LOADBALANCER

QUICK GUIDE

Load Balancing Microsoft Print Server

Version 1.4.0

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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/enterprise.

Some features may not be available or fully supported in all cloud platforms due to platform specific limitations. For more details, please refer to the "Main Differences to our Standard (Non-Cloud) Product" section in the appropriate cloud platform Quick Start Guide or check with Loadbalancer.org support.

3. Software Versions Supported

3.1. Loadbalancer.org Appliance

- V8.9.1 and later

> **Note** The screenshots used throughout this document aim to track the latest Loadbalancer.org software version. If you're using an older version, or the very latest, the screenshots presented here may not match your 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

Ports	Uses	Transport Layer Protocol
445	SMB	TCP
515	LPD	TCP

6. Appliance Configuration Overview

6.1. Operation Mode

Configuration steps are provided for layer 4 DR mode and layer 7 SNAT mode. Layer 4 DR mode requires the "ARP Problem" to be solved on each print server - for more information, please refer to Solve the ARP Problem (Layer 4

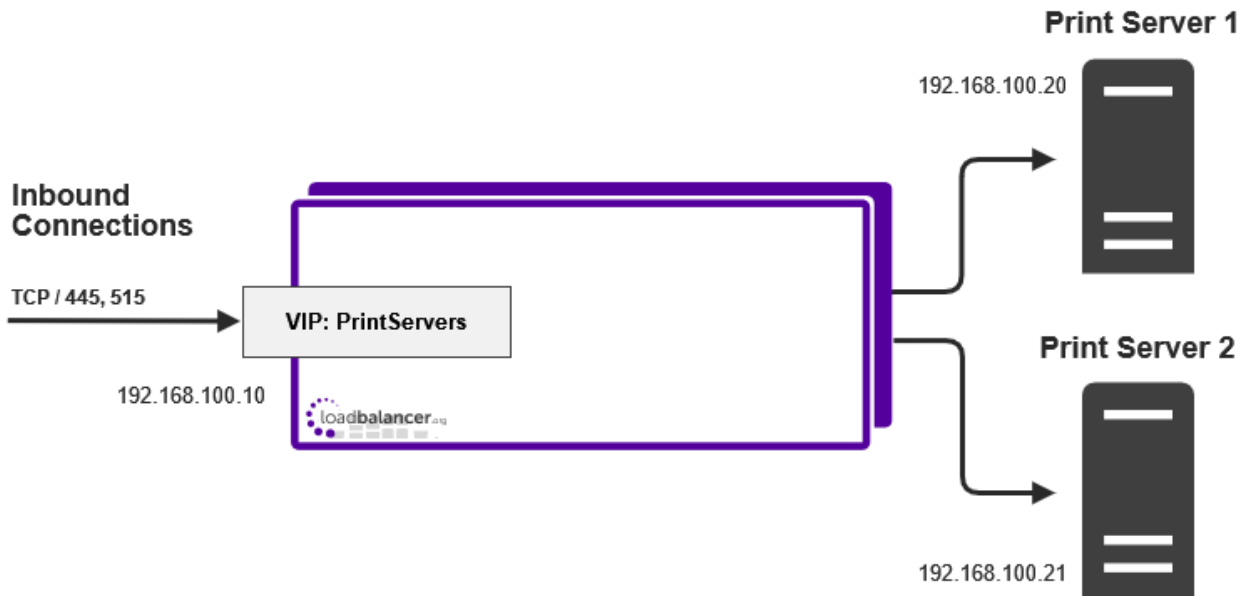
DR Mode Only). Layer 7 SNAT mode does not require any mode specific configuration changes.

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 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.

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 SSL certificate. This is due to the default self signed certificate that is used. If preferred, you can upload your own certificate - for more

information, please refer to Appliance Security Features.

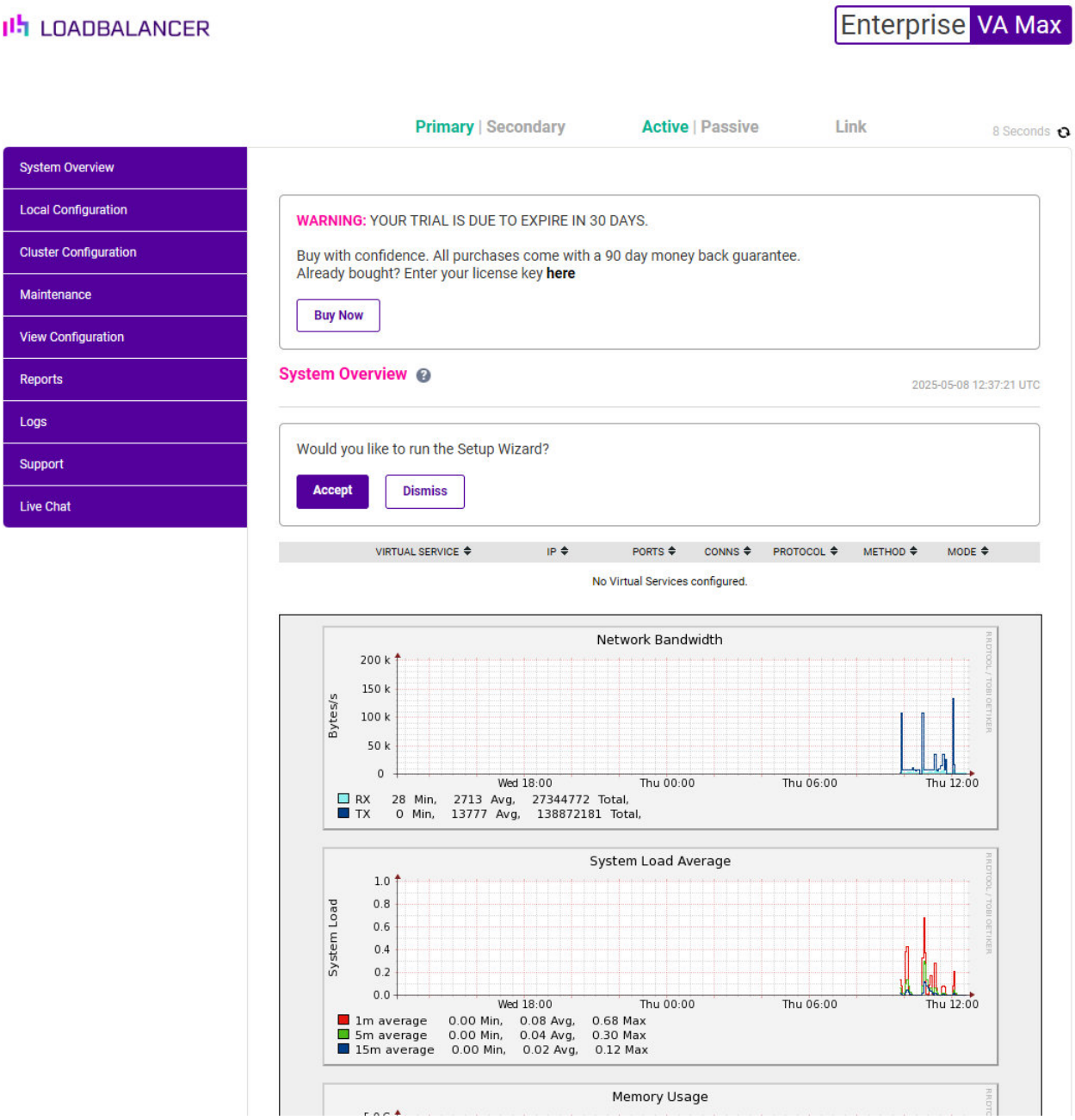
> **Note** If you need to change the port, IP address or protocol that the WebUI listens on, please refer to Service Socket Addresses.

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.

7.2.1. 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 creating 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

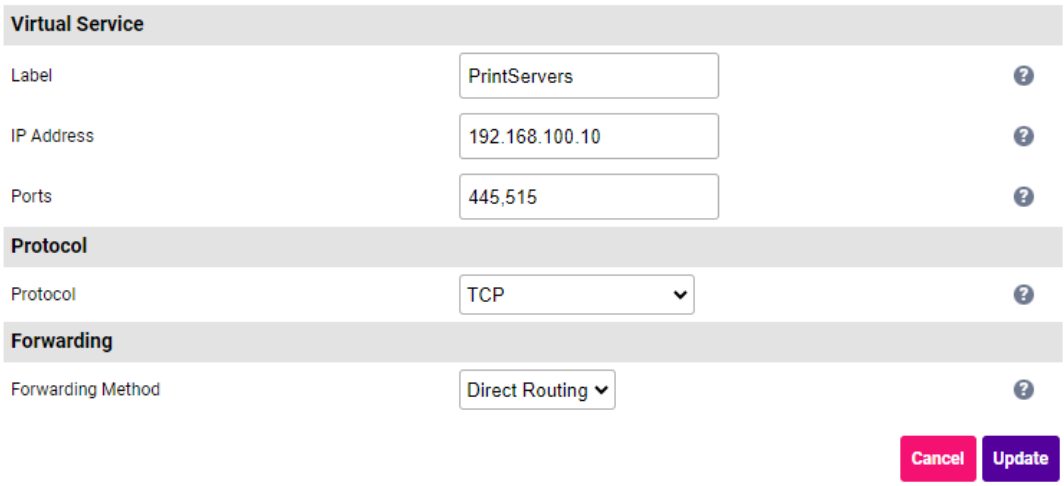
8.1. Appliance Configuration

8.1.1. Using Layer 4 DR Mode

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:



- Specify an appropriate *Label* (name) for the VIP, e.g. **PrintServers**.
- Set the *IP address* to the required IP address, e.g. **192.168.100.10**.
- Set the *Ports* to **445,515**.

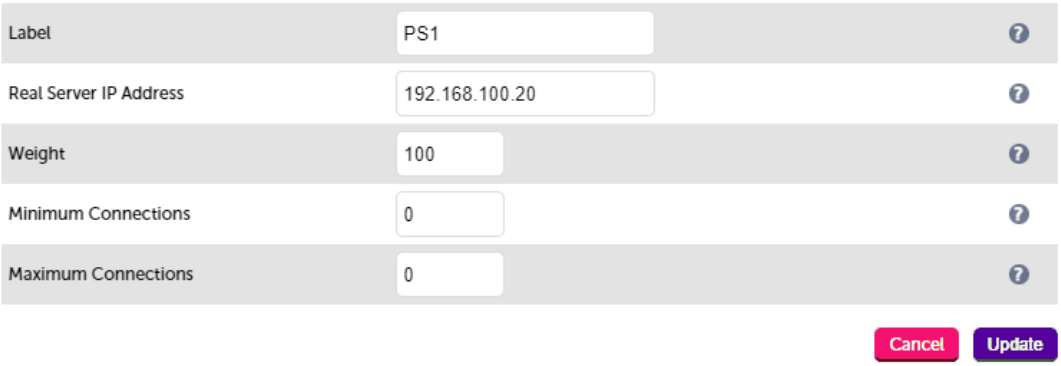
> **Note** If you only have SMB print queues, port 515 can be omitted.

- Leave the *Protocol* set to **TCP**.
- Leave the *Forwarding Method* set to **Direct Routing**.

3. Click **Update**.

Define the Real Servers

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



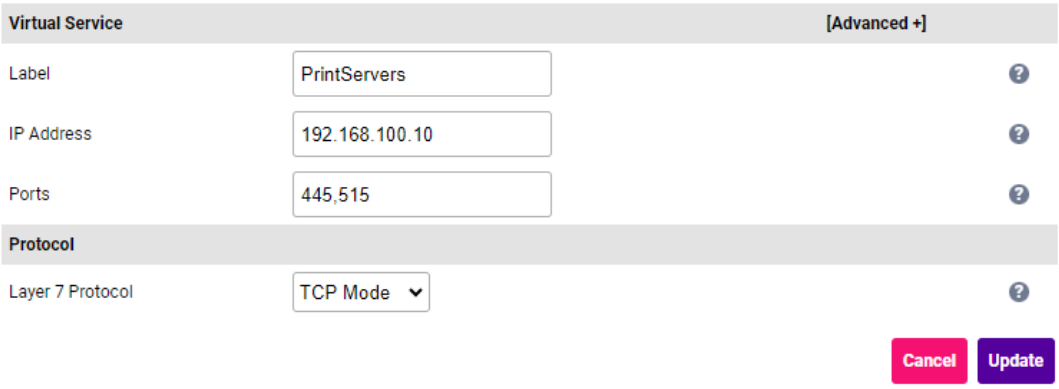
- Specify an appropriate *label* for the first print server, e.g. **PS1**.
- Set the *Real Server IP Address* to the address of the first print server, e.g. **192.168.100.20**.

3. Click **Update**.
4. Repeat these steps to add additional print servers.

8.1.2. Using Layer 7 SNAT Mode

Configure the Virtual Service (VIP)

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



- Specify an appropriate *Label* (name) for the VIP, e.g. **PrintServers**.
- Set the *IP address* to the required IP address, e.g. **192.168.100.10**.
- Set the *Ports* to **445,515**.

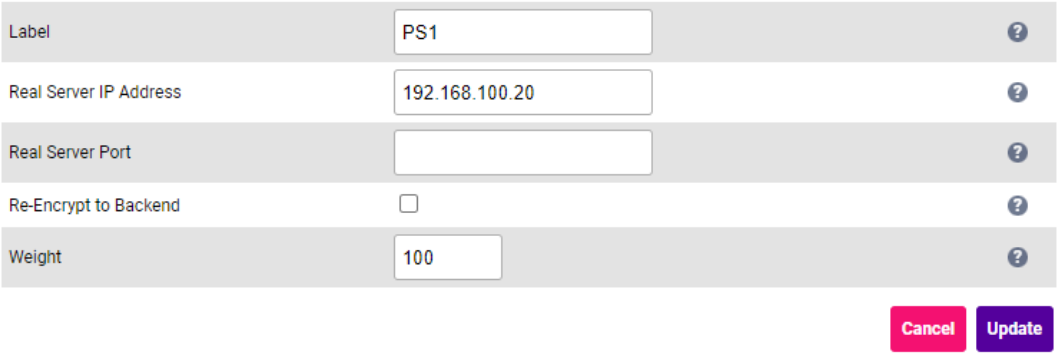
> **Note** If you only have SMB print queues, port 515 can be omitted.

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

3. Click **Update**.

Define the Real Servers

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



- Specify an appropriate *label* for the first print server, e.g. **PS1**.
- Set the *Real Server IP Address* to the address of the first print server, e.g. **192.168.100.20**.
- Leave the *Real Server Port* field blank.

3. Click **Update**.
4. Repeat these steps to add additional print servers.

Reload HAProxy

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:

1. Using the WebUI, navigate to: *Maintenance > Restart Services*.
2. Click **Reload HAProxy**.

8.2. Print Server Configuration

8.2.1. Solve the ARP Problem (Layer 4 DR Mode Only)

> **Note** The configuration steps in this section are NOT required when using layer 7 SNAT mode.

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

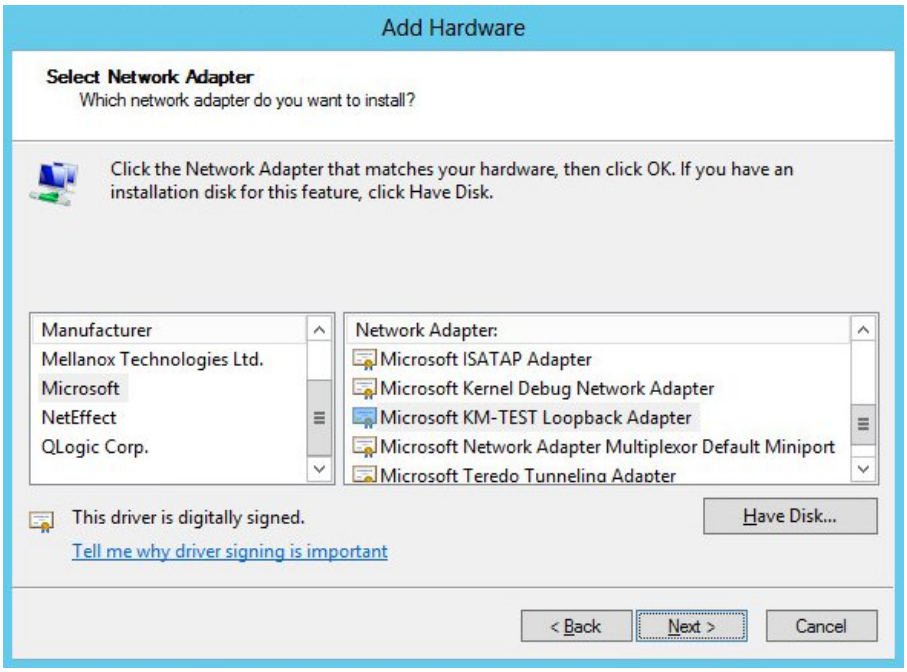
Windows Server 2012 and later support Direct Routing (DR) mode through the use of the Microsoft Loopback Adapter that must be installed and configured on each load balanced (Real) Server. The IP address configured on the Loopback Adapter must be the same as the Virtual Service (VIP) address. This enables 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, the strong/weak host behavior must be configured on each Real Server. The weak host model allows packets with any IP to be sent or received via an interface. The strong host model only allows packets with an IP belonging to the interface to be sent or received.

> **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

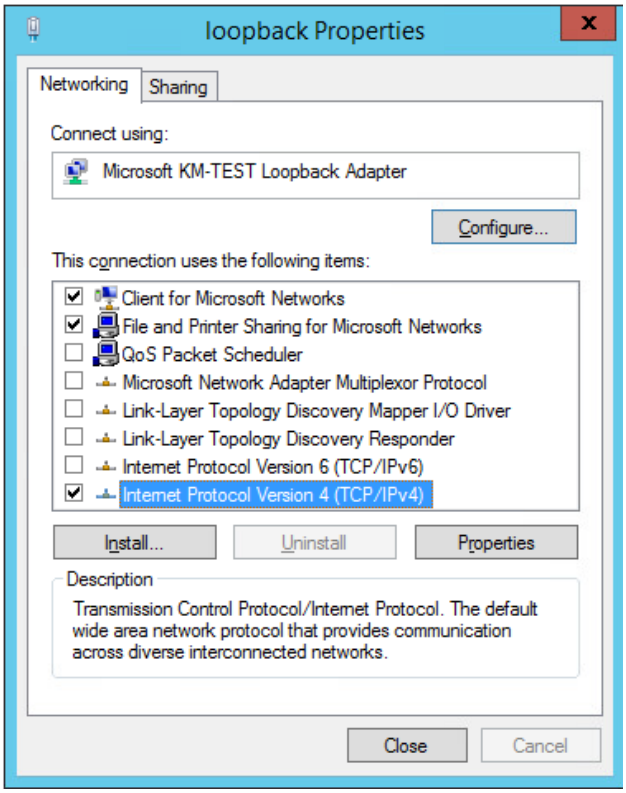
1. Open Control Panel and click **Network and Sharing Center**.
2. Click **Change adapter settings**.
3. Right-click the new Loopback Adapter and select **Properties**.

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

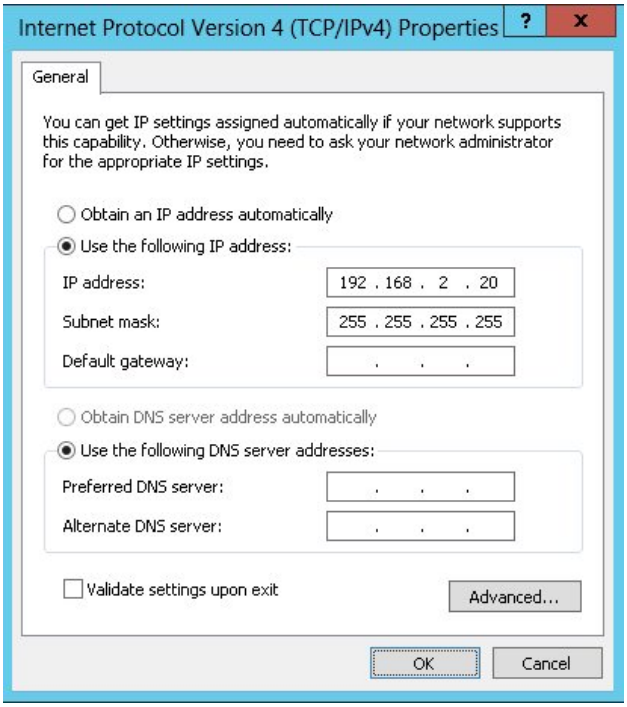
> **Important** When configuring the loopback adapter properties, make sure that **Client for Microsoft Networks** and **File & Printer Sharing for Microsoft Networks** is also checked as shown below.

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:



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:



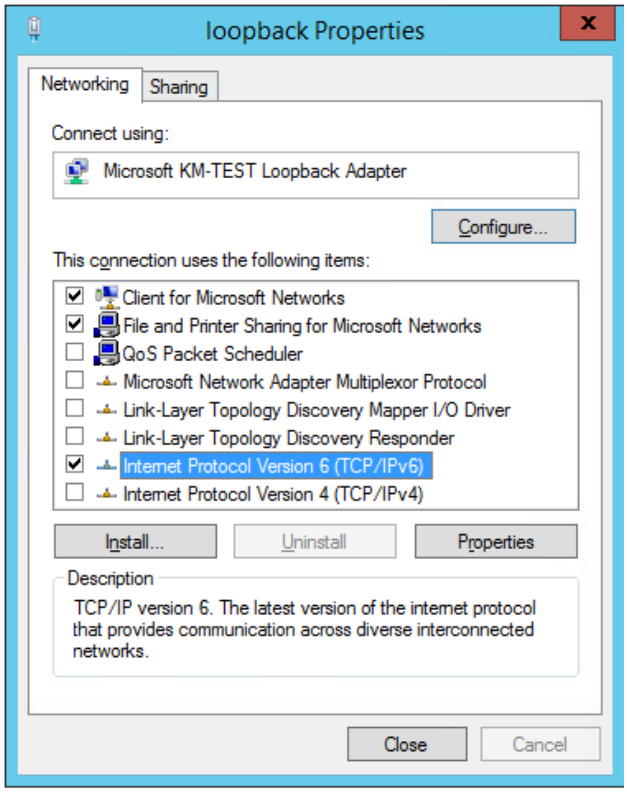
> **Note** **192.168.2.20** is an example, make sure you specify the correct VIP address.

> **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.

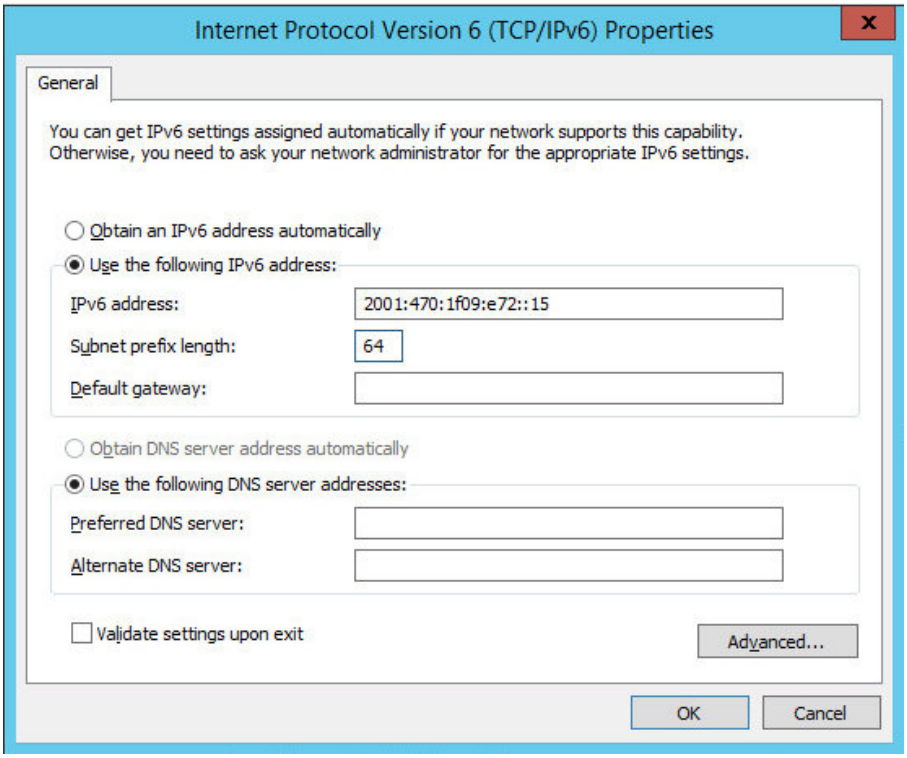
3. Click **OK** then click **Close** to save and apply the new settings.

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:



> **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
```

8.2.2. Enable Print and Document Server Load Balancing

When load balancing Microsoft print and document servers, a number of additional configuration steps must be followed to allow them to be load balanced and accessed via a shared name. The exact steps required depend on the particular version of Windows Server being used as detailed below.

Pre-Requisites

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

> **Note** A number of issues have been reported when using Type 4 print drivers, so whenever possible we recommend using Type 3 drivers. Type 4 drivers are usually bundled with the operating system or are downloaded from Windows update, whereas Type 3 drivers are typically downloaded from the printer manufacturer's website.

Enable access via Hostname

To enable the load balanced Print and Document 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** and the domain name is **lbtestdom.com**. Change these to suit your environment.

Windows 2019 & Later

For Windows 2019 & later, local host file entries and a single Registry Key must be added to each Server:

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

```
<Real Server IP address> printserver-vip
```

```
<Real Server IP address> printserver-vip.lbtestdom.com
```

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

On the 192.168.100.20 server:

```
192.168.100.20 printserver-vip
192.168.100.20 printserver-vip.lbtestdom.com
```

On the 192.168.100.21 server:

```
192.168.100.21 printserver-vip
192.168.100.21 printserver-vip.lbtestdom.com
```

2. Add the following Registry Key to each Server:

> **Note**
> In the example presented here, **printserver-vip** is the hostname that will be used to access the load balanced 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.

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

Windows 2012 & 2016

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

> **Note**
> In the example presented here, **printserver-vip** is the hostname that will be used to access the load balanced 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.

```
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
```

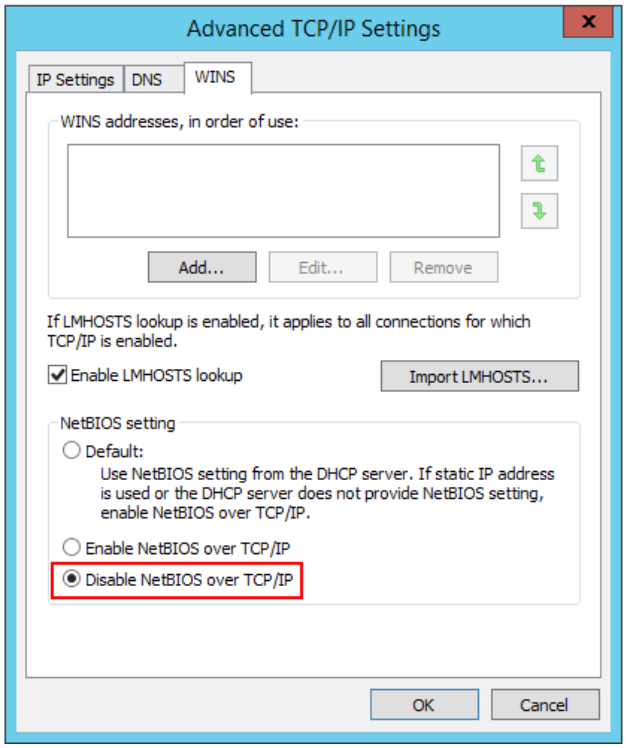
```
Key: HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\lanmanserver\parameters
Value: OptionalNames
Type: REG_MULTI_SZ
Data: printserver-vip
```

Configure DNS Name Resolution

1. Create a DNS Host (A) record that points to the VIP address. The hostname used must match the value set for the REG_MULTI_SZ **OptionalNames** registry entry, in this example: **printserver-vip → 192.168.100.10**.

Disable NetBIOS over TCP/IP

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



Server Reboot

To apply the changes, reboot each Server.

9. Testing & Verification

You should now be able to access your printers using either the Virtual Service IP address or the share name. For the example presented in this guide the following UNC paths can be used:

```
\\192.168.100.10
```

```
\\printserver-vip
```

```
\\printserver-vip.lbtestdom.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

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

Version	Date	Change	Reason for Change	Changed By
1.3.1	27 April 2023	Added note to say port 515 can be omitted if only have SMB print queues	Remove unnecessary configuration	RJC
1.3.2	24 August 2023	Added note to say that type 3 printer drivers are recommended	Type 4 drivers can cause issues	RJC
1.4.0	22 November 2023	Added layer 7 SNAT mode configuration	Provides additional deployment flexibility	RJC

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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.