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1. About this Guide

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

- All versions

4. Konica Minolta Dispatcher Phoenix

Konica Minolta’s Dispatcher Phoenix is a powerful application that can help any business save time by automating document image processing, printing, and routing tasks via customisable workflows. With a large variety of processing features, virtually everything is possible – from cleaning up images, applying watermarks and annotations, and renaming files to routing documents to folders, FTP servers, MFPs, or e-mail recipients – and it’s all fully automatic! Unique LiveFlo technology provides a real-time view of documents as they are being processed – a great way to identify bottlenecks and making sure files will reach their correct destinations. Dispatcher Phoenix provides busy offices with the convenience and flexibility they need.

The application is highly scalable up to the largest enterprise environments. Dispatcher Phoenix includes a web user interface for access to important enterprise tools – such as apps for setting up server clusters for redundancy/load balancing, failover, offloading, sharing workflows with specific users, and more. Administrators can manage their workflows (run, stop, pause) from the web as well as edit user variables and view important analytics about work being done, including the number of documents being scanned, files collected, and users scanning.
5. Load Balancing Konica Minolta Dispatcher Phoenix

For Konica Minolta Dispatcher Phoenix, the preferred load balancing method is 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.

Where it’s not feasible to use layer 4 DR mode, layer 7 SNAT mode should be used. Whist this mode does not have the raw throughput of layer 4 methods, it still enables high performance load balancing and requires no changes to the print servers.

6. Load Balancer Deployment Methods

As mentioned above, Layer 4 DR mode and Layer 7 SNAT mode can be used. Both methods are described below.

6.1. 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.

### 6.2. 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. Dispatcher Phoenix Deployment Concept

8. Load Balancing Konica Minolta Dispatcher Phoenix

8.1. Load Balancing & HA Requirements
In order to be successfully load balanced, a Konica Minolta Dispatcher Phoenix deployment must include the following components:

• Wide Area Network (WAN)
• Local Area Network (LAN)
• Firewall
• SQL Server
• Web Server
• Active Directory
• File Share

It is likely that a fully functional Dispatcher Phoenix deployment will already feature all of these components.
8.2. Persistence (aka Server Affinity)
Source IP address persistence is used for Dispatcher Phoenix servers. This ensures that a particular client will connect to the same Dispatcher Phoenix server for the duration of the session.

8.3. Virtual Service (VIP) Requirements
To provide load balancing and HA for Dispatcher Phoenix, 2 VIPs are used. The first VIP is for the underlying Microsoft print services and the second VIP is for the particular Konica Minolta service being load balanced.

8.4. Port Requirements
The following tables show the ports that are load balanced for the various Konica Minolta services:

**KMBS BEST Server**

<table>
<thead>
<tr>
<th>Port</th>
<th>Protocols</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>50808</td>
<td>HTTP</td>
<td>KMBS BEST Server</td>
</tr>
<tr>
<td>50809</td>
<td>HTTPS</td>
<td>Secure BEST Server</td>
</tr>
</tbody>
</table>

**KMBS LPR Service**

<table>
<thead>
<tr>
<th>Port</th>
<th>Protocols</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>515</td>
<td>TCP</td>
<td>LPR Service (LPD)</td>
</tr>
</tbody>
</table>

**KMBS SMTP Service**

<table>
<thead>
<tr>
<th>Port</th>
<th>Protocols</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>TCP</td>
<td>Default, but configurable within SMTP Manager</td>
</tr>
</tbody>
</table>

**KMBS SEC Workflow Worker Process**

<table>
<thead>
<tr>
<th>Port</th>
<th>Protocols</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>TCP</td>
<td>Output Port</td>
</tr>
<tr>
<td>53</td>
<td>TCP</td>
<td>Output Port</td>
</tr>
<tr>
<td>80</td>
<td>TCP</td>
<td>Output Port</td>
</tr>
<tr>
<td>443</td>
<td>TCP</td>
<td>Output Port</td>
</tr>
<tr>
<td>445</td>
<td>TCP</td>
<td>Output Port</td>
</tr>
<tr>
<td>465</td>
<td>TCP</td>
<td>Output Port</td>
</tr>
<tr>
<td>587</td>
<td>TCP</td>
<td>Output Port</td>
</tr>
</tbody>
</table>

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 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:


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>

   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.
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
```

Checking for Updates using Online Update

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](image)

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.](image)

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 support@loadbalancer.org 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.

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:

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

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. Load Balancing Konica Minolta Dispatcher Phoenix – Using DR Mode

10.1. Part 1 – Prepare the Konica Minolta Servers for Load Balancing

**Step 1 – Prerequisites**

For a load balanced Konica Minolta Dispatcher Phoenix environment, each print server must comply with the following requirements:

1. Be a member of a Microsoft Windows Domain.
2. Have the Print and Document Service role / Print Server service installed.
3. Have all required printers installed and shared – the share names and permissions must be the same across all servers.
4. Have Konica Minolta Dispatcher Phoenix installed.

**Step 2 – Solve the ARP Problem on Each server**

When using layer 4 DR mode, the "ARP problem" must be solved on each print server for DR mode to work. For detailed steps on solving the ARP problem for Windows, please refer to Solving the ARP Problem for more information.

For a detailed explanation of DR mode and the nature of the ARP problem, please refer to Layer 4 DR Mode.

**Step 3 – Configure Registry Entries**

For the load balanced print servers, to enable them to be accessed via a shared name (Dispatcher is the example used in this guide), add the following registry entries to each print server:
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.

### Step 4 – Configure Name Resolution

For printer load balancing to work, DNS name resolution should be configured. A DNS Host (A) record for the printer share name (**Dispatcher** in this example) that points at the Phoenix Dispatcher VIP (**192.168.81.10** in this example) is required.

In addition, NetBIOS over TCP/IP should be disabled on **all** interfaces on each print server as shown below:
When configuring printers to connect back to the highly available Dispatcher Phoenix, the Dispatcher Phoenix hostname / IP address should be the VIP address and not the individual Dispatcher Phoenix host name or IP address.

**Step 5 – Reboot Each Print Server**
To apply all settings, reboot each print server.

10.2. Part 2 – Configure Load Balancing for Microsoft Print Server

**Configure 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.

![Virtual Service Configuration](image)

2. Define the **Label** for the virtual service as required, e.g. **PrintServers**.
3. Set the **Virtual Service IP Address** field to the required IP address, e.g. **192.168.81.10**.
4. Set the **Ports** to **445**.
5. Leave **Protocol** set to **TCP**.
6. Leave **Forwarding Method** set to **Direct Routing**.
7. Click **Update**.

**Define 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. **PS1**.

3. Set the **Real Server IP Address** field to the required IP address, e.g. **192.168.81.184**.

4. Click **Update**.

5. Repeat these steps to add additional print servers as required.

### 10.3. Part 3 – Configure Load Balancing for Konica Minolta Dispatcher Phoenix

**Configure 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. **192.168.81.10**.

4. Set the **Ports** field according to the load balanced service – please refer to **Port Requirements**.

---

**Note**

If you are load balancing "KMBS SEC Workflow Worker Process", exclude port 445 from the list of ports since this port is load balanced by the Microsoft Print Server VIP configured...
5. Leave Protocol set to TCP.


7. Click Update.

8. Click Modify next to the newly created VIP.

9. Scroll down to the Health Checks section and set the Check Port to 445.

10. Click Update.

Define 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. Phoenix1.

3. Set the Real Server IP Address field to the required IP address, e.g. 192.168.81.184.

4. Click Update.

5. Repeat these steps to add additional Dispatcher Phoenix servers as required.

11. Load Balancing Konica Minolta Dispatcher Phoenix – Using SNAT Mode

11.1. Part 1 – Prepare the Konica Minolta Servers for Load Balancing

Step 1 – Prerequisites

For a load balanced Konica Minolta Dispatcher Phoenix environment, each print server must comply with the following requirements:

1. Be a member of a Microsoft Windows Domain.

2. Have the Print and Document Service role / Print Server service installed.
3. Have all required printers installed and shared – the share names and permissions must be the same across all servers.

4. Have Konica Minolta Dispatcher Phoenix installed.

**Step 2 – Configure Registry Entries**

For the load balanced print servers, to enable them to be accessed via a shared name (Dispatcher is the example used 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.

**Step 3 – Configure Name Resolution**

For printer load balancing to work, DNS name resolution should be configured. A DNS Host (A) record for the printer share name (Dispatcher in this example) that points at the Phoenix Dispatcher VIP (192.168.81.10 in this example) is required.

In addition, NetBIOS over TCP/IP should be disabled on all interfaces on each print server as shown below:
When configuring printers to connect back to the highly available Dispatcher Phoenix, the Dispatcher Phoenix hostname / IP address should be the VIP address and not the individual Dispatcher Phoenix host name or IP address.

**Step 4 – Reboot Each Print Server**
To apply all settings, reboot each print server.

**11.2. Part 2 – Configure Load Balancing for Microsoft Print Server**

**Configure 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*. 

![Layer 7 - Add a new Virtual Service](image)
2. Define the **Label** for the virtual service as required, e.g. *PrintServers*.

3. Set the **Virtual Service IP Address** field to the required IP address, e.g. *192.168.81.10*.

4. Set the **Ports** to *445*.

5. Set the **Layer 7 Protocol** to *TCP Mode*.

6. Click **Update**.

**Define the Real Servers (RIPs)**

1. 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.

   ![Layer 7 Add a new Real Server](image)

2. Define the **Label** for the Real Server as required, e.g. *PS1*.

3. Set the **Real Server IP Address** field to the required IP address, e.g. *192.168.81.184*.

4. Leave the **Real Server Port** field blank.

5. Click **Update**.

6. Repeat these steps to add additional print servers as required.

11.3. Part 3 – Configure Load Balancing for Konica Minolta Dispatcher Phoenix

**Configure 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. **192.168.81.10**.

4. Set the **Ports** field according to the load balanced service – please refer to **Port Requirements**.

   **Note** If you are load balancing "KMBS SEC Workflow Worker Process", exclude port 445 from the list of ports since this port is load balanced by the Microsoft Print Server VIP configured previously.

5. Set the **Layer 7 Protocol** to **TCP Mode**.

6. Click **Update**.

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

8. Scroll down to the **Health Checks** section and set the **Check Port** to **445**.

9. Click **Update**.

**Define the Real Servers (RIPs)**

1. 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.
2. Define the **Label** for the Real Server as required, e.g. **Phoenix1**.

3. Set the **Real Server IP Address** field to the required IP address, e.g. **192.168.81.184**.

4. Leave the **Real Server Port** field blank.

5. Click **Update**.

6. Repeat these steps to add additional print servers as required.

**Finalize Settings – Reload HAProxy**

To apply settings and activate the new VIPs, click the **Reload** button in the "Commit changes" box at the top of the screen.

### 12. Testing & Verification

**12.1. Testing the Load Balanced Servers**

The load balanced servers can be tested either by browsing to the virtual service IP address or to the printer share name. For example:

Using the Virtual IP address (VIP):

```
\192.168.81.10
```

or

Using the printer share name:

```
\Dispatcher
```

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

**12.2. Using System Overview**

The System Overview can be viewed in the WebUI. It shows a graphical view of all VIPs & RIPs (i.e. the Dispatcher Phoenix servers) and shows the state/health of each server as well as the state of the each cluster as a whole.

The example below shows that all Real Servers are healthy and available to accept connections.
This example shows layer 4 VIPs. A layer 7 configuration will look very similar.

If a particular server fails its health check, that server will be displayed red rather than green.

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. 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.

Note

If a Real Server is included in multiple DR mode VIPs, IP addresses 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 each Real Server.

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:
IPv4 Addresses

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

IPv6 Addresses

1. 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:

![Internet Protocol Version 6 (TCP/IPv6) Properties](image)

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

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

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

Either Network Shell (netsh) commands or PowerShell cmdlets can be used to set the required strong/weak host behavior.

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:

![Network Connections](image)

- **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
```

**15.2. 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:

<table>
<thead>
<tr>
<th>WebUI Main Menu Option</th>
<th>Sub Menu Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Configuration</td>
<td>Hostname &amp; DNS</td>
<td>Hostname and DNS settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Network Interface</td>
<td>All network settings including IP address(es), bonding configuration and VLANs</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Routing</td>
<td>Routing configuration including default gateways and static routes</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>System Date &amp; time</td>
<td>All time and date related settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Physical – Advanced Configuration</td>
<td>Various settings including Internet Proxy, Management Gateway, Firewall connection tracking table size, NIC offloading, SMTP relay, logging and Syslog Server</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Security</td>
<td>Appliance security settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>SNMP Configuration</td>
<td>Appliance SNMP settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Graphing</td>
<td>Appliance graphing settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>License Key</td>
<td>Appliance licensing</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Software Updates</td>
<td>Appliance software update management</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Firewall Script</td>
<td>Appliance firewall (iptables) configuration</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Firewall Lockdown Wizard</td>
<td>Appliance management lockdown settings</td>
</tr>
</tbody>
</table>

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

4. Click Add new node.

5. The pairing process now commences as shown below:

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

7. To finalize the configuration, restart heartbeat and any other services as prompted in the "Commit changes" message box at the top of the screen.
Clicking the Restart Heartbeat button on the Primary appliance will also automatically restart heartbeat on the Secondary appliance.

For more details on configuring HA with 2 appliances, please refer to Appliance Clustering for HA.

For details on testing and verifying HA, please refer to Clustered Pair Diagnostics.
## 16. Document Revision History

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Change</th>
<th>Reason for Change</th>
<th>Changed By</th>
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</thead>
<tbody>
<tr>
<td>1.0.0</td>
<td>21 October 2020</td>
<td>Initial version</td>
<td></td>
<td>NH, RJC</td>
</tr>
<tr>
<td>1.0.1</td>
<td>25 March 2021</td>
<td>Added section “Loadbalancer.org Appliance – the Basics”</td>
<td>Not included in the initial version</td>
<td>RJC</td>
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<tr>
<td>1.1.0</td>
<td>1 October 2021</td>
<td>Converted the document to AsciiDoc</td>
<td>Move to new documentation system</td>
<td>AH,RJC,ZAC</td>
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<tr>
<td>1.1.1</td>
<td>28 September 2022</td>
<td>Updated layer 7 VIP and RIP creation screenshots</td>
<td>Reflect changes in the web user interface</td>
<td>AH</td>
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<tr>
<td>1.1.2</td>
<td>5 January 2023</td>
<td>Combined software version information into one section</td>
<td>Housekeeping across all documentation</td>
<td>AH</td>
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<tr>
<td></td>
<td></td>
<td>Added one level of section numbering</td>
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<td>Added software update instructions</td>
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<td>Added table of ports used by the appliance</td>
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<td>Reworded 'Further Documentation’ section</td>
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<td>Removed references to the colour of certain UI elements</td>
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<td>2 February 2023</td>
<td>Updated screenshots</td>
<td>Branding update</td>
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<td>7 March 2023</td>
<td>Removed conclusion section</td>
<td>Updates across all documentation</td>
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<td>24 March 2023</td>
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<td></td>
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<td>Modified diagram colours</td>
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</table>
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Loadbalancer.org’s mission is to ensure that its clients’ businesses are never interrupted. The load balancer experts ask the right questions to get to the heart of what matters, bringing a depth of understanding to each deployment. Experience enables Loadbalancer.org engineers to design less complex, unbreakable solutions - and to provide exceptional personalized support.