LOADBALANCER

MANUALS

Enterprise Azure Configuration Guide

Version 8.11.3 Revision 1.0.0

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1. Introduction

Microsoft Azure is a comprehensive set of cloud services that developers and IT professionals use to build, deploy and manage applications through Microsoft's global network of data centers. It allows services to be deployed as and when required. Charges are made for what is used making it an extremely flexible and cost effective solution. The Loadbalancer.org Enterprise Azure cloud based load balancer allows customers to rapidly deploy and configure a feature rich load balancing solution within the Azure cloud.

2. About Enterprise Azure

Enterprise Azure is a fully featured Application Delivery Controller (ADC) / Load Balancer designed specifically for Azure. The core software is based on LBOS-7 which is a customized Linux build maintained by Loadbalancer.org, LVS, Ldirectord, Linux-HA, HAProxy & STunnel.

Enterprise Azure can be deployed as a single instance although we always recommend that 2 appliances are deployed as an HA clustered pair to avoid introducing a single point of failure.

Enterprise Azure is based on the same code base as our main hardware/virtual product. This means that Enterprise Azure supports many of the same features as the hardware & virtual based products. There are certain differences due to the way the Microsoft Azure environment works. The main differences are listed below.

2.1. Main Differences to Our Standard (Non-Cloud) Product

1. Layer 4 DR mode is ***not*** currently supported.

2. In Azure, you should configure your HA pair ***first*** before setting up your load balanced services. This is different to the recommendation for our hardware/virtual products and is due to the way HA is handled. In our standard product, when a failover occurs, the ***same*** VIP address is brought up on the passive device. In Azure, in order to minimize the time taken for the failover a different approach is used. When creating a VIP on an Azure HA pair, 2 private IPs must be specified – one for the VIP when it's active on the Primary and one for the VIP when it's active on the Secondary. The IPs for the VIP on the Primary & Secondary are selected using drop-downs within the VIP configuration screen. An Azure load balancer is used in front of the Loadbalancer.org HA pair to direct inbound connections to the active appliance. Both Primary & Secondary appliances must be in the same Availability Set or deployed within the same Availability Zone / split across 2 different Availability Zones. Please refer to High Availability for more information on configuring an HA pair.

Note

The private IPs for the VIP on the Primary & Secondary are selected using drop-downs within the VIP configuration screen. These drop-downs are only displayed ***after*** the pair is configured. They are populated with the IPs that are assigned to the network interface using the WebUI option: *Local Configuration > Network Interface Configuration.*

Adding VIPs after creating an HA pair (RECOMMENDED) – If you add VIPs after creating an HA pair, you'll be prompted for both IPs. Add the IPs you intend to use for the VIPs to the local interface on both Primary & Secondary and they'll be available in the drop-downs.

Creating an HA pair after configuring VIPs on the Primary – If you add a Secondary appliance and create an HA pair after adding VIPs to the Primary appliance, the floating IPs that were automatically configured for each VIP must first be removed using the WebUI option: *Cluster Configuration > Floating IPs* and then added to the network interface instead. This will ensure that these IPs appear in the drop-downs mentioned above. You'll also need to configure IPs in a similar way on the Secondary device so that corresponding Secondary IPs can be selected for each VIP using the drop-downs.

3. Layer 4 NAT mode where the default gateway on the load balanced real servers is required to be the load balancer is ***not*** supported. Routing rules for the real server subnet must be changed instead. Please refer to Configuration Example 4 for more details.
4. Layer 7 SNAT mode with TProxy enabled where the default gateway on the load balanced real servers is required to be the load balancer is ***not*** supported. Routing rules for the real server subnet must be changed instead. Please refer to Configuration Example 5 for more details.
5. Layer 4 NAT mode and layer 7 SNAT mode with Transparent Proxy are not supported when using an HA clustered pair. In both cases, the custom routing rules would need to be dynamically modified to route via the Secondary appliance rather than the Primary if a failover occurs. This is currently not supported.

2.2. Why use Enterprise Azure?

Microsoft Azure's load balancer provides basic load balancing functionality but is limited in several areas. Loadbalancer.org's Enterprise Azure load balancer provides the following additional features & advantages:

1. Supports comprehensive Layer 7 load balancing.
2. Load balances both Azure based and non-Azure based servers.
3. Supports Round Robin and Least Connection connection distribution algorithms.
4. Supports customizable timeouts for custom applications beyond those offered by Azure.
5. Supports comprehensive back-end server health-check options.
6. Enables fallback servers to be configured and invoked when all load balanced servers/services fail.
7. Provides extensive real time and historical statistics reports.
8. Supports session distribution based on actual server load (utilizing Loadbalancer.org's feedback agent which is available for both Linux & Windows).
9. Supports SSL Termination.
10. Supports Microsoft RDP Cookie based persistence.
11. Supports full integration with Microsoft Remote Desktop Services Connection Broker.

ℹ Note For a full feature comparison please refer to our Enterprise Azure product page.

3. Azure Deployment Models

The Azure platform currently supports both the original Classic model and the latest Resource Manager model. To simplify the deployment and management of resources, Microsoft recommends that the Resource Manager model is used for new resources, and, if possible, existing resources are re-deployed through Resource Manager. For a more detailed comparison of Classic and Resource Manager models, please refer to this URL.

4. Accessing Microsoft Azure

To start using Microsoft Azure, you'll need an Azure account. If you don't already have one you can create one at the following URL: https://azure.microsoft.com/en-gb/free/.

5. Azure Management

Azure resources can be managed in 3 ways:

- Azure Portal
- Azure PowerShell
- Azure CLI

5.1. Accessing the Azure Portal

The Azure Portal is available here.

5.2. Azure PowerShell & Azure CLI

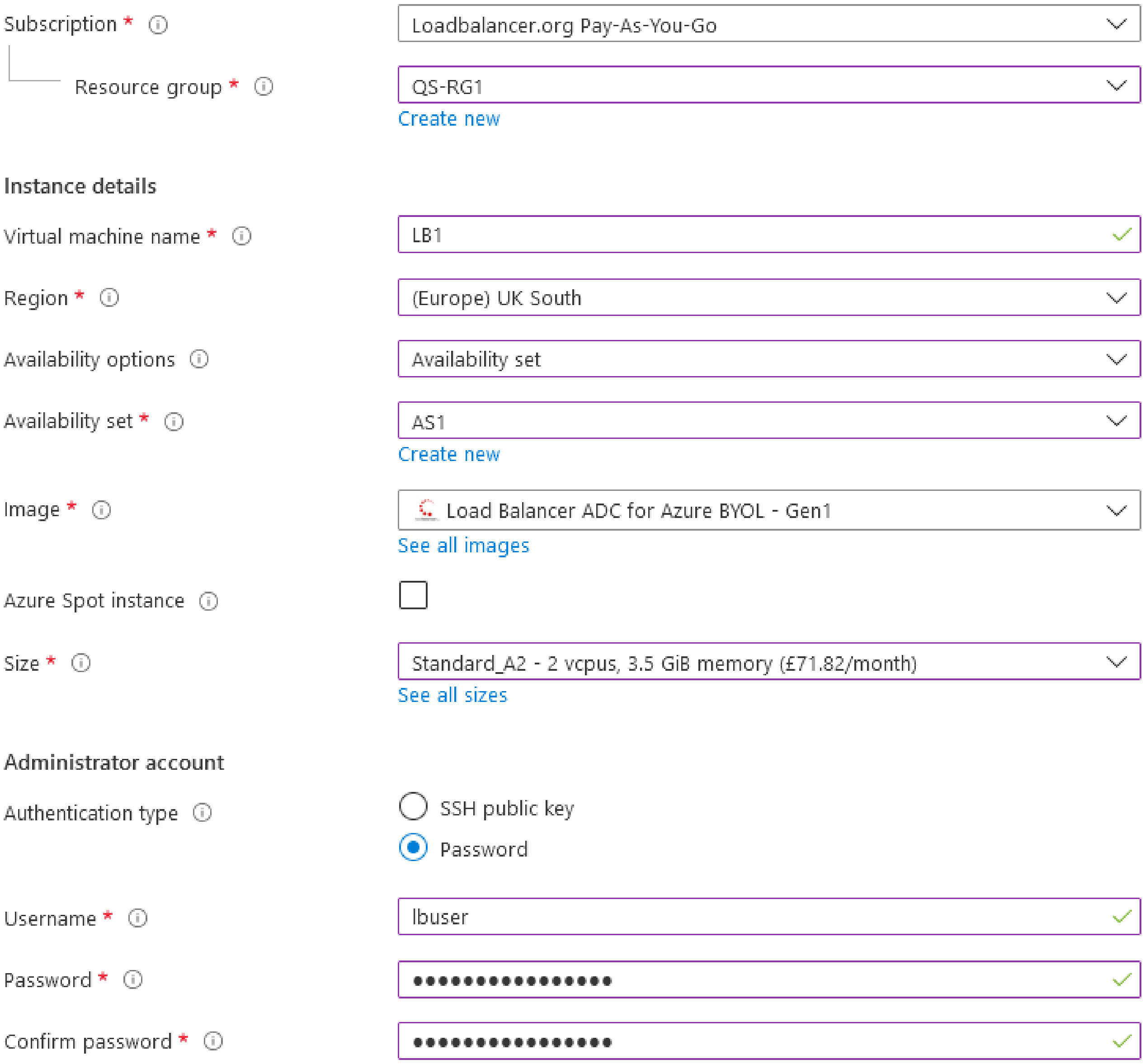
Information on how to obtain, install and configure PowerShell is available here.

Information on how to obtain, install and configure Azure CLI is available here.

6. Deploying Enterprise Azure From the Marketplace

1. Login to the Azure Portal.
2. Select **Virtual Machines**.
3. Click **Add**.

Configure the Basics



Subscription * ⓘ — Loadbalancer.org Pay-As-You-Go

Resource group * ⓘ — QS-RG1

Create new

Instance details

Virtual machine name * ⓘ — LB1 ✓

Region * ⓘ — (Europe) UK South

Availability options ⓘ — Availability set

Availability set * ⓘ — AS1

Create new

Image * ⓘ — Load Balancer ADC for Azure BYOL - Gen1

See all images

Azure Spot instance ⓘ — □

Size * ⓘ — Standard_A2 - 2 vcpus, 3.5 GiB memory (£71.82/month)

See all sizes

Administrator account

Authentication type ⓘ — ○ SSH public key ● Password

Username * ⓘ — lbuser ✓

Password * ⓘ — •••••••••••••••• ✓

Confirm password * ⓘ — •••••••••••••••• ✓

1. Configure the ***Subscription & Resource group*** settings according to your requirements.
2. Enter a suitable name for the instance, e.g. **LB1**.
3. Select the required *Region*.
4. Configure the ***Availability options*** according to your requirements.

> **Note** For an HA clustered pair, both VMs must be in the same Availability Set or deployed within the same Availability Zone / split across 2 different Availability Zones. Please refer to High Availability for more details on setting up an HA pair.

5. Select the required *Image* – to do this, click **See all images** then enter "Loadbalancer.org" in the Marketplace search box and hit <ENTER>.
6. The following options are available:
   - **Load Balancer ADC** – Fully featured appliance, hourly based billing

    - Load Balancer ADC – 10G (licensed for up to 20Gbps throughput)
    - Load Balancer ADC – 1G (licensed for up to 4Gbps throughput)
  - **Load Balancer ADC – BYOL** – Fully featured appliance, one time payment (*)
    - Load Balancer ADC – BYOL (purchase & apply either the 1G or the 10G license)

ℹ Note	(*) Azure infrastructure costs apply.

ℹ Note	The BYOL version will work completely unrestricted for 30 days without any license applied. During this period, only Azure usage charges will apply. After the 30 days, the trial will still function, but no configuration changes will be possible until the license is applied.

7. Select the required ***Size*** - this can be changed by expanding the drop-down and selecting from the recently used or recommended image sizes. Or alternatively by clicking **See all sizes** and choosing from the expanded list of options.

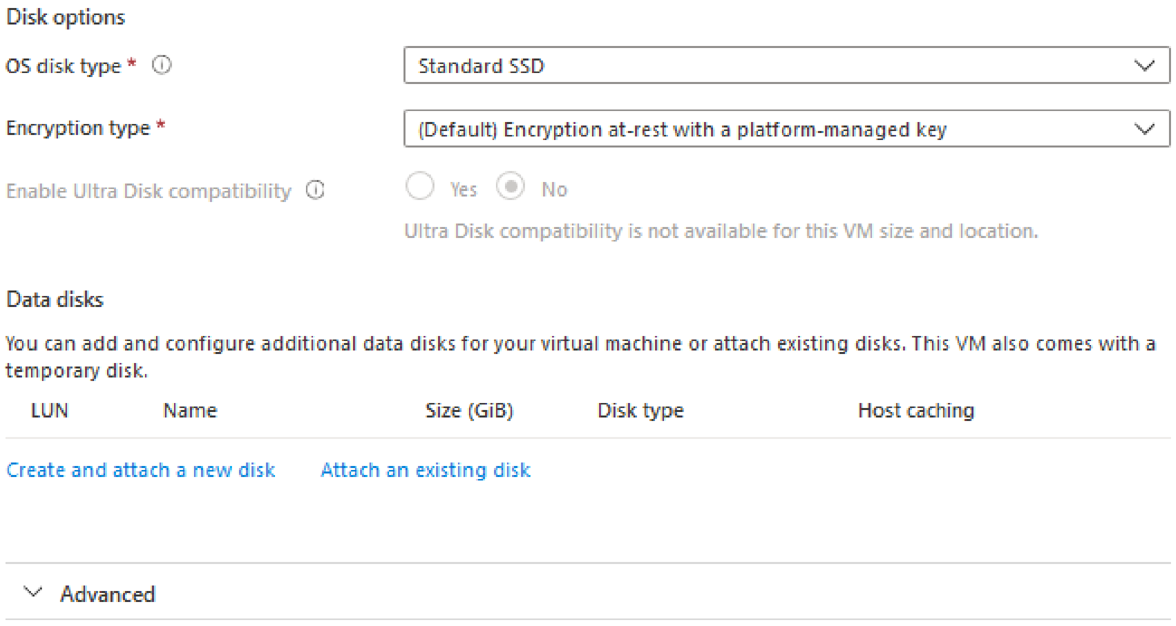
ℹ Note	The Image size required depends on the anticipated workload. For more details on the image size that best suits your requirements, please refer to the following Microsoft links: Sizes for Virtual Machines and Linux Virtual Machine Pricing. The standard A1 with 1 vCPU & 1.75GB RAM is primarily meant for PoC deployments and low traffic websites and application. For a non PoC deployment we recommend at least 2 vCPUs and 3.5GB RAM. For further help and advice please contact support@loadbalancer.org.

8. Select the required ***Authentication type*** – a **Password** or an **SSH Public key** can be used.

ℹ Note	Please refer to Generating SSH Keys for more details on creating and using SSH keys.

9. If using password authentication, enter a suitable ***Username*** & ***Password***.
10. Click **Next : Disks >**.

Configure Disks



Disk options

OS disk type * ⓘ: Standard SSD

Encryption type *: (Default) Encryption at-rest with a platform-managed key

Enable Ultra Disk compatibility ⓘ: ○ Yes ● No

Ultra Disk compatibility is not available for this VM size and location.

Data disks

You can add and configure additional data disks for your virtual machine or attach existing disks. This VM also comes with a temporary disk.

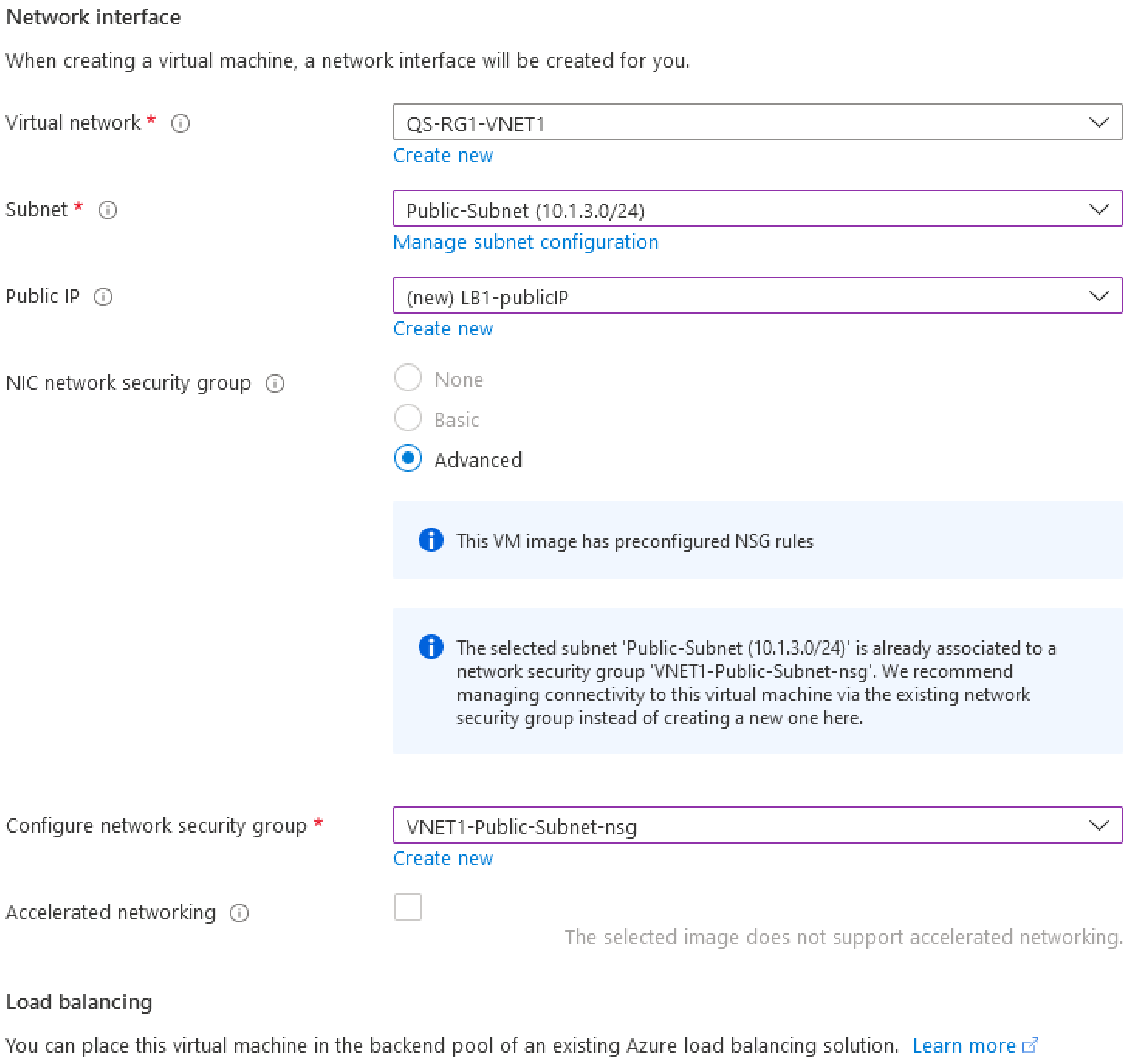
LUN	Name	Size (GiB)	Disk type	Host caching

1. Select the required *OS disk type* – by default this is set to **Standard SSD**, this can be changed if required. Typically, the default setting is appropriate for most deployments.

> ℹ Note
>
> Information on the various disk types available in Azure can be found here. Comparative disk pricing is available here.

2. Select the required *Encryption type*.
3. Click **Next : Networking >**.

Configure Networking



Network interface

When creating a virtual machine, a network interface will be created for you.

Virtual network * ⓘ QS-RG1-VNET1
Create new

Subnet * ⓘ Public-Subnet (10.1.3.0/24)
Manage subnet configuration

Public IP ⓘ (new) LB1-publicIP
Create new

NIC network security group ⓘ
○ None
○ Basic
● Advanced

ⓘ This VM image has preconfigured NSG rules

ⓘ The selected subnet 'Public-Subnet (10.1.3.0/24)' is already associated to a network security group 'VNET1-Public-Subnet-nsg'. We recommend managing connectivity to this virtual machine via the existing network security group instead of creating a new one here.

Configure network security group * VNET1-Public-Subnet-nsg
Create new

Accelerated networking ⓘ □
The selected image does not support accelerated networking.

Load balancing

You can place this virtual machine in the backend pool of an existing Azure load balancing solution. Learn more

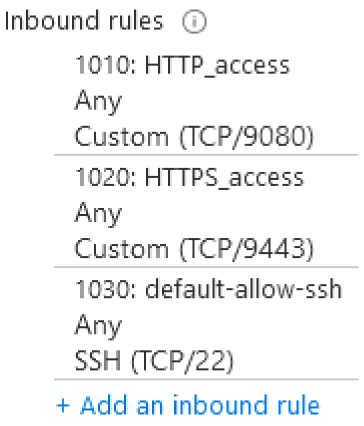
1. Configure the ***Virtual network***, ***Subnet*** & ***Public IP*** settings according to your requirements.

ℹ Note	Public IP addresses can be either Basic or Standard SKU – the default is Basic. When setting up HA (see High Availability), the Public IP SKU and the load balancer SKU must match to enable backend pools to be configured. For more information on setting up public IP addresses please click here.

2. Configure the ***Network Security Group*** settings according to your requirements.

ℹ Note	Microsoft recommends that where possible Network Security Groups are associated with subnets rather than individual interfaces since this simplifies management.

- If you choose to create a new NSG rather than selecting an existing one, the following inbound rules are included by default:



Inbound rules ⓘ

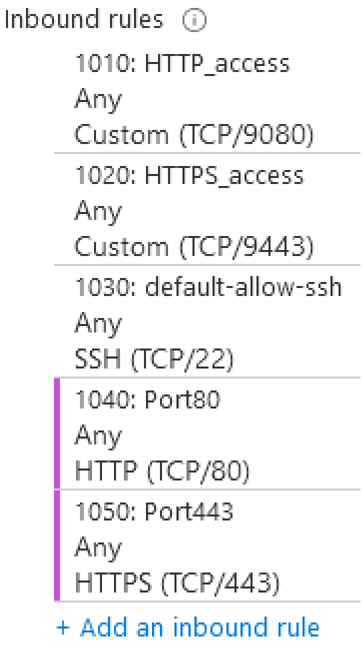
1010: HTTP_access
Any
Custom (TCP/9080)

1020: HTTPS_access
Any
Custom (TCP/9443)

1030: default-allow-ssh
Any
SSH (TCP/22)

+ Add an inbound rule

- These inbound rules are required for managing the load balancer
- The rules can be edited by clicking the ***Create new*** link under the network security group drop-down
- Specify additional inbound rules for the ports used for your load balanced applications, e.g. TCP 80 and TCP 443 if you're load balancing web servers, TCP 3389 if you're load balancing RDP etc.
- To specify additional inbound rules, click **Add an inbound rule**. The example below shows additional ports TCP/80 (for load balanced HTTP web server traffic) and TCP/443 (for load balanced HTTPS web server traffic).



Inbound rules ⓘ

1010: HTTP_access
Any
Custom (TCP/9080)

1020: HTTPS_access
Any
Custom (TCP/9443)

1030: default-allow-ssh
Any
SSH (TCP/22)

1040: Port80
Any
HTTP (TCP/80)

1050: Port443
Any
HTTPS (TCP/443)

+ Add an inbound rule

> **Note** The rules can also be edited after the NSG is created.

- Once the required rules have been defined, click **OK**.

3. Under the "Load Balancing" section, if you have already configured an Azure load balancer in preparation for configuring an HA pair, ensure the ***Place this virtual machine behind an existing load balancing solution?*** check-box is enabled, then set ***Load balancing options*** to **Azure load balancer** and select the relevant load balancer. Alternatively, the Azure load balancer can be created later, in which case leave the check-box

unchecked.

> **Note**
>
> When deploying an HA pair of Loadbalancer.org instances, they must be deployed behind an Azure load balancer. For more information please refer to High availability.

4. Click **Next : Management >**.

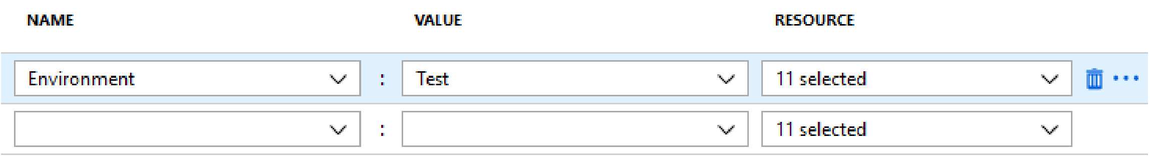
Configure Management

1. Configure the Management Settings according to your requirements.
2. Click **Next : Advanced >**.

Configure Advanced Options

1. Configure the Advanced Settings according to your requirements.
2. Click **Next : Tags >**.

Configure Tags



NAME		VALUE	RESOURCE
Environment	:	Test	11 selected
	:		11 selected

1. Configure Tags according to your requirements.
2. Click **Next : Review & Create >**.

Review & Create

1. Review all details, terms and settings, enter your *Name*, *Preferred e-mail address* and *Preferred phone number* in the fields provided and if you're happy to proceed, click **Create**.

   If validation completes successfully, the load balancer instance will now be deployed

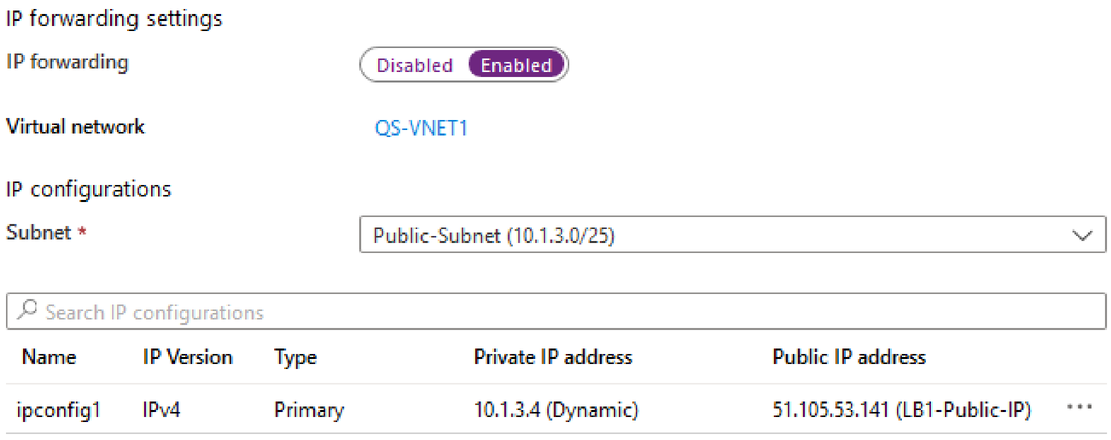
Enable IP Forwarding (If Required)

If you'll be configuring layer 4 NAT mode services, or layer 7 services with TProxy, ensure that IP forwarding is enabled. This allows the VM to accept traffic that is not addressed to itself, i.e. the return traffic from the load balanced servers to the client that passes via the load balancer. For an HA pair, this must be done on *both* VMs.

To enable IP forwarding:

1. In the Azure Management Portal, select the *Virtual Machines* option, click on the newly deployed Load Balancer VM, click on *Networking* and then select the network interface attached to the load balancer, then click *IP configurations*.

2. Ensure that IP forwarding is enabled as shown below:



IP forwarding settings

IP forwarding: Disabled **Enabled**

Virtual network: QS-VNET1

IP configurations

Subnet *: Public-Subnet (10.1.3.0/25)

Name	IP Version	Type	Private IP address	Public IP address
ipconfig1	IPv4	Primary	10.1.3.4 (Dynamic)	51.105.53.141 (LB1-Public-IP)

7. Accessing the Appliance

7.1. Accessing the Appliance WebUI

Using a browser, navigate to the public IP address or FQDN on port 9443:

https://<Public IP address>:9443

or

https://<FQDN>:9443

> **Note** To configure an FQDN in Azure please refer to this link.

> **Note** You'll receive a warning about the WebUI's SSL certificate. This is due to the default self signed certificate that is used. If preferred, you can upload your own certificate - for more information, please refer to Appliance Security Features.

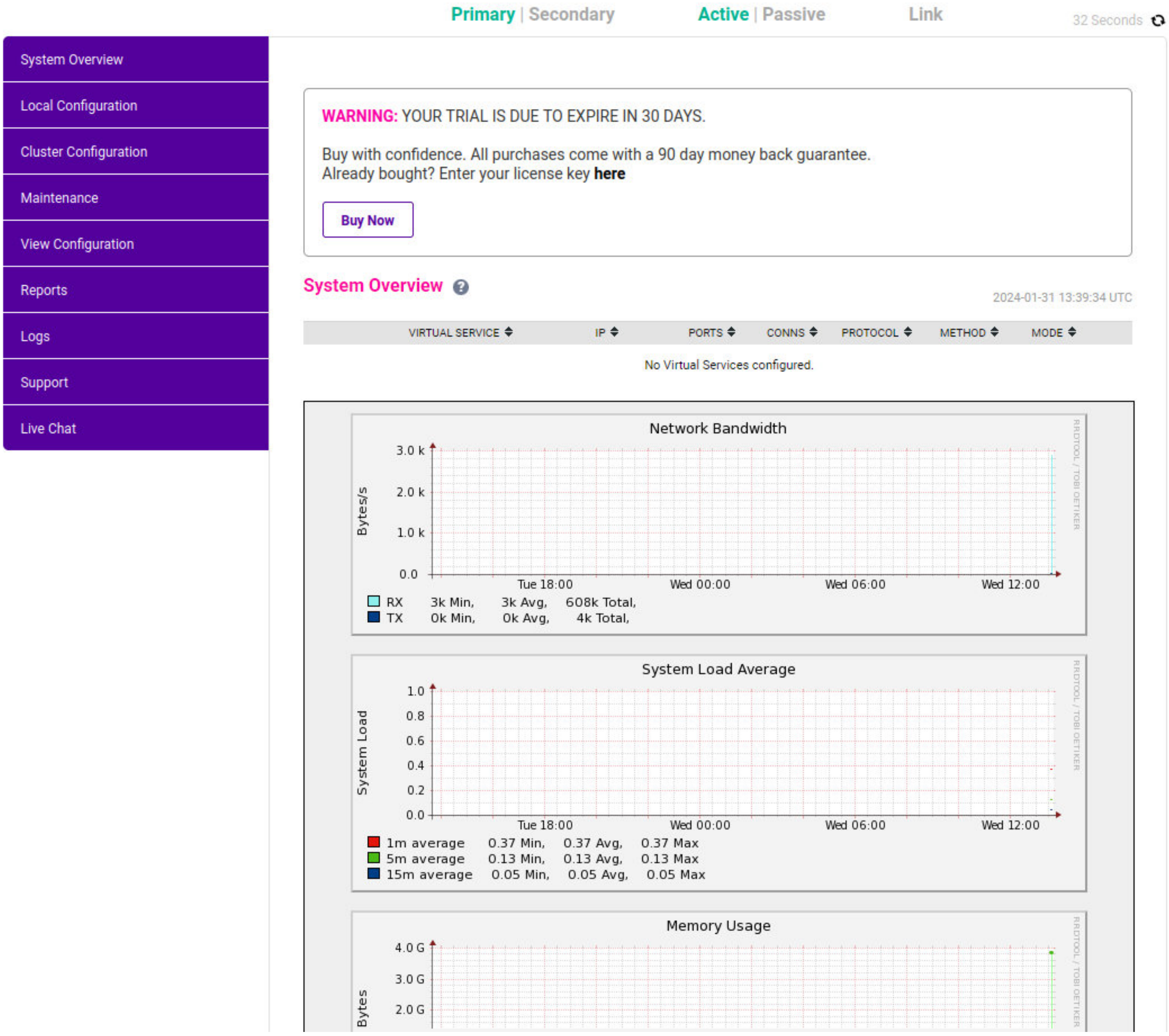
> **Note** If you need to change the port, IP address or protocol that the WebUI listens on, please refer to Service Socket Addresses.

Log in to the WebUI using the following default credentials:

Username: loadbalancer
Password: loadbalancer

> **Note** To change the password, use the WebUI option: ***Maintenance > Passwords.***

Once logged in, the WebUI is displayed:



WARNING: YOUR TRIAL IS DUE TO EXPIRE IN 30 DAYS.

Buy with confidence. All purchases come with a 90 day money back guarantee.
Already bought? Enter your license key **here**

System Overview

2024-01-31 13:39:34 UTC

VIRTUAL SERVICE	IP	PORTS	CONNS	PROTOCOL	METHOD	MODE

No Virtual Services configured.

WebUI Menu Options

System Overview - Displays a graphical summary of all VIPs, RIPs and key appliance statistics
Local Configuration - Configure local host settings such as IP address, DNS, system time etc.
Cluster Configuration - Configure load balanced services such as VIPs & RIPs
Maintenance - Perform maintenance tasks such as service restarts and taking backups
View Configuration - Display the saved appliance configuration settings
Reports - View various appliance reports & graphs
Logs - View various appliance logs
Support - Create a support download, contact the support team & access useful links
Live Chat - Start a Live Chat session with one of our Support Engineers

7.2. Appliance Security

Note

For full details of each security mode and all other security related features, please refer to

Appliance Security Features.

Security Mode

To control how the appliance is accessed and which features are enabled, 3 security modes are provided:

- **Custom** - In this mode the security options can be configured to suit your requirements
- **Secure - (Default)** - In this mode:
    - "root" user console access & SSH password access are disabled
    - WebUI connections are forced to use HTTPS
    - Access to the *Local Configuration > Execute shell command* menu option is disabled
    - The Firewall Script & the Firewall Lockdown Wizard Script cannot be edited
- **Secure - Permanent** - This mode is the same as **Secure** but once set it cannot be changed

> ⓘ Important Setting the security mode to **Secure - Permanent** is irreversible.

To configure the Security Mode:

1. Using the WebUI, navigate to: *Local Configuration > Security*.
2. Select the required *Appliance Security Mode*.
3. Click **Update**.

Passwords

The loadbalancer WebUI account

The password for the **loadbalancer** WebUI user account is set to "loadbalancer" by default. This can be changed using the WebUI menu option: *Maintenance > Passwords*.

The root Linux account

it’s not possible to directly log in as root. If root access is required, once you’ve logged into the console/SSH session using the credentials defined during instance deployment, run the following command:

```
$ sudo su
```

7.3. Checking For Updates

Once you have access to the WebUI, we recommend that you use the online update feature to ensure that you’re running the very latest version of the appliance. To check for updates, use the WebUI option: *Maintenance > Software Update* and click the **Online Update** button. If updates are available, you’ll be presented with a list of changes that are included in the update. To start the update, click the second **Online Update** button at the bottom of the screen. Updates are incremental, so repeat the process until you’re informed that no more updates are available.

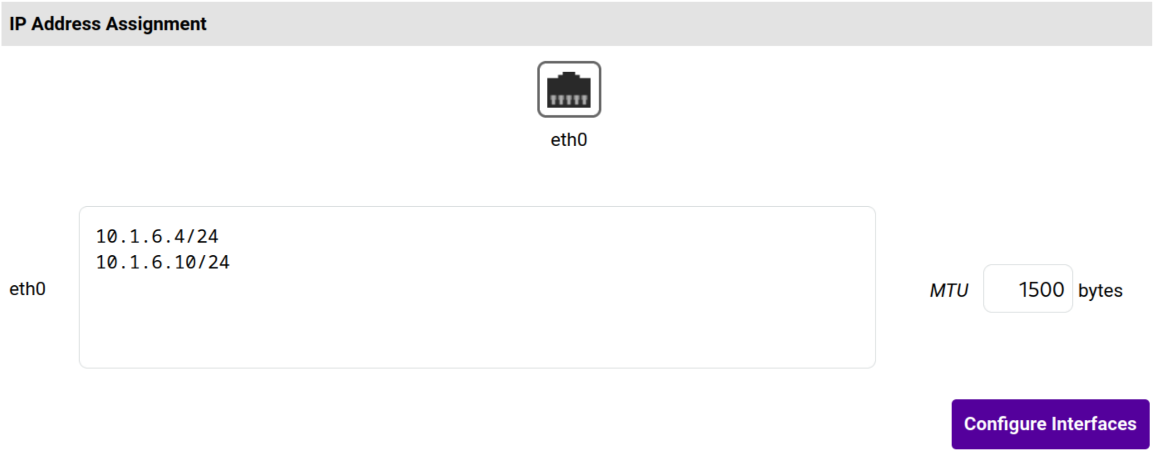
7.4. Appliance Licensing

If you've deployed the BYOL version of the appliance, by default it runs as a 30 day trial and is completely unrestricted during this time. After 30 days, the appliance continues to work but it's no longer possible to make changes to the configuration. When a license is purchased, you'll be provided with a license key file by our sales team. This must then be installed on your appliance. To install the license, use the WebUI option: *Local Configuration > License Key* to browse to and select the license file provided. Once selected, click **Install License Key** to apply the license. We recommend that you should check for updates *before* applying the license key.

7.5. Enterprise Azure Non-standard WebUI Menu Options

Enterprise Azure has some differences to the standard hardware/virtual product range due to the way the Microsoft Azure environment works. The menu options that work differently are detailed below. For all others please refer to our main Administration Manual.

1) Local Configuration > Network Interface Configuration



```
10.1.6.4/24
10.1.6.10/24
```

MTU 1500 bytes

This menu option works in a very similar way to the standard product range, although please note the following:

- On initial deployment, a single IP private address is allocated (either static or dynamic depending on the chosen setting)
- Additional addresses can be added as shown (10.1.6.10/24) – this is required when you require multiple VIPs on different IP addresses
- To add an additional IP address, enter the new address below the existing address as shown in the example above, then click **Configure Interfaces**

> Important
>
> If an IP address is added, you'll also need to add the same IP address to the Network Interface on the load balancer VM via the Azure portal. If this is not done, Azure will not be aware of the new address.

> Important
>
> If the IP address allocated to the VM on initial deployment (normally the first in the list) is changed, make sure that you add the same address to the VMs in Azure. If this is not done, you'll loose connectivity to the VM.

7.6. Accessing the Appliance using SSH

When the appliance is deployed, ***Authentication type*** must be set to either **SSH Public key** or **Password**. When set to **SSH Public Key**, a key pair must be manually generated outside of the Azure environment using tools such as ssh-keygen under Linux and PuttyGen under Windows. Once the key pair is generated, the public key must be copied into the ***SSH public key*** field at VM deployment, and the private key is then used on the SSH client machine to access the VM.

Generating SSH Keys

The steps below show how to generate SSH key pairs using Linux and Windows.

Using Linux

STEP 1 - Generate a keypair using ssh-keygen

All Distros:

```
# ssh-keygen -q -t rsa -b 2048 -f <output filename>
```

e.g.

```
# ssh-keygen -q -t rsa -b 2048 -f AzureKeys
```

When prompted, enter a pass-phrase, or leave empty for no passphrase:

```
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
```

2 files are created:

- **AzureKeys** – this is the Private Key file and is used on the SSH client machine
- **AzureKeys.pub** – this is the Public Key file, the contents are copied into the ***SSH public key*** field when the VM is deployed

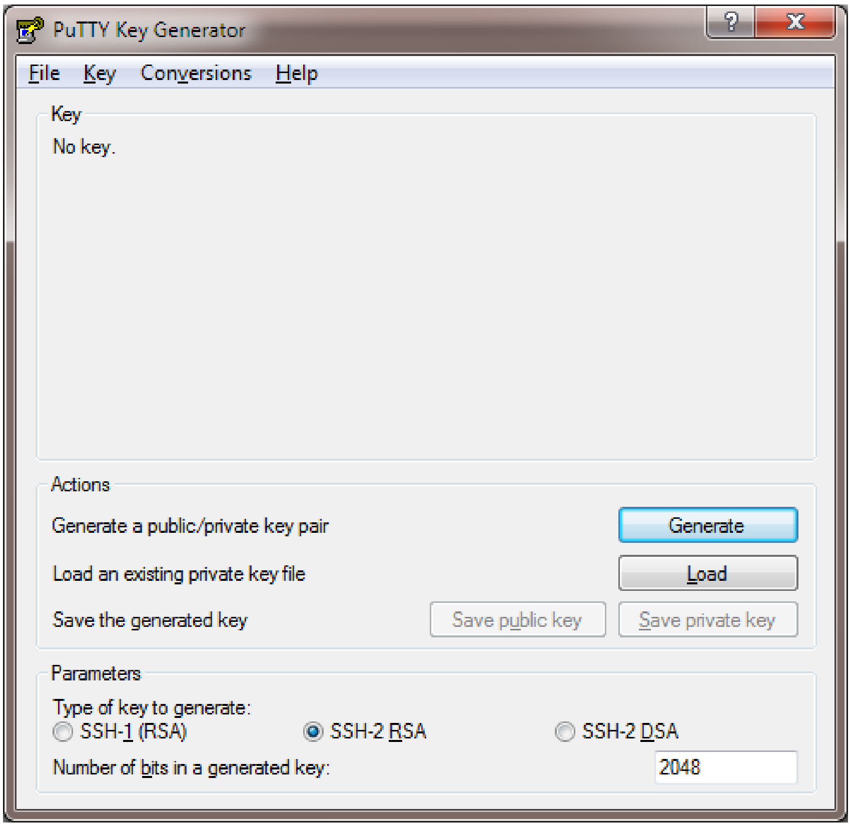
Using Windows

STEP 1 – Install PuTTY

1. Download PuTTY from here.
2. Run the installer.

STEP 2 – Use PuTTYgen to generate a Public/Private key pair

1. Browse to the PuTTY program folder and run PuTTYgen.



Key

No key.

Actions

Generate a public/private key pair

Load an existing private key file

Save the generated key

Parameters

Type of key to generate:

○ SSH-1 (RSA) ● SSH-2 RSA ○ SSH-2 DSA

Number of bits in a generated key: 2048

2. Click the **Generate** button.
3. As directed, move the mouse around to create random keys.
4. Once generated, click the **Save public key** and **Save private key** buttons to save the keys.

Accessing the Appliance from Linux

Start SSH specifying the private key file and login as the user defined when deploying the VM, e.g.

Using the IP address:

```
# ssh -i /root/AzureKeys lbuser@1.2.3.4
```

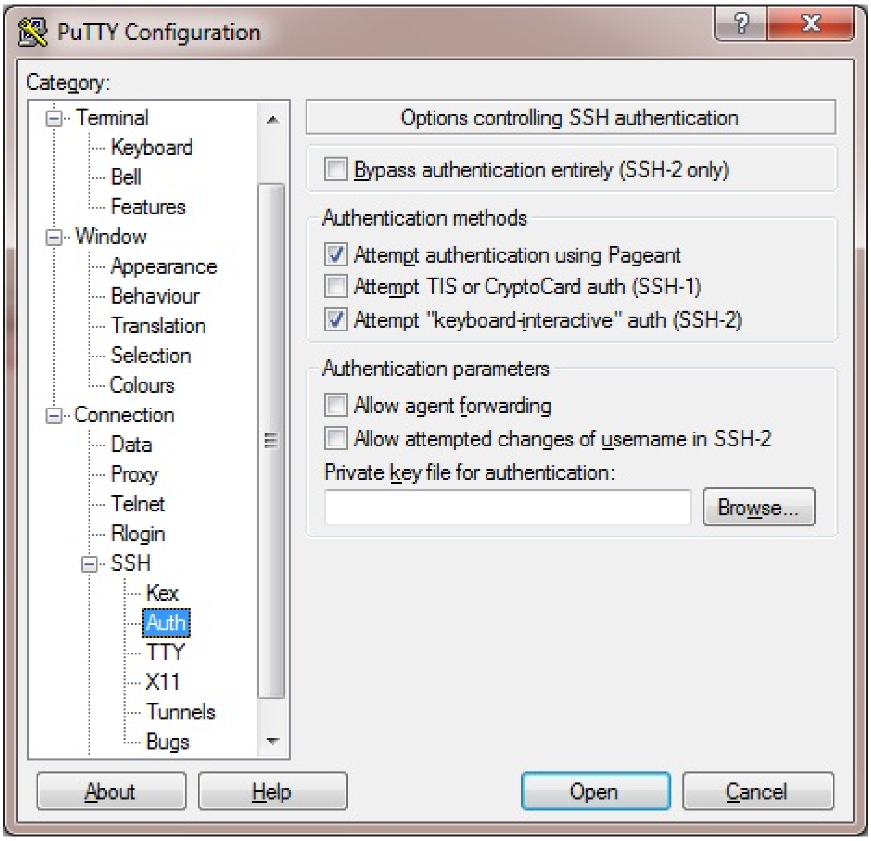
Or using the fqdn:

```
# ssh -i /root/AzureKeys lbuser@fqdn
```

> **Note** To configure an FQDN in Azure under the Resource Manager model please refer to this link.

Accessing the Appliance from Windows using PuTTY

1. Run PuTTY.
2. Expand the SSH section and select *Auth* as shown below.



Options controlling SSH authentication

□ Bypass authentication entirely (SSH-2 only)

Authentication methods

☑ Attempt authentication using Pageant

□ Attempt TIS or CryptoCard auth (SSH-1)

☑ Attempt "keyboard-interactive" auth (SSH-2)

Authentication parameters

□ Allow agent forwarding

□ Allow attempted changes of username in SSH-2

Private key file for authentication: Browse...

3. Click **Browse** and select the private key created earlier.
4. Click **Open** to start the SSH session.
5. Login using the username specified when deploying the instance, no password will be required.

Note

To enable full root access, the following command can be used once logged in to the appliance via SSH:

```
$ sudo su
```

8. Configuration Examples

This section presents 4 example configurations that illustrate how the load balancer is deployed. Web Servers are used in the examples, although the same concepts apply to other applications.

8.1. High Availability

We recommend that 2 appliances are deployed as an HA clustered pair to avoid introducing a single point of failure. In Azure, you should configure your HA pair ***FIRST*** before setting up your load balanced services.

Key Concepts

1. In our standard hardware / virtual product, when a failover occurs, the ***same*** VIP address is brought up on the passive device. In Azure, in order to minimize the time taken for the failover a different approach is used.

2. In Azure, when creating a Virtual Service on an HA pair, ***2*** private IPs must be specified – one to be used when the Primary is active and one to be used when the Secondary is active.
3. An Azure load balancer is used in front of the Loadbalancer.org HA pair to direct inbound connections to the ***active*** appliance.
4. Both Primary & Secondary appliances must be in the same Availability Set or deployed within the same Availability Zone / split across 2 different Availability Zones.

ℹ Note

If you're using Availability Zones rather than Availability Sets, then a standard SKU Azure load balancer ***must*** be used. The standard SKU has a published SLA and the cost depends on the amount of data processed and the number of load balancing rules as explained here. The Basic SKU is free, but comes with no published Azure SLA.

If you have already configured a single appliance and now want to add a Secondary appliance to create an HA pair, the following approach can be taken:

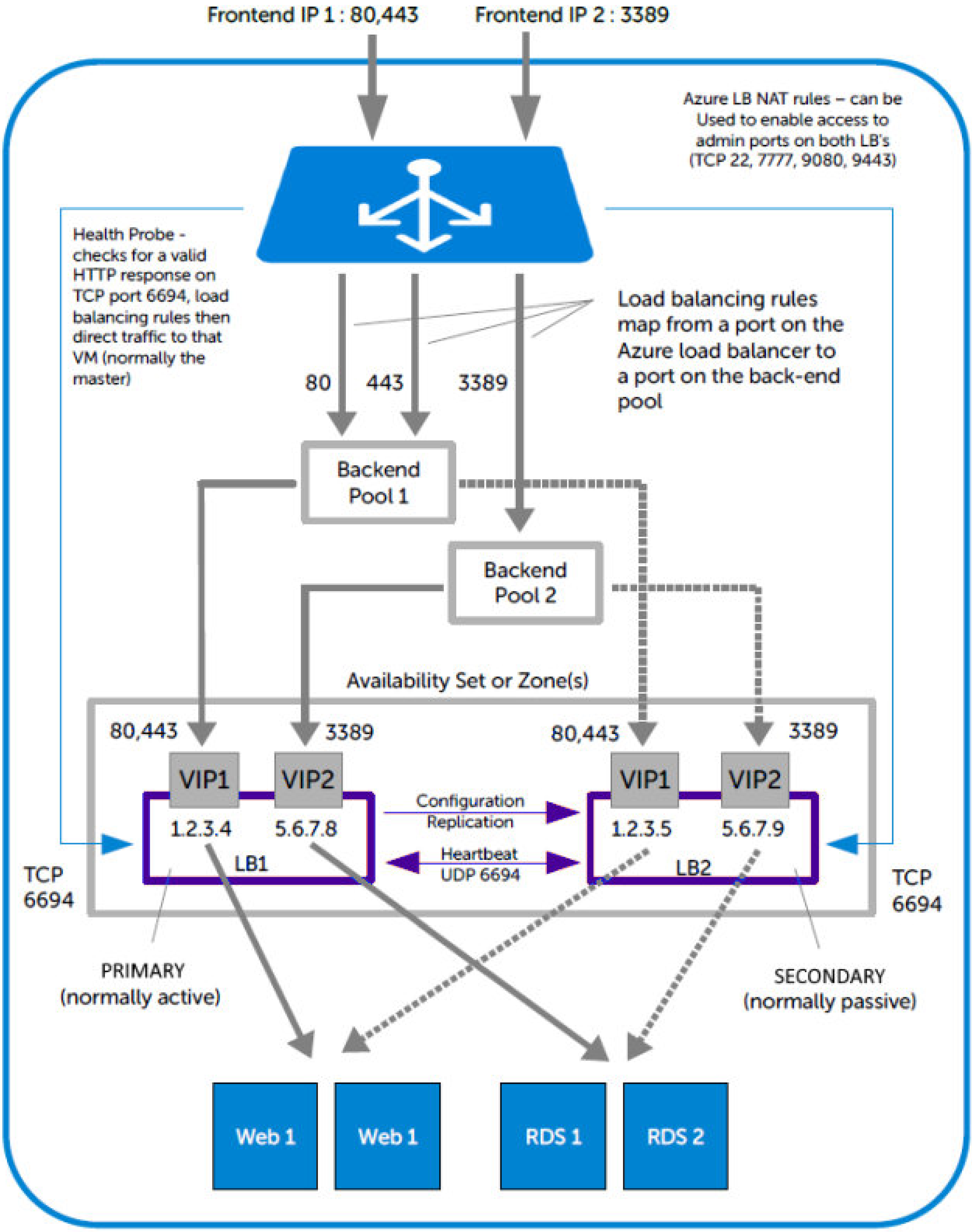
ℹ Note

If your existing appliance has not been deployed in an Availability Set or Zone, you'll have to re-deploy the instance because instances cannot be moved into a set or zone after creation. In this case, please refer to Configuration Example 1 or Configuration Example 2.

1. Deploy an additional Loadbalancer.org VM to be the Secondary, make sure it's in the same Availability Set or deployed within the same Availability Zone / split across 2 different Availability Zones.
2. On the Primary appliance, using the WebUI option: ***Cluster Configuration > Floating IPs***, remove the floating IPs that were automatically configured for each VIP, then using the WebUI option: ***Local Configuration > Network Interface Configuration*** add the same addresses to the network interface instead. This will ensure that these IPs appear in the drop-downs used to setup the VIP(s) when in HA mode as illustrated here.
3. On the Secondary appliance, using the WebUI option: ***Local Configuration > Network Interface Configuration*** add corresponding IPs for each VIP. This will ensure that these IPs appear in the drop-downs used to setup the VIP(s) when in HA mode.
4. Follow **Step 2** to **6** starting here.
5. Using the WebUI on the Primary appliance, ensure that the ***Virtual Service IP address*** & ***Secondary IP Address*** fields are set correctly for each VIP. As explained in Main Differences to Our Standard (Non-Cloud) Product, these drop-downs are used to specify the IP address used for the VIP when active on the Primary and when active on the Secondary.
6. Follow **Step 7** here.
7. Follow **Step 10 & 11** starting here.

8.2. Implementing HA in Azure

The following diagram shows how HA is configured in Azure. As shown, two Loadbalancer.org VMs are configured as a clustered pair in combination with an Azure load balancer.


Frontend IP 1 : 80,443
Frontend IP 2 : 3389
Azure LB NAT rules – can be Used to enable access to admin ports on both LB's (TCP 22, 7777, 9080, 9443)
Health Probe - checks for a valid HTTP response on TCP port 6694, load balancing rules then direct traffic to that VM (normally the master)
Load balancing rules map from a port on the Azure load balancer to a port on the back-end pool
80
443
3389
Backend Pool 1
Backend Pool 2
Availability Set or Zone(s)
80,443
3389
VIP1
VIP2
1.2.3.4
5.6.7.8
LB1
Configuration Replication
Heartbeat UDP 6694
80,443
3389
VIP1
VIP2
1.2.3.5
5.6.7.9
LB2
TCP 6694
TCP 6694
PRIMARY (normally active)
SECONDARY (normally passive)
Web 1
Web 1
RDS 1
RDS 2

- LB1 and LB2 are configured as an HA pair. In this mode, one device is active (typically the Primary appliance) and the other is passive (typically the Secondary appliance).

- The private IPs for the VIP on the Primary & Secondary are selected using drop-downs within the VIP configuration screen. These drop-downs are only displayed once the pair is configured. They are populated with the IPs that are assigned to the network interface using the WebUI option: *Local Configuration > Network Interface Configuration.*

- The probe service on TCP port 6694 is up on the active appliance (LB1) and down on the passive appliance (normally LB2), The active appliance responds with **200 OK.**
- The Azure load balancer probes port 6694 on LB1 and LB2 and then forwards traffic to the active load balancer appliance (normally LB1).
- If the Primary appliance fails for any reason, the passive appliance will detect this, become active and bring up the probe service on port 6694. In turn, the Azure load balancer detects this and will then forward traffic to the Secondary device (LB2).
- If your configuration includes VIPs with multiple ports or if you have multiple VIPs you'll need to setup multiple *Load balancing rules* to map from the Azure load balancer's Frontend IP to the appropriate *Backend Pool* and appropriate port. Also, you may need to setup multiple *Frontend IP Configurations* & *Backend Pools* depending on whether your VIPs share the same IP or have unique IP addresses, and whether the load balanced servers are common between VIPs or unique. The same *Health-probe* should be used for all *Load balancing rules*.

8.3. 1 – Load Balancing Web Servers, HA Configuration, 1 subnet, layer 7

This example demonstrates how to configure an HA pair of load balancers and then configure a layer 7 VIP to load balance 2 web servers. The Loadbalancer.org instances are deployed in the same ***Availability Set*** and a ***Basic*** SKU Azure load balancer is used to route connections to the active appliance.

Step 1 – Deploy 2 x Loadbalancer.org VMs – one to be the Primary, the other to be the Secondary

1. Please refer to Deploying Enterprise Azure From the Marketplace. Ensure that both load balancer VMs are in the ***same*** Availability Set.

Step 2 – Verify Network Security Group Settings

1. Ensure that your Network Security Group(s) permit the following communication between the 2 VMs:
   - TCP port 22 (SSH)
   - UDP port 6694 (heartbeat)
   - ICMP Ping

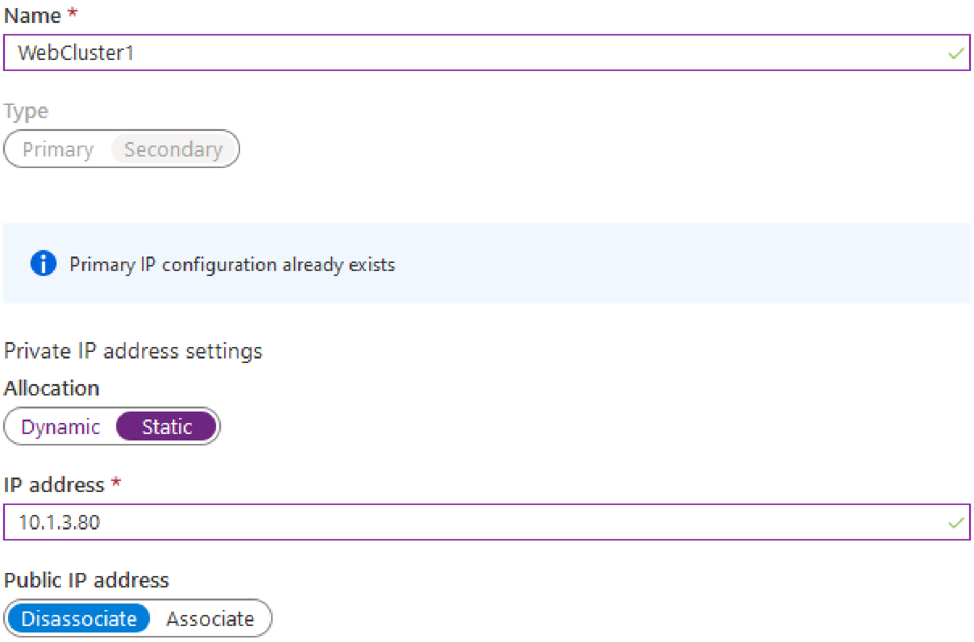
   > Note
   >
   > These requirements are covered by default within the same Virtual Network. Please refer to this link for more information on default rules.

2. Ensure that your Network Security Group(s) permit the following inbound communication from the Azure load balancer to both VMs:
   - TCP port 6694 (Azure load balancer health probe)

   > Note
   >
   > This requirement is covered by default within the same Virtual Network. Please refer to this link for more information on default rules.

Step 3 – Add the IP Address to be used for the VIP to the Primary & Secondary using the *Azure Portal*

1. In the Azure Portal select *Virtual Machines*.
2. Select the Primary VM.
3. Select *Networking*, then click the Network Interface.
4. Select *IP Configurations*.
5. Click **Add**.



Name *

WebCluster1

Type

Primary Secondary

Primary IP configuration already exists

Private IP address settings

Allocation

Dynamic **Static**

IP address *

10.1.3.80

Public IP address

Disassociate Associate

   - Enter a suitable name for the IP address, e.g. **WebCluster1**
   - Set *Private IP address Allocation* to **Static**
   - Enter an appropriate IP address (this must tally with the address to be used for your VIP on the Loadbalancer.org appliance), e.g. **10.1.3.80**
   - Click **OK**

6. Now repeat steps 1-5 on the Secondary VM for the VIP using a corresponding (but different) IP address, e.g. **10.1.3.81**.

Step 4 – Add the IP Address to be used for the VIP to the Primary & Secondary using the *Appliance WebUI*

Primary Appliance

- On the Primary, navigate to the WebUI option: *Local Configuration > Network Interface Configuration*
- Add the IP you intend to use for the VIP, use CIDR notation, e.g. **10.1.3.80/24**

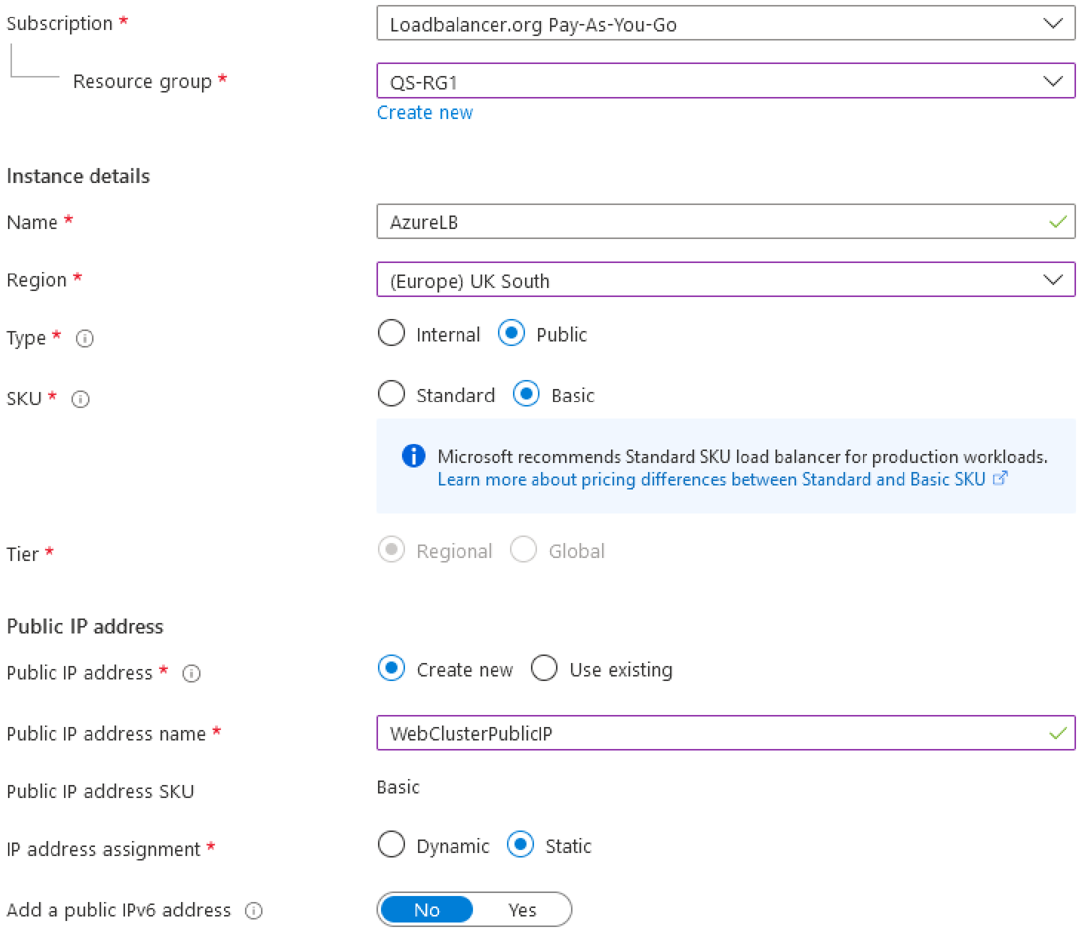
Secondary Appliance

- On the Secondary, navigate to the WebUI option: *Local Configuration > Network Interface Configuration*
- Add the IP you intend to use for the VIP, use CIDR notation, e.g. **10.1.3.81/24**

Step 5 – Add & Configure the Azure Load Balancer

1. First, add the Azure Load Balancer.

- In the Azure Portal select *Load balancers*
- Click **Add**



Subscription *	Loadbalancer.org Pay-As-You-Go
Resource group *	QS-RG1 Create new
Instance details	
Name *	AzureLB
Region *	(Europe) UK South
Type *	○ Internal ● Public
SKU *	○ Standard ● Basic Microsoft recommends Standard SKU load balancer for production workloads. Learn more about pricing differences between Standard and Basic SKU
Tier *	● Regional ○ Global
Public IP address	
Public IP address *	● Create new ○ Use existing
Public IP address name *	WebClusterPublicIP
Public IP address SKU	Basic
IP address assignment *	○ Dynamic ● Static
Add a public IPv6 address	[✓ No] Yes

- Configure the *Subscription* & *Resource group* settings according to your requirements
- Enter a suitable *Name* for the instance, e.g. **AzureLB**
- Select the required *Region*
- If deploying within a private network set *Type* to **Internal**, if it's public facing select **Public**
- Set *SKU* to **Basic**

> **Note**
>
> This configuration example uses a **Basic** SKU Azure load balancer. Configuration Example 2 uses a **Standard** SKU Azure load balancer. Please note the following when deciding which option to choose:
>
> - If you have deployed your Primary & Secondary instances in an Availability Set then either the Basic or Standard SKU can be used
> - If you have deployed your Primary & Secondary instances using Availability Zones, then the Standard SKU must be used

- The Basic SKU is free, rates apply to the Standard SKU
- The Standard SKU has a published SLA, the Basic SKU does not
- Microsoft recommends the Standard SKU load balancer for production workloads

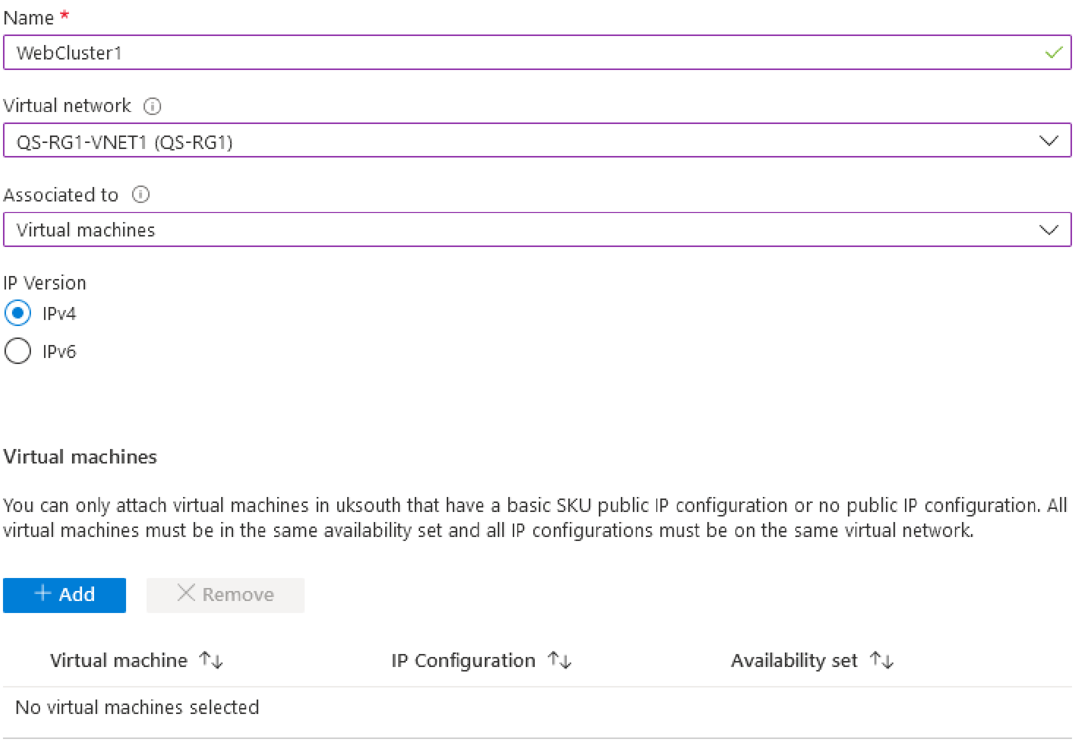
- Configure the ***Public IP address settings*** (for external deployments) or the ***Virtual Network*** settings (for internal deployments) according to your requirements

> **Note** Once the Azure Load balancer is created, the IP configuration can be modified using the *Frontend IP Configuration* in the Load balancer menu.

- Click **Next : Tags >**
- Configure the Tags according to your requirements
- Click **Next : Review + Create >**
- Once validated, review the settings and click **Create**

2. Next, create the Backend Pool(s).

- In the menu for the load balancer, click *Backend pools*
- Click **Add**



Name *
WebCluster1

Virtual network
QS-RG1-VNET1 (QS-RG1)

Associated to
Virtual machines

IP Version
● IPv4
○ IPv6

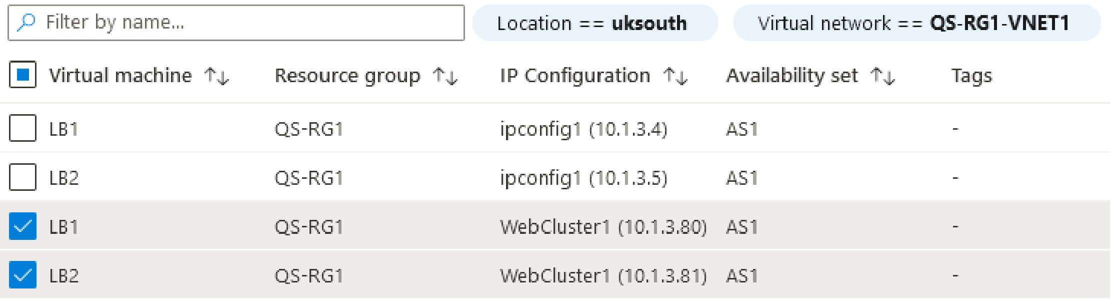
Virtual machines

You can only attach virtual machines in uksouth that have a basic SKU public IP configuration or no public IP configuration. All virtual machines must be in the same availability set and all IP configurations must be on the same virtual network.

Virtual machine ↑↓	IP Configuration ↑↓	Availability set ↑↓
No virtual machines selected		

- Enter an appropriate *Name*, e.g. **WebCluster1**
- Select the required *Virtual Network*
- Under *Associated to* select **Virtual machines**

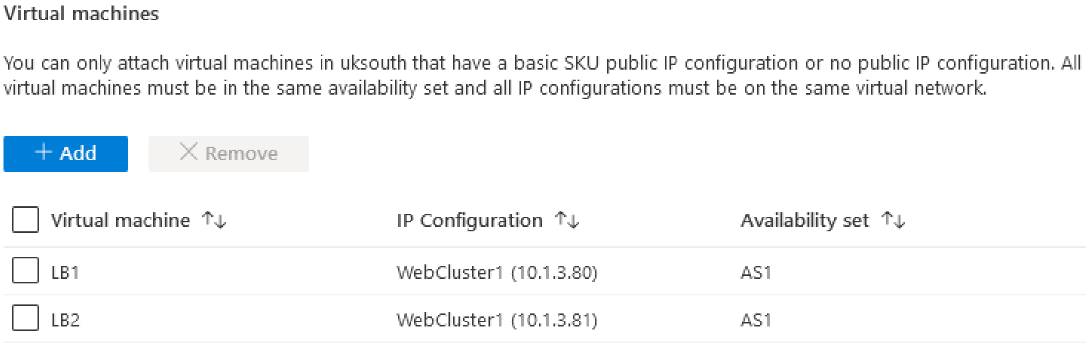
- Select the required_ IP version_, e.g. **IPv4**
- Click **Add**



Filter by name... | Location == **uksouth** | Virtual network == **QS-RG1-VNET1**

■ Virtual machine ↑↓	Resource group ↑↓	IP Configuration ↑↓	Availability set ↑↓	Tags
☐ LB1	QS-RG1	ipconfig1 (10.1.3.4)	AS1	-
☐ LB2	QS-RG1	ipconfig1 (10.1.3.5)	AS1	-
☑ LB1	QS-RG1	WebCluster1 (10.1.3.80)	AS1	-
☑ LB2	QS-RG1	WebCluster1 (10.1.3.81)	AS1	-

- Ensure that both load balancer VMs are selected as shown in the example above (LB1 & LB2), and that the IP addresses selected correspond to the VIP on each appliance (**10.1.3.80** & **10.1.3.81**)
- Click **Add**



Virtual machines

You can only attach virtual machines in uksouth that have a basic SKU public IP configuration or no public IP configuration. All virtual machines must be in the same availability set and all IP configurations must be on the same virtual network.

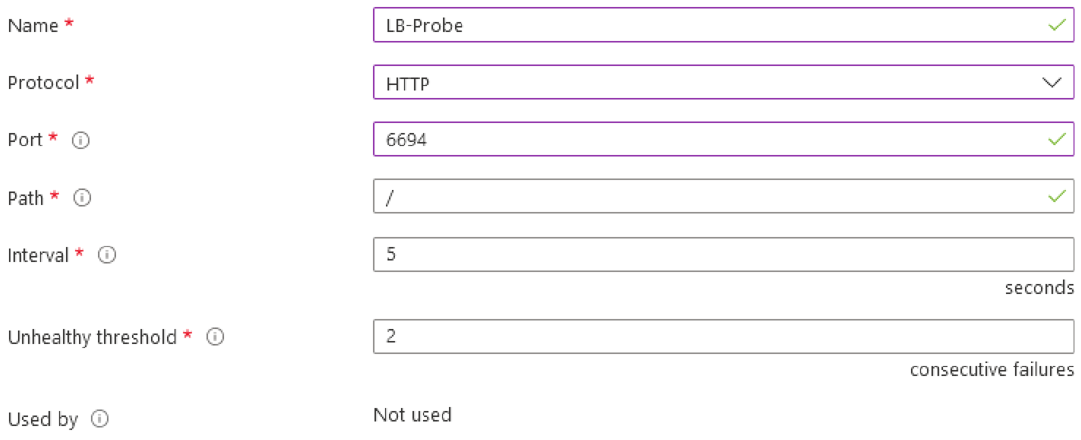
☐ Virtual machine ↑↓	IP Configuration ↑↓	Availability set ↑↓
☐ LB1	WebCluster1 (10.1.3.80)	AS1
☐ LB2	WebCluster1 (10.1.3.81)	AS1

- Click **Add** again to confirm your selection
- All settings will now be validated and the Backend Pool will be created

> **Note** If you have multiple VIPs on different IPs you'll need to setup a Backend Pool for each of these. This is illustrated in the diagram in Implementing HA in Azure.

3. Next, create a Health Probe.

- In the menu for the Load balancer, click ***Health-probes***
- Click **Add**



Name *	LB-Probe ✓
Protocol *	HTTP
Port * ⓘ	6694 ✓
Path * ⓘ	/ ✓
Interval * ⓘ	5 seconds
Unhealthy threshold * ⓘ	2 consecutive failures
Used by ⓘ	Not used

- Enter an appropriate name, e.g. **LB-Probe**
- Set *Protocol* to **HTTP**

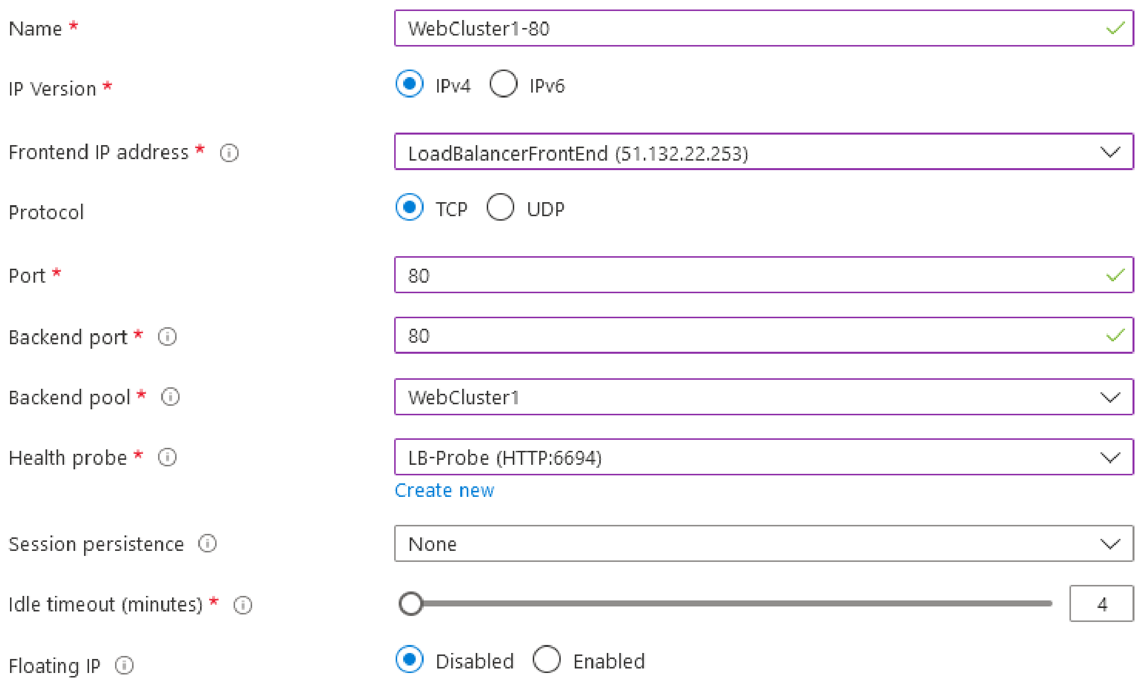
> ℹ Note
>
> Setting *Protocol* to **HTTP** will configure the Azure load balancer to look for a **200 OK** response from each Loadbalancer.org VM.

- Set *Port* to **6694**
- Leave the remaining settings at their default values
- Click **OK**

> ℹ Note
>
> The same Health probe should be used across all ***Load balancing rules***.

4. Next, configure the Load Balancing Rule.

   - In the menu for the Load balancer, click ***Load balancing rules***
   - Click **Add**



Name *	WebCluster1-80 ✓
IP Version *	● IPv4 ○ IPv6
Frontend IP address * ⓘ	LoadBalancerFrontEnd (51.132.22.253)
Protocol	● TCP ○ UDP
Port *	80 ✓
Backend port * ⓘ	80 ✓
Backend pool * ⓘ	WebCluster1
Health probe * ⓘ	LB-Probe (HTTP:6694) Create new
Session persistence ⓘ	None
Idle timeout (minutes) * ⓘ	4
Floating IP ⓘ	● Disabled ○ Enabled

- Enter an appropriate *Name*, e.g. **WebCluster1-80**
- Select the required *IP version*, e.g. **IPv4**
- Select the required *Frontend IP address*
- Set the *Protocol* to **TCP**
- Set the *Port* to the required value, e.g. **80**
- Set the *Backend port* to the required value, e.g. **80**
- Select the *Backend pool* created previously
- Select the *Health Probe* created previously
- Leave *Session persistence* set to **None –** session persistence is ***not*** required since the Azure Load balancer will simply send all traffic to the working Loadbalancer.org appliance, i.e the appliance that is responding with a **200 OK** to the HTTP probe on TCP port 6694
- Click **Add**

> ℹ Note
>
> If your configuration includes other ports (e.g. HTTPS port 443) or if you have multiple VIPs you'll need to setup multiple *Load balancing rules* to map from the Azure load balancer's Frontend IP to the appropriate *Backend Pool* and appropriate port. Also, you may need to setup multiple *Frontend IP Configurations* & *Backend Pools* depending on whether your VIPs share the same IP or have unique IP addresses, and whether the load balanced servers are common between VIPs or unique. The same *Health-probe* should be used for all *Load balancing rules*. This is illustrated in the diagram in Implementing HA in Azure.

5. Next, configure the Inbound NAT Rules (if required) to enable VM access via the Azure Load balancer.

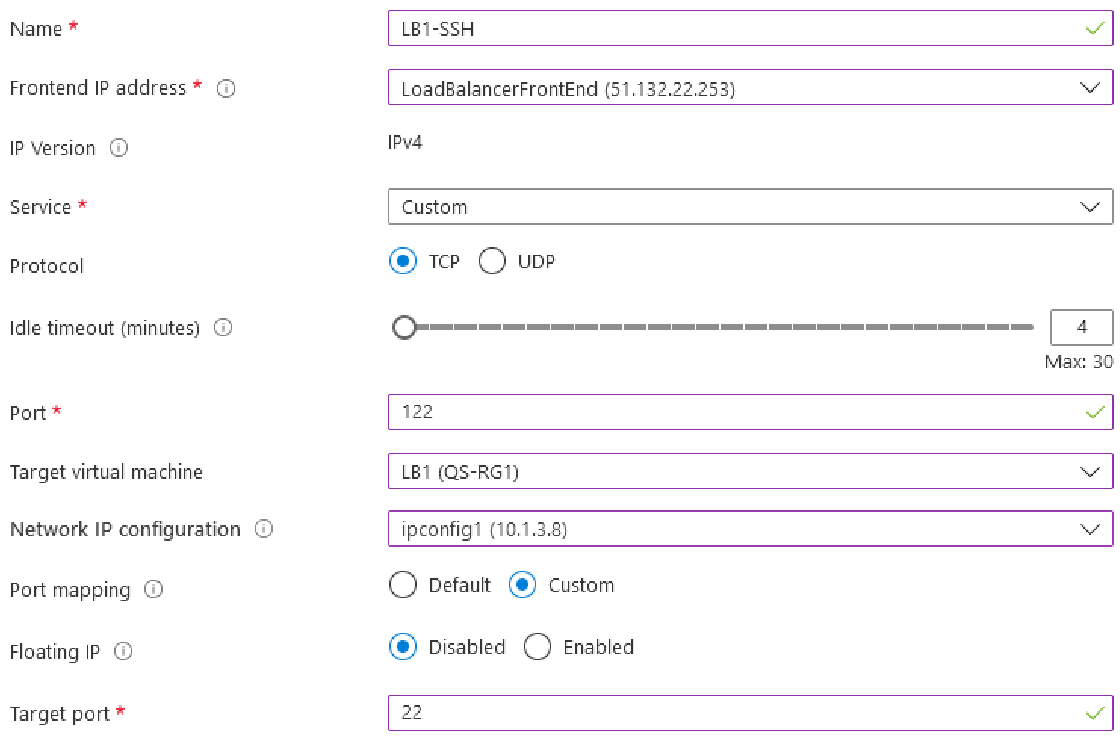
> ℹ Note
>
> Each load balancer retains it's original public IP address by default and this is displayed in

the *Azure Portal > Home > Virtual Machines* page in the *Public IP Address* column. If you continue to drill down into each VM, the *same* Public IP address is shown for both load balancers, this is the Front end IP address of the Azure load balancer.

If preferred, the individual IP addresses can be removed, leaving just the front end IP address of the load balancer. In this case, NAT rules can be used to provide access to the individual load balancer VM's that are located behind the Azure load balancer in an HA configuration.

The example below shows how to setup a rule to allow SSH access (TCP port 22) to the Primary Loadbalancer.org VM via the Azure load balancer public IP address on TCP port 122.

- In the menu for the Load balancer, click *Inbound NAT rules*
- Click **Add**



Name *	LB1-SSH ✓
Frontend IP address * ⓘ	LoadBalancerFrontEnd (51.132.22.253)
IP Version ⓘ	IPv4
Service *	Custom
Protocol	● TCP ○ UDP
Idle timeout (minutes) ⓘ	4 Max: 30
Port *	122 ✓
Target virtual machine	LB1 (QS-RG1)
Network IP configuration ⓘ	ipconfig1 (10.1.3.8)
Port mapping ⓘ	○ Default ● Custom
Floating IP ⓘ	● Disabled ○ Enabled
Target port *	22 ✓

- Enter an appropriate name, e.g. **LB1-SSH**
- Ensure the *Frontend IP address* is set to the correct address (IP's from other Azure Load balancers will be included in the list)
- Set *Service* to **Custom**
- Set *Protocol* to **TCP**
- Set *Port* to **122**
- Set *Target Virtual Machine* to the Primary Loadbalancer.org appliance, e.g. **LB1**
- Set *Network IP Configuration* to the Interface on the Primary Loadbalancer.org appliance
- Set *Port Mapping* to **Custom**

- Set *Target port* to **22**
- Click **Add**

> ℹ **Note**
>
> Don't forget to modify the inbound rules on the appropriate Network Security Group to allow connections to the relevant target port, in this example TCP port 22.

> ℹ **Note**
>
> Rules to access other Loadbalancer.org management ports can be added as required. The table below shows example rules and ports that can be configured to access SSH and the WebUI on both appliances. The configuration for the first rule listed is covered above.

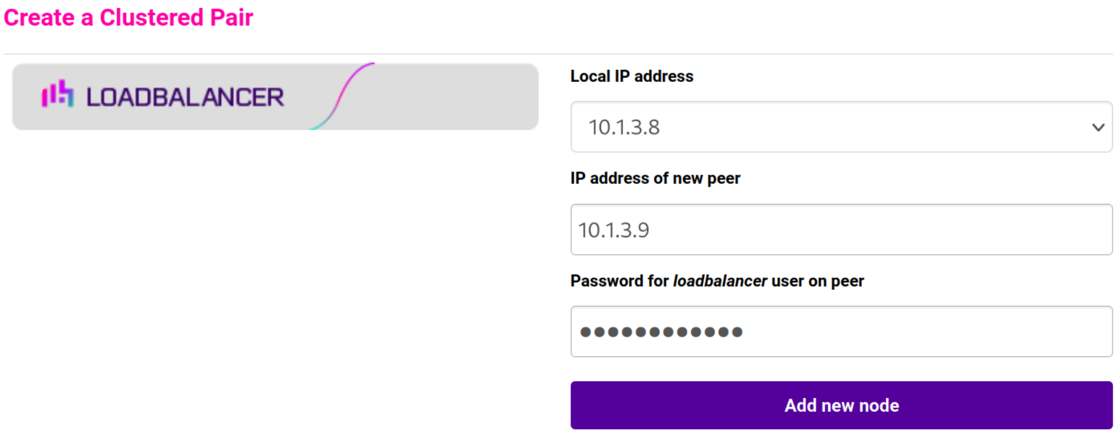
Example rules for Primary and Secondary management

The table below shows example NAT rules that can be used to enable access to SSH and the WebUI on both the Primary and Secondary appliances.

Rule Name	Port	Target Port	Use
LB1-SSH	122	22	external access to SSH on LB1
LB2-SSH	222	22	external access to SSH on LB2
LB1-WebUI	19443	9443	external access to WebUI on LB1
LB2-WebUI	29443	9443	external access to WebUI on LB2

Step 6 – Configure the HA Clustered Pair

1. Open the WebUI on the Primary appliance.
2. Navigate to: *Cluster Configuration > High Availability Configuration*.



Create a Clustered Pair

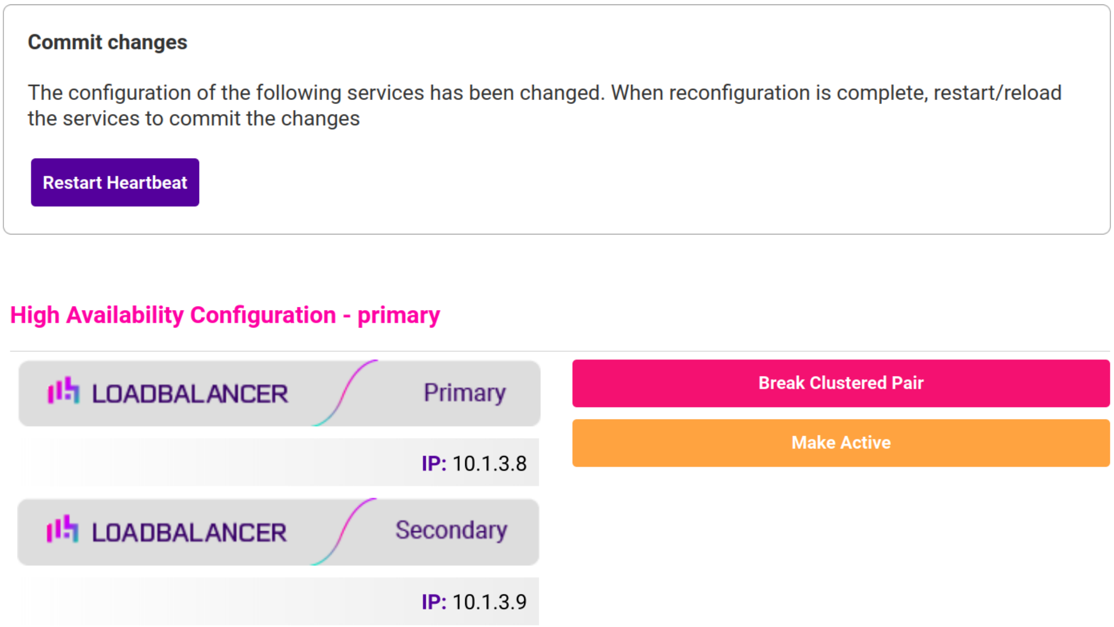
Local IP address: 10.1.3.8

IP address of new peer: 10.1.3.9

Password for *loadbalancer* user on peer: ●●●●●●●●●●●●

3. In the *IP address of new peer* field, enter the Secondary appliance's private IP address.
4. In the *Password for loadbalancer user on peer* field enter the relevant password, the default password is "loadbalancer".
5. Click **Add new node**.

6. Once the pairing configuration has finished, any service restart messages and the confirmed pair message will be displayed as shown below:



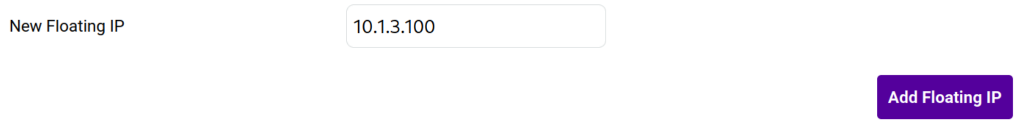
Commit changes

The configuration of the following services has been changed. When reconfiguration is complete, restart/reload the services to commit the changes

7. Restart the services using the buttons presented, in this case Heartbeat.

Step 7 – Configure the Primary appliance to allow service control during failover / fail-back

1. On the Primary appliance, navigate to: *Cluster configuration > Floating IPs*.



New Floating IP: 10.1.3.100

2. In the *New Floating IP* field define an unused IP address in the same subnet as the appliances – this address is not used for any connections, it's required to allow service control on both Primary & Secondary units.

> Note — The chosen IP address should not be in use anywhere else in the deployment.

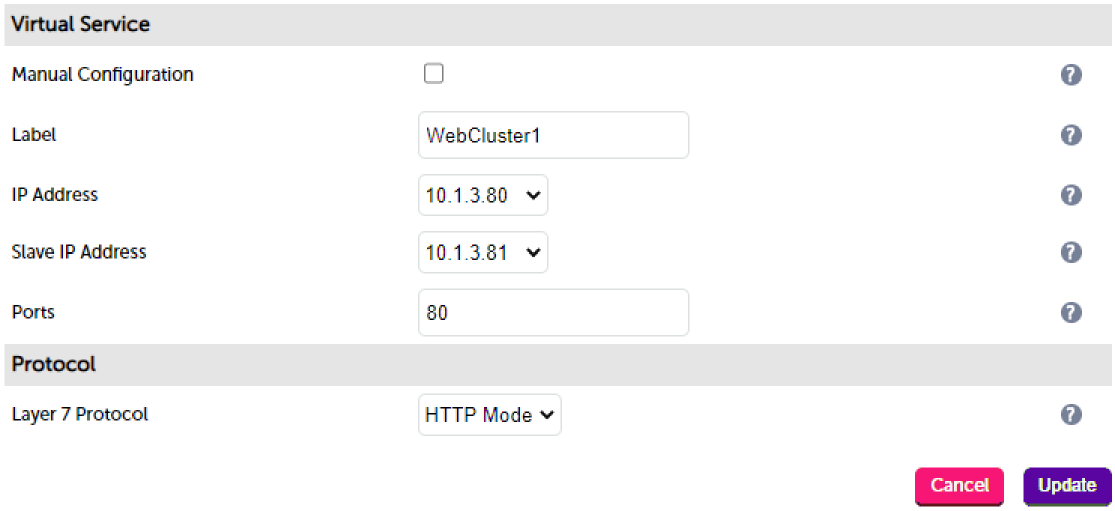
3. Click **Add Floating IP**.

Step 8 – Configure the Virtual Service (VIP)

> Note — If you plan on adding a custom Layer manual 7 VIP please see Configuration Example 3.

1. On the Primary appliance, navigate to: *Cluster Configuration > Layer 7 – Virtual Services* and click **Add a New Virtual Service**.

2. Enter the following details:



Virtual Service

Manual Configuration	□
Label	WebCluster1
IP Address	10.1.3.80
Slave IP Address	10.1.3.81
Ports	80

Protocol

Layer 7 Protocol	HTTP Mode

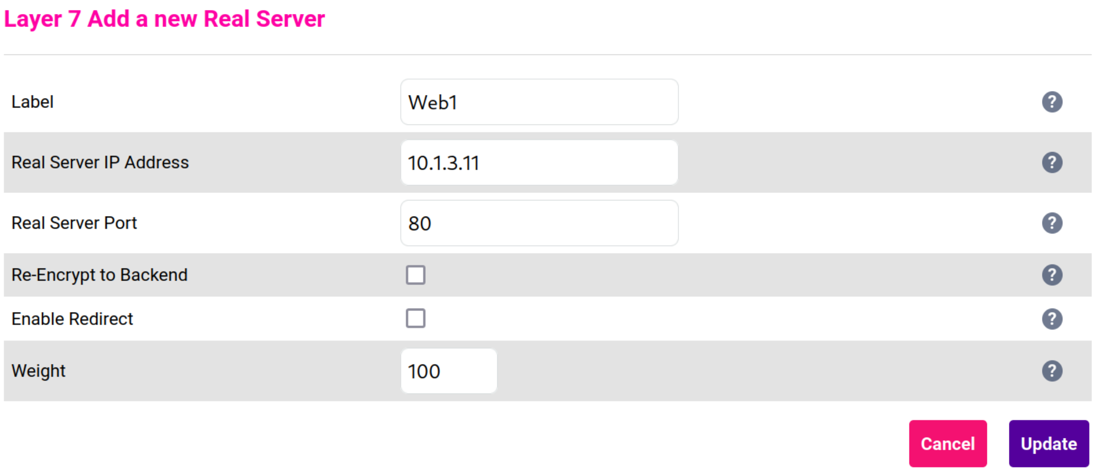
3. Enter an appropriate label for the VIP, e.g. **WebCluster1**.
4. Set the *IP Address* field to the IP address of the VIP when active on the *Primary* appliance (the same address as added earlier in steps 3 & 4), e.g **10.1.3.80**.
5. Set the *Secondary IP Address* field to the IP address of the VIP when active on the *Secondary* appliance (same address added earlier in steps 3 & 4), e.g **10.1.3.81**.

> ℹ Note
>
> To assign additional IP addresses to the appliance, use the WebUI option: *Local Configuration > Network Interface Configuration*. If an IP address is added, you'll also need to add the same IP address to the Network Interface on the load balancer VM via the Azure portal.

6. Set the *Virtual Service Ports* field to **80**.
7. Leave *Layer 7 Protocol* set to **HTTP**.
8. Click **Update**.

Step 9 – Configure the Real Servers (RIPs)

1. On the Primary appliance, navigate to: *Cluster Configuration > Layer 7 – Real Servers* and click **Add a new Real Server** next to the newly created VIP.
2. Enter the following details:


Layer 7 Add a new Real Server

Label	Web1
Real Server IP Address	10.1.3.11
Real Server Port	80
Re-Encrypt to Backend	□
Enable Redirect	□
Weight	100

3. Enter an appropriate label for the RIP, e.g. **Web1**.

4. Change the *Real Server IP Address* field to the required IP address, e.g. **10.1.3.11**.

5. Set the *Real Server Port* field to **80**.

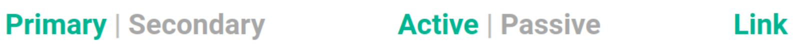
6. Click **Update**.

7. Repeat the above steps to add your other Web Server(s).

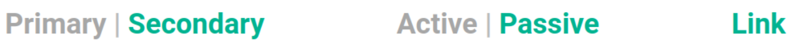
Step 10 – Verify synchronization state

1. Verify that the status on the Primary & Secondary is as follows:

Primary Unit:

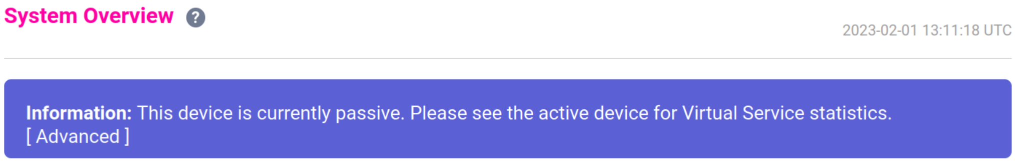


Secondary Unit:



> Note — For other possible states, please refer to Clustered Pair Diagnostics.

The Secondary can be made active by clicking **[Advanced]** in the information box that states "This device is currently passive", and then clicking the **Take over** button:


System Overview

2023-02-01 13:11:18 UTC

Information: This device is currently passive. Please see the active device for Virtual Service statistics.
[Advanced]

Step 11 – Testing & Verification

- Browse to the public IP address of the Azure load balancer on port 80 and port 443, i.e.

http://<Public IP Address of Azure Load Balancer>

and

https://<Public IP Address of Azure Load Balancer>

- To verify failover to the passive device (typically the Secondary) click the **Take Over** button on the passive device and verify that load balanced services are still available via the now active Secondary appliance – the failover time will depend on the settings for the health probe, but using default values it should complete in under 10 seconds.

8.4. 2 – Load Balancing Web Servers, HA Configuration, 1 subnet, layer 7 with SSL Termination

This is similar to the first example with the addition of SSL termination on the load balancer. We generally recommend that SSL should be terminated on the backend servers rather than the load balancer for scalability reasons, although in some cases terminating on the load balancer may be preferred. In this example, the Loadbalancer.org instances are deployed across ***2 Availability Zones*** and a ***Standard*** SKU Azure load balancer is used to route connections to the active appliance.

Step 1 – Deploy 2 x Loadbalancer.org VMs – one to be the Primary, the other to be the Secondary

1. Please refer to Deploying Enterprise Azure From the Marketplace. Set the *Availability Option* to **Availability Zone** and set the *Availability zone* number according to your requirements. For example, select Availability Zone **1** for the Primary VM and Availability Zone **2** for the Secondary VM.

> Note
>
> Some Images may not be supported within certain Availability Zones. If this is the case, please click **Select size** and choose an alternative option. For example, the **Standard_A1_v2** image can be used instead of the **Standard_A1** image.

Step 2 – Verify Network Security Group Settings

1. Ensure that your Network Security Group(s) permit the following communication between the 2 VMs:
    - TCP port 22 (SSH)
    - UDP port 6694 (heartbeat)
    - ICMP Ping

    > Note
    >
    > These requirements are covered by default within the same Virtual Network. Please refer to this link for more information on default rules.

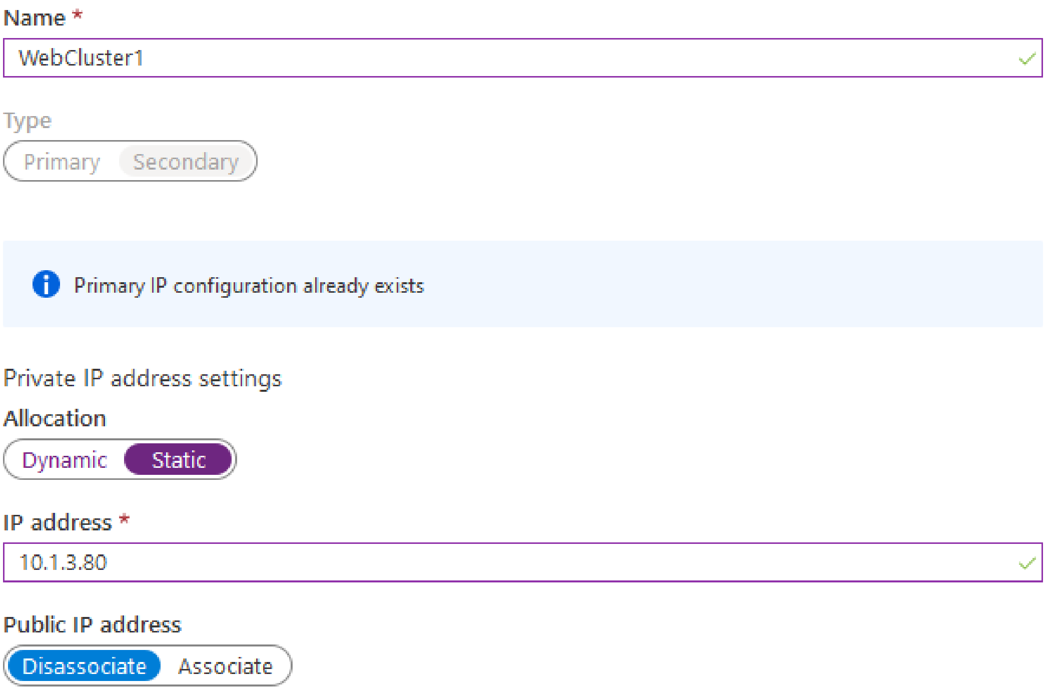
2. Ensure that your Network Security Group(s) permit the following inbound communication from the Azure load balancer to both VMs:
    - TCP port 6694 (Azure load balancer health probe)

    > Note
    >
    > This requirement is covered by default within the same Virtual Network. Please refer

to this link for more information on default rules.

Step 3 – Add the IP Address to be used for the VIP to the Primary & Secondary using the *Azure Portal*

1. In the Azure Portal select *Virtual Machines*.
2. Select the Primary VM.
3. Select *Networking,* then click the Network Interface.
4. Select *IP Configurations*.
5. Click **Add**.



Name *

WebCluster1

Type

Primary Secondary

Primary IP configuration already exists

Private IP address settings

Allocation

Dynamic Static

IP address *

10.1.3.80

Public IP address

Disassociate Associate

- Enter a suitable name for the IP address, e.g. **WebCluster1**
- Set *Private IP address Allocation* to **Static**
- Enter an appropriate IP address (this must tally with the address to be used for your VIP on the Loadbalancer.org appliance), e.g. **10.1.3.80**
- Click **OK**

6. Now repeat steps 1-5 on the Secondary VM for the VIP using a corresponding (but different) IP address, e.g. **10.1.3.81**.

Step 4 – Add the IP Address to be used for the VIP to the Primary & Secondary using the *Appliance WebUI*

Primary Appliance

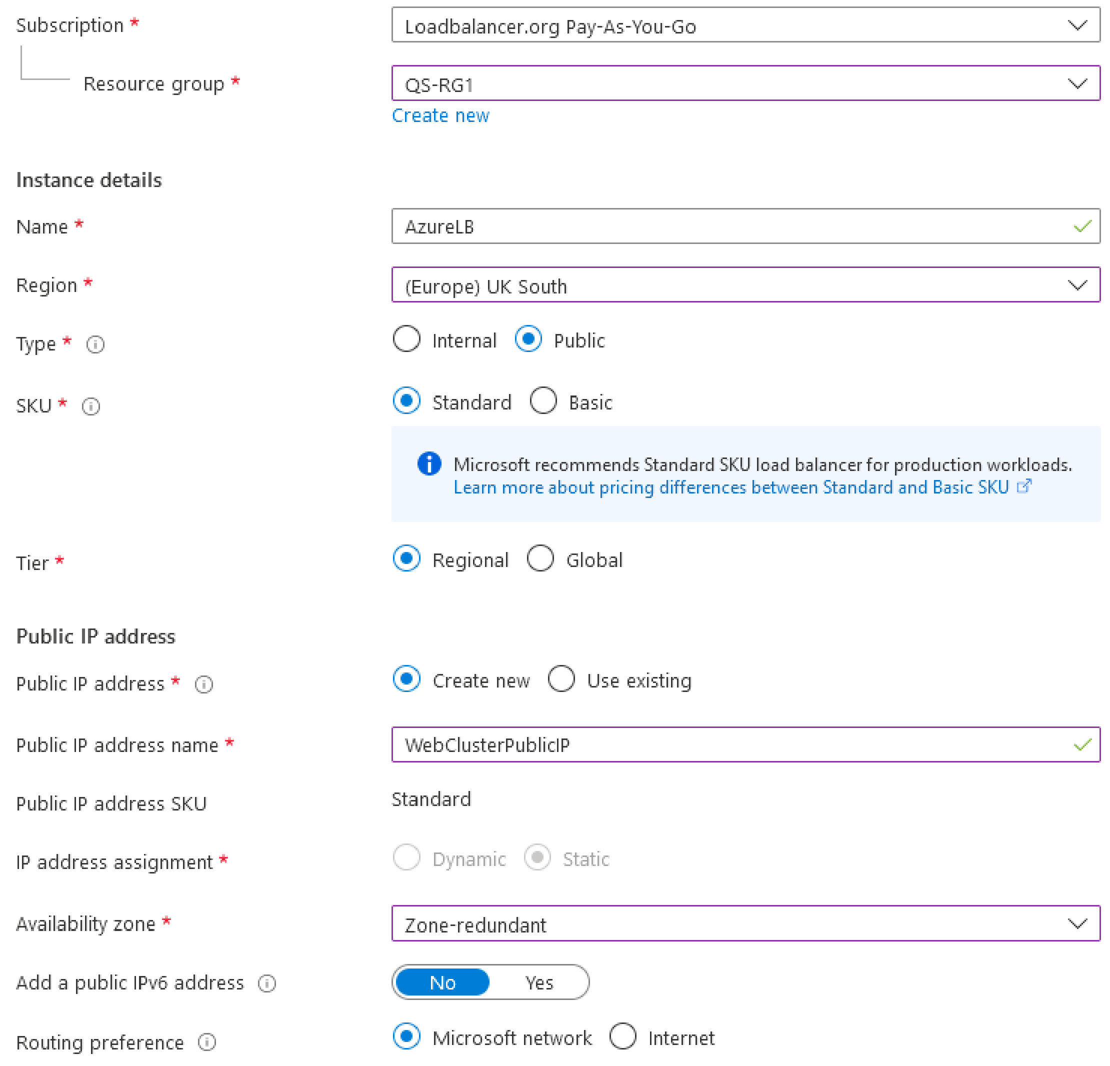
- On the Primary, navigate to the WebUI option: *Local Configuration > Network Interface Configuration*
- Add the IP you intend to use for the VIP, use CIDR notation, e.g. **10.1.3.80/24**

Secondary Appliance

- On the Secondary, navigate to the WebUI option: Local Configuration > Network Interface Configuration
- Add the IP you intend to use for the VIP, use CIDR notation, e.g. 10.1.3.81/24

Step 5 – Add & Configure the Azure Load Balancer

1. First, add the Azure Load Balancer.
    - In the Azure Portal select *Load balancers*
    - Click **Add**



Subscription *	Loadbalancer.org Pay-As-You-Go
Resource group *	QS-RG1 Create new
Instance details	
Name *	AzureLB ✓
Region *	(Europe) UK South
Type * ⓘ	○ Internal ● Public
SKU * ⓘ	● Standard ○ Basic
	ⓘ Microsoft recommends Standard SKU load balancer for production workloads. Learn more about pricing differences between Standard and Basic SKU
Tier *	● Regional ○ Global
Public IP address	
Public IP address * ⓘ	● Create new ○ Use existing
Public IP address name *	WebClusterPublicIP ✓
Public IP address SKU	Standard
IP address assignment *	○ Dynamic ● Static
Availability zone *	Zone-redundant
Add a public IPv6 address ⓘ	[✓ No] Yes
Routing preference ⓘ	● Microsoft network ○ Internet

- Configure the *Subscription* & *Resource group* settings according to your requirements
- Enter a suitable *Name* for the instance, e.g. **AzureLB**
- Select the required *Region*
- If deploying within a private network set *Type* to **Internal**, if it's public facing select **Public**
- Set *SKU* to **Standard**

> ℹ Note
>
> This configuration example uses a **Standard** SKU Azure load balancer. Configuration Example 1 uses a **Basic** SKU Azure load balancer. Please note the following when deciding which option to choose:
>
> - If you have deployed your Primary & Secondary instances in an Availability Set then either the Basic or Standard SKU can be used
> - If you have deployed your Primary & Secondary instances using Availability Zones, then the Standard SKU must be used
> - The Basic SKU is free, rates apply to the Standard SKU
> - The Standard SKU has a published SLA, the Basic SKU does not
> - Microsoft recommends the Standard SKU load balancer for production workloads

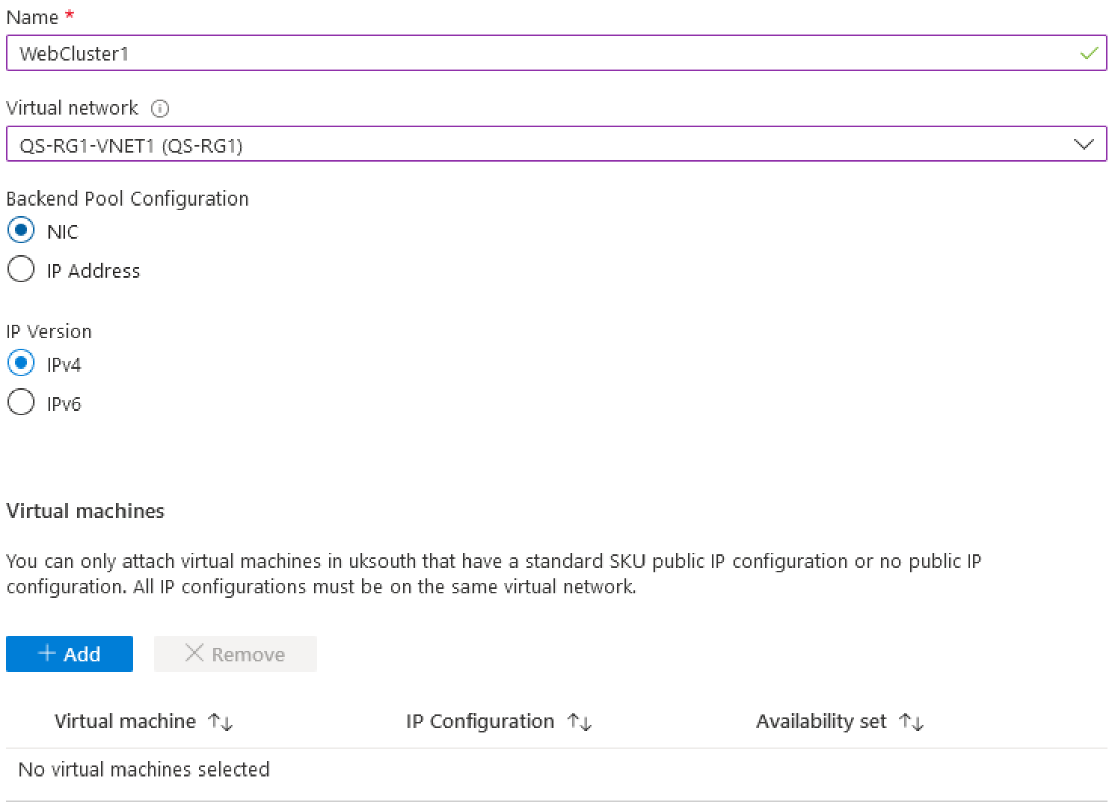
- Set the *Tier* according to your requirements
- Configure the ***Public IP address*** settings (for external deployments) or the ***Virtual Network*** settings (for internal deployments) according to your requirements

> ℹ Note
>
> Once the Azure Load balancer is created, the IP configuration can be modified using the ***Frontend IP Configuration*** in the Load balancer menu.

- If you have deployed your Primary and Secondary VM's in different Availability Zones, set ***Availability Zone*** to **Zone Redundant**, if you have deployed your VM's in the same Availability Zone, set **Availability Zone** to the same zone
- Click **Next : Tags >**
- Configure the Tags according to your requirements
- Click **Next : Review + Create >**
- Once validated, review the settings and click **Create**

2. Next, create the Backend Pool(s).

- In the menu for the load balancer, click ***Backend pools***
- Click **Add**



Name *

WebCluster1 ✓

Virtual network ⓘ

QS-RG1-VNET1 (QS-RG1)

Backend Pool Configuration

● NIC

○ IP Address

IP Version

● IPv4

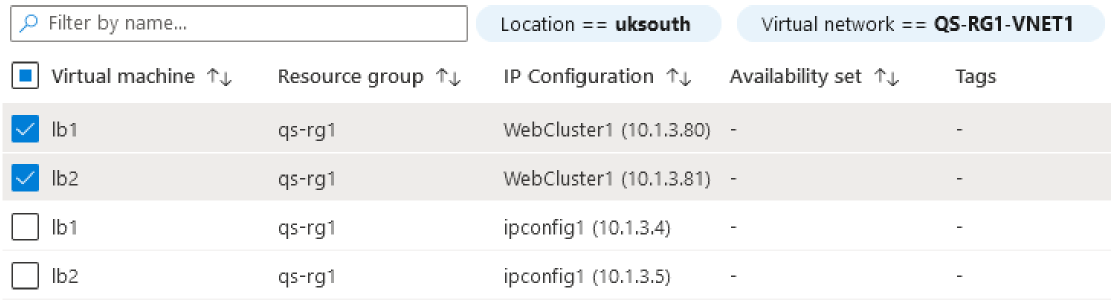
○ IPv6

Virtual machines

You can only attach virtual machines in uksouth that have a standard SKU public IP configuration or no public IP configuration. All IP configurations must be on the same virtual network.

Virtual machine ↑↓	IP Configuration ↑↓	Availability set ↑↓
No virtual machines selected		

- Enter an appropriate *Name*, e.g. **WebCluster1**
- Select the required *Virtual Network*
- Leave *Backend Pool Configuration* set to **NIC**
- Select the required *IP version*, e.g. **IPv4**
- Click **Add** in the *Virtual Machines* section

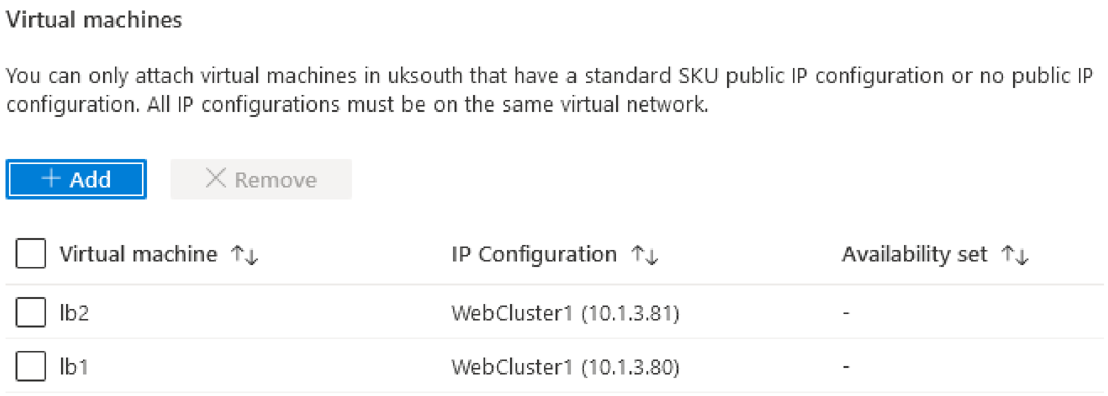


Location == **uksouth**

Virtual network == **QS-RG1-VNET1**

■	Virtual machine ↑↓	Resource group ↑↓	IP Configuration ↑↓	Availability set ↑↓	Tags
☑	lb1	qs-rg1	WebCluster1 (10.1.3.80)	-	-
☑	lb2	qs-rg1	WebCluster1 (10.1.3.81)	-	-
□	lb1	qs-rg1	ipconfig1 (10.1.3.4)	-	-
□	lb2	qs-rg1	ipconfig1 (10.1.3.5)	-	-

- Ensure that both load balancer VMs are selected as shown in the example above (LB1 & LB2), and that the IP addresses selected correspond to the VIP on each appliance (**10.1.3.80** & **10.1.3.81**)
- Click **Add**



Virtual machines

You can only attach virtual machines in uksouth that have a standard SKU public IP configuration or no public IP configuration. All IP configurations must be on the same virtual network.

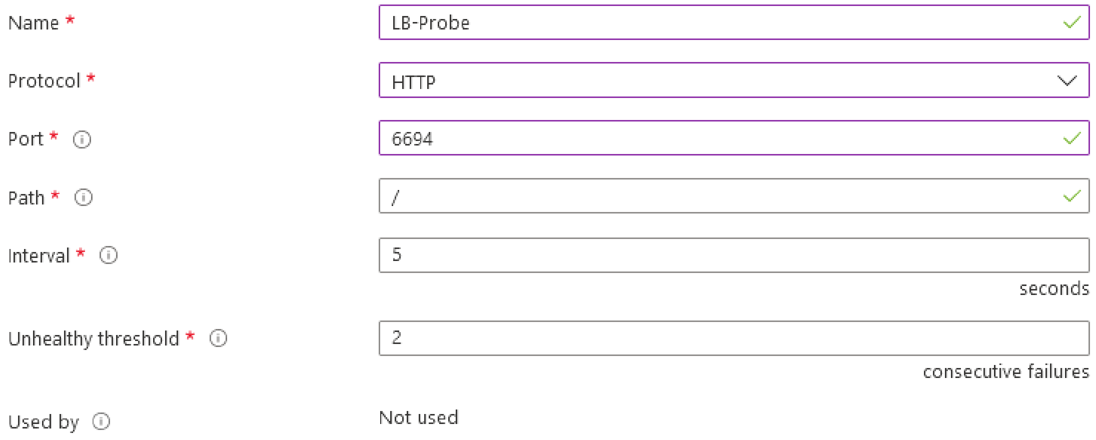
□ Virtual machine ↑↓	IP Configuration ↑↓	Availability set ↑↓
□ lb2	WebCluster1 (10.1.3.81)	-
□ lb1	WebCluster1 (10.1.3.80)	-

- Click **Add** at the bottom of the screen to confirm your selections
- All settings will now be validated and the Backend Pool will be created

> **Note** If you have multiple VIPs on different IPs you'll need to setup a Backend Pool for each of these. This is illustrated in the diagram in Implementing HA in Azure.

3. Next, create a Health Probe.

- In the menu for the Load balancer, click ***Health-probes***
- Click **Add**



Name *	LB-Probe ✓
Protocol *	HTTP
Port * ⓘ	6694 ✓
Path * ⓘ	/ ✓
Interval * ⓘ	5 seconds
Unhealthy threshold * ⓘ	2 consecutive failures
Used by ⓘ	Not used

- Enter an appropriate name, e.g. **LB-Probe**
- Set *Protocol* to **HTTP**

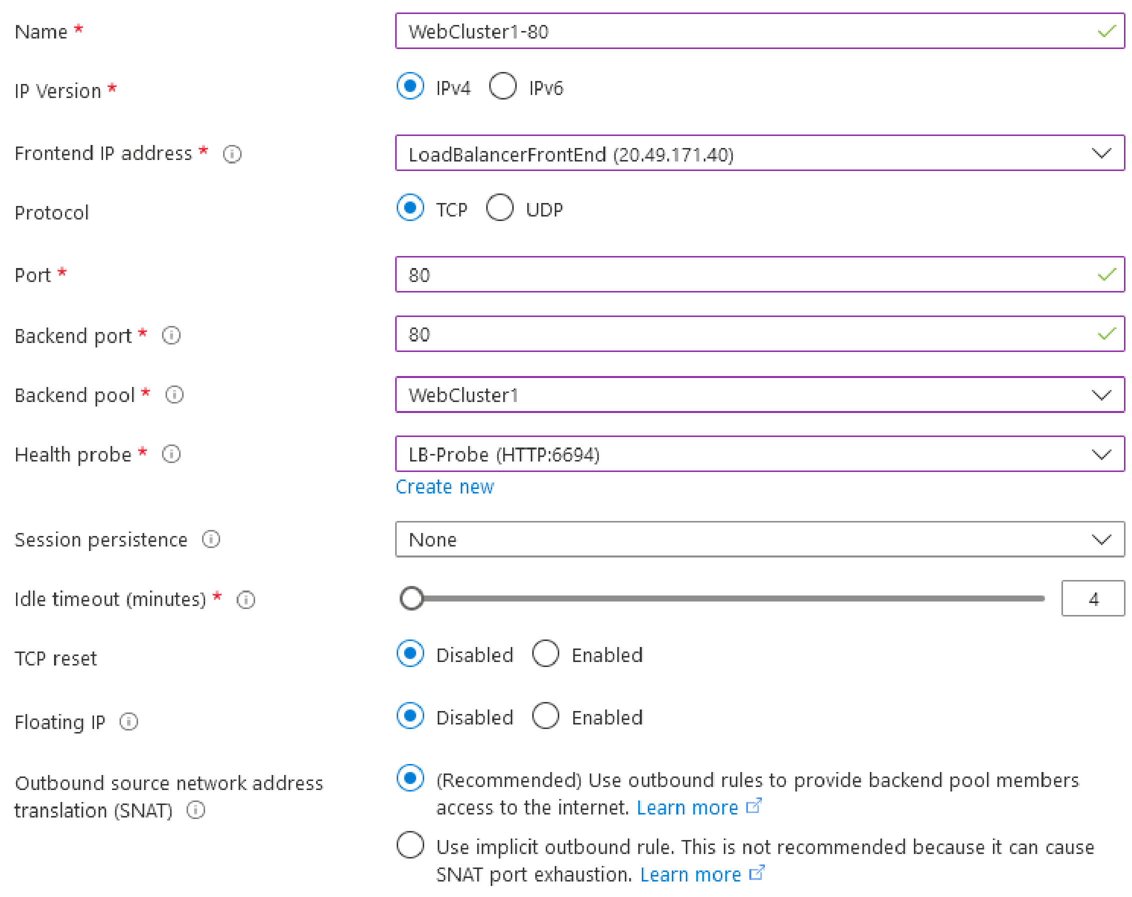
> **Note** Setting *Protocol* to **HTTP** will configure the Azure load balancer to look for a **200 OK** response from each Loadbalancer.org VM.

- Set *Port* to **6694**
- Leave the remaining settings at their default values
- Click **OK**

> ℹ **Note** The same Health probe should be used across all *Load balancing rules*.

4. Next, configure the Load Balancing Rule.

   - In the menu for the Load balancer, click *Load balancing rules*
   - Click **Add**



Name *	WebCluster1-80 ✓
IP Version *	● IPv4 ○ IPv6
Frontend IP address * ⓘ	LoadBalancerFrontEnd (20.49.171.40)
Protocol	● TCP ○ UDP
Port *	80 ✓
Backend port * ⓘ	80 ✓
Backend pool * ⓘ	WebCluster1
Health probe * ⓘ	LB-Probe (HTTP:6694) Create new
Session persistence ⓘ	None
Idle timeout (minutes) * ⓘ	4
TCP reset	● Disabled ○ Enabled
Floating IP ⓘ	● Disabled ○ Enabled
Outbound source network address translation (SNAT) ⓘ	● (Recommended) Use outbound rules to provide backend pool members access to the internet. Learn more ○ Use implicit outbound rule. This is not recommended because it can cause SNAT port exhaustion. Learn more

   - Enter an appropriate name, e.g. **WebCluster1-80**
   - Select the required IP version, e.g. **IPv4**
   - Select the required *Frontend IP address*
   - Set the *Protocol* to **TCP**
   - Set the *Port* to the required value, e.g. **80**
   - Set the *Backend port* to the required value, e.g. **80**
   - Select the *Backend pool* created previously
   - Select the *Health Probe* created previously
   - Leave *Session persistence* set to **None –** session persistence is ***not*** required since the Azure Load balancer will simply send all traffic to the working Loadbalancer.org appliance, i.e the appliance that is responding with a **200 OK** to the HTTP probe on TCP port 6694
   - Leave the remaining settings at their default values

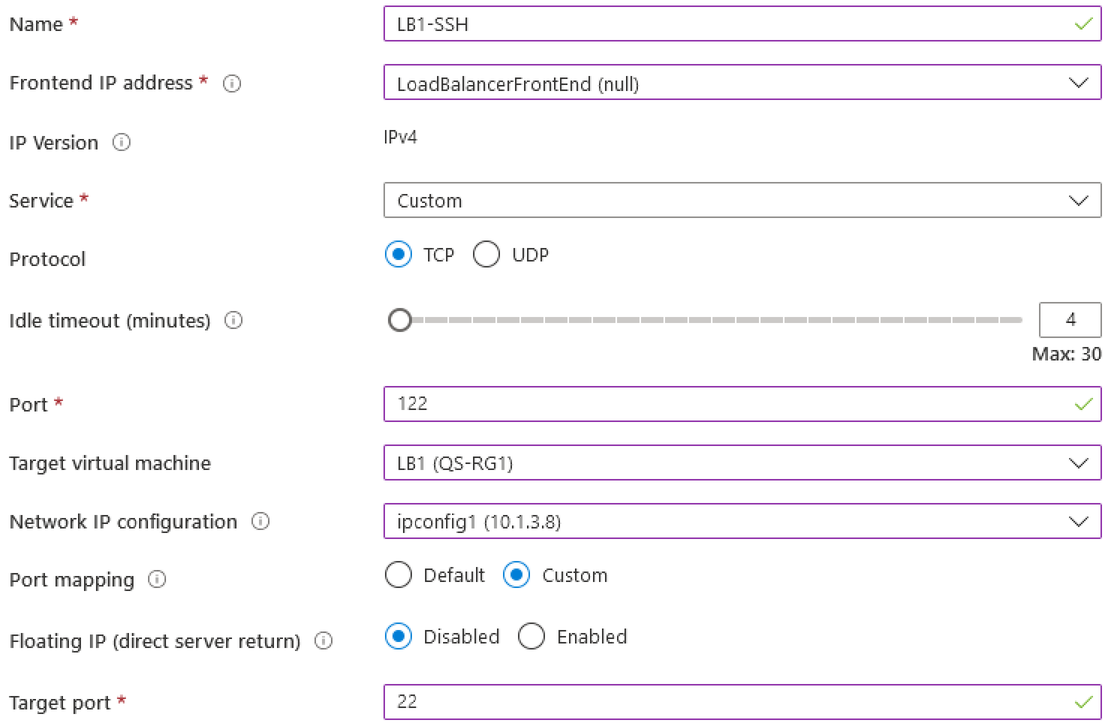
- Click **OK**

> **Note**
>
> If your configuration includes other ports (e.g. HTTPS port 443) or if you have multiple VIPs you'll need to setup multiple ***Load balancing rules*** to map from the Azure load balancer's Frontend IP to the appropriate ***Backend Pool*** and appropriate port. Also, you may need to setup multiple ***Frontend IP Configurations*** & ***Backend Pools*** depending on whether your VIPs share the same IP or have unique IP addresses, and whether the load balanced servers are common between VIPs or unique. The same ***Health-probe*** should be used for all ***Load balancing rules***. This is illustrated in the diagram in Implementing HA in Azure.

5. Next, configure the Inbound NAT Rules (if required) to enable VM access via the Azure Load balancer.

> **Note**
>
> Each load balancer retains it's original public IP address by default and this is displayed in the ***Azure Portal > Home > Virtual Machines*** page in the ***Public IP Address*** column. If you continue to drill down into each VM, the ***same*** Public IP address is shown for both load balancers, this is the Front end IP address of the Azure load balancer.
>
> If preferred, the individual IP addresses can be removed, leaving just the front end IP address of the load balancer. In this case, NAT rules can be used to provide access to the individual load balancer VM's that are located behind the Azure load balancer in an HA configuration.
>
> The example below shows how to setup a rule to allow SSH access (TCP port 22) to the Primary Loadbalancer.org VM via the Azure load balancer public IP address on TCP port 122.

- In the menu for the Load balancer, click ***Inbound NAT rules***
- Click **Add**



Name *	LB1-SSH ✓
Frontend IP address * ⓘ	LoadBalancerFrontEnd (null)
IP Version ⓘ	IPv4
Service *	Custom
Protocol	● TCP ○ UDP
Idle timeout (minutes) ⓘ	4 Max: 30
Port *	122 ✓
Target virtual machine	LB1 (QS-RG1)
Network IP configuration ⓘ	ipconfig1 (10.1.3.8)
Port mapping ⓘ	○ Default ● Custom
Floating IP (direct server return) ⓘ	● Disabled ○ Enabled
Target port *	22 ✓

- Enter an appropriate name, e.g. **LB1-SSH**
- Ensure the ***Frontend IP address*** is set to the correct address (IP's from other Azure Load balancers will be included in the list)
- Set *Service* to **Custom**
- Set *Protocol* to **TCP**
- Set *Port* to **122**
- Set *Target Virtual Machine* to the Primary Loadbalancer.org appliance, e.g. **LB1**
- Set *Network IP Configuration* to the Interface on the Primary Loadbalancer.org appliance
- Set *Port Mapping* to **Custom**
- Set *Target port* to **22**
- Click **Add**

> Note
>
> Don't forget to modify the inbound rules on the appropriate Network Security Group to allow connections to the relevant target port, in this example TCP port 22.

> Note
>
> Rules to access other Loadbalancer.org management ports can be added as required. The table below shows example rules and ports that can be configured to access SSH and the WebUI on both appliances. The configuration for the first rule listed is covered above.

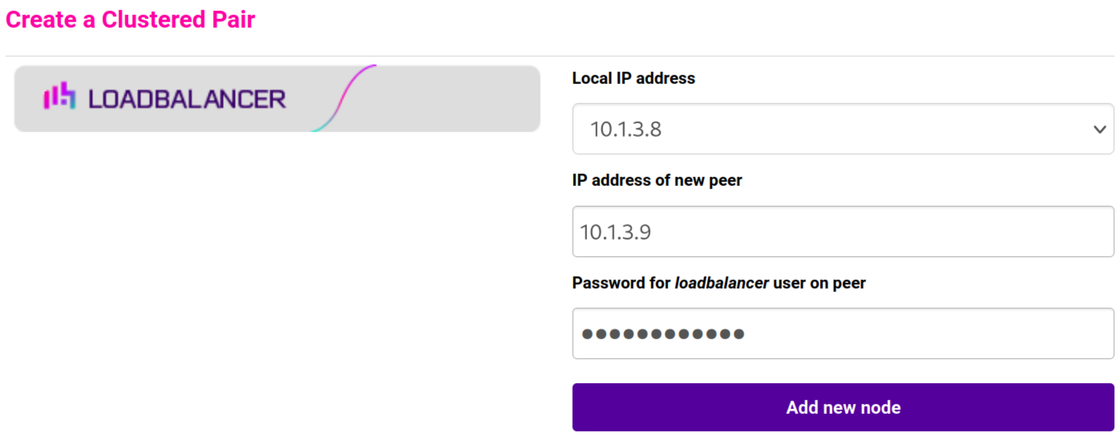
Example rules for Primary and Secondary management

The table below shows example NAT rules that can be used to enable access to SSH and the WebUI on both the Primary and Secondary appliances.

Rule Name	Port	Target Port	Use
LB1-SSH	122	22	external access to SSH on LB1
LB2-SSH	222	22	external access to SSH on LB2
LB1-WebUI	19443	9443	external access to WebUI on LB1
LB2-WebUI	29443	9443	external access to WebUI on LB2

Step 6 – Configure the HA Clustered Pair

1. Open the WebUI on the Primary appliance.
2. Navigate to: *Cluster Configuration > High Availability Configuration*.

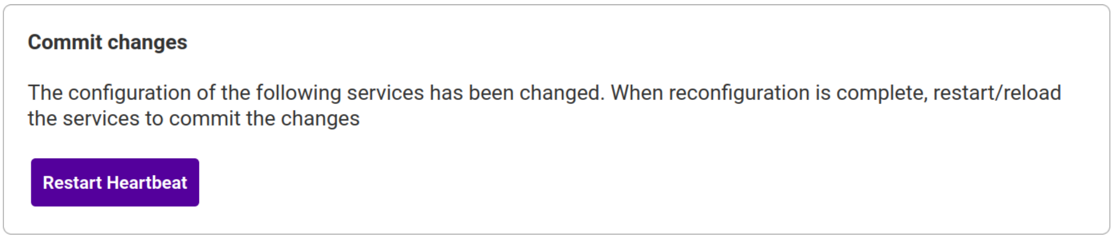

Create a Clustered Pair

Local IP address: 10.1.3.8

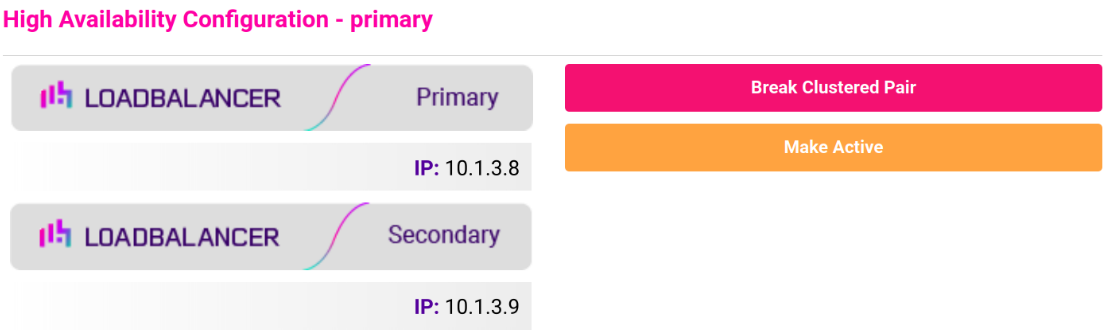
IP address of new peer: 10.1.3.9

Password for *loadbalancer* user on peer: ●●●●●●●●●●●●

3. In the *IP address of new peer* field, enter the Secondary appliance's private IP address.
4. In the *Password for loadbalancer user on peer* field enter the relevant password, the default password is "loadbalancer".
5. Click **Add new node**.
6. Once the pairing configuration has finished, any service restart messages and the confirmed pair message will be displayed as shown below:


Commit changes

The configuration of the following services has been changed. When reconfiguration is complete, restart/reload the services to commit the changes


High Availability Configuration - primary

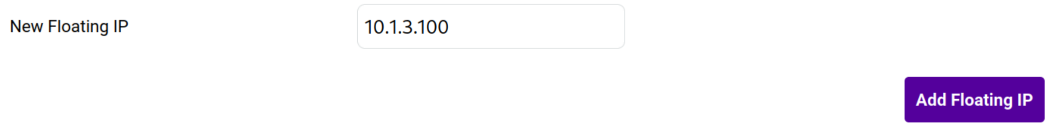
Primary IP: 10.1.3.8

Secondary IP: 10.1.3.9

7. Restart the services using the buttons presented, in this case Heartbeat.

Step 7 – Configure the Primary appliance to allow service control during failover / fail-back

1. On the Primary appliance, navigate to: *Cluster configuration > Floating IPs*.


New Floating IP: 10.1.3.100

2. In the *New Floating IP* field enter an unused IP address in the same subnet as the appliances – this address is not used for any connections, it's required to allow service control on both Primary & Secondary units.

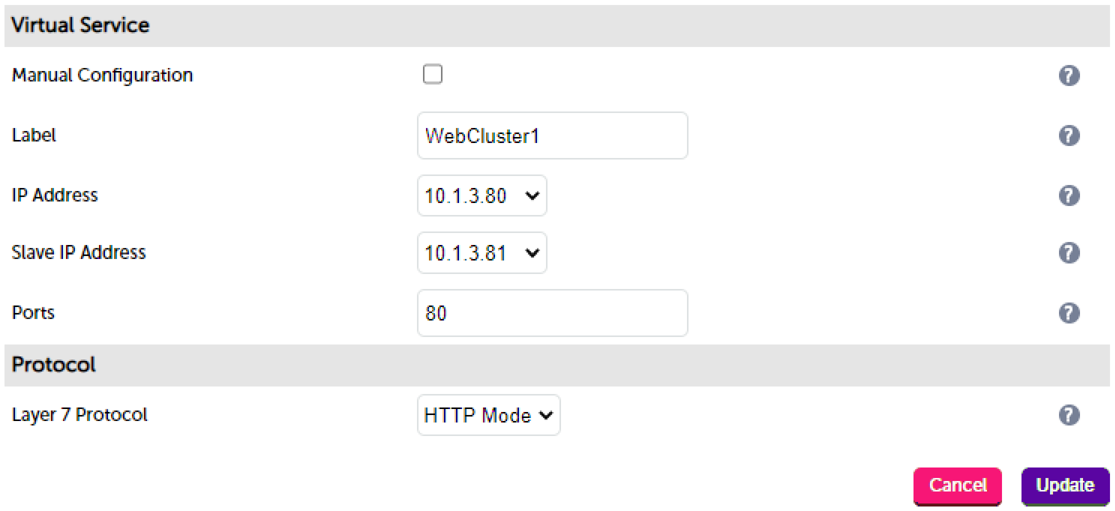
3. Click **Add Floating IP**.

Step 8 – Configure the Virtual Service (VIP)

> Note — If you plan on adding a custom Layer manual 7 VIP please see Configuration Example 3.

1. On the Primary appliance, navigate to: *Cluster Configuration > Layer 7 – Virtual Services* and click **Add a New Virtual Service**.

2. Enter the following details:



Virtual Service	
Manual Configuration	□
Label	WebCluster1
IP Address	10.1.3.80
Slave IP Address	10.1.3.81
Ports	80
Protocol	
Layer 7 Protocol	HTTP Mode

3. Enter an appropriate label for the VIP, e.g. **WebCluster1**.

4. Set the *IP Address* field to the IP address of the VIP when active on the *Primary* appliance (the same address as added earlier in steps 3 & 4), e.g **10.1.3.80**.

5. Set the *Secondary IP Address* field to the IP address of the VIP when active on the *Secondary* appliance (same address added earlier in steps 3 & 4), e.g **10.1.3.81**.

> Note — To assign additional IP addresses to the appliance, use the WebUI option: *Local Configuration > Network Interface Configuration*. If an IP address is added, you'll also need to add the same IP address to the Network Interface on the load balancer VM via the Azure portal.

1. Set the *Virtual Service Ports* field to **80**.

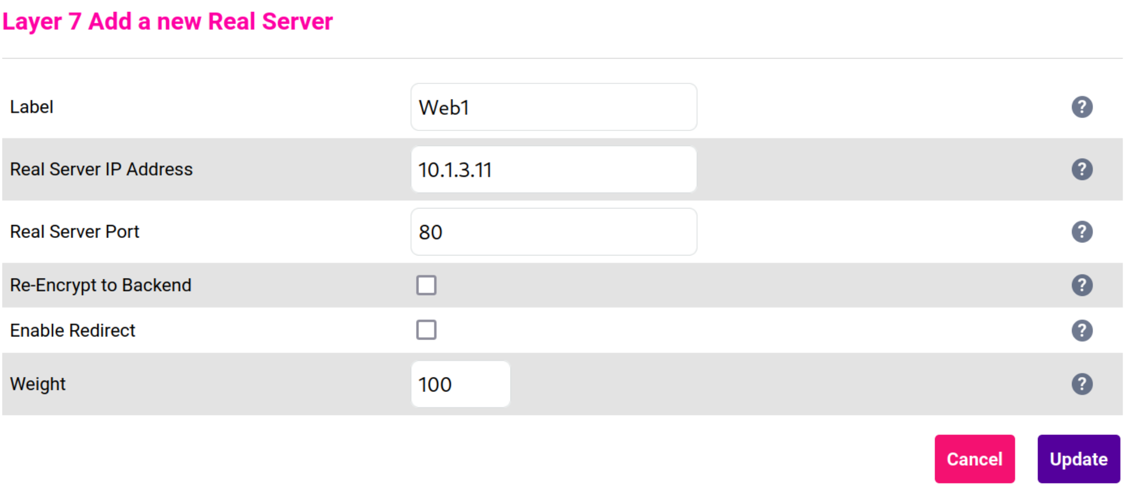
2. Leave *Layer 7 Protocol* set to **HTTP**.

3. Click **Update**.

Step 9 – Configure the Real Servers (RIPs)

1. On the Primary appliance, navigate to: *Cluster Configuration > Layer 7 – Real Servers* and click **Add a new Real Server** next to the newly created VIP.

2. Enter the following details:



Layer 7 Add a new Real Server

Label	Web1
Real Server IP Address	10.1.3.11
Real Server Port	80
Re-Encrypt to Backend	□
Enable Redirect	□
Weight	100

3. Enter an appropriate label for the RIP, e.g. **Web1**.
4. Change the ***Real Server IP Address*** field to the required IP address, e.g. **10.1.3.11**.
5. Set the ***Real Server Port*** field to **80**.
6. Click **Update**.
7. Repeat the above steps to add your other Web Server(s).

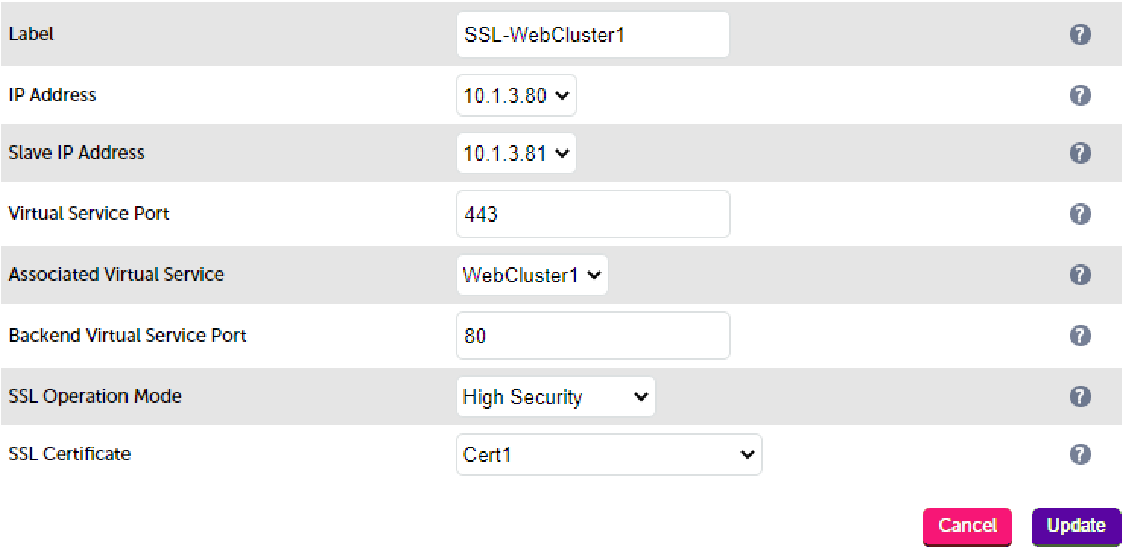
Step 10 – Upload your SSL Certificate

1. Using the WebUI, navigate to: *Cluster Configuration > SSL Certificate* and click **Add a new SSL Certificate**.
2. Select *Upload prepared PEM/PFX file*.
3. Enter an appropriate label (name) for the certificate, e.g. **Cert1**.
4. Browse to and select the relevant certificate file.
5. for PFX files, enter the *PFX File Password*.
6. Click **Add Certificate**.

> Note
>
> You can also create a CSR on the load balancer. If this is required, select the *Create A New SSL Certificate (CSR)* option instead of *Upload prepared PEM/PFX file* in step 2 above. For additional information please refer to Generating a CSR on the Load Balancer.

Step 11 – Configure SSL Termination

1. Using the WebUI, navigate to: *Cluster Configuration > SSL Termination* and click **Add a New Virtual Service**.



Label	SSL-WebCluster1
IP Address	10.1.3.80
Slave IP Address	10.1.3.81
Virtual Service Port	443
Associated Virtual Service	WebCluster1
Backend Virtual Service Port	80
SSL Operation Mode	High Security
SSL Certificate	Cert1

2. Enter a suitable label (name), e.g. **SSL-WebCluster1**.
3. Using the **IP Address** drop-down, set the address to the same address configured previously in Step 8 when active on the Primary, e.g. **10.1.3.80**.
4. Using the **Secondary IP Address** drop-down, set the address to the same address configured previously in Step 8 when active on the Secondary, e.g. **10.1.3.81**.
5. Set the ***Associated Virtual Service*** drop-down to the VIP created previously in Step 8.
6. Ensure the Backend Port is set to the same port that the VIP created previously listens on, e.g. **80**.
7. Leave the ***SSL Operation Mode*** set to **High Security**.
8. Select the ***SSL Certificate*** uploaded in step (d) above.
9. Click **Update**.

Step 12 – Apply the New Settings

- Once the configuration is complete:
    1. use the **Reload HAProxy** button at the top of the screen to commit the changes.
    2. use the **Restart STunnel** button at the top of the screen to commit the changes.

Step 13 – Verify synchronization state

1. Verify that the status on the Primary & Secondary is as follows:

   Primary Unit:

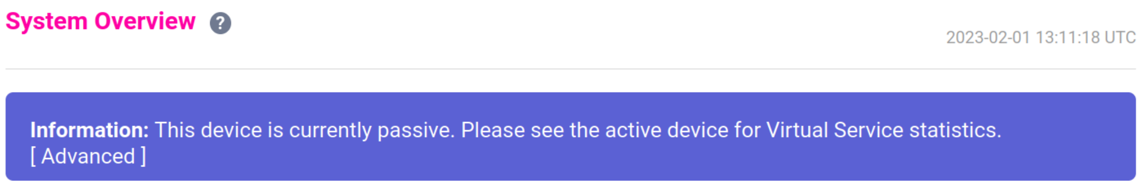
   Primary | Secondary   **Active** | Passive   **Link**

   Secondary Unit:

   Primary | **Secondary**   Active | **Passive**   **Link**

Note If no services have been configured, 'Active' will be grayed out on both instances.

The Secondary can be made active by clicking **[Advanced]** in the information box that states "This device is currently passive", and then clicking the **Take over** button:



System Overview ?

2023-02-01 13:11:18 UTC

Information: This device is currently passive. Please see the active device for Virtual Service statistics.
[Advanced]

Note For other possible states, please refer to Clustered Pair Diagnostics.

Step 14 – Testing & Verification

- Browse to the public IP address of the Azure load balancer on port 80 and port 443, i.e.

  http://<Public IP Address of Azure Load Balancer>

  and

  https://<Public IP Address of Azure Load Balancer>

- To verify failover to the passive device (typically the Secondary) click the **Take Over** button on the passive device and verify that load balanced services are still available via the now active Secondary appliance – the failover time will depend on the settings for the health probe, but using default values it should complete in under 10 seconds.

8.5. 3 – Load Balancing Web Servers, HA Configuration, 1 subnet, layer 7 (Manual Configuration) with SSL Termination

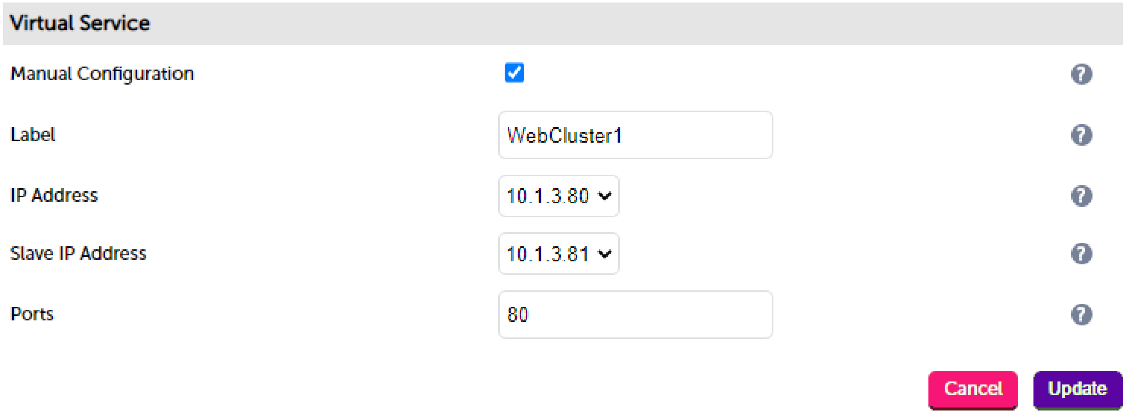
The configuration used in the example is very similar to Example 2. The difference is that the layer 7 VIP and associated RIPs are configured using a Layer 7 'Manual Configuration'.

Custom, manually configured Layer 7 services are useful when your configuration requires advanced HAProxy settings that are not directly supported by the WebUI when creating and modifying VIPs & RIPs.

This example demonstrates the key point for manual layer 7 based services which is that an additional HAProxy **bind** directive must be added to the VIPs configuration. This additional bind directive allows the service to be brought up on a corresponding IP address on the Secondary appliance should a failover occur. Since this example also has an SSL termination, an **acl** directive also needs to be added to allow failover to the Save appliance as shown below.

1. Follow steps **1** to **7** in Configuration Example 2.
2. On the Primary appliance, navigate to: *Cluster Configuration > Layer 7 – Virtual Services* and click **Add a New Virtual Service**.

3. Enter the following details:



Virtual Service

Manual Configuration	☑
Label	WebCluster1
IP Address	10.1.3.80
Slave IP Address	10.1.3.81
Ports	80

4. Ensure that the *Manual Configuration* checkbox is ticked.

5. Enter an appropriate label for the VIP, e.g. **WebCluster1**.

6. Set the *IP Address* field to the IP address of the VIP when active on the *Primary* appliance (the same address as added earlier in steps 3 & 4), e.g **10.1.3.80**.

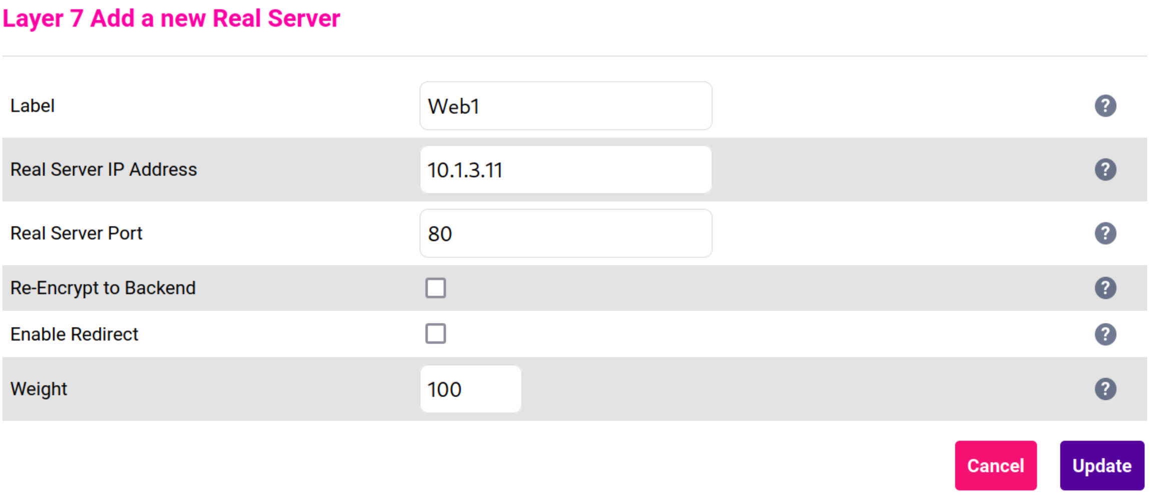
7. Set the *Secondary IP Address* field to the IP address of the VIP when active on the *Secondary* appliance (same address added earlier in steps 3 & 4), e.g **10.1.3.81**.

8. Set the *Virtual Service Ports* field to **80**.

9. Click **Update**.

10. On the Primary appliance, navigate to: *Cluster Configuration > Layer 7 – Real Servers* and click **Add a new Real Server** next to the newly created VIP.

11. Enter the following details:



Layer 7 Add a new Real Server

Label	Web1
Real Server IP Address	10.1.3.11
Real Server Port	80
Re-Encrypt to Backend	□
Enable Redirect	□
Weight	100

12. Enter an appropriate label for the RIP, e.g. **Web1**.

13. Change the *Real Server IP Address* field to the required IP address, e.g. **10.1.3.11**.

14. Set the *Real Server Port* field to **80**.

15. Click **Update**.

16. Repeat the above steps to add your other Web Server(s).

17. Now navigate to: *Cluster Configuration > Layer 7 – Manual configuration*.

18. Paste the following configuration into the edit window under the last line of text:

```
listen WebCluster1
bind 10.1.3.80:80 transparent
bind 10.1.3.81:80 transparent <--- See Note 2 below
mode http
balance leastconn
acl SSL-WebCluster1 src 10.1.3.80
acl SSL-WebCluster1 src 10.1.3.81 <--- See Note 3 below
tcp-request connection expect-proxy layer4 if SSL-WebCluster1
cookie SERVERID maxidle 30m maxlife 12h insert nocache indirect
server backup 127.0.0.1:9081 backup non-stick
option http-keep-alive
timeout http-request 5s
option forwardfor
timeout tunnel 1h
option redispatch
option abortonclose
maxconn 40000
server Web1 10.1.3.11:80 weight 100 cookie web1 check inter 4000 rise 2 fall 2 slowstart 8000
minconn 0 maxconn 0 on-marked-down shutdown-sessions
server Web2 10.1.3.12:80 weight 100 cookie web1 check inter 4000 rise 2 fall 2 slowstart 8000
minconn 0 maxconn 0 on-marked-down shutdown-sessions
```

Note — (1) This is an example, for more information please refer to Layer 7 - Custom Configurations..

Note — (2) Additional bind statement for the VIP when active on the Secondary.

Note — (3) Additional SSL termination related ACL statement when active on the Secondary.

Note — (4) Make sure you use the ***same*** names, IP addresses and Ports as you did when graphically defining the VIP and RIPs.

19. Click **Update**.

20. Now follow steps **10** to **14** starting here.

8.6. 4 – Load Balancing Web Servers, Single Appliance, 2 subnets, layer 4 NAT Mode

This example uses 2 subnets – one public subnet for the load balancer and one private subnet for the web servers. The load balancer has a single network interface located in the first subnet. Routing rules for the second private subnet must be changed so that return traffic passes back via the load balancer. This is achieved by creating a custom routing table with the required rules, then associating this with the private subnet – this can now be done directly in the portal (step 2 below), previously PowerShell had to be used.

> **Note**
>
> This configuration is currently not supported in HA mode. In this mode, the custom routing rules would need to be dynamically modified to route via the Secondary appliance rather than the Primary if a failover occurs. This is currently not supported.

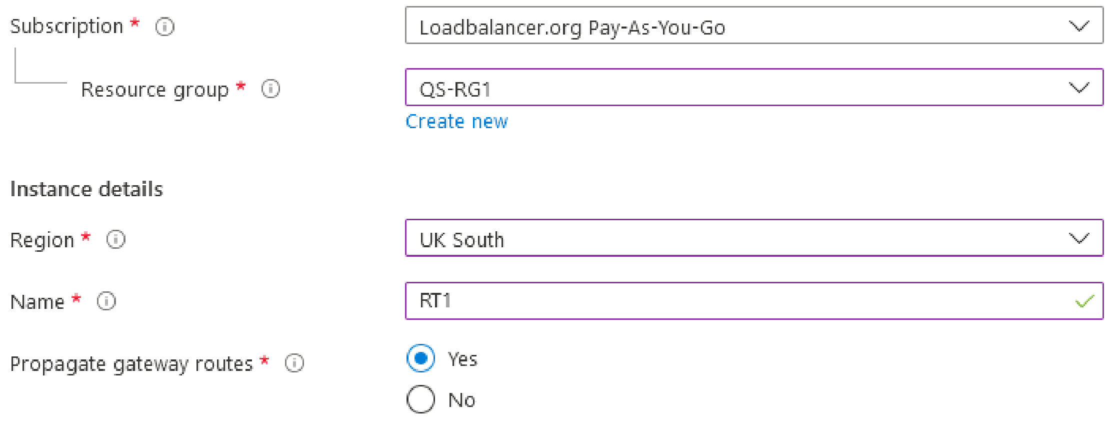
Step 1 – Setting up Azure

1) Deploy VM's & Configure Network Security Groups:

1. Deploy the load balancer instance into the first (public) subnet as described in Deploying Enterprise Azure From the Marketplace.
2. Deploy your required web server VMs into the second (private) subnet.
3. Configure Network Security Groups to permit the required traffic flows. Configure the following rules for the 2 subnets (assuming a public facing deployment):
   - **Load Balancer (Public) Subnet:**
     - Inbound rule – from 0.0.0.0/0 to port 80
     - Outbound rule – from 0.0.0.0/0 to private subnet, port 80
   - **Web Server (Private) Subnet:**
     - Inbound rule – from 0.0.0.0/0 to port 80
4. Ensure that you add the private IP address to be used for the VIP to the VMs NIC using the Azure Portal, otherwise Azure will ***not*** be aware of this address.

2) Configure a Custom Routing Table

1. Using the search option at the top of the page, search for "Route tables".
2. Click **Add**.



Subscription * : Loadbalancer.org Pay-As-You-Go

Resource group * : QS-RG1

Instance details

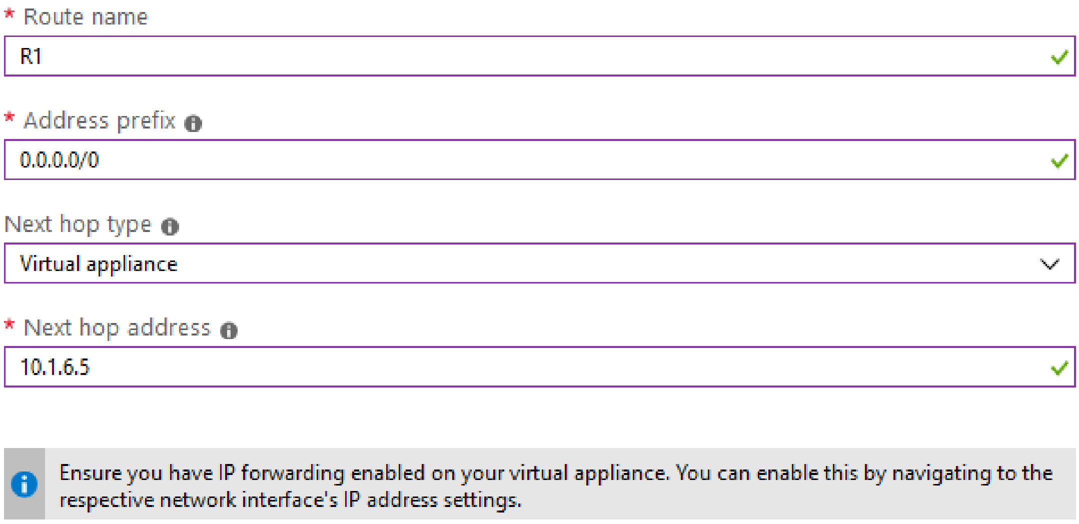
Region * : UK South

Name * : RT1

Propagate gateway routes * : ● Yes ○ No

3. Configure the ***Subscription, Resource group*** & ***Region*** settings according to your requirements.

4. Enter a suitable name for the Route table, e.g. **RT1**.
5. Click **Next : Tags >**.
6. Define any required tags.
7. Click **Review Create**.
8. Once created, select the newly created Route table.
9. Click *Routes* under *Settings*, click **Add**.



* Route name
R1

* Address prefix
0.0.0.0/0

Next hop type
Virtual appliance

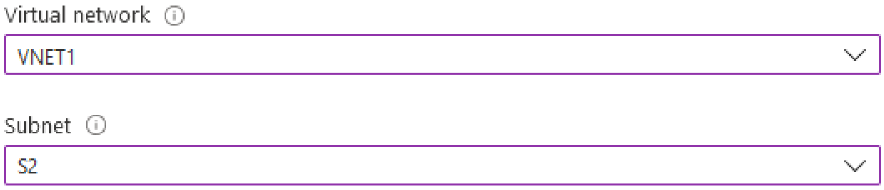
* Next hop address
10.1.6.5

Ensure you have IP forwarding enabled on your virtual appliance. You can enable this by navigating to the respective network interface's IP address settings.

10. Enter a suitable name for the route, e.g. **R1**.
11. Set the *Address prefix* to **0.0.0.0/0** (i.e. the default route).
12. Set the next hop type to *Virtual appliance*.
13. Set the next hop address to the IP address of the load balancer in the public subnet, e.g. **10.1.6.5**.
14. Click **OK**.

> Note
>
> As mentioned in the note in the above screen shot, IP forwarding must be enabled for the load balancer VM. This is covered below in section 3).

15. Click *Subnets* under *Settings*.
16. Click **Associate**
17. Select the relevant *VNet* and the *Private Subnet*



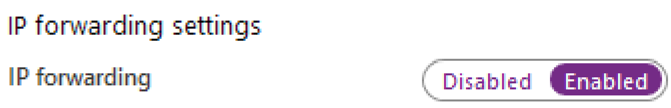
Virtual network
VNET1

Subnet
S2

18. Click **OK**.

3) Enable IP Forwarding for the Load balancer VM:

1. In the Azure Portal main menu, select *Virtual Machines*.
2. Select the Load balancer VM and click *Networking* under Settings.
3. Click the Network Interface for the VM.
4. Click *IP Configurations*.
5. Ensure that *IP forwarding* is enabled as shown below:



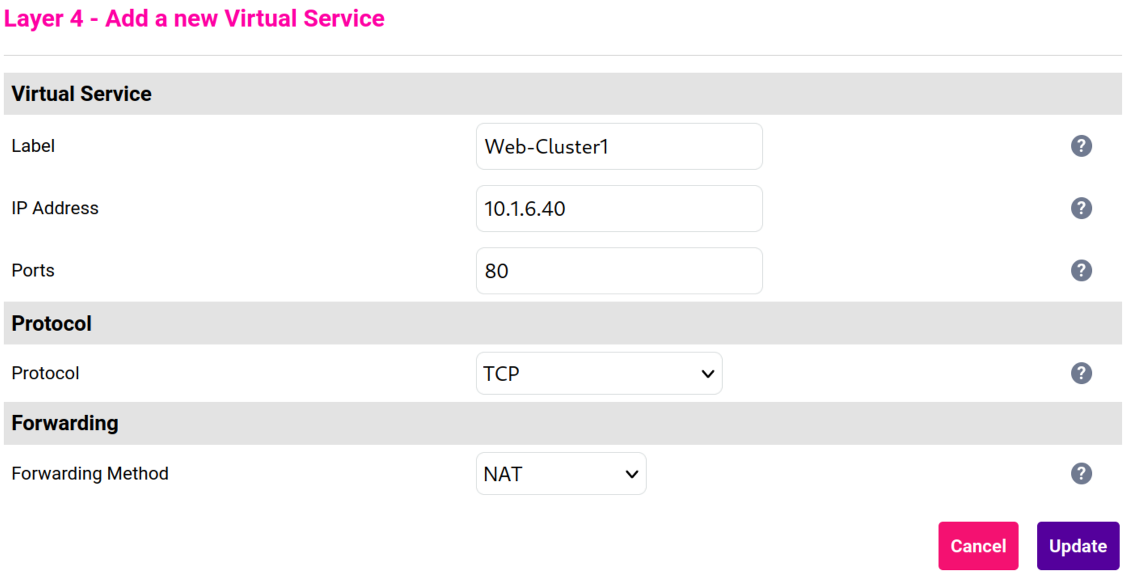
IP forwarding settings

IP forwarding ○ Disabled ● Enabled

6. Click **Save**.

Step 2 – Configure the Virtual Service on the Load Balancer

1. Using the WebUI, navigate to: *Cluster Configuration > Layer 4 – Virtual Services* and click **Add a New Virtual Service**.
2. Enter the following details:



Layer 4 - Add a new Virtual Service

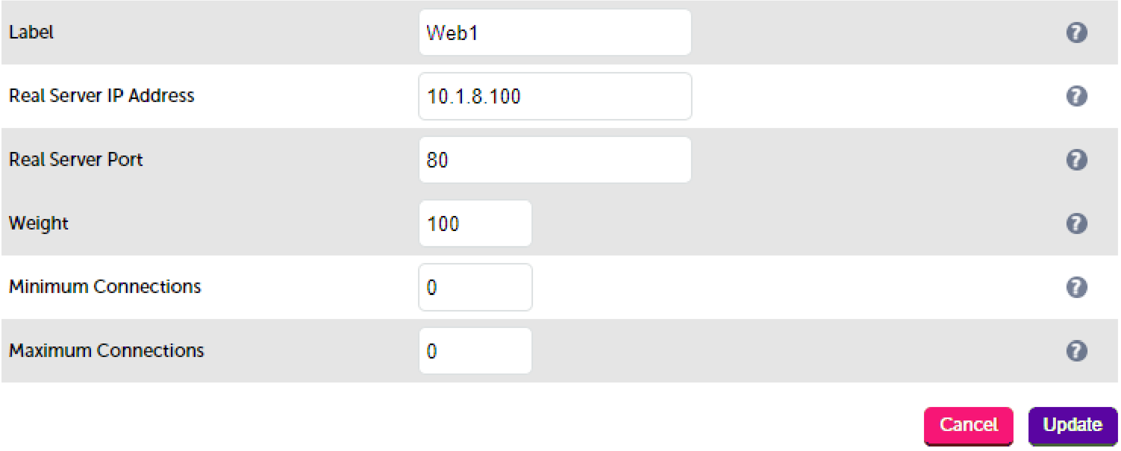
Virtual Service	
Label	Web-Cluster1
IP Address	10.1.6.40
Ports	80
Protocol	
Protocol	TCP
Forwarding	
Forwarding Method	NAT

3. Enter an appropriate label for the VIP, e.g. **Web-Cluster1**.
4. Set the *Virtual Service IP Address* field to an appropriate value, e.g. 10.1.6.40.
5. Set the *Virtual Service Ports* field to **80**.
6. Leave *Protocol* set to **TCP**.
7. Ensure *Forwarding Method* is set to **NAT**.

8. Click **Update**.

Step 3 – Setting up the Real Servers

1. Using the WebUI, navigate to: *Cluster Configuration > Layer 4 – Real Servers* and click **Add a new Real Server** next to the newly created VIP.
2. Enter the following details:



Label	Web1
Real Server IP Address	10.1.8.100
Real Server Port	80
Weight	100
Minimum Connections	0
Maximum Connections	0

3. Enter an appropriate label for the RIP, e.g. **Web1**.
4. Change the *Real Server IP Address* field to the required IP address, e.g. **10.1.8.100**.
5. Set the *Real Server Port* field to **80**.
6. Click **Update**.
7. Repeat the above steps to add your other Web Server(s).

> **Note** If you want your Real Severs to be able to access the outside world, i.e. the Internet in a public facing deployment, outbound requests passing via the load balancer must be NAT'd so that the source IP becomes the load balancer's own external address. This can be configured using the WebUI menu option: *Cluster Configuration > Layer 4 Advanced Configuration* and setting the *Auto-NAT* drop-down to **eth0**.

Step 4 – Assigning a Public IP Address

- For public facing deployments, you'll need to associate a Public IP address with the Private IP address used for the VIP. To associate a Public IP address with a Private address:
  1. Select the load balancer VM in the Azure Portal.
  2. Click *Networking*.
  3. Select the Network Interface.
  4. Select *IP Configurations*.
  5. Click the IP configuration for the VIP.

6. Change Public IP address to **Enabled**.
7. Select an existing available Public IP address or create a new one.
8. Click **Save**.

Step 5 – Testing & Verification

- To test the configuration is working, browse to the public IP address or FQDN on HTTP port 80, i.e.

  http://<Public IP Address>

  or

  http://<FQDN>

8.7. 5 – Load Balancing Web Servers, Single Appliance, 2 subnets, layer 7 with TProxy

This example is the same as the previous example with regard to network layout. It uses 2 subnets – one public subnet for the load balancer and one private subnet for the web servers. The load balancer has a single network interface located in the first subnet. Routing rules for the second private subnet must be changed so that return traffic passes back via the load balancer. This is achieved by creating a custom routing table with the required rules, then associating this with the private subnet.

In addition, Layer 7 transparency is enabled on the load balancer to ensure that the source IP address of packets reaching the web servers is the source IP of the clients and not the IP address of the load balancer.

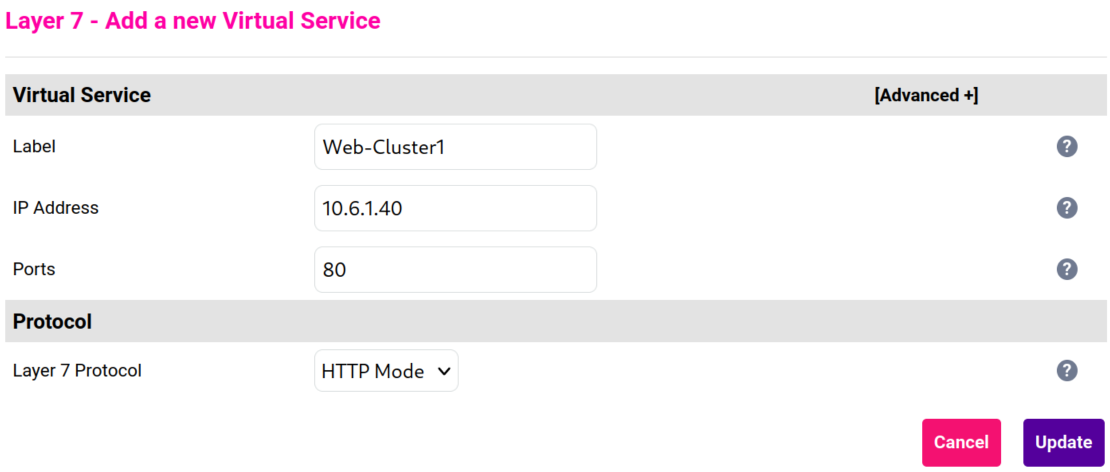
> ℹ Note
>
> This configuration is currently not supported in HA mode. In this mode, the custom routing rules would need to be dynamically modified to route via the Secondary appliance rather than the Primary if a failover occurs. This is currently not supported.

Step 1 – Setting up Azure

Follow steps 1 to 3 in the "Setting up Azure" section of Configuration Example 3.

Step 2 – Configure the Virtual Service on the Load Balancer

1. Using the WebUI, navigate to: *Cluster Configuration > Layer 7 – Virtual Services* and click **Add a New Virtual Service**.
2. Enter the following details:



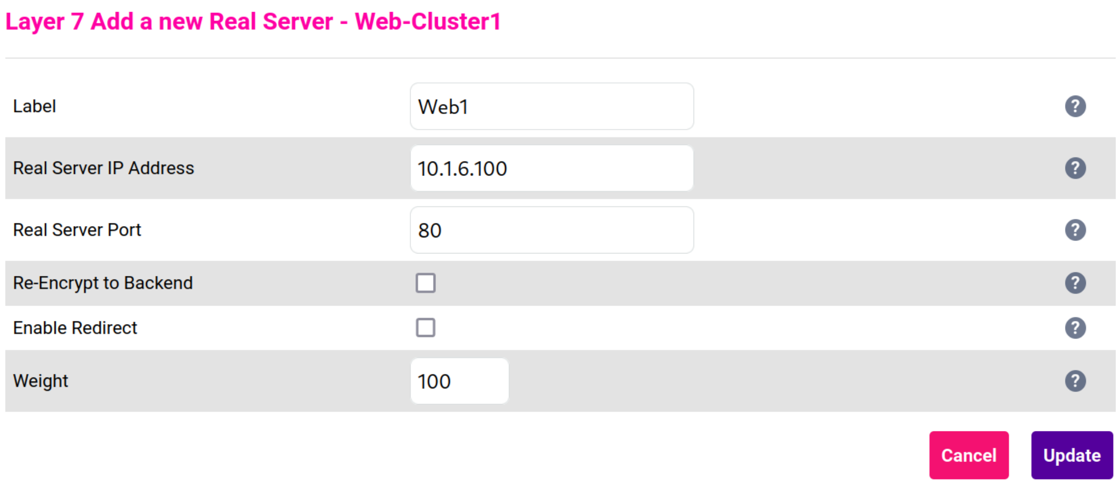
Layer 7 - Add a new Virtual Service

Virtual Service		**[Advanced +]**
Label	Web-Cluster1	?
IP Address	10.6.1.40	?
Ports	80	?
Protocol		
Layer 7 Protocol	HTTP Mode	?

3. Enter an appropriate label for the VIP, e.g. **Web-Cluster1**.
4. Set the *Virtual Service IP Address* field to an appropriate value, e.g. 10.1.6.40.
5. Set the *Virtual Service Ports* field to **80**.
6. Leave *Protocol* set to **HTTP Mode**.
7. Click **Update**.
8. Now click **Modify** next to the newly created VIP.
9. Scroll down to the 'Other' section, click **[Advanced]**, scroll to the bottom and enable (check) **Transparent Proxy**.
10. Click **Update**.

Step 3 – Setting up the Real Servers

1. Using the WebUI, navigate to: *Cluster Configuration > Layer 7 – Real Servers* and click **Add a new Real Server** next to the newly created VIP.
2. Enter the following details:



Layer 7 Add a new Real Server - Web-Cluster1

Label	Web1	?
Real Server IP Address	10.1.6.100	?
Real Server Port	80	?
Re-Encrypt to Backend	☐	?
Enable Redirect	☐	?
Weight	100	?

3. Enter an appropriate label for the RIP, e.g. **Web1**.

4. Change the ***Real Server IP Address*** field to the required IP address, e.g. **10.1.8.100**.

5. Set the ***Real Server Port*** field to **80**.

6. Click **Update**.

7. Repeat the above steps to add your other Web Server(s).

> ℹ Note
>
> If you want your Real Severs to be able to access the outside world, i.e. the Internet in a public facing deployment, outbound requests passing via the load balancer must be NAT'd so that the source IP becomes the load balancer's own external address. This can be configured using the WebUI menu option: *Cluster Configuration > Layer 4 Advanced Configuration* and setting the *Auto-NAT* drop-down to **eth0**.

Step 4 – Assigning a Public IP Address

- For public facing deployments, you'll need to associate a Public IP address with the Private IP address used for the VIP. To associate a Public IP address with a Private address:
  1. Select the load balancer VM in the Azure Portal.
  2. Click *Networking*.
  3. Select the Network Interface.
  4. Select *IP Configurations*.
  5. Click the IP configuration for the VIP.
  6. Change Public IP address to **Enabled**.
  7. Select an existing available Public IP address or create a new one.
  8. Click **Save**.

Step 5 – Testing & Verification

- To test the configuration is working, browse to the public IP address or FQDN on HTTP port 80, i.e.

  http://<Public IP Address>

  or

  http://<FQDN>

9. Testing & Verification

For additional guidance on diagnosing and resolving any issues you may have, please also refer to Diagnostics & Troubleshooting.

10. More Information

Please refer to our website for all the latest Manuals and Deployment Guides.

11. Loadbalancer.org Technical Support

Our highly experienced Support Engineers are on hand to help 24 hours a day, 365 days a year.

11.1. Contacting Support

If you have any questions regarding the appliance or need assistance with load balancing your application, please don't hesitate to contact support@loadbalancer.org.

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