# Table of Contents

1. About this Guide .......................................................... 3 
2. Loadbalancer.org Appliances Supported .......................... 3 
3. Loadbalancer.org Software Versions Supported .............. 3 
4. Epic EHR Software Versions Supported ....................... 3 
5. Epic EHR ................................................................. 3 
6. Load Balancing Epic EHR .............................................. 3 
   - Persistence (aka Server Affinity) ............................... 3 
   - Virtual Service (VIP) Requirements ......................... 3 
   - Port Requirements ............................................... 4 
7. Deployment Concept ................................................... 4 
8. Loadbalancer.org Appliance – the Basics ....................... 4 
   - Virtual Appliance ................................................. 4 
   - Initial Network Configuration ................................. 5 
   - Accessing the WebUI ............................................. 5 
      - Main Menu Options ........................................... 6 
   - HA Clustered Pair Configuration ............................... 7 
9. Appliance Configuration for Epic EHR ......................... 7 
   - Configuring VIP 1 – Hyperspace ............................. 7 
      - Configuring the Virtual Service (VIP) .................. 7 
      - Defining the Real Servers (RIPs) ....................... 8 
   - Configuring VIP 2 – Hyperspace Redirect ................ 8 
      - Configuring the Virtual Service (VIP) .................. 8 
   - Configuring VIP 3 – MyChart (Optional) ................. 9 
      - Configuring the Virtual Service (VIP) .................. 9 
      - Defining the Real Servers (RIPs) ....................... 10 
   - Configuring VIP 4 – MyChart Redirect (Optional) .... 10 
      - Configuring the Virtual Service (VIP) ............... 10 
      - Finalizing the Configuration ............................ 11 
10. Testing & Verification ................................................ 11 
    - Using System Overview ...................................... 11 
11. Technical Support .................................................... 12 
12. Further Documentation ............................................. 12 
13. Conclusion ............................................................. 12 
14. Appendix .................................................................. 13 
   - Configuring HA - Adding a Secondary Appliance .... 13 
      - Non-Replicated Settings ................................. 13 
15. Document Revision History ....................................... 16
1. About this Guide

This guide details the steps required to configure a load balanced Epic EHR environment utilizing Loadbalancer.org appliances. It covers the configuration of the load balancers and also any Epic EHR 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 Epic EHR. For full specifications of available models please refer to https://www.loadbalancer.org/products.

Some features may not be supported in all cloud platforms due to platform specific limitations, please check with Loadbalancer.org support for further details.

3. Loadbalancer.org Software Versions Supported

- V8.6.1 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.

4. Epic EHR Software Versions Supported

- Epic EHR – all versions

5. Epic EHR

The Epic EHR (Electronic Health Records) software suite brings together essential tools for clinicians and patients in the healthcare space.

Epic Hyperspace is a clinician-facing platform. It’s a front-end client used to access most parts of the Epic software suite, including patient charts, prescribing, and even print services.

Epic MyChart is a patient-facing web portal. It gives patients the ability to view their medical records and test results, manage their appointments and prescriptions, and more.

6. Load Balancing Epic EHR

Note: It’s highly recommended that you have a working Epic EHR environment first before implementing the load balancer.

Persistence (aka Server Affinity)

The Epic EHR applications require sessions to stick to the same real server. Source IP address affinity is used to achieve this.

Virtual Service (VIP) Requirements
To provide load balancing and HA for Epic EHR, the following VIPs are required:

- Hyperspace
- Hyperspace redirect (to force inbound HTTP traffic to use HTTPS)

 Optionally, additional VIPs may be required as follows:

- MyChart
- MyChart redirect (to force inbound HTTP traffic to use HTTPS)

## Port Requirements

The following table shows the ports that are load balanced:

<table>
<thead>
<tr>
<th>Port</th>
<th>Protocols</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>TCP/HTTP</td>
<td>Redirect to HTTPS (not strictly load balanced)</td>
</tr>
<tr>
<td>443</td>
<td>TCP/HTTPS</td>
<td>Web Services</td>
</tr>
</tbody>
</table>

### 7. Deployment Concept

VIPs = Virtual IP Addresses

The load balancer can be deployed as a single unit, although Loadbalancer.org recommends a clustered pair for resilience & high availability. Please refer to the section Configuring HA - Adding a Secondary Appliance in the appendix for more details on configuring a clustered pair.

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

#### 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.

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.

Accessing the WebUI

The WebUI is accessed using a web browser. By default, user authentication is based on local Apache .htaccess files. User administration tasks such as adding users and changing passwords can be performed using the WebUI menu option: Maintenance > Passwords.

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

Note: If required, users can also be authenticated against LDAP, LDAPS, Active Directory or Radius. For more information please refer to External Authentication.

1. Using a browser, access the WebUI using the following URL:


2. Log in to the WebUI:

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

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

   Once logged in, the WebUI will be displayed as shown below:
The WebUI for the VA is shown, the hardware and cloud appliances are very similar. The yellow licensing related message is platform & model dependent.

3. You'll be asked if you want to run the Setup Wizard. If you click **Accept** the Layer 7 Virtual Service configuration wizard will start. If you want to configure the appliance manually, simple click **Dismiss**.

**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
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 the section Configuring HA - Adding a Secondary Appliance of the appendix.

9. Appliance Configuration for Epic EHR
Configuring VIP 1 – Hyperspace
Configuring the Virtual Service (VIP)
1. Using the web user interface, navigate to Cluster Configuration > Layer 7 – Virtual Services and click on Add a new Virtual Service.
2. Define the Label for the virtual service as required, e.g. Hyperspace.
3. Set the Virtual Service IP Address field to the required IP address, e.g. 192.168.85.150.
4. Set the Ports field to 443.
5. Set the Layer 7 Protocol to TCP Mode.
6. Click Update to create the virtual service.

7. Click Modify next to the newly created VIP.
8. In the Persistence section click Advanced to expand the menu.
9. Set Timeout to 60 (the default units are minutes).
10. Click Update.
Defining the Real Servers (RIPs)

1. Using the web user interface, navigate to Cluster Configuration > Layer 7 – Real Servers and click on Add a new Real Server next to the newly created VIP.

2. Define the Label for the real server as required, e.g. Hyperspace_Srv_1.

3. Set the Real Server IP Address field to the required IP address, e.g. 192.168.85.200.

4. Click Update.

5. Repeat these steps to add additional servers as required.

---

Layer 7 Add a new Real Server - Hyperspace

<table>
<thead>
<tr>
<th>Label</th>
<th>Hyperspace_Srv_1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Server IP Address</td>
<td>192.168.85.200</td>
</tr>
<tr>
<td>Real Server Port</td>
<td></td>
</tr>
<tr>
<td>Re-Encrypt to Backend</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>100</td>
</tr>
</tbody>
</table>

---

Configuring VIP 2 – Hyperspace Redirect

Configuring the Virtual Service (VIP)

1. Using the web user interface, navigate to Cluster Configuration > Layer 7 – Virtual Services and click on Add a new Virtual Service.

2. Define the Label for the virtual service as required, e.g. Hyperspace_redirect.

3. Set the Virtual Service IP Address field to the same IP address used for the Hyperspace VIP, e.g. 192.168.85.150.

4. Set the Ports field to 80.

5. Set the Layer 7 Protocol to HTTP Mode.

6. Click Update to create the virtual service.

---

Layer 7 - Add a new Virtual Service

<table>
<thead>
<tr>
<th>Virtual Service</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual Configuration</td>
<td></td>
</tr>
<tr>
<td>Label</td>
<td>Hyperspace_redirect</td>
</tr>
<tr>
<td>IP Address</td>
<td>192.168.85.150</td>
</tr>
<tr>
<td>Ports</td>
<td>80</td>
</tr>
<tr>
<td>Layer 7 Protocol</td>
<td>HTTP Mode</td>
</tr>
</tbody>
</table>
7. Click **Modify** next to the newly created VIP.
8. In the **Other** section click **Advanced** to expand the menu.
9. Set **Force to HTTPS** to **Yes**.
10. Click **Update**.

![Force to HTTPS](image)

**Configuring VIP 3 – MyChart (Optional)**

**Configuring the Virtual Service (VIP)**

1. Using the web user interface, navigate to **Cluster Configuration > Layer 7 – Virtual Services** and click on **Add a new Virtual Service**.
2. Define the **Label** for the virtual service as required, e.g. **MyChart**.
3. Set the **Virtual Service IP Address** field to the required IP address, e.g. **192.168.85.151**.
4. Set the **Ports** field to **443**.
5. Set the **Layer 7 Protocol** to **TCP Mode**.
6. Click **Update** to create the virtual service.

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

7. Click **Modify** next to the newly created VIP.
8. In the **Persistence** section click **Advanced** to expand the menu.
9. Set **Timeout** to **60** (the default units are minutes).
10. Click **Update**.

![Persistence](image)
Defining the Real Servers (RIPs)

1. Using the web user interface, navigate to Cluster Configuration > Layer 7 – Real Servers and click on Add a new Real Server next to the newly created VIP.

2. Define the Label for the real server as required, e.g. MyChart_Srv_1.

3. Set the Real Server IP Address field to the required IP address, e.g. 192.168.85.210.

4. Click Update.

5. Repeat these steps to add additional servers as required.

Configuring VIP 4 – MyChart Redirect (Optional)

Note  
If the optional MyChart VIP has been configured then this redirect VIP must also be configured to ensure proper operation of the load balanced MyChart service.

Configuring the Virtual Service (VIP)

1. Using the web user interface, navigate to Cluster Configuration > Layer 7 – Virtual Services and click on Add a new Virtual Service.

2. Define the Label for the virtual service as required, e.g. MyChart_redirect.

3. Set the Virtual Service IP Address field to the same IP address used for the MyChart VIP, e.g. 192.168.85.151.

4. Set the Ports field to 80.

5. Set the Layer 7 Protocol to HTTP Mode.

6. Click Update to create the virtual service.
7. Click **Modify** next to the newly created VIP.
8. In the Other section click **Advanced** to expand the menu.
9. Set **Force to HTTPS** to Yes.
10. Click **Update**.

### Finalizing the Configuration

To apply the new settings, HAProxy must be reloaded. This can be done using the button in the blue 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**.

### 10. Testing & Verification

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

### Using System Overview

The System Overview can be viewed in the WebUI. It shows a graphical view of all VIPs & RIPs (i.e. the Hyperspace and MyChart 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 servers of both services are healthy and available to accept connections:
11. Technical Support

For more details about configuring the appliance and assistance with designing your deployment please don’t hesitate to contact the support team using the following email address: support@loadbalancer.org.

12. Further Documentation


13. Conclusion

Loadbalancer.org appliances provide a very cost effective solution for highly available load balanced Epic EHR environments.
14. Appendix

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 should be configured first, 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.

Note

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.

To add a Secondary node - i.e. create a highly available clustered pair:
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 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 blue 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.
## 15. Document Revision History

<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>1.0.0</td>
<td>22 February 2022</td>
<td>Initial version</td>
<td></td>
<td>AH</td>
</tr>
</tbody>
</table>
About Loadbalancer.org

Loadbalancer.org's mission is to ensure that its clients' businesses are never interrupted. The load balancer experts ask the right questions to get to the heart of what matters, bringing a depth of understanding to each deployment. Experience enables Loadbalancer.org engineers to design less complex, unbreakable solutions - and to provide exceptional personalized support.