Load Balancing VMware Horizon

Version 1.3.0
# Table of Contents

1. About this Guide ................................................................. 4  
   2. Loadbalancer.org Appliances Supported .......................... 4  
   3. Software Versions Supported ....................................... 4  
      3.1. Loadbalancer.org Appliance .................................. 4  
      3.2. VMware Horizon .................................................. 4  
   4. VMware Horizon .......................................................... 4  
   5. VMware Horizon Servers to be Load Balanced ............... 4  
   6. VMware Horizon Protocols ......................................... 5  
      6.1. Primary Horizon Protocol (Phase 1) ....................... 5  
      6.2. Secondary Horizon Protocols (Phase 2) ............... 5  
   7. Load Balancing VMware Horizon .................................. 5  
      7.1. Port Requirements ............................................. 6  
      7.2. Persistence (aka Server Affinity) .......................... 6  
      7.3. SSL Certificates .............................................. 7  
      7.4. SSL Offload .................................................... 7  
   8. Load Balancer Deployment Options ............................... 8  
      8.1. External Clients ............................................. 8  
         External Clients – Option 1 .................................. 8  
         External Clients – Option 2 .................................. 9  
         External Clients – Option 3 .................................. 9  
      8.2. Internal Clients .............................................. 10  
   9. Network Topology Used for this Guide ......................... 11  
   10. Loadbalancer.org Appliance – the Basics .................... 11  
       10.1. Virtual Appliance ........................................... 11  
       10.2. Initial Network Configuration ............................ 12  
       10.3. Accessing the WebUI ...................................... 12  
         Main Menu Options ........................................... 13  
       10.4. Appliance Software Update ................................ 14  
         Determining the Current Software Version .............. 14  
         Checking for Updates using Online Update ............ 14  
         Using Offline Update ........................................ 15  
       10.5. Ports Used by the Appliance .............................. 15  
       10.6. HA Clustered Pair Configuration ......................... 16  
   11. Configuring for External Clients ................................ 16  
       11.1. Option 1 ..................................................... 16  
         Connection Server Configuration .......................... 16  
         UAG Configuration ............................................. 18  
         Load Balancer Configuration ................................. 19  
       11.2. Option 2 ..................................................... 21  
         Connection Server Configuration .......................... 21  
         UAG Configuration ............................................. 21  
         Load Balancer Configuration ................................. 23  
         Port Requirements ............................................. 23  
       11.3. Option 3 ..................................................... 28  

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1</td>
<td>Connection Server Configuration</td>
<td>33</td>
</tr>
<tr>
<td>12.2</td>
<td>Load Balancer Configuration</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Configuring The VIP &amp; RIPs for the Primary Protocol (source IP persistence)</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Configuring the VIP &amp; RIPs for the Primary Protocol (Cookie persistence)</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Configure Remaining Load Balancer Settings &amp; Reload Services</td>
<td>37</td>
</tr>
<tr>
<td>13.1</td>
<td>Client Protocol Testing</td>
<td>38</td>
</tr>
<tr>
<td>13.2</td>
<td>Using System Overview</td>
<td>38</td>
</tr>
<tr>
<td>13.3</td>
<td>Layer 4 Current Connections Report</td>
<td>39</td>
</tr>
<tr>
<td>13.4</td>
<td>Layer 4 Status Report</td>
<td>39</td>
</tr>
<tr>
<td>13.5</td>
<td>Layer 7 Statistics Report</td>
<td>40</td>
</tr>
<tr>
<td>13.6</td>
<td>Appliance Logs</td>
<td>40</td>
</tr>
<tr>
<td>14.</td>
<td>Technical Support</td>
<td>40</td>
</tr>
<tr>
<td>15.</td>
<td>Further Documentation</td>
<td>40</td>
</tr>
<tr>
<td>16.</td>
<td>Appendix</td>
<td>41</td>
</tr>
<tr>
<td>16.1</td>
<td>Configuring an HTTP to HTTPS redirect</td>
<td>41</td>
</tr>
<tr>
<td>16.2</td>
<td>Configuring HA - Adding a Secondary Appliance</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>Non-Replicated Settings</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>Adding a Secondary Appliance - Create an HA Clustered Pair</td>
<td>42</td>
</tr>
<tr>
<td>17.</td>
<td>Document Revision History</td>
<td>45</td>
</tr>
</tbody>
</table>
1. About this Guide

This guide details the steps required to configure a load-balanced VMware Horizon environment utilizing Loadbalancer.org appliances. It covers the configuration of the load balancers and also any VMware Horizon configuration changes that are required to enable load balancing.

Note: If you want to load balance VMware Horizon v6.1 & earlier (with Security Server) please refer to our VMware View Deployment Guide.

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 VMware Horizon. 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. VMware Horizon

- v6.2 and later

4. VMware Horizon

VMware Horizon (formerly VMware Horizon View) is a virtual desktop infrastructure (VDI) solution that simplifies desktop management and provides users with access to these desktops when needed, from virtually any device, whatever their location.

5. VMware Horizon Servers to be Load Balanced

<table>
<thead>
<tr>
<th>Server</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection Server</td>
<td>Horizon Connection Server acts as a broker for client connections by authenticating and then directing incoming user requests to the appropriate remote desktops and applications.</td>
</tr>
</tbody>
</table>
### Server | Purpose
---|---
**Security Server** | A security server is an instance of a Connection Server that is installed in the DMZ. It adds an additional layer of security between the Internet and the internal network. Each Security Server must be paired with a Connection Server and forwards all traffic to that instance.

**Access Point** | Access Point is a hardened Linux based appliance introduced in v6.2 as an alternatively to Security Server.

**Unified Access Gateway** | Access Point was renamed Unified Access Gateway in Horizon v7.0. UAG is now the preferred option over Security Server.

---

*Note*  
This guide covers configuring load balancing for Connection Servers and Unified Access Gateways (UAGs).

### 6. VMware Horizon Protocols

When a VMware Horizon Client user connects to a Horizon environment, several different protocols are used. The first connection is always the primary XML-API protocol over HTTPS. Following successful authentication, one or more secondary protocols are also made.

#### 6.1. Primary Horizon Protocol (Phase 1)

The user enters a hostname at the Horizon Client and this starts the primary Horizon protocol. This is a control protocol for authentication, authorization and session management. It uses XML structured messages over HTTPS. This protocol is sometimes known as the Horizon XML-API control protocol. In a load balanced environment, the load balancer distributes client connections across the available set of UAGs.

#### 6.2. Secondary Horizon Protocols (Phase 2)

After the Horizon Client has established secure communication to one of the UAG appliances, the user authenticates. If this authentication attempt is successful, then one or more secondary connections are made from the Horizon client. These secondary connections can include:

- HTTPS Tunnel used for encapsulating TCP protocols such as RDP, MMR/CDR and the client framework channel (TCP 443)
- Blast display protocol (TCP/UDP 443 & TCP/UDP 8443)
- PCoIP display protocol (TCP/UDP 4172)

These secondary Horizon protocols must be routed to the same UAG appliance to which the primary Horizon protocol was routed. The reason for this is so that UAG can authorize the secondary protocols based on the authenticated user session. If the secondary protocols were to be misrouted to a different UAG appliance to the primary protocol one, they would not be authorized and would therefore be dropped in the DMZ and the connection would fail.

### 7. Load Balancing VMware Horizon
It's highly recommended that you have a working VMware Horizon environment first before implementing the load balancer.

The diagram below illustrates where the load balancers are positioned in a typical deployment. With the older VMware Horizon View architecture, each Security Server had to be paired with a Connection Server. This pairing required the Connection Server to be in tunnel mode, which meant it was not suitable for internal client connections, so two sets of Connection Servers were needed. UAG is not paired, so only one set of Connection Servers is needed for both external and internal clients.

We recommend that a clustered pair of load balancers is deployed rather than a single appliance to avoid introducing a single point of failure.

### 7.1. Port Requirements

The following table shows the ports that are load balanced:

<table>
<thead>
<tr>
<th>Port</th>
<th>Transport Protocol</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>443</td>
<td>TCP</td>
<td>Various HTTPS traffic</td>
</tr>
<tr>
<td>443</td>
<td>TCP &amp; UDP</td>
<td>Blast</td>
</tr>
<tr>
<td>4172</td>
<td>TCP &amp; UDP</td>
<td>PCoIP</td>
</tr>
<tr>
<td>8443</td>
<td>TCP &amp; UDP</td>
<td>Blast</td>
</tr>
</tbody>
</table>

Some of the above ports may not be used in all scenarios. For simplicity when setting up the load balancer and to ensure all scenarios are covered, all are included.

For full details of ports used under various scenarios, please refer to the following URLs:

TCP and UDP Ports Used by Clients and Agents

UAG Documentation Reference

### 7.2. Persistence (aka Server Affinity)
External Clients
Source IP address or cookie based persistence can be used to ensure all primary protocol connections are handled by the same UAG. For simplicity, source IP address persistence is recommended where possible. Typically, the only time source IP persistence is not appropriate is when clients are located behind a NAT device that hides their IP addresses. Secondary protocol connections must be handled by the same UAG to which the primary protocol was routed. This can be achieved in various ways as described in Load Balancer Deployment Options: External Clients.

Internal Clients
Source IP address or cookie based persistence can be used to ensure all primary protocol connections are handled by the same Connection Server. For simplicity, source IP address persistence is recommended where possible. Typically, the only time source IP persistence is not appropriate is when clients are located behind a NAT device that hides their IP addresses. Secondary protocol connections are direct from client to Connection Server.

7.3. SSL Certificates
Wild card certificates and SAN based certificates are supported for VMware Horizon. In this guide, the SSL certificate was obtained from an internal CA. The common name was set to horizon.lbtestdom.com and SANs were added for the hostname of each Connection Server and UAG. For more information on using, configuring and troubleshooting SSL certificates for Horizon servers, please refer to the following links: Configuring SSL Certificates for Horizon 7 Servers, Setting Up SSL Certificates for Horizon.

7.4. SSL Offload
Terminating SSL on the load balancer is only necessary when using cookie based persistence for the primary protocol connections. Cookie based persistence is only needed when source IP address persistence cannot be used due to inline NAT/proxy devices hiding client source IP addresses. If SSL offload is used, the load balancer and the UAGs must have the same certificate as mentioned here.

7.5. Load Balancer Deployment Modes
The primary protocol is TCP/HTTPS based, so either layer 7 or layer 4 methods can be used. The secondary protocols use both TCP & UDP so only layer 4 methods are supported. Layer 4 NAT mode and layer 7 SNAT mode are used for the configurations presented in this guide.

Note
Layer 4 DR mode is not supported for UAG. This is because UAG is a hardened appliance based on Linux which has been locked down by VMware. This means that modifying the UAGs to solve the ARP issue becomes more complex and may cause unforeseen issues.

7.6. Server Health Checks
The load balancer is configured to check the health of each Connection Server and UAG by periodically sending an HTTPS GET /favicon.ico request. It will perform this HTTPS GET and expect a "200 OK" response. If it receives a response other than "200 OK" or doesn’t get any response, that server will be marked as down and will not attempt to route client requests to it. It will continue to poll so that it can detect when it is available again.
8. Load Balancer Deployment Options

The load balancer can be configured in various ways to support internal and external clients.

8.1. External Clients

As explained in Secondary Horizon Protocols (Phase 2) the key requirement for external clients is that the secondary protocols must be sent to the same UAG as the primary protocol. This guide presents 3 options to achieve this. These are explained below. Please also refer to this VMware URL for additional information.

External Clients – Option 1

The load balancer uses a single VIP configured with source IP address persistence to load balance the primary protocol to one of the UAGs. The client connection URLs on each UAG (Option 1: UAG Configuration) are configured so that secondary protocols are also sent to the VIP for load balancing to the same UAG.

This option is recommended for all environments where source IP address persistence is possible. Where it’s not possible (typically due to in-line NAT devices hiding client source IP addresses), then either option 2 or option 3 should be used.

Key Points:

- Requires a single public IP address
- All traffic passes via the load balancer

Notes

1. The load balancer requires one network interface.
2. The UAGs are configured with 2 NICs.
3. The VIP is configured in Layer 4 NAT mode using source IP persistence.
4. The default gateway of the UAGs must be the load balancer, for a clustered pair of load balancers (Primary &
Secondary) this should be a floating IP address to allow failover.

5. The default gateway of the load balancer is the external firewall.

6. Please refer to Configuring for External Clients: Option 1 for UAG and load balancer configuration guidance.

External Clients – Option 2
The load balancer uses a single VIP configured with either source IP address or cookie persistence to load balance the primary protocol to one of the UAGs. The client connection URLs on each UAG (Option 2: UAG Configuration) are configured so that secondary protocols are sent directly to the same UAG, bypassing the load balancer.

Key Points:

- Requires multiple public IP addresses – one for the VIP, one for each UAG.
- Only the primary protocol is load balanced, secondary protocols go direct to the UAGs.

Notes

1. The load balancer requires one network interface.
2. The UAGs are configured with 2 NICs.
3. The VIP is configured in Layer 7 SNAT mode using either source IP address or cookie based persistence.
4. The default gateway of the UAGs is the external firewall.
5. The default gateway of the load balancer is the external firewall.
6. Please refer to Configuring for External Clients: Option 2 for UAG and load balancer configuration guidance.

External Clients – Option 3
The load balancer uses one VIP configured with either source IP address or cookie persistence to load balance the primary protocol to one of the UAGs. The client connection URLs on each UAG (Option 3: UAG Configuration) are configured so that secondary protocols are sent to the same UAG via additional VIPs on unique port numbers.
Key Points:

- Requires a single public IP address (VIP1 – VIP7 use the same IP address).
- All traffic passes via the load balancer.
- Uses non standard ports for external client connections (example ports are shown, any appropriate ports can be used).

Notes

1. The load balancer requires one network interface.
2. The UAGs are configured with 2 NICs.
3. VIP1 is configured in Layer 7 SNAT mode using either source IP address or cookie based persistence.
4. VIPs 2 to 7 are configured in Layer 4 NAT mode.
5. The default gateway of the UAGs must be the load balancer, for a clustered pair of load balancers (Primary & Secondary) this should be a floating IP address to allow failover.
6. The default gateway of the load balancer is the external firewall.
7. Please refer to Configuring for External Clients: Option 3 for UAG and load balancer configuration guidance.

8.2. Internal Clients

Internal clients connect directly to the Connection Servers located on the LAN.
Key Points:

- Only the primary protocol is load balanced, secondary protocols go direct to the virtual desktops.

Notes

1. The load balancer requires one interface.
2. The VIP is configured in Layer 7 SNAT mode using either source IP address or cookie based persistence.
3. Please refer to Configuring for Internal Clients for server and load balancer configuration guidance.

9. Network Topology Used for this Guide

The diagram below shows the network topology used for this deployment guide. Clustered Pair 1 in the DMZ is used to load balance external clients connecting to the UAGs, and clustered Pair 2 on the LAN is used to load balance internal clients connecting to the Connection Servers.

10. Loadbalancer.org Appliance – the Basics

10.1. 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.

10.2. 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.

Important
Be sure to set a secure password for the load balancer, when prompted during the setup routine.

10.3. Accessing the 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:


Note
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, RIPv 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
Live Chat - Start a live chat session with one of our Support Engineers

10.4. 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:
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.

**Note**

Please contact support@loadbalancer.org to check if an update is available and obtain the latest offline update files.

**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**

   **Offline Update**

   The following steps will lead you through offline update.

   1. Contact loadbalancer.org support to obtain the offline update archive and checksum.
   2. Save the archive and checksum to your local machine.
   3. Select the archive and checksum files in the upload form below.
   4. Click *Upload and Install* to begin the update process.

   *Archive: Choose File* No file chosen
   *Checksum: Choose File* No file chosen
   ![Upload and Install button]

   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.

**10.5. 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>Protocol &amp; Port</td>
<td>Protocol</td>
<td>Port</td>
</tr>
<tr>
<td>----------------</td>
<td>--------------</td>
<td>------</td>
</tr>
<tr>
<td>TCP &amp; UDP</td>
<td>TCP</td>
<td>161</td>
</tr>
<tr>
<td>UDP</td>
<td>UDP</td>
<td>6694</td>
</tr>
<tr>
<td>TCP</td>
<td>TCP</td>
<td>7778</td>
</tr>
<tr>
<td>TCP</td>
<td>TCP</td>
<td>9080</td>
</tr>
<tr>
<td>TCP</td>
<td>TCP</td>
<td>9081</td>
</tr>
<tr>
<td>TCP</td>
<td>TCP</td>
<td>9443</td>
</tr>
</tbody>
</table>

10.6. 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.

11. Configuring for External Clients

11.1. Option 1
The configuration presented in this section relates to the topology described in External Clients – Option 1.

Connection Server Configuration
For each Connection Server, complete the following steps:

Step 1 – Configure General Settings
Un-check the 3 boxes as shown above. These options are not required when using UAG. These options only need to be set when a security server is paired with the Connection Server.

**Step 2 - Enable HTML Access via the Load Balancer**

Connection Servers that are directly behind a load balancer or load-balanced gateway must know the address by which browsers will connect to the load balancer when users use HTML Access. On each Connection Server complete the following steps:

1. Create or edit the `locked.properties` file in the SSL gateway configuration folder, i.e.

   `software\Install folder\VMware\VMware View\Server\sslgateway\conf\locked.properties`

2. Add the `balancedHost` property and set it to the address that users type for HTML Access. For example, if users type `https://horizon.example.com`, add the following entry to the file:

   `balancedHost=horizon.example.com` *(Note: "balancedHost" is case sensitive!)*

3. Save the `locked.properties` file.

4. Restart the Connection Server service to apply the changes.

If the above steps are not completed, you’ll receive the following error when connecting via a browser:
## UAG Configuration

### Horizon Settings

<table>
<thead>
<tr>
<th>Setting</th>
<th>Status</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enable Horizon</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Connection Server URL</td>
<td></td>
<td><a href="https://192.168.112.206">https://192.168.112.206</a></td>
</tr>
<tr>
<td>Connection Server URL Thumbprint</td>
<td></td>
<td>sha1-8c0d867b596214a3e27a024a8505bf6d8e84</td>
</tr>
<tr>
<td>Enable PCoIP</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>PCoIP External URL</td>
<td></td>
<td>10.200.251.206:4172</td>
</tr>
<tr>
<td>Enable Blast</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Blast External URL</td>
<td></td>
<td><a href="https://horizon.lbtestdom.com:8443">https://horizon.lbtestdom.com:8443</a></td>
</tr>
<tr>
<td>Enable UDP Tunnel Server</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Tunnel External URL</td>
<td></td>
<td><a href="https://horizon.lbtestdom.com:443">https://horizon.lbtestdom.com:443</a></td>
</tr>
</tbody>
</table>

### Step 1 – Configure URLs

The various URLs must be configured on each UAG as shown above. To access the UAG Web Interface use: https://<uag-ip>:9443/admin.

1. Configure the Connection Server URL to be the VIP address of the load balanced Connection Servers on the internal load balancer, in this guide [https://192.168.112.206](https://192.168.112.206).
2. Configure the PCoIP External URL to be the public IP address of the VIP on the load balancer, in this guide 10.200.251.206:4172.
3. Configure the Blast External URL to be the FQDN that external clients use to connect, in this guide [https://horizon.lbtestdom.com:8443](https://horizon.lbtestdom.com:8443), this should resolve to the public IP address of the VIP on the load balancer.
4. Configure the Tunnel External URL to be the FQDN that external clients use to connect, in this guide [https://horizon.lbtestdom.com:443](https://horizon.lbtestdom.com:443), this should resolve to the public IP address of the VIP on the load balancer.
Steps 2 – 4 above illustrate that clients connect via the load balancer for all secondary protocols.

Step 2 - Configure the Default Gateway on the UAGs

**Note** Return traffic MUST pass back via the load balancer for layer 4 NAT mode to operate.

1. Set the default gateway on each UAG to be an address on the load balancer. This address should be a floating IP address to enable failover when using a clustered pair as described in the Load Balancer Configuration section (Step 2) below.

**Note** The default gateway can be set at UAG deployment, or later by using the UAG’s Admin UI as mentioned here.

Load Balancer Configuration

The load balancer is used for both the primary and secondary protocols.

Port Requirements

The following table shows the ports that are load balanced:

<table>
<thead>
<tr>
<th>Port</th>
<th>Transport Protocol</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>443</td>
<td>TCP</td>
<td>Various HTTPS traffic</td>
</tr>
<tr>
<td>443</td>
<td>TCP &amp; UDP</td>
<td>Blast</td>
</tr>
<tr>
<td>4172</td>
<td>TCP &amp; UDP</td>
<td>PCoIP</td>
</tr>
<tr>
<td>8443</td>
<td>TCP &amp; UDP</td>
<td>Blast</td>
</tr>
</tbody>
</table>

Step 1 - Configure the Virtual Service & Real Servers

a) Setting up the Virtual Service

1. Using the WebUI, navigate to: Cluster Configuration > Layer 4 – Virtual Service and click Add a New Virtual Service.

2. Enter the following details:
3. Enter an appropriate label (name) for the VIP, e.g. **HorizonExternal**.

4. Set the **Virtual Service IP address** field to the required IP address, e.g. **10.200.251.206**.

5. Set the **Virtual Service Ports** field to **443,4172,8443**.

6. Set the **Protocol** to TCP/UDP.

7. Set the **Forwarding Method** to **NAT**.

8. Click **Update**.

9. Now click **Modify** next to the newly created VIP.

10. Ensure **Persistence** is enabled and set **Persistence Timeout** to **36000** (i.e. 10 hour).

    **Note** As mentioned [here](#) the value set should match the **Forcibly disconnect users** setting under Global Settings for the Connection Server (the default value for this is 10 hours).

11. Set **Check Type** to **Negotiate**.

12. Set **Check Port** to **443**.

13. Set **Protocol** to HTTPS.

14. Set **Request to send** to **favicon.ico**.

15. Leave **Response expected** blank.

16. Click **Update**.

b) Setting up the Real 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:

   ![Real Server Configuration]

   3. Enter an appropriate label for the RIP, e.g. **UAG1**.

   4. Change the **Real Server IP Address** field to the required IP address, e.g. **10.200.251.10**.
5. Leave the **Real Server Port** field blank.

6. Click **Update**.

7. Repeat the above steps to add your other UAG(s).

**Step 2 - Add a Floating IP Address to the Load Balancer to be used as the UAGs Default Gateway**

Using the WebUI option: **Cluster Configuration > Floating IP’s** add a Floating IP that can be used as the default gateway for the UAGs. Using a floating IP will ensure that the IP address is available when a clustered pair is used, and a failover to the Secondary has occurred. This floating IP should be an additional IP address that is dedicated to this purpose.

**Step 3 - Configure the Default Gateway on the Load Balancer**

Using the WebUI option: **Local Configuration > Routing** set the default gateway to be the internal interface of the external firewall, e.g. **10.200.251.254**.

**Step 4 - Configure HTTP to HTTPS Redirection**

If required, the load balancer can be configured to automatically redirect clients who attempt to connect to http://<Horizon URL> to https://<Horizon URL>.

When SSL is terminated on the real servers, a separate VIP is required to handle this. For details on setting this up, please refer to Configuring an HTTP to HTTPS redirect.

**11.2. Option 2**

The configuration presented in this section relates to the topology described in **External Clients – Option 2**.

**Connection Server Configuration**

Follow the Connection Server configuration steps in **Option 1 - Connection Server Configuration**.

**UAG Configuration**
## Step 1 – Configure URLs

The various URLs must be configured on each UAG as shown above. To access the UAG Web Interface use: https://<uag-ip>:9443/admin.

1. Configure the **Connection Server URL** to be the VIP address of the load balanced Connection Servers on the internal load balancer, in this guide https://192.168.112.206.

2. Configure the **PCoIP External URL** to be the public IP address of the UAG, in this guide 10.200.251.10:4172.

3. Configure the **Blast External URL** to be the FQDN of the UAG, in this guide https://uag1.lbtestdom.com:8443, this should resolve to the public IP address of the UAG.

4. Configure the **Tunnel External URL** to be the FQDN of the UAG, in this guide https://uag1.lbtestdom.com:443, this should resolve to the public IP address of the UAG.

### Note
Steps 2 – 4 above illustrate that clients connect directly to the UAGs for all secondary protocols, bypassing the load balancer. Using FQDNs for steps 3 & 4 rather than IP addresses avoids certificate related errors. For a SAN certificate, make sure you include the FQDN of each UAG.

## Step 2 - Configure the default gateway on the UAGs

1. Set the default gateway on each UAG to be the external firewall.

### Note
The default gateway can be set at UAG deployment, or later by using the UAG's Admin UI as mentioned here.
Load Balancer Configuration

The load balancer is used for the primary protocol only, secondary protocols pass directly from client to the UAGs. Source IP address persistence is recommended if there are no inline NAT devices between the clients and the VIP – see the section below for configuration steps. If there are inline NAT devices, cookie based persistence can be used – please see Configuring the VIP & RIPS for the Primary Protocol (using cookie persistence).

Port Requirements

The following table shows the ports that are load balanced:

<table>
<thead>
<tr>
<th>Port</th>
<th>Transport Protocol</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>443</td>
<td>TCP</td>
<td>Various HTTPS traffic</td>
</tr>
</tbody>
</table>

Configuring the VIP & RIPS for the Primary Protocol (using source IP persistence)
a) Setting up the Virtual Service

1. Using the WebUI, navigate to: Cluster Configuration > Layer 7 – Virtual Services and click Add a New Virtual Service.
2. Enter the following details:

   ![Layer 7 - Add a new Virtual Service](https://loadbalancer.org/images/layer7-add-new-virtual-service.png)

   3. Enter an appropriate label for the VIP, e.g. HorizonExternal.
   4. Set the Virtual Service IP address field to the required IP address, e.g. 10.200.251.206.
   5. Set the Virtual Service Ports field to 443.
   7. Click Update.
   8. Now click Modify next to the newly created VIP*.
   9. Set Health Checks to Negotiate HTTPS.
   10. Set Check Port to 443.
   11. Set Request to send to favicon.ico.
12. Leave *Response expected* blank.

13. Click **Update**.

b) Setting up the Real 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](image)

   3. Enter an appropriate label for the RIP, e.g. **UAG1**.

   4. Change the **Real Server IP Address** field to the required IP address, e.g. **10.200.251.10**.

   5. Change the **Real Server Port** field to **443**.

   6. Click **Update**.

   7. Repeat the above steps to add your other UAG(s).

**Configuring the VIP & RIPs for the Primary Protocol (using cookie persistence)**

a) Setting up the Virtual Service

1. Using the WebUI, navigate to: *Cluster Configuration > Layer 7 – Virtual Services* and click **Add a New Virtual Service**.

2. Enter the following details:
3. Enter an appropriate label for the VIP, e.g. HorizonExternal.
4. Set the Virtual Service IP address field to the required IP address, e.g. 10.200.251.206.
5. Set the Virtual Service Ports field to 80.
7. Click Update.
8. Now click Modify next to the newly created VIP.
9. Set Health Checks to Negotiate HTTP.
10. Set Check Port to 80.
11. Set Request to send to favicon.ico.
12. Leave Response expected blank.
13. Click Update.

b) Setting up the Real 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:
3. Enter an appropriate label for the RvP, e.g. UAG1.

4. Set the **Real Server IP Address** field to the required IP address, e.g. **10.200.251.10**.

5. Set the **Real Server Port** field to **443**.

6. Enable (check) **Re-Encrypt to Backend**.

7. Click **Update**.

8. Repeat the above steps to add your other UAG(s).

c) Configure SSL Termination – Upload the SSL certificate

1. Using the WebUI, navigate to: **Cluster Configuration > SSL Certificate**.

2. Click **Add a new SSL Certificate**.

3. Select **Upload prepared PEM/PFX file**.

4. Enter a suitable label (name) for the certificate, e.g. **Horizon**.

5. Browse to the relevant Horizon PFX certificate file.

   - **Note**: When SSL re-encryption (SSL bridging) is used, the UAG & load balancer **must** have the same SSL certificate as mentioned [here](https://www.loadbalancer.org).

6. Enter the relevant **PFX File Password**.

7. Click **Add Certificate**.

d) Configure SSL Termination – Create the SSL Virtual Service

1. Using the WebUI, navigate to: **Cluster Configuration > SSL Termination** and click **Add a new Virtual Service**.
2. Using the **Associated Virtual Service** drop-down, select the Virtual Service created above, e.g. HorizonExternal.

   ![Label field auto-populated](image)

   **Note** Once the VIP is selected, the **Label** field will be auto-populated with **SSL-HorizonExternal**. This can be changed if preferred.

3. Leave **Virtual Service Port** set to **443**.
4. Leave **SSL Operation Mode** set to **High Security**.
5. Select the SSL certificate uploaded previously using the **SSL Certificate** drop-down
6. Click **Update**.

**Configure Remaining Load Balancer Settings & Reload Services**

**Step 1 - Configure HTTP to HTTPS Redirection**

If required, the load balancer can be configured to automatically redirect clients who attempt to connect to http://<Horizon URL> to https://<Horizon URL>.

- When using cookie based persistence (SSL is terminated on the load balancer), this can be configured by modifying the HorizonExternal VIP and enabling the **Force to HTTPS** option.
- When using source IP persistence (SSL is terminated on the real servers), a separate VIP is required to handle this. For details on setting this up, please refer to Configuring an HTTP to HTTPS redirect.

**Step 2 - Configure the Default Gateway on the Load Balancer**

Using the WebUI option: **Local Configuration > Routing** set the default gateway to be the internal interface of the external firewall, e.g. 10.200.251.254.

**Step 3 – Reload Services**

To apply the new settings, HAProxy and STunnel (if using SSL offload) must both be reloaded. This can be done...
using the buttons in the “Commit changes” box at the top of the screen or by using the Restart Services menu option:

1. Using the WebUI, navigate to: Maintenance > Restart Services.
2. Click Reload HAProxy.
3. Click Reload STunnel.

11.3. Option 3
The configuration presented in this section relates to the topology described in External Clients – Option 3.

Connection Server Configuration
Follow the Connection Server configuration steps in Option 1 - Connection Server Configuration.

UAG Configuration
Step 1 - Decide on the External Ports for the VIPs

The table below shows one possible option for the external ports for the VIPs used for the secondary protocols.

<table>
<thead>
<tr>
<th>VIP/External Port</th>
<th>Primary/Secondary</th>
<th>Protocol</th>
<th>VIP Name</th>
<th>Real Server IP/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UAG 1 &amp; 2 – Primary Protocol</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10.200.251.20:443</td>
</tr>
<tr>
<td><strong>UAG1 – Secondary Protocols</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>UAG2 – Secondary Protocols</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Step 2 – Configure URLs

The various URLs must be configured on each UAG as shown above. To access the UAG Web Interface use: https://<uag-ip>:9443/admin.

1. Configure the Connection Server URL to be the VIP address of the load balanced Connection Servers on the internal load balancer, in this guide https://192.168.112.206.

2. Configure the **PCoIP External URL** to be the public IP address of the VIP on the load balancer, in this guide 10.200.251.206:4172.

3. Configure the **Blast External URL** to be the FQDN that external clients use to connect, in this guide https://horizon.lbtestdom.com:18443, this should resolve to the public IP address of the VIP on the load balancer.

4. Configure the **Tunnel External URL** to be the FQDN that external clients use to connect, in this guide https://horizon.lbtestdom.com:1443, this should resolve to the public IP address of the VIP on the load balancer.

---

**Note**

Steps 2 – 4 above illustrate that clients connect to the VIP on the load balancer for all secondary protocols.

Step 3 - Configure the default gateway on the UAGs

**Note**

Return traffic MUST pass back via the load balancer for layer 4 NAT mode to operate.
1. Set the default gateway on each UAG to be an address on the load balancer. This address should be a floating IP address to enable failover when using a clustered pair as described in Configure Remaining Load Balancer Settings & Reload Services.

Note: The default gateway can be set at UAG deployment, or later by using the UAG's admin UI as mentioned here.

Load Balancer Configuration
The load balancer is used for both the primary & secondary protocols.

Configuring the VIP & RIPS for the Primary Protocol
Source IP address persistence is recommended if there are no inline NAT devices between the clients and the VIP – please follow the steps in Configuring the VIP & RIPS for the Primary Protocol (using source IP persistence).

If there are inline NAT devices, cookie based persistence can be used – please follow the steps in Configuring the VIP & RIPS for the Primary Protocol (using cookie persistence).

Once complete, configure the VIPs for the secondary protocols.

Configuring the VIPs & RIPS for the Secondary Protocols
The 6 secondary protocol VIPs (3 for UAG1, 3 for UAG2) listed in Option 3: UAG Configuration.

The configuration for the first VIP, UAG1-HTTPS is shown below:

a) Setup the Virtual Service

1. Using the WebUI, navigate to: Cluster Configuration > Layer 4 – Virtual Service and click Add a New Virtual Service.

2. Enter the following details:

3. Enter an appropriate label (name) for the VIP, e.g. UAG1-443.

4. Set the Virtual Service IP address field to the required IP address, e.g. 10.200.251.206.

5. Set the Virtual Service Ports field to 1443.
6. Set the **Protocol** to TCP/UDP.

7. Set the **Forwarding Method** to NAT.

8. Click **Update**.

9. Now click **Modify** next to the newly created VIP.

10. Set **Check Type** to Negotiate.

11. Set **Check Port** to 443.

12. Set **Protocol** to HTTPS.

13. Set **Request to send** to favicon.ico.

14. Leave **Response expected** blank.

15. Click **Update**.

b) Setup the Real 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:

   ![Real Server Configuration](image)

   3. Enter an appropriate label for the RIP, e.g. **UAG1**.

   4. Change the **Real Server IP Address** field to the required IP address, e.g. **10.200.251.10**.

   5. Set the port to the **443**.

   6. Click **Update**.

   7. Repeat the above steps to add your other UAG(s).

Now continue and create the 5 remaining secondary protocol VIPs (UAG1-PCoIP, UAG1-Blast, UAG2-443, UAG2-PCoIP & UAG2-Blast) & associated RIPs listed in the table. Make sure that you:

- Configure all VIPs using layer 4 NAT mode.
- Set the **Virtual Service Port** and the **Real Server Port** according to column 1 & 5 respectively in the table.
• Set the Protocol according to column 3 in the table.

• Configure the same health check settings:
  • Set Check Type to Negotiate.
  • Set Check Port to 443.
  • Set Protocol to HTTPS.
  • Set Request to send to favicon.ico.
  • Leave Response expected blank.

Configure Remaining Load Balancer Settings & Reload Services
Step 1 - Add a Floating IP Address to the Load Balancer to be used as the UAG’s Default Gateway

Using the WebUI option: Cluster Configuration > Floating IP’s add a Floating IP that can be used as the default gateway for the UAGs. Using a floating IP will ensure that the IP address is available when a clustered pair is used, and a failover to the Secondary has occurred. This floating IP should be an additional IP address that is dedicated to this purpose.

Step 2 - Configure the Default Gateway on the Load Balancer

Using the WebUI option: Local Configuration > Routing set the default gateway to be the internal interface of the external firewall, e.g. 10.200.251.254.

Step 3 - Configure HTTP to HTTPS Redirection

If required, the load balancer can be configured to automatically redirect clients who attempt to connect to http://<Horizon URL> to https://<Horizon URL>.

• When using cookie based persistence (SSL is terminated on the load balancer), this can be configured by modifying the HorizonExternal VIP and enabling the Force to HTTPS option.
• When using source IP persistence (SSL is terminated on the real servers), a separate VIP is required to handle this. For details on setting this up, please refer to Configuring an HTTP to HTTPS redirect.

Step 4 – Reload Services

To apply the new settings, HAProxy and STunnel (if using SSL offload) must both be reloaded. This can be done using the buttons in the “Commit changes” box at the top of the screen or by using the Restart Services menu option:

1. Using the WebUI, navigate to: Maintenance > Restart Services.
2. Click Reload HAProxy.
3. Click Reload STunnel.

12. Configuring for Internal Clients

The configuration presented in this section relates to the topology described in Internal Clients.
Internal clients connect directly to the virtual desktop rather than going via the Connection Servers. For HTML Access, this can result in a Blast certificate error. Please refer to the following URLs for dealing with this: Blast Certificate Issue, DNS Names for Horizon Servers.

12.1. Connection Server Configuration

Follow the Connection Server configuration steps Option 1 - Connection Server Configuration.

12.2. Load Balancer Configuration

The load balancer is used for the primary protocol only, secondary protocols pass directly from client to virtual desktop. Source IP address persistence is recommended if there are no inline NAT devices between the clients and the VIP – see the section below for configuration steps. If there are inline NAT devices, cookie based persistence can be used – please see Configuring the VIP & RIPs for the Primary Protocol (Cookie persistence).

If you want the actual client IP addresses to be represented in X-Forwarded-For (XFF) headers which the Connection Servers can use, please follow Configuring the VIP & RIPs for the Primary Protocol (Cookie persistence). In addition to the configuration steps mentioned there, you’ll also need to enable (check) the option Set X-Forward-For header when configuring the layer 7 VIP “HorizonInternal”.

For more information on enabling layer 7 transparency using inserted headers, please refer to the Administration Manual and search for “Using Proxy Protocol & X-Forwarded-For Headers”.

Port Requirements

The following table shows the ports that are load balanced:

<table>
<thead>
<tr>
<th>Port</th>
<th>Transport Protocol</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>443</td>
<td>TCP</td>
<td>Various HTTPS traffic</td>
</tr>
</tbody>
</table>

Configuring The VIP & RIPs for the Primary Protocol (source IP persistence)

a) Setting up the Virtual Service

1. Using the WebUI, navigate to: Cluster Configuration > Layer 7 – Virtual Services and click Add a New Virtual Service.

2. Enter the following details:
3. Enter an appropriate label for the VIP, e.g. HorizonInternal.

4. Set the Virtual Service IP address field to the required IP address, e.g. 192.168.112.206.

5. Set the Virtual Service Ports field to 443.


7. Click Update.

8. Now click Modify next to the newly created VIP.

9. Set Health Checks to Negotiate HTTPS.

10. Set Check Port to 443.

11. Set Request to send to favicon.ico.

12. Leave Response expected blank.

13. Click Update.

b) Setting up the Real 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:
3. Enter an appropriate label for the RIP, e.g. CS1.

4. Change the Real Server IP Address field to the required IP address, e.g. 192.168.112.200.

5. Change the Real Server Port field to 443.

6. Click Update.

7. Repeat the above steps to add your other Connection Server(s).

Configuring the VIP & RIPS for the Primary Protocol (Cookie persistence)

a) Setting up the Virtual Service

1. Using the WebUI, navigate to: Cluster Configuration > Layer 7 – Virtual Services and click Add a New Virtual Service.

2. Enter the following details:

<table>
<thead>
<tr>
<th>Layer 7 – Add a new Virtual Service</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Virtual Service Form" /></td>
</tr>
</tbody>
</table>

   3. Enter an appropriate label for the VIP, e.g. HorizonInternal.

   4. Set the Virtual Service IP address field to the required IP address, e.g. 192.168.112.206.

   5. Set the Virtual Service Ports field to 80.


   7. Click Update.

   8. Now click Modify next to the newly created VIP.

   9. Set Health Checks to Negotiate HTTP.

   10. Set Check Port to 80.

   11. Set Request to send to favicon.ico.

   12. Leave Response expected blank.

   13. Click Update.

b) Setting up the Real 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](image)

   - Enter an appropriate label for the RIP, e.g. **CS1**.
   - Change the **Real Server IP Address** field to the required IP address, e.g. **192.168.112.200**.
   - Change the **Real Server Port** field to **443**.
   - Click **Update**.

   7. Repeat the above steps to add your other Connection Server(s).

   c) Configure SSL Termination – Upload the SSL certificate

   1. Using the WebUI, navigate to: **Cluster Configuration > SSL Certificate**.
   2. Click **Add a new SSL Certificate**.
   3. Select **Upload prepared PEM/PFX file**.
   4. Enter a suitable label (name) for the certificate, e.g. **Horizon**.
   5. Browse to the relevant Horizon PFX certificate file.
   6. Enter the relevant **PFX File Password**.
   7. Click **Add Certificate**.

   d) Configure SSL Termination – Create the SSL Virtual Service

   1. Using the WebUI, navigate to: **Cluster Configuration > SSL Termination** and click **Add a new Virtual Service**.
2. Using the **Associated Virtual Service** drop-down, select the Virtual Service created above, e.g. **HorizonInternal**.

   ![Configuration Table](image)

   **Note** Once the VIP is selected, the **Label** field will be auto-populated with **SSL-HorizonInternal**. This can be changed if preferred.

3. Leave **Virtual Service Port** set to **443**.

4. Leave **SSL Operation Mode** set to **High Security**.

5. Select the SSL certificate uploaded previously using the **SSL Certificate** drop-down.

6. Click **Update**.

### Configure Remaining Load Balancer Settings & Reload Services

**Step 1 - Configure HTTP to HTTPS Redirection**

If required, the load balancer can be configured to automatically redirect clients who attempt to connect to **http://<Horizon URL>** to **https://<Horizon URL>**.

- When using cookie based persistence (SSL is terminated on the load balancer), this can be configured by modifying the **HorizonInternal** VIP and enabling the **Force to HTTPS** option.
- When using source IP persistence (SSL is terminated on the real servers), a separate VIP is required to handle this. For details on setting this up, please refer to **Configuring an HTTP to HTTPS redirect**.

**Step 2 – Reload Services**

To apply the new settings, HAProxy and STunnel (if using SSL offload) must both be reloaded. This can be done using the buttons in the “Commit changes” box at the top of the screen or by using the **Restart Services** menu option:

1. Using the WebUI, navigate to: **Maintenance > Restart Services**.
2. Click **Reload HAProxy**.

3. Click **Reload STunnel**.

### 13. Testing & Verification

For additional guidance on diagnosing and resolving any issues you may have, please also refer to [Diagnostics & Troubleshooting](#).


To ensure that all required client protocols are configured correctly, the Horizon client should be configured to each of the configured protocols using the right-click menu as shown below for both internal and external clients.

![Client Protocol Testing](image)

HTML Access should also be verified for internal and external clients using a browser.

#### 13.2. Using System Overview

The System Overview shows a graphical view of all VIPs & RIPs (i.e. the Horizon 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 both UAGs are healthy and available to accept connections.
13.3. Layer 4 Current Connections Report

The Layer 4 Current Connection report shows all current layer 4 connects and their status. This can be accessed in the WebUI using the option: **Reports > Layer 4 Current Connections**. The example below shows the report whilst an External Horizon Client is connected via a layer 4 VIP.

**Layer 4 Current Connections**

<table>
<thead>
<tr>
<th>IPVS connection entries</th>
<th>Check Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>pro expire state source virtual destination</td>
<td></td>
</tr>
<tr>
<td>IP 597:12 NONE 10.200.252.1:0 119.53.146.0:0 10.200.251.20:0</td>
<td></td>
</tr>
</tbody>
</table>

13.4. Layer 4 Status Report

The Layer 4 Status report gives a summary of layer 4 configuration and running stats as shown below. This can be accessed in the WebUI using the option: **Reports > Layer 4 Status**.

**Layer 4 Status**

<table>
<thead>
<tr>
<th>Virtual Service</th>
<th>Real Server</th>
<th>Forwarding Method</th>
<th>Weight</th>
<th>Active Connections</th>
<th>Inactive Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>UAGs 10.200.251.206</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.200.251.206/udp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UAG1 10.200.251.10</td>
<td>Masq</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>UAG2 10.200.251.20</td>
<td>Masq</td>
<td>100</td>
<td>6</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
13.5. Layer 7 Statistics Report

The Layer 7 Statistics report gives a summary of all layer 7 configuration and running stats as shown below. This can be accessed in the WebUI using the option: Reports > Layer 7 Status.

HAProxy

Statistics Report for pid 32274

13.6. Appliance Logs

Logs are available for both layer 4 and layer 7 services and can be very useful when trying to diagnose issues. Layer 4 logs are active by default and can be accessed using the WebUI option: Logs > Layer 4. Layer 7 logging is not enabled by default (because its extremely verbose) and can be enabled using the WebUI option: Cluster Configuration > Layer 7 – Advanced Configuration, and then viewed using the option: Logs > Layer 7.

14. 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.

15. Further Documentation

For additional information, please refer to the Administration Manual.
16. Appendix

16.1. Configuring an HTTP to HTTPS redirect
An additional layer 7 VIP is required that listens on HTTP port 80 on the same IP address. The VIP is then configured to redirect connections to HTTPS port 443.

e.g. http://horizon.lbtestdom.com should be redirected to https://horizon.lbtestdom.com.

The steps:

1) Create another Layer 7 VIP with the following settings:

- **Label**: HTTP-redirect.
- **Virtual Service IP Address**: <same as the VIP that’s listening on port 443>.
- **Virtual Service Ports**: 80.
- **Layer 7 Protocol**: HTTP Mode.
- **Persistence Mode**: None.
- **Force to HTTPS**: Yes.

This additional VIP will be shown purple/green to indicate that it's being used for HTTP to HTTPS redirection.

2) Apply the new settings – to apply the new settings, HAProxy must be restarted:

- Using the WebUI, navigate to: **Maintenance > Restart Services** and click **Restart HAProxy**

16.2. 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>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:

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

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

For more details on configuring HA with 2 appliances, please refer to **Appliance Clustering for HA**.

For details on testing and verifying HA, please refer to **Clustered Pair Diagnostics**.
<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Change</th>
<th>Reason for Change</th>
<th>Changed By</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1.0</td>
<td>13 August 2019</td>
<td>Styling and layout</td>
<td>General styling updates</td>
<td>RJC</td>
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<tr>
<td>1.1.1</td>
<td>7 January 2020</td>
<td>Updated method to change default gateway on UAGs</td>
<td>Changes in later versions of the UAG's Admin UI</td>
<td>RJC</td>
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<tr>
<td>1.1.2</td>
<td>21 July 2020</td>
<td>New title page</td>
<td>Branding update</td>
<td>AH</td>
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<td></td>
<td>Updated Canadian contact details</td>
<td>Change to Canadian contact details</td>
<td>AH</td>
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<td>1.1.3</td>
<td>16 October 2020</td>
<td>Corrected steps to configure Connection Servers for External Client (Option 1)</td>
<td>Steps listed referred to UAGs rather than Connection Servers</td>
<td>RJC</td>
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<td>1.2.0</td>
<td>1 December 2021</td>
<td>Converted the document to AsciiDoc</td>
<td>Move to new documentation system</td>
<td>AH, RJC, ZAC</td>
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<tr>
<td>1.2.1</td>
<td>26 April 2022</td>
<td>Updated SSL related content to reflect latest software version</td>
<td>New software release</td>
<td>RJC</td>
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<td>28 September 2022</td>
<td>Updated layer 7 VIP and RIP creation screenshots</td>
<td>Reflect changes in the web user interface</td>
<td>AH</td>
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<tr>
<td>1.2.3</td>
<td>5 January 2023</td>
<td>Combined software version information into one section</td>
<td>Housekeeping across all documentation</td>
<td>AH</td>
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<tr>
<td></td>
<td></td>
<td>Added one level of section numbering</td>
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<td>Added software update instructions</td>
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<td></td>
<td>Added table of ports used by the appliance</td>
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<tr>
<td></td>
<td></td>
<td>Reworded 'Further Documentation' section</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>Removed references to the colour of certain UI elements</td>
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<tr>
<td>1.2.4</td>
<td>2 February 2023</td>
<td>Updated screenshots</td>
<td>Branding update</td>
<td>AH</td>
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<tr>
<td>1.2.5</td>
<td>7 March 2023</td>
<td>Removed conclusion section</td>
<td>Updates across all documentation</td>
<td>AH</td>
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<tr>
<td>Version</td>
<td>Date</td>
<td>Change</td>
<td>Reason for Change</td>
<td>Changed By</td>
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<td>24 March 2023</td>
<td>New document theme</td>
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<td></td>
<td>Modified diagram colours</td>
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</table>
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