

Load Balancing Konica Minolta Dispatcher Paragon

Version 1.2.0



Table of Contents

1. About this Guide	4
2. Loadbalancer.org Appliances Supported	4
3. Software Versions Supported	4
3.1. Loadbalancer.org Appliance	4
3.2. Konica Minolta Dispatcher Paragon	4
4. Konica Minolta Dispatcher Paragon	4
5. Load Balancing Konica Minolta Dispatcher Paragon	4
5.1. Introduction and Overview of Load Balancing Methods	4
5.2. Load Balancing & HA Requirements	5
5.3. Overview of Steps Required	5
6. Deployment Concept	5
6.1. Virtual Service (VIP) Requirements	6
7. Load Balancer Deployment Methods	6
7.1. Layer 4 DR Mode	6
7.2. Layer 7 SNAT Mode	7
7.3. Our Recommendation	8
8. Configuring Print Servers for Load Balancing	9
8.1. Registry Modifications	9
Microsoft Windows Server 2008 Specific Registry Change	10
8.2. Configuring Name Resolution	10
DNS Name Resolution (Windows 2000 & later)	10
NetBIOS Name Resolution (legacy Environments)	10
8.3. Finalising the Server Configuration	11
8.4. Installing and Configuring Konica Minolta Dispatcher Paragon	11
9. Loadbalancer.org Appliance – the Basics	11
9.1. Virtual Appliance	11
9.2. Initial Network Configuration	12
9.3. Accessing the Appliance WebUI	12
Main Menu Options	13
9.4. Appliance Software Update	14
Determining the Current Software Version	14
Checking for Updates using Online Update	14
Using Offline Update	14
9.5. Ports Used by the Appliance	15
9.6. HA Clustered Pair Configuration	16
10. Appliance Configuration for Dispatcher Paragon – Using Layer 4 DR Mode	16
10.1. Configuring the Virtual Service (VIP)	16
10.2. Defining the Real Servers (RIPs)	17
11. Appliance Configuration for Dispatcher Paragon – Using Layer 7 SNAT Mode	17
11.1. Configuring the Virtual Service (VIP)	17
11.2. Defining the Real Servers (RIPs)	18
11.3. Finalizing the Layer 7 Configuration	18
12. Testing & Verification	19
13. Technical Support	19
14. Further Documentation	19
15. Appendix	20
15.1. Vendor and Application Specific Lists of Ports to Load Balance	20
15.2. Solving the ARP Problem	21

Windows Server 2012 & Later	21
15.3. Configuring HA - Adding a Secondary Appliance	26
Non-Replicated Settings	26
Adding a Secondary Appliance - Create an HA Clustered Pair	27
16. Document Revision History	29

1. About this Guide

This guide details the steps required to configure a load balanced Konica Minolta Dispatcher Paragon environment utilizing Loadbalancer.org appliances. It covers the configuration of the load balancers and also any Konica Minolta Dispatcher Paragon configuration changes that are required to enable load balancing.

For more information about initial appliance deployment, network configuration and using the Web User Interface (WebUI), please also refer to the [Administration Manual](#).

2. Loadbalancer.org Appliances Supported

All our products can be used with Konica Minolta Dispatcher Paragon. For full specifications of available models please refer to <https://www.loadbalancer.org/products>. Some features may not be supported in all cloud platforms due to platform specific limitations, please check with Loadbalancer.org support for further details.

3. Software Versions Supported

3.1. Loadbalancer.org Appliance

- V8.3.8 and later

Note

The screenshots used throughout this document aim to track the latest Loadbalancer.org software version. If using an older software version, note that the screenshots presented here may not match the WebUI exactly.

3.2. Konica Minolta Dispatcher Paragon

- All versions

4. Konica Minolta Dispatcher Paragon

The core of Dispatcher Paragon's functionality is the central accounting of all print, copy, and scan operations. Providing comprehensive information with details like job name, first page preview, date, number of pages, and toner coverage, the application greatly facilitates and streamlines administrator tasks. What's more, print administrators can activate pull printing, and create effective print governance policies. Enterprises thus take advantage of a range of tools that allow them to improve print, copy, and scan workflows, and increase employee productivity – all of which ultimately helps lower print-related costs while at the same time maximising document security.

5. Load Balancing Konica Minolta Dispatcher Paragon

Note

It's highly recommended that you have a working Dispatcher Paragon environment first before implementing the load balancer.

5.1. Introduction and Overview of Load Balancing Methods



For a Dispatcher Paragon deployment, the preferred and default load balancer configuration uses Layer 4 DR Mode (Direct Routing, aka DSR / Direct Server Return). This is a very high performance solution that requires little change to your existing infrastructure. It is necessary to solve "the ARP problem" on the real print servers. This is a straightforward process, and is detailed in [Solving the ARP Problem](#).

It is also possible to load balance a Dispatcher Paragon deployment using Layer 7 SNAT Mode. This mode might be preferable if making changes to the real print servers is not possible, although some Windows Registry keys need to be added. Due to the increased amount of information at layer 7, performance is not as fast as at layer 4. Also note that load balanced connections at layer 7 are not source IP transparent, which is not usually an issue when load balancing print servers but should still be considered.

5.2. Load Balancing & HA Requirements

A load balanced Konica Minolta Dispatcher Paragon environment requires the following:

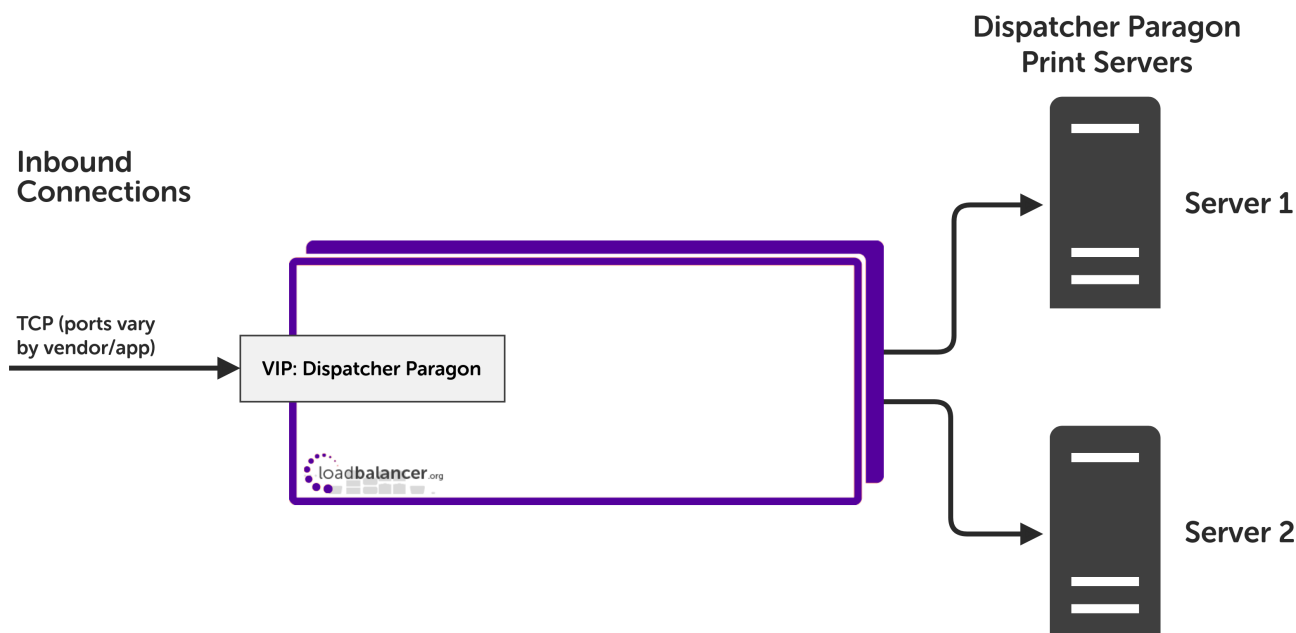
1. Microsoft Windows Server environment.
2. Installation of Dispatcher Paragon.

5.3. Overview of Steps Required

Setting up a load balanced Dispatcher Paragon environment can be summarised as follows:

1. Create a virtual service (VIP) on the load balancer that listens on the required ports.
2. Associate the print servers to the virtual service, i.e. define them as 'real servers' (RIPs) for the VIP.
3. Install and configure the Konica Minolta Windows print servers.
4. Configure registry settings on the print servers to enable them to be accessed via a shared name.
5. Configure name resolution related settings on the print servers.
6. Point users at the VIP to access the print server and the printer shares.

6. Deployment Concept



VIPs = Virtual IP Addresses

Note

The load balancer can be deployed as a single unit, although Loadbalancer.org recommends a clustered pair for resilience & high availability. Please refer to [Configuring HA - Adding a Secondary Appliance](#) for more details on configuring a clustered pair.

6.1. Virtual Service (VIP) Requirements

A single virtual service is required which load balances Dispatcher Paragon traffic on the required ports.

7. Load Balancer Deployment Methods

The load balancer can be deployed in 4 fundamental ways: *Layer 4 DR mode*, *Layer 4 NAT mode*, *Layer 4 SNAT mode*, and *Layer 7 SNAT mode*.

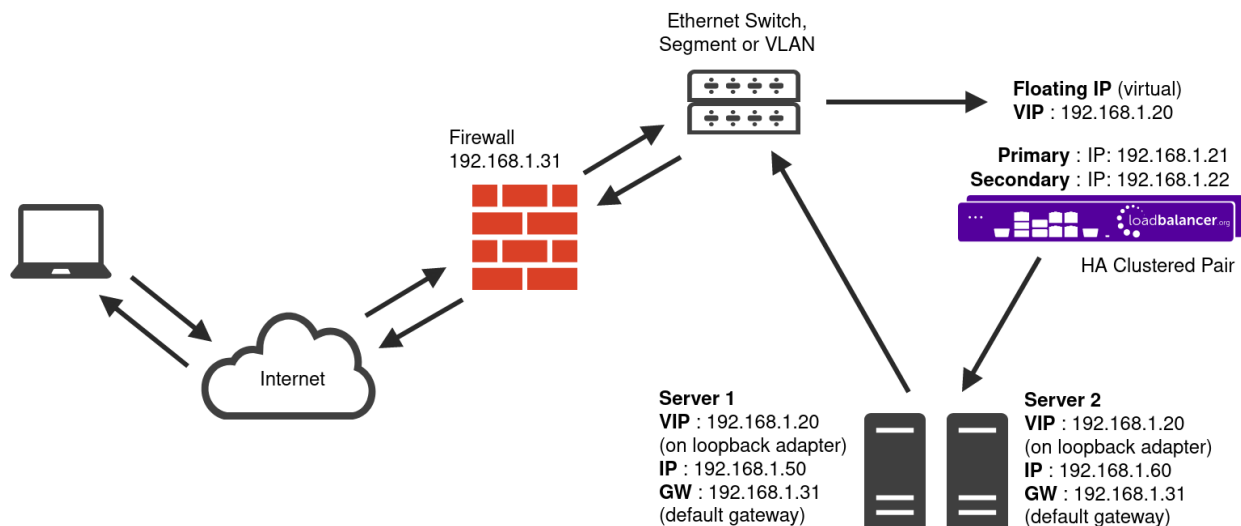
For Dispatcher Paragon, using layer 4 DR mode or layer 7 SNAT mode is recommended. These modes are described below and are used for the configurations presented in this guide. For configuring using DR mode please refer to [Appliance Configuration for Dispatcher Paragon – Using Layer 4 DR Mode](#), and for configuring using a combination of layer 4 NAT mode and layer 7 SNAT mode refer to [Appliance Configuration for Dispatcher Paragon - Using Layer 7 SNAT Mode](#).

7.1. Layer 4 DR Mode

One-arm direct routing (DR) mode is a very high performance solution that requires little change to your existing infrastructure.

Note

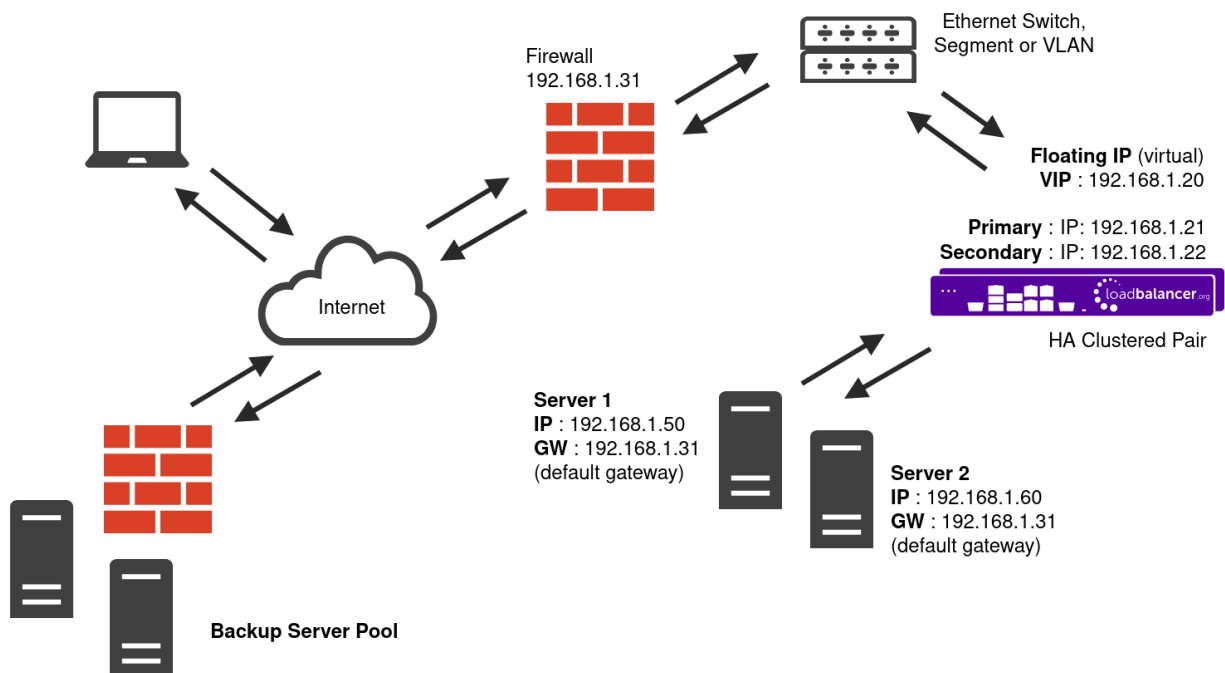
Kemp, Brocade, Barracuda & A10 Networks call this *Direct Server Return* and F5 call it *nPath*.



- DR mode works by changing the destination MAC address of the incoming packet to match the selected Real Server on the fly which is very fast.
- When the packet reaches the Real Server it expects the Real Server to own the Virtual Services IP address (VIP). This means that you need to ensure that the Real Server (and the load balanced application) respond to both the Real Server's own IP address and the VIP.
- The Real Servers should not respond to ARP requests for the VIP. Only the load balancer should do this. Configuring the Real Servers in this way is referred to as **Solving the ARP problem**. For more information please refer to [DR Mode Considerations](#).
- On average, DR mode is 8 times quicker than NAT for HTTP, 50 times quicker for Terminal Services and much, much faster for streaming media or FTP.
- The load balancer must have an Interface in the same subnet as the Real Servers to ensure layer 2 connectivity required for DR mode to work.
- The VIP can be brought up on the same subnet as the Real Servers, or on a different subnet provided that the load balancer has an interface in that subnet.
- Port translation is not possible with DR mode, e.g. VIP:80 → RIP:8080 is not supported.
- DR mode is transparent, i.e. the Real Server will see the source IP address of the client.

7.2. Layer 7 SNAT Mode

Layer 7 SNAT mode uses a proxy (HAProxy) at the application layer. Inbound requests are terminated on the load balancer and HAProxy generates a new corresponding request to the chosen Real Server. As a result, Layer 7 is typically not as fast as the Layer 4 methods. Layer 7 is typically chosen when either enhanced options such as SSL termination, cookie based persistence, URL rewriting, header insertion/deletion etc. are required, or when the network topology prohibits the use of the layer 4 methods.



- Because layer 7 SNAT mode is a full proxy, any server in the cluster can be on any accessible subnet including across the Internet or WAN.
- Layer 7 SNAT mode is not transparent by default, i.e. the Real Servers will not see the source IP address of the client, they will see the load balancer's own IP address by default, or any other local appliance IP address if preferred (e.g. the VIP address). This can be configured per layer 7 VIP. If required, the load balancer can be configured to provide the actual client IP address to the Real Servers in 2 ways. Either by inserting a header that contains the client's source IP address, or by modifying the Source Address field of the IP packets and replacing the IP address of the load balancer with the IP address of the client. For more information on these methods please refer to [Transparency at Layer 7](#).
- Layer 7 SNAT mode can be deployed using either a one-arm or two-arm configuration. For two-arm deployments, **eth0** is normally used for the internal network and **eth1** is used for the external network although this is not mandatory.
- Requires no mode-specific configuration changes to the load balanced Real Servers.
- Port translation is possible with Layer 7 SNAT mode, e.g. VIP:80 → RIP:8080 is supported.
- You should not use the same RIP:PORT combination for layer 7 SNAT mode VIPs and layer 4 SNAT mode VIPs because the required firewall rules conflict.

7.3. Our Recommendation

Where possible, we recommend that Layer 4 Direct Routing (DR) mode is used. This mode offers the best possible performance since replies go directly from the Real Servers to the client, not via the load balancer. It's also relatively simple to implement. Ultimately, the final choice does depend on your specific requirements and infrastructure.

If DR mode cannot be used, for example if the real servers are located in remote routed networks, then Layer 7 SNAT mode is recommended.

If the load balancer is deployed in AWS, Azure, or GCP, layer 7 SNAT mode must be used as layer 4 direct routing

is not currently possible on these platforms.

8. Configuring Print Servers for Load Balancing

The following steps should be carried out on each print server defined in the virtual service:

1. Join the server to the same domain as the client PCs.
2. Install the **Print and Document Service** role / **Print Server** service.
3. Install and share the printers (use exactly the same share names and permissions across all servers).
4. If DR mode is used, solve the "ARP problem" on each print server, so that DR mode will work. For detailed steps on solving the ARP problem for the various versions of Windows, please refer to [Solving the ARP Problem](#) for more information.

Important

When configuring the Loopback Adapter to solve the ARP Problem, the following options **must** also be checked (ticked):

Client for Microsoft Networks and File & Printer Sharing for Microsoft Networks

8.1. Registry Modifications

To enable the print servers to be accessed via a shared name (**Dispatcher** in the example virtual service in this guide), add the following registry entries to each print server:

Key: HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Lsa
Value: DisableLoopbackCheck
Type: REG_DWORD
Data: 1

Key: HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\lanmanserver\parameters
Value: DisableStrictNameChecking
Type: REG_DWORD
Data: 1

Key: HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\lanmanserver\parameters
Value: OptionalNames
Type: REG_MULTI_SZ
Data: Dispatcher

Note

In the example presented here, Dispatcher is the name that will be used to access the load balanced print servers via the virtual service (VIP) created on the load balancer. This can be set to any appropriate name. Whatever name is used, it must resolve to the IP address of the VIP as explained in the section below.

Microsoft Windows Server 2008 Specific Registry Change

If Microsoft Windows Server 2008 is used as the operating system for the printer servers, an additional registry entry change is required. The following registry entry should be changed from a DWORD to a QWORD:

```
Key: HKLM\SYSTEM\CurrentControlSet\Control\Print\DNSOneWire
Value: DnsOnWire
Type: REG_QWORD
Data: 1
```

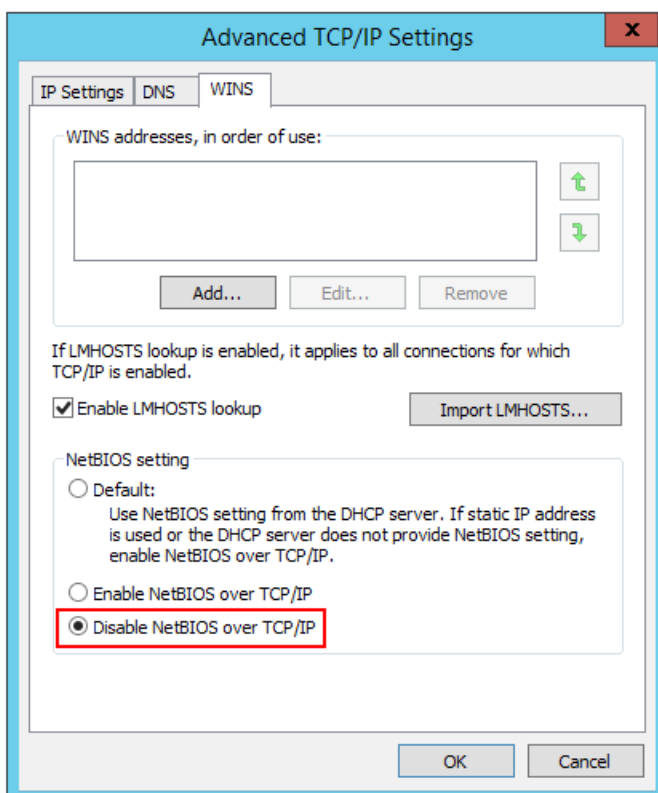
8.2. Configuring Name Resolution

For printer load balancing to work, **either** DNS or NetBIOS name resolution should be configured as detailed below.

DNS Name Resolution (Windows 2000 & later)

To configure DNS name resolution, the following steps should be completed:

1. NetBIOS over TCP/IP should be disabled on **all** interfaces of **each** print server as shown below:



2. A host name and corresponding "Host (A)" record for the virtual Dispatcher service that matches the virtual IP (VIP) address for the load balancer should be created.

NetBIOS Name Resolution (legacy Environments)

To configure NetBIOS name resolution, the following steps should be completed:

1. NetBIOS over TCP/IP should be **disabled on the main NIC** and **left enabled on the Loopback adapter** on **each** print server.
2. Either a WINS server should be set up and all clients configured to use this, **or** pre-loaded entries in the LMHosts file of each client should be set up.

Note

As shown in the flow chart in [this Technet article](#), for a default H-node client, NetBIOS name resolution occurs in the following order:

Therefore, to avoid broadcast, LMHost entries must be declared as pre-loaded to ensure they are available in the local NetBIOS cache.

Configuring the LMHosts file

This is done by creating an entry like so:

Dispatcher 10.10.10.150 #PRE

Entries with the #PRE directive are loaded into the cache on reboot, or can be forced using the command:

```
nbtstat -R
```

The following command can be used to view the cache and verify that the entry has been added:

```
nbtstat -c
```

8.3. Finalising the Server Configuration

To finalise the print server configuration changes, **each print server must be rebooted**.

8.4. Installing and Configuring Konica Minolta Dispatcher Paragon

The Dispatcher Paragon software should be set up by following the steps outlined in the *Konica Minolta Dispatcher Paragon Installation Guide*.

9. Loadbalancer.org Appliance – the Basics

9.1. Virtual Appliance

A fully featured, fully supported 30 day trial is available if you are conducting a PoC (Proof of Concept) deployment. The VA is currently available for VMware, Virtual Box, Hyper-V, KVM, XEN and Nutanix AHV and has been optimized for each Hypervisor. By default, the VA is allocated 2 vCPUs, 4GB of RAM and has a 20GB virtual disk. The Virtual Appliance can be downloaded [here](#).

Note

The same download is used for the licensed product, the only difference is that a license key file (supplied by our sales team when the product is purchased) must be applied using the appliance's WebUI.



Note

Please refer to [Virtual Appliance Installation](#) and the ReadMe.txt text file included in the VA download for additional information on deploying the VA using the various Hypervisors.

Note

The VA has 4 network adapters. For VMware only the first adapter (**eth0**) is connected by default. For HyperV, KVM, XEN and Nutanix AHV all adapters are disconnected by default. Use the network configuration screen within the Hypervisor to connect the required adapters.

9.2. Initial Network Configuration

After boot up, follow the instructions on the appliance console to configure the management IP address, subnet mask, default gateway, DNS Server and other network settings.

Important

Be sure to set a secure password for the load balancer, when prompted during the setup routine.

9.3. Accessing the Appliance WebUI

The WebUI is accessed using a web browser. By default, users are authenticated using Apache authentication. Users can also be authenticated against LDAP, LDAPS, Active Directory or Radius - for more information, please refer to [External Authentication](#).

Note

There are certain differences when accessing the WebUI for the cloud appliances. For details, please refer to the relevant [Quick Start / Configuration Guide](#).

Note

A number of compatibility issues have been found with various versions of Microsoft Internet Explorer and Edge. The WebUI has been tested and verified using both Chrome & Firefox.

1. Using a browser, navigate to the following URL:

<https://<IP-address-configured-during-the-network-setup-wizard>:9443/lbadmin/>

Note

You'll receive a warning about the WebUI's 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](#).

2. Log in to the WebUI using the following credentials:

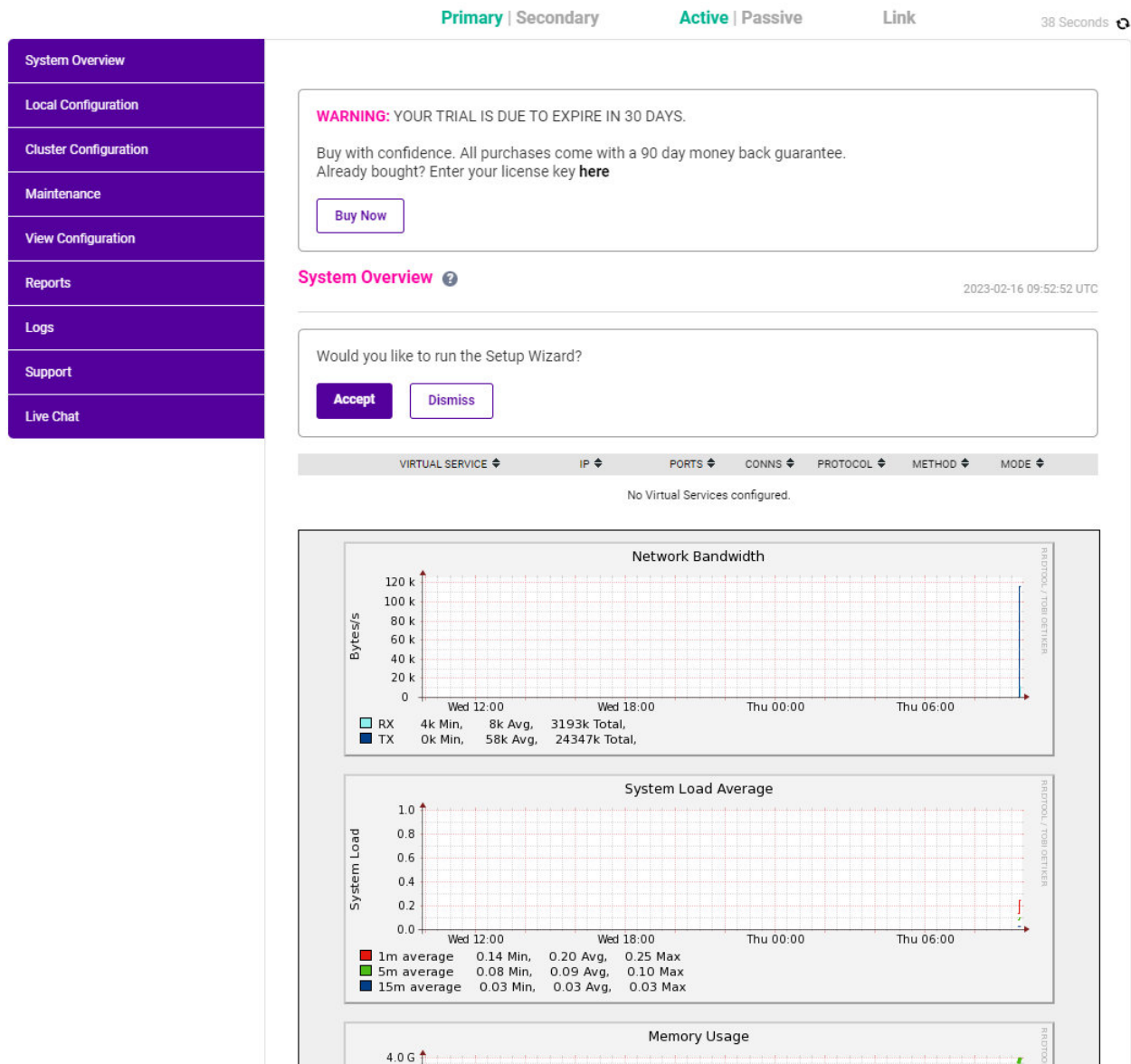
Username: loadbalancer

Password: <configured-during-network-setup-wizard>

Note

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

Once logged in, the WebUI will be displayed as shown below:



3. You'll be asked if you want to run the Setup Wizard. Click **Dismiss** if you're following a guide or want to configure the appliance manually. Click **Accept** to start the Setup Wizard.



Note

The Setup Wizard can only be used to configure Layer 7 services.

Main 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

9.4. Appliance Software Update

To ensure that the appliance(s) are running the latest software version, we recommend a software update check is performed.

Determining the Current Software Version

The software version is displayed at the bottom of the WebUI as shown in the example below:

Copyright © Loadbalancer.org Inc. 2002 – 2023
ENTERPRISE VA Max - v8.9.0

English ▼

Checking for Updates using Online Update

Note

By default, the appliance periodically contacts the Loadbalancer.org update server and checks for updates. An update check can also be manually triggered as detailed below.

1. Using the WebUI, navigate to: **Maintenance > Software Update**.
2. Select **Online Update**.
3. If the latest version is already installed, a message similar to the following will be displayed:

Information: Version v8.9.0 is the current release. No updates are available

4. If an update is available, you'll be presented with a list of new features, improvements, bug fixes and security related updates.
5. Click **Online Update** to start the update process.

Note

Do not navigate away whilst the update is ongoing, this may cause the update to fail.

6. Once complete (the update can take several minutes depending on download speed and upgrade version) the following message will be displayed:

Information: Update completed successfully.

7. If services need to be reloaded/restarted or the appliance needs a full restart, you'll be prompted accordingly.

Using Offline Update

If the load balancer does not have access to the Internet, offline update can be used.



Note

Please contact support@loadbalancer.org to check if an update is available and obtain the latest offline update files.

To perform an offline update:

1. Using the WebUI, navigate to: **Maintenance > Software Update**.
2. Select **Offline Update**.
3. The following screen will be displayed:

Software Update

Offline Update

The following steps will lead you through offline update.

1. Contact **Loadbalancer.org support** to obtain the offline update archive and checksum.
2. Save the archive and checksum to your local machine.
3. Select the archive and checksum files in the upload form below.
4. Click *Upload and Install* to begin the update process.

Archive: No file chosen

Checksum: No file chosen

4. Select the *Archive* and *Checksum* files.
5. Click **Upload and Install**.
6. If services need to be reloaded/restarted or the appliance needs a full restart, you'll be prompted accordingly.

9.5. Ports Used by the Appliance

By default, the appliance uses the following TCP & UDP ports:

Protocol	Port	Purpose
TCP	22	SSH
TCP & UDP	53	DNS
TCP & UDP	123	NTP
TCP & UDP	161	SNMP
UDP	6694	Heartbeat between Primary & Secondary appliances in HA mode
TCP	7778	HAProxy persistence table replication
TCP	9080	WebUI - HTTP (disabled by default)
TCP	9081	Nginx fallback page
TCP	9443	WebUI - HTTPS



9.6. HA Clustered Pair Configuration






Loadbalancer.org recommend that load balancer appliances are deployed in pairs for high availability. In this guide a single unit is deployed first, adding a secondary unit is covered in [Configuring HA - Adding a Secondary Appliance](#).

10. Appliance Configuration for Dispatcher Paragon – Using Layer 4 DR Mode

10.1. Configuring the Virtual Service (VIP)

1. Using the web user interface, navigate to *Cluster Configuration > Layer 4 – Virtual Services* and click on **Add a new Virtual Service**.
2. Define the **Label** for the virtual service as required, e.g. **Dispatcher**.
3. Set the **Virtual Service IP Address** field to the required IP address, e.g. **10.10.10.191**.
4. Set the **Ports** field as needed, depending on your vendor or application:
 - For Konica Minolta, use ports **80,443,5014-5019,5021,5022,50001,50003**.
 - For HP, use ports **443,5021,5022,5025,7627,57627**.
 - For other vendors or applications, refer to [Vendor and Application Specific Lists of Ports to Load Balance](#).
5. Leave the **Protocol** set to **TCP**.
6. Leave the **Forwarding Method** set to **Direct Routing**.
7. Click **Update** to create the virtual service.

Layer 4 - Add a new Virtual Service

Virtual Service		
Label	<input type="text" value="Dispatcher"/>	
IP Address	<input type="text" value="10.10.10.191"/>	
Ports	<input type="text" value="80,443,5014-5019,5021,5022,"/>	
Protocol		
Protocol	<input type="text" value="TCP"/>	
Forwarding		
Forwarding Method	<input type="text" value="Direct Routing"/>	

8. Click **Modify** next to the newly created VIP.

9. Ensure that the *Persistence Enable* checkbox is not checked.
10. Set the *Health Checks Check Port* to **5122**.
11. Click **Update**.

10.2. Defining the Real Servers (RIPs)

1. Using the web user interface, navigate to *Cluster Configuration > Layer 4 – Real Servers* and click on **Add a new Real Server** next to the newly created VIP.
2. Define the *Label* for the real server as required, e.g. **Paragon_SRV_1**.
3. Set the *Real Server IP Address* field to the required IP address, e.g. **10.10.10.195**.
4. Click **Update**.
5. Repeat these steps to add additional print servers as required.

Layer 4 Add a new Real Server - Dispatcher

Label	<input type="text" value="Paragon_SRV_1"/>	?
Real Server IP Address	<input type="text" value="10.10.10.195"/>	?
Weight	<input type="text" value="100"/>	?
Minimum Connections	<input type="text" value="0"/>	?
Maximum Connections	<input type="text" value="0"/>	?

11. Appliance Configuration for Dispatcher Paragon – Using Layer 7 SNAT Mode

11.1. Configuring the Virtual Service (VIP)

1. Using the web user interface, navigate to *Cluster Configuration > Layer 7 – Virtual Services* and click on **Add a new Virtual Service**.
2. Define the *Label* for the virtual service as required, e.g. **Dispatcher**.
3. Set the *Virtual Service IP Address* field to the required IP address, e.g. **10.10.10.150**.
4. Set the *Ports* field as needed, depending on your vendor or application:
 - For Konica Minolta, use ports **80,443,5014-5019,5021,5022,50001,50003**.
 - For HP, use ports **443,5021,5022,5025,7627,57627**.
 - For other vendors or applications, refer to [Vendor and Application Specific Lists of Ports to Load Balance](#).



- Set the *Layer 7 Protocol* to **TCP Mode**.
- Click **Update** to create the virtual service.

Layer 7 - Add a new Virtual Service

Virtual Service		[Advanced +]
Label	<input type="text" value="Dispatcher"/>	?
IP Address	<input type="text" value="10.10.10.150"/>	?
Ports	<input type="text" value="80,443,5014-5019,5021,5022,"/>	?
Protocol		
Layer 7 Protocol	<input type="text" value="TCP Mode"/>	?

Cancel Update

11.2. Defining the Real Servers (RIPs)

- Using the web user interface, navigate to *Cluster Configuration > Layer 7 – Real Servers* and click on **Add a new Real Server** next to the newly created VIP.
- Define the *Label* for the real server as required, e.g. **Paragon_SRV_1**.
- Set the *Real Server IP Address* field to the required IP address, e.g. **10.10.10.151**.
- Click **Update**.
- Repeat these steps to add additional print servers as required.

Layer 7 Add a new Real Server - Dispatcher

Label	<input type="text" value="Paragon_SRV_1"/>	?
Real Server IP Address	<input type="text" value="10.10.10.151"/>	?
Real Server Port	<input type="text"/>	?
Re-Encrypt to Backend	<input type="checkbox"/>	?
Weight	<input type="text" value="100"/>	?

Cancel Update

11.3. Finalizing the Layer 7 Configuration

To apply the new settings, HAProxy must be reloaded. This can be done using the button in the "Commit changes" box at the top of the screen or by using the **Restart Services** menu option:

- Using the WebUI, navigate to: **Maintenance > Restart Services**.

2. Click **Reload HAProxy**.

12. Testing & Verification

Note

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

The load balanced print service can be tested, either by browsing to the virtual service IP address or the share name. In the example presented in this document, this would be done by going to:

```
\\10.10.10.150
```

or

```
\\Dispatcher
```

Any shared printers and shared folders that have been configured on the real print servers should be visible.

13. Technical Support

For more details about configuring the appliance and assistance with designing your deployment please don't hesitate to contact the support team using the following email address: support@loadbalancer.org.

14. Further Documentation

For additional information, please refer to the [Administration Manual](#).



15. Appendix

15.1. Vendor and Application Specific Lists of Ports to Load Balance

The table below includes lists of ports that should be load balanced when working with equipment from different vendors or different applications.

Vendor / Application	List of Ports to Load Balance
Brother	5026,5027
Desktop Interface	5558
Develop	5014-5019,5021,5022
End User Interface Payment System	8080,8443
Epson	80,443,5021-5024
FlexiSpooler server / client (non-)spooling	80,443,515,631,5559,9100
Fuji Xerox	5011-5013,5021,5022,5029
HP	443,5021,5022,5025,7627,57627
Konica Minolta	80,443,5014-5019,5021,5022,50001,50003
Lexmark	5021,5022
Mobile Integration Gateway	5559
Mobile Print Server	5559
Mobile terminal (Android, iPhone, Windows, generic)	5021,5022
OKI	389,636,5011,5012
Olivetti	5014-5019,5021,5022
Other application LPR printing, e.g. SAP	515
Ricoh	5011,5012,5021,5022,64098
SafeQ Client	9100
Samsung	80,5013
Sharp	5011,5012,5021,5022
SPM payment machine	4196-4199
Terminal Professional (TPv3.5)	4096,5011,5021,5022
Terminal Professional (TP4)	5021,5022
Terminal Ultralight	4096
Toshiba	389,636,5011,5012,5021,5022,49629,49630
User/LPD Windows Spooler	515
Xerox	80,161,443,389,636,5011,5012,5021,5022

15.2. Solving the ARP Problem

Windows Server 2012 & Later

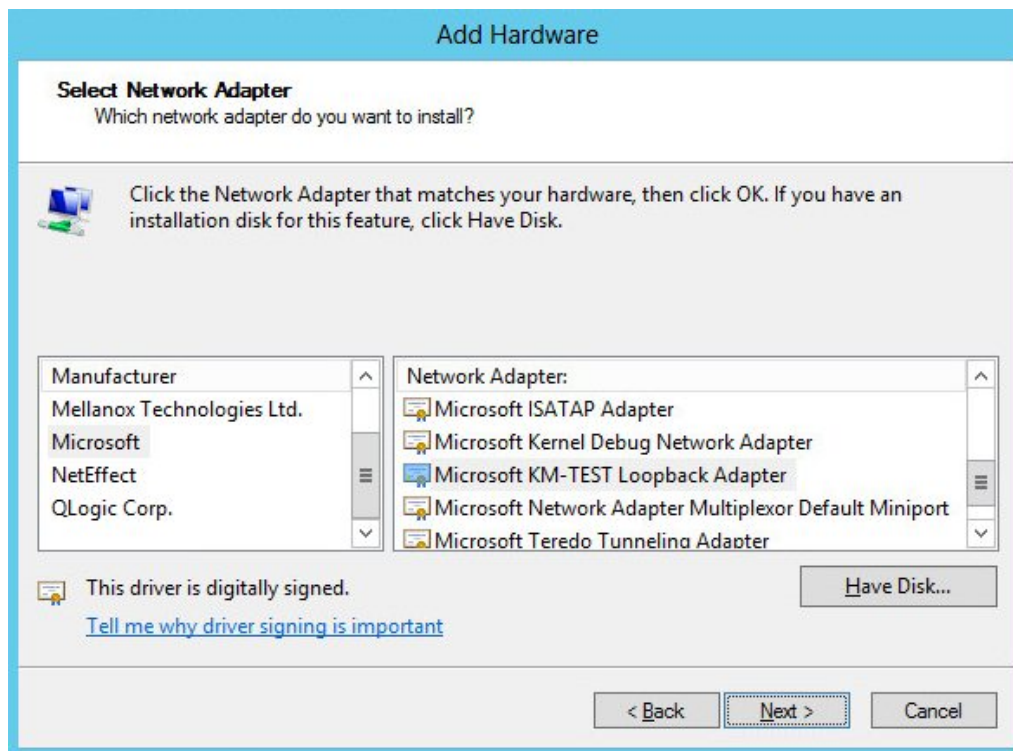
Windows Server 2012 and later support Direct Routing (DR) mode through the use of the Microsoft Loopback Adapter that must be installed and configured on each load balanced (Real) Server. The IP address configured on the Loopback Adapter must be the same as the Virtual Service (VIP) address. This enables the server to receive packets that have their destination set as the VIP address. If a Real Server is included in multiple DR mode VIPs, an IP address for each VIP must be added to the Loopback Adapter.

In addition, steps must be taken to set the strong/weak host behavior on each Real Server. This is used to either prevent or allow interfaces to receive packets destined for a different interface on the same server.

(!) Important The following 3 steps must be completed on **all** Real Servers associated with the VIP.

Step 1 of 3: Install the Microsoft Loopback Adapter

1. Click **Start**, then run **hdwwiz** to start the Hardware Installation Wizard.
2. Once the Wizard has started, click **Next**.
3. Select **Install the hardware that I manually select from a list (Advanced)**, click **Next**.
4. Select **Network adapters**, click **Next**.



5. Select **Microsoft & Microsoft KM-Test Loopback Adapter**, click **Next**.
6. Click **Next** to start the installation, when complete click **Finish**.

Step 2 of 3: Configure the Loopback Adapter

1. Open Control Panel and click **Network and Sharing Center**.

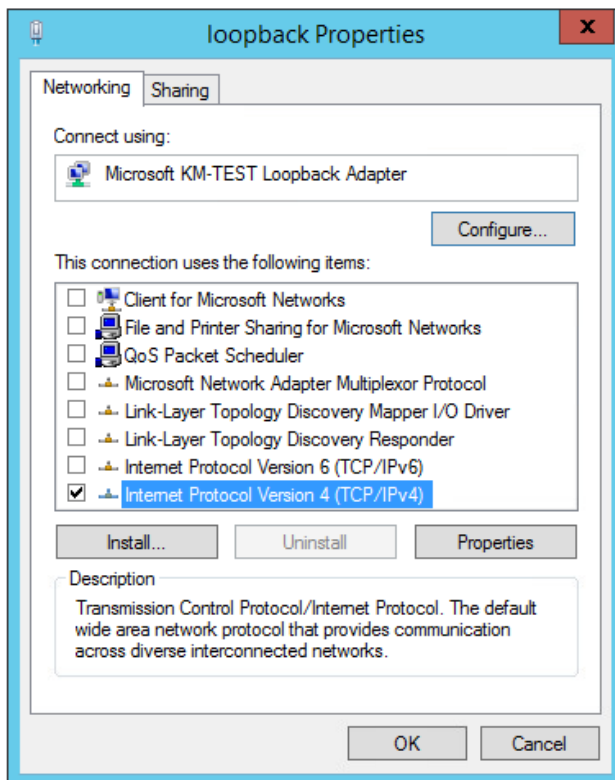
2. Click **Change adapter settings**.
3. Right-click the new Loopback Adapter and select **Properties**.

Note

You can configure IPv4 or IPv6 addresses or both depending on your requirements.

IPv4 Addresses

1. Uncheck all items except **Internet Protocol Version 4 (TCP/IPv4)** as shown below:



2. Ensure that **Internet Protocol Version (TCP/IPv4)** is selected, click **Properties** and configure the IP address to be the same as the Virtual Service address (VIP) with a subnet mask of **255.255.255.255**, e.g. **192.168.2.20/255.255.255.255** as shown below:

Internet Protocol Version 4 (TCP/IPv4) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

☐ Obtain an IP address automatically

☒ Use the following IP address:

IP address: 192 . 168 . 2 . 20

Subnet mask: 255 . 255 . 255 . 255

Default gateway: . . .

☐ Obtain DNS server address automatically

☒ Use the following DNS server addresses:

Preferred DNS server: . . .

Alternate DNS server: . . .

☐ Validate settings upon exit

Advanced...

OK Cancel

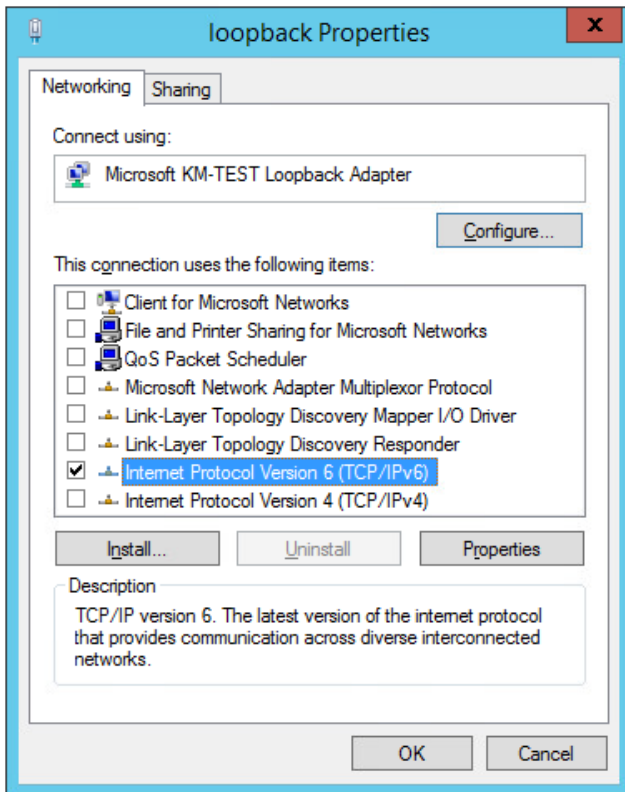
Note **192.168.2.20** is an example, make sure you specify the correct VIP address.

Note If a Real Server is included in multiple DR mode VIPs, an IP address for each VIP must be added to the Loopback Adapter.

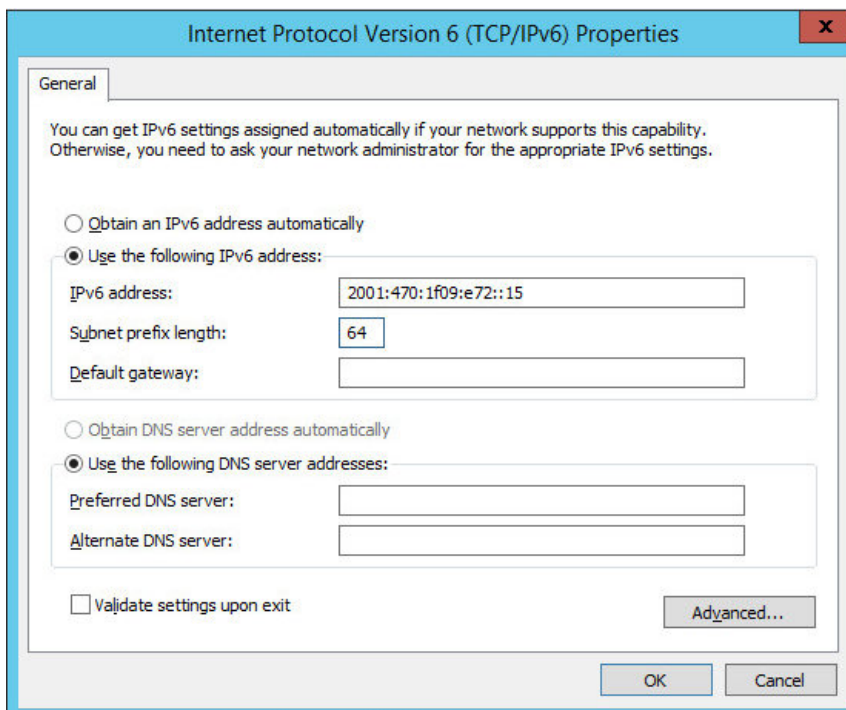
- Click **OK** then click **Close** to save and apply the new settings.

IPv6 Addresses

- Uncheck all items except **Internet Protocol Version 6 (TCP/IPv6)** as shown below:



2. Ensure that **Internet Protocol Version (TCP/IPv6)** is selected, click **Properties** and configure the IP address to be the same as the Virtual Service (VIP) and set the **Subnet Prefix Length** to be the same as your network setting, e.g. **2001:470:1f09:e72::15/64** as shown below:



Note **2001:470:1f09:e72::15/64** is an example, make sure you specify the correct VIP address.

Note If a Real Server is included in multiple DR mode VIPs, an IP address for each VIP must be

added to the Loopback Adapter.

3. Click **OK** then click **Close** to save and apply the new settings.

Step 3 of 3: Configure the strong/weak host behavior

The strong/weak host behavior can be configured using either of the following 2 methods:

- Option 1 - Using network shell (netsh) commands
- Option 2 - Using PowerShell cmdlets

The commands in this section assume that the LAN Adapter is named "**net**" and the Loopback Adapter is named "**loopback**" as shown in the example below:



(!) Important

Either adjust the commands to use the names allocated to your LAN and loopback adapters, or rename the adapters before running the commands. Names are case sensitive so make sure that the interface names used in the commands match the adapter names exactly.

Option 1 - Using Network Shell (netsh) Commands

To configure the correct strong/weak host behavior run the following commands:

For IPv4 addresses:

```
netsh interface ipv4 set interface "net" weakhostreceive=enabled
netsh interface ipv4 set interface "loopback" weakhostreceive=enabled
netsh interface ipv4 set interface "loopback" weakhostsend=enabled
```

For IPv6 addresses:

```
netsh interface ipv6 set interface "net" weakhostreceive=enabled
netsh interface ipv6 set interface "loopback" weakhostreceive=enabled
netsh interface ipv6 set interface "loopback" weakhostsend=enabled
netsh interface ipv6 set interface "loopback" dadtransmits=0
```

Option 2 - Using PowerShell Cmdlets

For IPv4 addresses:




```
Set-NetIpInterface -InterfaceAlias loopback -WeakHostReceive enabled -WeakHostSend enabled  
-DadTransmits 0 -AddressFamily IPv4
```

```
Set-NetIpInterface -InterfaceAlias net -WeakHostReceive enabled -AddressFamily IPv4
```

For IPv6 Addresses:

```
Set-NetIpInterface -InterfaceAlias loopback -WeakHostReceive enabled -WeakHostSend enabled  
-DadTransmits 0 -AddressFamily IPv6
```

```
Set-NetIpInterface -InterfaceAlias net -WeakHostReceive enabled -AddressFamily IPv6
```

15.3. Configuring HA - Adding a Secondary Appliance

Our recommended configuration is to use a clustered HA pair of load balancers to provide a highly available and resilient load balancing solution.

We recommend that the Primary appliance is configured first and then the Secondary should be added. Once the Primary and Secondary are paired, all load balanced services configured on the Primary are automatically replicated to the Secondary over the network using SSH/SCP.

Note

For Enterprise Azure, the HA pair should be configured first. In Azure, when creating a VIP using an 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. Configuring the HA pair first, enables both IPs to be specified when the VIP is created.

The clustered HA pair uses Heartbeat to determine the state of the other appliance. Should the active device (normally the Primary) suffer a failure, the passive device (normally the Secondary) will take over.

Non-Replicated Settings

A number of settings are not replicated as part of the Primary/Secondary pairing process and therefore must be manually configured on the Secondary appliance. These are listed by WebUI menu option in the table below:

WebUI Main Menu Option	Sub Menu Option	Description
Local Configuration	Hostname & DNS	Hostname and DNS settings
Local Configuration	Network Interface Configuration	All network settings including IP address(es), bonding configuration and VLANs
Local Configuration	Routing	Routing configuration including default gateways and static routes
Local Configuration	System Date & time	All time and date related settings

WebUI Main Menu Option	Sub Menu Option	Description
Local Configuration	Physical – Advanced Configuration	Various settings including Internet Proxy, Management Gateway, Firewall connection tracking table size, NIC offloading, SMTP relay, logging and Syslog Server
Local Configuration	Security	Appliance security settings
Local Configuration	SNMP Configuration	Appliance SNMP settings
Local Configuration	Graphing	Appliance graphing settings
Local Configuration	License Key	Appliance licensing
Maintenance	Software Updates	Appliance software update management
Maintenance	Firewall Script	Appliance firewall (iptables) configuration
Maintenance	Firewall Lockdown Wizard	Appliance management lockdown settings

⚠ Important

Make sure that if these settings/updates have been configured on the Primary appliance, they're also configured on the Secondary appliance.


Adding a Secondary Appliance - Create an HA Clustered Pair

📌 Note

If you have already run the firewall lockdown wizard on either appliance, you'll need to ensure that it is temporarily disabled on both appliances whilst performing the pairing process.

1. Deploy a second appliance that will be the Secondary and configure initial network settings.
2. Using the WebUI on the Primary appliance, navigate to: **Cluster Configuration > High-Availability Configuration**.

Create a Clustered Pair



Local IP address

IP address of new peer



Password for *loadbalancer* user on peer

Add new node

3. Specify the IP address and the *loadbalancer* user's password for the Secondary (peer) appliance as shown in the example above.



- Click **Add new node**.
- The pairing process now commences as shown below:

Create a Clustered Pair

<div> LOADBALANCER Primary</div> <div>IP: 192.168.110.40</div> <div> Attempting to pair..</div>	<div>Local IP address</div> <div>192.168.110.40</div> <div>IP address of new peer</div> <div>192.168.110.41</div> <div>Password for <i>loadbalancer</i> user on peer</div> <div>••••••••••</div> <div>configuring</div>
--	---

- Once complete, the following will be displayed on the Primary appliance:

High Availability Configuration - primary

<div> LOADBALANCER Primary</div> <div>IP: 192.168.110.40</div>	<div>Break Clustered Pair</div>
<div> LOADBALANCER Secondary</div> <div>IP: 192.168.110.41</div>	<div>Make Active</div>

- To finalize the configuration, restart heartbeat and any other services as prompted in the "Commit changes" message box at the top of the screen.

Note

Clicking the **Restart Heartbeat** button on the Primary appliance will also automatically restart heartbeat on the Secondary appliance.

Note

For more details on configuring HA with 2 appliances, please refer to [Appliance Clustering for HA](#).

Note

For details on testing and verifying HA, please refer to [Clustered Pair Diagnostics](#).



16. Document Revision History

Version	Date	Change	Reason for Change	Changed By
1.0.0	4 May 2020	Initial version		NH, AH
1.0.1	20 May 2020	Added appendix <i>Vendor and Application Specific Lists of Ports to Load Balance</i> Added references to the new appendix in the configuration instructions	Adds support for a large variety of vendors and applications	NH, AH
1.1.0	1 October 2021	Converted the document to AsciiDoc	Move to new documentation system	AH,RJC,ZAC
1.1.1	28 September 2022	Updated layer 7 VIP and RIP creation screenshots	Reflect changes in the web user interface	AH
1.1.2	5 January 2023	Combined software version information into one section Added one level of section numbering Added software update instructions Added table of ports used by the appliance Reworded 'Further Documentation' section Removed references to the colour of certain UI elements	Housekeeping across all documentation	AH
1.1.3	2 February 2023	Updated screenshots	Branding update	AH
1.1.4	7 March 2023	Removed conclusion section	Updates across all documentation	AH
1.2.0	24 March 2023	New document theme Modified diagram colours	Branding update	AH



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