

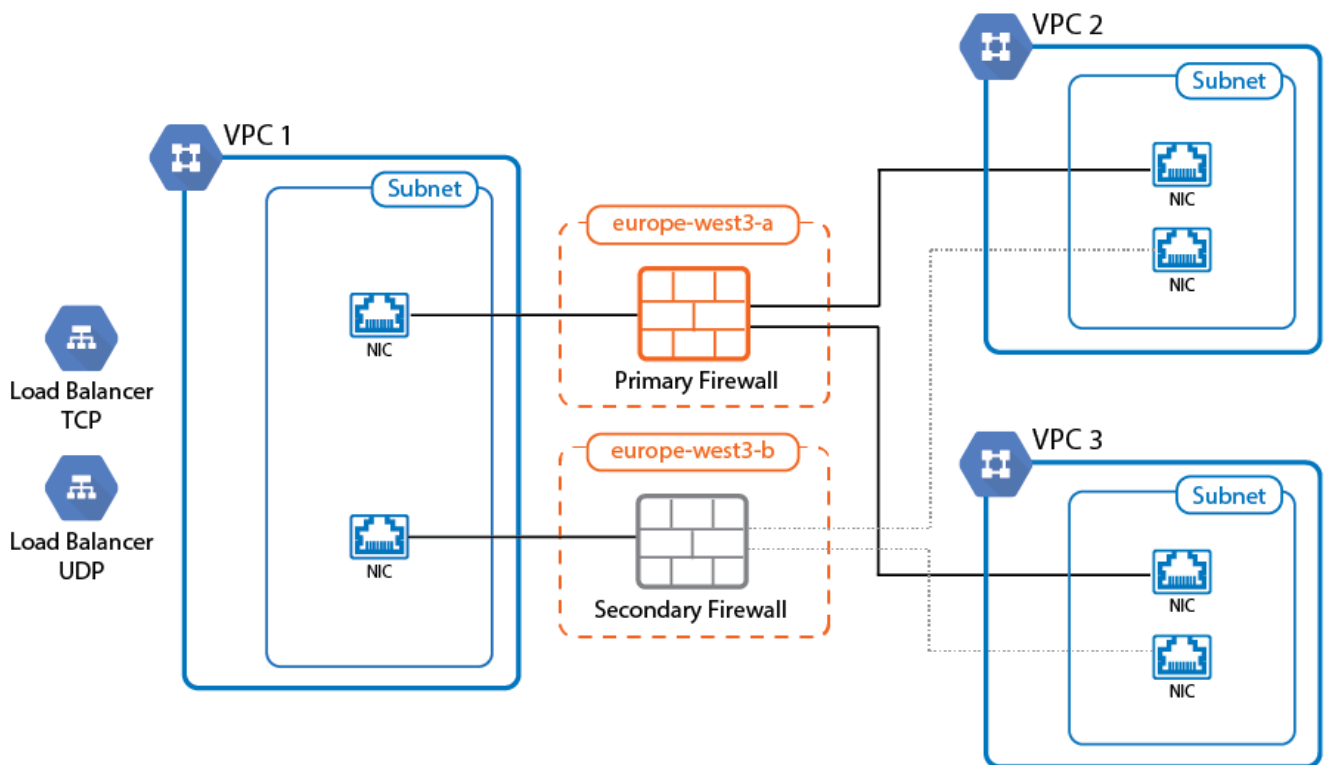
How to Configure a High Availability Cluster in Google Cloud

<https://campus.barracuda.com/doc/79463119/>

Running your CloudGen Firewall in a High Availability cluster in the Google Cloud ensures that even in the event of a datacenter failure in the cloud the other firewall can take over and your applications will remain reachable. All VPC networks must be in the same region; however, the two firewall instances are deployed into two different zones inside this region. The firewall instances are configured with one network interface per VPC network. Routing table in the VPC networks are configured to use the firewall as the target for traffic to the Internet and to other VPC networks. This allows the firewall to act both as the default gateway for Internet-bound traffic and as a segmentation firewall to VPC-to-VPC traffic. The number of network interfaces is determined by the number of CPU cores of the selected instance types. For example: for three VPCs, you need an instance with 3 CPU cores or more.

To rewrite the routes using the firewall as the target, a script must be placed in the `/opt/phion/hooks/ha/` directory of each firewall. The script is executed every time the service fails over and rewrites the routes to use the active firewall as the target.

To use the High Availability cluster with a single public IP address, add a TCP and/or UDP Google Network Load balancer. To use the load balancer, there must be a service on port 80 or 433 running on or behind the firewall because the Google legacy health check only allows HTTP and HTTPS health checks. Use the SSL VPN service or the Cloud landing page. Alternatively, it is also possible to probe a web service behind the firewall, but an outage of the web service would result in the firewall to be considered unhealthy.



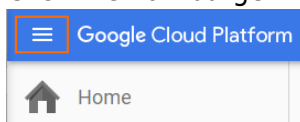
Before You Begin

- Download the Google Cloud Image from the Barracuda Networks Download Portal: <https://dlportal.barracudanetworks.com>.
- Create a custom service account and role for the High Availability cluster. For more information, see [How to Create a Custom Role and Service Account for the CloudGen Firewall in the Google Cloud](#).
- Download the Google Cloud Takeover script needed for Step 18: [gcp-ha-takeover.sh](https://github.com/barracuda-networks/gcp-ha-takeover.sh)

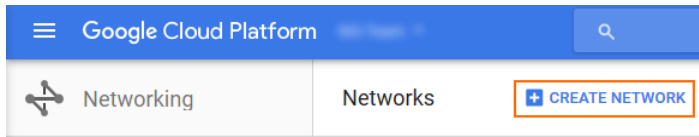
Step 1. Create the Hub VPC Network

Create the virtual private network where the two firewall instances will be running. Create a subnet for the firewall instances.

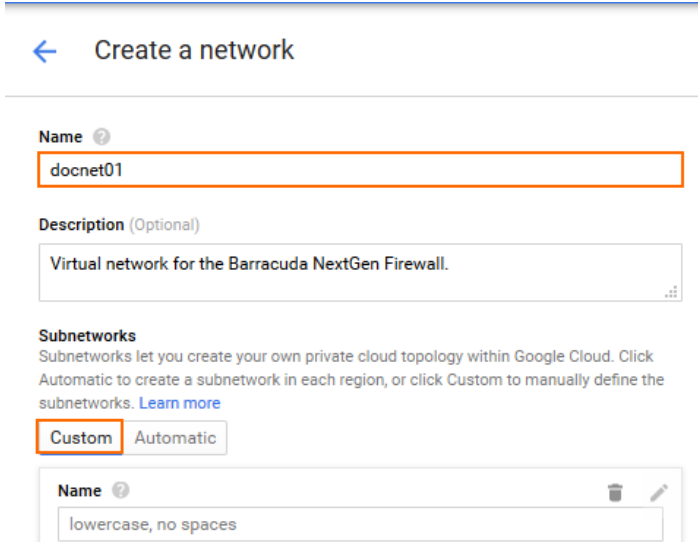
1. Log into the Google Cloud Platform. <https://console.cloud.google.com/>
2. Click the hamburger menu in the upper-left corner.



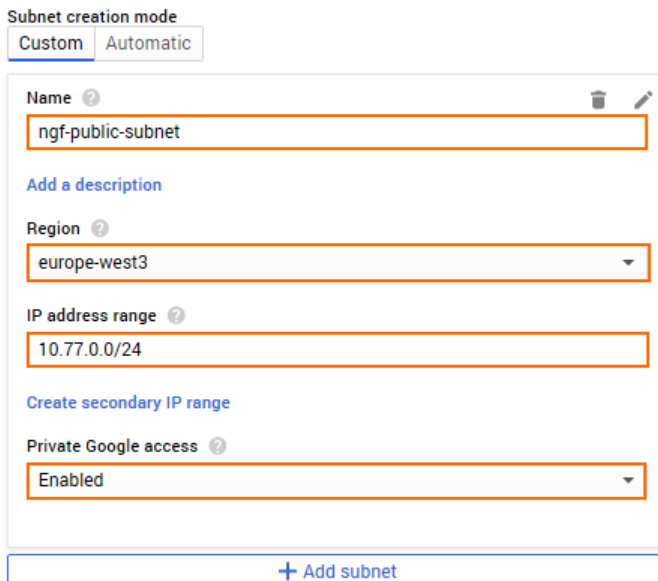
3. In the **Compute** section, click **Networking**.
4. In the main area, click **Create Network**.



5. Enter the **Name** and, in the **Subnetworks** section, click **Custom**.



6. Create the public subnet:
 - **Name** - Enter **ngf-public-subnet**
 - **Region** - Select your region. All virtual networks must be in the same region.
 - **IP address range** - Enter the network in CIDR format. Do not use a network that overlaps with your on-premises network.
 - **Private Google access** - Select **Enabled**.



7. (optional) For each additional subnet in this virtual network, click **Add subnet**.
8. Click **Create**.

The VPC network for the firewall instances are now listed in the **VPC Networks** list.

VPC network	VPC networks + CREATE VPC NETWORK REFRESH				
VPC networks	docnet01	3	Custom	1	Off
External IP addresses	europa-west3	ngf-public-subnet	10.77.0.0/24	10.77.0.1	
Firewall rules	europa-west3	private-subnet-01	10.77.1.0/24	10.77.1.1	
	europa-west3	private-subnet-02	10.77.2.0/24	10.77.2.1	

Step 2. Create Additional VPC Networks

Create additional virtual networks with subnets in the same region. The number of virtual networks may not exceed the number of CPU cores on the firewall instance. Verify that the networks of the VPC networks do not overlap.

The VPC networks are now listed in the **VPC Networks** list.

docnet01	3	Custom	1	Off
	europa-west3	ngf-public-subnet	10.77.0.0/24	10.77.0.1
	europa-west3	private-subnet-01	10.77.1.0/24	10.77.1.1
	europa-west3	private-subnet-02	10.77.2.0/24	10.77.2.1
docnet02	1	Custom	1	Off
	europa-west3	docnet02-subnet02	10.78.1.0/24	10.78.1.1
docnet03	1	Custom	1	Off
	europa-west3	docnet03-subnet02	10.79.1.0/24	10.79.1.1

Step 3. Create Google Firewall Rules


Google firewall rules must be configured for traffic to reach the firewall instances.

1. Go to <https://console.cloud.google.com>.
2. Click the hamburger menu in the upper-left corner.
3. In the **Compute** section, click **Networking**.
4. In the left menu, click **Firewall rules**.
5. In the main area, click **Create firewall rule**.


Firewall rules [+ CREATE FIREWALL RULE](#) [DELETE](#)


6. Create a firewall rule to allow incoming traffic from the Internet to your firewall instances:
 - o **Name** – Enter the firewall rule name.


- **Network** – Select the network created in Step 1.
- **Priority** – Set a priority lower than 1000.
- **Direction of traffic** – Select **Ingress**.
- **Action on match** – Select **Allow**.
- **Targets** – Select **Specified target tags**.
- **Target tags** – Enter the tag `ngfha` that will be assigned to the firewall instances.
- **Source filter** – Select **IP ranges**.
- **Source IP ranges** – Enter `0.0.0.0/0`.
- **Protocols and ports** – Enter a semicolon-delimited, lower-case list of protocols and ports, or select **Allow all**.

Name 


Description (Optional)

Network 


Priority 
Priority can be 0 - 65535 [Check priority of other firewall rules](#)

Direction of traffic 


Ingress
 Egress


Action on match 


Allow
 Deny


Targets 


Target tags

Source filter 

Source IP ranges 

Second source filter 

Protocols and ports 

Allow all
 Specified protocols and ports

7. Click **Create**.

8. In each VPC network, create a firewall rule to allow traffic from selected subnets to the firewall:
- **Name** – Enter the firewall rule name.
 - **Network** – Select one of the VPC network created in Step 2. Select the VPC network created in Step 1 to allow traffic from private subnets in the hub VPC network to the firewall.
 - **Priority** – Set a priority lower than 1000.

- **Action on match** – Select **Allow**.
 - **Targets** – Select **Specified target tags**.
 - **Target tags** – Enter the tag `ngfha` that will be assigned to the firewall instances.
 - **Source filter** – Select **Subnetworks**.
 - **Subnetworks** – Select the subnets and click **OK**.
 - **Protocols and ports** – Enter a semicolon-delimited, lower-case list of protocols and ports, or select **Allow all**.
9. Click **Create**.

Traffic is now allowed to and from the firewall instances from the Internet and the additional VPC networks, as well as the private networks in the hub VPC network.

Step 4. Create a Storage Bucket and Upload the Disk Image

Upload the disk image to Google Cloud. If the upload through the browser does not work, you can instead use Google Cloud SDK to upload the disk image.

1. Go to <https://console.cloud.google.com>.
2. Click the hamburger menu in the upper left corner.
3. In the **Storage** section, click **Storage**.
4. In the main area, click **Create bucket**.

Browser + CREATE BUCKET ↻ REFRESH 🗑️ DELETE

5. Create a storage bucket:
 - **Name** – Enter a unique name.
 - **Storage class** – Select a storage class depending on your preferences.
 - **Location** – Select the location matching the region you are deploying in.

Create a bucket

Name ?
 The bucket name must be unique across Cloud Storage.

Storage class ?

Location ?

Privacy: Do not include sensitive information in the bucket name. Users cannot access your data without permission, but they can still try to access or create buckets to find out if the name exists.

6. Click **Create**.
7. Click the storage bucket you just created.

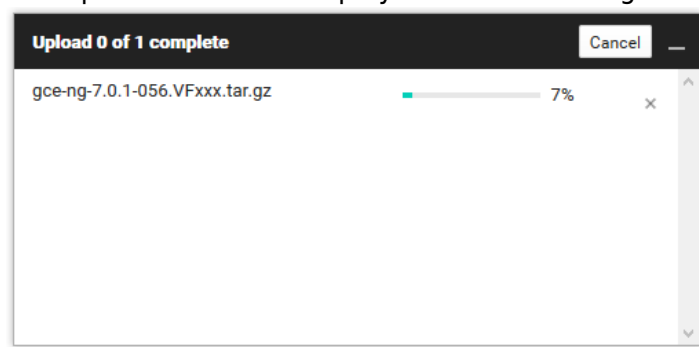
Buckets

 Name docstorage01

8. Click **Upload Files** and select the firewall disk image you previously downloaded from the [Barracuda Download Portal](#).

Browser

9. The upload window is displayed in the lower-right corner.




The disk image is now listed in the file list of the storage bucket.

Browser

Buckets / docstorage01

Filter by prefix...

<input type="checkbox"/> Name	Size	Type	Last modified	Share publicly
<input type="checkbox"/>  gce-ng-7.0.1-056.VFxxx.tar.gz	1.79 GB	application/gzip	8/25/16, 9:59 AM	<input type="checkbox"/>

Step 5. Create a Compute Engine Image from the Uploaded Disk Image

To be able to deploy a firewall from the disk image uploaded in Step 3, you must create a Google Compute Engine image. The firewall is created with one dhcp interface. DHCP reservation can be done manually (static) or automatically by Google during deployment. Once assigned, the internal IP address does not change.

1. Go to <https://console.cloud.google.com>.
2. Click the hamburger menu in the upper-left corner.
3. In the **Compute** section, click **Compute Engine**.
4. In the left menu, click **Images**.
5. In the main area, click **Create Images**.

Images [+] CREATE IMAGE CREATE INSTANCE

6. Create an image using the disk image uploaded in Step 3.
 - o **Name** - Enter a name for the firewall image.
 - o **Encryption** - Select **Automatic (recommended)**.
 - o **Source** - Select **Cloud Storage file**.
 - o **Cloud Storage File** - Click **Browse** and select the disk image in the storage bucket created in Step 3.

[← Create an image](#)

Name ?

Family (Optional) ?

Description (Optional)

Encryption ?

Source ?

Cloud Storage file ?
 docstorage01/gce-ng-7.0.1-056.VFxxx.tar.gz Browse

Create Cancel

7. Click **Create**.

The firewall disk image is now listed in the **Images** list.

Images [+] CREATE IMAGE CREATE INSTANCE DEPRECATE DELETE

name:nextgen* Columns ▾ Labels

<input type="checkbox"/>	Name	Size	Created by	Family	Creation time
<input checked="" type="checkbox"/>	nextgen-firewall-f-701	80 GB	NG-Team		Aug 25, 2016, 10:42:30 AM

Step 6. Create the Primary Firewall Instance

Launch the primary firewall instance into the public subnet of the hub VPC network. Add one network interface per additional VPC network. The number of CPU cores must be at least equal to the required

number of network interfaces.

1. Go to <https://console.cloud.google.com>.
2. Click the hamburger menu in the upper-left corner.
3. In the **Compute** section, click **Compute Engine**.
4. In the main area, click **Create instance**.

VM instances + CREATE INSTANCE

5. Enter a lowercase **Name** for the primary firewall instance.
6. Select the **Zone**. The zone must be in the same region as the public subnet in the network created in Step 1.
7. Select **Machine type**. Verify that the number of vCPUs matches the number of cores included in your CloudGen Firewall license and the number of network interfaces used by the instance.

Name ?

Zone ?

Machine type
 8 GB memory Customize

8. In the **Boot disk** section, click **Change**.
9. Click the **Custom Images** tab.
10. Select the disk image you created in Step 5.
11. Select the **Boot disk type**:
 - o **Standard persistent disk**
 - o **SSD persistent disk**

Boot disk

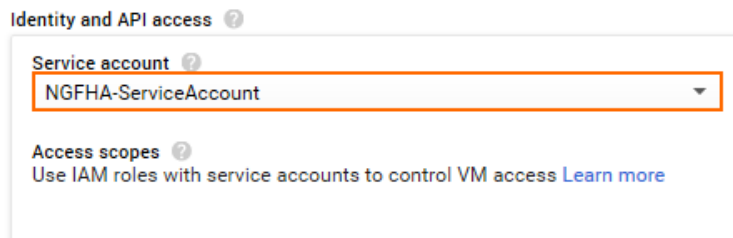
Select an image or snapshot to create a boot disk; or attach an existing disk

OS images Application images Custom images Snapshots Existing disks

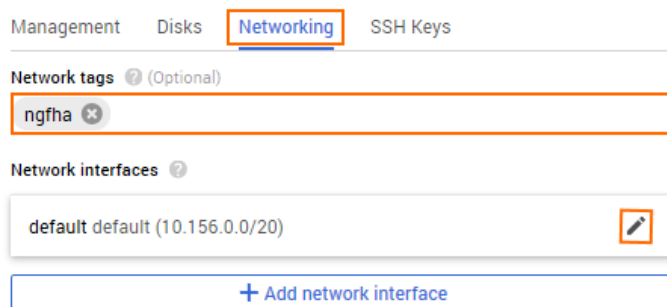
cusdangfbyol-v711-056-hf84-hf844-20170925
 The Barracuda NextGen Firewall F-Series is an enterprise-grade next-generation firewall that was purpose-built for efficient deployment and operation within dispersed, highly dynamic, and security-critical network environments.
 Created from NG-Team on Sep 25, 2017, 8:00:31 PM

Boot disk type ? Size (GB) ?

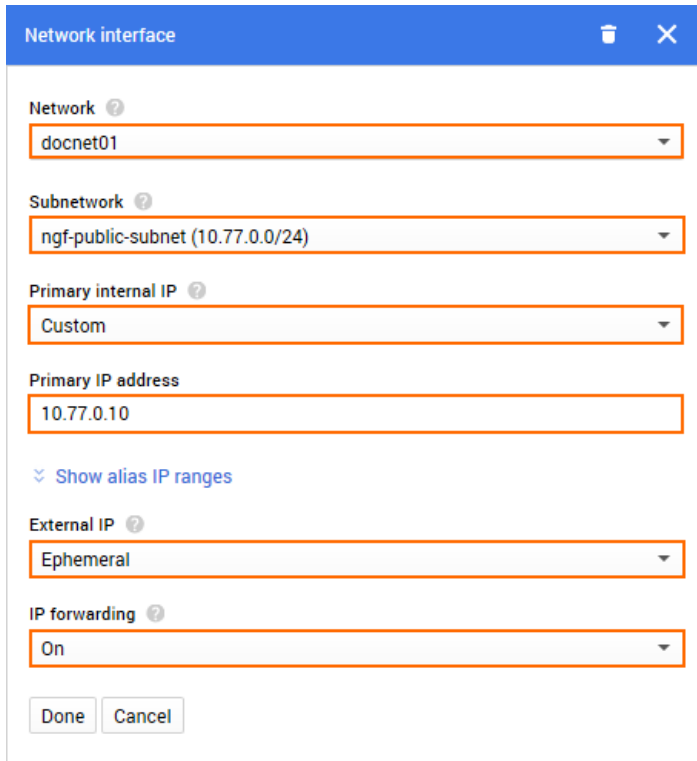
12. Click **Select**.
13. Select the dedicated **Service account** associated with the custom role that was created for the High Availability cluster. For more information, see [How to Create a Custom Role and Service Account for the CloudGen Firewall in the Google Cloud](#).
14. In the **Access scopes** section, select **Allow full access to all Cloud APIs**.



15. Below the **Firewall** section, click **Management, disk, networking, SSH keys**.
16. Click on the **Networking** tab.
17. Add ngfha to the **Network tags**.
18. In the **Network Interfaces** section, click the edit icon for the **default** network interface.



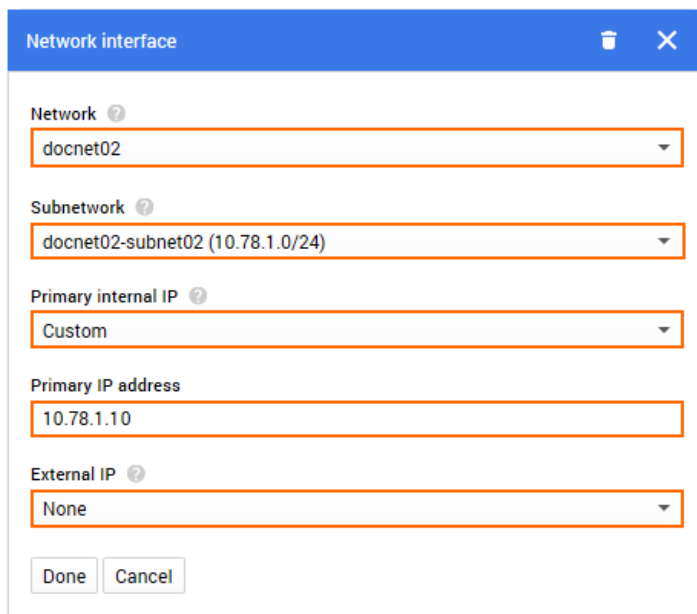
19. Configure the default network interface:
 - **Network** – Select the network created in Step 1.
 - **Subnetwork** – Select the public subnet created in Step 1.
 - **Internal IP** – Select **Custom**.
 - **Internal IP address** – Enter a free IP address in the subnet. The first IP address in the subnet is reserved for the gateway.
 - **External IP** – Select a reserved external IP address. To use a dynamic public IP address, select **Ephemeral**.
 - **IP forwarding** – Select **On**.



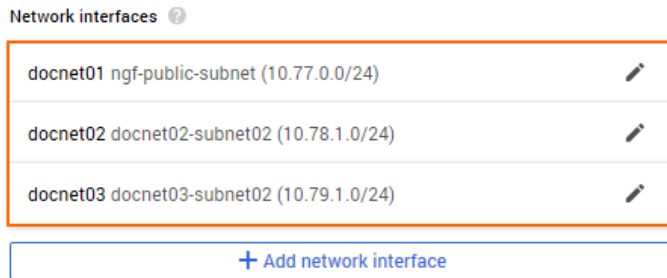
20. For each additional network interface, click **Add network interface**.

21. Configure the additional network interface:

- **Network** – Select one of the additional VPC networks created in Step 2.
- **Subnetwork** – Select a subnet in the VPC network that is in the same region as the firewall instance.
- **Internal IP** – Select **Custom**.
- **Internal IP address** – Enter a free IP address in the subnet. The first IP address in the subnet is reserved for the gateway.
- **External IP** – Select **None**.



22. Click **Done**. All network interfaces are now listed in the **Network interfaces** section.



23. Click **Create**.

The primary firewall instance is now started.

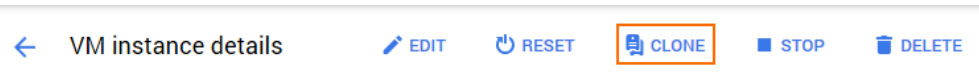
Step 7. Create the Secondary Firewall Instance

Deploy the secondary firewall of the High Availability cluster into the same subnet, but in a different zone. This ensures that one firewall of the cluster will always be running, even in case of a datacenter failure within the Google Cloud. To ease configuration clone the primary firewall and change the configuration to match the settings of the secondary firewall.

1. Go to <https://console.cloud.google.com>.
2. Click the hamburger menu in the upper-left corner.
3. In the **Compute** section, click **Compute Engine**.
4. Click on the primary firewall instance created in Step 4. The **VM instance details** page opens.

<input type="checkbox"/>	Name ^	Zone	Recommendation	Internal IP	External IP	Connect
<input checked="" type="checkbox"/>	doc-ngfha-01	europe-west3-b		10.77.0.10	35.198.187.69	SSH ▾ ⋮

5. Click **CLONE**.



doc-ngfha-01

6. Enter the **Name** for the secondary firewall instance.
7. Select a **Zone**. Select different zones in the same region for the two firewalls in the High Availability cluster.

Name ?

Zone ?

8. Below the **Firewall** section, click **Management, disk, networking, SSH keys**.
9. Click the **Networking** tab
10. Add ngfha to the **Network tags**.
11. In the **Network Interfaces** section, click the edit icon for the **default** network interface
12. Click the edit icon for the first network interface:

- **Network** – Select the network created in Step 1.
 - **Subnetwork** – Select the public subnet created in Step 1.
 - **Internal IP** – Select **Custom**.
 - **Internal IP address** – Enter a free IP address in the subnet.
 - **External IP** – Select a reserved external IP address. To use a dynamic public IP address, select **Ephemeral**.
 - **IP forwarding** – Select **On**.
13. Click **Done**.
 14. Click the edit icon for the other network interfaces, and assign free custom internal IP addresses in the subnets.
 15. Click **Create**.

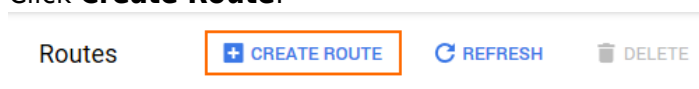
Both the primary and secondary firewalls of the High Availability cluster are now running.

<input type="checkbox"/>	Name ^	Zone	Recommendation	Internal IP	External IP	Connect
<input type="checkbox"/>	<input checked="" type="checkbox"/> doc-ngfha-01	europa-west3-a		10.77.0.10	35.198.187.69	SSH ▾ ⋮
<input type="checkbox"/>	<input checked="" type="checkbox"/> doc-ngfha-02	europa-west3-b		10.77.0.11	35.198.120.230	SSH ▾ ⋮

Step 8. Configure a Default Route for the VPC Networks to Use the Primary Firewall

For each VPC network, create a default route for the client instances to use the active firewall as the target.

1. Go to <https://console.cloud.google.com>.
2. Click the hamburger menu in the upper-left corner.
3. Click **VPC network**.
4. In the left menu, click **Routes**.
5. Click **Create Route**.



6. Configure the route:
 - **Name** – Enter a name for the route.
 - **Network** – Select the VPC network from the list.
 - **Destination IP range** – Enter 0.0.0.0/0.
 - **Priority** – Enter 100.
 - **Next hop** – Select **Specify an instance**.
 - **Next hop instance** – Select the active firewall.

Name [?]
docnet02-default-route-ngf

Description (Optional)
Default route for docnet02 using the firewall as the target

Network [?]
docnet02

Destination IP range [?]
0.0.0.0/0

Priority [?]
100

Instance tags (Optional) [?]

Next hop [?]
Specify an instance

Next hop instance [?]
doc-ngfha-01

7. Click **Create**.

All traffic leaving the VPC is now being sent through the active firewall. If you have attached two additional VPC networks to the firewall, you should have at least two routes: one for each VPC network. If you also have private subnets in the hub VPC network, three routes must be created. The next hop is the IP address of the firewall's network interface in that VPC network subnet.

Step 9. Add an Additional Network Interface to the Primary Firewall Configuration

Add and configure the additional network interfaces on the primary firewall.

1. Log into the primary firewall:
 - **IP Address** - The public IP address listed in the **External IP** column on the **VM Instances** page.
 - **User** - Enter root
 - **Password** - The name of the instance.
2. Go to **CONFIGURATION > Configuration Tree > Box > Network**.
3. Click **Lock**.
4. In the left menu, select **Interfaces**.
5. Double-click the entry in **Network Interface Cards**. The **Network Interface Configuration** window opens.
6. Change the **Number of Interfaces** to the number of interfaces attached to the firewall.
7. Click **Send Changes**.
8. In the left menu, select **Advance Routing**.

9. In the left menu, expand the **Configuration Mode** section and click **Switch to Advanced**.
10. Click + in the **IPv4 Routing Table** to create a new direct attached route for private IP address of the network interface:
 - **Target Network Address** - Enter the private IP address of the network interface with a /32 subnet mask E.g., 10.78.1.10/32
 - **Route Type** - Select **directly attached network**.
 - **Interface** - Select the network interface. E.g., eth1
 - **Foreign IP Sufficient** - Select **yes**.
 - **Trust Level** - Select **Trusted**.
 - **MTU** - Enter 1460.

IPv4 Route Configuration

Target Network Address	✓ 10.78.1.10/32	📄
Gateway		📄
Route Metric		📄
Route Type	✓ directly attached network	📄
Interface	✓ eth1 <input type="checkbox"/> Other	📄
Source Address		📄
Foreign IP Sufficient	✓ yes	📄
Trust Level	✓ Trusted (added to Trusted-LAN for Firewall)	📄
Default Gateway		📄
MTU	✓ 1460	📄


11. Click + in the **IPv4 Routing Table** to create a new direct attached route for the default subnet gateway assigned by Google. The default gateway is always the first IP address in the subnet:
 - **Target Network Address** - Enter the first IP address in the subnet with /32 subnet mask. E.g., 10.78.1.1/32.
 - **Route Type** - Select **directly attached network**.
 - **Interface Name** - Select the network interface. E.g., eth1
 - **Foreign IP Sufficient** - Select **yes**.
 - **Trust Level** - Select **Trusted**.
 - **MTU** - Enter 1460.


IPv4 Route Configuration


Target Network Address	<input checked="" type="checkbox"/> 10.78.1.1/32	
Gateway	<input type="text"/>	
Route Metric	<input type="text"/>	
Route Type	<input checked="" type="checkbox"/> directly attached network	
Interface	<input checked="" type="checkbox"/> eth1 <input type="checkbox"/> Other	
Source Address	<input type="text"/>	
Foreign IP Sufficient	<input checked="" type="checkbox"/> yes	
Trust Level	<input checked="" type="checkbox"/> Trusted (added to Trusted-LAN for Firewall)	
Default Gateway	<input type="text"/>	
MTU	<input checked="" type="checkbox"/> 1460	
Advertise Route	<input type="text" value="no"/>	
Reachable IPs		
Re-Reachable Command	<input type="text"/>	


12. Click + in the **IPv4 Routing Table** to create a new **gateway route** for the subnet using the default subnet gateway:
- **Target Network Address** - Enter the subnet in CIDR format. E.g., 10.78.1.0/24
 - **Route Type** - Select **gateway**.
 - **Gateway** - Enter the first IP address in the subnet. E.g., 10.78.1.1
 - **Trust Level** - Select **Trusted**.
 - **MTU** - Enter 1460.


IPv4 Route Configuration


Target Network Address 10.78.1.0/24 


Gateway 10.78.1.1 


Route Metric 


Route Type 


Interface Other 


Source Address 








Foreign IP Sufficient 


Trust Level Trusted (added to Trusted-LAN for Firewall) 

Default Gateway 

MTU 1460 

Advertise Route 

Reachable IPs       

Re-Reachable Command 




13. Click **Send Changes** and **Activate**.

Step 10. Disable ICMP Gateway Monitoring for Additional Network Interfaces

Disable ICMP gateway monitoring for all additional network interfaces.

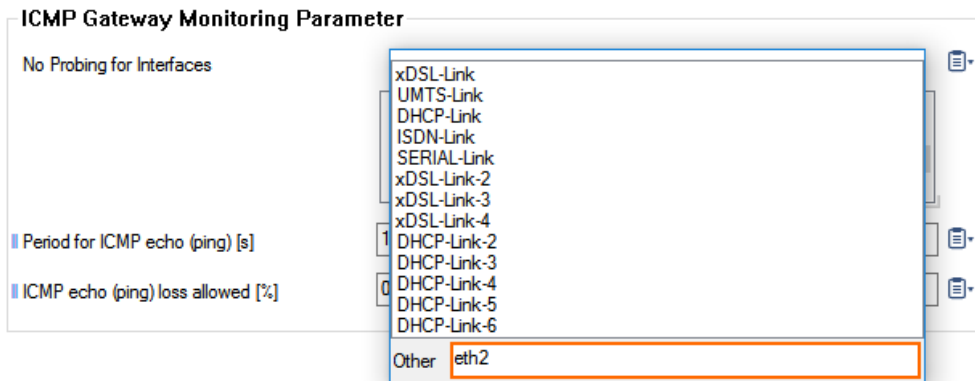
1. Log into the primary firewall.
2. Go to **CONFIGURATION > Configuration Tree > Box > Infrastructure Services > Control**.
3. Click **Lock**.
4. For each additional network interface click **+** to add an entry in the **No Probing for Interfaces** table,

ICMP Gateway Monitoring Parameter

No Probing for Interfaces   

DHCP-Link
ISDN-Link
SERIAL-Link

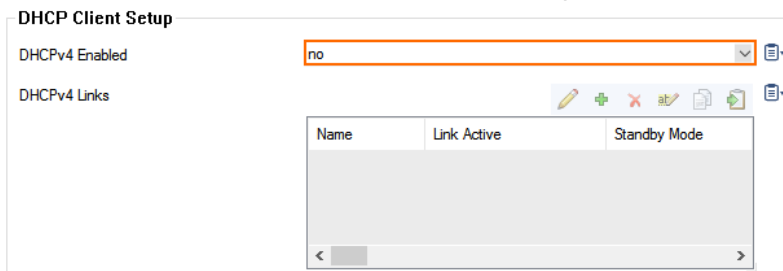
5. If the interface is not in the list, enter it in the **Other** field.



6. Click **Send Changes** and **Activate**.

Step 11. Change the Primary Firewall Configuration to Use the Static Network Interface

1. Log into the primary firewall.
2. Go to **CONFIGURATION > Configuration Tree > Box > Network**.
3. In the left menu, expand the **Configuration Mode** section and click **Switch to Advanced**.
4. Click **Lock**.
5. in the left menu, click **xDSL/DHCP**.
6. Delete the **DHCP01** entry in the **DHCP Links** list.
7. Select **No** from the **DHCPv4 Enabled** drop-down list.



8. In the left menu, click **IP Configuration**.
9. In the **Management Network and IPs** section, reconfigure the management IP:
 - o **Interface Name** - Select **Other** and enter eth0.
 - o **Management IP** - Enter the private IP address of the primary firewall. Go to **CONTROL > Network**. The private IP address is assigned to the dhcp interface.
 - o **Associated Netmask** - Select **single-host**.
 - o **MTU** - Enter 1460.

Management Network and IPs

Interface	<input checked="" type="checkbox"/> eth0	<input checked="" type="checkbox"/> Other	
Management IP	<input checked="" type="checkbox"/> 10.77.0.10		
Associated Netmask	<input checked="" type="checkbox"/> single-host		
Responds to Ping	yes		
Use for NTPd	yes		
Trust Level	Trusted (added to Trusted-LAN for Firewall)		
MTU	<input checked="" type="checkbox"/> 1460		

10. In the left menu, click **Advanced Routing**.

11. Click **+** in the **IPv4 Routing Table** to create a new direct attached route for the default subnet gateway assigned by Google. The default gateway is always the first IP address in the subnet:

- **Target Network Address** - Enter the first IP address in the subnet with /32 subnet mask. E.g., 10.77.0.1/32
- **Route Type** - Select **directly attached network**.
- **Interface Name** - Select **Other** and enter eth0.
- **Foreign IP Sufficient** - Select **yes**.
- **Trust Level** - Select **Unclassified**.
- **MTU** - Enter 1460.

IPv4 Route Configuration

Target Network Address	<input checked="" type="checkbox"/> 10.77.0.1/32	
Gateway		
Route Metric		
Route Type	<input checked="" type="checkbox"/> directly attached network	
Interface	<input checked="" type="checkbox"/> eth0	<input checked="" type="checkbox"/> Other
Source Address		
Foreign IP Sufficient	<input checked="" type="checkbox"/> yes	
Trust Level	Unclassified	
Default Gateway		
MTU	<input checked="" type="checkbox"/> 1460	

12. Click **OK**.

13. Click **+** in the **IPv4 Routing Table** and add the default route:

- **Target Network Address** - Enter 0.0.0.0/0.
- **Gateway** - Enter the first IP address in the subnet. E.g., 10.77.0.1
- **Route Type** - Select **gateway**.
- **Trust Level** - Select **Unclassified**.
- **MTU** - Enter 1460.

IPv4 Route Configuration

Target Network Address	<input type="text" value="0.0.0.0/0"/>	
Gateway	<input checked="" type="checkbox"/> <input type="text" value="10.77.0.1"/>	
Route Metric	<input type="text"/>	
Route Type	<input checked="" type="checkbox"/> <input type="text" value="gateway"/>	
Interface	<input type="text"/> <input type="checkbox"/> Other	
Source Address	<input type="text"/>	
Foreign IP Sufficient	<input type="text" value="no"/>	
Trust Level	<input type="text" value="Unclassified"/>	
Default Gateway	<input type="text"/>	
MTU	<input checked="" type="checkbox"/> <input type="text" value="1460"/>	

14. Click **OK**.
15. Click **Send Changes** and **Activate**.

Open the **CONTROL > Network** page. Your interface and IP address are now static.

Step 12. Activate the Network Changes

1. Go to **CONTROL > Box**.
2. In the left menu, expand the **Network** section and click **Activate new network configuration**.
3. Select **Failsafe**.

Step 13. Configure the DNS Server

Add the first IP address of the subnet as the DNS server (e.g., 10.77.0.1). Do not use external DNS servers because, otherwise, it is not possible to resolve the internal Google metadata service used by the HA failover script.

For more information, see [How to Configure DNS Settings](#).

Step 14. Configure the Management IP and Network on the Primary Firewall

1. Log into the primary firewall.
2. Go to **CONFIGURATION > Configuration Tree > Box > Network**.
3. In the left menu, expand the **Configuration Mode** section and click **Switch to Advanced**.

4. In the left menu click **IP Configuration**.
5. In the **Management IP and Network** section, reconfigure the management IP:
 - o **Interface** - Select **Other** and enter eth0.
 - o **Management IP** - Enter the private IP address of the secondary firewall. On the secondary firewall, go to **CONTROL> Network**. The private IP address is assigned to the dhcp interface.
 - o **Associated Netmask** - Select **single-host**.
 - o **MTU** - Enter 1460.

Management Network and IPs

Interface	<input checked="" type="checkbox"/> eth0	<input checked="" type="checkbox"/> Other	
Management IP	<input checked="" type="checkbox"/> 10.77.0.11		
Associated Netmask	<input checked="" type="checkbox"/> single-host		
Responds to Ping	yes		
Use for NTPd	yes		
Trust Level	Trusted (added to Trusted-LAN for Firewall)		
MTU	<input checked="" type="checkbox"/> 1460		

6. Edit the directly attached routes for the private IP addresses to match the secondary firewall custom internal IP address on that network interface.
7. In the left menu, click **Advanced Routing**.
8. Verify that the routing is configured analog to the primary firewall:
 - o For the hub VPC network - One gateway route and one directly attached route.
 - o For each additional VPC network - One gateway and two directly attached routes. The directly attached routes for the private IP addresses must be changed to match the custom internal IP addresses of the secondary firewall on that interface.

Main Routing Tables

IPv4 Routing Table

Name	Target Network Address	Route Type
docnet01DefaultRoute	0.0.0.0/0	gateway
docnet01GW	10.77.0.1/32	directly attach
docnet02Subnet	10.78.1.0/24	gateway
docnet02gw	10.78.1.1/32	directly attach
docnet02privateIP	10.78.1.11/32	directly attach
docnet03GW	10.79.1.1/32	directly attach
docnet03PrivateIP	10.79.1.11/32	directly attach
docnet03Subnet	10.79.1.0/24	gateway

9. Click **Send Changes** and **Activate**.

Step 15. Add the Private IPs to the Shared IPs

Add the custom private IP addresses of both firewalls to the additional network interfaces to the shared IP addresses, e.g., 10.78.1.10, 10.78.1.11, 10.79.1.10 and 10.79.1.11.

1. Log into the primary firewall
2. Go to **CONFIGURATION > Configuration Tree > Box > Network**.
3. Click **Lock**.
4. In the left menu, click **IP Configuration**.
5. In the **Shared Networks and IPs** section, double-click on the entry of the network where the IP address is attached to, or click **+** to create a new entry.
6. The **Shared Network and IPs** window opens.
 1. In the **Shared IPs in this Network** section, click **+**.
 - **IP Address** – Enter the IP address.
 - **Alias for this IP**– Select **None**.
 - **Responds to Ping**– Select **yes**.
 - Click **OK** to save this settings.
 2. Click **OK** to save this settings.
7. Click **Send Changes** and **Activate**.
8. Go to **CONTROL > Box**.
9. In the left menu, expand the **Network** section and click **Activate new network configuration**.
10. Select **Failsafe**.

Step 16. Create a High Availability Cluster

Create a high availability cluster on your primary firewall and join it with the secondary firewall.

For more information, see [How to Set Up a High Availability Cluster](#).

Step 17. Activate and License the High Availability Cluster

Activate and license the High Availability cluster. Activate the secondary firewall first. Then, activate the primary firewall.

For more information, see [How to Activate and License a Standalone High Availability Cluster](#).

Step 18. (optional) Add the Google Network Load Balancer

To use only one public-facing IP address, it is also possible to use the Google Network Load Balancer in front of the High Availability cluster. To use the load balancer, a service on port 80 or 443 must be reachable for the health check of the load balancer. TCP and UDP services require separate load balancers. To use a service on the firewall for probing create an **App Redirect** rule redirecting HTTP traffic to the fwauth daemon running on 127.0.0.1:451.

For more information, see <https://cloud.google.com/compute/docs/load-balancing/network/>

Figures

1. google_cloud_ha_lb.png
2. gcc_networking01.png
3. gcc_networking02.png
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