# Table of Contents

1. About this Guide .................................................................................. 3
2. Loadbalancer.org Appliances Supported ........................................... 3
3. Software Versions Supported ................................................................. 3
   3.1. Loadbalancer.org Appliance .......................................................... 3
   3.2. Microsoft Windows Server ............................................................ 3
4. Related Documentation .......................................................................... 3
5. Load Balanced Ports / Services ............................................................ 3
6. Appliance Configuration Overview ....................................................... 3
   6.1. Operation Mode ........................................................................... 3
   6.2. Print Server Health-check ............................................................. 4
   6.3. Deployment Concept .................................................................... 4
7. Deploying & Accessing the Appliance ................................................... 4
   7.1. Deployment .................................................................................. 4
   7.2. Accessing the WebUI .................................................................... 4
      Main Menu Options .......................................................................... 6
8. Configuration Steps ............................................................................... 6
   8.1. Appliance Configuration ............................................................... 6
      Configure the Virtual Service (VIP) .................................................. 6
      Define the Real Servers ................................................................... 7
   8.2. Print Server Configuration ............................................................ 7
      Solve the ARP Problem .................................................................... 7
      Enable Microsoft Print Server Load Balancing ............................... 12
9. Testing & Verification ......................................................................... 15
10. Deploying Load Balanced Printers via Group Policy ............................ 15
11. Loadbalancer.org Technical Support .................................................. 15
12. Document Revision History ............................................................... 16
1. About this Guide
This document provides a quick reference guide on how to load balance Microsoft Print Servers using Loadbalancer.org appliances.

2. Loadbalancer.org Appliances Supported
All our products can be used with Microsoft Print Server. 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](https://www.loadbalancer.org/products)
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. Microsoft Windows Server
- Windows Server 2012 and later

4. Related Documentation
For additional information, please refer to the Administration Manual and the relevant Quick Start / Configuration Guide.

5. Load Balanced Ports / Services

<table>
<thead>
<tr>
<th>Ports</th>
<th>Uses</th>
<th>Transport Layer Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>445</td>
<td>SMB</td>
<td>TCP</td>
</tr>
<tr>
<td>515</td>
<td>LPD</td>
<td>TCP</td>
</tr>
</tbody>
</table>

6. Appliance Configuration Overview

6.1. Operation Mode
The load balancer is configured using layer 4 DR mode. This mode requires the "ARP Problem" to be solved on each Real Server. For more information, please refer to Solve the ARP Problem.
6.2. Print Server Health-check
A connect to port health-check on port 445 is used to verify that each Print Server is available.

6.3. Deployment Concept
Once the load balancer is deployed, clients connect to the Virtual Service (VIP) on the load balancer rather than directly to one of the Print Servers.

7. Deploying & Accessing the Appliance

7.1. Deployment
Deploy the Loadbalancer.org appliance as described in the relevant Quick Start / Configuration Guide.

7.2. 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:

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
- **Live Chat** - Start a live chat session with one of our Support Engineers

**8. Configuration Steps**

**8.1. Appliance Configuration**

**Configure the Virtual Service (VIP)**

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

2. Enter the following details:

   - **Label** (name) for the VIP, e.g. **PrintServer**.
   - **Virtual Service IP address** field to the required IP address, e.g. **192.168.100.10**.
   - **Virtual Service Ports** field to **445,515**.

   ![Virtual Service Configuration]

   - Define the required **Label** (name) for the VIP, e.g. **PrintServer**.
   - Set the **Virtual Service IP address** field to the required IP address, e.g. **192.168.100.10**.
   - Set the **Virtual Service Ports** field to **445,515**.

   ![Note]

   If you only have SMB print queues, port 515 can be omitted.
· Leave the Protocol set to TCP.
· Leave the Forwarding Method set to Direct Routing.

3. Click Update.

4. Now click Modify next to the newly created Virtual Service.
   · Scroll to the Health Checks section.
   · Ensure the Health Check is set to Connect to Port.
   · Click [Advanced] and set the Check Port to 445.

5. Click Update.

**Define the Real Servers**

The Real Servers (i.e. the Print Servers) must now be associated with the VIP.

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:

<table>
<thead>
<tr>
<th>Label</th>
<th>PS1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Server IP Address</td>
<td>192.168.100.20</td>
</tr>
<tr>
<td>Weight</td>
<td>100</td>
</tr>
<tr>
<td>Minimum Connections</td>
<td>0</td>
</tr>
<tr>
<td>Maximum Connections</td>
<td>0</td>
</tr>
</tbody>
</table>

   · Enter an appropriate label for the Real Server, e.g. PS1.
   · Change the Real Server IP Address field to the required address, e.g. 192.168.100.20.

3. Click Update.

4. Repeat the above steps to add your other Print Server(s).

**8.2. Print Server Configuration**

**Solve the ARP Problem**

Layer 4 DR (Direct Routing) mode works by changing the MAC address of inbound packets to match the Real Server selected by the load balancing algorithm. Steps must taken for each Real Server to enable DR mode to work correctly. This is known as “solving the ARP Problem”. The exact steps required depend on the particular operating system in use.

Note: For more details on the ARP problem, please refer to DR Mode Considerations.
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.

   **Important** when configuring the loopback adapter properties, make sure that **Client for Microsoft Networks** and **File & Printer Sharing for Microsoft Networks** is also checked as shown below.

**IPv4 Addresses**

1. Uncheck all items except **Client for Microsoft Networks**, **File & Printer Sharing for Microsoft Networks** and **Internet Protocol Version 4 (TCP/IPv4)** as shown below:

![IPv4 Addresses](image)

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

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

**IPv6 Addresses**

1. Uncheck all items except **Client for Microsoft Networks**, **File & Printer Sharing for Microsoft Networks** and **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**

© Copyright Loadbalancer.org • Documentation • Load Balancing Microsoft Print Server
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
```

**Enable Microsoft Print Server Load Balancing**

**Pre-Requisites**

1. Each Print Server must be joined to the same domain as the client PCs.
2. Each Print Server must have the **Print and Document Service** role installed.
3. All printers must be installed & shared on each Print Server using the same share names and permissions.

**Enable access via Hostname**

To enable the load balanced Print Servers to be accessed via an appropriate hostname, complete the following steps:

*Note* The configuration steps below assume the hostname for the VIP is **printserver-vip**. Change this...
Windows 2019 & Later
For Windows 2019 & later, host entries must be added to the local hosts file and a Registry Key must be added:

1. Add the following host entries to the local hosts file on each Print Server:

\[
\begin{align*}
&\text{\textless local IP address\textgreater} \text{ printserver-vip} \\
&\text{\textless local IP address\textgreater} \text{ printserver-vip}.\text{\textless domain\textgreater}
\end{align*}
\]

For example, if you have 2 Print Servers - 192.168.100.20 and 192.168.100.21, the following entries must be added:

a. on the 192.168.100.20 server:

\[
\begin{align*}
&192.168.100.20 \text{ printserver-vip} \\
&192.168.100.20 \text{ printserver-vip.domain.com}
\end{align*}
\]

b. on the 192.168.100.21 server:

\[
\begin{align*}
&192.168.100.21 \text{ printserver-vip} \\
&192.168.100.21 \text{ printserver-vip.domain.com}
\end{align*}
\]

2. Add the following Registry Key to each Print Server:

Key: HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\lanmanserver\parameters
Value: OptionalNames
Type: REG_MULTI_SZ
Data: printserver-vip

Note
In the example presented here, printserver-vip 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 be any appropriate name, although whatever name is used, it must be the same name that is used for the DNS entry described in the "Configure DNS Name Resolution" section below.

Windows 2012 & 2016
For Windows 2012 & 2016, the following Registry Keys must be added to each Print Server:

Key: HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Lsa
Value: DisableLoopbackCheck
Type: REG_DWORD
Data: 1
Configure DNS Name Resolution

To configure DNS name resolution, complete the following steps:

1. On each Print Server, disable NetBIOS over TCP/IP on all interfaces:

2. Create a DNS Host (A) record for the hostname used for the Virtual Service that points to the VIP address, in this example: printserver-vip → 192.168.100.10.

Server Reboot

To apply the changes, reboot each Print Server.
9. Testing & Verification

You should now be able to access your printers using either the Virtual Service IP address or the share name. In the example presented in this guide, either:

\192.168.100.10

or

\printserver-vip

or

\printserver-vip.domain.com

Any shared printers and shared folders that have been configured on the Print Servers should be visible.

10. Deploying Load Balanced Printers via Group Policy

1. Ensure that the name you’ve used for your load balanced Print Server cluster (e.g. printserver-vip) is resolvable by DNS as explained above.

2. On one of your Print Servers, open: Administrative Tools > Print Management.
   - Right-click Print Servers and click Add/Remove Servers.
   - Specify the name you’ve used for your load balanced Print Server cluster, e.g. printserver-vip and click OK.
   - Expand the Print Servers section then expand the new printserver-vip section.
   - Select Printers.
   - Right click the printer you want to deploy and click Deploy with Group Policy.
   - Select the relevant GPO and configure the remaining settings according to your requirements.

11. Loadbalancer.org Technical Support

If you have any questions regarding the appliance or would like assistance designing your deployment, please don’t hesitate to contact our support team: support@loadbalancer.org.
## 12. Document Revision History

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Change</th>
<th>Reason for Change</th>
<th>Changed By</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1.0</td>
<td>4 November 2019</td>
<td>Styling and layout</td>
<td>General styling updates</td>
<td>AH</td>
</tr>
<tr>
<td>1.1.1</td>
<td>9 June 2020</td>
<td>New title page</td>
<td>Branding update</td>
<td>AH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Updated Canadian contact details</td>
<td>Change to Canadian contact details</td>
<td></td>
</tr>
<tr>
<td>1.1.2</td>
<td>25 June 2021</td>
<td>Added Print Server load balancing configuration steps for Windows 2019</td>
<td>The steps listed for other versions of Windows do not work for Windows 2019</td>
<td>RJC</td>
</tr>
<tr>
<td>1.2.0</td>
<td>1 September 2022</td>
<td>Converted the document to AsciiDoc</td>
<td>Move to new documentation system</td>
<td>AH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Updated links and instructions where necessary</td>
<td>Required updates</td>
<td></td>
</tr>
<tr>
<td>1.2.1</td>
<td>3 November 2022</td>
<td>Removed configuration sections for Legacy environments</td>
<td>Section no longer needed / updated configuration requirements</td>
<td>RJC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Added section covering how to solve the ARP problem for Windows 2012 &amp; Later</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Added port 515 to the VIP</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Added the OptionalNames Registry key for Windows 2019 &amp; later</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2.2</td>
<td>7 November 2022</td>
<td>Added minimum software version sections</td>
<td>Additional information</td>
<td>RJC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Various minor tidy ups</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2.3</td>
<td>5 January 2023</td>
<td>Combined software version information into one section</td>
<td>Housekeeping across all documentation</td>
<td>AH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Added one level of section numbering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2.4</td>
<td>2 February 2023</td>
<td>Updated screenshots</td>
<td>Branding update</td>
<td>AH</td>
</tr>
<tr>
<td>1.2.5</td>
<td>8 March 2023</td>
<td>Improved document structure</td>
<td>Document standardization</td>
<td>RJC</td>
</tr>
<tr>
<td>1.3.0</td>
<td>24 March 2023</td>
<td>New document theme</td>
<td>Branding update</td>
<td>AH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Modified diagram colours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version</td>
<td>Date</td>
<td>Change</td>
<td>Reason for Change</td>
<td>Changed By</td>
</tr>
<tr>
<td>---------</td>
<td>------------</td>
<td>---------------------------------------------------------------</td>
<td>---------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>1.3.1</td>
<td>27 April 2023</td>
<td>Added note to say port 515 can be omitted if only have SMB print queues</td>
<td>Remove unnecessary configuration</td>
<td>RJC</td>
</tr>
</tbody>
</table>
About Loadbalancer.org

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.

Visit us: www.loadbalancer.org
Phone us: +44 (0)330 380 1064
Phone us: +1 833 274 2566
Email us: info@loadbalancer.org
Follow us: @loadbalancer.org