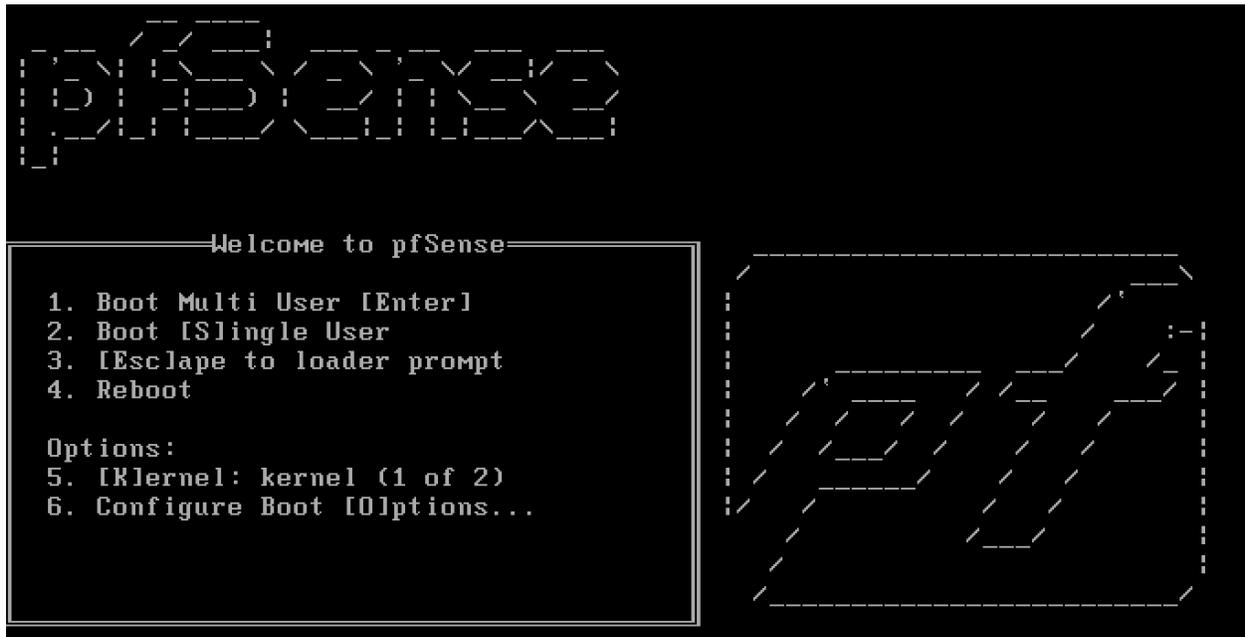
```
pfSense-netgate-memstick-XG-7100-2.4.5-p1-RELEASE-amd64.img.gz
```

---

**Note:** The pfSense® factory version is the version that is preinstalled on units purchased from Netgate. The factory image is optimally tuned for our hardware and contains some features that cannot be found elsewhere, such as the AWS VPN Wizard.

---

2. Write the image to a USB memstick. Locating the image and writing it to a USB memstick is covered in detail under [Writing Flash Drives](#).
3. *Connect to the console port* of the Netgate device.
4. Insert the memstick into an open USB port and boot the system.
5. After a minute the pfSense loader menu will be displayed with a 3 second timer. Either allow the menu to timeout or press 1 (the default) to continue.



6. Console options are presented for serial console installation. The default option is **vt100**.

```
Please choose the appropriate terminal type for your system.
Common console types are:
ansi      Standard ANSI terminal
vt100     VT100 or compatible terminal
xterm     xterm terminal emulator (or compatible)
cons25w   cons25w terminal
```

---

**Note:** Choosing the default `vt100` will work, but using `cons25w` on the XG-7100 will be easier to read.

---

7. The installer will automatically launch and several options will be presented. On Netgate firewalls, choosing `Enter` for the default options will complete the installation process.

---

**Note:** Options such as the type of disk partition can be modified through this installation if required.

---

8. The installer will then prompt to choose the type of system being installed, which pre-configures device-specific defaults. Choose the option that exactly matches the unit being reinstalled. If the model is unknown, check the sticker on the bottom of the unit.
9. Once the installer is finished, choose `No` and press `Enter` to skip going to a shell.
10. The installer will then prompt to Reboot the system. Select **Reboot** and press `Enter`. The system will shutdown and reboot.

```
Dec 21 22:41:37 Waiting (max 60 seconds) for system process `vnlru` to stop... done
Waiting (max 60 seconds) for system process `syncer` to stop...
Waiting (max 60 seconds) for system process `bufdaemon` to stop... done
All buffers synced.
Uptime: 5m43s
umass0: detached
```

11. **Remove the USB drive** from the USB port. pfSense will restart automatically. If the USB drive remains attached, the system will boot into the installer again because by default the system firmware is configured so that a device plugged into the USB port will be booted with a higher priority.

---

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

---

## 2.4 M.2 SATA Installation

The XG-7100 Desktop has 32 GB of onboard eMMC storage. Optionally, a M.2 SATA drive can be installed as an upgrade or to bypass the onboard eMMC flash memory.

**Warning: Before proceeding:**

1. Backup your 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:** By default, the M.2 SATA drive will be the first drive recognized by the Netgate® device. pfSense® must be reinstalled on the M.2 SATA drive.

---

---

**Note:** The XG-7100 does **not** support NVMe drives.

---

The M.2 SATA slot is located underneath the XG-7100 system board, so the entire board must be removed. The standoff is for the 2280 (22mm x 80mm) M.2 SATA drive.

1. Turn the XG-7100 Desktop over and remove the four (4) case screws.
2. Unplug the Power Supply Connector from the system board, being careful not to flex the board.
3. Unplug the power supply connector and the fan connector from the system board, being careful not to flex the board.

**Warning:** Be sure to pull from the connector, not the wires.

4. Remove the four (4) system board screws and gently slide system board away from the front faceplate until the board is free.





Fig. 10: Slide the Base of the System Away From the Lid

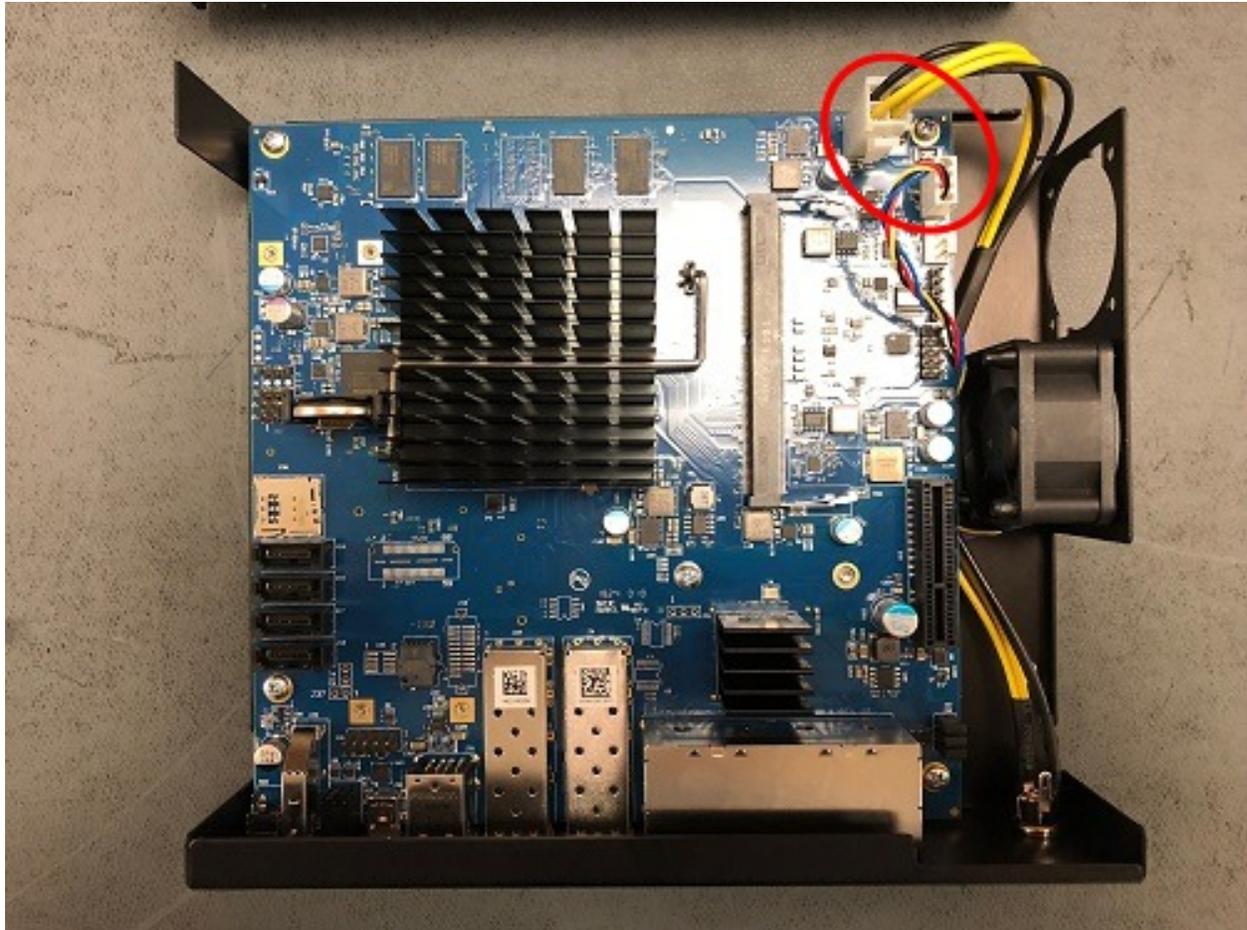


Fig. 11: Power Supply Connector and Fan Connector Location

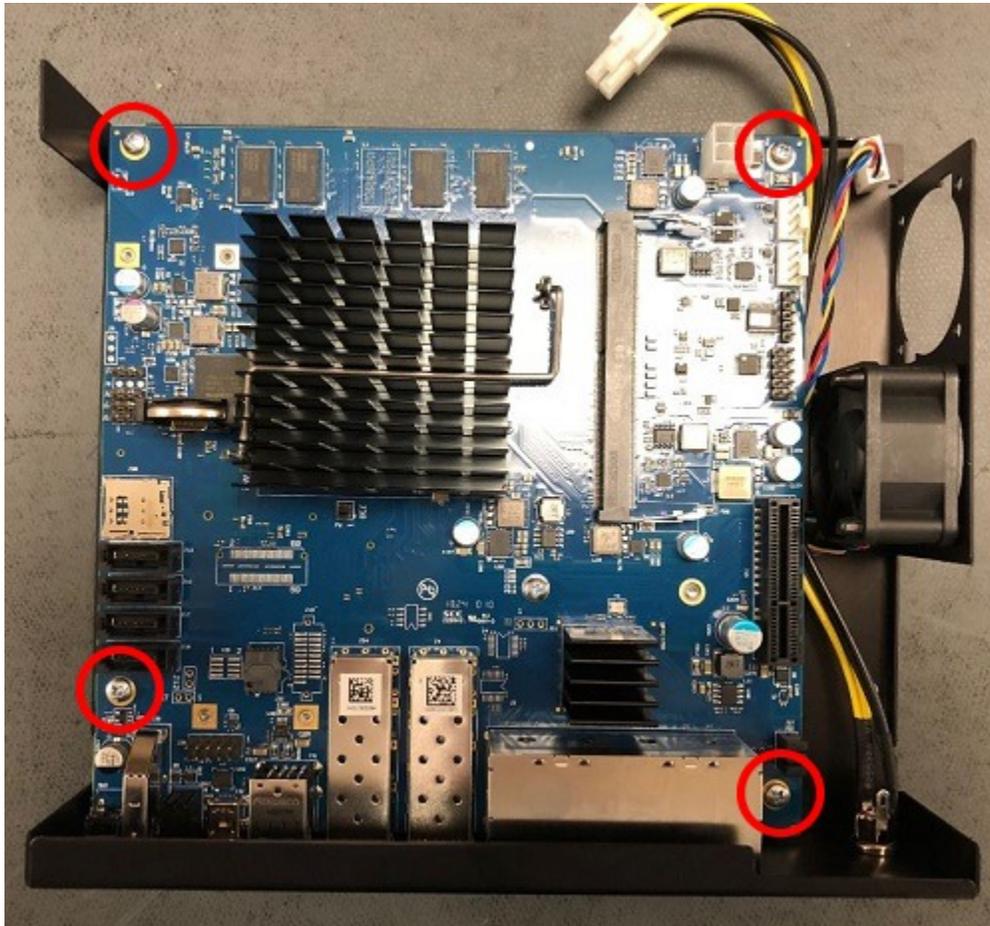


Fig. 12: Board Screw Locations

5. Turn the board over and locate the M.2 SATA slot.

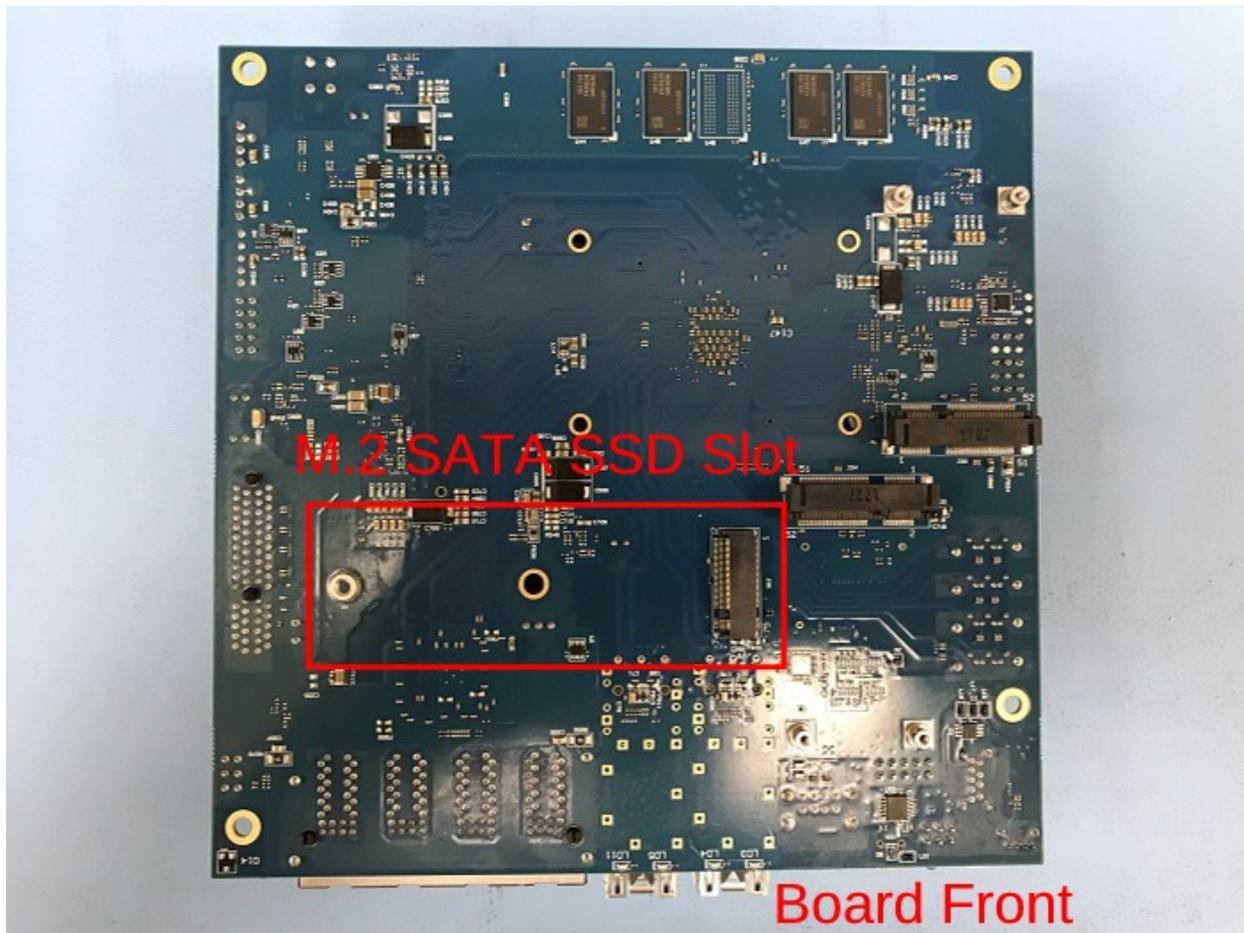


Fig. 13: M.2 SATA Slot Location

6. Insert the gold leads of the M.2 SATA drive into the slot at the angle shown.

---

**Note:** Be sure the drive label is facing up and can be seen. The drive slot is keyed and the drive can only go in one way. Do not force the drive into the slot.

---

7. Push the M.2 SATA drive down until it is parallel with the system board and use the screw to secure the M.2 SATA drive in place.
8. Turn the board over and place it into the chassis. Secure the system board with four (4) board screws.
9. Replace the power supply connector and fan connectors.
10. Slide the base back into the lid of the case, and replace the case screws. **Use a hand screwdriver and be careful not to crosstread the screws.**
11. Reinstall the pfSense software on the new M.2 SATA drive.
12. Restore your configuration backup if you have one.



Fig. 14: M.2 SATA Drive Properly Inserted into the Slot

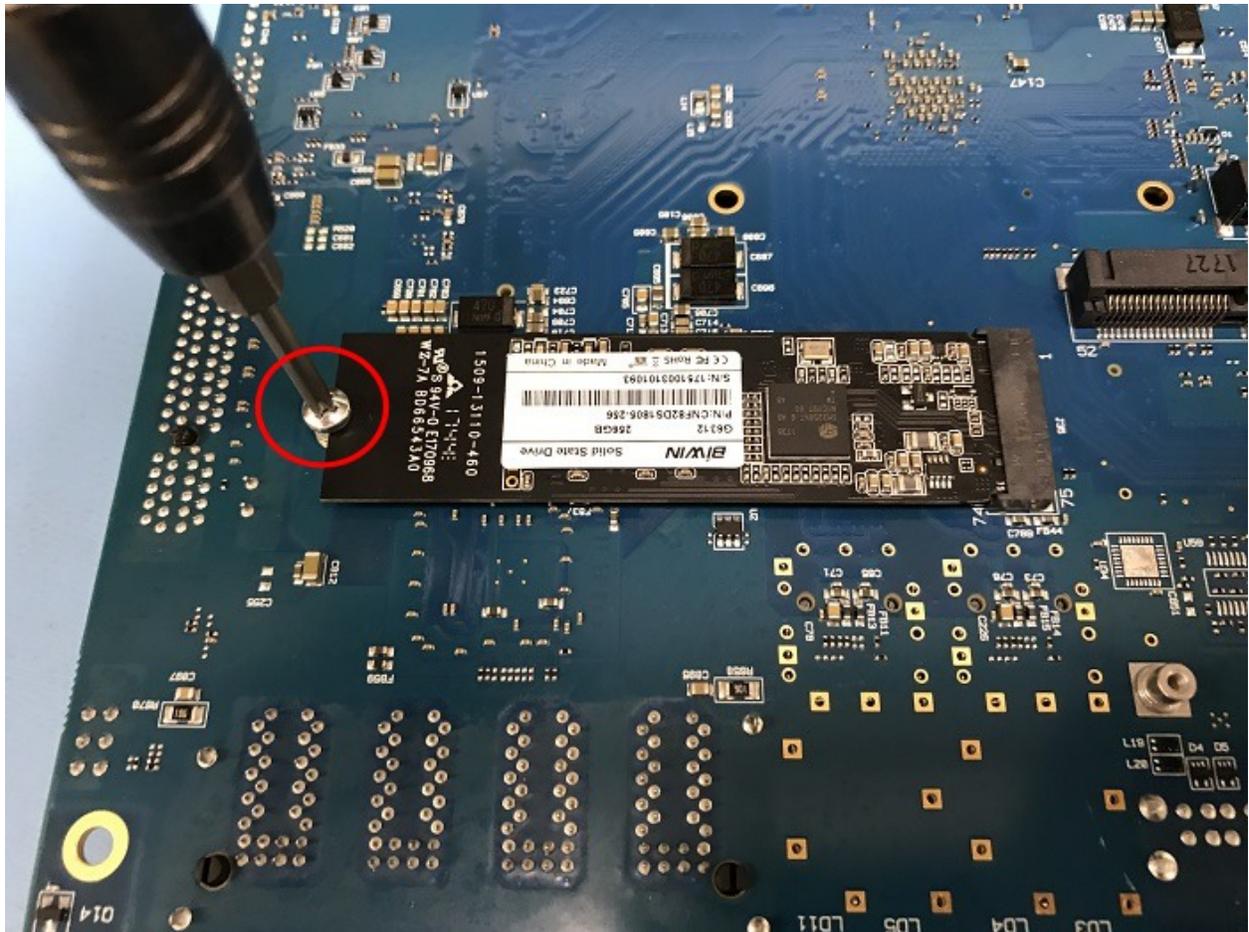


Fig. 15: Secure the M.2 SATA Drive

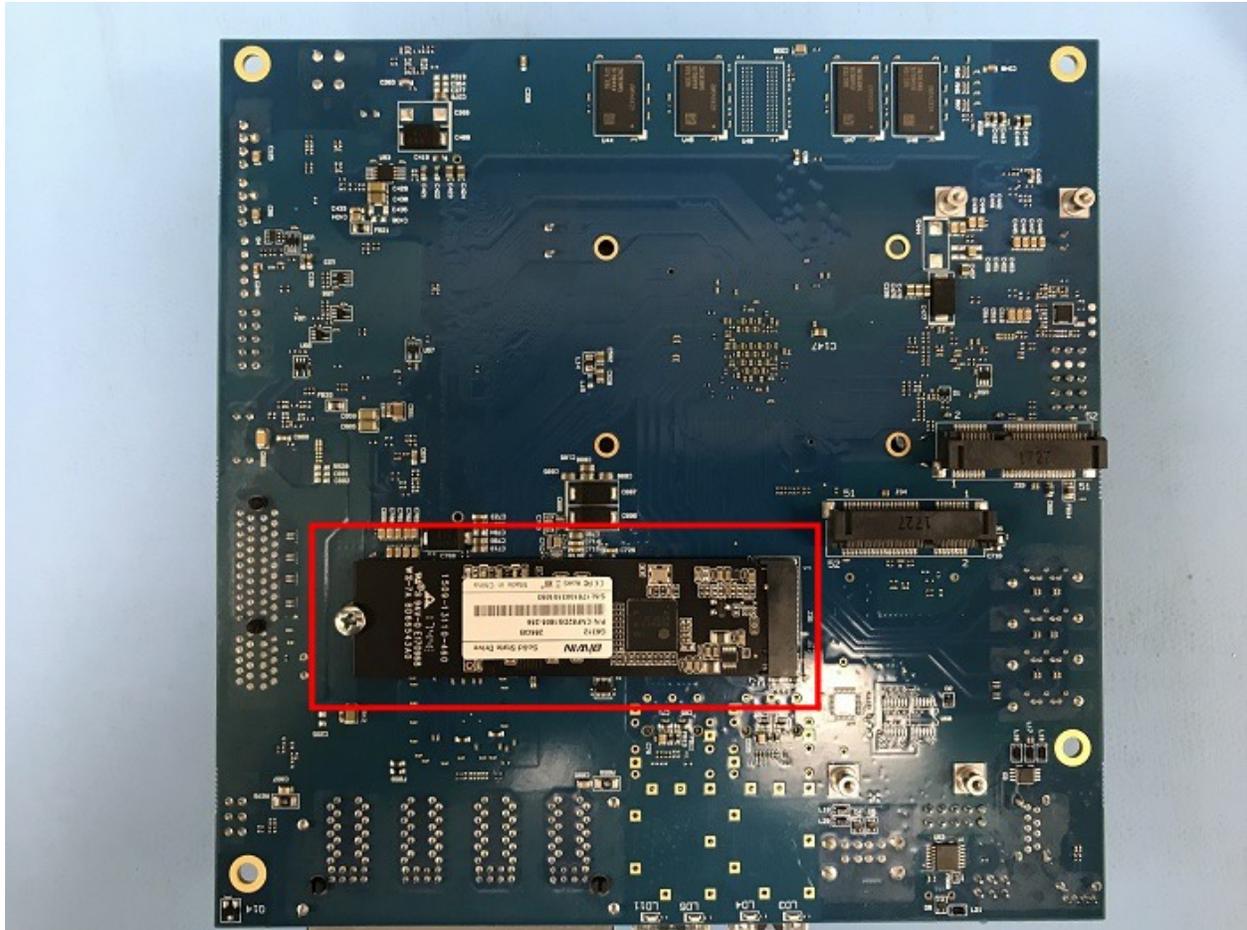


Fig. 16: M.2 SATA Drive Installed

## 2.5 BIOS Flash Procedure

### 2.5.1 Update via the GUI

**Warning:** This only works with Netgate systems running pfSense® version 2.3 or greater.

1. To install the package, navigate to **System > Package Manager > Available Packages**.
2. Click the **Install** button for the package named **Netgate\_Coreboot\_Upgrade**.
3. On the next page, click the **Confirm** button.
4. When the installation is complete a message will appear saying:

```
pfSense-pkg-Netgate_Coreboot_Upgrade installation successfully completed
```

5. Now that the package is installed, navigate to **System > Netgate Coreboot Upgrade**.
6. This page will show you the latest version of Coreboot available and the current version that is running on the system. If you happen to be on an older version of Coreboot then an **Update** button will be available to click.

---

**Important:** Pay close attention to any disclaimers presented. Some devices require a physical reboot or some step unique to that device.

---

## REFERENCES

### 3.1 Switch Ports Overview

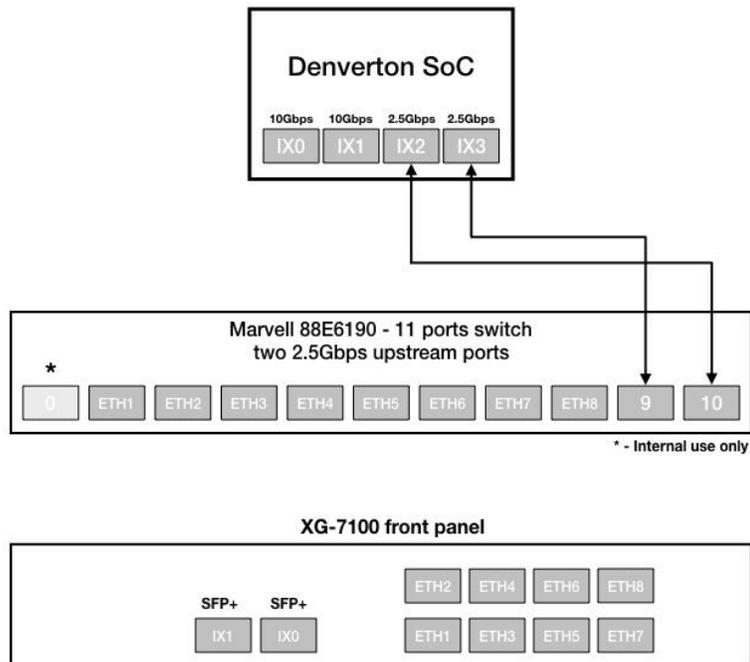
#### 3.1.1 Interface Links

In addition to two SFP+ interfaces, there is also an ethernet switch on the XG-7100. There are eight ethernet ports on this switch that are physically accessible - these interfaces are referred to as ETH1-ETH8. In addition to those 8 ports, there are also three additional ports that operate behind the scenes - PORT 0, PORT 9 (ix2), and PORT 10 (ix3).

ETH1-ETH8 are gigabit switchports.

PORT 9-10 are 2.5 Gbps uplink switchports. These two ports connect the ethernet switch to a [Denverton SoC](#). The SFP+ interfaces (ix0 and ix1) also connect to this SoC.

The diagram below demonstrates how these interfaces are connected:

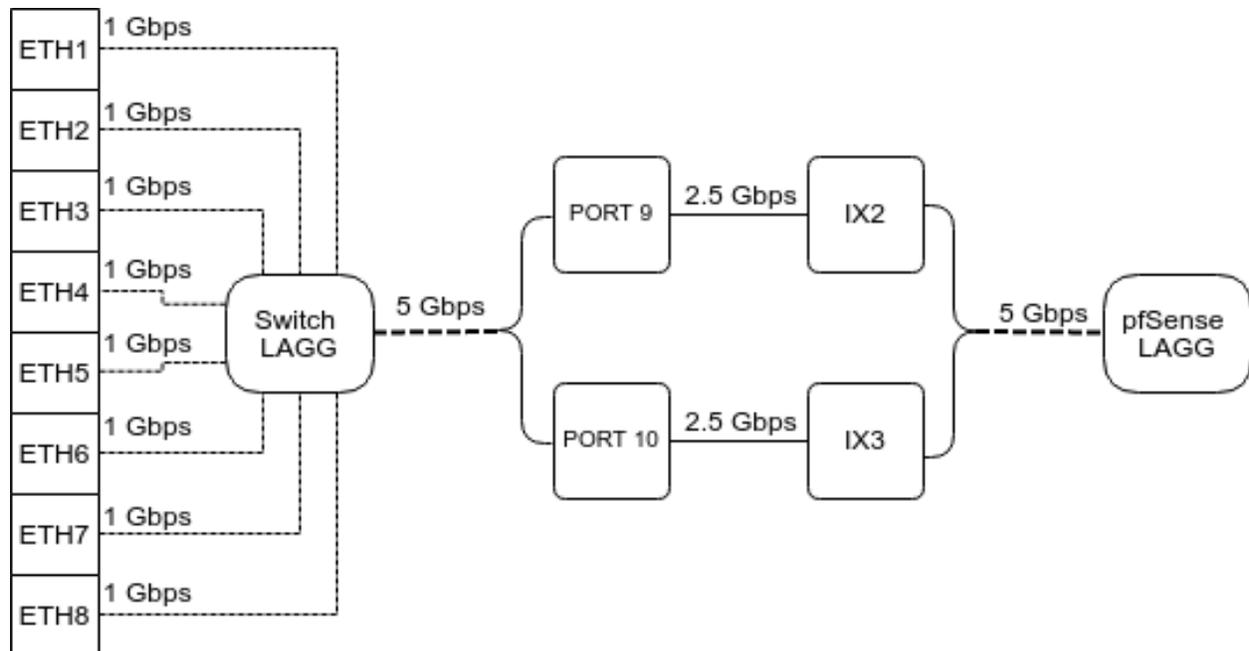


From the operating systems perspective, there are four physical interfaces present:

```
ix0 - 10Gbps SFP+
ix1 - 10Gbps SFP+
ix2 - 2.5 Gbps (2500-Base-KX, switch link to SoC/CPU)
ix3 - 2.5 Gbps (2500-Base-KX, switch link to SoC/CPU)
```

### 3.1.2 Switch LAGG

ix2 and ix3 (switch uplink ports 9 and 10), are configured as a load-balanced LAGG. This provides an aggregate uplink capable of 5Gbps for ethernet switchports ETH1-8. This is further demonstrated in the diagram below:



When data is received on ETH1-8, the switch is capable of utilizing LAGG to determine whether that data should be sent out of PORT 9 or PORT 10. That data then passes over one of two 2.5Gbps switch links (PORT 9/10) to the SoC. Data coming from PORT 9 has a direct line to ix2 and data from PORT 10 has a direct line to ix3.

pfSense® LAGG will then take in traffic from both ix2 and ix3 as though it came in on a single interface, **lagg0**. The same concept applies to traffic sourcing from the pfSense LAGG to the switch LAGG.

### 3.1.3 Switch VLANs

By default, ETH1 on the the switch is configured as a WAN interface and ETH2-8 are configured as the LAN interface. These eight switchports are customizable and each can be configured to act as an independent interface. For example, all of these configurations are possible:

- ETH1-8 dedicated as a LAN switch
- ETH1-4 configured as a switch for LAN network A and ETH5-8 configured as a switch for LAN network B
- ETH1-8 configured as individual network interfaces
- ETH1 configured for WAN A, ETH2 configured for WAN B, ETH3 configured for LAN network A, ETH4-6 configured as a switch for LAN network B, and ETH8 configured as a H/A sync port.

These scenarios are possible by utilizing VLANs. Each of the switchports (ETH1-8 and PORT9-10) are VLAN aware interfaces. They are capable of functioning like 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

In the default configuration, two VLANs are used to create the ETH1 WAN interface and ETH2-8 LAN interface:

WAN	VLAN 4090
LAN	VLAN 4091

ETH1-8 are configured to act as **Access** ports.

- When data comes into the ETH1 interface, a VLAN tag of 4090 is added to the ethernet frame.
- When data comes into interfaces ETH2-8, a VLAN tag of 4091 is added to the ethernet frame.

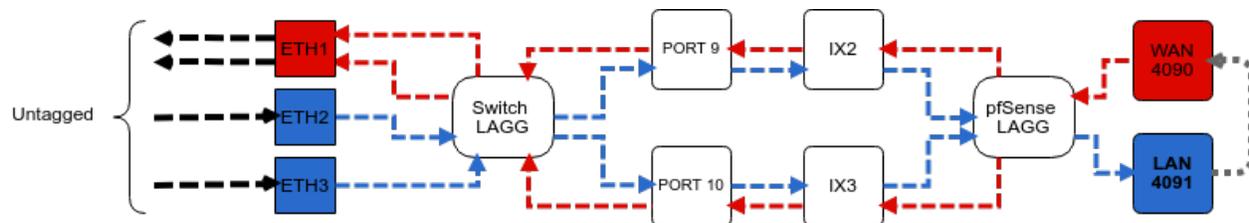
PORT9-10 are configured to act as **Trunk** ports.

- By default, only ethernet frames containing a VLAN tag of 4090 or 4091 are allowed over the trunk.

Each VLAN configured on the switch uses the LAGG interface as its parent interface. For example, the default interface assignment for WAN and LAN:

WAN	lagg0.4090
LAN	lagg0.4091

This means **vlan4090** and **vlan4091**, as well as any other VLANs created for the switch, all share the same 5Gbps LAGG uplink across two 2.5Gbps links. The visual below demonstrates how the VLAN tagging works along with the traffic flow:



**Note:** Traffic leaving and entering the ETH1-3 interfaces in the visual above are untagged. Devices sending/receiving traffic over these ports do not need to be VLAN aware. The VLAN tagging that occurs within the switch is completely transparent to clients. It's used solely for segmenting switch traffic internally.

Aside from being able to specify whether a switchport should act as an access or trunk port, it's also possible to disable 802.1q VLAN mode. When this is done, a third mode called **Port VLAN Mode** is enabled. In this 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 you have numerous VLANs on your network and want 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, you can specify which physical ports form a switch. For example, if I want to create two physical switches that act as individual dummy switches - allowing tagged or untagged traffic, I could configure **Port VLAN Mode** like so:

```
// UPLINKS
VLAN group 9, Port 9, Members 1,2,3,4,10
VLAN group 10, Port 10, Members 1,2,3,4,9

// SWITCH-A
VLAN group 1, Port 1, Members 2,3,4,9,10
VLAN group 2, Port 2, Members 1,3,4,9,10
VLAN group 3, Port 3, Members 1,2,4,9,10
VLAN group 4, Port 4, Members 1,2,3,9,10

// SWITCH-B
VLAN group 5, Port 5, Members 6,7,8
VLAN group 6, Port 6, Members 5,7,8
VLAN group 7, Port 7, Members 5,6,8
VLAN group 8, Port 8, Members 5,6,7
```

With this configuration in place, ETH1-8 now function like so:

```
// SWITCH-A
PORT 1 = ETH1
PORT 2 = ETH2
PORT 3 = ETH3
PORT 4 = ETH4
PORT 9 = UPLINK 1
PORT 10 = UPLINK 2

// SWITCH-B
PORT 5 = ETH5
PORT 6 = ETH6
PORT 7 = ETH7
PORT 8 = ETH8
```

### SWITCH-A

ETH1-4 can talk to each other and to the LAGG uplink. PORT9-10 are members of this switch... this is required for this switch to have uplink to pfSense.

### SWITCH-B

ETH5-8 can talk to each other but because PORT9-10 are not included as members, clients connecting to ETH5-8 can only talk to other clients on ETH5-8. They will not be able to reach the SoC where ix2 and ix3 are defined, so they never reach pfSense. This can be useful if you want a device other than pfSense to act as the primary uplink for those connected clients.

Since WAN and LAN are assigned to **lagg0.4090** and **lagg0.4091**, if **Port VLAN Mode** is enabled, be sure to update the LAN and WAN interface assignment to reference the appropriate VLAN. Also remember to create the new VLANs with **lagg0** as the parent interface.

If **Port VLAN Mode** is being used to handle untagged traffic, the **LAGG0** interface should be added, enabled, and configured under Interface Assignments.

#### See also:

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

## 3.2 Additional Resources

### 3.2.1 Netgate Training

Netgate training offers training courses for increasing your knowledge of pfSense® products and services. Whether you need to maintain or improve the security skills of your staff or offer highly specialized support 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 your Netgate appliance and for other helpful resources, make sure to browse our Resource Library.

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

### 3.2.3 Professional Services

Support 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 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

If you elected not to get a [paid support plan](#), you can find help from the active and knowledgeable pfSense community on our forums.

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

## 3.3 Warranty and Support

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

For support information, view our [support plans](#).

**See also:**

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