Load Balancing Xerox Print Servers

Version 1.2.0
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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 supported in all cloud platforms due to platform specific limitations, please check with Loadbalancer.org support for further details.

3. Loadbalancer.org Software Versions Supported

- V8.3.8 and later

4. Xerox Print Server Software Versions Supported

- Xerox print servers – all versions

5. 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.

6. Load Balancing Xerox Print Servers

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.
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

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

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.
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.
## 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.

### Layer 4 - Modify Virtual Service

<table>
<thead>
<tr>
<th>Label</th>
<th>XeroxPrintService</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual Service IP Address</td>
<td>10.10.10.190</td>
</tr>
<tr>
<td>Ports</td>
<td>445,135-139,721-731,1024-6</td>
</tr>
<tr>
<td>Protocol</td>
<td>TCP</td>
</tr>
<tr>
<td>Forwarding Method</td>
<td>Direct Routine</td>
</tr>
<tr>
<td>Balance Mode</td>
<td>Weighted Least Connection</td>
</tr>
<tr>
<td>Persistent</td>
<td></td>
</tr>
<tr>
<td>Health Checks</td>
<td></td>
</tr>
<tr>
<td>Check Type</td>
<td>Connect to port</td>
</tr>
<tr>
<td>Check Port</td>
<td>445</td>
</tr>
<tr>
<td>Feedback Method</td>
<td>None</td>
</tr>
</tbody>
</table>

---

## 8. Appliance Configuration for Xerox Print Servers – Using SNAT Mode

### 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**.

### Layer 4 Add a new Real Server - XeroxPrintService

<table>
<thead>
<tr>
<th>Label</th>
<th>PrintServer1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Server IP Address</td>
<td>10.10.10.200</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>

---
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.

### Layer 7 - Add a new Virtual Service

<table>
<thead>
<tr>
<th>Label</th>
<th>XeroxPrintService</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual Service IP Address</td>
<td>10.10.10.190</td>
</tr>
<tr>
<td>Ports</td>
<td>445</td>
</tr>
<tr>
<td>Layer 7 Protocol</td>
<td>TCP Mode</td>
</tr>
<tr>
<td>Manual Configuration</td>
<td></td>
</tr>
</tbody>
</table>

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

---

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.

### Layer 7 Add a new Real Server - XeroxPrintService

<table>
<thead>
<tr>
<th>Label</th>
<th>PrintServer1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Server IP Address</td>
<td>10.10.10.200</td>
</tr>
<tr>
<td>Real Server Port</td>
<td>445</td>
</tr>
<tr>
<td>Re-Encrypt to Backend</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>100</td>
</tr>
</tbody>
</table>

---
9. 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.

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**

**Important**

**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:
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.

Finalizing the Server Configuration
To finalize the print server configuration changes, each print server must be rebooted.

Testing the Load Balanced Print Service
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

12. Conclusion
Loadbalancer.org appliances provide a very cost effective solution for highly available load balanced Xerox print server environments.
13. Appendix

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, 2016 & 2019

The basic concept is the same as for Windows 2000/2003. However, additional steps are required to set the strong/weak host behavior. This is used to either block or allow interfaces receiving packets destined for a different interface on the same server. As with Windows 2000/2003/2008, if the Real Server is included in multiple VIPs, you can add additional IP addresses to the Loopback Adapter that correspond to each VIP.

Step 1 of 3: Install the Microsoft Loopback Adapter

1. Click Start, then run hdwwiz to start the Hardware Installation Wizard.
2. When 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**.

4. Uncheck all items except **Internet Protocol Version 4 (TCP/IPv4)** and **Internet Protocol Version 6 (TCP/IPv6)** as shown below:

   ![Loopback Properties](image)

   **Note**  
   Leaving both checked ensures that both IPv4 and IPv6 are supported. Select one if preferred.

   **Important**  
   When configuring the Loopback Adapter to solve the ARP Problem make sure that you also check (tick) **Client for Microsoft Networks** and **File & Printer Sharing for Microsoft Networks** as shown above.

5. If configuring IPv4 addresses select **Internet Protocol Version (TCP/IPv4)**, click **Properties** and configure the IP address to be the same as the Virtual Service (VIP) with a subnet mask of 255.255.255.255, e.g. 192.168.2.20/255.255.255.255 as shown below:
6. If configuring IPv6 addresses select Internet Protocol Version (TCP/IPv6), 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:

7. Click OK on TCP/IP Properties, then click Close on Ethernet Properties to save and apply the new settings.

**Note**

For Windows 2012/2016/2019, it's not necessary to modify the interface metric on the advanced tab and should be left set to Automatic.

Step 3 of 3: Configure the strong/weak host behavior
To configure the correct strong/weak host behavior for Windows 2012/2016/2019, the following commands must be run on each Real Server:

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 these commands to work, the LAN connection NIC must be named "net" and the loopback NIC must be named "loopback" as shown below. If you prefer to leave your current NIC names, then the commands above must be modified accordingly. For example, if your network adapters are named "LAN" and "LOOPBACK", the commands required would be:

```
netsh interface ipv4 set interface "LAN" 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
```

For these commands to work, the LAN connection NIC must be named "net" and the loopback NIC must be named "loopback" as shown below. If you prefer to leave your current NIC names, then the commands above must be modified accordingly. For example, if your network adapters are named "LAN" and "LOOPBACK", the commands required would be:

```
netsh interface ipv6 set interface "LAN" 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
```

Note: The names for the NICs are case sensitive, so make sure that the name used for the interface and the name used in the commands match exactly.

- Start PowerShell or use a command window to run the appropriate netsh commands as shown in the example below:
Note: This shows an IPv6 example, use the IPv4 commands if you’re using IPv4 addresses.

Repeat steps 1 - 3 on all remaining Windows 2012/2016/2019 Real Server(s).

For Windows 2012/2016/2019 you can also use the following PowerShell Cmdlets:

The following example configures both IPv4 and IPv6 at the same time:

```
Set-NetIpInterface -InterfaceAlias loopback -WeakHostReceive enabled -WeakHostSend enabled -DadTransmits 0
Set-NetIpInterface -InterfaceAlias net -WeakHostReceive enabled
```

To configure just IPv4:

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

To configure just IPv6:

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

**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.
## 14. Document Revision History

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<td>Initial version</td>
<td></td>
<td>AH</td>
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<td>1.0.1</td>
<td>13 November 2018</td>
<td>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</td>
<td>Required updates</td>
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<td>1.2.0</td>
<td>1 November 2021</td>
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<td>Move to new documentation system</td>
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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.