| Hey KEMP | 🔍 |

KEMP Technologies (/hc/en-us) › Documentation (/hc/en-us/categories/200294835-Documentation) › Feature Description (/hc/en-us/sections/200789405-Feature-Description)

High Availability (HA)

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1 Introduction

The LoadMaster system can be deployed as a single unit or in an active/standby dual-unit configuration (HA). HA allows two physical or virtual machines to become one logical device. Only one of these units is active and handling traffic at any one time. One unit is active and the other is a hot standby (passive). This provides redundancy and resiliency, meaning if one LoadMaster goes down for any reason, the hot standby can become active, therefore avoiding any downtime.

HA in the LoadMaster for Azure and AWS products works a different way to that of a regular LoadMaster. For more information and instructions on how to configure HA on the LoadMaster for Azure or AWS, refer to the HA for Azure, Feature Description or HA for AWS, Feature Description document.

Three IP addresses are needed per active interface; one for the active unit, one for the passive unit and one IP address for the shared interface.

1.1 Document Purpose

The purpose of this document is to describe the HA feature in the KEMP LoadMaster and provide step-by-step instructions on how to configure HA.

It is also possible to cluster a number of LoadMasters. For further information, please refer to the Feature Description, LoadMaster Clustering.

1.2 Intended Audience

This document is intended to be read by anyone who is interested in learning about the HA feature in the KEMP LoadMaster.

2 Advantages Of High Availability (HA)
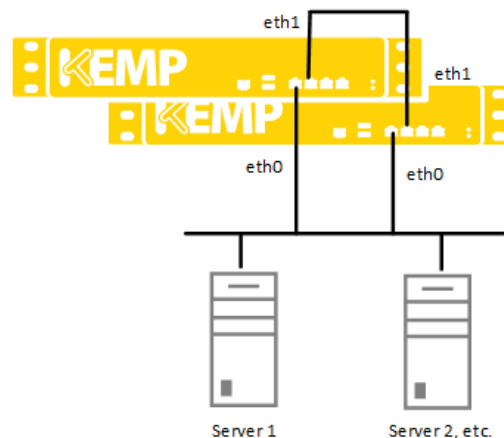
The ultimate goal of redundant LoadMasters is to provide reliable traffic management, even if one LoadMaster becomes unavailable. The advantages of HA are as follows:

- Eliminates a single point of failure

- The second (passive) unit monitors the active unit to detect if a failure has occurred

- Active connections and sessions are not lost when a fail-over occurs

3 Prerequisites

There are some prerequisites to be aware of before setting up HA:

- Two LoadMasters must be set up

- LoadMasters must be located on the same subnet to be in a HA pair

- LoadMasters must be in the same physical location

- A layer 2 connection (Ethernet/VLAN) is required

- The LoadMasters must not be located further than 100 meters from each other

- Ensure that you have more than one interconnection between the two LoadMasters to avoid data loss or lack of availability

- The two LoadMasters must use the same default gateway

- Use Network Time Protocol (NTP) to keep times on LoadMasters up-to-date. This ensures that the times are correct on any logs and that Common Address Redundancy Protocol (CARP) message timestamps are in sync.

- Ensure that any switches do not prevent MAC spoofing

- Latency on the link between the two LoadMasters must be below 100 milliseconds

- Multicast traffic flow is required in both directions between the devices

- Three IP addresses are required for each subnet in which the LoadMaster is configured

4 HA Components

Two protocols are used by LoadMasters in an HA configuration to perform health checks and to synchronize the configuration between LoadMasters.

CARP:

- Keeps updated on the health of the partner

- Governs whether the LoadMaster will take the active role

- The **Use for HA Checks** option enables CARP requests to be sent over enabled interfaces. This can be set for multiple interfaces.

When CARP is being used, packet analysis tools (such as Wireshark), incorrectly display the protocol used as Virtual Router Redundancy Protocol (VRRP). Any IP addresses displayed by the packet analysis tools are fictitious and are not part of the CARP protocol.

Sync:

- Sync maintains a "single image view" of the LoadMaster settings. It keeps the LoadMaster up-to-date with changes made to Virtual Services and all other configurations.

- Notable exceptions that are not synchronized are; time and passwords

- Keeps the standby LoadMaster updated on persistence updates

5 Setting Up HA

5.1 Set up the First Unit

To build a HA LoadMaster environment there are a number of settings that must be carefully specified. Follow the steps below to set up HA:

1. Log in to the LoadMaster that is desired to be the active (master) unit.

2. In the main menu, select the **System Configuration** and click the HA option.

Confirm

○ HA Mode   An HA configuration requires two LoadMasters, only one of which is active and processing traffic at any time. The other passive unit continuously monitors the health of the active unit and will begin serving traffic when the active unit becomes unavailable. Once you configure HA mode, clustering options will be unavailable.

○ Clustering   A Clustering configuration requires the following:

1. At least three LoadMasters (four or more are recommended). All LoadMasters in a cluster actively process traffic.
2. All hardware LoadMasters must be the same model. Virtual LoadMasters must have the same CPU, RAM and disk storage assigned. You cannot mix hardware and virtual LoadMasters in a cluster.
3. All LoadMasters should be set to use factory-default settings, with the exception of networking.

Once you configure clustering, HA mode options will be unavailable.

Confirm   Cancel

3. A screen will appear asking if you want to set up **HA Mode** or **Clustering**. To set up HA, select **HA Mode** and click **Confirm**.

HA Mode   HA (First) Mode ▼

4. Select **HA (First) Mode** in the **HA Mode** drop-down.

This will enable HA mode on reboot.
This machine will be known as the 'first'.
Do you really want to do this?

OK   Cancel

5. Click **OK** on the resulting message.

Do not reboot at this time.

Please don't forget to set the Shared IP addresses.

☐ Prevent this page from creating additional dialogs

OK

6. Click **OK** on the resulting message reminding not to forget to set the Shared IP address.

Selecting the **Prevent this page from creating additional dialogs** check box will stop any warning messages, such as this one, from appearing.

Network Interface 0

Interface Address (address[/prefix])	10.154.11.100/16	Set Address
HA Shared IP address	10.154.11.110	Set Shared address
HA Partner IP address	10.154.11.180	Set Partner address
HA Virtual ID	110 ▼	Default setting for the HA virtual ID is 110. Please verify that this is correct.
Use for HA checks	☑	
Use for GEO Responses and Requests	☑	
Link Status	Speed: 10000Mb/s, Full Duplex	Automatic ▼ Force Link
	MTU: 1500 Set MTU	
Additional addresses (address[/prefix])		Add Address

VLAN Configuration   VXLAN Configuration   Interface Bonding

Reboot Now

7. Specify the desired shared IP address in the **HA Shared IP address** field and click **Set Shared address**.

8. A confirmation message may appear. Click **OK**.

Do not reboot or reconnect at this time.

9. Enter the IP address of the passive (slave) unit in the **HA Partner IP address** and click the **Set Partner address** button.

10. A confirmation message will appear. Click **OK**.

11. As of the 7.2.36 firmware, the LoadMaster selects a **HA Virtual ID** based on the shared IP address of the first configured interface (the last 8 bits). You can change the value to whatever you want (in the range 10 - 255) or you can keep it at the value it already selected.

Please ensure the virtual ID is unique on each LoadMaster on the network.

12. Configure any other settings as needed.
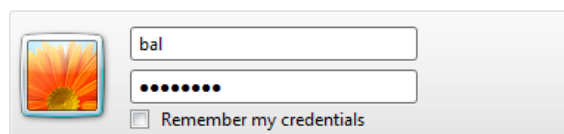
13. Click **Reboot Now**.

Rebooting

Continue

14. Click **Continue**.

15. Refresh the page after the LoadMaster has rebooted (this may take a few minutes).

The server 10.154.11.70 is asking for your user name and password. The server reports that it is from user.

bal

••••••••

☐ Remember my credentials

OK   Cancel

A log in screen appears. After logging in, a different menu will appear than before. This is the **Local Administration** menu displayed for HA units. This menu has far fewer options. Only configuration settings pertaining to that specific unit are accessible using the **Local Administration** option. All management of the HA units should be done using the shared IP address. To see the full menu and configure the units, access the WUI of the shared IP address, which was specified above.

16. Log in to the shared IP WUI by entering the shared IP address in the address bar of the browser and pressing **Enter**.

In the top-right of the screen there are 2 indicator squares.

A ✕

These squares indicate the status of the HA pair. The left square always represents HA1 and the right represents HA2. The **A** represents which unit is active. The first or second HA unit can be opened by clicking the relevant status icon. Green and green status colors indicate a properly paired configuration. Currently, they will probably be green and red since the HA2 unit has not yet joined the pair. For an explanation of all icon colors and statuses, refer to the HA Parameters section.

17. Go to **HA Parameters** in the main menu.

18. Enter a different number (different from the IDs of other HA devices) in the **HA Virtual ID** text box and click **Set Virtual ID**. Using the same ID as other HA devices may cause problems.

All LoadMasters on the network that are or will be configured into HA pairs must be assigned unique **HA Virtual ID** numbers.

5.2 Set Up the Second Unit

Now that HA has been configured on the first unit, the second unit needs to be setup. Follow the steps below to do this.

1. Enter the IP address of the second unit in the address bar of the browser and press **Enter**.

Ensure to enter **https://** before the IP address.

2. In the main menu, select **System Configuration** and click the HA option.

Confirm

○ HA Mode

An HA configuration requires two LoadMasters, only one of which is active and processing traffic at any time. The other passive unit continuously monitors the health of the active unit and will begin serving traffic when the active unit becomes unavailable. Once you configure HA mode, clustering options will be unavailable.

○ Clustering

A Clustering configuration requires the following:

1. At least three LoadMasters (four or more are recommended). All LoadMasters in a cluster actively process traffic.
2. All hardware LoadMasters must be the same model. Virtual LoadMasters must have the same CPU, RAM and disk storage assigned. You cannot mix hardware and virtual LoadMasters in a cluster.
3. All LoadMasters should be set to use factory-default settings, with the exception of networking.

Once you configure clustering, HA mode options will be unavailable.

Confirm   Cancel

3. If you have a clustering license, a screen will appear asking if you want to set up **HA Mode** or **Clustering**. To set up HA, select **HA Mode** and click **Confirm**.
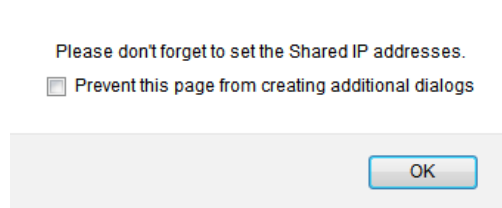
HA Mode | HA (Second) Mode ▾

4. Select **HA (Second) Mode** as the **HA Mode**.

This will enable HA mode on reboot.
This machine will be known as the 'second'.
The 'first' machine should already be configured.
Do you really want to do this?

OK   Cancel

5. Click **OK** on the resulting message.

Please don't forget to set the Shared IP addresses.

☐ Prevent this page from creating additional dialogs

[OK]

6. Click **OK** on the resulting message.

Ticking the **Prevent this page from creating additional dialogs** check box will stop any warning messages, such as this one, from appearing.

Network Interface 0

Interface Address (address[/prefix])	10.154.11.10/16	Set Address
HA Shared IP address	10.154.11.80	Set Shared address
HA Partner IP address	10.154.11.70	Set Partner address
Use for HA checks	☑	
Allow Adminstrative WUI Access	☑	
Use for GEO Responses and Requests	☑	
Link Status	Speed: 10000Mb/s, Full Duplex	Automatic ▼ Force Link
	MTU: 1500 Set MTU	
Additional addresses (address[/prefix])		Add Address

VLAN Configuration | VXLAN Configuration | Interface Bonding
Reboot Now

7. Enter the **HA Shared IP address** and click the **Set Shared address** button.

The **HA Shared IP address** must be the same as the **HA Shared IP address** which was set when configuring the first unit in **the** Set up the First Unit section.

8. Click **OK** on the resulting message.

9. Click **OK** on the message asking to reconnect to the shared IP address.

10. Enter the IP address of the first (master) unit in the HA pair in the **HA Partner IP address** field and click **Set Partner address**.

11. Click **OK** on the resulting message.

12. Change any other settings as needed.

13. Click the **Reboot Now** button.

Rebooting

[Continue]

14. Click **Continue**.

Passwords for the bal account are not synchronized across HA pairs, so ensure to use the same password on both units. Problems may occur if different passwords are used.

After rebooting, the HA pair will establish a TCP connection (using port 6973) between the 2 addresses. The synchronization process is started for the configuration.

The indicator squares should now show green and green.

The A indicates the active unit of the pair. If the first synchronization attempt fails (that is, the icons are not green and green) a second attempt might be needed.

```
        IP address   10.154.11.180 (lb100:10.154.11.170)
LoadMaster Version   7.1-33-2517.20160210-0930
    Serial Number   1050976
        Boot Time   Wed Feb 10 10:25:48 UTC 2016
```

On the home screen, the IP address field has changed. In addition to specifying the shared IP address of the pair, it also specifies the active unit in the pair. The left IP address is the shared address. The IP address in parentheses is the address of the current, active unit.

5.3 Enable the "Use for HA Checks" Option

Some guidelines relating to the **Use for HA checks** option are below:

- If you have a physical LoadMaster, you can connect a direct cable on eth1 between both boxes. Leave the IP configuration blank. Select the **Use for HA checks** check box.

- In a hardware configuration, if a direct cable has been deployed between both units over eth1 and there are IP addresses set in the interface management screen (and **Use for HA checks** is enabled on that interface) this causes problems because the LoadMaster will think it is a production link and if one of the LoadMasters reboot the other will fail too.

- If the **Use for HA checks** check box is greyed out it means that this is the only interface configured to be used for HA checks and cannot be deselected.

To enable the **Use for HA checks** option, follow the steps below:

1. Go to the WUI of the shared IP address.

2. In the main menu, select **System Configuration**.

3. Select the relevant interface.

4. Select the **Use for HA checks** check box.

These steps can be repeated if the **Use for HA checks** option needs to be enabled on more than one interface.

5.4 Test Failover

Now that the HA units have been set up, failover can be tested if needed. The easiest way to do this is to reboot the active unit. To reboot the unit, follow the steps below:

1. Log in to the IP address of the active unit.

2. In the main menu, click **Local Administration**.

3. Select **System Reboot**.
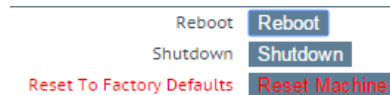
4. Click **Reboot**.

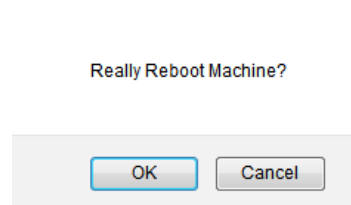5. A confirmation message may appear. Click **OK**.

6. Click **Continue**.

When HA1 is back online, both HA status icons should be green. The **A** should have moved into the right green square.

This means that the secondary unit is now the active unit.

When using local certificates in HA mode - the shared IP inherits the local certificate from the master unit. So, if a slave unit has a different local certificate to the master and failover occurs, the shared IP inherits the local certificate of the slave (now master) unit.

6 How To Perform A Firmware Update On HA Pairs

KEMP recommends that firmware updates are performed outside of working hours. This is to ensure there is no interruption to client connectivity. If it has to be done during working hours we suggest that a window of maintenance is put in place.

Before updating the firmware, ensure that the **Switch to Preferred Server** drop-down list is set to **No Preferred Host** in **System Configuration > HA Parameters**.

To update the firmware on a HA pair; perform the following steps using the shared IP address:

1. Update the currently active LoadMaster ("A").

2. When the update is complete, reboot A so that the passive unit becomes active.

3. When the first unit is back up, update the other unit.

4. When the update is complete, reboot other unit.

Now A should be active as it originally was.

7 HA Disaster Recovery Process (Replacing A Defective Unit)

In a disaster recovery scenario, you may need to replace one of the HA units. Prerequisites and installation steps for this scenario are provided in the sections below.

7.1 Prerequisites

There are some prerequisites that are needed before replacing a HA unit in a disaster recovery situation. These are listed below:

- The new LoadMaster should be licensed:

    - - Verify that the license is valid for the relevant features, that is, the same features for which the other HA unit is licensed

- Gather the following data:

    - - IP address of the LoadMaster

    - - IP address of the partner

    - - Shared IP address

7.2 Installation

Installation of a new HA unit should be performed during a maintenance window. Allow approximately 20 minutes for the installation.

Follow the steps below:

1. Ensure that the HA ports are connected and both machines can reach each other by using the **Ping** option in **System Configuration > Logging Options > System Log Files > Debug Options**.

2. Connect to the WUI on the local (machine) IP address of the new LoadMaster.

If any changes are needed to the network configuration to access the replacement unit (the WUI interface, Default Gateway, and so on), please verify that the settings are identical to the settings in the remaining active unit. If this cannot be guaranteed, it is advisable to continue with the approach as described in **the** Replacing HA Units section.

3. In the main menu of the WUI, select **System Configuration** and click the HA option.

Confirm
_____

○ HA Mode

An HA configuration requires two LoadMasters, only one of which is active and processing traffic at any time. The other passive unit continuously monitors the health of the active unit and will begin serving traffic when the active unit becomes unavailable. Once you configure HA mode, clustering options will be unavailable.

_____

○ Clustering

A Clustering configuration requires the following:

1. At least three LoadMasters (four or more are recommended). All LoadMasters in a cluster actively process traffic.
2. All hardware LoadMasters must be the same model. Virtual LoadMasters must have the same CPU, RAM and disk storage assigned. You cannot mix hardware and virtual LoadMasters in a cluster.
3. All LoadMasters should be set to use factory-default settings, with the exception of networking.

Once you configure clustering, HA mode options will be unavailable.

_____

Confirm   Cancel

4. A screen will appear asking if you want to set up **HA Mode** or **Clustering**. To set up HA, select **HA Mode** and click **Confirm**.

HA Mode | Non HA Mode ▼ |
Non HA Mode
HA (First) Mode
HA (Second) Mode

5. Select the relevant **HA Mode** (first or second).

6. Click **OK**.

7. Click **OK** again.

Network Interface 0

Interface Address (address[/prefix])	10.154.11.70/16	Set Address
HA Shared IP address	10.154.11.80	Set Shared address
HA Partner IP address	10.154.11.10	Set Partner address
Use for HA checks	✔	
Use for GEO Responses and Requests	✔	
Link Status	Speed: 10000Mb/s, Full Duplex Automatic ▼	Force Link
	MTU: 1500 Set MTU	
Additional addresses (address[/prefix])		Add Address

VLAN Configuration | VXLAN Configuration | Interface Bonding

Reboot Now

8. Enter the **HA Shared address**. Click **Set Shared address**.

9. Enter the **HA Partner IP address**. Click **Set Partner address**.

10. Click **Reboot Now**.

11. Wait 45 to 60 seconds, then click **Continue**.

12. Wait until the HA icons at the top of the screen are green.

13. If not yet done, connect the LoadMaster to the Real Server network and the open network side.

14. In the main menu, select **Local Administration > System Reboot**.

Reboot	Reboot
Shutdown	Shutdown
Reset To Factory Defaults	Reset Machine

15. Click **Reboot**.

16. Click **OK**.

17. Click **Continue**.

It is optional, but KEMP recommends simulating a failover to the newly restored partner to check that everything is working OK. There are two ways to do this, both are detailed in the sections below.

7.2.1 Reboot the Active Unit

Rebooting the active unit should cause the new unit to take over. To do this, follow the steps below in the WUI of the active unit:

1. In the main menu of the WUI, select **Local Administration > System Reboot**.

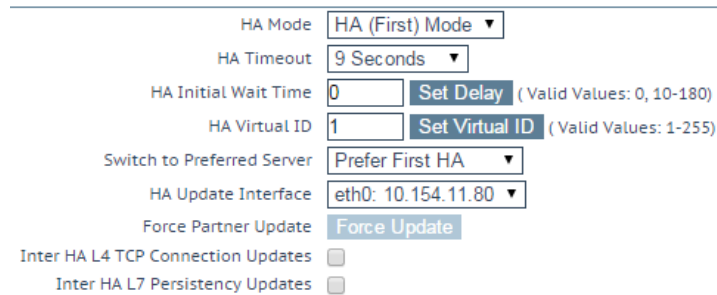|	
Reboot	Reboot
Shutdown	Shutdown
Reset To Factory Defaults	Reset Machine

2. Click **Reboot**.

3. Wait 45 to 60 seconds, then click **Continue**.

7.2.2 Change the Switch to Preferred Server Option

To change the **Switch to Preferred Server** option, follow the steps below in the WUI of the shared IP address:

1. In the main menu, select **System Configuration > HA Parameters**.

2. In the **Switch to Preferred Server** drop-down list, select the relevant option in order to set the new LoadMaster as the preferred master.

8 HA WUI Options

See below for descriptions of the various HA-related fields in the LoadMaster WUI.

8.1 HA and Clustering

Confirm

○ HA Mode   An HA configuration requires two LoadMasters, only one of which is active and processing traffic at any time. The other passive unit continuously monitors the health of the active unit and will begin serving traffic when the active unit becomes unavailable. Once you configure HA mode, clustering options will be unavailable.

○ Clustering   A Clustering configuration requires the following:

1. At least three LoadMasters (four or more are recommended). All LoadMasters in a cluster actively process traffic.
2. All hardware LoadMasters must be the same model. Virtual LoadMasters must have the same CPU, RAM and disk storage assigned. You cannot mix hardware and virtual LoadMasters in a cluster.
3. All LoadMasters should be set to use factory-default settings, with the exception of networking.

Once you configure clustering, HA mode options will be unavailable.

Confirm   Cancel

The HA section in the WUI is called **HA and Clustering**.

This screen describes both **HA Mode** and **Clustering**. Select the relevant option and click **Confirm** to continue.

If clustering is configured, the HA mode options become unavailable.

8.1.1 Interfaces

If the unit is part of an HA configuration, the following screen is displayed when one of the interfaces is clicked.

Network Interface 0

Interface Address (address[/prefix])	10.154.11.70/16 Set Address
HA Shared IP address	10.154.11.80 Set Shared address
HA Partner IP address	10.154.11.10 Set Partner address
Use for HA checks	☑
Use for GEO Responses and Requests	☑
Link Status	Speed: 10000Mb/s, Full Duplex Automatic ▼ Force Link
	MTU: 1500 Set MTU
Additional addresses (address[/prefix])	Add Address

VLAN Configuration | VXLAN Configuration | Interface Bonding

Reboot Now

This screen tells the user:

- The IP address of this LoadMaster

- The HA shared IP address. This is the IP address used to configure the pair.

- The IP address of the paired machine

- Whether or not this interface is enabled for HA health-checking

- The speed of the link (automatically detected)

- Any alternate addresses on this interface

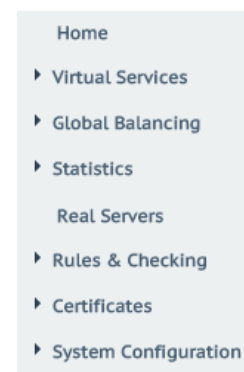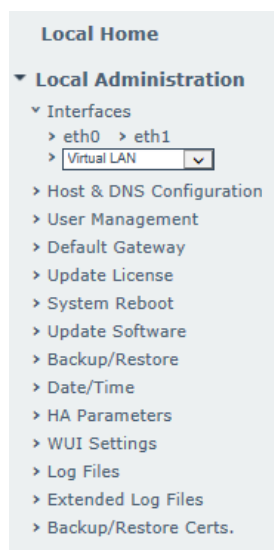### 8.1.1.1 "Use for HA checks"

Some key points to note about this option are below:

- The **Use for HA checks** check box must be selected on at least one interface that has connectivity from HA1 to HA2.

- If the **Use for HA checks** check box is greyed out it means that this is the only interface configured to be used for HA checks and cannot be deselected.

- This option should include at least one production interface, because if HA checks are only selected on non-production interfaces, the backup unit will not notice if a production interface goes down and will not take over for the incapacitated unit.

- In a hardware configuration, if a direct cable is deployed between both units over eth1 and IP addresses have been set in the interface (and **Use for HA Checks** is enabled on that interface) this causes problems because the LoadMaster will think it is a production link and if one of the LoadMasters reboot, the other will fail too.

8.1.2 HA Parameters

 The role of the LoadMaster can be changed by setting the HA Mode. If the **HA Mode** is set **to HA (First) Mode** or **HA (Second) Mode**, a prompt will appear reminding to add a shared IP. Changing the HA Mode will require a reboot, so after the details are set, click the **Reboot** button provided. Once the LoadMaster has rebooted, the **HA Parameters** menu option is available in the **System Configuration** section provided the role is not **Non HA Mode**. Configuring both units in the same **HA Mode**, for example, **HA (First Mode)** and **HA (First) Mode**, will result in severe operational problems as; not only will both units be master, both units will try to use the same IP address.

When logging in to the HA cluster, use the shared IP address to view and set the full functionality of the pair, apart from passwords and licensing. Logging in to the direct IP address of either one of the devices displays different menu options (see menus below). Logging into one of the LoadMasters directly is usually reserved for maintenance.

Local Home

▼ **Local Administration**
   ▾ Interfaces
      › eth0   › eth1
      › Virtual LAN   [⌄]
   › Host & DNS Configuration
   › User Management
   › Default Gateway
   › Update License
   › System Reboot
   › Update Software
   › Backup/Restore
   › Date/Time
   › HA Parameters
   › WUI Settings
   › Log Files
   › Extended Log Files
   › Backup/Restore Certs.

Home

▸ Virtual Services

▸ Global Balancing

▸ Statistics

   Real Servers

▸ Rules & Checking

▸ Certificates

▸ System Configuration

When a LoadMaster is in HA mode, the following screen appears when the **HA Parameters** menu option is selected:

HA Mode	HA (First) Mode ▾
HA Timeout	9 Seconds ▾
HA Initial Wait Time	0 [Set Delay] (Valid Values: 0, 10-180)
HA Virtual ID	1 [Set Virtual ID] (Valid Values: 1-255)
Switch to Preferred Server	No Preferred Host ▾
HA Update Interface	eth0: 10.154.11.80 ▾
Force Partner Update	[Force Update]
Inter HA L4 TCP Connection Updates	☐
Inter HA L7 Persistency Updates	☐

After initial configuration, the HA parameters should not be modified unless both units in the HA pair are available and operating properly (if they are both showing green icons at the top of the WUI, with one LoadMaster in active mode and the other in standby).

HA Status

At the top of the screen, next to the time, icons denote the real-time status of the LoadMaster units in the cluster. There is an icon for each unit in the cluster. This status is maintained using an automatic ping between the units.

A **X** [lb100] 01:44:18 PM

Clicking on these icons opens the management interface of the relevant HA partner.

The four possible icons are:

| Green (with 'A') | **A** | The unit is online and operational and the HA units are correctly paired. |
| | | The A in the middle of the square indicates that this is the master (active) unit. |

| Green (without 'A') | ■ | The unit is online and operational and the HA units are correctly paired. |
| | | The absence of an 'A' in the middle of the square indicates that this is not the master unit (standby). |

| Red/Yellow | ⊠ | The unit is not operational. It may be offline or misconfigured. The unit is not ready to take over. It may be offline or incorrectly paired. |

| Blue | ■ | When the unit reboots more than three times in 5 minutes it enters a pacified state. In this state the machine is only accessible using the direct machine WUI (not the shared WUI) and it is not participating in any HA activity. Therefore, no changes from the master are received and it will not take over if the master fails. To remove the unit from the pacified state, log in to the pacified LoadMaster through SSH or the console and reboot. |

| Grey | ■ | The machine is in an indeterminate state and may require a reboot to return to operation. In some cases, this may mean both machines are active, that is, both are set to master, and something has gone seriously wrong. If rebooting does not solve the issue, call KEMP Support. |

| **No HA icons** | | If the HA status squares are not appearing in the WUI, it probably means that HA is not enabled. Go to **System Administration** and select the HA option. Ensure the **HA Mode** is set to either **First** or **Second**. |

In HA mode, each LoadMaster has its own IP address that is used only for diagnostic purposes directly on the unit. The HA pair have a shared IP address over which the WUI is used to configure and manage the pair as a single entity.

There are a number of prerequisites that must be in place in order for HA to function correctly, refer to **the** Prerequisites **section** for a list of these prerequisites.

HA Mode

If using a single LoadMaster, select **Non HA Mode**.   When setting up HA mode, one LoadMaster must be set to **HA (First) Mode** and the other **HA (Second) Mode**. HA will not operate if both units have the same **HA Mode**.

HA Timeout

 CARP requests are sent every second from the master. The value selected in the **HA Timeout** drop-down list is the time that the master machine must be unavailable before a switchover occurs. With this option, the time it takes an HA cluster to detect a failure can be adjusted from 3 seconds to 15 seconds in 3 second increments. The default value is 9 seconds. A lower value will detect failures sooner, whereas a higher value gives better protection against a DOS attack.

HA Initial Wait Time

How long after the initial boot of a LoadMaster, before the machine decides that it should become active. If the partner machine is running, then this value is ignored. This value can be changed to mitigate the time taken for some intelligent switches to detect that the LoadMaster has started and to bring up the link.

HA Virtual ID

When using multiple HA LoadMaster clusters (or other devices using CARP-like protocols) on the same network, this value uniquely identifies each cluster so that there are no potential unwanted interactions.

KEMP highly recommends using a higher value than 10, as any other HA device using the same ID could interfere with HA operations.

As of the 7.2.36 release, the LoadMaster selects a virtual ID based on the shared IP address of the first configured interface (the last 8 bits). It is selected and displayed once both the shared address and the partner address are set. You can change the value to whatever you want (in the range 1 - 255) or you can keep it at the value it already selected. Please ensure the virtual ID is unique on each LoadMaster on the network.

Switch to Preferred Server

By default, neither partner in a HA cluster has priority. So that when a machine restarts after a failover, the machine becomes the standbyand stays in that state until forced to master. Specifying a preferred host means that when this machine restarts, it will always try to become master and the partner will revert to standby mode.

Some connections may be dropped during the switchover if a preferred host is specified.

For normal operating conditions, KEMP recommends selecting **No Preferred Host**.

HA Update Interface

The interface used to synchronize the entire HA configuration within the HA cluster. Synchronization occurs every two minutes. The information is synchronized over SSH port 6973.

Force Partner Update

Immediately forces the configuration from the active to standby unit without waiting for a normal update.

Inter HA L4 TCP Connection Updates

When using L4 services, if updates are enabled it allows L4 connections to be maintained across a HA failover. This option is ignored for L7 services.

Inter HA L7 Persistency Updates

When using L7 services, if this option is enabled it allows persistence information to be shared between the HA partners. If an HA failover occurs, the persistence information will not be lost. Enabling this option can have a significant performance impact.

HA Multicast Interface

The network interface used for multicast traffic which is used to synchronize Layer 4 and Layer 7 traffic when Inter HA Updates are enabled.

Use Virtual MAC Addresses

Selecting this option creates a shared MAC address for both units. When failover occurs, the LoadMaster will handle the MAC address handover too. This allows the switches to keep the same MAC address and not worry about ARP caches or stale records. This is useful when gratuitous ARPs (used in communicating changes in HA IP addresses to switches) are not allowed.

This option is not available in VLMs because they are not physically connected.

9 Troubleshooting

This section outlines troubleshooting steps for some common HA-related problems. If further help is needed, please contact KEMP Support.

9.1 General Troubleshooting Tips

General HA troubleshooting steps are below:

- Check that the IP settings for the **Interface**, **Partner** and **Shared IP address** are correct. These settings can be found in **System Configuration > Interfaces > eth0**.

- Log in to each of the single HA interface addresses and ensure the HA parameters are correct (**Local Administration > HA Parameters**):

    - - Ensure that unit 1 is set to **HA (First) Mode** and unit 2 is **HA (Second) Mode**

    - - Ensure that both units are on the same protocol and HA ID

- Ensure that all of the IP addresses are available and are not in use by another device. IP conflict will cause numerous problems.

- Shut down one or both LoadMasters and try to ping the IP address of each unit. If there is an answer, another device is using that IP address. Try the 'arp -a' or 'netstat' commands to find out more information on what device that is.

- Set the **HA Virtual ID** (in **Local Administration > HA Parameters**) to something other than **1**. The further up the range the better - avoid numbers from 1 to 10 as other HA devices may have those IDs and use Virtual Router Redundancy Protocol (VRRP).

The Virtual ID can conflict with any device on the network which is using VRRP. If there are multiple HA clusters on the same network, they must also have different Virtual IDs.

- Check that the time of both units are in sync and if they are not, ensure that NTP is configured and running on both units.

- Ensure there are no Virtual Services using TCP and port 6973 on the interface where synchronization is configured.

- Ensure there are no Virtual Services on either of the HA individual addresses.

- Ensure there are no Virtual Services using TCP and port 22 on a LoadMaster interface port.

9.2 No HA Status Squares are Visible in the WUI

If the HA status squares are not appearing in the WUI, it probably means that HA is not enabled. Go to **System Administration > HA Parameters** and ensure the **HA Mode** is set to either **First** or **Second**.

9.3 Green/Red HA Status Squares

If one of the HA status squares is red, check if one of the machines has crashed. If it has not crashed, try the following steps:

- Confirm that multicast is allowed on the network

- Confirm that IGMP snooping is disabled

- Ensure that promiscuous mode and portfast is enabled

- For VLMs; ensure that MAC spoofing is allowed

- Reboot both of the units using a single IP

- Ping between the units

- Confirm the network settings

- Check the HA settings on both machines

- Select more than one interface for HA checks

- For hardware LoadMasters;

    - - Connect eth1 with a direct cable, leave the interface unconfigured and select **Use for HA checks**

    - - Check that **No Preferred Host** is selected in the **Switch to Preferred Server** field. If HA works on eth1, the network could be the issue

    - - Connecting eth1 and only using this interface for HA checks could lead to problems if the production interface goes down because HA failover might not occur

    - - Run a TCP dump on both units and the switch in between and confirm that VRRP signals are sent and received

- Change the **HA Virtual ID** to something other than 1 (preferably higher than 10)

- Increase the value of the HA timeouts

- Move one or both VLMs so that they are on the same physical host

9.4 Blue HA Status Square

If there is a blue HA status square, follow the steps below:

1. Let the affected unit run for 10 minutes.

While waiting you can check the HA parameters to ensure they are configured correctly.

2. After that, shut down the blue unit for 5 minutes and restart using SSH or the console.

3. Confirm the network and HA settings.

9.5 Both Units are Active and the WUI is Unresponsive - Blue or Red Status Square

This usually means that both units are set to the same **HA Mode**, for example **HA (First) Mode**. This will cause both units to be master as well as try to take the same IP address. This causes serious problems with all functions of the LoadMaster.

9.6 Grey HA Status Square

If there is a grey HA status square, call KEMP Technical Support.

9.7 Virtual Services Temporarily Unavailable After Failover

If Virtual Services are temporarily unavailable after a failover, try flushing the ARP cache on the next-hop Layer 3 device to which the LoadMaster is connected.

If that does not work, activate Virtual MAC and flush the ARP cache. Activating the Virtual MAC requires a reboot.

The Virtual MAC option is not available in VLMs due to the inability to physically influence the units.

To activate Virtual MAC, follow the steps below:

1. In the shared IP address WUI, go to **System Configuration > HA Parameters**.

2. Enable the Use Virtual MAC Addresses option.

Selecting this option creates a shared MAC address for both units. When failover occurs, the LoadMaster will handle the MAC address handover too. This allows the switches to keep the same MAC address and not worry about ARP caches or stale records. This is useful when gratuitous ARPs (used in communicating changes in HA IP addresses to switches) are not allowed.

9.8 No Access to WUI on HA1/2 or Shared

If the WUI is inaccessible using any of the three IP addresses, try the steps below:

- Wait 5 minutes and try again. Sometimes WUI access has not yet been activated, even though the LoadMaster is responding to pings.

- Try a different web browser

- Clear the web browser cache

- Try from a different computer

- Log in to the console (of the IP address where the problem is occurring) using SSH, go to option **3 Local Administration**, **4 Web Address** and **s Immediately Stop Web Server Access**, which will then turn into **s Immediately Start Web Server Access**. This should restart hanging WUI access.
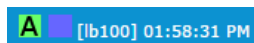
9.9 Nothing Works

If everything in this troubleshooting section fails, try to shut down one of the LoadMasters. The remaining LoadMaster should take over. This can remain in HA mode or be set to single - whichever works. This will provide a working solution until a more permanent fix can be found.

9.10 Issue with Hyper-V and HA on a Pair of VLMs

If you are having problems with Hyper-V and HA on a pair of VLMs, the following Microsoft TechNet article may help you to fix the problem: http://technet.microsoft.com/en-us/magazine/ff458341.aspx (http://technet.microsoft.com/en-us/magazine/ff458341.aspx)

9.11 HA Issue on VMware

9.11.1 Both Units Think That They Are the Master Unit

[lb100] 01:58:31 PM

A [lb100] 01:58:31 PM

In some situations, when using HA in a VMware environment, both units might think that they are the master unit and they may see the other unit as pacified (represented by a blue HA status square). This issue could be caused by the VMware Switch configuration. To resolve this issue, select the options as outlined below on the virtual switch.
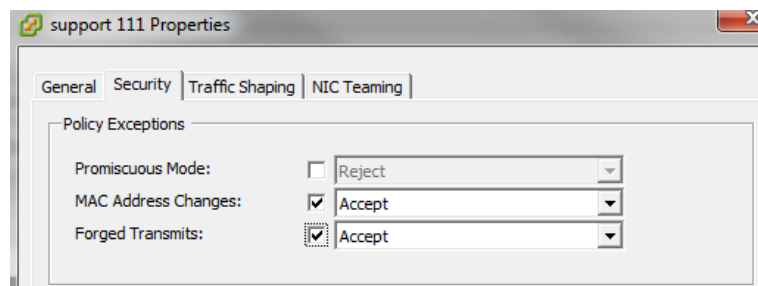
Ensure that **MAC Address Changes** and **Forged Transmits** are both selected. When they have been selected, reboot one of the LoadMasters.

A [lb100] 01:58:31 PM

A [lb100] 01:58:31 PM
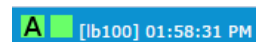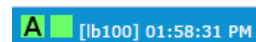
The units should now be able to communicate properly. The correct state should now appear in the HA status icons.

9.11.2 Two Virtual LoadMasters on Different Hosts

Having two Virtual LoadMasters on different hosts can also pose problems on VMware.
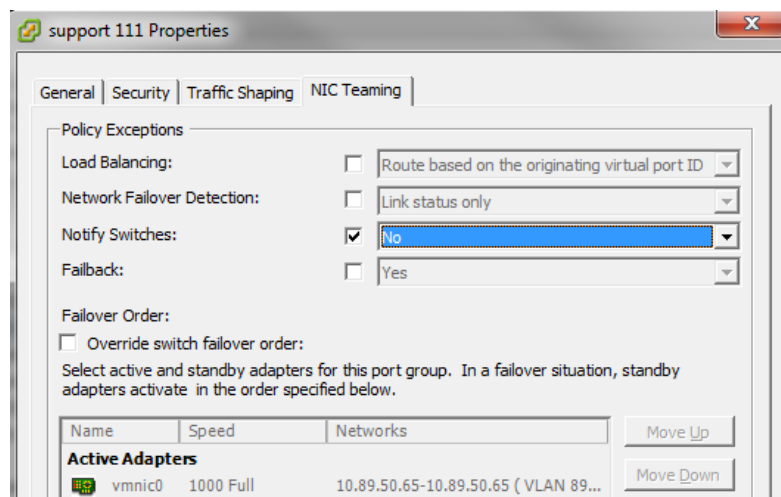
To resolve these issues, select the **Notify Switches** check box in the **NIC Teaming** tab of the virtual switch.

9.12 Synchronization Issue After Unbonding/Bonding an Interface

Occasionally, after unbonding a bonded interface or bonding an unbonded interface - the master/standby units cannot communicate. To fix this issue, restart the master unit.

10 Replacing HA Units

When replacing HA units, it is important to follow the correct steps in sequence to ensure that there is little or no downtime for end users. The below example has two old units which are to be replaced with two new units.

The steps below are written assuming that the new units are powered on and available to be provisioned and that all cabling is in place.

No preferred master set

Replacement units:

Update the firmware on the old units if possible. For further information on how to upgrade the firmware of a HA pair, refer to **the** How to Perform a Firmware Update on HA Pairs section and the Software Migration - Version 6 to 7, Technical Note document.

1. On the WUI of the individual unit being replaced, in the main menu, go to **Local Administration > Backup/Restore**.

Create a Backup

Backup the LoadMaster   Create Backup File

2. Click **Create Backup File**.

3. Save the backup file.

4. In the WUI of unit 1 (A), in the main menu, go to **System Configuration > HA Parameters**.

HA Mode	HA (First) Mode ▼
HA Timeout	9 Seconds ▼
HA Initial Wait Time	0 Set Delay (Valid Values: 0, 10-180)
HA Virtual ID	1 Set Virtual ID (Valid Values: 1-255)
Switch to Preferred Server	Prefer First HA ▼
HA Update Interface	eth0: 10.154.11.80 ▼
Force Partner Update	Force Update
Inter HA L4 TCP Connection Updates	☐
Inter HA L7 Persistency Updates	☐

5. Select **Prefer First HA** in the **Switch to Preferred Server** drop-down list.

Specifying a preferred host means that when the machine restarts, the preferred unit always becomes master and the partner will revert to slave mode. This may cause connection loss.

6. Remove old unit 2 (B) from production.

As old unit 1 (A) is master, this should not affect production.

7. In the WUI of new unit 2 (D), in the main menu, go to **System Configuration > System Administration > Backup/Restore**.

Restore Backup

Backup File	Choose File No file chosen
LoadMaster Base Configuration	☐
VS Configuration	☑
Geo Configuration	☑
ESP SSO Configuration	☑
	Restore Configuration

8. Click **Choose File**.

9. Browse to and select the backup file.

10. Select the configuration(s) that need to be restored.

This is the backup from old unit 2 (B).

11. Click **Restore Configuration**.

It is not possible to restore a single machine configuration onto a HA machine, or restore a HA configuration onto a single machine. A unit must be put into HA mode before a backup from a HA machine can be used to restore the **LoadMaster Base Configuration**.

It is not possible to restore a configuration containing ESP-enabled Virtual Services onto a machine which is not enabled for ESP.

12. Click **Reboot Now**.

13. Click **Continue**.

14. In the main menu, go to **Local Administration > Interfaces**.

15. Select the relevant interface.

Network Interface 0

Interface Address (address[/prefix])	10.154.11.70/16	Set Address
HA Shared IP address	10.154.11.80	Set Shared address
HA Partner IP address	10.154.11.10	Set Partner address
Use for HA checks	☑	
Use for GEO Responses and Requests	☑	
Link Status	Speed: 10000Mb/s, Full Duplex	Automatic ▼ Force Link
	MTU: 1500 Set MTU	
Additional addresses (address[/prefix])		Add Address

VLAN Configuration | VXLAN Configuration | Interface Bonding

Reboot Now

16. Check that the **Interface Address (address[/prefix])**, the **HA Shared IP address** and **HA Partner IP address** are correct before adding it to the production unit.

17. In the main menu, go to **Local Administration > HA Parameters**.

HA Mode	HA (First) Mode ▼
HA Timeout	9 Seconds ▼
HA Initial Wait Time	0 Set Delay (Valid Values: 0, 10-180)
HA Virtual ID	1 Set Virtual ID (Valid Values: 1-255)
Switch to Preferred Server	No Preferred Host ▼
HA Update Interface	eth0: 10.154.11.80 ▼
Force Partner Update	Force Update
Inter HA L4 TCP Connection Updates	☐
Inter HA L7 Persistency Updates	☐

18. Ensure that the **HA Virtual ID** is correct and unique.

19. When the new unit 2 (D) is connected, open the WUI of the shared IP address and in the main menu, go to **System Configuration > HA Parameters**.

HA Mode	HA (First) Mode ▼
HA Timeout	9 Seconds ▼
HA Initial Wait Time	0 Set Delay (Valid Values: 0, 10-180)
HA Virtual ID	1 Set Virtual ID (Valid Values: 1-255)
Switch to Preferred Server	Prefer First HA ▼
HA Update Interface	eth0: 10.154.11.80 ▼
Force Partner Update	Force Update
Inter HA L4 TCP Connection Updates	☐
Inter HA L7 Persistency Updates	☐

20. Click **Force Update**.

This will copy the configuration from the old unit 1 (A) (Master) to the new unit 2 (D) (standby). This will take approximately 15 seconds.

21. When the update has completed, in the main menu, go to **System Configuration > HA Parameters**.

HA Mode	HA (First) Mode ▾
HA Timeout	9 Seconds ▾
HA Initial Wait Time	0	Set Delay	(Valid Values: 0, 10-180)
HA Virtual ID	1	Set Virtual ID	(Valid Values: 1-255)
Switch to Preferred Server	Prefer Second HA ▾
HA Update Interface	eth0: 10.154.11.80 ▾
Force Partner Update	Force Update
Inter HA L4 TCP Connection Updates	☐
Inter HA L7 Persistency Updates	☐

22. Select **Prefer Second HA** in the **Switch to Preferred Server** drop-down list.

This will drop all connections while the second unit takes over as master.

Preferred master: unit 2

23. Now, old unit 1 (A) can be removed from production.

As new unit 2 (D) is master, this should not affect production.

24. On the WUI of the new unit 1 (C), in the main menu, go to **System Configuration > System Administration > Backup/Restore**.

Restore Backup

Backup File	Choose File	No file chosen
LoadMaster Base Configuration	☑
VS Configuration	☑
Geo Configuration	☑
	Restore Configuration

25. Click **Choose File**.

26. Browse to and select the backup file.

27. Select the configuration(s) that need to be restored.

This is the backup configuration from old unit 1 (A).

28. Click **Restore Configuration**.

It is not possible to restore a single machine configuration onto a HA machine and vice versa.

It is not possible to restore a configuration containing ESP-enabled Virtual Services onto a machine which is not enabled for ESP.

29. Click **Reboot Now**.

30. Click **Continue**.

31. In the main menu, go to **Local Administration > Interfaces**.

32. Select the relevant interface.

Network Interface 0

Interface Address (address[/prefix])	10.154.11.70/16　Set Address
HA Shared IP address	10.154.11.80　Set Shared address
HA Partner IP address	10.154.11.10　Set Partner address
Use for HA checks	☑
Use for GEO Responses and Requests	☑
Link Status	Speed: 10000Mb/s, Full Duplex　Automatic ▼　Force Link
	MTU: 1500　Set MTU
Additional addresses (address[/prefix])	Add Address

VLAN Configuration　VXLAN Configuration　Interface Bonding

Reboot Now

33. Check that the **Interface Address (address[/prefix])**, the **HA Shared IP address** and **HA Partner IP address** are correct before adding it to the production unit.

34. In the main menu, go to **Local Administration > HA Parameters**.

HA Mode	HA (First) Mode ▼
HA Timeout	9 Seconds ▼
HA Initial Wait Time	0　Set Delay (Valid Values: 0, 10-180)
HA Virtual ID	1　Set Virtual ID (Valid Values: 1-255)
Switch to Preferred Server	No Preferred Host ▼
HA Update Interface	eth0: 10.154.11.80 ▼
Force Partner Update	Force Update
Inter HA L4 TCP Connection Updates	☐
Inter HA L7 Persistency Updates	☐

35. Ensure that the **HA Virtual ID** is correct and unique.

36. When new unit 1 (C) is connected, open the WUI of the shared IP address and in the main menu, go to **System Configuration > HA Parameters**.

HA Mode	HA (First) Mode ▼
HA Timeout	9 Seconds ▼
HA Initial Wait Time	0 Set Delay (Valid Values: 0, 10-180)
HA Virtual ID	1 Set Virtual ID (Valid Values: 1-255)
Switch to Preferred Server	Prefer First HA ▼
HA Update Interface	eth0: 10.154.11.80 ▼
Force Partner Update	Force Update
Inter HA L4 TCP Connection Updates	☐
Inter HA L7 Persistency Updates	☐

37. Click **Force Update**.

38. This will take approximately 15 seconds.

39. When the update is complete, in the main menu, go to **System Configuration > HA Parameters**.

40. In the **Switch to Preferred Server** drop-down list, switch the preferred host to the other unit or select **No Preferred Host**.

Preferred master set to none

Current setup - two units in production

If you were replacing faulty units, ensure to send the old faulty units back to KEMP for testing.

References

Unless otherwise specified, the following documents can be found at http://kemptechnologies.com/documentation (http://kemptechnologies.com/documentation).

HA for Azure, Feature Description

HA for AWS, Feature Description

Software Migration - Version 6 to 7, Technical Note

Web User Interface (WUI), Configuration Guide

Feature Description, LoadMaster Clustering

Document History

Date	Change	Reason for Change	Version	Resp.
July 2016	Release updates	Updates for 7.1.35 release	7.0	LB
Oct 2016	Release updates	Updates for 7.2.36 release	8.0	LB
Jan 2017	Minor change	Enhancement made	9.0	LB
Mar 2017	Release updates	Updates for 7.2.38 release	10.0	LB
July 2017	Minor changes	Enhancements made	11.0	LB

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KEMP Resources

⬇ Try a Virtual LoadMaster (http://kemptechnologies.com/server-load-balancing-appliances/virtual-loadbalancer/vlm-download?
utm_source=KEMP_Support&utm_medium=link&utm_campaign=Calls_to_Action)

⌨ KEMP's Product Matrices (http://kemptechnologies.com/server-load-balancing-appliances/product-matrix.html?utm_source=KEMP_Support&utm_medium=link&utm_campaign=Calls_to_Action)

⚙ KEMP's Sizing Guides (http://kemptechnologies.com/loadmaster-sizing-guide?utm_source=KEMP_Support&utm_medium=link&utm_campaign=Calls_to_Action)

▶ KEMP's Video Library (http://kemptechnologies.com/load-balancing-webinars-and-videos?utm_source=KEMP_Support&utm_medium=link&utm_campaign=Calls_to_Action)

Related articles

📄 KEMP LoadMaster (/hc/en-us/articles/204373265-KEMP-LoadMaster)

📄 Edge Security Pack (ESP) (/hc/en-us/articles/203125029-Edge-Security-Pack-ESP-)

📄 Hardware LoadMaster (/hc/en-us/articles/204244665-Hardware-LoadMaster)

📄 Bonding, VLAN and VXLAN (/hc/en-us/articles/203859895-Bonding-VLAN-and-VXLAN)

📄 Transparency (/hc/en-us/articles/203126369-Transparency)

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