# Table of Contents

1. About this Brief ................................................................. 3
2. Loadbalancer.org Appliances Supported .................................. 3
3. Software Versions Supported .................................................. 3
   3.1. Loadbalancer.org Appliance ............................................. 3
   3.2. Access Rio ............................................................... 3
4. Access Rio ........................................................................... 3
5. Load Balancing Access Rio ...................................................... 3
   5.1. Persistence (aka Server Affinity) ....................................... 3
   5.2. Virtual Service (VIP) Requirements .................................. 4
   5.3. Port Requirements ....................................................... 4
6. Deployment Concept ............................................................. 4
7. Load Balancer Deployment Methods ........................................ 4
   7.1. Layer 4 SNAT Mode ....................................................... 5
8. Loadbalancer.org Appliance – the Basics .................................. 5
   8.1. Virtual Appliance .......................................................... 5
   8.2. Initial Network Configuration .......................................... 6
   8.3. Accessing the Appliance WebUI ....................................... 6
      Main Menu Options ....................................................... 7
   8.4. Appliance Software Update ............................................. 8
      Determining the Current Software Version .......................... 8
      Checking for Updates using Online Update ......................... 8
      Using Offline Update .................................................... 9
   8.5. Ports Used by the Appliance .......................................... 9
   8.6. HA Clustered Pair Configuration ..................................... 10
9. Appliance Configuration for Access Rio .................................... 10
   9.1. Configuring the Virtual Service (VIP) ............................... 10
   9.2. Defining the Real Servers (RIPs) ..................................... 11
10. Testing & Verification ........................................................... 11
   10.1. Using a Test Client ..................................................... 11
   10.2. Using System Overview .............................................. 12
11. Technical Support ............................................................... 12
12. Further Documentation ....................................................... 12
13. Appendix ............................................................................ 13
      Non-Replicated Settings ................................................ 13
      Configuring the HA Clustered Pair .................................... 14
14. Document Revision History ................................................ 16
1. About this Brief

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

Some features may not be available or fully supported in all cloud platforms due to platform specific limitations. For more details, please refer to the “Main Differences to our Standard (Non-Cloud) Product” section in the appropriate cloud platform Quick Start Guide or check with Loadbalancer.org support.

3. Software Versions Supported

3.1. Loadbalancer.org Appliance

- V8.9.1 and later

Note: The screenshots used throughout this document aim to track the latest Loadbalancer.org software version. If you’re using an older version, or the very latest, the screenshots presented here may not match your WebUI exactly.

3.2. Access Rio

- All versions

4. Access Rio

Access Rio (formerly Servelec Rio) is an electronic patient record (EPR) system. Rio stores comprehensive health records, including medication details, X-ray results, inpatient appointments, and medical history, along with other things medical-health related, facilitating easy and quick access as and when needed.

5. Load Balancing Access Rio

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

5.1. Persistence (aka Server Affinity)

Access Rio requires source IP address-based session affinity which ensures that a client sticks to the same Rio
server for the entirety of its session. This is enabled by default when following the instructions in this brief.

5.2. Virtual Service (VIP) Requirements
To provide load balancing and HA for Access Rio, a single multi-port VIP is required:

- Rio Services

5.3. 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>Rio Web Services</td>
</tr>
<tr>
<td>443, 11443</td>
<td>TCP/HTTPS</td>
<td>Rio Web Services (Secure)</td>
</tr>
<tr>
<td>3040</td>
<td>TCP</td>
<td>Other Rio Services</td>
</tr>
</tbody>
</table>

6. Deployment Concept

VIP = Virtual IP Address

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.

7. Load Balancer Deployment Methods
The load balancer can be deployed in 4 fundamental ways: **Layer 4 DR mode**, **Layer 4 NAT mode**, **Layer 4 SNAT mode**, and **Layer 7 SNAT mode**.
For Access Rio, using layer 4 SNAT mode is recommended. This mode is described below and is used for the configurations presented in this guide. For configuring using layer 4 SNAT mode please refer to Section 9, “Appliance Configuration for Access Rio”.

### 7.1. Layer 4 SNAT Mode

Layer 4 SNAT mode is a high performance solution, although not as fast as Layer 4 NAT mode or Layer 4 DR mode.

- The load balancer translates all requests from the external Virtual Service to the internal Real Servers in the same way as NAT mode - please refer to Layer 4 NAT Mode for more information.
- Layer 4 SNAT mode is not transparent, an iptables SNAT rule translates the source IP address to be the load balancer rather than the original client IP address.
- Layer 4 SNAT mode can be deployed using either a one-arm or two-arm configuration. For two-arm deployments, `eth0` is normally used for the internal network and `eth1` is used for the external network although this is not mandatory.
- If the Real Servers require Internet access, Auto-NAT should be enabled using the WebUI option: `Cluster Configuration > Layer 4 - Advanced Configuration`, the external interface should be selected.
- Requires no mode-specific configuration changes to the load balanced Real Servers.
- Port translation is possible with Layer 4 SNAT mode, e.g. VIP:80 → RIP:8080 is supported.
- You should not use the same RIP:PORT combination for layer 4 SNAT mode VIPs and layer 7 SNAT mode VIPs because the required firewall rules conflict.

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

#### 8.1. 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.

8.2. Initial Network Configuration

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

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

8.3. 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.

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


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

   Note: If you need to change the port, IP address or protocol that the WebUI listens on, please refer to Service Socket Addresses.

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

3. You’ll be asked if you want to run the Setup Wizard which can be used to configure layer 7 services. Click Dismiss if you’re following a guide or want to configure the appliance manually or click Accept to start the wizard.

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

8.4. 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

Note: By default, the appliance periodically contacts the Loadbalancer.org update server and checks for updates. An update check can also be manually triggered as detailed below.

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 v6.11.1 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 and Checksum files]

   ![Upload and Install]

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.

### 8.5. 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 / GSLB</td>
</tr>
<tr>
<td>TCP &amp; UDP</td>
<td>123</td>
<td>NTP</td>
</tr>
<tr>
<td>Protocol &amp; Port</td>
<td>Purpose</td>
<td>Protocol &amp; Port</td>
</tr>
<tr>
<td>---------------</td>
<td>---------</td>
<td>---------------</td>
</tr>
<tr>
<td>TCP &amp; UDP 161</td>
<td>SNMP</td>
<td>UDP 6694</td>
</tr>
<tr>
<td>TCP 7778</td>
<td>HAPProxy persistence table replication</td>
<td>TCP 9000</td>
</tr>
<tr>
<td>TCP 9080</td>
<td>WebUI - HTTP (disabled by default)</td>
<td>TCP 9081</td>
</tr>
<tr>
<td>TCP 9443</td>
<td>WebUI - HTTPS</td>
<td>TCP 25565</td>
</tr>
</tbody>
</table>

The ports used for SSH, GSLB, SNMP, the WebUI, the fallback page, the gateway service and the shuttle service can be changed if required. For more information, please refer to Service Socket Addresses.

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

9. Appliance Configuration for Access Rio

9.1. Configuring the Virtual Service (VIP)
1. Using the web user interface, navigate to Cluster Configuration > Layer 4 – Virtual Services and click on Add a new Virtual Service.
2. Define the Label for the virtual service as required, e.g. Rio.
3. Set the Virtual Service IP Address field to the required IP address, e.g. 192.168.85.140.
4. Set the Ports field to 80,443,3040,11443.
5. Leave the Protocol set to TCP.
6. Leave the Forwarding Method set to SNAT.
7. Click Update to create the virtual service.
9.2. Defining the Real Servers (RIPs)

1. Using the web user interface, navigate to Cluster Configuration > Layer 4 – Real Servers and click on Add a new Real Server next to the newly created VIP.

2. Define the Label for the real server as required, e.g. Rio Server 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 the remaining Rio servers.

10. Testing & Verification

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

10.1. Using a Test Client

Use a test client to access Rio services via the new load balanced virtual service (VIP). Ensure that Rio services and functionality operate as expected.
10.2. Using System Overview

The System Overview can be viewed in the WebUI. It shows a graphical view of all VIPs & RIPv (i.e. the Rio servers) and shows the state/health of each server as well as the state of the cluster as a whole. The example below shows a standard deployment where both Rio servers are healthy and available to accept connections:

![System Overview](image)

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

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

13.1. 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 fully configured first, then the Secondary appliance can be added to create an HA pair. Once the HA pair is configured, load balanced services must be configured and modified on the Primary appliance. The Secondary appliance will be automatically kept in sync.

For Enterprise Azure, the HA pair should be configured first. For more information, please refer to the Azure Quick Start/Configuration Guide available in the documentation library.

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>Interface IP addresses, bonding configuration and VLANs</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Routing</td>
<td>Default gateways and static routes</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>System Date &amp; time</td>
<td>Time and date related settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Physical – Advanced Configuration</td>
<td>Various appliance settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Portal Management</td>
<td>Portal management settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Security</td>
<td>Security settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>SNMP Configuration</td>
<td>SNMP settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>Graphing</td>
<td>Graphing settings</td>
</tr>
<tr>
<td>Local Configuration</td>
<td>License Key</td>
<td>Appliance licensing</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Backup &amp; Restore</td>
<td>Local XML backups</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Software Updates</td>
<td>Appliance software updates</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Fallback Page</td>
<td>Fallback page configuration</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Firewall Script</td>
<td>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 where any of the above have been configured on the Primary appliance, they’re also configured on the Secondary.

---

**Configuring the 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*.

### Create a Clustered Pair

![Create a Clustered Pair](image)

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:
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.
## 14. 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>6 October 2023</td>
<td>Initial version</td>
<td></td>
<td>RH, 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.

Visit us: www.loadbalancer.org
Phone us: +44 (0)330 380 1064
Phone us: +1 833 274 2566
Email us: info@loadbalancer.org
Follow us: @loadbalancer.org