



Enterprise Azure Quick Start Guide **v8.4.0**

Rev. 1.0.1

Table of Contents

1. Introduction.....	3
2. About Enterprise Azure.....	3
Main Differences to Our Standard (Non-Cloud) Product.....	3
Why use Enterprise Azure?.....	4
3. Azure Deployment Models.....	4
4. Accessing Microsoft Azure.....	4
5. Azure Management.....	4
Accessing the Azure Portal.....	5
Azure PowerShell & Azure CLI.....	5
6. Deploying Enterprise Azure From the Marketplace.....	5
7. Accessing the Appliance.....	11
Accessing the Appliance using the WebUI.....	11
WebUI Menu Options.....	13
Checking For Updates.....	13
Appliance Licensing.....	13
Enterprise Azure Non-standard WebUI Menu Options.....	13
Accessing the Appliance using SSH.....	14
Generating SSH Keys.....	14
Accessing the Appliance from Linux.....	15
Accessing the Appliance from Windows using PuTTY.....	16
8. Configuration Examples.....	17
Deployment Notes.....	17
1 – Load Balancing Web Servers – 1 subnet, layer 7.....	17
2 – Load Balancing Web Servers – 1 subnet, layer 7, SSL termination.....	20
3 – Load Balancing Web Servers – 2 subnets, layer 4 NAT Mode.....	23
4 – Load Balancing Web Servers – 2 subnets, layer 7 SNAT Mode with TProxy.....	28
9. Configuring High Availability using two instances (Master & Slave).....	31
Example HA Configuration – Load Balancing Web Servers – 1 subnet, layer 7.....	32
10. Testing – General Comments.....	43
Testing Load Balanced Services.....	43
Diagnosing VIP Connection Problems.....	43
Taking Real Servers Offline.....	44
Using Reports & Log Files.....	45
11. More Information.....	45
12. Loadbalancer.org Technical Support.....	45
13. Company Contact Information.....	46

1. Introduction

Azure is Microsoft's cloud platform. 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

The core software is based on customized versions of Centos 6.x/RHEL 6.x, Linux 4.9.x, LVS, HA-Linux, HAProxy, Pound, STunnel & Ldirectord. Enterprise Azure can be deployed as a single instance or as an HA clustered pair of instances for high availability and resilience. For details of adding a second (Slave) instance, please refer to page [31](#). 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.

Note:

Prior to v8.3.1, Enterprise Azure could only have a single IP address ,so all work-load and management services had to be accessed via the same IP. From v8.3.1, multiple IP addresses can be assigned to the appliance which enables support for multiple VIPs on different IP addresses.

MAIN DIFFERENCES TO OUR STANDARD (NON-CLOUD) PRODUCT

- Layer 4 DR mode is currently not supported.
- For an HA pair, a different approach to our hardware/virtual product is used to handle VIP failover. In our standard product, the same IP is brought up on the passive device (normally the Slave) should the active device (normally the Master) fail.

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 Master and one for the VIP when it's active on the Slave. An Azure load balancer is then used to forward traffic to the active appliance. This approach is used to minimize the time taken to failover between devices. For more details on setting up an HA pair please refer to page [31](#).

Note:

The private IPs for the VIP on the Master & Slave 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*.

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 Master & Slave and they'll be available in the drop-downs.

Creating an HA pair after configuring VIPs on the Master - If you add a Slave appliance and create an HA pair after adding VIPs to the Master appliance, the floating IPs that were automatically configured for each VIP must 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 Slave device so that corresponding Slave IPs can be selected for each VIP using the drop-downs.

- 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 the example on page [23](#) for more details on configuring this.
- 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 the example on page [28](#) for more details on configuring this.

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

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

ACCESSING THE AZURE PORTAL

The Azure Portal is available [here](#).

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 Basic Settings

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 ⓘ	No infrastructure redundancy required	✓
Image * ⓘ	Advanced Load Balancer ADC for Azure BYOL	✓
Browse all public and private images		
Size * ⓘ	Standard A1 1 vcpu, 1.75 GiB memory	✓
Change size		
Administrator account		
Authentication type ⓘ	<input checked="" type="radio"/> Password <input type="radio"/> SSH public key	
Username * ⓘ	lbuser	✓
Password * ⓘ	••••••••••	✓
Confirm password * ⓘ	••••••••••	✓

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

Note:

For an HA clustered pair, both VMs must be in the same Availability set. Please refer to page [31](#) for more details on setting up an HA pair.

8. Select the required *Image* – to do this, click **Browse all public and private images** then enter "Loadbalancer.org" in the Marketplace search box and hit <ENTER>
9. Select one of the available options:

Load Balancer for Azure R20 – hourly billing with up to 4 VIPs, each with up to 5 RIPs

Load Balancer for Azure MAX – hourly billing with unlimited VIPs / RIPs

Advanced Load Balancer ADC for Azure BYOL – for purchasing & applying your own license

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.

10. Select the required instance *Size* – by default this is set to **Standard A1**, this can be changed if required by clicking **Change size**
11. Select the required *Authentication type* – a **Password** or an **SSH Public key** can be used

Note:

Please refer to page [14](#) for more details on creating and using SSH keys.

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

Configure Disk Settings

DISK OPTIONS

* OS disk type ⓘ

Standard SSD

▼

Enable Ultra SSD compatibility (Preview) ⓘ

☐ Yes
 ☒ No

Ultra SSD 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
Create and attach a new disk Attach an existing disk				

▼

ADVANCED

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.

Note:

Information on the various disk types available in Azure can be found [here](#). Comparative disk pricing is available [here](#).

2. Click **Next : Networking >**

Configure Network Settings

[Basics](#)
[Disks](#)
[Networking](#)
[Management](#)
[Advanced](#)
[Tags](#)
[Review + create](#)

Define network connectivity for your virtual machine by configuring network interface card (NIC) settings. You can control ports, inbound and outbound connectivity with security group rules, or place behind an existing load balancing solution. [Learn more](#)

Network interface


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

Virtual network * ⓘ (new) QS-VNET1 ▼
[Create new](#)

Subnet * ⓘ (new) Public-Subnet (10.1.3.0/25) ▼

Public IP ⓘ (new) LB1-Public-IP ▼
[Create new](#)

NIC network security group ⓘ ☐ None ☐ Basic ☒ Advanced

 This VM image has preconfigured NSG rules

Configure network security group * (new) Default-Subnet-NSG ▼
[Create new](#)

Accelerated networking ⓘ ☐ On ☒ Off

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](#)

Place this virtual machine behind an existing load balancing solution? ☐ Yes ☒ No

1. Configure the *Virtual network*, *Subnet* & *Public IP* settings according to your requirements
2. Configure the *NIC Network Security Group* settings – either leave the default option to add a new Network Security Group (NSG) or select an existing group
 - If a new NSG is created, 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. If you'll be deploying layer 7 services, TCP port 7777 can also be added – this allows the HAProxy statistics page to be viewed
- 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) and TCP/7777 (for HAProxy stats)

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: Port_443	Any	✓ ...
Custom (Any/443)		
1050: Port_7777	Any	✓ ...
Custom (Any/7777)		
+ Add an inbound rule		

Note:

The rules can also be edited after the NSG is created. This can be done by selecting the NIC for the image and modifying the *Network Security Group* settings there, or by searching for "network security groups" using the search option at the top of the

page to list all groups, then selecting and modifying the relevant group.

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

Note:

Microsoft recommends that where possible Network Security Groups are associated with subnets rather than individual interfaces since this simplifies management. To make the association at the subnet level, edit the security group, associate the group with the relevant subnet then delete the association with the NIC.

- Click **Next : Management >**

Configure Management Settings

Monitoring

Boot diagnostics ⓘ ☒ On ☐ Off

OS guest diagnostics ⓘ ☐ On ☒ Off

Diagnostics storage account * ⓘ (new) qsrq1diag [Create new](#)

Identity

System assigned managed identity ⓘ ☐ On ☒ Off

Azure Active Directory

Login with AAD credentials (Preview) ⓘ ☐ On ☒ Off

Auto-shutdown

Enable auto-shutdown ⓘ ☐ On ☒ Off

Warning: This image does not support Login with AAD.

- Configure the Management Settings according to your requirements
- Click **Next : Advanced >**

Configure Advanced Settings

- Configure the Advanced Settings according to your requirements


Extensions

Extensions provide post-deployment configuration and automation.

Extensions ⓘ [Select an extension to install](#)

Cloud init

Cloud init is a widely used approach to customize a Linux VM as it boots for the first time. You can use cloud-init to install packages and write files or to configure users and security. [Learn more](#)

 The selected image does not support cloud init.

Host

Azure Dedicated Hosts allow you to provision and manage a physical server within our data centers that are dedicated to your Azure subscription. A dedicated host gives you assurance that only VMs from your subscription are on the host, flexibility to choose VMs from your subscription that will be provisioned on the host, and the control of platform maintenance at the level of the host. [Learn more](#)

Host group ⓘ No host group found

Proximity placement group


Proximity placement groups allow you to group Azure resources physically closer together in the same region. [Learn more](#)

Proximity placement group ⓘ No proximity placement groups found

VM generation

Generation 2 VMs (preview) support features such as UEFI-based boot architecture, increased memory and OS disk size limits, Intel® Software Guard Extensions (SGX), and virtual persistent memory (vPMEM).

VM generation ⓘ ☒ Gen 1 ☐ Gen 2

 Generation 2 VMs (preview) do not yet support some Azure platform features, including VM backup, Azure Site Recovery, or Azure Disk Encryption.

- Click **Next : Tags >**

Configure Tags

NAME	VALUE	RESOURCE
Environment	:	Test
	:	11 selected
	:	11 selected

- Configure Tags according to your requirements
- Click **Next : Review & Create >**

Review & Create

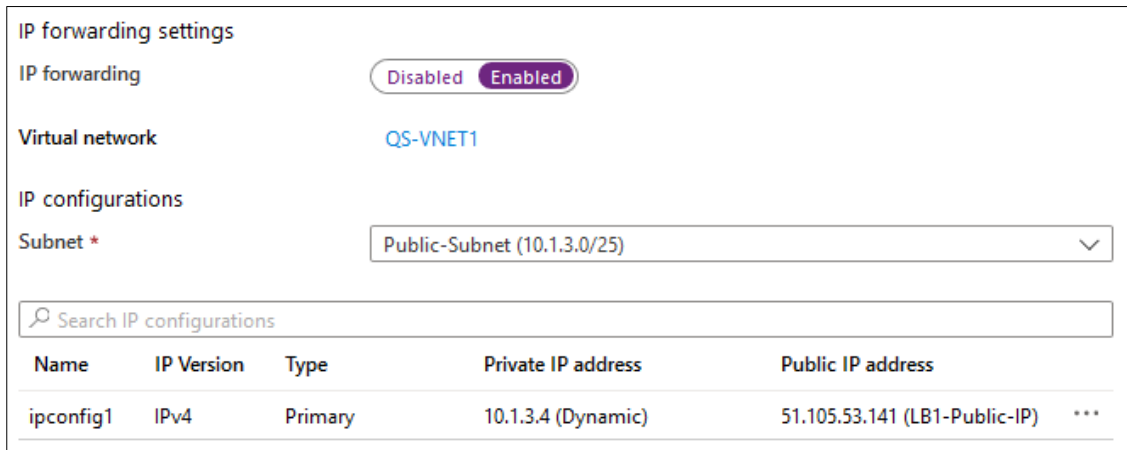
1. Review all details, terms and settings and if you're happy to proceed click **Create**
2. The load balancer will now be deployed

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)

Search IP configurations

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

ACCESSING THE APPLIANCE USING THE WEBUI

In a browser, navigate to the Public IP address or FQDN on port 9443 , i.e.

`https://<Public IP Address>:9443`

or

`https://<FQDN>:9443`

Note:

To configure an FQDN in Azure under the Resource Manager model please refer to [this link](#).

You'll receive a warning about the certificate as it's a self signed cert not related to an Internet based CA. Confirm you want to continue and a login prompt will be displayed. Use the following default credentials:

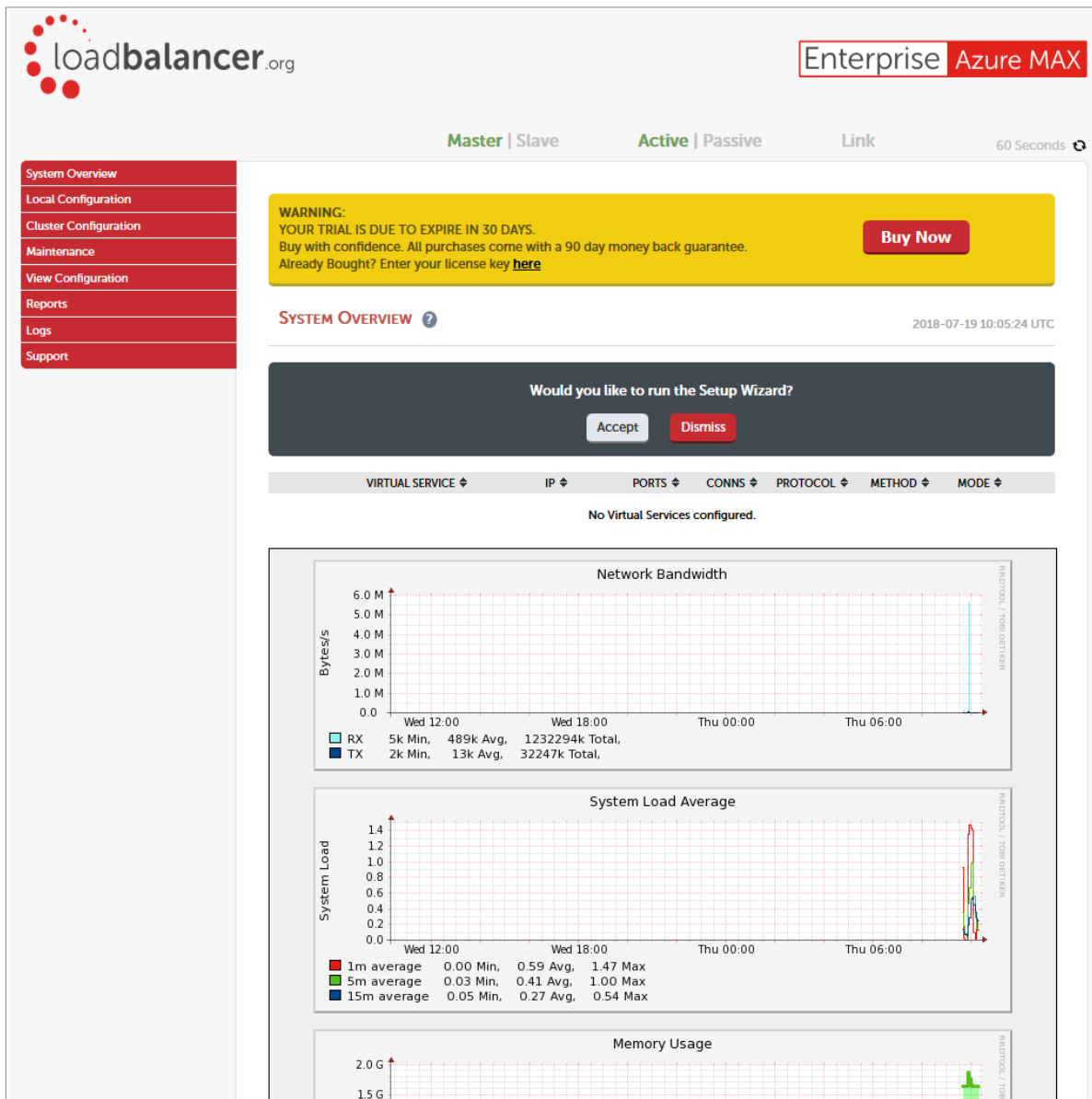
Username: loadbalancer

Password: loadbalancer

Note:

To change the password for the 'loadbalancer' account, use the WebUI option: *Maintenance > Passwords*.

Once logged in, the WebUI is displayed:



WEBUI MENU OPTIONS

The main menu options are as follows:

System Overview – Displays a graphical summary of all VIPs, RIPS and key appliance statistics

Local Configuration – Configure local host settings such as DNS, Date & 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

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.

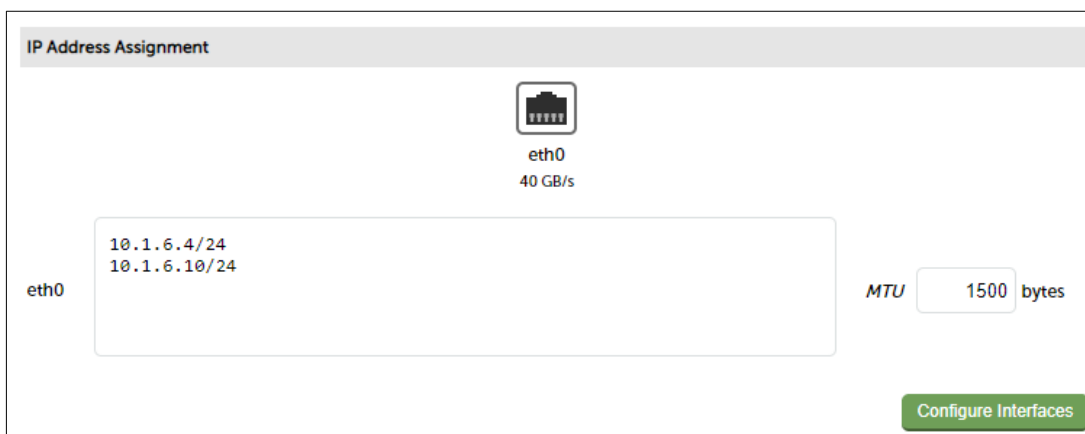
APPLIANCE LICENSING

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.

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



The screenshot shows the 'IP Address Assignment' configuration page for the 'eth0' network interface. At the top, there is a header 'IP Address Assignment' and a network card icon labeled 'eth0' with a speed of '40 GB/s'. Below this, a text box contains the IP addresses '10.1.6.4/24' and '10.1.6.10/24'. To the right of the text box, the MTU is set to '1500 bytes'. At the bottom right, there is a green button labeled 'Configure Interfaces'.

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 lose connectivity to the VM.

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

Generate a keypair using ssh-keygen

All Distro:

```
# 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

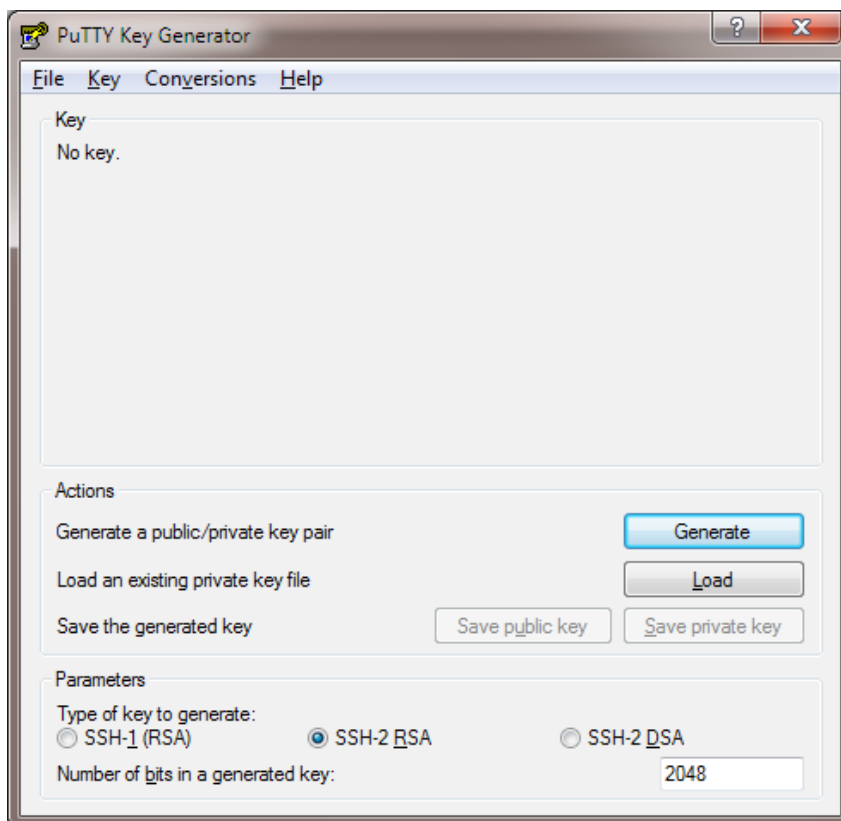
Using Windows

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



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:

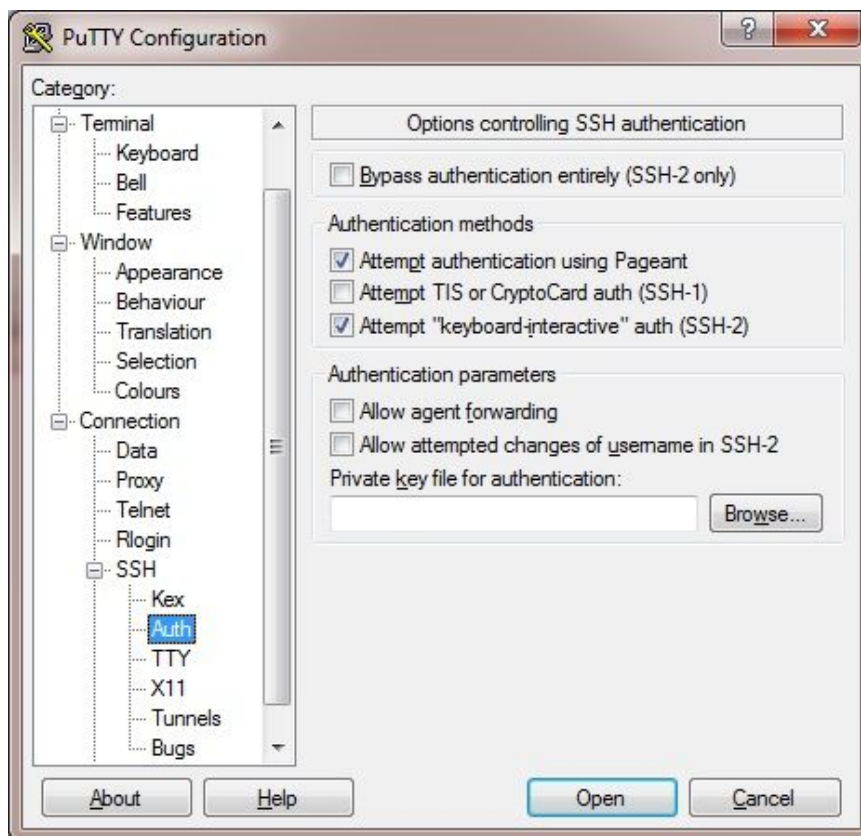
```
# ssh -i /root/AzureKeys lbuser@fqdn
```

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



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

The following sections provide a number of examples to help illustrate how the load balancer can be deployed.

DEPLOYMENT NOTES

High Availability

- We recommend that 2 appliance's are deployed as an HA pair to avoid introducing a single point of failure. For Azure, we also recommend that you configure your HA pair **first** before setting up your load balanced services – this is the simplest approach. Please refer to page [32](#) for an example using HA.
- If you do configure a single appliance first (as in the examples below) and later want to add a slave appliance and create an HA pair, follow these steps:

Note:

The following procedure assumes that your existing appliance will be the master of the HA pair.

1. Deploy an additional Loadbalancer.org VM to be the slave, make sure it's in the **SAME** Availability Set.
2. On the master 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 in step 7 on page [41](#).
3. On the slave 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 on page [32](#).
5. Using the WUI on the master appliance, ensure that the *Virtual Service IP address & Slave IP Address* fields are set correctly for each VIP. As explained on page [3](#), these drop-downs are used to specify the IP address used for the VIP when active on the master and when active on the slave.
6. Follow **Step 7** on page [40](#).
7. Follow **Step 10** on page [42](#).
8. Follow **Step 11** on page [43](#).

1 – LOAD BALANCING WEB SERVERS – 1 SUBNET, LAYER 7

This is a simple, single appliance, layer 7 example using one subnet for both the load balancer and the web servers.

a) Setting up Azure

1. Deploy the load balancer instance as described earlier in the section starting on page [5](#)
2. Deploy the web server VMs into the same VNet & subnet as the load balancer
3. Ensure that the Network Security Group includes TCP ports 80 & 443
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

b) Setting up the Virtual Service

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

Label	<input type="text" value="Web-Cluster1"/>	?
Virtual Service		
IP Address	<input type="text" value="10.1.6.40"/>	?
Ports	<input type="text" value="80,443"/>	?
Protocol		
Layer 7 Protocol	<input type="text" value="TCP Mode"/>	?
Manual Configuration	<input type="checkbox"/>	?
		<input type="button" value="Cancel"/> <input type="button" value="Update"/>

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**

Note:

When you click **Update**, a corresponding floating IP matching the IP address assigned to the Virtual Service is automatically created on the appliance and can be viewed using the WebUI option: *Cluster Configuration > Floating IPs*.

If you plan to configure an HA pair, we recommend that you first add the IP address to be used for the VIP to the load balancer using the WebUI option: *Local Configuration > Network Interface Configuration* before creating the virtual Service. This will ensure that these IPs appear in the drop-downs that are used to setup VIP(s) when in HA mode as explained on page [17](#).

Whichever way the IP address is added, you'll also need to assign the same IP address to the load balancer's network interface using the Azure Portal. If this is not done, Azure will not be aware of the new address.

5. Set the *Virtual Service Ports* field to **80,443**
6. Leave *Layer 7 Protocol* set to **TCP Mode**
7. Click **Update**

c) 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:

Label	<input type="text" value="Web1"/>	?
Real Server IP Address	<input type="text" value="10.1.6.100"/>	?
Real Server Port	<input type="text"/>	?
Re-Encrypt to Backend	<input type="checkbox"/>	?
Weight	<input type="text" value="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. **10.1.6.100**
5. Leave the *Real Server Port* field blank
6. Click **Update**
7. Repeat the above steps to add your other Web Server(s)

d) Applying the New Settings

1. Once the configuration is complete, use the **Reload HAProxy** button at the top of the screen to commit the changes

e) 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**

f) Testing & Verification

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

http://<IP Address>

or

http://<FQDN>

Note:

To configure an FQDN in Azure under the Resource Manager model please refer to [this link](#).

2 – LOAD BALANCING WEB SERVERS – 1 SUBNET, LAYER 7, 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. As with example 1, a single appliance is used.

a) Setting up Azure

1. Deploy the load balancer instance as described earlier in the section starting on page [5](#)
2. Deploy the web server VMs into the same VNet & subnet as the load balancer
3. Ensure that the Network Security Group includes TCP ports 80 & 443
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

b) Setting up the Virtual Service

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

Label	<input type="text" value="Web-Cluster1"/>	?
Virtual Service		
IP Address	<input type="text" value="10.1.6.40"/>	?
Ports	<input type="text" value="80"/>	?
Protocol		
Layer 7 Protocol	<input type="text" value="HTTP Mode"/>	?
Manual Configuration	<input type="checkbox"/>	?
		<input type="button" value="Cancel"/> <input type="button" value="Update"/>

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**

Note:

When you click **Update**, a corresponding floating IP matching the IP address assigned to the Virtual Service is automatically created on the appliance and can be viewed using the WebUI option: *Cluster Configuration > Floating IPs*.

If you plan to configure an HA pair, we recommend that you first add the IP address to be used for the VIP to the load balancer using the WebUI option: *Local Configuration > Network Interface Configuration* before creating the virtual Service. This will ensure that these IPs appear in the drop-downs that are used to setup VIP(s) when in HA mode as explained on page [17](#).

Whichever way the IP address is added, you'll also need to assign the same IP address to the load balancer's network interface using the Azure Portal. If this is not done, Azure will not be aware of the new address.

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

c) 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:

Label	<input type="text" value="Web1"/>	?
Real Server IP Address	<input type="text" value="10.1.6.100"/>	?
Real Server Port	<input type="text"/>	?
Re-Encrypt to Backend	<input type="checkbox"/>	?
Weight	<input type="text" value="100"/>	?
		<input type="button" value="Cancel"/> <input type="button" value="Update"/>

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. **10.1.6.100**
5. Click **Update**
6. Repeat the above steps to add your other Web Server(s)

d) Upload an SSL Certificate

1. Using the WebUI, navigate to *SSL Termination* 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 the [Administration Manual](#) and search for "Generating a CSR on the Load Balancer".

e) Configuring SSL Termination

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

Label	SSL-Web-Cluster1	?
Associated Virtual Service	Web-Cluster1 ▼	?
Virtual Service Port	443	?
SSL Operation Mode	High Security ▼	?
SSL Certificate	Cert1 ▼	?
		<input type="button" value="Cancel"/> <input type="button" value="Update"/>

2. Set the *Associated Virtual Service* drop-down to the VIP created in step (b) above (the *Label* field will be auto-populated)
3. Leave the *SSL Operation Mode* set to **High Security**
4. Select the *SSL Certificate* uploaded in step (d) above
5. Click **Update**

Note:

For an HA pair, there are 2 additional drop-downs – one for the IP address of the STunnel VIP when it's active on the Master, the other for the IP address of the STunnel VIP when active on the Slave. Also, the *Backend Virtual Service Port* field is included as illustrated in the screenshot below:

Label	SSL-Web-Cluster1
IP Address	10.1.6.10 ▼
Slave IP Address	10.1.6.11 ▼
Virtual Service Port	443
Associated Virtual Service	Web-Cluster1 ▼
Backend Virtual Service Port	80
SSL Operation Mode	High Security ▼
SSL Certificate	Cert1 ▼

For more details on setting up an HA pair, please refer to page [31](#).

f) Applying 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

g) 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**

h) Testing & Verification

- To test the configuration is working, browse to the public IP address or FQDN on HTTP port 80 and HTTPS port 443, i.e.

`http://<Public IP Address>` and `https://<Public IP Address>`

or

`http://<FQDN>` and `https://<Public IP Address>`

Note:

To configure an FQDN in Azure under the Resource Manager model please refer to [this link](#).

3 – LOAD BALANCING WEB SERVERS – 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 c 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 Slave appliance rather than the Master if a failover occurs which is not currently supported.

a) 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 the section starting on page [5](#)
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

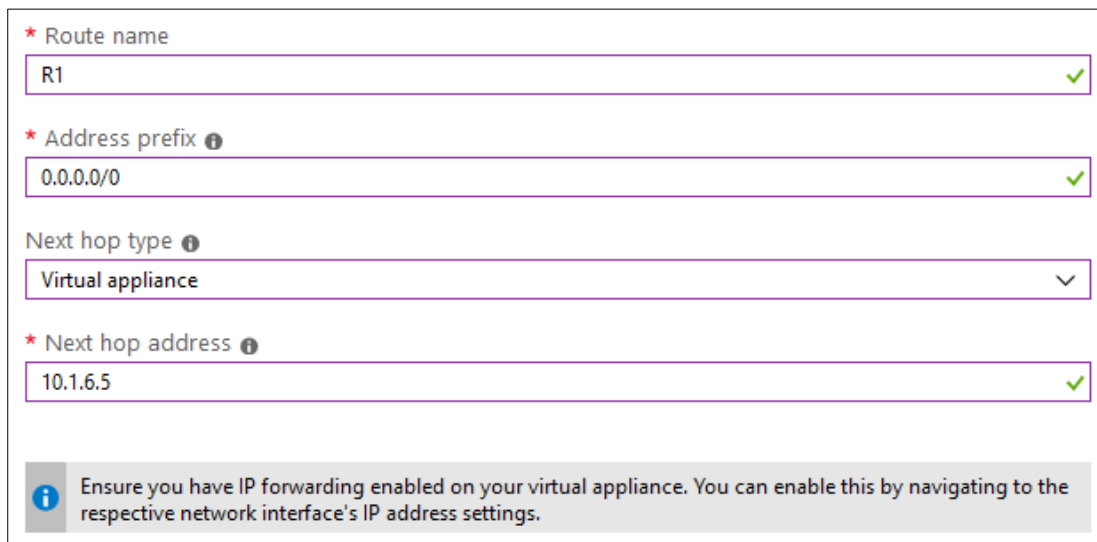
2) Configure a Custom Routing Table

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

The screenshot shows the 'Add Route Table' form in the Azure Portal. The form has the following fields and values:

- Name:** RT1 (with a green checkmark icon)
- Subscription:** Loadbalancer.org Pay-As-You-Go (dropdown menu)
- Resource group:** QS-RG1 (dropdown menu, with a 'Create new' link below it)
- Location:** (Europe) UK South (dropdown menu)
- Virtual network gateway route propagation:** Enabled (toggle button, with 'Disabled' and 'Enabled' options)

3. Enter a suitable name for the Route Table, e.g. **RT1**
4. Configure other settings according to your requirements
5. Click **Create**
6. Once created, select the newly created Route table
7. 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.

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

13. Click *Subnets* under *Settings*
14. Click **Associate**
15. Select the relevant *VNet* and the *Private Subnet*



Associate subnet
RT1

1	Virtual network VNET1	✓
2	Subnet S2	✓

16. 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

- Click **Save**

b) Configure the Virtual Service on the Load Balancer

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

Label
Web-Cluster1
?

Virtual Service

IP Address
10.1.6.40
?

Ports
80
?

Protocol

Protocol
TCP
?

Forwarding

Forwarding Method
NAT
?

Cancel
Update

- Enter an appropriate label for the VIP, e.g. **Web-Cluster1**
- Set the *Virtual Service IP Address* field to an appropriate value, e.g. 10.1.6.40

Note:

When you click **Update**, a corresponding floating IP matching the IP address assigned to the Virtual Service is automatically created on the appliance and can be viewed using the WebUI option: *Cluster Configuration > Floating IPs*.

If you plan to configure an HA pair, we recommend that you first add the IP address to be used for the VIP to the load balancer using the WebUI option: *Local Configuration > Network Interface Configuration* before creating the virtual Service. This will ensure that these IPs appear in the drop-downs that are used to setup VIP(s) when in HA mode as explained on page [17](#).

Whichever way the IP address is added, you'll also need to assign the same IP address to the load balancer's network interface using the Azure Portal. If this is not done, Azure will not be aware of the new address.

- Set the *Virtual Service Ports* field to **80**
- Leave *Protocol* set to **TCP**
- Ensure *Forwarding Method* is set to **NAT**
- Click **Update**

c) 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	<input type="text" value="Web1"/>	?
Real Server IP Address	<input type="text" value="10.1.8.100"/>	?
Real Server Port	<input type="text" value="80"/>	?
Weight	<input type="text" value="100"/>	?
Minimum Connections	<input type="text" value="0"/>	?
Maximum Connections	<input type="text" value="0"/>	?
		<input type="button" value="Cancel"/> <input type="button" value="Update"/>

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 Servers 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**.

d) 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**

e) 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>

Note:

To configure an FQDN in Azure under the Resource Manager model please refer to [this link](#).

4 – LOAD BALANCING WEB SERVERS – 2 SUBNETS, LAYER 7 SNAT MODE 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.

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 Slave appliance rather than the Master if a failover occurs which is not currently supported.

a) Setting up Azure

Follow steps 1 to 3 in the “Setting up Azure” section of example 3 on page [23](#).

b) Enable Transparent Proxy (TPProxy) on the Load Balancer

Enabling TProxy ensures that the Real Servers behind the load balancer see the client source IP address in requests.

1. Using the WebUI, navigate to: *Cluster Configuration > Layer 7 – Advanced Configuration*

Maximum Connections	<input type="text" value="40000"/>	?
Abort on Close	<input checked="" type="checkbox"/>	?
Transparent Proxy	<input checked="" type="checkbox"/>	?

2. Ensure that Transparent Proxy is enabled as shown above.
3. Click **Update**

c) 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:

Label	<input type="text" value="Web-Cluster1"/>	?
Virtual Service		
IP Address	<input type="text" value="10.6.1.40"/>	?
Ports	<input type="text" value="80"/>	?
Protocol		
Layer 7 Protocol	<input type="text" value="HTTP Mode"/>	?
Manual Configuration	<input type="checkbox"/>	?
		<input type="button" value="Cancel"/> <input type="button" value="Update"/>

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

Note:

When you click **Update**, a corresponding floating IP matching the IP address assigned to the Virtual Service is automatically created on the appliance and can be viewed using the WebUI option: *Cluster Configuration > Floating IPs*.

If you plan to configure an HA pair, we recommend that you first add the IP address to be used for the VIP to the load balancer using the WebUI option: *Local Configuration > Network Interface Configuration* before creating the virtual Service. This will ensure that these IPs appear in the drop-downs that are used to setup VIP(s) when in HA mode as explained on page [17](#).

Whichever way the IP address is added, you'll also need to assign the same IP address to the load balancer's network interface using the Azure Portal. If this is not done, Azure will not be aware of the new address.

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

d) 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:

Label	<input type="text" value="Web1"/>	?
Real Server IP Address	<input type="text" value="10.1.8.100"/>	?
Real Server Port	<input type="text" value="80"/>	?
Re-Encrypt to Backend	<input type="checkbox"/>	?
Weight	<input type="text" value="100"/>	?
		<input type="button" value="Cancel"/> <input type="button" value="Update"/>

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 Servers 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**.

e) 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**

f) 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

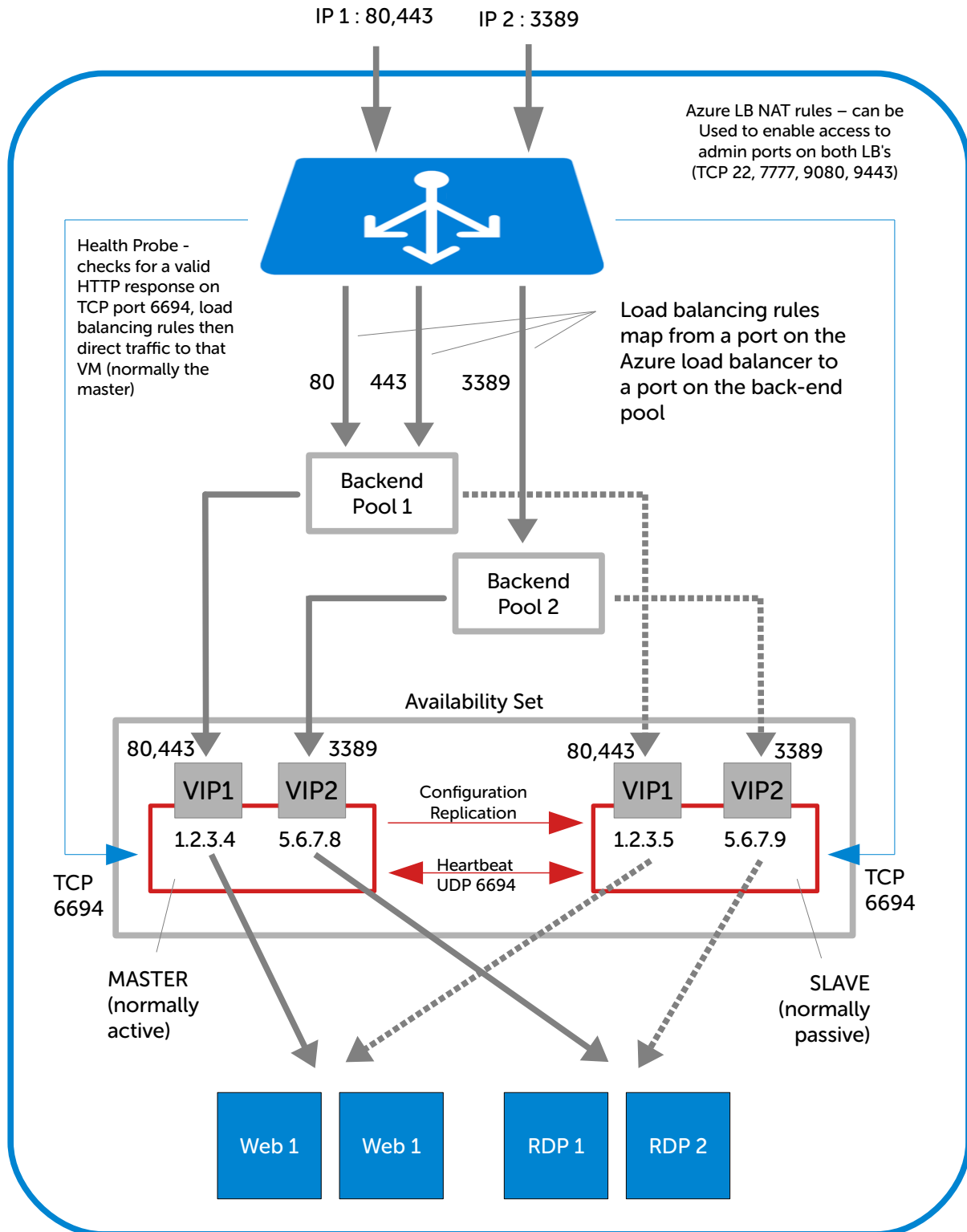
http://<FQDN>

Note:

To configure an FQDN in Azure under the Resource Manager model please refer to [this link](#).

9. Configuring High Availability using two instances (Master & Slave)

Enterprise Azure supports HA by using two Loadbalancer.org VMs configured as a clustered pair in combination with an Azure load balancer as shown in the diagram below.



- LB1 and LB2 are configured as an HA pair. In this mode, one device is active (typically the Master appliance) and the other is passive (typically the Slave appliance).
- For an Azure HA pair, a different approach to our hardware/virtual product is used to handle VIP failover. In our standard product, the same IP is brought up on the passive device (normally the Slave) should the active device (normally the Master) fail.
- 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 Master and one for the VIP when it's active on the Slave. An Azure load balancer is then used to forward traffic to the active appliance. This approach is used to minimize the time taken to failover between devices.
- The private IPs for the VIP on the Master & Slave 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 Master 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 Slave 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*. This is illustrated in the diagram on page [31](#).

EXAMPLE HA CONFIGURATION – LOAD BALANCING WEB SERVERS – 1 SUBNET, LAYER 7

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

1. Please refer to the steps starting on page [5](#). 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 Master & Slave using the Azure Portal

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

* Name
 VIP1 ✓

Type

Primary Secondary

ⓘ Primary IP configuration already exists

Private IP address settings

Allocation

Dynamic Static

* IP address
 10.1.6.10 ✓

Public IP address

Disabled Enabled

- Enter a suitable name for the IP address, e.g. **VIP1**
 - 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. **10.1.6.10**
 - Click **OK**
6. Now repeat steps 1-6 on the Slave VM for the VIP using a corresponding (but different) IP address, e.g. **10.1.6.11**

Step 4 – Add the IP Address to be used for the VIP to the Master & Slave using the Appliance WebUI

Master appliance

- On the Master, 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. **10.1.6.10/24**

Slave appliance

- On the Slave, 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. **10.1.6.11/24**

Step 5 – Add & Configure the Azure Load Balancer

- First, add the Azure Load Balancer

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

The screenshot shows the 'Add' form for an Azure Load Balancer. The form is divided into several sections:

- Subscription:** Loadbalancer.org Pay-As-You-Go
- Resource group:** QS-RG1
- Instance details:**
 - Name:** AzureLB
 - Region:** (Europe) UK South
 - Type:** Public (selected over Internal)
 - SKU:** Basic (selected over Standard)
- Public IP address:**
 - Public IP address:** Create new (selected over Use existing)
 - Public IP address name:** AzureLB-PublicIP
 - Public IP address SKU:** Basic
- Assignment:** Static (selected over Dynamic)
- Add a public IPv6 address:** No (selected over 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**
- Configure the *Public IP address* settings (for external deployments) / *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 >**
- 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**
BP1 ✓

IP version
IPv4 IPv6

Associated to ⓘ
Availability set ✓

Availability set ⓘ
AS1
number of virtual machines: 2 ✓

Target network IP configurations
Only VMs within the current availability set can be chosen. Once a VM is chosen, you can select a network IP configuration related to it.

Virtual machine: LB-Master Network IP configuration: lb-master718/VIP1 (10.1.6.10)	🗑️
Virtual machine: LB-Slave Network IP configuration: lb-slave353/VIP1 (10.1.6.11)	🗑️

[+ Add a target network IP configuration](#)

- Enter an appropriate name, .e.g. **BP1**
- Select the required IP version, e.g. **IPv4**
- Select the *Availability set* that contains the load balancer VMs, e.g. **AS1**
- Ensure that both load balancer VMs are selected as shown in the example above (LB-Master &

LB-Slave), and that the IP addresses selected correspond to the VIP on the Master & Slave (10.1.6.10 & 10.1.6.11)

- Click **OK**

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 on page [31](#).

3. Next, create a Health Probe

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



The screenshot shows the 'Add Health Probe' configuration form in the Azure portal. The fields are as follows:

- Name:** LB-Probe (with a green checkmark icon)
- IP version:** IPv4
- Protocol:** HTTP (selected from a dropdown menu)
- Port:** 6694 (with a green checkmark icon)
- Path:** /
- Interval:** 5 seconds
- Unhealthy threshold:** 2 consecutive failures

- 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**

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**

The screenshot shows the configuration form for a new Load Balancing Rule in Azure. The fields are as follows:

- Name:** LB-Rule1 (with a green checkmark icon)
- IP Version:** IPv4 (selected with a radio button), IPv6 (unselected)
- Frontend IP address:** 51.143.150.87 (LoadBalancerFrontEnd) (dropdown menu)
- Protocol:** TCP (selected with a radio button), UDP (unselected)
- Port:** 80 (text input)
- Backend port:** 80 (text input)
- Backend pool:** BP1 (2 virtual machines) (dropdown menu)
- Health probe:** LB-Probe (HTTP:6694) (dropdown menu)
- Session persistence:** None (dropdown menu)
- Idle timeout (minutes):** A slider bar set to 4 (text input)
- Floating IP (direct server return):** Disabled (selected button), Enabled (unselected button)

- Enter an appropriate name, e.g. **LB-Rule1**
- Select the required IP version, e.g. **IPv4**
- 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 **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 balancers 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 on page [31](#).

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

Note:

This step is optional, you may have alternative ways of accessing & managing your VMs. The example below shows how to setup a rule to allow SSH access (TCP port 22) to the Master Loadbalancer.org VM via the Azure load balancer IP on TCP port 122.

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

The screenshot shows the configuration for a new Inbound NAT rule. The fields are as follows:

- Name:** NAT-Rule1 (with a green checkmark)
- Frontend IP address:** LoadBalancerFrontEnd (51.143.150.87) (dropdown menu)
- IP Version:** IPv4
- Service:** Custom (dropdown menu)
- Protocol:** TCP (selected button, with UDP as an alternative)
- Idle timeout (minutes):** 4 (slider and input field)
- Port:** 122 (with a green checkmark)
- Associated to:** as1 (availability set) (link)

Screenshot continued.....

Target virtual machine ⓘ

LB-Master
size: Standard_A1, network interfaces: 1

Network IP configuration ⓘ

ipconfig1 (10.1.6.4)

Port mapping ⓘ

Default Custom

Floating IP (direct server return) ⓘ

Disabled Enabled

* Target port

22

- Enter an appropriate name, e.g. **NAT-Rule1**
- The *Frontend IP address* is the address of the Azure load balancer
- Set *Service* to **Custom**
- Set *Protocol* to **TCP**
- Set *Port* to **122**
- Set *Target Virtual Machine* to the Master Loadbalancer.org appliance, e.g. **LB1**
- Set *Network IP Configuration* to the Interface on the Master Loadbalancer.org appliance
- Set *Port Mapping* to **Custom**
- Set *Target port* to **22**
- Click **OK**

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.

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.

Example rules for Master and Slave management :

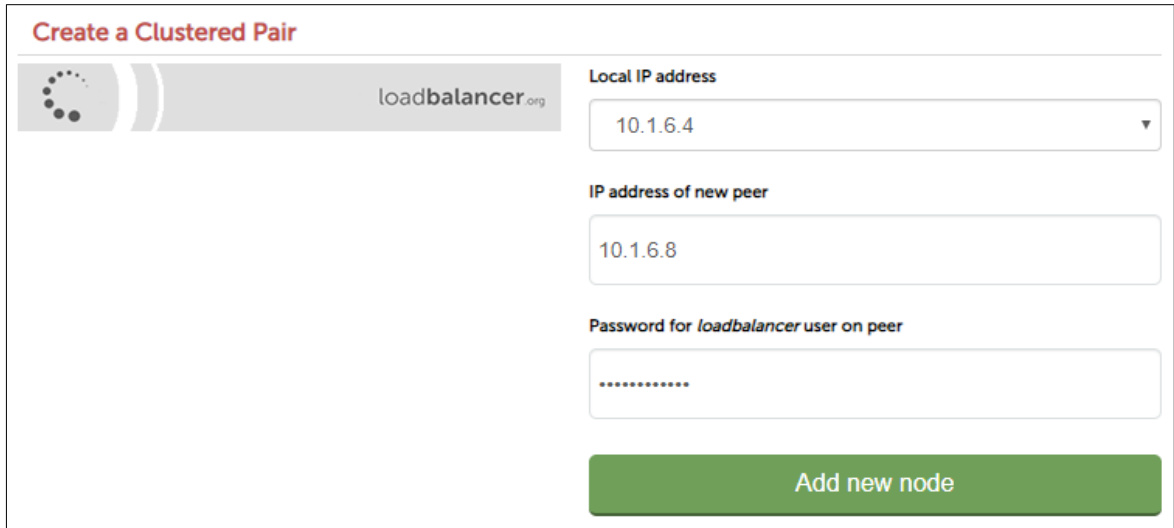
The table below shows example NAT rules that can be used to enable access to SSH and the WebUI on both the Master and Slave appliances.

Rule Name	Port	Target Port	Use
NAT-LB1-22	122	22	external access to SSH on LB-Master
NAT-LB2-22	222	22	external access to SSH on LB-Slave

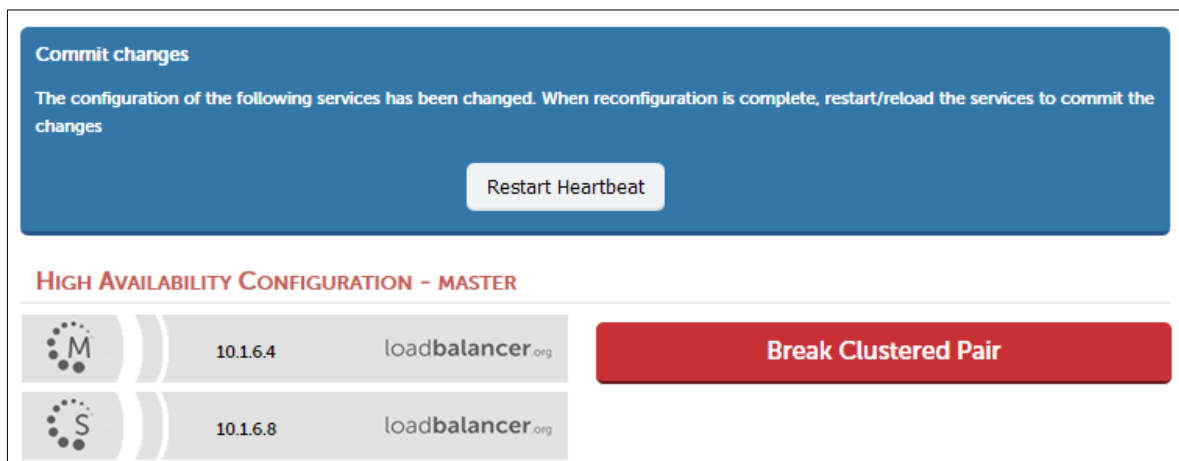
NAT-LB1-9443	19443	9443	external access to WebUI on LB-Master
NAT-LB2-9443	29443	9443	external access to WebUI on LB-Slave

Step 6 – Configure the HA Clustered Pair

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



3. In the *IP address of new peer* field, enter the Slave 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:



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

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

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

New Floating IP	<input type="text" value="10.1.6.20"/>	<input type="button" value="Add Floating IP"/>
-----------------	--	--

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 Master & Slave units
3. Click **Add Floating IP**

Step 8 – Configure the Virtual Service (VIP)

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

Label	<input type="text" value="Web-Cluster"/>	<input data-bbox="1362 790 1385 822" type="button" value="?"/>
Virtual Service		
IP Address	<input type="text" value="10.1.6.10"/>	<input data-bbox="1249 896 1272 927" type="button" value="?"/>
Slave IP Address	<input type="text" value="10.1.6.11"/>	<input data-bbox="1249 954 1272 985" type="button" value="?"/>
Ports	<input type="text" value="80"/>	<input data-bbox="1362 1014 1385 1046" type="button" value="?"/>
Protocol		
Layer 7 Protocol	<input type="text" value="HTTP Mode"/>	<input data-bbox="1362 1120 1385 1151" type="button" value="?"/>
Manual Configuration	<input type="checkbox"/>	<input data-bbox="1362 1178 1385 1209" type="button" value="?"/>
		<input type="button" value="Cancel"/> <input type="button" value="Update"/>

3. Enter an appropriate label for the VIP, e.g. **Web-Cluster**
4. Set the *Virtual Service IP Address* field to the IP address added in step 3, e.g **10.1.6.10**
5. Set the *Slave IP Address* field to the IP address added in step 3, e.g **10.1.6.11**

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 Master 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:

Label	<input type="text" value="Web1"/>	?
Real Server IP Address	<input type="text" value="10.1.6.50"/>	?
Real Server Port	<input type="text" value="80"/>	?
Re-Encrypt to Backend	<input type="checkbox"/>	?
Weight	<input type="text" value="100"/>	?
		<input type="button" value="Cancel"/> <input type="button" value="Update"/>

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. **10.1.6.50**
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 Master & Slave is as follows:

Master Unit:

Master Slave	Active Passive	Link
-----------------------	-------------------------	-------------

Slave Unit:

Master Slave	Active Passive	Link
-----------------------	-------------------------	-------------

The Slave can be made active by clicking **[Advanced]** in the green box, and then clicking the **Take over** button

System Overview ?	2019-07-09 15:14:50 UTC
Information: This device is currently passive. Please see the active device for Virtual Service statistics. [Advanced]	

Other states:

Master Slave	Active Passive	Link	this is a Master unit, it's active, no Slave unit has been defined
Master Slave	Active Passive	Link	this is a Master unit, it's active, a Slave has been defined but the link to the Slave is down. Action:

			<i>check & verify the heartbeat configuration</i>
Master Slave	Active Passive	Link	this is a Slave unit, it's active (a failover from the Master has occurred) and the heartbeat link to the Master has been established

Step 11 – Testing & Verification

- Connect to the Public IP address of the Azure Load balancer and verify that you can access the load balanced service. Use the **Take Over** button on the passive device and verify that the service is still available – the failover time will depend on the settings for the health probe, but using default values should complete in under 10 seconds.

10. Testing – General Comments

TESTING LOAD BALANCED SERVICES

For example, to test a web server based configuration, add a page to each web servers root directory e.g. **test.html** and put the server name on this page for easy identification during the tests.

Use two or more clients to do the testing. Open up a web browser on each test clients and enter the URL for the VIP e.g. **http://104.40.133.119**

Provided that persistence is disabled, each client should see a different server name because of the load balancing algorithm in use , i.e. they are being load balanced across the cluster.

Why test using two clients? If you use a single client it will most likely keep on hitting the same server for multiple requests. This is to do with the way that the load balancing algorithms are optimized.

DIAGNOSING VIP CONNECTION PROBLEMS

1. **Make sure that the device is active** – this can be checked in the WebUI. For a single appliance, the status bar should report **Master & Active** as shown below:

Master Slave	Active Passive	Link
----------------	------------------	------

2. **Check that the Real Servers are up** – Using *System Overview* make sure that none of your VIPs are colored red. If they are, the entire cluster is down (i.e. all Real Servers). Green indicates a healthy cluster, yellow indicates that your cluster may need attention (one or more of the Real Servers may be down), and blue indicates all Real Server have been deliberately taken offline (by using either Halt or Drain).

SYSTEM OVERVIEW ?								2015-03-18 11:37:15 UTC
	VIRTUAL SERVICE	IP	PORTS	CONNS	PROTOCOL	METHOD	MODE	
	HTTP-Cluster	192.168.110.150	80	0	HTTP	Layer 7	Proxy	
	RDP-Cluster	192.168.110.150	3389	0	TCP	Layer 7	Proxy	
	HTTP-Cluster-2	192.168.110.152	80	0	HTTP	Layer 7	Proxy	
	RDP-Cluster-2	192.168.110.152	3389	0	TCP	Layer 7	Proxy	

3. Check the connection state

For layer 4 (NAT mode) VIPs, check *Reports > Layer 4 Current Connections* to view the current traffic in detail. Any packets with state **SYN_RECV** often implies a return traffic routing issue, so make sure that the routing rules for the real server subnet have been configured correctly

For Layer 7 VIPs, check *Reports > Layer 7 Status*. The default credentials required are:

username: loadbalancer

password: loadbalancer

This will open a second tab in the browser and display a statistics/status report as shown in the example below (this is accessed on port TCP/7777 so make sure that the inbound rules allow connections on this port) :

Statistics Report for pid 3261

> General process information

pid = 3261 (process #1, nbproc = 1)

uptime = 0d 0h00m42s

system limits: memmax = unlimited; ulimit-n = 81000

maxsock = 80024; maxconn = 40000; maxpipes = 0

current conns = 1; current pipes = 0/0; conn rate = 2/sec

Running tasks: 1/5; idle = 100 %

active UP

active UP, going down

active DOWN, going up

active or backup DOWN

active or backup DOWN for maintenance (MAINT)

backup UP

backup UP, going down

backup DOWN, going up

not checked

Display option:

Hide 'DOWN' servers

Refresh now

CSV export

External resources:

Primary site

Updates (v1.6)

Online manual

Note: UP with load-balancing disabled is reported as "NOLB".

L7

	Queue			Session rate			Sessions			Bytes		Denied		Errors		Warnings		Status		Server										
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Downtme	Thrtle	
Frontend				0	15	-	0	4	40 000	56		21 696	3 385 782	0	0	0					OPEN									
backup	0	0	-	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0			1	-	Y				-	
RIP1	0	0	-	0	16	-	0	2	-	56	56	21 696	3 385 782	0	0	0	0	0	0	0	42s UP	L4OK in 0ms	1	Y	-	0	0	0s	-	
Backend	0	0	-	0	16	-	0	2	4 000	56	56	21 696	3 385 782	0	0	0	0	0	0	0	42s UP		1	1	1		0	0s		

stats

	Queue			Session rate			Sessions			Bytes		Denied		Errors		Warnings		Status		Server									
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Downtme	Thrtle
Frontend				2	4	-	1	1	2 000	8		1 464	33 111	0	0	4					OPEN								
Backend	0	0	-	0	0	-	0	0	200	0	0	1 464	33 111	0	0		0	0	0	0	42s UP		0	0	0		0		





TAKING REAL SERVERS OFFLINE

1) Using the *System Overview* check that when you Halt one of the Real Servers the connections are redirected to the other server in the cluster.

2) Stop the web service/process on one of the servers, wait a few seconds (for the load balancer to detect the change) and then refresh the browsers on both clients. They should now both switch to the same server (since one has been removed from the load balancing list). Also check that the server is shown red (down) in the system overview.

3) Start the web service/process on the server, wait a few seconds and then refresh the browsers again. After a few refreshes they should again show different web servers. Also check that the server is shown green (up) in the system overview.

The *System Overview* shows the status as these tests are performed:

SYSTEM OVERVIEW ?							
2015-04-30 08:35:41 UTC							
	VIRTUAL SERVICE	IP	PORTS	CONNS	PROTOCOL	METHOD	MODE
	HTTP-Cluster	192.168.110.150	80	0	HTTP	Layer 7	Proxy
	REAL SERVER	IP	PORTS	WEIGHT	CONNS		
	RIP1	192.168.110.240	80	100	0	Drain	Halt
	RIP2	192.168.110.241	80	0	0	Online (halt)	
	RIP3	192.168.110.242	80	100	0	Drain	Halt

In this example:

RIP1 is green, this indicates that it's operating normally

RIP2 is blue, this indicates that it has been either Halted or Drained. in this example Halt has been used as indicated by *Online (Halt)* being displayed. If it had been drained it would show as *Online (Drain)*

RIP3 is red, this indicates that it has failed a health check

USING REPORTS & LOG FILES

The appliance includes several logs and reports that are very useful when diagnosing issues. Both are available as main menu options in the WebUI. Details of both can be found in the administration manual.

11. More Information

Please refer to our website for the latest administration manual, deployment guides and all other documentation: <https://www.loadbalancer.org/uk/resources/manuals>

12. Loadbalancer.org Technical Support

If you have any questions regarding the appliance or how to load balance your application, please don't hesitate to contact our support team using the following email address: support@loadbalancer.org

13. Company Contact Information

<i>Website</i>	URL: www.loadbalancer.org
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