Fortinet NGFW with Gigamon Inline Deployment Guide

Version 1.0

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Overview

Fortinet's award-winning next-generation firewalls (NGFWs) provide high-performance, consolidated security for end-to-end protection across the entire network. Through awareness of applications, users, and content within network traffic, FortiGate NGFWs offer comprehensive protection against known and unknown threats (e.g., ransomware, malicious botnets, zero-day, and encrypted malware). They offer scalable throughput of advanced security services, flexible network interfaces, and performance based on Fortinet's powerful security processors. The FortiOS operating system ensures superior price, performance, and security efficacy.

The GigaVUE-HC2 Series is part of the GigaSECURE® Security Delivery Platform from Gigamon. The GigaBPS module in the GigaVUE-HC2 Series provides bypass protection to the Fortinet 3020 NGFWs. The module leverages two levels of bypass protection: physical and logical. Physical bypass preserves network traffic, failing to wire in the event of a power outage. Logical bypass protects against inline tool failures that could disrupt network traffic. Bidirectional heartbeats monitor the health of the inline tool and in the event of a loss of link or loss of heartbeat the Gigamon-HC2 can bypass traffic around the failing tool. Alternatively, the Gigamon-HC2 can bring down the network link so that the traffic can be routed to a redundant network path. GigaBPS pertains specifically to fiber links. For copper bypass, Gigamon offers a GigaVUE-HC2 copper TAP module. This module includes electrical relays that can be used for bypass protection.

Aside from the above, deploying FortiGate and Gigamon together has the following benefits:

- Traffic distribution for load sharing

  Improves the scalability of inline security by distributing the traffic across multiple FortiGate NGFW appliances, allowing them to share the load and inspect more traffic.

- Agile deployment

  Adds, removes, and/or upgrades FortiGate NGFW appliances without disrupting network traffic; converting FortiGate NGFW appliances from out-of-band monitoring to inline inspection on the fly without rewiring.

Solution Overview

The solution tested and described in this guide is based on a standard active inline network and tool deployment where two or more Fortinet appliances are directly cabled to one GigaVUE-HC2 chassis. The solution was tested with one GigaVUE-HC2 visibility node, one GigaVUE-FM Fabric Manager, and a FortiGate appliance.

This section covers the following:

- Use Case
- Deployment Prerequisites
- Architecture Overview
- Access Credentials

Use Case: Inline Bypass (Virtual Wire Pair) Mode

Customers may need multiple FortiGate NGFW appliances to scale to the volume of traffic generated on their network. When the aggregate traffic exceeds the capacity of any single FortiGate NGFW, you must deploy multiple NGFWs with the ability to select traffic of interest, while bypassing the rest, and then distributing the selected traffic of interest among two or more NGFWs.

This distribution ensures all packets in a given TCP/UDP session go to the same group member. It also ensures that if any member of the group goes offline for any reason, the Gigamon-HC2 will distribute traffic amongst the remaining members, thereby ensuring availability of the security functions provided by the Fortinet NGFW.

Gigamon also gives the ability to test the configuration in an out-of-band mode called *bypass with monitoring* to allow complete confidence before going *live*. Switching from out-of-band to in-band is done by changing the setting in the inline network link, eliminating the need for physical change control procedures.

Deployment Prerequisites

The Gigamon plus Fortinet Next Generation Firewall (NGFW) solution consists of the following:

- GigaVUE-HC2 chassis with GigaVUE-OS 5.0.00 software, one PRT-HC0-X24, and one TAP-HC0-G100C0 (a BPS-HC0 line card can also be used).
- GigaVUE-FM version 5.0 software for GigaVUE-HC2 GUI configuration
- Two FortiGate NGFW appliance. This includes the following:
- FortiOS version 5.4.5

NOTE: This guide assumes all appliances are fully licensed for all features used, management network interfaces have been configured, and an account with sufficient admin privileges is used.

Architecture Overview

This section presents the combined solution using a GigaVUE-HC2 inline bypass module with a FortiGate NGFW appliance. The reference architecture in Figure 1-1 shows each component's position in the overall network infrastructure, where all network components and inline security tools are connected directly to the GigaVUE-HC2.

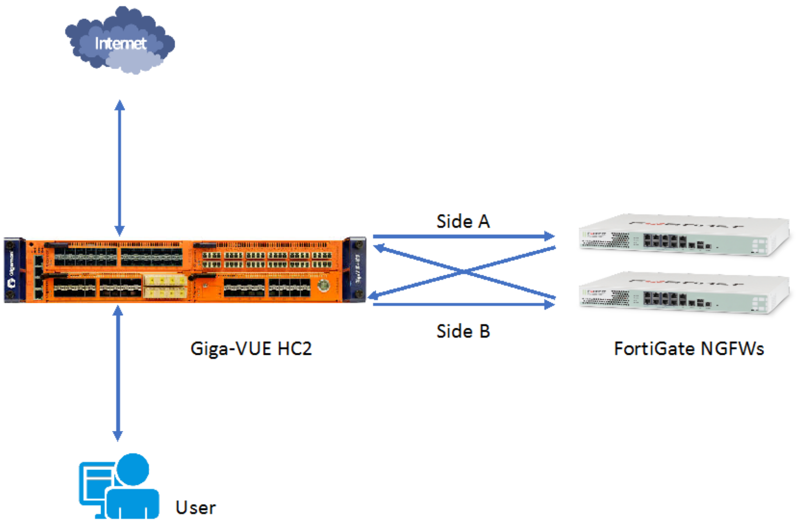


Figure 1-1: Gigamon Inline Bypass with FortiGate NGFW

Notice in Figure 1-1 that there is a sidedness to the architecture because data flows to and from Side A where the clients reside to Side B where the Internet and resources they request also reside.

NOTE: It is essential that you connect the inline network and inline tool device bridge links to the GigaVUE-HC2 correctly relative to Side A and Side B so that traffic is distributed correctly to the Fortinet devices of the inline tool group.

Access Credentials

The default access credentials for the Gigamon GigaVUE-FM and FortiGate NGFW are as follows:

Gigamon GigaVUE-FM access defaults:

- Username: admin
- Password: admin123A!
- There is no default management IP address

FortiGate NGFW access defaults:

- Username: admin
- Password: *leave blank*
- Default management IP address: 192.168.1.99

NOTE: The GigaVUE-HC2 supports a Graphical User Interface (GUI) named H-VUE and a Command Line Interface (CLI). This document shows only the steps for configuring the GigaVUE-HC with GigaVUE-FM. For the equivalent H-VUE and CLI configuration commands, refer to the *GigaVUE-OS H-VUE User's Guide and GigaVUE-OS CLI User's Guide* respectively for the GigaVUE-OS 5.0 release.

Configurations

This chapter describes the configuration procedures for the GigaVUE-HC2 and FortiGate NGFW as an inline tool group solution through Gigamon's GigaVUE-FM. The procedures are organized as follows:

- FortiGate Configuration: Virtual Wire Pair
- Gigamon GigaVUE-HC2 Configuration: Inline Networks and Inline Tool Groups

The procedures configure the GigaVUE-HC2 to send live traffic to the FortiGate inline tool group, which will allow the use of FortiGate's NGFW protection capabilities.

Per best practices guidelines from FortiGate, the Gigamon GigaVUE-HC2 will be configured to distribute the traffic to the two Fortinet appliances in the inline tool group, assuring all traffic for any given client (by IP address) goes to the same member of the Fortinet inline tool group.

NOTE: This chapter assumes that you have connected the Fortinet appliances directly to GigaVUE-HC2 as shown in Figure 1-1. You should configure all GigaVUE-HC2 ports that connects the Fortinet appliances as port type Inline Tool. Furthermore, you should configure the GigaVUE-HC2 inline bypass ports connected to the network devices as Inline Network ports. For specific instructions on how to complete these tasks, refer to the User Guides and Technical Documentation in the Customer Portal.

NOTE: This chapter describes how to configure the FortiGate NGFW in NAT Mode using Virtual Wire Pairs. The FortiGate NGFW could instead be configured in Transparent Mode if needed.

Configuring FortiGate NGFW: Virtual Wire Pair

The procedures described in this section apply to the highlighted area in the reference architecture diagram shown in Figure 2-1.

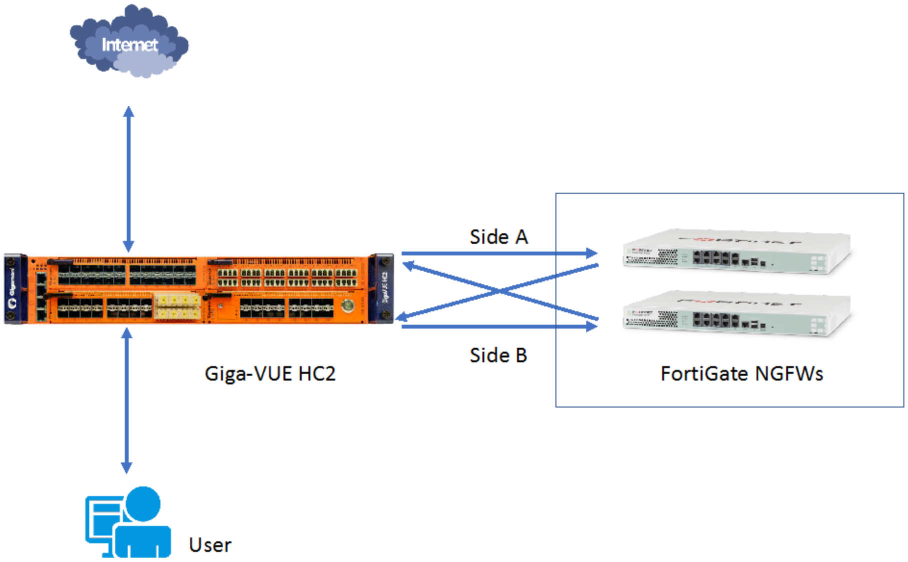


Figure 2-1: FortiGate NGFW

Configuring FortiGate Virtual Wire Pair

To configure the FortiGate NGFW Virtual Wire Pair, perform the following steps for each FortiGate appliance. You can skip these steps if the Virtual Wire Pairs you wish to use are already configured.

1. In the FortiGate GUI, go to **Network** > **Interfaces**.

2. Click **Create New** and choose **Virtual Wire Pair** from the drop-down list. Refer to Figure 2-2.

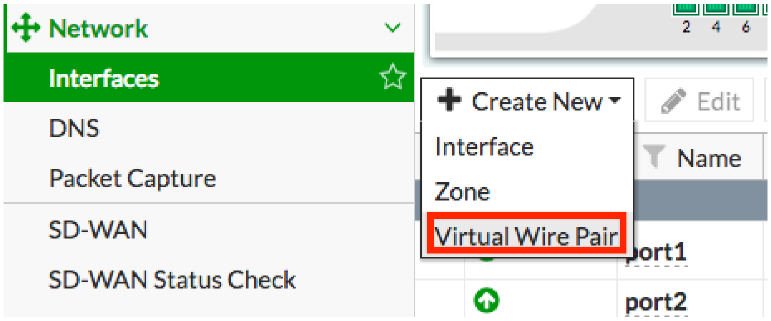
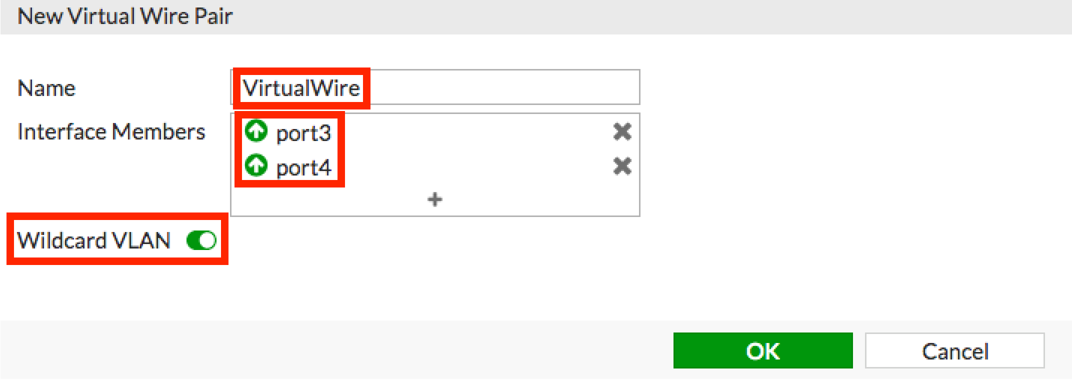


Figure 2-2: Navigation to Virtual Wire Pair

3. In the **Name** field, enter a name for the Virtual Wire Pair. Refer to Figure 2-3.



New Virtual Wire Pair

Name: VirtualWire

Interface Members: port3, port4

Wildcard VLAN: ●

Figure 2-3: Creating the Virtual Wire Pair

4. In the **Interface Members** box, click the + sign and choose the 2 ports you want to use.
5. Enable the **Wildcard VLAN** option if you are passing the traffic that is VLAN tagged. Click **OK**.
6. Repeat these steps on the next FortiGate NGFW.

Configuring GigaVUE-HC2: Inline Network and Inline Tool Groups

This section covers configuring the GigaVUE-HC2 for all inline network and inline tool elements that you will use to create traffic flow maps. There are some configuration differences depending upon whether you are using BPS (Bypass fiber) or BPC (Bypass copper) interfaces for inline bypass. This section explains these differences. The configuration consists of the following procedures:

- Configuring the GigaVUE-HC2 Inline Network and Inline Tools
- Configuring the Inline Traffic Flow Maps
- Testing the Functionality of the FortiGate NGFW

The configuration procedures described in this section apply to the highlighted area in Figure 2-4.

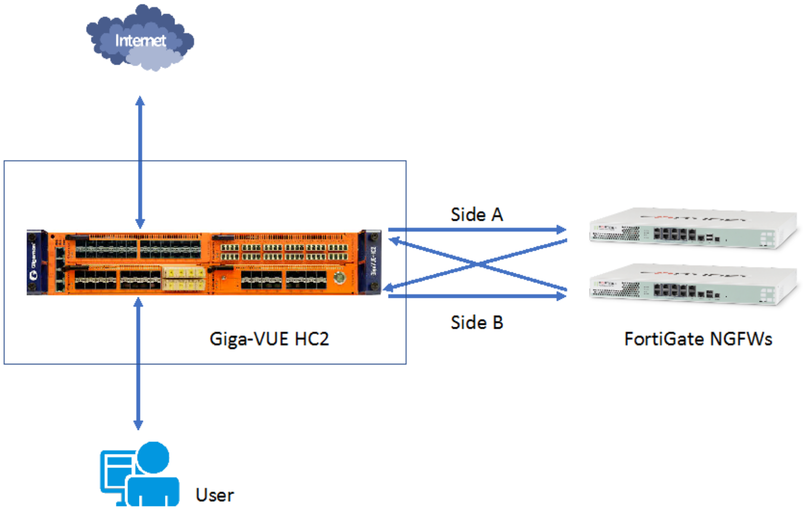


Figure 2-4: Gigamon GigaVUE-HC2 Configurations

Configuring the GigaVUE-HC2 Inline Network and Inline Tools

This section describes the steps needed to configure inline network bypass pairs and an inline network group for those pairs. As the enterprise infrastructure grows, you can add additional inline network pairs to the inline network group. The basic steps are as follows:

Step 1: Configure the Inline Network Bypass Pair

Step 2: Configure the Inline Network Group (if applicable)

Step 3: Configure the Inline Tools

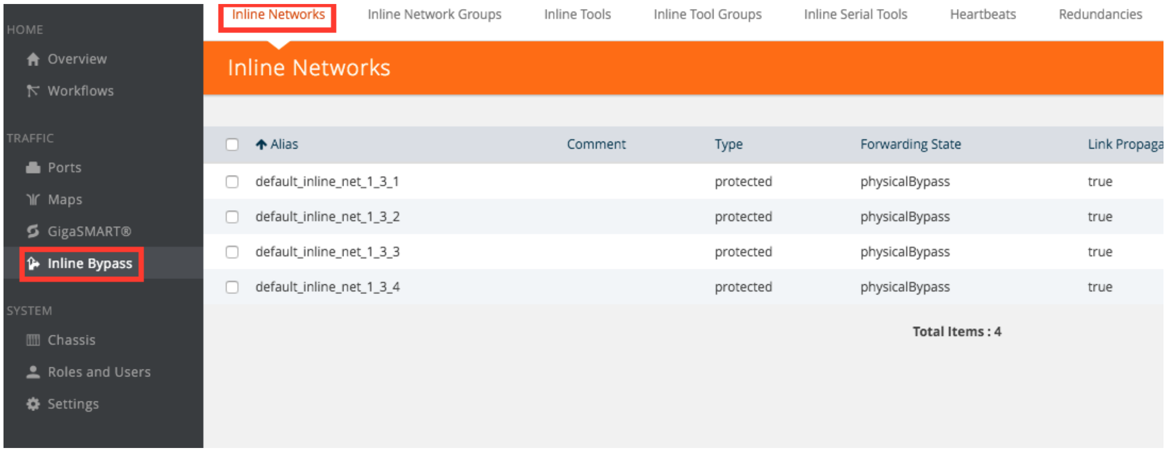
NOTE: This section assumes all the ports to which the network devices are connected are set as Inline Network port types. For specific instructions on completing these tasks, refer to the User Guides and Technical Documentation in the Customer Portal.

Step 1: Configuring the Inline Network Bypass Pair

To configure the inline network bypass pair, do the following:

1. Log into GigaVUE-FM and select **Physical Nodes**.
2. Select the GigaVUE-HC2 from the list of physical nodes that GigaVUE-FM is managing.
3. Select **Inline Bypass > Inline Networks**.

NOTE: If there is a bypass combo module in the GigaVUE-HC2, there will be four preconfigured Inline Network port pairs as shown in Figure 2-5. If your network is 1G or 10G fiber, use one of these preconfigured inline bypass pairs and move on to Step 2. If your network is 1G copper, perform the following steps.



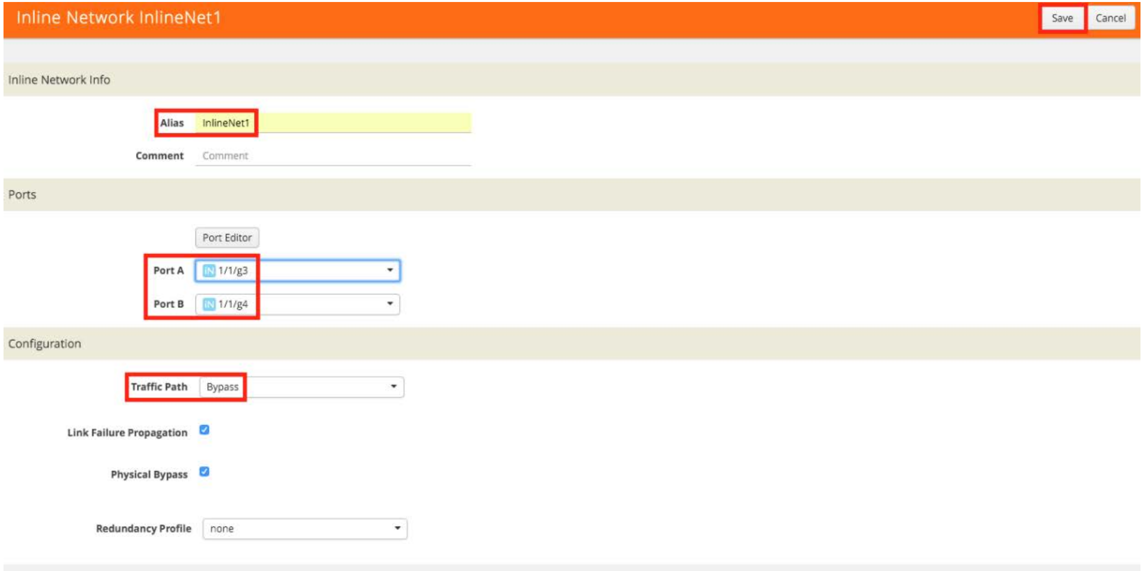
Inline Networks

☐	Alias	Comment	Type	Forwarding State	Link Propaga
☐	default_inline_net_1_3_1		protected	physicalBypass	true
☐	default_inline_net_1_3_2		protected	physicalBypass	true
☐	default_inline_net_1_3_3		protected	physicalBypass	true
☐	default_inline_net_1_3_4		protected	physicalBypass	true

Total Items : 4

Figure 2-5: Inline Networks Page

4. Click **New**. The Inline Network configuration page displays. Refer to Figure2-6.



Alias: InlineNet1
Comment: Comment
Port A: 1/1/g3
Port B: 1/1/g4
Traffic Path: Bypass
Link Failure Propagation ☑
Physical Bypass ☑
Redundancy Profile: none

Figure 2-6: Inline Network Pair Configuration

5. On the Inline Network page, do the following (refer to Figure 2-6):

   a. In the **Alias** field, type an alias that will help you remember which network link this Inline Network bypass pair represents. For example, InLineNet1.

   b. From the **Port A** drop-down list, select the port A as it is represented in the network topology diagram shown in Figure 1-1. The value in the Port B drop-down list is automatically populated once you select Port A.

   Important: It is essential for Side A and Side B of the GigaVUE-HC2 to match with Side A and Side B of the FortiGate NGFW. If they don't match, the traffic distribution or the Inline Tool Group will not work correctly.

   c. Retain the default selection in **Traffic Path** and **Link Failure Propagation**.

   d. Select **Physical Bypass**. This minimizes packet loss during traffic map changes.

6. Click **Save**.

NOTE: Traffic Path is set to Bypass to prevent packet loss until the inline tool groups and maps have been set up. After the inline tool groups and maps are configured, the traffic path can be set to inline tool as described in the subsequent section.

7. Repeat these steps for all other network links (if applicable).

Step 2: Configuring the Inline Network Group

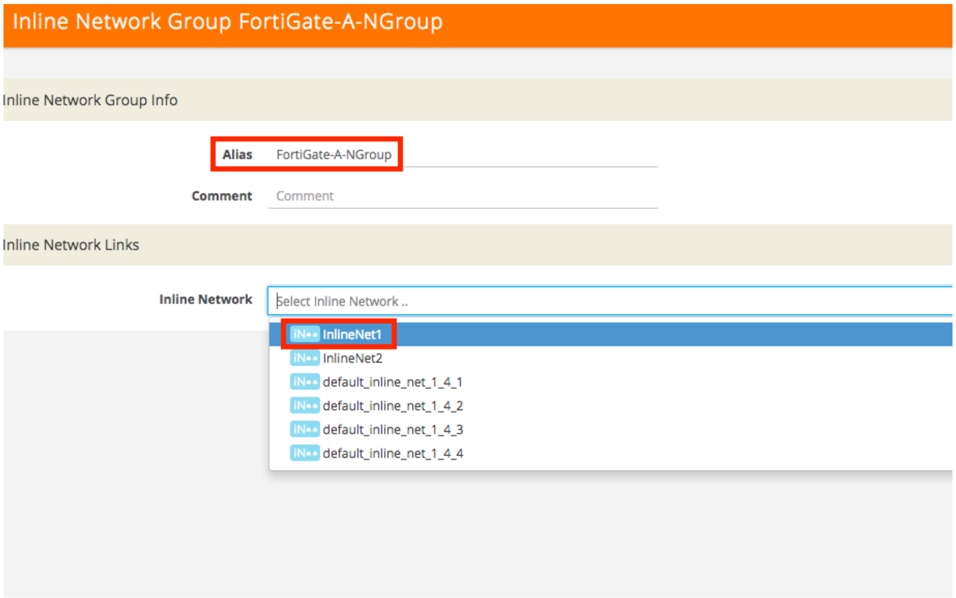
To configure the inline network group (if applicable), do the following:

1. In GigaVUE-FM, select **Inline Bypass** > **Inline Network Groups**.

2. Click **New**.

3. In the **Alias** field, type an alias that represents the inline network group. For example, `FortiGate-A_NGroup`.

4. From the Inline Network field, select the inline network as shown in Figure 2-7 or start typing any portion of the alias associated with Inline Network you want to add to the Inline Network Group.



Inline Network Group FortiGate-A-NGroup

Inline Network Group Info

Alias FortiGate-A-NGroup

Comment Comment

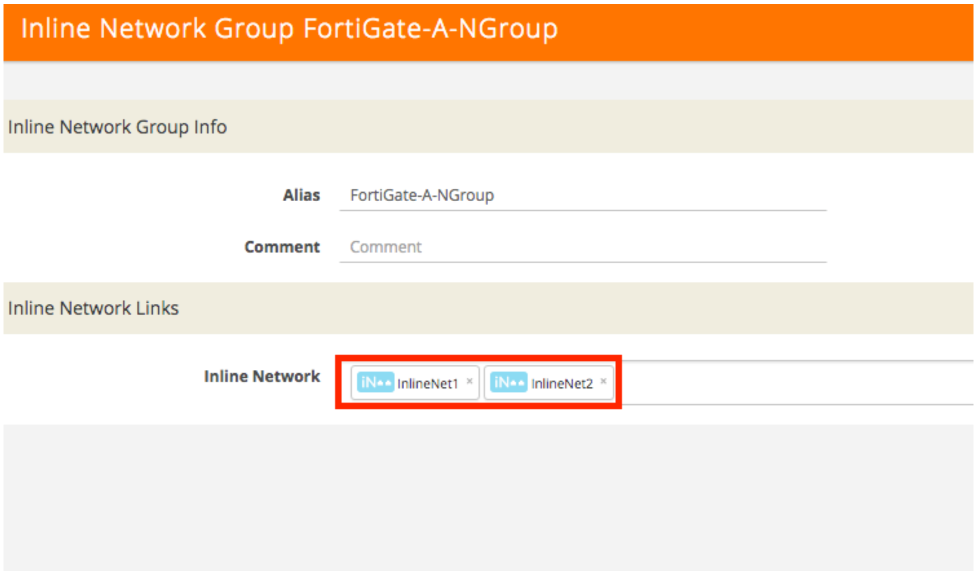
Inline Network Links

Inline Network Select Inline Network ..

- InlineNet1
- InlineNet2
- default_inline_net_1_4_1
- default_inline_net_1_4_2
- default_inline_net_1_4_3
- default_inline_net_1_4_4

Figure 2-7: Inline Network Selection

5. Continue adding inline networks until all port pairs are in the **Inline Network** field as shown in Figure 2-8.



Inline Network Group FortiGate-A-NGroup

Inline Network Group Info

Alias FortiGate-A-NGroup

Comment Comment

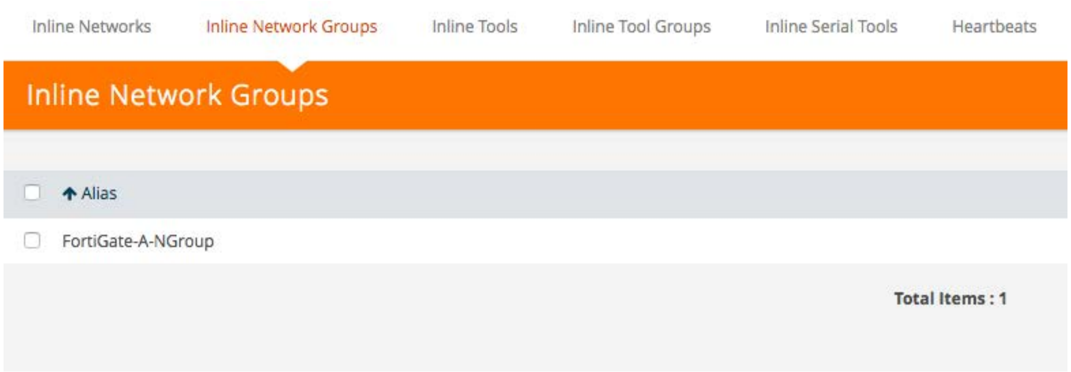
Inline Network Links

Inline Network InlineNet1 × InlineNet2 ×

Figure 2-8: Inline Networks added to the Inline Network Group

6. Click **Save.**

The Inline Network Groups page is displayed as shown in Figure 2-9.



☐	Alias
☐	FortiGate-A-NGroup

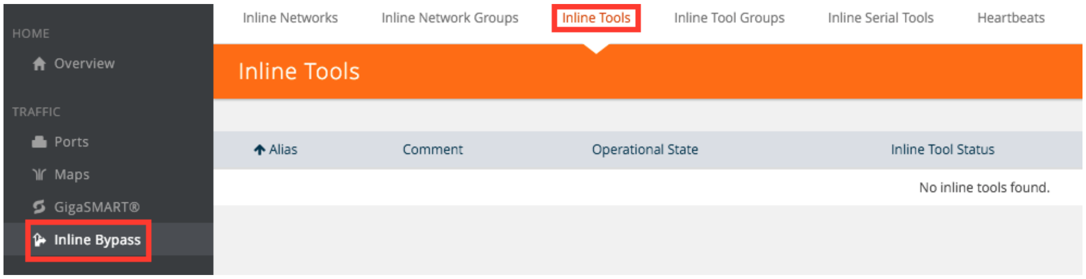
Total Items : 1

Figure 2-9: Finished list of Inline Network Groups

Step 3: Configuring the Inline Tools

This section describes the steps necessary to define the inline tool port pairs and the inline tool group that will be used in the traffic flow map defined in Configuring the Traffic Flow Map with a Pass All Rule.

1. In GigaVUE-FM, select **Inline Bypass** > **Inline Tools.**



Alias	Comment	Operational State	Inline Tool Status

No inline tools found.

Figure 2-10: Navigating to the Inline Tools page

2. Click **New** to open the configuration page for inline tools.

3. In the Alias field, type an alias that will help you remember which inline tool this inline tool pair represents. For example, `FortiGate`.

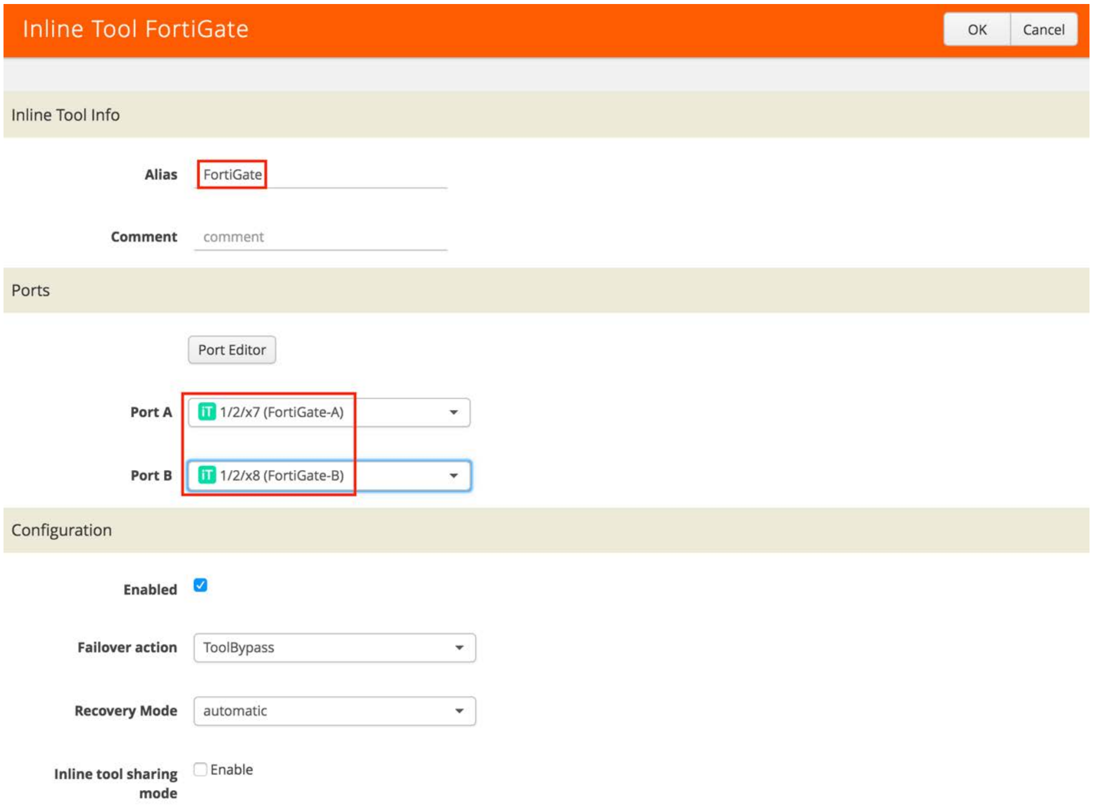
4. In the Ports section, specify the ports as follows:

   - For Port A, specify the port that corresponds to Side A in the network diagram
   - For Port B, specify the port that corresponds to Side B in the network diagram

For the network diagram, refer to Figure 1-1.

Important: It is essential for Port A and Port B to match Side A and Side B of the inline network port pairs respectively.

5. Leave the default setting for the remaining configuration options. Your configuration should be similar to the example shown in Figure 2-11.



Inline Tool FortiGate

Inline Tool Info

Alias FortiGate

Comment comment

Ports

Port A IT 1/2/x7 (FortiGate-A)

Port B IT 1/2/x8 (FortiGate-B)

Configuration

Enabled ☑

Failover action ToolBypass

Recovery Mode automatic

Inline tool sharing mode ☐ Enable

Figure 2-11: Inline Tool Pair Configuration

6. Click **Save**.

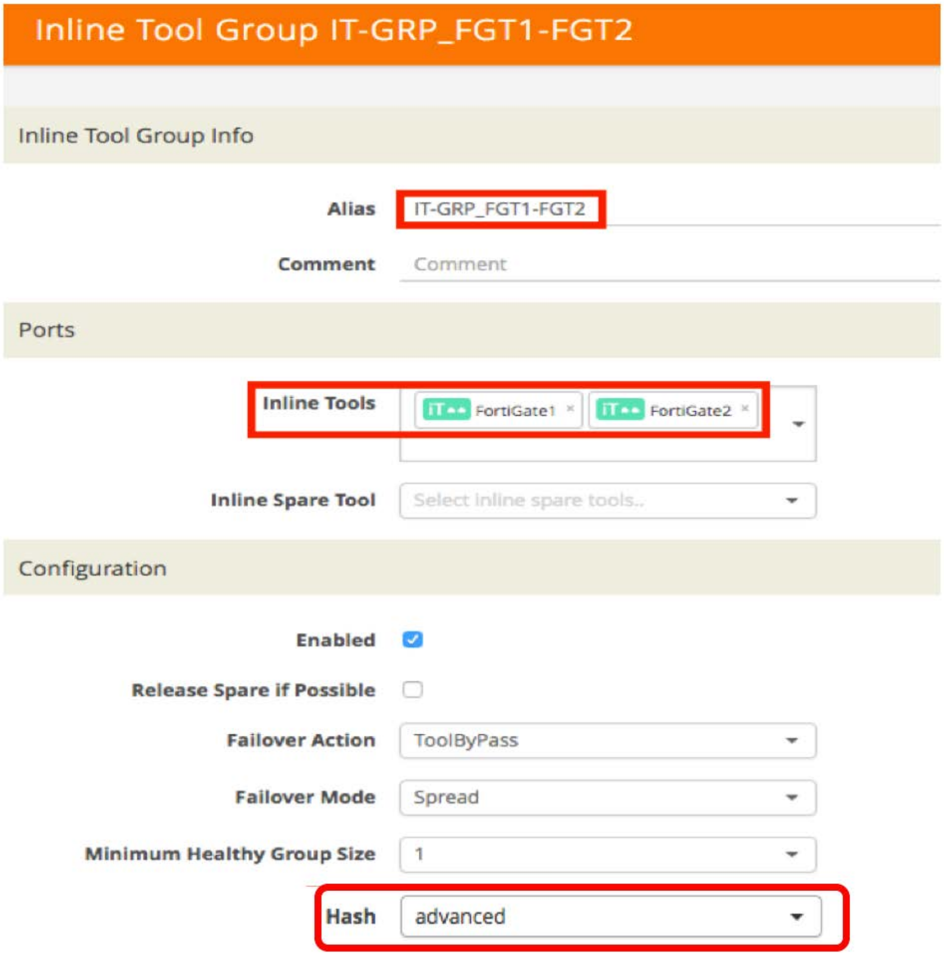
7. Repeat steps 2 through 6 for all additional FortiGate NGFWs.

NOTE: The failure action for this inline tool is **ToolBypass**. This means that the GigaVUE-HC2 will not send traffic to this inline tool if it is considered to be in a failure mode. The online help fully describes other options for inline tool. The other options have very different effects on the overall traffic flow. If you have not enabled the heartbeat feature, the failover action will only take place if one of the inline tool port links go down.

Step 4: Configuring the Inline Tool Group

To configure the inline tool group, do the following:

1. In GigaVUE-FM, select Inline Bypass > Inline Tool Groups
2. Click **New** to open the Inline Tool Groups configuration page. Refer to Figure 2-12.



Inline Tool Group IT-GRP_FGT1-FGT2

Inline Tool Group Info

Alias: IT-GRP_FGT1-FGT2

Comment: Comment

Ports

Inline Tools: FortiGate1 ×, FortiGate2 ×

Inline Spare Tool: Select inline spare tools..

Configuration

Enabled ☑

Release Spare if Possible □

Failover Action: ToolByPass

Failover Mode: Spread

Minimum Healthy Group Size: 1

Hash: advanced

Figure 2-12: Inline Tool Group Configuration

3. In the Alias field, type an alias that describes the inline tool groups. For example, `IT-GRP_FGT1-FGT2`.
4. In the Ports section, click the Inline tools field and select all the inline tools for this group from the list of available inline tools.

   There is an option to select an Inline spare tool. When you select this option, it becomes the primary failure action for this inline tool group.
5. In the Configuration section, do the following:
   a. Select **Enable**.
   b. Select **Release Spare If Possible** if applicable.
   c. Retain the defaults for **Failover action**, **Failover Mode**, and **Minimum Healthy Group Size**.
   d. Select **Advanced** for **Hash**.
6. Click **Save**.

Configuring the Inline Traffic Flow Maps

This section describes the high-level process for configuring traffic to flow from the inline network links to the inline FortiGate tool group, allowing you to test the deployment functionality of the Fortinet appliances within the group. Perform the following steps:

Step 1: Configure the Traffic Flow Map with a Pass All Rule

Step 2: Change Inline Network Traffic Path to Inline Tool

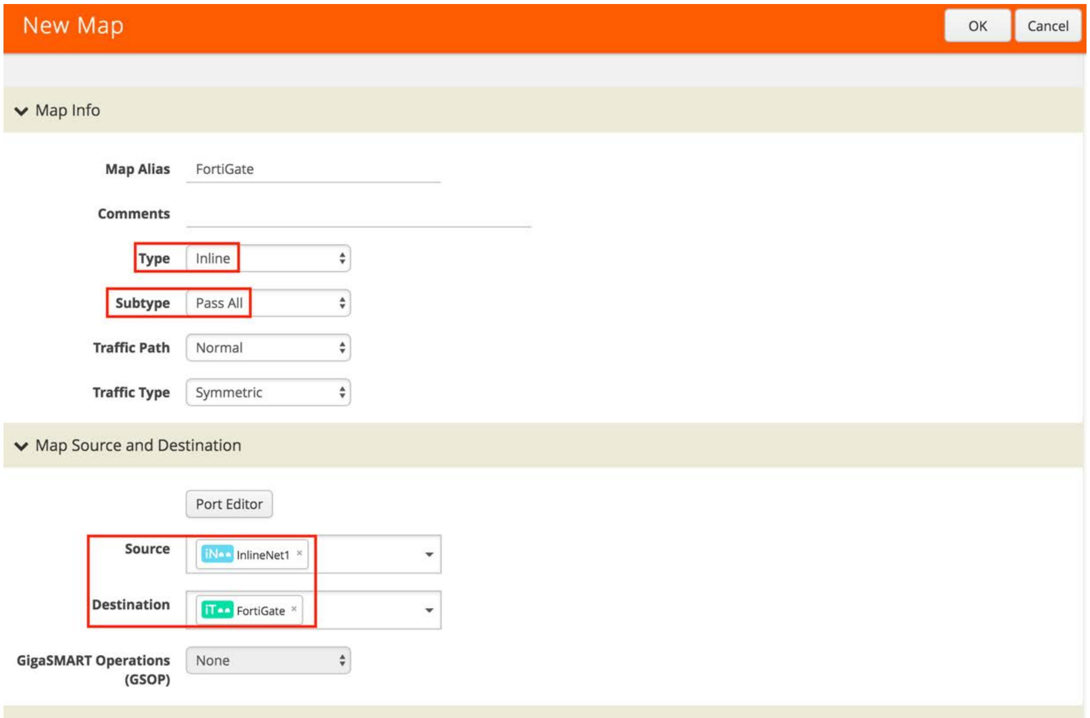
After completing these steps, you will be ready to test the deployment of the FortiGate appliances. Refer to *Testing the Functionality of the FortiGate NGFWs* describes the test procedure.

Configuring the Traffic Flow Map with a Pass All Rule

This section describes the configuration of a traffic flow map between the Inline Network Group and the Inline Tool Group:

1. In GigaVUE-FM, navigate to the **Maps** page.

2. Click **New.** The New Map page displays.



Map Alias: FortiGate
Comments:
Type: Inline
Subtype: Pass All
Traffic Path: Normal
Traffic Type: Symmetric
Source: InlineNet1
Destination: FortiGate
GigaSMART Operations (GSOP): None

Figure 2-13: Configuration for Pass All Map

3. In the **Alias** field, enter a map alias that represents the network source and tool destination.

4. From the **Type** drop-down list, select **Inline**.

5. From the **Subtype** drop-down list, select **Pass All**.

6. From the **Traffic Path** drop-down list, select Normal.

7. Under Map Source and Destination, select the **Source** and **Destination** fields as follows:

    a. Set **Source** to the inline network group that you created in Step 2: Configure the Inline Network Group. Choose your inline network if you do not have an Inline Network Group.

b. Set **Destination** to the inline tool groups that you created in Step 4: Configure the Inline Tool Group.

NOTE: This example uses a Pass All rule so any traffic going through the Inline Network(s) will be sent to the FortiGate(s) for inspection. If you want to selectively send traffic to the FortiGate(s), then use a combination of a Bypass Rule and then a Collector Rule. For specific instructions on completing these tasks, refer to the User Guides and Technical Documentation in the Customer Portal.

8. Click **Save**.

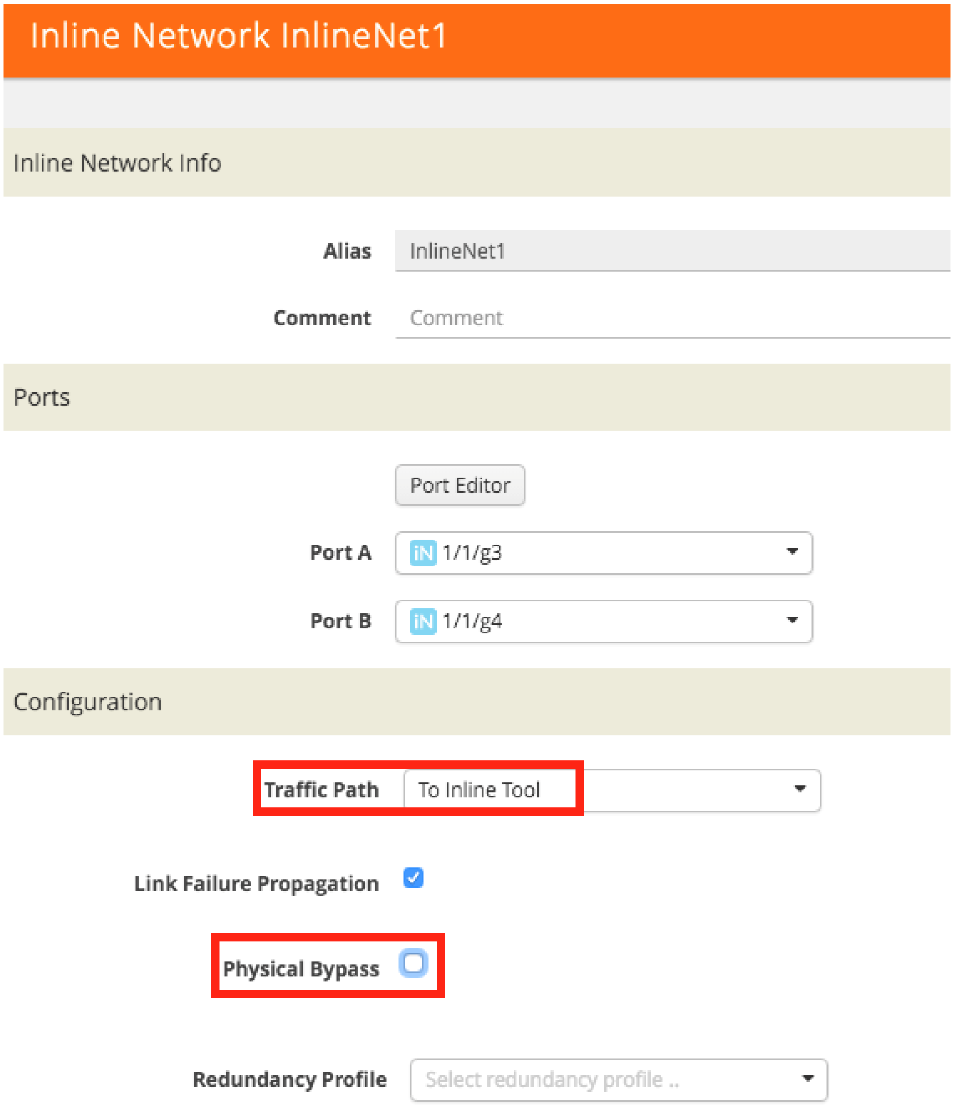
Changing Inline Network Traffic Path to Inline Tool

After configuring the maps, you need to change the traffic path for the inline network(s) from Bypass to Inline Tool. However, before setting the traffic path to Inline Tool, make sure that the inline tool ports are up. You can check the status of the ports by going to **GigaVUE-FM** > **System** > **Chassis** in the main navigation pane.

To change the traffic path from bypass to inline tool, do the following:

1. In GigaVUE-FM, select **Inline Bypass** > **Inline Networks**.

2. Select one of the inline networks that you defined previously (refer to Step 2: Configure the Inline Network Group), and then click **Edit**.



Alias: InlineNet1

Comment: Comment

Port A: iN 1/1/g3

Port B: iN 1/1/g4

Traffic Path: To Inline Tool

Link Failure Propagation ☑

Physical Bypass ☐

Redundancy Profile: Select redundancy profile ..

Figure 2-14: Inline Network Traffic Path Changed to Inline Tool, Physical Bypass Unchecked

3. From the **Traffic Path** drop-down list, select **To Inline Tool**.

4. Uncheck **Physical Bypass**.

5. Click **Save**.

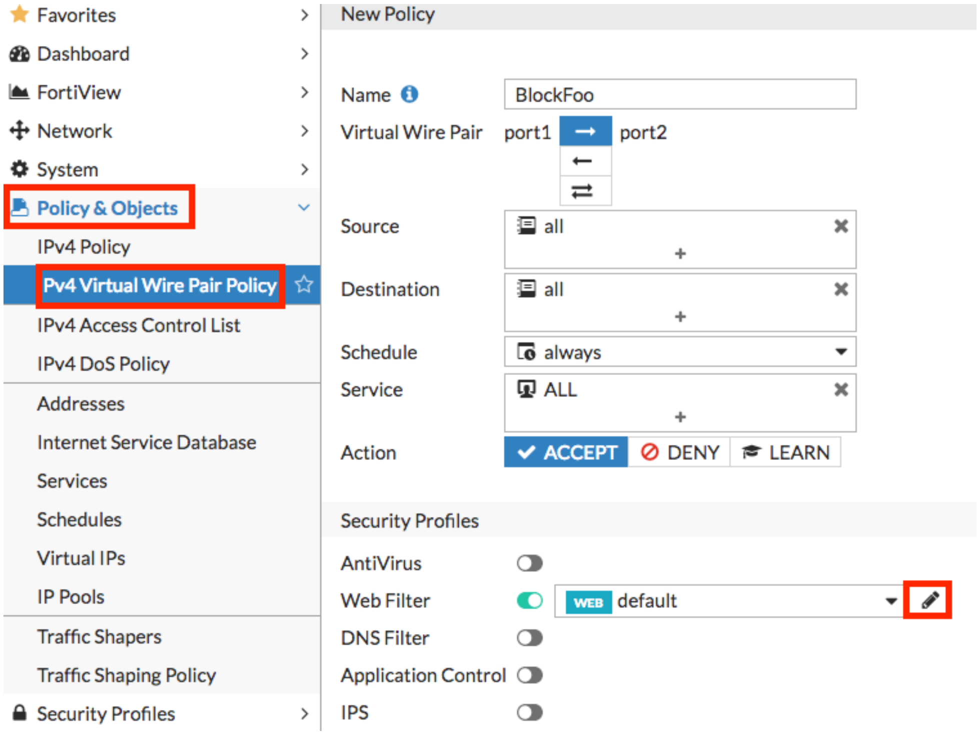
6. Repeat step 3 and step 4 for each inline network in the inline network group (if applicable).

Testing the Functionality of the FortiGate NGFWs

One of the easiest ways to determine if the FortiGate NGFW is working properly is by attempting to access a website that should be blocked. In the example below, policy has been created to block access to the website foo.com.

1. From Policy & Objects, select IPv4 Virtual Wire Pair Policy.

2. Click **New** and create a policy as shown in Figure 2-15.



New Policy

Name: BlockFoo

Virtual Wire Pair: port1 → port2

Source: all

Destination: all

Schedule: always

Service: ALL

Action: [✓ ACCEPT] DENY LEARN

Security Profiles

AntiVirus: ○

Web Filter: ● WEB default

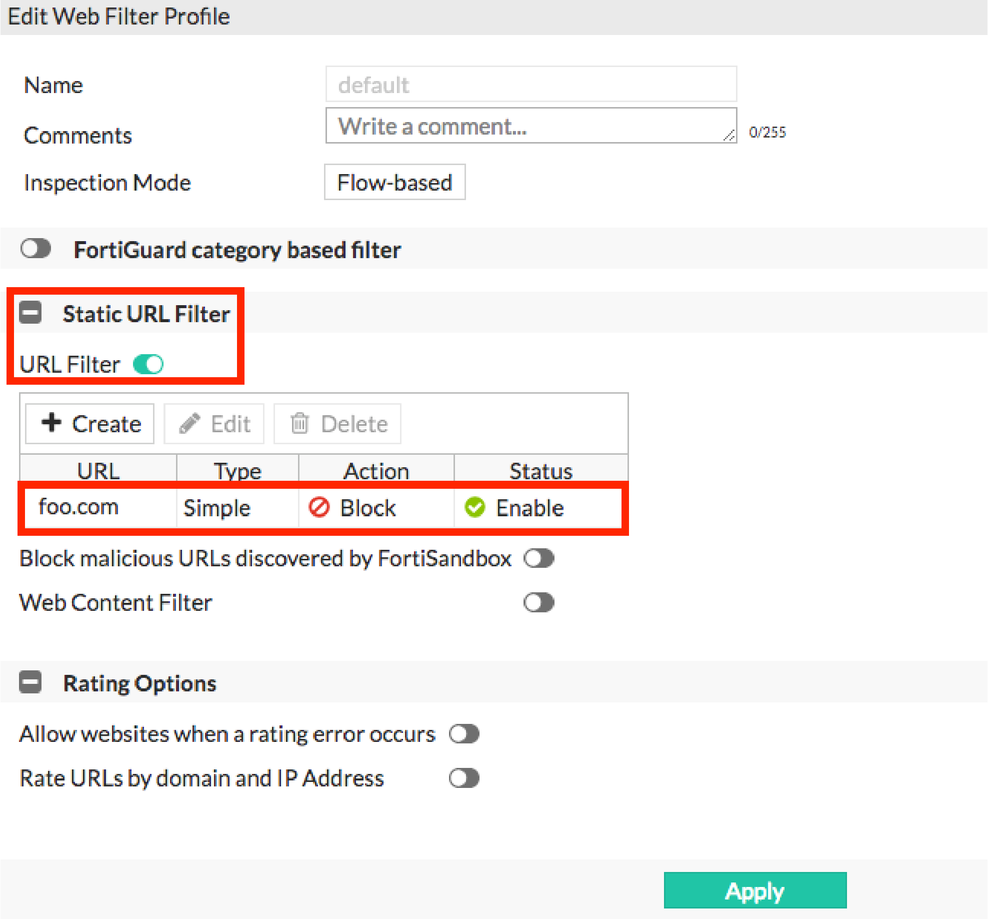
DNS Filter: ○

Application Control: ○

IPS: ○

Figure 2-15: Creating a New Policy

3. Edit the **Web Filter** (or create a new one) and add a **Static URL Filter** as shown in Figure 2-16.



Edit Web Filter Profile

Name: default

Comments: Write a comment... 0/255

Inspection Mode: Flow-based

○ FortiGuard category based filter

Static URL Filter

URL Filter ●

URL	Type	Action	Status
foo.com	Simple	⊘ Block	✓ Enable

Block malicious URLs discovered by FortiSandbox ○

Web Content Filter ○

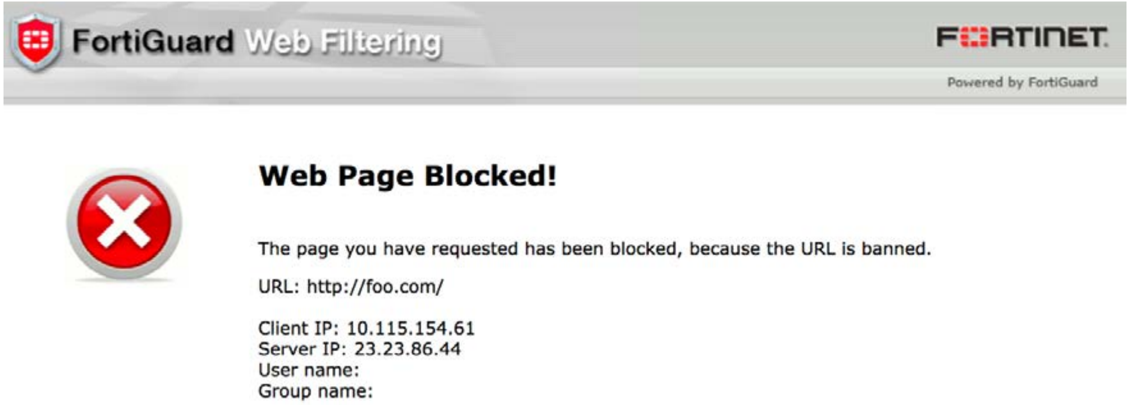
Rating Options

Allow websites when a rating error occurs ○

Rate URLs by domain and IP Address ○

Figure 2-16: Editing the Web Filter Profile

To test the functionality, go to a client computer that connects to the internet through the Gigamon HC2. Open a web browser and go to http://foo.com/. You should get a block page similar to the following:



Web Page Blocked!

The page you have requested has been blocked, because the URL is banned.

URL: http://foo.com/

Client IP: 10.115.154.61
Server IP: 23.23.86.44
User name:
Group name:

Figure 2-17: Block Page

Summary and Conclusions

The previous chapters described how to deploy Gigamon GigaVUE-HC2 bypass protection with FortiGate NGFW appliances. This combined solution using the Gigamon-GigaVUE-HC2 chassis for inline tool high availability and traffic distribution achieves the following objectives:

- High availability of FortiGate NGFW because each inline security solution can be put into a Gigamon inline tool group with tool failover actions. The inline tool group can be optimized for each security need, regardless of whether the tool goes off-line due to an outage or planned maintenance.
- Traffic distribution to multiple FortiGate NGFW appliances for load sharing across multiple instances.
- Seamless scalability for an increasing network infrastructure as well as the inline security tools to accommodate the additional traffic.
- Ultimate flexibility of adding new types of inline security tools without physical change control because all new tools are physically added to the GigaVUE-HC2 and logically added to the path through traffic flow maps.

For more information on the GigaVUE-HC2 bypass protection, high availability, and scalability provided by Gigamon's Security Delivery Platform, go to *www.gigamon.com.*

Available Documentation

Document	Summary
GigaVUE-FM and GigaVUE-VM User's Guide	Provides an overview of the GigaVUE Fabric Manager including, initial configuration, upgrade instructions, setting up accounts and configuring the GigaVUE nodes.
GigaVUE-OS CLI User's Guide	Describes how to configure and operate the GigaVUE-OS software from the command line interface.
GigaVUE-OS H-VUE™ User's Guide	Describes how to use the Web-based H-VUE interface to configure and operate the GigaVUE H Series software.

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