Load Balancing eCopy
ShareScan
Version 1.2.0
Table of Contents

1. About this Guide ........................................................................................................... 4
2. Loadbalancer.org Appliances Supported .................................................................... 4
3. Software Versions Supported
   3.1. Loadbalancer.org Appliance .................................................................................. 4
   3.2. eCopy ShareScan ................................................................................................. 4
4. eCopy ShareScan .......................................................................................................... 4
5. Load Balancing eCopy ShareScan
   5.1. The Basics ............................................................................................................. 4
   5.2. Ports & Protocols .................................................................................................. 5
   5.3. eCopy ShareScan Server Health-checks ................................................................. 5
   5.4. SSL Termination & Certificates ............................................................................. 5
   5.5. Persistence (aka Server Affinity) ........................................................................... 5
   5.6. Load Balancer Deployment .................................................................................... 5
   5.7. Load Balancer Deployment Modes
      5.7.1. Layer 4 DR Mode ........................................................................................... 6
      5.7.2. Layer 4 NAT Mode ....................................................................................... 7
      5.7.3. Loadbalancer.org Recommended Mode ......................................................... 10
6. Loadbalancer.org Appliance – the Basics
   6.1. Virtual Appliance .................................................................................................... 10
   6.2. Initial Network Configuration ................................................................................ 10
   6.3. Accessing the Appliance WebUI
      Main Menu Options .................................................................................................... 12
   6.4. Appliance Software Update
      Determining the Current Software Version ................................................................ 13
      Checking for Updates using Online Update ............................................................... 13
      Using Offline Update ................................................................................................. 13
   6.5. Ports Used by the Appliance .................................................................................. 14
   6.6. HA Clustered Pair Configuration .......................................................................... 15
7. Appliance & eCopy ShareScan Server Configuration – Using Layer 4 DR Mode
   7.1. Overview ................................................................................................................ 15
   7.2. Load Balancer Configuration
      Configure the Network Interface .............................................................................. 15
      Configure the Virtual Service (VIP) ........................................................................... 15
      Configure the Real Servers (RIPs) ............................................................................ 16
   7.3. eCopy ShareScan Server Configuration
      Solve the 'ARP Problem' ............................................................................................ 17
   7.4. DR Mode – Key Points .......................................................................................... 17
   7.5. Configure ShareScan server registry settings ......................................................... 17
8. Appliance & eCopy ShareScan Server Configuration – Using Layer 4 NAT Mode
   8.1. Overview ................................................................................................................ 18
   8.2. Load Balancer Configuration
      Configure the Network Interfaces ............................................................................. 18
      Configure the Virtual Service (VIP) ........................................................................... 19
      Configure the Real Servers (RIPs) ............................................................................ 20
      Create a Floating IP to use for the eCopy ShareScan server server's Default Gateway 20
   8.3. eCopy ShareScan Server Configuration
      Default Gateway ........................................................................................................ 21
      NAT Mode – Key Points ............................................................................................ 21
8.4. Configure ShareScan server registry settings .................................................. 21
8.5. Real Server (eCopy ShareScan) Health Checks ............................................... 22
   Layer 4 .................................................................................................................. 22
8.6. Server Feedback Agent ..................................................................................... 22
   Agent Download ..................................................................................................... 23
   Starting the Agent .................................................................................................. 24
   Configuration .......................................................................................................... 25
8.7. Load Balancer Transparency ............................................................................ 25
   Layer 4 .................................................................................................................. 25
9. Testing & Verification ............................................................................................ 25
  9.1. Using the System Overview ............................................................................ 25
  9.2. Using the eCopy ShareScan Troubleshooting Tool ........................................... 26
10. Technical Support ................................................................................................ 27
11. Further Documentation ....................................................................................... 27
12. Appendix ............................................................................................................. 28
  12.1. Solving the ARP Problem .............................................................................. 28
      Windows Server 2012 & Later ......................................................................... 28
  12.2. Configuring HA - Adding a Secondary Appliance ........................................ 33
      Non-Replicated Settings ................................................................................... 33
      Adding a Secondary Appliance - Create an HA Clustered Pair ..................... 34
13. Document Revision History ................................................................................ 36
1. About this Guide

This guide details the steps required to configure a load balanced eCopy ShareScan environment utilizing Loadbalancer.org appliances. It covers the configuration of the load balancers and also any eCopy ShareScan 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 with eCopy ShareScan. 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. Software Versions Supported

3.1. Loadbalancer.org Appliance

- V8.3.8 and later

Note: The screenshots used throughout this document aim to track the latest Loadbalancer.org software version. If using an older software version, note that the screenshots presented here may not match the WebUI exactly.

3.2. eCopy ShareScan

- v6.2 and later

4. eCopy ShareScan

eCopy ShareScan 6.2 is an MFP document capture solution that enables MFP users to engage their business systems and processes by completely automating document capture processes. As a result, eCopy ShareScan simplifies MFP capture workflows and enables users with advanced imaging capabilities. The eCopy ShareScan software extends the capabilities of digital copiers and scanners. When installing and setting up a ShareScan system, you must be familiar with the scanning devices that you will use with ShareScan, the ShareScan software components, and the basic installation and configuration workflow.

5. Load Balancing eCopy ShareScan

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

5.1. The Basics

The primary function of the load balancer is to distribute inbound requests across multiple eCopy ShareScan...
servers. This allows administrators to configure multiple servers and easily share the load between them. Adding additional capacity as demand grows then becomes straightforward and can be achieved by simply adding additional eCopy ShareScan servers to the load balanced cluster.

5.2. Ports & Protocols
The following table shows the ports that are normally used with eCopy ShareScan:

<table>
<thead>
<tr>
<th>Port</th>
<th>Protocol</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>*</td>
<td>TCP</td>
<td>Testing load balancer configuration</td>
</tr>
<tr>
<td>8080</td>
<td>TCP/HTTP</td>
<td>HTTP eCopy Tomcat application</td>
</tr>
<tr>
<td>443</td>
<td>TCP/HTTPS</td>
<td>HTTPS eCopy Tomcat application</td>
</tr>
<tr>
<td>9600</td>
<td>TCP</td>
<td>Web based MFDs</td>
</tr>
<tr>
<td>9261</td>
<td>TCP</td>
<td>Embedded MFDs i.e. Ricoh and Canon</td>
</tr>
</tbody>
</table>

Note: For the complete port list necessary to configure for a particular device vendor consult ShareScan documentation (High Availability and Load Balancing Deployment Guide, v6.2.)

5.3. eCopy ShareScan Server Health-checks
Regular eCopy ShareScan server monitoring ensures that failed servers are marked as down and client requests are only directed to functional servers. Health checks can range from a simple ICMP PING to a full negotiate check where content on a certain page is read and verified. Please refer to Real Server (eCopy ShareScan) Health Checks for more details.

5.4. SSL Termination & Certificates
It is recommended that all SSL traffic is terminated on the eCopy ShareScan servers (SSL pass-through).

5.5. Persistence (aka Server Affinity)
Source IP persistence is required when load balancing the eCopy ShareScan application and is the only available persistence method when load balancing at layer 4.

5.6. Load Balancer Deployment
The following diagram illustrates how the load balancer is deployed with multiple eCopy ShareScan servers.
VIP = Virtual IP Address

5.7. Load Balancer Deployment Modes

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 eCopy ShareScan, Layer 4 DR mode and Layer 4 NAT 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 **Appliance & eCopy ShareScan Server Configuration – Using Layer 4 DR Mode**, for configuring using NAT mode, refer to **Appliance & eCopy ShareScan Server Configuration – Using Layer 4 NAT Mode**.

**Layer 4 DR Mode**

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

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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 Server’s own IP address and the VIP.

The Real Servers 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**. For more information please refer to DR Mode Considerations.

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 with DR mode, e.g. VIP:80 → RIP:8080 is not supported.

DR mode is transparent, i.e. the Real Server will see the source IP address of the client.

### Layer 4 NAT Mode

Layer 4 NAT mode is a high performance solution, although not as fast as layer 4 DR mode. This is because real server responses must flow back to the client via the load balancer rather than directly as with DR mode.
• The load balancer translates all requests from the Virtual Service to the Real Servers.

• NAT mode can be deployed in the following ways:
  
  • **Two-arm (using 2 Interfaces)** (as shown above) - Here, 2 subnets are used. The VIP is located in one subnet and the load balanced Real Servers are located in the other. The load balancer requires 2 interfaces, one in each subnet.

  ![Diagram showing two-arm mode](https://via.placeholder.com/150)

  **Internal Floating IP (virtual)**
  VIP : 192.168.1.20

  **External Floating IP (virtual)**
  VIP : 10.0.0.20

  **Primary** : IP : 192.168.1.21 (internal)
  **Secondary** : IP : 192.168.1.22 (internal)

  **Primary** : IP : 10.0.0.21 (external)
  **Secondary** : IP : 10.0.0.22 (external)

  **Server 1**
  IP : 192.168.1.50
  **GW** : 192.168.1.20 (default gateway)

  **Server 2**
  IP : 192.168.1.60
  **GW** : 192.168.1.20 (default gateway)

  **Firewall**
  10.0.0.31

  **Ethernet Switch, Segment or VLAN**

  **Ethernet Switch, Segment or VLAN**

  **HA Clustered Pair**

  **Note**
  This can be achieved by using two network adapters, or by creating VLANs on a single adapter.

  • Normally `eth0` is used for the internal network and `eth1` is used for the external network although this is optional. Any interface can be used for any purpose.

  • If the Real Servers require Internet access, **Autonat** should be enabled using the WebUI menu option: **Cluster Configuration > Layer 4 - Advanced Configuration**, the external interface should be selected.

  • The default gateway on the Real Servers must be set to be an IP address on the load balancer.

  **Note**
  For an HA clustered pair, a floating IP should be added to the load balancer and used as the Real Server’s default gateway. This ensures that the IP address can ‘float’ (move) between Primary and Secondary appliances.

  • Clients can be located in the same subnet as the VIP or any remote subnet provided they can route to the VIP.

  • **One-arm (using 1 Interface)** - Here, the VIP is brought up in the same subnet as the Real Servers.
To support remote clients, the default gateway on the Real Servers must be an IP address on the load balancer and routing on the load balancer must be configured so that return traffic is routed back via the router.

For an HA clustered pair, a floating IP should be added to the load balancer and used as the Real Server’s default gateway. This ensures that the IP address can ‘float’ (move) between Primary and Secondary appliances.

To support local clients, return traffic would normally be sent directly to the client bypassing the load balancer which would break NAT mode. To address this, the routing table on the Real Servers must be modified to force return traffic to go via the load balancer. For more information please refer to One-Arm (Single Subnet) NAT Mode.

If you want Real Servers to be accessible on their own IP address for non-load balanced services, e.g. RDP, you will need to setup individual SNAT and DNAT firewall script rules for each Real Server or add additional VIPs for this.

Port translation is possible with Layer 4 NAT mode, e.g. VIP:80 → RIP:8080 is supported.

NAT mode is transparent, i.e. the Real Servers will see the source IP address of the client.

### NAT Mode Packet re-Writing

In NAT mode, the inbound destination IP address is changed by the load balancer from the Virtual Service IP address (VIP) to the Real Server. For outbound replies the load balancer changes the source IP address of the Real Server to be the Virtual Services IP address.

The following table shows an example NAT mode setup:

<table>
<thead>
<tr>
<th>Protocol</th>
<th>VIP</th>
<th>Port</th>
<th>RIP</th>
<th>Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCP</td>
<td>10.0.0.20</td>
<td>80</td>
<td>192.168.1.50</td>
<td>80</td>
</tr>
</tbody>
</table>

In this simple example all traffic destined for IP address 10.0.0.20 on port 80 is load-balanced to the real IP address 192.168.1.50 on port 80.

Packet rewriting works as follows:

1) The incoming packet for the web server has source and destination addresses as:
2) The packet is rewritten and forwarded to the backend server as:

<table>
<thead>
<tr>
<th>Source</th>
<th>Destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>x.x.x:34567</td>
<td>10.0.0.20:80</td>
</tr>
</tbody>
</table>

3) Replies return to the load balancer as:

<table>
<thead>
<tr>
<th>Source</th>
<th>Destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>192.168.1.50:80</td>
<td>x.x.x:34567</td>
</tr>
</tbody>
</table>

4) The packet is written back to the VIP address and returned to the client as:

<table>
<thead>
<tr>
<th>Source</th>
<th>Destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0.0.20:80</td>
<td>x.x.x:34567</td>
</tr>
</tbody>
</table>

**Loadbalancer.org Recommended Mode**

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 eCopy ShareScan 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.

### 6. Loadbalancer.org Appliance – the Basics

#### 6.1. Virtual Appliance

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, XEN and Nutanix AHV and has been optimized for each Hypervisor. By default, the VA is allocated 2 vCPUs, 4GB of RAM and has a 20GB 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 [Virtual Appliance Installation](#) and the ReadMe.txt text file included in the VA download for additional information on deploying the VA using the various Hypervisors.

**Note**
The VA has 4 network adapters. For VMware only the first adapter (eth0) is connected by default. For HyperV, KVM, XEN and Nutanix AHV all adapters are disconnected by default. Use the network configuration screen within the Hypervisor to connect the required adapters.

#### 6.2. Initial Network Configuration

After boot up, follow the instructions on the appliance console to configure the management IP address, subnet mask, default gateway, DNS Server and other network settings.
6.3. 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.

Note: A number of compatibility issues have been found with various versions of Microsoft Internet Explorer and Edge. The WebUI has been tested and verified using both Chrome & Firefox.

1. Using a browser, navigate to the following URL:


   You’ll receive a warning about the WebUI’s 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.

2. Log in to the WebUI using the following credentials:

   Username: loadbalancer
   Password: <configured-during-network-setup-wizard>

   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.

**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 taking 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
6.4. Appliance Software Update

To ensure that the appliance(s) are running the latest software version, we recommend a software update check is performed.

Determining the Current Software Version
The software version is displayed at the bottom of the WebUI as shown in the example below:

Checking for Updates using Online Update

1. Using the WebUI, navigate to: Maintenance > Software Update.
2. Select Online Update.
3. If the latest version is already installed, a message similar to the following will be displayed:

   Information: Version v8.9.0 is the current release. No updates are available

4. If an update is available, you'll be presented with a list of new features, improvements, bug fixes and security related updates.
5. Click Online Update to start the update process.

   Note
   Do not navigate away whilst the update is ongoing, this may cause the update to fail.

6. Once complete (the update can take several minutes depending on download speed and upgrade version) the following message will be displayed:

   Information: Update completed successfully.

7. If services need to be reloaded/restarted or the appliance needs a full restart, you'll be prompted accordingly.

Using Offline Update
If the load balancer does not have access to the Internet, offline update can be used.
To perform an offline update:

1. Using the WebUI, navigate to: Maintenance > Software Update.
2. Select Offline Update.
3. The following screen will be displayed:

   ![Software Update Screen](image)

4. Select the Archive and Checksum files.
5. Click Upload and Install.
6. If services need to be reloaded/restarted or the appliance needs a full restart, you'll be prompted accordingly.

### 6.5. Ports Used by the Appliance

By default, the appliance uses the following TCP & UDP ports:

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Port</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCP</td>
<td>22</td>
<td>SSH</td>
</tr>
<tr>
<td>TCP &amp; UDP</td>
<td>53</td>
<td>DNS</td>
</tr>
<tr>
<td>TCP &amp; UDP</td>
<td>123</td>
<td>NTP</td>
</tr>
<tr>
<td>TCP &amp; UDP</td>
<td>161</td>
<td>SNMP</td>
</tr>
<tr>
<td>UDP</td>
<td>6694</td>
<td>Heartbeat between Primary &amp; Secondary appliances in HA mode</td>
</tr>
<tr>
<td>TCP</td>
<td>7778</td>
<td>HAP proxy persistence table replication</td>
</tr>
<tr>
<td>TCP</td>
<td>9080</td>
<td>WebUI - HTTP (disabled by default)</td>
</tr>
<tr>
<td>TCP</td>
<td>9081</td>
<td>Nginx fallback page</td>
</tr>
<tr>
<td>TCP</td>
<td>9443</td>
<td>WebUI - HTTPS</td>
</tr>
</tbody>
</table>
6.6. 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 unit is covered in Configuring HA - Adding a Secondary Appliance.

7. Appliance & eCopy ShareScan Server Configuration – Using Layer 4 DR Mode

**Note**
It’s highly recommended that you have a working eCopy ShareScan environment first before implementing the load balancer and you must ensure that the DNS name points to the load balancer VIP.

7.1. Overview
This is our recommended deployment mode for eCopy ShareScan. It’s ideal when you want the fastest possible deployment and cannot make any network changes on the eCopy ShareScan servers.

7.2. Load Balancer Configuration

**Configure the Network Interface**
1. One interface is required. For more information on configuring network settings please refer to Initial Network Configuration.

**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:

<table>
<thead>
<tr>
<th>Virtual Service</th>
<th>ShareScan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Label</td>
<td>ShareScan</td>
</tr>
<tr>
<td>IP Address</td>
<td>172.24.11.34</td>
</tr>
<tr>
<td>Ports</td>
<td>TCP</td>
</tr>
</tbody>
</table>

3. Enter an appropriate name (Label) for the VIP, e.g. ShareScan.
4. Set the Virtual Service IP address field to the required IP address, e.g. 172.24.11.34.

5. Set the Virtual Service Ports field to *.

6. Leave Protocol set to TCP.

7. Ensure that Forwarding Method is set to Direct Routing.

8. Click Update.

9. Now click Modify next to the newly created Virtual Service.

10. Set Balance Mode (the load balancing algorithm) according to your requirements. “Weighted least connection” is the default and recommended method.

11. Persistence is enabled by default for new layer 4 VIPs and is based on source IP address. The persistence timeout can be set using the Persistence Timeout field, the default is 5 minutes which is normally fine for HTTP/HTTPS traffic.

12. Set the Health Checks Check type menu to Negotiate.

13. Set Check Port to 443.

14. Set Protocol to HTTPS.

15. Ensure that Request to send and Response expected are both blank.

16. Click Update.

**Note**

For eCopy health check you can either monitor ports 8080 or 443 for the Tomcat service (Konica Minolta) or, ports 9600 for web-based devices or 9261 for embedded devices, like Ricoh and Canon as per the table in Ports & Protocols.

**Configure the Real Servers (RIPs)**

1. Using the WebUI, navigate to: Cluster Configuration > Layer 4 – Real Servers and click Add a new Real Server next to the newly created Virtual Service.

2. Enter the following details:
3. Enter an appropriate name (Label) for the first eCopy ShareScan server, e.g. **ShareScan1**.

4. Change the **Real Server IP Address** field to the required IP address, e.g. **172.24.11.32**.

5. Leave other settings at their default values.

6. Click **Update**.

7. Repeat the above steps for your other eCopy ShareScan server(s).

### 7.3. eCopy ShareScan Server Configuration

**Solve the 'ARP Problem'**

As mentioned previously, DR mode works by changing the destination MAC address of the incoming packet to match the selected ShareScan server on the fly which is very fast. When the packet reaches the ShareScan server it expects the ShareScan server to own the Virtual Services IP address (VIP). This means that you need to ensure that the ShareScan server (and the load balanced application) respond to both the ShareScan servers own IP address and the VIP. The ShareScan server should not respond to ARP requests for the VIP. Only the load balancer should do this.

To achieve this, a loopback adapter is added to the ShareScan servers. The IP address is set to be the same as the Virtual Service and the loopback adapter is configured so that it does not respond to ARP requests. Please refer to **Solving the ARP Problem** for full details of solving the ARP problem for Windows 2012 & later.

### 7.4. DR Mode – Key Points

- **You must** solve the ‘ARP Problem’ on all eCopy ShareScan servers in the cluster (please refer to **Solving the ARP Problem** for more information)

- Virtual Services & Real Servers (i.e. the eCopy ShareScan servers) must be within the same switch fabric. They can be on different subnets but this cannot be across a router – this is due to the way DR mode works, i.e. by changing MAC addresses to match the destination server

- Port translation is not possible, e.g. VIP:80 → eCopy ShareScan:82 is not allowed. The port used for the VIP & RIP must be the same

### 7.5. Configure ShareScan server registry settings

The following registry changes should be made on the ShareScan servers:

1. Using the Start menu, enter **regedit** to access the registry.

2. Open/expand the tree on the left pane and select **HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Nuance\ShareScan**.

3. In the right pane, choose the string **ManagerIP**. Double click on it and enter the IP address of the load balancer VIP.

4. Next, right click on the right side pane and select “new string”. Name the new string value as **ClusterNodeIP**. Double click on the new string and enter the IP address of the main network adapter, i.e. the real server IP address.

5. In the left pane, now navigate to **ShareScanManager**. In the right pane, right click and choose **New String** and enter the name **ClusterName**.
6. Double click on **ClusterName** and change the value to the FQDN of the load balancer VIP and click **OK**.

7. Reboot the server to apply the registry changes.

8. **Appliance & eCopy ShareScan Server Configuration – Using Layer 4 NAT Mode**

   **Note**
   It's highly recommended that you have a working eCopy ShareScan environment first before implementing the load balancer.

8.1. Overview

If the load balancer and the eCopy ShareScan servers are not part of the same layer 2 network, then DR mode cannot be used. If you require a high performance solution that is transparent by default (i.e. the client IP address is maintained through the load balancer) then layer 4 NAT mode can be used. Layer 4 NAT mode is also a high performance solution, although not as fast as layer 4 DR mode. This is because eCopy ShareScan server responses must flow back to the client via the load balancer rather than directly as with DR mode.

8.2. Load Balancer Configuration

**Configure the Network Interfaces**

Layer 4 NAT mode is typically used in a 2-arm configuration where the VIP is located in one subnet and the load balanced Real Servers are located in another. This can be achieved by using two network adapters, or by creating VLAN's on a single adapter. Single arm configuration is also supported under certain conditions - for more information please refer to **Layer 4 NAT Mode**.

*To configure an additional network interface for a 2-arm configuration:*

1. Using the WebUI, navigate to **Local Configuration > Network Interface Configuration**.

2. Scroll to the **IP Address Assignment** section.

   ![IP Address Assignment](image.png)

   - eth0: 192.168.86.133/18, MTU: 1500 bytes
   - eth1: 172.24.11.4/24, MTU: 1500 bytes

3. Specify an appropriate IP address for **eth1** in CIDR format as shown above.
4. Click **Configure Interfaces**.

**Note** There are no restrictions on which interface is used for each requirement.

---

**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:

   - **Label**: Enter an appropriate name (Label) for the VIP, e.g. *eCopy NAT VIP*.
   - **IP Address**: Set the **Virtual Service IP address** field to the required IP address, e.g. *192.168.86.134*.
   - **Ports**: Set the **Virtual Service Ports** field to *.
   - **Protocol**: Leave **Protocol** set to *TCP*.
   - **Forwarding Method**: Set the **Forwarding Method** to *NAT*.

3. Click **Update**.

4. Now click **Modify** next to the newly created Virtual Service.

5. Set **Balance Mode** (the load balancing algorithm) according to your requirements. "Weighted least connection" is the default and recommended method.

6. Persistence is enabled by default for new layer 4 VIPs and is based on source IP address. The persistence timeout can be set using the **Persistence Timeout** field, the default is 5 minutes which is normally fine for HTTP/HTTPS traffic.

7. Set **Health Checks Check type** menu to *Negotiate*.

8. Set **Check Port** to *443*.

9. Set **Protocol** to *HTTPS*.
15. Ensure that the fields Request to send and Response expected are blank.

16. Click Update.

For eCopy health check you can either monitor ports 8080 or 443 for the Tomcat service (Konica Minolta) or, ports 9600 for web-based devices or 9261 for embedded devices, like Ricoh and Canon as per the table in Ports & Protocols.

Configure the Real Servers (RIPs)

1. Using the WebUI, navigate to: Cluster Configuration > Layer 4 – Real Servers and click Add a new Real Server next to the newly created Virtual Service.

2. Enter the following details:

   ![Layer 4 Add a new Real Server - Ecopys NAT VIP](image)

   3. Enter an appropriate name (Label) for the first eCopy ShareScan server, e.g. ShareScan1.

   4. Change the Real Server IP Address field to the required IP address, e.g. 172.24.11.32.

   5. Leave the Real Server Port blank.

   6. Leave other settings at their default values.

   7. Click Update.

   8. Repeat the above steps for your other eCopy ShareScan server(s).

Create a Floating IP to use for the eCopy ShareScan server server's Default Gateway

The default gateway on each eCopy ShareScan server server must be configured to be an IP address on the load balancer. It’s possible to use the IP address assigned to the internal facing interface (eth0 in this example) for the default gateway, although it’s recommended that an additional floating IP is created for this purpose. This is required if two load balancers (our recommended configuration) are used. In this scenario if the Primary unit fails, the floating IP will be brought up on the Secondary.

To create a floating IP address on the load balancer:
1. Using the WebUI, navigate to: \textit{Cluster Configuration > Floating IPs}.

2. Enter the required IP address to be used for the default gateway, e.g. 172.24.11.35.

3. Click \textit{Update}.

Once added, there will be two floating IP's, one for the Virtual Service (192.168.86.134) and one for the default gateway (e.g. 172.24.11.35) as shown below:

![Floating IPs](image)

8.3. eCopy ShareScan Server Configuration

\textbf{Default Gateway}

To ensure return traffic passes back to the client via the load balancer, set the default gateway of each eCopy ShareScan server to be the floating IP address added in the previous step, in this example 172.24.11.35.

\textbf{NAT Mode – Key Points}

- Virtual Services & Real Servers (i.e. the eCopy ShareScan servers) must be on different subnets
- The default gateway on the eCopy ShareScan servers should be an IP address on the load balancer (for an HA pair this must be a floating IP address)
- Port translation is possible, e.g. \textit{VIP:80 $\rightarrow$ RIP:8080} is allowed

8.4. Configure ShareScan server registry settings

The following registry changes should be made on the ShareScan servers:

1. Using the Start menu, enter \texttt{regedit} to access the registry.

2. Open/expand the tree on the left pane and select \texttt{HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Nuance\ShareScan}.

3. In the right pane, choose the string \texttt{ManagerIP}. Double click on it and enter the IP address of the load balancer VIP.

4. Next, right click on the right side pane and select "new string". Name the new string value as \texttt{ClusterNodeIP}. Double click on the new string and enter the IP address of the main network adapter, i.e. the real server IP address.

5. In the left pane, now navigate to \texttt{ShareScanManager}. In the right pane, right click and choose \texttt{New String} and enter the name \texttt{ClusterName}.

6. Double click on \texttt{ClusterName} and change the value to the FQDN of the load balancer VIP and click \texttt{OK}. 
7. Reboot the server to apply the registry changes.

8.5. Real Server (eCopy ShareScan) Health Checks

The load balancer performs regular health checks to ensure that each server in the cluster is healthy and able to accept client connections. The health check options at layer 4 have been outlined below.

**Layer 4**

By default, a TCP connect health check is used for newly created layer 4 Virtual Services. The following table lists all options available:

<table>
<thead>
<tr>
<th>Check Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negotiate</td>
<td>Sends a request and looks for a specific response. This option enables the load balancer to perform a more robust check. For example, an HTTP check can be configured that requests a certain page and then looks for a specific word on that page.</td>
</tr>
<tr>
<td>Connect to port</td>
<td>Just do a simple connect to the specified port/service &amp; verify that it’s able to accept a connection.</td>
</tr>
<tr>
<td>Ping server</td>
<td>Sends an ICMP echo request packet to the Real Server.</td>
</tr>
<tr>
<td>External check</td>
<td>Use a custom script for the health check.</td>
</tr>
<tr>
<td>No checks, always Off</td>
<td>All Real Servers are off.</td>
</tr>
<tr>
<td>No checks, always On</td>
<td>All Real Servers are on (no checking).</td>
</tr>
<tr>
<td>5 Connects, 1 Negotiate</td>
<td>Do 5 connect checks and then 1 negotiate check.</td>
</tr>
<tr>
<td>10 Connects, 1 Negotiate</td>
<td>Do 10 connect checks and then 1 negotiate check.</td>
</tr>
</tbody>
</table>

For full details on the options available, please refer to [Real Server Health Monitoring & Control](#).

8.6. Server Feedback Agent

The load balancer can modify the weight (amount of traffic) of each server by gathering data from either a custom agent or an HTTP server. For layer 4 VIPs the feedback method can be set to either agent or HTTP, for Layer 7 VIPs, only the agent method is supported.

A telnet to port 3333 on a Real Server with the agent installed will return the current idle stats as an integer value in the range 0 – 100. The figure returned can be related to CPU utilization, RAM usage or a combination of both. This can be configured using the XML configuration file located in the agents installation folder (by default `C:\ProgramData\LoadBalancer.org\LoadBalancer`).

The load balancer typically expects a 0-99 integer response from the agent which by default relates to the current CPU idle state, e.g. a response of 92 would imply that the Real Servers CPU is 92% idle. The load balancer will then use the formula (92/100*requested_weight) to find the new optimized weight.

*Note* The 'Requested Weight' is the weight set in the WebUI for each Real Server. For more
Agent Download

The latest Windows feedback agent can be downloaded from here. To install the agent, run loadbalanceragent.msi on each eCopy ShareScan Server:

Leave the default location or change according to your requirements, click Next.

Leave the default location or change according to your requirements, click Next.
Click **Install** to start the installation process.

Click **Finish**.

**Note** The agent should be installed on all eCopy ShareScan Servers in the cluster.

**Starting the Agent**

Once the installation has completed, you'll need to start the service on the Real Servers. The service is controlled by the Feedback Agent monitor & control program that is also installed along with the Agent. This can be accessed on the Windows server from: *Start > Loadbalancer.org > Loadbalancer.org Feedback Agent*. It's also possible to start the service using the services snap-in – the service is called 'LBCPUMon'.
To start the service, click the **Start** button.

To stop the service, click the **Stop** button.

**Configuration**

To Configure Virtual Services to use the feedback agent, follow the steps below:

1. Using the WebUI, navigate to **Cluster Configuration > Layer 4 Virtual Services** and click **Modify** next to the Virtual Service.

2. Change the Feedback Method to **Agent**.

3. Click **Update**.

4. Reload/Restart services as prompted.

**8.7. Load Balancer Transparency**

**Layer 4**

Both Layer 4 DR mode and layer 4 NAT mode are transparent by default. This means that ShareScan will log the actual IP address of the client rather than the IP address of the load balancer.

**9. Testing & Verification**

For additional guidance on diagnosing and resolving any issues you may have, please also refer to **Diagnostics & Troubleshooting**.

**9.1. Using the System Overview**

The System Overview can be accessed via the WebUI. It shows a graphical view of all VIPs & RIPs (i.e. the eCopy
ShareScan servers) and shows the state/health of each server as well as the state of the cluster as a whole. The example below shows that all ShareScan servers are healthy (green) and available to accept connections:

If one of the servers within the cluster fails its health check, that server will be colored red and the cluster will be colored yellow as shown below:

Make sure that all servers are up (green) and verify that clients can connect to the VIP and access all load balanced services.

### Note
Make sure that DNS points at the VIP rather than individual servers.

#### 9.2. Using the eCopy ShareScan Troubleshooting Tool

eCopy ShareScan has an application troubleshooting tool that can be utilised to test connectivity via the load balancer VIP to the eCopy Sharescan real servers. As such, to initiate the troubleshooter follow the defined steps below.

1. Start ShareScan Troubleshooter on all Sharescan server nodes and one Sharescan client that has access to the Sharescan load balanced VIP.
2. On the ShareScan server nodes click the Advanced drop down menu > Network tests > Server side network test. It will automatically start listening on port 9600.
3. On the non-load balanced client PC click the Advanced drop down menu > Network tests > Client side network test.
4. Enter the ShareScan Virtual IP into the Server address / hostname, and click Connect.
5. The request should now connect to one of the Sharescan servers via the load balancer VIP resulting in a
connection message in one of the open dialogues on one of the servers.

6. Confirm that the IP shown by the connection message is the IP of the client PC and NOT the IP of the load balancer.

10. 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.

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 eCopy ShareScan server to be able to receive traffic destined for the VIP, and ensuring that each eCopy ShareScan 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, steps must be taken to set the strong/weak host behavior on each Real Server. This is used to either prevent or allow interfaces to receive packets destined for a different interface on the same server.

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.

![Add Hardware Window](image)
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.

**IPv4 Addresses**

1. Uncheck all items except 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:
3. Click OK then click Close to save and apply the new settings.

IPv6 Addresses

1. Uncheck all items except Internet Protocol Version 6 (TCP/IPv6) 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.
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:

![Internet Protocol Version 6 (TCP/IPv6) Properties](image)

**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
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:

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:

```plaintext
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:

```plaintext
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:
12.2. Configuring HA - Adding a Secondary Appliance

Our recommended configuration is to use a clustered HA pair of load balancers to provide a highly available and resilient load balancing solution.

We recommend that the Primary appliance is configured first and then the Secondary should be added. Once the Primary and Secondary are paired, all load balanced services configured on the Primary are automatically replicated to the Secondary over the network using SSH/SCP.

For Enterprise Azure, the HA pair should be configured first. In Azure, when creating a VIP using an HA pair, 2 private IPs must be specified – one for the VIP when it’s active on the Primary and one for the VIP when it’s active on the Secondary. Configuring the HA pair first, enables both IPs to be specified when the VIP is created.

The clustered HA pair uses Heartbeat to determine the state of the other appliance. Should the active device (normally the Primary) suffer a failure, the passive device (normally the Secondary) will take over.

Non-Replicated Settings

A number of settings are not replicated as part of the Primary/Secondary pairing process and therefore must be manually configured on the Secondary appliance. These are listed by WebUI menu option in the table below:

<table>
<thead>
<tr>
<th>WebUI Main Menu Option</th>
<th>Sub Menu Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Configuration</td>
<td>Hostname &amp; DNS</td>
<td>Hostname and DNS settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Network Interface Configuration</td>
<td>All network settings including IP address(es), bonding configuration and VLANs</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Routing</td>
<td>Routing configuration including default gateways and static routes</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>System Date &amp; time</td>
<td>All time and date related settings</td>
</tr>
<tr>
<td>WebUI Main Menu Option</td>
<td>Sub Menu Option</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Physical – Advanced Configuration</td>
<td>Various settings including Internet Proxy, Management Gateway, Firewall connection tracking table size, NIC offloading, SMTP relay, logging and Syslog Server</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Security</td>
<td>Appliance security settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>SNMP Configuration</td>
<td>Appliance SNMP settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Graphing</td>
<td>Appliance graphing settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>License Key</td>
<td>Appliance licensing</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Software Updates</td>
<td>Appliance software update management</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Firewall Script</td>
<td>Appliance firewall (iptables) configuration</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Firewall Lockdown Wizard</td>
<td>Appliance management lockdown settings</td>
</tr>
</tbody>
</table>

**Important**

Make sure that if these settings/updates have been configured on the Primary appliance, they're also configured on the Secondary appliance.

**Adding a Secondary Appliance - Create an HA Clustered Pair**

**Note**

If you have already run the firewall lockdown wizard on either appliance, you’ll need to ensure that it is temporarily disabled on both appliances whilst performing the pairing process.

1. Deploy a second appliance that will be the Secondary and configure initial network settings.

2. Using the WebUI on the Primary appliance, navigate to: **Cluster Configuration > High-Availability Configuration**.

3. Specify the IP address and the *loadbalancer* user’s password for the Secondary (peer) appliance as shown in the example above.
4. Click **Add new node**.

5. The pairing process now commences as shown below:

![Create a Clustered Pair](image)

6. Once complete, the following will be displayed on the Primary appliance:

![High Availability Configuration - primary](image)

7. To finalize the configuration, restart heartbeat and any other services as prompted in the "Commit changes" message box at the top of the screen.

---

**Note**

Clicking the **Restart Heartbeat** button on the Primary appliance will also automatically restart heartbeat on the Secondary appliance.

**Note**

For more details on configuring HA with 2 appliances, please refer to [Appliance Clustering for HA](#).

**Note**

For details on testing and verifying HA, please refer to [Clustered Pair Diagnostics](#).
## 13. Document Revision History

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Change</th>
<th>Reason for Change</th>
<th>Changed By</th>
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<td>Initial draft</td>
<td>Initial draft</td>
<td>IBG, AH</td>
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<td>Health checks updated</td>
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<td>Health checks updated</td>
<td>IBG</td>
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<td>3 September 2020</td>
<td>New title page</td>
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<td></td>
<td>Updated Canadian contact details</td>
<td></td>
<td></td>
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<tr>
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<td>1 November 2021</td>
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<td>Move to new documentation system</td>
<td>AH, RJC, ZAC</td>
</tr>
<tr>
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<td>5 January 2023</td>
<td>Updated Testing &amp; Verification section</td>
<td>General Improvements</td>
<td>RJC</td>
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<tr>
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<td>5 January 2023</td>
<td>Combined software version information into one section</td>
<td>Housekeeping across all documentation</td>
<td>AH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Added one level of section numbering</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Added software update instructions</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Added table of ports used by the appliance</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reworded ‘Further Documentation’ section</td>
<td></td>
<td></td>
</tr>
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<td>2 February 2023</td>
<td>Updated screenshots</td>
<td>Branding update</td>
<td>AH</td>
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<td>Updates across all documentation</td>
<td>AH</td>
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<td>24 March 2023</td>
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<td>Branding update</td>
<td>AH</td>
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<tr>
<td></td>
<td></td>
<td>Modified diagram colours</td>
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</table>
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