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1. About this Guide
This guide details the steps required to configure a load balanced PaperCut secondary print server utilizing Loadbalancer.org appliances. It covers the configuration of the load balancers and also any Microsoft print 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 PaperCut secondary 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>
</tr>
<tr>
<td>Enterprise VA</td>
<td>Enterprise 10G</td>
</tr>
<tr>
<td>Enterprise R320</td>
<td>Enterprise 40G</td>
</tr>
<tr>
<td></td>
<td>Enterprise Ultra</td>
</tr>
<tr>
<td></td>
<td>Enterprise VA R20</td>
</tr>
<tr>
<td></td>
<td>Enterprise VA MAX</td>
</tr>
<tr>
<td></td>
<td>Enterprise AWS **</td>
</tr>
<tr>
<td></td>
<td>Enterprise AZURE **</td>
</tr>
<tr>
<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

- V8.4.1 and later

4. Papercut NG, MF, and Mobility Print Software Versions Supported

- Papercut NG/MF 19.2.3
- Papercut Mobility print 1.0.2623
5. PaperCut

PaperCut is a print management solutions provider which offers this via three applications:

- **PaperCut NG** for simple print management, and the powerful PaperCut MF for complete print, scan, copy, and fax management. Lets you track activity and influence better printing with behavior-changing policies.

- **PaperCut MF** lets you cut costs and waste in your workplace by managing print, scan, copy, and fax. It has powerful exclusive features including Job Ticketing and Secure Print Release.

- **PaperCut Mobility Print** keeps users printing when they're outside your network, or on an untrusted guest network. It keeps jobs local to keep printing quick, and only uses the Internet when necessary — and cloud jobs compress and encrypt to save space and keep your data safe.

**PaperCut Print Server Components**

**Application Server**

- This is the main application, where you can administer reports, printing costs, and print quotas, as well as other print-related actions.

**Secondary Server (Print Provider, Mobility Print)**

- This reports to the application server, updating user and print information that the secondary print server has handled.

Note: Mobility Print can be installed on the secondary print servers and can be made highly available when placed behind a load balancer. Mobility Print allows users to print from their mobile devices via network print services and can be load balanced using TCP/UDP 53, 9163, 9164.

**Site Server**

- This component is designed to be placed on remote sites from where the application and secondary (print servers) are located. An example might be that the application server and secondary servers are installed at a head office and the site servers are installed at regional satellite offices. In the event of a WAN outage, as the users in the regional office will continue printing via the site server (where PaperCut replicates info from the application server), this allows them to continue to be able to print jobs, authenticate at an MFD in that office, and release their jobs.

- In the event of an outage on the application server, the site server will take over to allow printing and reporting to continue at that site.

Note: placing the application server or site server behind a network load balancer is not recommended. For details on PaperCut's recommended deployment methods for the application and site servers, see
6. Load Balancing PaperCut secondary print servers

Note: It's highly recommended that you have a working PaperCut environment first before implementing the load balancer.

Load Balancing & HA Requirements
This guide details the configuration of a load balanced Microsoft print server environment which uses the PaperCut application.

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 servers, i.e. the print servers. This is a straightforward process, and is covered in the section Configuring Microsoft Print Servers using PaperCut for Load Balancing starting on page 10.

It is also possible to load balance a PaperCut secondary print server using Layer 7 SNAT Mode. This mode might be preferable if making changes to the print servers is not possible, although some Windows Registry keys need to be added on the servers. Due to the increased amount of information at layer 7, performance is not as great as at layer 4. Also note that load balanced connections at layer 7 are not source IP transparent, i.e. the print servers will see all client connections as originating from the load balancer's IP address. This is not usually an issue when load balancing print servers but should still be considered.

Persistence (aka Server Affinity)
Neither Microsoft print servers or the PaperCut application require session affinity at the load balancing layer.

Virtual Service (VIP) Requirements
To provide load balancing and HA for PaperCut secondary print servers, the following VIPs are required:

- PaperCut Mobility Print
- PaperCut Print Provider

Load Balanced Ports

<table>
<thead>
<tr>
<th>Port</th>
<th>Use</th>
<th>Transport Layer Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>445</td>
<td>Papercut Print Provider</td>
<td>TCP</td>
</tr>
<tr>
<td>53, 9163, 9164</td>
<td>Papercut Mobility Print</td>
<td>TCP/UDP</td>
</tr>
</tbody>
</table>
7. Deployment Concept

VIPs = Virtual IP Addresses

Note: The load balancer can be deployed as a single unit, although Loadbalancer.org recommends a clustered pair for resilience & high availability. Please refer to section 1 of the appendix on page 23 for more details on configuring a clustered pair.

8. Load Balancer Deployment Methods

The load balancer can be deployed in 4 fundamental ways: Layer 4 DR mode, Layer 4 NAT mode, Layer 4 SNAT mode, and Layer 7 SNAT mode.

For Microsoft Print Servers using PaperCut, layer 4 DR mode and layer 7 SNAT mode are recommended. These modes are described below and are used for the configurations presented in this guide. For configuring using DR mode please refer to the section starting on page 14, and for configuring using layer 7 SNAT mode refer to the section starting on page 16.
Layer 4 DR Mode

One-arm direct routing (DR) mode is a very high performance solution that requires little change to your existing infrastructure.

Note: Kemp, Brocade, Barracuda & A10 Networks call this Direct Server Return and F5 call it N-Path.

- DR mode works by changing the destination MAC address of the incoming packet to match the selected Real Server on the fly which is very fast.
- When the packet reaches the Real Server it expects the Real Server to own the Virtual Services IP address (VIP). This means that you need to ensure that the Real Server (and the load balanced application) respond to both the Real Servers own IP address and the VIP.
- The Real Server should not respond to ARP requests for the VIP. Only the load balancer should do this. Configuring the Real Servers in this way is referred to as Solving the ARP Problem. Please refer to page 11 for more information.
- On average, DR mode is 8 times quicker than NAT for HTTP, 50 times quicker for Terminal Services and much, much faster for streaming media or FTP.
- The load balancer must have an Interface in the same subnet as the Real Servers to ensure layer 2 connectivity required for DR mode to work.
- The VIP can be brought up on the same subnet as the Real Servers, or on a different subnet provided that the load balancer has an interface in that subnet.
- Port translation is not possible in DR mode i.e. having a different RIP port than the VIP port.
- DR mode is transparent, i.e. the Real Server will see the source IP address of the client.
Layer 7 SNAT Mode

Layer 7 SNAT mode uses a proxy (HAProxy) at the application layer. Inbound requests are terminated on the load balancer, and HAProxy generates a new request to the chosen Real Server. As a result, Layer 7 is a slower technique than DR or NAT mode at Layer 4. Layer 7 is typically chosen when either enhanced options such as SSL termination, cookie based persistence, URL rewriting, header insertion/deletion etc. are required, or when the network topology prohibits the use of the layer 4 methods.

This mode can be deployed in a one-arm or two-arm configuration and does not require any changes to the Real Servers. However, since the load balancer is acting as a full proxy it doesn't have the same raw throughput as the layer 4 methods.

The load balancer proxies the application traffic to the servers so that the source of all traffic becomes the load balancer.

- SNAT mode is a full proxy and therefore load balanced Real Servers do not need to be changed in any way
- Because SNAT mode is a full proxy any server in the cluster can be on any accessible subnet including across the Internet or WAN
- SNAT mode is not transparent by default, i.e. the Real Servers will not see the source IP address of the client, they will see the load balancers own IP address by default, or any other local appliance IP address if preferred (e.g. the VIP address), this can be configured per layer 7 VIP. If required, the clients IP address can be passed through either by enabling TProxy on the load balancer, or for HTTP, using X-forwarded-For headers. Please refer to chapter 6 in the administration manual for more details
- SNAT mode can be deployed using either a 1-arm or 2-arm configuration
Our Recommendation

Where possible we recommend that Layer 4 Direct Routing (DR) mode is used. This mode offers the best possible performance since replies go directly from the Real Servers to the client, not via the load balancer. It's also relatively simple to implement. Ultimately, the final choice does depend on your specific requirements and infrastructure.

If DR mode cannot be used, for example if it is not possible to make changes to the real servers, or if the real servers are located in remote routed networks, then layer 7 SNAT mode is recommended.

9. Configuring Microsoft Print Servers using PaperCut for Load Balancing

Registry Modifications

For the print servers that are going to be load balanced, to enable them to be accessed via a shared name (PapercutPrintService is the example used 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: PapercutPrintService

Note: In the example presented here, PapercutPrintService 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.

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.
Layer 4 DR Mode – Solving the ARP Problem

If using layer 4 DR mode, the ‘ARP problem’ must be solved on each real server for DR mode to work. For detailed steps on solving the ARP problem for Windows, please refer to section 2 of the appendix on page 25 for more information. For a detailed explanation of DR mode and the nature of the ARP problem, please refer to the section that covers layer 4 DR mode on page 8.
Virtual Appliance Download & Deployment
A fully featured, fully supported 30 day trial is available if you are conducting a PoC (Proof of Concept) deployment. The VA is currently available for VMware, Virtual Box, Hyper-V, KVM and Xen and has been optimized for each Hypervisor. By default, the VA is allocated 1 CPU, 2GB of RAM and has an 8GB virtual disk. The Virtual Appliance can be downloaded here.

Note: The same download is used for the licensed product, the only difference is that a license key file (supplied by our sales team when the product is purchased) must be applied using the appliance's WebUI.

Note: Please refer to the Administration Manual and the ReadMe.txt text file included in the VA download for more detailed information on deploying the VA using various Hypervisors.

Initial Network Configuration
The IP address, subnet mask, default gateway and DNS settings can be configured in several ways as detailed below:

Method 1 - Using the Network Setup Wizard at the console
After boot up, follow the instructions on the console to configure the IP address, subnet mask, default gateway and DNS settings.

Method 2 - Using the WebUI
Using a browser, connect to the WebUI on the default IP address/port: https://192.168.2.21:9443
To set the IP address & subnet mask, use: Local Configuration > Network Interface Configuration
To set the default gateway, use: Local Configuration > Routing
To configure DNS settings, use: Local Configuration > Hostname & DNS

Accessing the Web User Interface (WebUI)
The WebUI can be accessed via HTTPS at the following URL: https://192.168.2.21:9443/lbadmin
* Note the port number → 9443

(replace 192.168.2.21 with the IP address of your load balancer if it’s been changed from the default)

Login using the following credentials:
Username: loadbalancer
Password: loadbalancer

Note: To change the password, use the WebUI menu option: Maintenance > Passwords.

Once logged in, the WebUI will be displayed as shown below:

HA Clustered Pair Configuration
Loadbalancer.org recommend that load balancer appliances are deployed in pairs for high availability. In this guide a single unit is deployed first, adding a secondary slave unit is covered in section 1 of the appendix on page 23.
11. Appliance Configuration for PaperCut Print Servers – Using Layer 4 DR Mode

When deploying PaperCut, two virtual services must be configured: a virtual service for the PaperCut Print Provider and a virtual service for PaperCut Mobility Print.

Configuring VIP 1 – PaperCut Print Provider

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 required Label (name) for the VIP, e.g. PrintProviderVIP
3. Set the Virtual Service IP address field to the required IP address, e.g. 192.168.0.100
4. Set the Virtual Service Ports field to 445
5. Leave the Protocol set to TCP
6. Leave the Forwarding Method set to Direct Routing
7. Click Update to create the virtual service
8. Now click Modify next to the newly created Virtual Service
9. Disable Persistence by unchecking the Enable check box
10. Click Update

Define The Real Servers (Print 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:
3. Enter an appropriate label for the Real Server, e.g. **PS1**
4. Change the **Real Server IP Address** field to the required address, e.g. **192.168.0.41**
5. Click **Update**
6. Repeat the above steps to add your other Print Server(s)

Note: In the next section, **Configuring VIP 2 – PaperCut Mobility Print**, we will make use of the **Duplicate Service** button to retain the configuration including the added real servers. We will then need to amend the configuration with a new label and IP address accordingly. Meanwhile, other configuration items, such as added real servers, will be retained.

### Configuring VIP 2 – PaperCut Mobility Print

#### Configuring The Virtual Service (VIP)

1. Using the web user interface, navigate to **Cluster Configuration > Layer 4 – Virtual Services** and click on **Modify** on the **PrintProviderVIP** virtual service
2. Click the **Duplicate Service** located in the top right of the menu
3. Define the required **Label** (name) for the VIP, e.g. **MobilityPrint**
4. Set the **Virtual Service IP address** field to the required IP address, e.g. **192.168.0.110**
5. Set the **Virtual Service Ports** field to **53,9163,9164**
6. Set the **Protocol** to **TCP/UDP**
7. Leave the Forwarding Method set to **Direct Routing**
8. Under Health Checks set the Check Port to **9163**
9. Click **Update**

12. Appliance Configuration for PaperCut Print Servers – Using Layer 7 SNAT Mode

When deploying PaperCut, two virtual services must be configured: a virtual service for the PaperCut Print Provider and, a virtual service for the PaperCut Mobility Print.

**Configuring VIP 1 – PaperCut Print Provider**

**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 required **Label (name)** for the VIP, e.g. **PrintProvider**
3. Set the **Virtual Service IP address** field to the required IP address, e.g. **192.168.0.200**
4. Set the **Virtual Service Ports** field to **445**
5. Change the Layer 7 Protocol to **TCP Mode**
6. Click **Update** to create the virtual service
7. Now click **Modify** next to the newly created Virtual Service
8. Under the **Persistence** section change the drop down option from Source IP to **None**
9. Click **Update**

---

![Layer 7 - Add a new Virtual Service](image)

**Define The Real (Print Server) 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:

![Layer 7 Add a new Real Server - PrintProvider](image)

3. Enter an appropriate label for the Real Server, e.g. **PS1**
4. Change the **Real Server IP Address** field to the required address, e.g. **192.168.0.41**
5. Click **Update**
6. Repeat the above steps to add your other Print Server(s)

Note: In the next section, *Configuring VIP 2 – PaperCut Mobility Print*, we will make use of the **Duplicate Service** button to retain the configuration including the added real servers. We will then need to amend the configuration with a new label and IP address accordingly. Meanwhile, other configuration items, such as added real servers, will be retained.

---

**Configuring VIP 2 – PaperCut Mobility Print**

**Configuring The Virtual Service (VIP)**

1. Using the web user interface, navigate to *Cluster Configuration > Layer 7 – Virtual Services* and click on **Modify** on the **PrintProvider** virtual service
2. Click the **Duplicate Service** located in the top right of the menu
3. Define the required **Label** (name) for the VIP, e.g. **MobilityPrint**
4. Set the **Virtual Service IP address** field to the required IP address, e.g. **192.168.0.220**
5. Set the **Virtual Service Ports** field to **53,9163,9164**
6. Under the Health Checks set the **Check Port** to **9163**
7. Click **Update**
Finalizing the Configuration
To apply the new settings, HAProxy must be reloaded either via the Reload HAProxy button on the system overview or as follows:

1. Using the WebUI, navigate to: Maintenance > Restart Services and click Reload HAProxy

PaperCut Secondary Print Server Configuration

Step 1 - Initial Configuration

Complete the following steps on each print server:

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 the same share names and permissions across all servers)
4. Solve the "ARP Problem" - this involves installing and configuring a Loopback Adapter and configuring the
Windows networking stack to use the weak host model. For full details of the configuration steps required, please refer to the Administration Manual and search for “Solving the ARP Problem for Windows Servers” and follow the steps for your version of Windows.

IMPORTANT NOTE: When configuring the loopback adapter, make sure that these options are also checked (ticked): Client for Microsoft Networks and File & Printer Sharing for Microsoft Networks.

Note: You can easily check the host model settings before / after configuration using the command:

```bash
netsh interface ipv4 show interface <interface name>
```
e.g.

```bash
netsh interface ipv4 show interface loopback
```

**Step 2 – Registry Modifications**

To enable the print servers to be accessed via a shared name (printserver-vip in this guide), add the following registry entries to each print server:

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Registry Key Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Key: HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Lsa&lt;br&gt;Value: DisableLoopbackCheck&lt;br&gt;Type: REG_DWORD&lt;br&gt;Data: 1</td>
</tr>
<tr>
<td>2</td>
<td>Key: HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\lanmanserver\parameters&lt;br&gt;Value: DisableStrictNameChecking&lt;br&gt;Type: REG_DWORD&lt;br&gt;Data: 1</td>
</tr>
<tr>
<td>3</td>
<td>Key: HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\lanmanserver\parameters&lt;br&gt;Value: OptionalNames&lt;br&gt;Type: REG_MULTI_SZ&lt;br&gt;Data: printserver-vip</td>
</tr>
</tbody>
</table>

Note: ‘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. Whatever name is used, it must be the **same name** that is used for the DNS or NetBIOS entry described in the Configure Name Resolution section below.
Step 3 – Configure Name Resolution
Configure either DNS name resolution as detailed below:

DNS Name Resolution
To configure DNS name resolution complete the following steps:

1. Disable NetBIOS over TCP/IP on all interfaces of each print server
2. Create a DNS record for the share name, in this example: printserver-vip ---> 192.168.0.100

Step 4 – Server Reboot
To apply all the changes, reboot each print server.

Deploying Printers via Group Policy

• Ensure that the load balanced print server name (e.g. printserver-vip) is resolvable by DNS as explained above
• On your print server, open: Administrative Tools > Printer Management
  ◦ Right-click Print Servers and enter the name for your load balanced print server (e.g. printserver-vip) and click OK
  ◦ Expand the Printers section
  ◦ 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

13. Testing & Verification
You should now be able to access your printers by browsing, using either the Virtual Service IP address or the share name. In this example:

\192.168.0.100
or
\printserver-vip

Using System Overview
The System Overview can be viewed in the WebUI. It shows a graphical view of all VIPs & RIPs (i.e. the PaperCut secondary servers) and shows the state/health of each server as well as the state of the each cluster as a whole. The example below shows that all real servers are healthy and available to accept connections.
Client Connection Tests
Ensure that clients’ print jobs succeed when sent via the load balancer to the PaperCut print servers. You’ll probably need to create new DNS records or modify your existing DNS records, replacing the IP addresses of individual servers or the cluster with the IP address of the Virtual Service on the load balancer.

Note: For more details on testing & diagnosing load balanced services please refer to chapter 12 in the Administration Manual.

14. 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.

15. Additional Documentation

16. Conclusion
Loadbalancer.org appliances provide a very cost effective solution for a highly available load balanced PaperCut print server environments.
17. Appendix

1 – Clustered Pair Configuration – Adding a Slave Unit

If you initially configured just the master unit and now need to add a slave – our recommended procedure, please refer to the relevant section below for more details:

Note: A number of settings are not replicated as part of the master/slave pairing process and therefore must be manually configured on the slave appliance. These are listed below:

- Hostname & DNS settings
- Network settings including IP addresses, bonding configuration and VLANs
- Routing configuration including default gateways and static routes
- Date & time settings
- Physical – Advanced Configuration settings including Internet Proxy IP address & port, Firewall table size, SMTP relay and Syslog server
- SNMP settings
- Graphing settings
- Firewall Script & Firewall Lockdown Script settings
- Software updates

To add a slave node – i.e. create a highly available clustered pair:

- Deploy a second appliance that will be the slave and configure initial network settings
- Using the WebUI, navigate to:: Cluster Configuration > High-Availability Configuration

- Specify the IP address and the loadbalancer users password (the default is 'loadbalancer') for the slave (peer) appliance as shown above
• Click **Add new node**

• The pairing process now commences as shown below:

![Create a Clustered Pair](image)

• Once complete, the following will be displayed:

![High Availability Configuration - Master](image)

• To finalize the configuration, restart heartbeat and any other services as prompted in the blue message box at the top of the screen

Note: Clicking the Restart Heartbeat button on the master appliance will also automatically restart heartbeat on the slave appliance.

Note: Please refer to chapter 9 – Appliance Clustering for HA in the [Administration Manual](#) for more detailed information on configuring HA with 2 appliances.
2 – DR Mode Server Configuration

When using Layer 4 DR mode the ARP problem must be solved. This involves configuring each Papercut Secondary Print Server to accept traffic destined for the VIP in addition to its own IP address, and ensuring that each server does not respond to ARP requests for the VIP address – only the load balancer should do this.

Note: The steps below are for Windows 2012 / 2016 IPv4 addresses, for other versions of Windows & IPv6 configuration steps, please refer to chapter 6 in the Administration Manual.

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. Un-check all items except Internet Protocol Version 4 (TCP/IPv4) as shown below:
5. For IPv4 addresses, select Internet Protocol Version (TCP/IPv4), click Properties and configure the IP address to be the same as the address you’ve used for the Virtual Service (VIP) with a subnet mask of 255.255.255.255, e.g. 192.168.100.100/255.255.255.255 as shown below:

6. Click OK on TCP/IP Properties, then click Close on the Interface Properties to save and apply the new settings.
Step 3 of 3: Configure the strong/weak host behaviour

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 behaviour. 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
```

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:
Repeat steps 1 – 3 on all remaining Papercut Secondary Print Server(s).
# Document Revision History

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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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