Load Balancing Xerox Print Servers

v1.1.1
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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 relevant Administration Manual:

- v7 Administration Manual
- v8 Administration Manual

2. Loadbalancer.org Appliances Supported
All our products can be used for load balancing Xerox print servers. The complete list of models is shown below:

<table>
<thead>
<tr>
<th>Discontinued Models</th>
<th>Current Models *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterprise R16</td>
<td>Enterprise R20</td>
</tr>
<tr>
<td>Enterprise VA R16</td>
<td>Enterprise MAX</td>
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<td>Enterprise AWS **</td>
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<td>Enterprise AZURE **</td>
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<td></td>
<td>Enterprise GCP **</td>
</tr>
</tbody>
</table>

* For full specifications of these models please refer to: http://www.loadbalancer.org/products/hardware

** Some features may not be supported, please check with Loadbalancer.org support

3. Loadbalancer.org Software Versions Supported

- V7.6.4 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
4. Set the Ports to 445,135-139,721-731,1024-65535
5. Click **Update** to create the virtual service

![Layer 4 - Add a new Virtual Service](image)

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**

![Layer 4 - Modify Virtual Service](image)

## 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

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
3. Set the Virtual Service IP Address field to the required IP address, e.g. 10.10.190
4. Set the Ports to 445
5. Set the Layer 7 Protocol to TCP Mode
6. Click Update
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 blue box that appears. This will apply the new changes and put the new virtual service and its associated virtual servers into use.

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 Appendix 1 on page 10 for more information.

Note: Important: When configuring the Loopback Adapter to solve the ARP Problem, the following options must also be checked (ticked):
- Client for Microsoft Networks
- File & Printer Sharing for Microsoft Networks
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

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

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 2012/2016, for other versions of Windows please refer to chapter 6 in the administration manual.

Step 1: 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: 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. Un-check 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, the following options **must** also be checked (ticked):
   - Client for Microsoft Networks
   - File & Printer Sharing for Microsoft Networks

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.

8. Now repeat the above process on the other Windows 2012/2016 Real Servers.
Step 3: Configure the strong/weak host behavior

Windows Server 2000 and Windows Server 2003 use the weak host model for sending and receiving for all IPv4 interfaces and the strong host model for sending and receiving for all IPv6 interfaces. You cannot configure this behavior. The Next Generation TCP/IP stack in Windows 2008 and later supports strong host sends and receives for both IPv4 and IPv6 by default. To ensure that Windows 2012/2016 is running in the correct mode to be able to respond to the VIP, 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
```  

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
```
```bash
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.

1. Start Powershell or use a command window to run the appropriate netsh commands as shown in the example below:

   ![Network Connections](image)

   Note: This shows an IPv6 example, use the IPv4 commands if you're using IPv4 addresses.

2. Now repeat these 4 commands on the other Windows 2012/2016 Real Servers

   Note: Solving the ARP problem for other version of Windows is similar. For full details, please refer to the [administration manual](#).
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>21 March 2018</td>
<td>Initial version</td>
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<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>
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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.

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