CONTENTS

1 Out of the Box 2
2 How-To Guides 21
3 References 53
This Quick Start Guide covers the first time connection procedures for the Netgate® 7100 Desktop Firewall Appliance and will provide the information needed to keep the appliance up and running.

**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.
CHAPTER ONE

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.

![Image of the Netgate appliance and a laptop connected via Ethernet cables]
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 Netgate 7100 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 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

1.2.1 The Setup Wizard

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

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

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).

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

5. 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.

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

7. Change the **Admin Password.** Enter the same password in both fields.

8. Click **Reload** to save the configuration.
Fig. 5: Change the Timezone and Click Next

Fig. 6: Default Settings Should be Acceptable. Click Next
9. After a few seconds, a message will indicate the Setup Wizard has completed. To proceed to the pfSense® Plus dashboard, click Finish.

10. A final notification screen will appear with the Copyright and Trademark Notices. Read and click Accept to continue to the dashboard.

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 Plus 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.

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® 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.

![Setup Wizard]

Fig. 9: Re-run the 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. 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.

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

1.4 Input and Output Ports

1.4.1 Networking Ports

<table>
<thead>
<tr>
<th>Interface Name</th>
<th>Port Name</th>
<th>Port Type</th>
<th>Port Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAN</td>
<td>ETH1</td>
<td>RJ-45</td>
<td>1 Gbps</td>
</tr>
<tr>
<td>LAN</td>
<td>ETH2-ETH8</td>
<td>RJ-45</td>
<td>1 Gbps</td>
</tr>
<tr>
<td>OPT1</td>
<td>IX0</td>
<td>SFP+</td>
<td>10 Gbps</td>
</tr>
<tr>
<td>OPT2</td>
<td>IX1</td>
<td>SFP+</td>
<td>10 Gbps</td>
</tr>
</tbody>
</table>

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 Netgate 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:** 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:

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

- Semi-recessed Power (PWR) (performs a graceful shutdown)
- 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 Netgate 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.

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.

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


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.
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 néaste 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.

1.5.8 Declaration of Conformity

Czech

NETGATE tímto prohla uje, e tento NETGATE device, je ve shod se základními po adavky a dal ími p íslu n mi ustanoveními sm rnice 1999/5/ES.

Danish

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

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”. (BMWi)

Ελληνικά [Greek]

ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ NETGATE ΔΗΛΩΝΕΙ ΤΙ ΝΕΤGATE device, ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ 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 vi 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 stabilita 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.
NETGATE declares that this NETGATE device is compliant with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Lietuviškai [Lithuanian]

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

Malti [Maltese]

Hawnhekk, Netgate, jiddikjara li dan NETGATE device, jikkonforma mal- ti ijiet 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 cualesquier 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.
**1.5.9 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

The arbitration will be conducted by the American Arbitration Association (AAA) under its rules. The AAA’s rules are available at 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.

**1.5.10 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.
1.5.11 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.

1.5.12 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.

1.5.13 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.

TO THE FULL EXTENT PERMISSIBLE BY APPLICABLE LAW, RUBICON COMMUNICATIONS, LLC (RCL) AND ELECTRIC SHEEP FENCING (ESF) DISCLAIM ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. RCL AND ESF DO NOT WARRANT THAT THE PRODUCTS/SERVICES, INFORMATION, CONTENT, MATERIALS, PRODUCTS (INCLUDING SOFTWARE) OR OTHER SERVICES INCLUDED ON OR OTHERWISE MADE AVAILABLE TO YOU THROUGH THE PRODUCTS/SERVICES, RCL’S OR ESF’S SERVERS OR ELECTRONIC COMMUNICATIONS SENT FROM RCL OR ESF ARE FREE OF VIRUSES OR OTHER HARMFUL COMPONENTS. RCL AND ESF WILL NOT BE LIABLE FOR ANY DAMAGES OF ANY KIND ARISING FROM THE USE OF ANY PRODUCTS/SERVICES, OR FROM ANY INFORMATION, CONTENT, MATERIALS, PRODUCTS (INCLUDING SOFTWARE) OR OTHER SERVICES INCLUDED ON OR OTHERWISE MADE AVAILABLE TO YOU THROUGH ANY PRODUCTS/SERVICES, INCLUDING, BUT NOT LIMITED TO DIRECT, INDIRECT, INCIDENTAL, PUNITIVE, AND CONSEQUENTIAL DAMAGES, UNLESS OTHERWISE SPECIFIED IN WRITING.

IN NO EVENT WILL RCL’S OR ESF’S LIABILITY TO YOU EXCEED THE PURCHASE PRICE PAID FOR THE PRODUCT OR SERVICE THAT IS THE BASIS OF THE CLAIM.

CERTAIN STATE LAWS DO NOT ALLOW LIMITATIONS ON IMPLIED WARRANTIES OR THE EXCLUSION OR LIMITATION OF CERTAIN DAMAGES. IF THESE LAWS APPLY TO YOU, SOME OR ALL OF THE ABOVE DISCLAIMERS, EXCLUSIONS, OR LIMITATIONS MAY NOT APPLY TO YOU, AND YOU MIGHT HAVE ADDITIONAL RIGHTS.
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® Plus 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

Fig. 1: Information on the Marvell 6000 switch

LAGGs

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.
### XG-7100 Switch Ports

<table>
<thead>
<tr>
<th>Port #</th>
<th>Port name</th>
<th>Port VID</th>
<th>Flags</th>
<th>State</th>
<th>Media</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ETH1</td>
<td>4090</td>
<td></td>
<td>FORWARDING</td>
<td>Ethernet autoselect (1000BaseT &lt;full-duplex&gt;)</td>
<td>Active</td>
</tr>
<tr>
<td>2</td>
<td>ETH2</td>
<td>4091</td>
<td></td>
<td>FORWARDING</td>
<td>Ethernet autoselect (none)</td>
<td>No Carrier</td>
</tr>
<tr>
<td>3</td>
<td>ETH3</td>
<td>4091</td>
<td></td>
<td>FORWARDING</td>
<td>Ethernet autoselect (none)</td>
<td>No Carrier</td>
</tr>
<tr>
<td>4</td>
<td>ETH4</td>
<td>4091</td>
<td></td>
<td>FORWARDING</td>
<td>Ethernet autoselect (none)</td>
<td>No Carrier</td>
</tr>
<tr>
<td>5</td>
<td>ETH5</td>
<td>4091</td>
<td></td>
<td>FORWARDING</td>
<td>Ethernet autoselect (none)</td>
<td>No Carrier</td>
</tr>
<tr>
<td>6</td>
<td>ETH6</td>
<td>4091</td>
<td></td>
<td>FORWARDING</td>
<td>Ethernet autoselect (none)</td>
<td>No Carrier</td>
</tr>
<tr>
<td>7</td>
<td>ETH7</td>
<td>4091</td>
<td></td>
<td>FORWARDING</td>
<td>Ethernet autoselect (none)</td>
<td>No Carrier</td>
</tr>
<tr>
<td>8</td>
<td>ETH8</td>
<td>4091</td>
<td></td>
<td>FORWARDING</td>
<td>Ethernet autoselect (none)</td>
<td>No Carrier</td>
</tr>
<tr>
<td>9</td>
<td>Uplink 2</td>
<td>1</td>
<td>HOST</td>
<td>FORWARDING</td>
<td>Ethernet 2500Base-KX &lt;full-duplex&gt;</td>
<td>Active</td>
</tr>
<tr>
<td>10</td>
<td>Uplink 1</td>
<td>1</td>
<td>HOST</td>
<td>FORWARDING</td>
<td>Ethernet 2500Base-KX &lt;full-duplex&gt;</td>
<td>Active</td>
</tr>
</tbody>
</table>

**Fig. 3:** 802.1q enabled (default)

### XG-7100 Switch Ports

<table>
<thead>
<tr>
<th>Port #</th>
<th>Port name</th>
<th>Flags</th>
<th>State</th>
<th>Media</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ETH1</td>
<td>DISABLED</td>
<td></td>
<td>Ethernet autoselect (1000BaseT &lt;full-duplex&gt;)</td>
<td>Active</td>
</tr>
<tr>
<td>2</td>
<td>ETH2</td>
<td>DISABLED</td>
<td></td>
<td>Ethernet autoselect (none)</td>
<td>No Carrier</td>
</tr>
<tr>
<td>3</td>
<td>ETH3</td>
<td>DISABLED</td>
<td></td>
<td>Ethernet autoselect (none)</td>
<td>No Carrier</td>
</tr>
<tr>
<td>4</td>
<td>ETH4</td>
<td>DISABLED</td>
<td></td>
<td>Ethernet autoselect (none)</td>
<td>No Carrier</td>
</tr>
<tr>
<td>5</td>
<td>ETH5</td>
<td>DISABLED</td>
<td></td>
<td>Ethernet autoselect (none)</td>
<td>No Carrier</td>
</tr>
<tr>
<td>6</td>
<td>ETH6</td>
<td>DISABLED</td>
<td></td>
<td>Ethernet autoselect (none)</td>
<td>No Carrier</td>
</tr>
<tr>
<td>7</td>
<td>ETH7</td>
<td>DISABLED</td>
<td></td>
<td>Ethernet autoselect (1000BaseT &lt;full-duplex&gt;)</td>
<td>Active</td>
</tr>
<tr>
<td>8</td>
<td>ETH8</td>
<td>DISABLED</td>
<td></td>
<td>Ethernet autoselect (1000BaseT &lt;full-duplex&gt;)</td>
<td>Active</td>
</tr>
<tr>
<td>9</td>
<td>Uplink 2</td>
<td>HOST</td>
<td>DISABLED</td>
<td>Ethernet 2500Base-KX &lt;full-duplex&gt;</td>
<td>Active</td>
</tr>
<tr>
<td>10</td>
<td>Uplink 1</td>
<td>HOST</td>
<td>DISABLED</td>
<td>Ethernet 2500Base-KX &lt;full-duplex&gt;</td>
<td>Active</td>
</tr>
</tbody>
</table>

**Fig. 4:** Port VLAN Mode
Fig. 5: 802.1q enabled (default)

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.

**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.

**LAGGs**

Under LAGGs, the default **lagg0** containing **ix2** and **ix3** can be seen. The **lagg0** interface should not be modified.
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 Netgate 7100:

```
*** 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:c9:60:00:00 (down) Intel(R) PRO/10GbE PCI-Express Network Driver,
ix1  34:12:78:56:01:01 (down) Intel(R) PRO/10GbE PCI-Express Network Driver,
ix2  00:a0:c9:00:00:02 (down) Intel(R) PRO/10GbE PCI-Express Network Driver,
ix3  00:a0:c9:00:00:02 (down) Intel(R) PRO/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:
Input the same default **LAN** interface of `lag0.4091` for the **LAN** interface name and press *Enter* to complete the interface reassignment:

The interface assignments should show like this now:
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**:

VLAN 4090 is no longer needed since WAN is dedicated to ix0 now. You can either select the row containing 4090 to delete this entry, or click to remove port 1 as a member:
For this example, I simply removed VLAN 4090 from the switch with VLAN 4091 entry to include Member 1 as shown below:

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:
Then click on Save:

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® Plus. 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:
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® Plus 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:

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

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

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

Now that pfSense® Plus 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:
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:

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

Once it’s added, the final result should look like this:
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 OS X 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 OS X
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.
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 Plus 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 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-plus-memstick-XG-7100-21.05.1-RELEASE-amd64.img.gz

   Note: pfSense® Plus is preinstalled on Netgate appliances, which is optimally tuned for our hardware and contains some features that cannot be found elsewhere, such as the AWS VPC 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® Plus 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 Netgate 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.
11. **Remove the USB drive** from the USB port. pfSense® Plus 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® Plus 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. 9: Case Screws
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.

![M.2 SATA Slot Location](image)

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 cross-thread the screws.

11. Reinstall the pfSense® Plus 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

Updating firmware via the GUI is handled via the “Netgate Firmware Upgrade” package.

Note: This package was formerly known as “Netgate Coreboot Upgrade”

Install the Netgate Firmware Upgrade Package

This package is present on relevant Netgate hardware installations by default, but can be added manually. If the package is already present, skip to the next section.

- Navigate to System > Package Manager > Available Packages
- Click the Install button for the package named Netgate_Firmware_Upgrade
- Click the Confirm button
- Wait for the installation to complete

When complete, the page displays the following message:

```
 pfSense-pkg-Netgate_Firmware_Upgrade installation successfully completed
```

Update Firmware

With the package installed, updating the firmware is now possible on supported hardware:

- Navigate to System > Netgate Firmware Upgrade
  This page shows the latest version of firmware available and the current version that is running on the system.

- Compare the Current Firmware Version to the Latest Firmware Version
  If the system is on an older firmware version, the page displays an Update button.

- Click Update to update the firmware

Important: Pay close attention to any disclaimers presented. Some devices require a physical power cycle (remove and reapply power) or steps unique to specific devices.
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® Plus 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® Plus LAGG to the switch LAGG.

### 3.1.3 Switch VLANs

By default, ETH1 on 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:

<table>
<thead>
<tr>
<th></th>
<th>VLAN ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAN</td>
<td>VLAN 4090</td>
</tr>
<tr>
<td>LAN</td>
<td>VLAN 4091</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>VLAN</th>
<th>LAGG interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAN</td>
<td>lagg0.4090</td>
</tr>
<tr>
<td>LAN</td>
<td>lagg0.4091</td>
</tr>
</tbody>
</table>

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:

```markdown
// 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® Plus software.

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 the pfSense® Plus software. This can be useful if you want a device other than a pfSense® Plus firewall 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® Plus 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® 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

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® Plus software, see the pfSense Documentation and Resource Library.