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About this Guide
This guide provides a quick reference for setting up SIP load balancing using Loadbalancer.org appliances.

Related Documentation
For additional information about the Loadbalancer.org appliance, please also refer to the following documents:

- Quick Start Guide
- Administration Manual

Load Balanced Ports

<table>
<thead>
<tr>
<th>Port</th>
<th>Use</th>
<th>Transport Layer Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>5060</td>
<td>non-encrypted SIP</td>
<td>UDP &amp; TCP</td>
</tr>
<tr>
<td>5061</td>
<td>encrypted SIP</td>
<td>UDP &amp; TCP</td>
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Note: The exact port requirements depend on how the VoIP system is configured. This guide includes both TCP & UDP ports 5060 and 5061 for completeness.

Load Balancer Configuration

Operation Mode
The load balancer is configured in single-arm layer 4 DR (Direct Return) mode. This mode offers very high performance since return traffic passes directly from the SIP Servers back to the clients by-passing the load balancer. DR mode works by changing the MAC address on the fly to match the relevant SIP Server. Since packets will still have the IP address of the VIP, the SIP Servers must be configured to accept this traffic, but must also be configured to not reply to ARP requests for this address. For more details, please refer to the section 'Solving the ARP Problem' on page 8.
Deploy The Loadbalancer.org Appliance
Deploy the Loadbalancer.org appliance as detailed in the [Quick Start Guide](#).

Accessing The Appliance WebUI
Using a browser, navigate to the appliance's IP address on HTTPS port 9443, i.e.
https://<IP-Address>:9443

Note: For HTTPS connections you'll receive a warning about the certificate as it's a self signed cert not related to an Internet based CA.

Use the following default credentials to login:

**Username**: loadbalancer

**Password**: loadbalancer

Note: To change the password for the 'loadbalancer' account, use the WebUI option: Maintenance > Passwords.
Once logged in, the WebUI is displayed:

Configuration Steps

Step 1 – Create The Virtual Service (VIP)

Create a new VIP as described below – this is the IP address that clients will connect to. A 'Firewall Mark' is used which enables the VIP to support both TCP and UDP on ports 5060 and 5061.

1. Using the WebUI, navigate to: Cluster Configuration > Layer 4 – Virtual Services and click
2. Click Add a New Virtual Service
3. Enter the following details:
4. Define the required Label (name) for the VIP, e.g. **SIP**

5. Instead of entering an IP address, enter a numeric value, e.g. **1** – this is the numeric reference for the Firewall Mark, this reference is used in the Firewall Mark Setup section below when defining the firewall rules

6. The Virtual Service Ports field does not need to be set as it is not relevant in this case - the actual port(s) used are defined in the Firewall Mark Setup section below when defining the firewall rules

7. Set **Protocol** to **Firewall Marks** – at this point the Virtual Service Ports field will be grayed out

8. Leave the **Forwarding Method** set to **Direct Routing**

9. Click **Update**

10. Click **Modify** next to the newly created VIP

11. Set **Check Port** to **5060** or **5061** to suit your requirements

   **Note:** If your SIP server only supports SIP over UDP, the standard port connect check won’t work. For UDP only SIP servers, set the check type to **ping server**.

12. Click **Update**

Step 2 – Define The Real Servers (RIPs)

The Real Servers (i.e. the SIP servers) must now be associated with the VIP.

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

2. Enter the following details:

3. Enter an appropriate label for the RIP, e.g. **SIP1**

4. Change the **Real Server IP Address** field to the required address, e.g. **192.168.10.20**

5. Click **Update**

6. Repeat the above steps to add your other SIP server(s)
Step 3 – Configure Firewall Marks
To enable the Firewall Mark the following lines must be added to the firewall script:

VIP1="192.168.10.10"

iptables -t mangle -A PREROUTING -d $VIP1 --dport 5060 -j MARK --set-mark 1
iptables -t mangle -A PREROUTING -d $VIP1 --dport 5061 -j MARK --set-mark 1

This enables Firewall Mark ‘1’ to support both TCP & UDP on ports 5060 & 5061.

To configure this, follow the steps below:
1. Using the WebUI, navigate to: Maintenance > Firewall Script
2. Scroll down to the Firewall Marks section
3. Add the additional lines as shown below:

   ![Firewall Script](image)

4. Click Update

Step 4 – Add The Floating IP Address
A floating IP must be added that corresponds to the Firewall Mark.
1. Using the WebUI, navigate to: Cluster Configuration > Floating IPs
2. Enter the required IP address, e.g. 192.168.10.10
Step 5 – Solve The ARP Problem

As mentioned previously, DR mode works by changing the MAC address of the inbound packets to match the Real Server selected by the load balancing algorithm. To enable DR mode to operate:

- Each Real Server must be configured to accept packets destined for both the VIP address and the Real Servers IP address (RIP). This is because in DR mode the destination address of load balanced packets is the VIP address, whilst for other traffic such as health-checks, administration traffic etc. it’s the Real Server’s own IP address (the RIP). The service/process (e.g. IIS) must also respond to both addresses.
- Each Real Server must be configured so that it does not respond to ARP requests for the VIP address – only the load balancer should do this.

Configuring the Real Servers in this way is referred to as ‘Solving the ARP problem’. The exact steps required depend on the particular OS being used. For full details, please refer to the Administration Manual and search for “Solving the ARP Problem”.

Testing & Verification

Check Server State

Using the System Overview in the WebUI, verify that the VIP and associated RIPS are up (green) as shown in the example below:

Check Connectivity

Now test the load balancer by connecting clients to the VIP address (192.168.10.10 in this example configuration) rather than connecting users directly to the SIP servers.
Related Quick Reference Guides
The following guide may also be useful:

- Load Balancing Asterix in AWS

Loadbalancer.org 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.
## Document Revision History

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Change</th>
<th>Reason for Change</th>
<th>Changed By</th>
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<tbody>
<tr>
<td>1.5.0</td>
<td>5 November 2019</td>
<td>Styling and layout</td>
<td>General styling updates</td>
<td>AH</td>
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<tr>
<td>1.5.1</td>
<td>3 June 2020</td>
<td>New title page</td>
<td>Branding update</td>
<td>AH</td>
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<td>Updated Canadian contact details</td>
<td>Change to Canadian contact details</td>
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<tr>
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<td></td>
<td>Updated ‘Quick Start Guide’ hyperlink URL</td>
<td>Quick Start Guides have been amalgamated at a new location</td>
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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.

United Kingdom

Loadbalancer.org Ltd.
Compass House, North Harbour
Business Park, Portsmouth, PO6 4PS
UK:+44 (0) 330 380 1064
sales@loadbalancer.org
support@loadbalancer.org

Canada

Loadbalancer.org Appliances Ltd.
300-422 Richards Street, Vancouver,
BC, V6B 2Z4, Canada
TEL:+1 866 998 0508
sales@loadbalancer.org
support@loadbalancer.org

United States

Loadbalancer.org, Inc.
4550 Linden Hill Road, Suite 201
Wilmington, DE 19808, USA
TEL: +1 833.274.2566
sales@loadbalancer.org
support@loadbalancer.org

Germany

Loadbalancer.org GmbH
Tengstraße 2780798,
München, Germany
TEL: +49 (0)89 2000 2179
sales@loadbalancer.org
support@loadbalancer.org