LOADBALANCER

DEPLOYMENT GUIDE

Load Balancing Xerox Print Servers

Version 1.3.0

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1. About this Guide

This guide details the steps required to configure a load balanced Xerox printer server environment utilizing Loadbalancer.org appliances. It covers the configuration of the load balancers and also any Xerox printer server 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 for load balancing Xerox print servers. For full specifications of available models please refer to https://www.loadbalancer.org/products.

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. Xerox Print Server

- All versions

4. Xerox Print Servers

Xerox print servers provide a flexible and high performance front-end for printing hardware, such as printers and presses. From a common workflow, users have the power to manage print jobs, queues, and resources across varied printer environments. Colour management, secure printing, and more can be handled from a drag-and-drop graphical interface.

Third party print management solutions can be load balanced when used with Xerox print servers. For Nuance Equitrac print management software, please refer to the associated Load Balancing Nuance Equitrac deployment guide.

5. Load Balancing Xerox Print Servers

5.1. Introduction and Overview of Different Modes

This guide details the configuration of a load balanced Xerox print server deployment.

For load balancing print servers, 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 covered in the section Configuring Xerox Print Servers for Load Balancing.

It is also possible to load balance a Xerox print server 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. Overview of Steps Required

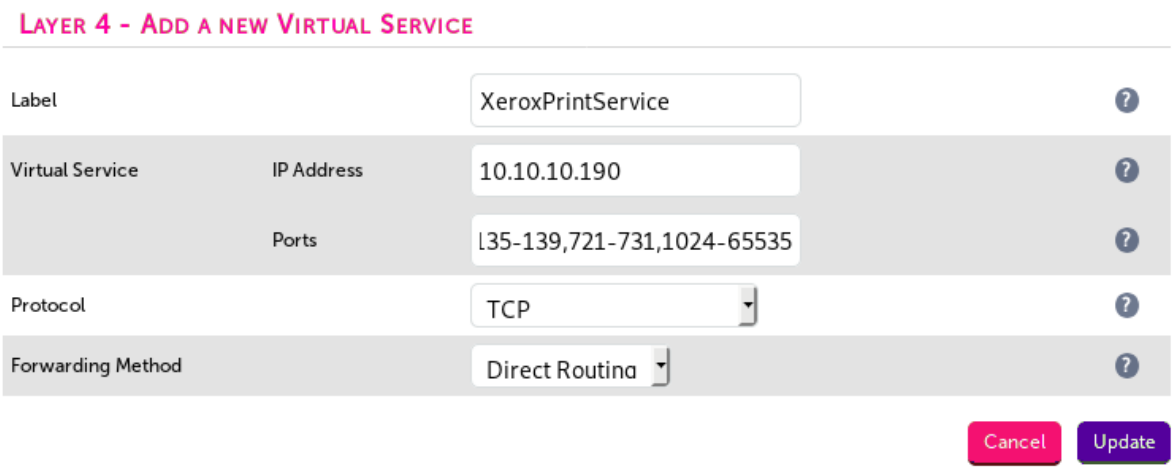
Setting up a load balanced Xerox print server environment can be summarised as follows:

- Create a virtual service (VIP) on the load balancer that listens on the required ports
- Associate the print servers to the virtual service, i.e. define them as 'real servers' (RIPs) for the VIP
- Install and configure the Xerox print servers
- Configure registry settings on the print servers to enable them to be accessed via a shared name
- Configure DNS name resolution
- Point users at the VIP to access the print server and the printer shares

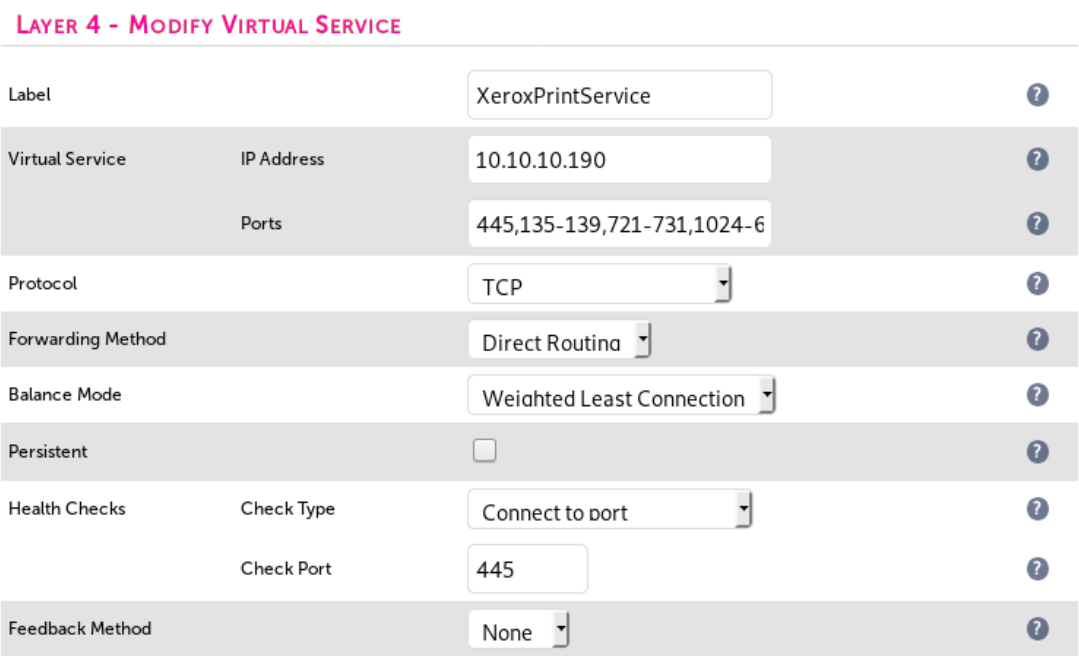
6. Appliance Configuration for Xerox Print Servers – Using DR Mode

6.1. 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. **XeroxPrintService**.
3. Set the *Virtual Service IP Address* field to the required IP address, e.g. **10.10.10.190**.
4. Set the *Ports* to **445,135-139,721-731,1024-65535**.
5. Click **Update** to create the virtual service.

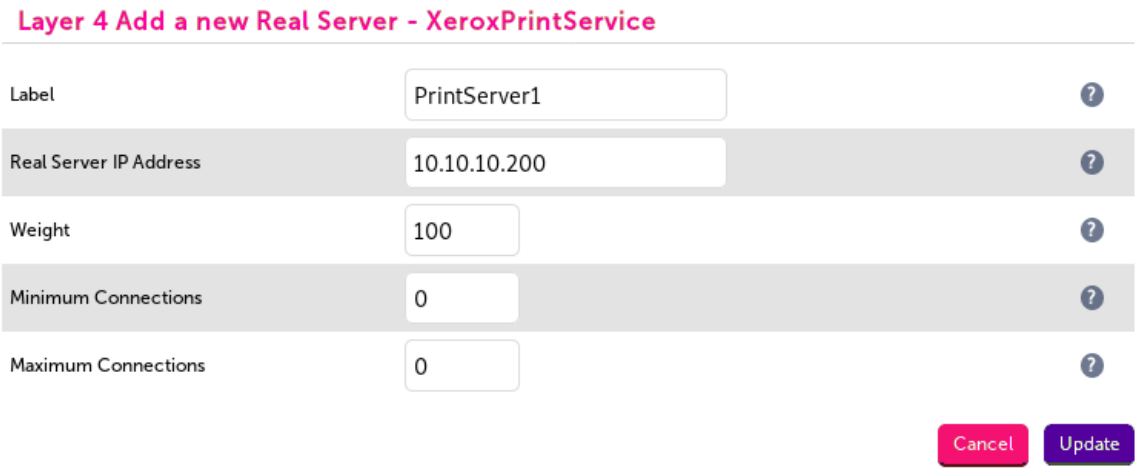


6. Click **Modify** next to the newly created VIP.
7. Make sure that the *Persistent* checkbox is not selected.
8. Set the *Check Port* for server/service online to **445**.
9. Click **Update**.



6.2. Defining the Real Servers (RIPs)

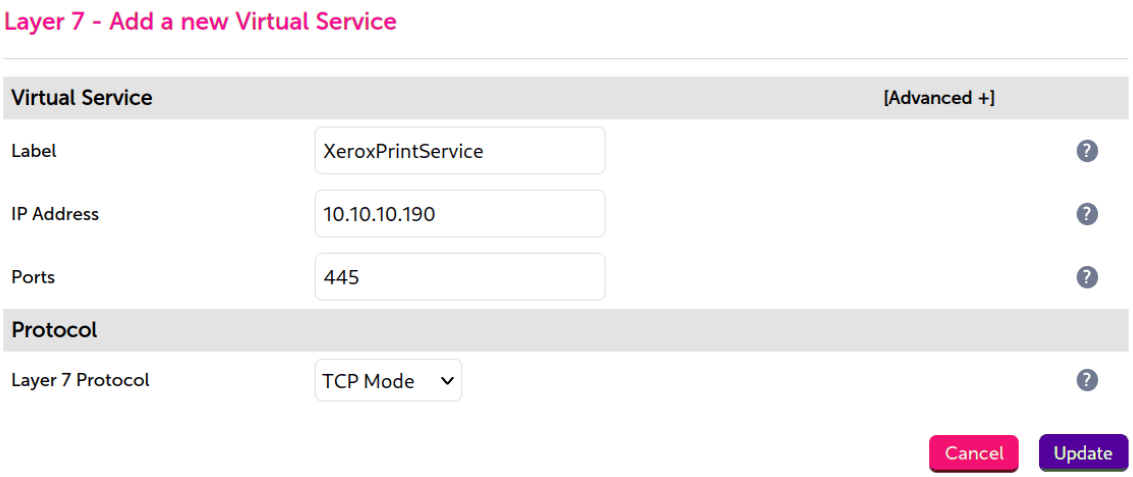
1. Using the web user interface, navigate to *Cluster Configuration > Layer 4 – Real Servers* and click on **Add a new Real Server** next to the newly created VIP.
2. Define the *Label* for the real server as required, e.g. **PrintServer1**.
3. Set the *Real Server IP Address* field to the required IP address, e.g. **10.10.10.200**.
4. Click *Update*.
5. Repeat these steps to add additional print servers as required.



7. Appliance Configuration for Xerox Print Servers – Using SNAT Mode

7.1. Configuring the Virtual Service (VIP)

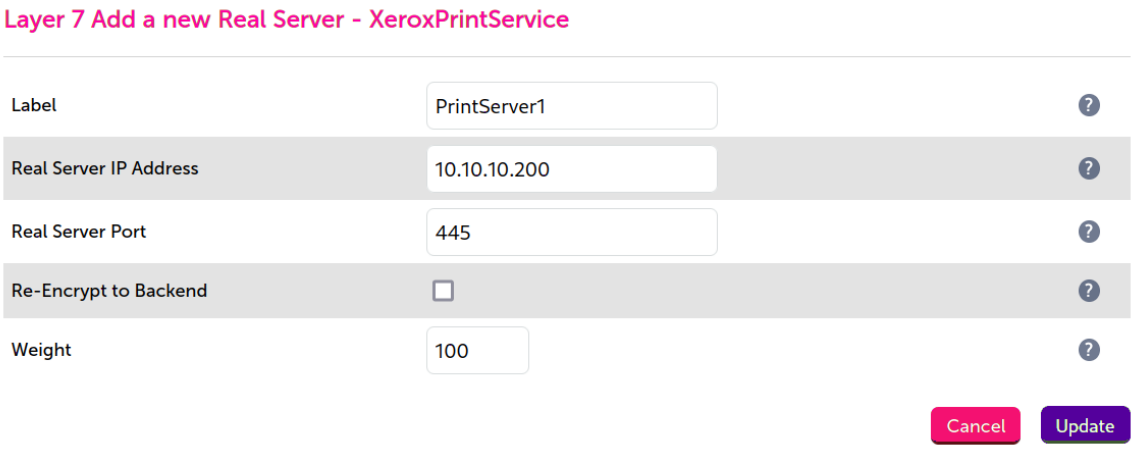
1. Using the web user interface, navigate to *Cluster Configuration > Layer 7 – Virtual Services* and click on **Add a new Virtual Service**.
2. Define the *Label* for the virtual service as required, e.g. **XeroxPrintService**.
3. Set the *Virtual Service IP Address* field to the required IP address, e.g. **10.10.10.190**.
4. Set the *Ports* to **445**.
5. Set the *Layer 7 Protocol* to **TCP Mode**.
6. Click **Update**.



7.2. Defining 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. **PrintServer1**.
3. Set the *Real Server IP Address* field to the required IP address, e.g. **10.10.10.200**.
4. Set the *Real Server Port* field to **445**.
5. Click **Update**.
6. Repeat these steps to add additional print servers as required.



7. Click on **Reload HAProxy** when prompted to do so in the "Commit changes" box that appears. This will apply the new changes and put the new virtual service and its associated virtual servers into use.

8. Configuring Xerox Print Servers for Load Balancing

The following steps should be carried out on each Xerox 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 (**XeroxPrintService** 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: XeroxPrintService
```

> **Note** In the example presented here, XeroxPrintService 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, DNS name resolution should be configured. A host name and corresponding "Host (A)" record for the virtual service should be created, and should match the virtual IP (VIP) address defined on the load balancer.

In the example presented here, **XeroxPrintService** would resolve to **10.10.10.190**.

8.3. Finalizing the Server Configuration

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

9. 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

```
\\10.10.10.190
```

or

```
\\XeroxPrintService
```

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

10. 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.

11. Further Documentation

For additional information, please refer to the Administration Manual.

12. Appendix

12.1. Solving the ARP Problem

When using Layer 4 DR mode, the ARP problem must be solved. This involves configuring each Real Server to be able to receive traffic destined for the VIP, and ensuring that each Real Server does not respond to ARP requests for the VIP address – only the load balancer should do this. The steps below are for Windows 2012 & later.

Windows Server 2012 & Later

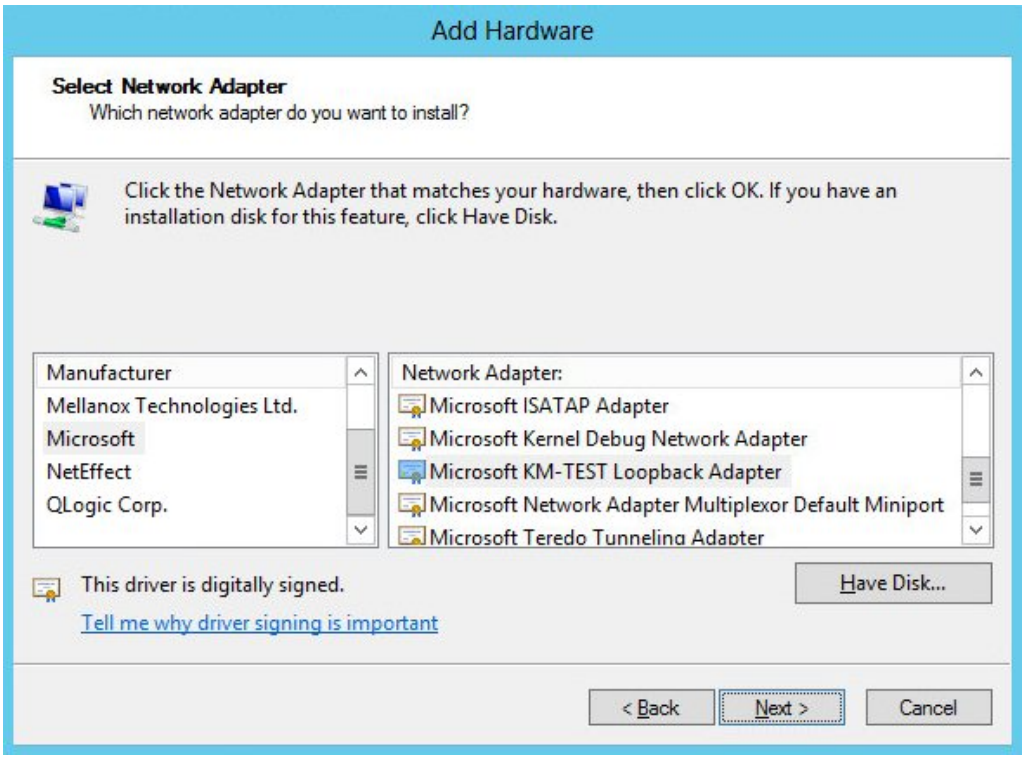
Windows Server 2012 and later support Direct Routing (DR) mode through the use of the Microsoft Loopback Adapter that must be installed and configured on each load balanced (Real) Server. The IP address configured on the Loopback Adapter must be the same as the Virtual Service (VIP) address. This enables 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

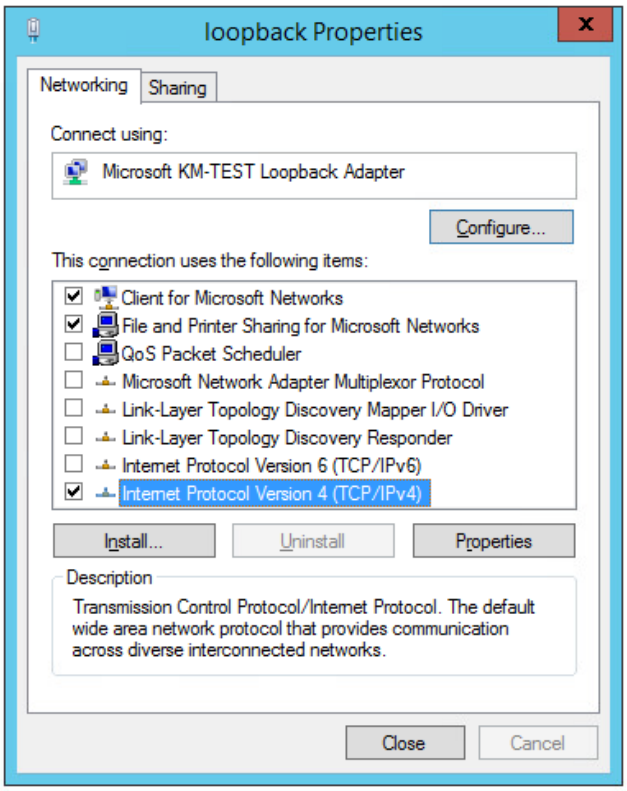
1. Open Control Panel and click **Network and Sharing Center**.
2. Click **Change adapter settings**.
3. Right-click the new Loopback Adapter and select **Properties**.

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

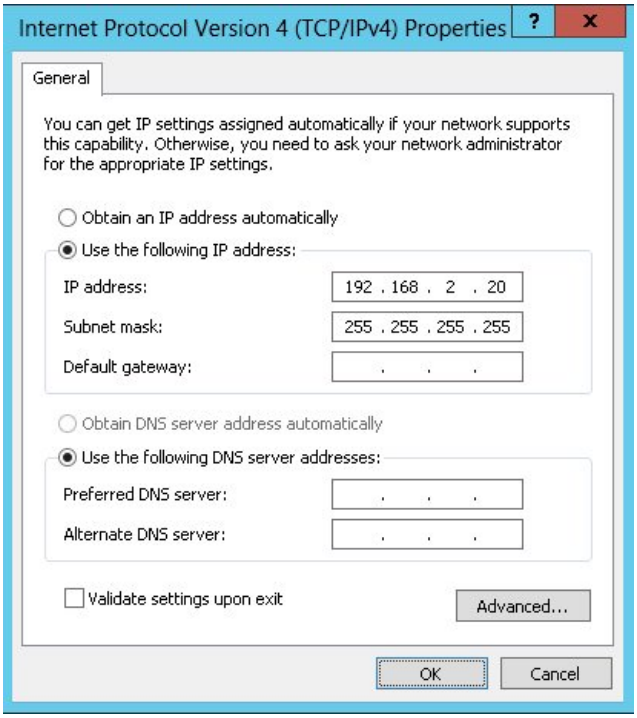
> **Important** When configuring the loopback adapter properties, make sure that **Client for Microsoft Networks** and **File & Printer Sharing for Microsoft Networks** is also checked as shown below.

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:



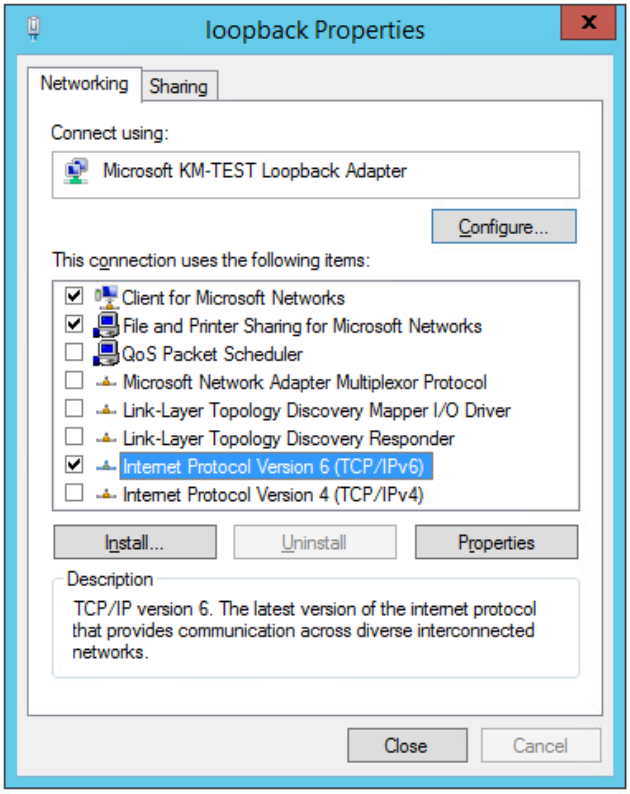
> **Note** **192.168.2.20** is an example, make sure you specify the correct VIP address.

> **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.

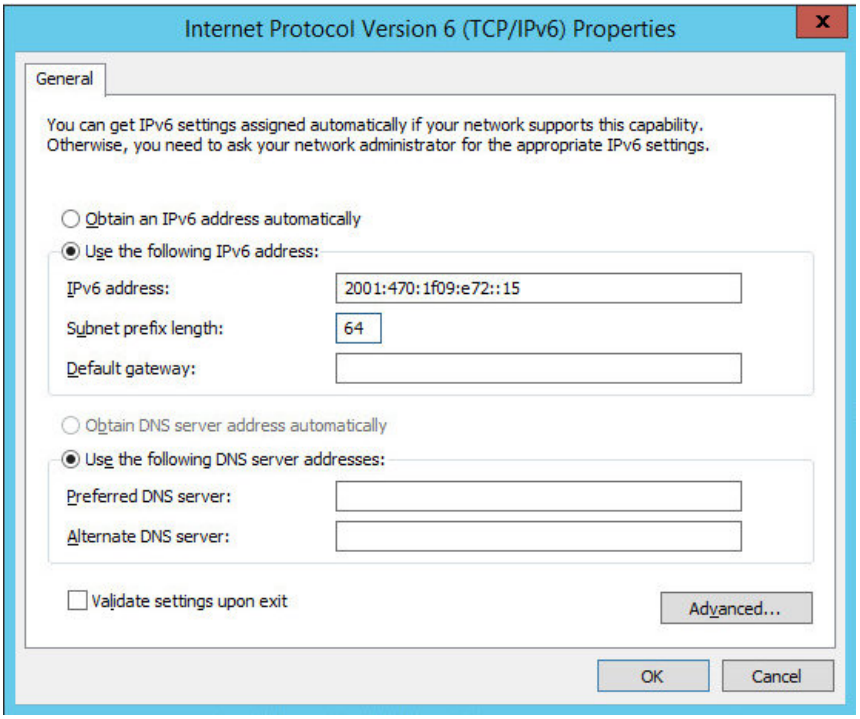
3. Click **OK** then click **Close** to save and apply the new settings.

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
```

12.2. Sending Print Jobs from the Command Line (Microsoft Windows)

When using a load balanced print service, it is still possible to send print jobs from the command line using the lpr command.

An example of such a command:

```
lpr -S 192.168.81.150 -P KONICA -ol c:\test.txt
```

- lpr = Line Printer Remote / Line Printer Daemon protocol
- -S = name or IP address of the host providing the lpd (Line Printer Daemon) service
- -P = name of printer queue
- -ol = indication of file type (binary file)

At the end of the command is the path of the file to print.

13. Document Revision History

Version	Date	Change	Reason for Change	Changed By
1.0.0	21 March 2018	Initial version		AH
1.0.1	13 November 2018	Changed the IP address of the example layer 4 DR mode real server so that it is in the same subnet as the VIP, to match the majority of normal deployments Added instruction to define the real server port at layer 7, as this is best practice	Required updates	AH
1.0.2	6 December 2018	Added the new "Company Contact Information" page	Required updates	AH
1.1.0	6 August 2019	Styling and layout	General styling updates	RJC
1.1.1	20 May 2020	New title page Updated Canadian contact details	Branding update Change to Canadian contact details	AH
1.2.0	1 November 2021	Converted the document to AsciiDoc	Move to new documentation system	AH, RJC, ZAC
1.2.1	28 September 2022	Updated layer 7 VIP and RIP creation screenshots	Reflect changes in the web user interface	AH
1.2.2	5 January 2023	Combined software version information into one section Added one level of section numbering Reworded 'Further Documentation' section Removed references to the colour of certain UI elements	Housekeeping across all documentation	AH
1.2.3	2 February 2023	Updated screenshots	Branding update	AH
1.2.4	7 March 2023	Removed conclusion section	Updates across all documentation	AH
1.3.0	24 March 2023	New document theme Modified diagram colours	Branding update	AH

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