



RESTful API

Interface Description

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1 Introduction

KEMP Technologies leads the industry in driving the price/performance value proposition for application delivery and load balancing to levels that our customers can afford. Our products' versatile and powerful architecture provide the highest value, while enabling our customers to optimize their businesses that rely on Internet-based infrastructure to conduct business with their customers, employees and partners.

KEMP Technologies products optimize web and application infrastructure as defined by High Availability (HA), high-performance, flexible scalability, security and ease of management. They maximize the total cost-of-ownership for web infrastructure, while enabling flexible and comprehensive deployment options.

1.1 Document Purpose

This document describes the RESTful API Interface to the KEMP LoadMaster. It describes in detail how to configure the various features of the KEMP LoadMaster using the RESTful API.

This document does not explain each of the features or options in detail. For further information, please refer to the relevant Feature Description document on

www.kemptechnologies.com/documentation.

1.2 Intended Audience

This document is intended to help anyone who wishes to configure the KEMP LoadMaster using the RESTful API.

2 The RESTful API Interface

This document describes an interface designed to allow remote applications access to the LoadMaster in a simple and consistent manner. The interface is a REST-like interface. REST (Representational State Transfer) is a style of software architecture for distributed systems and is one of the predominant web service design models.

2.1 How the LoadMaster RESTful API Works

The LoadMaster RESTful API works in a RESTful manner, by allowing a user or application to pass HTTPS requests to the LoadMaster. The LoadMaster answers the request with an XML formatted response. The HTTPS request is in the format:

https://<LoadMaster IP Address>/access/<command>?<parameter1>=value&<parameter2>=value

The basic interface is a simple HTTPS GET operation where the command is specified by the URL. If any parameters are required by the operation, they are passed as QUERY parameters.

The following points should be noted regarding the formatting of the HTTPS request:

- Only one command can be given at a time.
- The '?' character signifies the end of a command.
- The '&' character signifies the end of a parameter/value pair.
- If there are any unnecessary parameter/value pairs, they will be ignored.
- The order in which the parameter/value pairs appear does not matter.
- There cannot be any spaces within the query. Although some applications, like browsers, would convert spaces to HTML code prior to sending the string to the LoadMaster.
- Multiple parameters can be modified within the same command.

For example, the following query will return the maximum cache size from a LoadMaster with the IP address of 10.11.0.20.

https://10.11.0.20/access/get?param=cachesize

The response to the query, from the LoadMaster, is returned in an easily decoded XML format, for example:

```
-----  
<?xml version="1.0" encoding="ISO-8859-1"?>  
<Response stat="200" code="ok">  
  <Success>  
    <Data>  
      <cachesize>  
        100  
      </cachesize>  
    </Data>  
  </Success>  
</Response>  
-----
```

Not all commands in this document will be allowed on all LoadMasters.
Some functions are only available for certain LoadMaster licenses.

2.2 Security

An application can only access the LoadMaster using the standard WUI IP address. Security is provided in exactly the same way as over the standard WUI, that is, valid credentials must be passed on every access using Basic Authentication.

The user **bal** naturally has access to all functionality; other users have access to the subsystems that have been assigned to them via the LoadMaster permissions.

Currently there is no way to modify user permissions via this interface.

Depending on security settings and whether the browser has ever connected to the WUI before adding login information may be required. In this case instead of a standard command format such as:

https://<LoadMaster IP address>/access/<command>?params

the login information would need to be included, for example:

https://<UserName>:<UserPassword>@<LoadMasterIPaddress>/access/<command>?params

You can also use certificate-based authentication. For instructions on how to do this, refer to Section 2.2.1.

2.2.1 Configure Certificate-Based Authentication

Follow the steps in the sections below to configure certificate-based authentication.

2.2.1.1 Enable Session Management

You must enable **Session Management** before you can enable client certificate authentication. To enable Session Management, follow the steps below:

1. In the main menu of the LoadMaster WUI, navigate to **System Configuration > Miscellaneous Options > WUI Settings**.

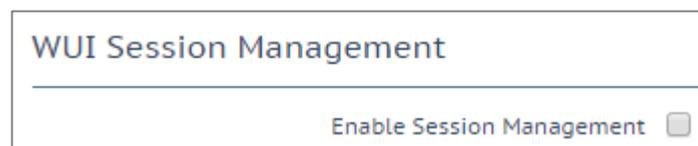


Figure 2-1: Enable Session Management

2. Select the **Enable Session Management** check box.

After this check box is selected, you must log in to continue using the LoadMaster.

3. Configure any other settings as needed.

2.2.1.2 Create a User (If Needed)

It is not possible to use certificate-based authentication with the **bal** user. However, you can create a non-**bal** user and grant it **All Permissions**, or whatever permissions you want. If you do not already have another user created, you can add one by following these steps:

1. In the main menu of the LoadMaster WUI, expand **System Configuration > System Administration** and click **User Management**.

Add User

User Password No Local Password

Figure 2-2: Add User

2. At the bottom of the screen, enter a username in the **User** text box.
3. At this point, you can either set a **Password** for the new user, or select the **No Local Password** check box.

For further information on the **No Local Password** option and on certificate authentication in general, refer to the **User Management, Feature Description**.

4. Click **Add User**.

2.2.1.3 Enable Client Certificate Authentication on the LoadMaster

A number of different login methods are available to enable. For steps on how to set the **Admin Login Method**, along with a description of each of the available methods, refer to the steps below:

1. In the main menu of the LoadMaster WUI, expand **Certificates & Security** and click **Remote Access**.

Administrator Access

Allow Remote SSH Access Using: Port:

SSH Pre-Auth Banner

Allow Web Administrative Access Using: Port:

Admin Default Gateway

Allow Multi Interface Access

Enable API Interface

Admin Login Method

Enable Software FIPS 140-2 Level 1 Mode

Allow Update Checks

Figure 2-3: Admin Login Method

2. Select the relevant **Admin Login Method**.

Using local certificates only works with API authentication. Because of this, it might be best to select the **Password or Client certificate** option. This enables API access using the client certificate and WUI access using the username/password.

The following login methods are available:

- **Password Only Access (default):** This option provides access using the username and password only – there is no access using client certificates.
- **Password or Client certificate:** You can log in either using the username/password or using a valid client certificate. If a valid client certificate is in place, the username and password is not required.

The LoadMaster asks the client for a certificate. If a client certificate is available, the LoadMaster checks for a match. The LoadMaster checks if the certificate matches one of the local certificates, or checks if the Subject Alternative Name (SAN) or Common Name (CN) of the certificate is a match. The SAN is used in preference to the CN when performing a match. If there is a match, you are granted access to the LoadMaster. This works both using the API and user interface.

An invalid certificate will not allow access.

If no client certificate is supplied, the LoadMaster expects that a username and password is supplied (for the API) or will request a password using the standard WUI login page.

- **Client certificate required:** Access is only allowed via the use of a client certificate. It is not possible to log in using the username and password. SSH access is not affected by this (only the **bal** user can log in via SSH).
- **Client certificate required (Verify via OCSP):** This is the same as the **Client certificate required** option, but the client certificate is verified via an OCSP service. You must configure the OCSP Server Settings for this to work. For further information on the OCSP Server Settings, refer to the **SSL Accelerated Services, Feature Description**.

Some points to note regarding the client certificate methods are below:

- The **bal** user does not have a client certificate. Therefore, it is not possible to log into the LoadMaster as **bal** using the **Client certificate required** methods. However, a non-**bal** user can be created and granted **All Permissions**. This will allow the same functionality as the **bal** user.
- There is no log out option for users that are logged in to the WUI using client certificates, as it is not possible to log out (if the user did log out the next access would automatically log them back in again). The session terminates when the page is closed, or when the browser is restarted.

2.2.1.4 Generate and Download the Client Certificate

To generate a local certificate, follow the steps below:

Users with **User Administration** permissions are able to manage local certificates for themselves and other users.

1. In the main menu of the LoadMaster WUI, navigate to **System Configuration > System Administration > User Management**.



Figure 2-4: Modify user

2. Click **Modify** on the relevant user.



Figure 2-5: Generate certificate

3. Enter a **Passphrase** and click **Generate**.

Entering a passphrase is optional. If a passphrase is entered, it is used to encrypt the private key.

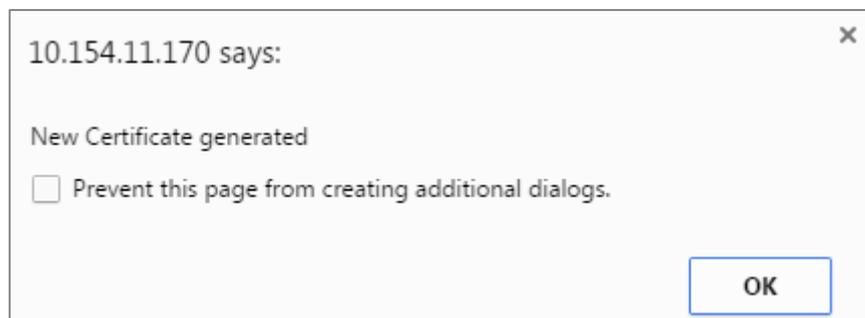


Figure 2-6: New Certificate generated

4. Click **OK** to the pop-up message that appears.

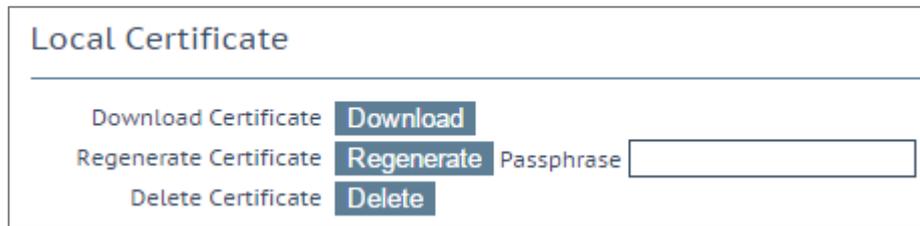


Figure 2-7: Download the certificate

5. Click **Download**.

You can also regenerate from this screen.

2.2.1.5 Specify the Certificate Details in the API

After configuring all of the options as outlined in the above sections, you must specify the details of the certificate to run the API commands successfully. You must also run the command as a cURL command, for example:

```
curl -k -E <PathToCertificateFile>/<CertificateFilename>.pem
https://172.21.59.100/access/get?param=version
```

2.2.1.6 Create a PFX File (If Running Commands via a Web Browser)

If you are running the RESTful APIs from the command line – you can use the PEM file, as indicated in **Section 2.2.1.5**. If you want to run RESTful API commands via a web browser, you need to create a PFX file and import that into the browser.

You can convert the .pem file to .pfx any way you like. For the purposes of this document, we have provided steps on how to do it using OpenSSL. If you are using Windows, you may need to install OpenSSL to run these steps.

To create a .pfx file using, follow the steps below:

1. Open the .pem certificate.
2. Copy from the start of the -----BEGIN CERTIFICATE----- section to the end of the -----END CERTIFICATE----- section.
3. Paste this text into a new file.
4. Save the file as <CerFileName>.cer.
5. Go to the .pem certificate file again.
6. Copy from the start of the -----BEGIN RSA PRIVATE KEY----- section to the end of the -----END RSA PRIVATE KEY----- section.
7. Paste this text into a new file.
8. Save the file as <KeyFileName>.key.
9. Use the **openssl** command to create the .pfx file:


```
openssl pkcs12 -export -out <NewFileName>.pfx -inkey
<KeyFileName>.key -in <CerFileName>.cer
```
10. Import the certificate to the web browser.

2.3 Enabling the LoadMaster RESTful API Interface

The RESTful API interface is enabled or disabled via the LoadMaster WUI. By default the interface is disabled.

To enable the RESTful API interface complete the following steps:

1. Select the **Certificates & Security > Remote Access** menu option.
2. Select the **Enable API Interface** checkbox.

2.4 Using get and set commands

A large number of LoadMaster parameters can be managed using the **set** and **get** commands. These parameters are described throughout the document. A list of parameters is also provided in **Appendix A – get and set Parameters**.

Values of parameters can be obtained using the **get** command using the format

https://<LoadMasterIPAddress>/access/get?param=<ParameterName>

Values of parameters can be set using the **set** command using the format

https://<LoadMasterIPAddress>/access/set?param=<ParameterName>&value=<ParameterValue>

2.5 Error Reports

If an error occurs, for example where a request is missing the **param** value, an error report is generated as follows:

```
-----  
<?xml version="1.0" encoding="ISO-8859-1"?>  
<Response stat="400" code="fail">  
  <Error>  
    param: String value missing  
  </Error>  
</Response>  
-----
```

The HTTP status of the request also reflects the response code.

2.6 Notation

Throughout the document the parameter types are defined as follows:

Type	Abbreviation	Typical Values
Boolean	B	Y or N; y or n; 1 or 0;
Integer	I	<minint>-<maxint>
String	S	"value"
Address	A	IP-address
File	F	Some type of file

Table 2-1: Parameter Notation

3 RESTful API Commands

3.1 Command Syntax

A request is made up of two parts: the command and the parameters.

https://<LoadMaster IP address>/access/<command>?params

When there is more than one parameter in a request, individual parameters are separated using an ampersand (&) symbol.

All commands are consistent. For example in all places where a Virtual Service is required, the IP address of a Virtual Service is specified by using **vs=<ipaddr>** i.e. to show a Virtual Service, the command could be:

https://<LoadMasterIPAddress>/access/showvs?vs=10.0.0.10&port=80&prot=tcp

To show a Real Server on a Virtual Service:

https://<LoadMasterIPAddress>/access/showrs?vs=10.0.0.10&port=80&prot=tcp&rs=99.1.1.1&rsport=80

3.2 getall Command

The **getall** command returns a list of all parameters that are available (and that are not null):

https://<LoadMasterIPAddress>/access/getall

3.3 Home Screen Information

Some information which is available in the LoadMaster WUI is also available via the API. Refer to the sub-sections below for further details.

3.3.1 Retrieve the LoadMaster Firmware Version

The LoadMaster firmware version can be obtained using the **get** command and the **version** parameter:

https://<LoadMasterIPAddress>/access/get?param=version

3.3.2 Retrieve the Boot Time and Active Time

The boot time is the time at which the LoadMaster last booted. The boot time and active time are the same when a LoadMaster is not running in HA mode. When in HA mode, the active time is the time at which the LoadMaster last became the master unit. The active time will be zero if the LoadMaster is in slave mode. To retrieve these values, run the following commands:

https://<LoadMasterIPAddress>/access/get?param=boottime

https://<LoadMasterIPAddress>/access/get?param=activetime

3.3.3 Retrieve the Serial Number

To retrieve the LoadMaster serial number, run the **get** command for the **serialnumber** parameter:

```
https://<LoadMasterIPAddress>/access/get?param=serialnumber
```

3.3.4 Retrieve the Virtual Service and Real Service Statuses

To retrieve the total numbers of Virtual Services, SubVSs and Real Servers that are up, down and administratively disabled, run the **vstotals** command:

```
https://<LoadMasterIPAddress>/access/vstotals
```

3.3.5 Retrieve Licensing Information

To retrieve details about the LoadMaster license, run the **licenseinfo** command:

```
https://<LoadMasterIPAddress>/access/licenseinfo
```

3.4 Initial Configuration

Please note that the initial configuration API commands are currently unavailable on LoadMasters for Amazon Web Services (AWS).

A number of steps are involved in initially deploying a LoadMaster, such as accepting the End User License Agreement (EULA) and licensing the unit. Before the LoadMaster can be fully deployed the user must display and accept the EULA. These initial configuration steps can either be performed via the WUI or the API. The API commands relating to initial configuration are listed in the sections below.

These commands should be run in sequential order

3.4.1 Read the EULA

The ReadEula command displays the EULA and a magic cookie.

The magic cookie is used for security reasons - it limits the possibility of remote attacks. If a command requires the magic cookie (like some of the other ones in the sections below) and does not get the correct magic cookie from the previous command, the command will fail.

```
https://<LoadMasterIPAddress>/access/readeula
```

The magic string is an automatically generated random string, for example **c0a6fcc-1c53-4a26-8ed3-e0d0bb8e23f3**. Please copy this string because it will be needed in the next command to set the license type.

3.4.2 Accept the EULA and Set the License Type

Currently there are three license types available from KEMP. These are:

- Trial (Unrestricted)
- Perpetual
- Free (Restricted)

The **AcceptEULA** command is used to enter the magic cookie key returned by the readEula command in order to accept the EULA and set the type of license used, for example **trial**, **perm** or **free**.

https://<LoadMasterIPAddress>/access/accepteula?magic=<CorrectMagicString>&type=free

Value	Name in WUI	Description
Trial	Trial (Unrestricted)	Temporary license for users evaluating the KEMP LoadMaster
Perm	Perpetual	Purchased permanent LoadMaster
Free	Free (Restricted)	Free LoadMaster

Table 3-1: Valid Values for the License Type Parameter

If running this command on a Virtual LoadMaster (VLM) which has been created in the Multi-Tenant LoadMaster product, the license type set here is irrelevant because the license type will be inherited from the Multi-Tenant LoadMaster. However, this command still needs to be run in order to get another magic string which is needed to run the next command (**AcceptEula2**).

3.4.3 Specify Whether or not to use the Call Home Feature

The **AcceptEULA2** command is used to specify whether or not to use the Call Home feature. If this is enabled, the LoadMaster regularly contacts KEMP to check for updates and other information.

https://<LoadMasterIPAddress>/access/accepteula2?magic=<CorrectMagicString>&accept=<yes/no>

3.4.4 Retrieve the Available License Types

To retrieve a list of available license types for a particular KEMP ID, run the **alsilicensetypes** command:

https://<LoadMasterIPAddress>/access/alsilicensetypes?kempid=<KEMPID>&password=<PasswordForKEMPID>&orderid=<OrderID>

The **orderid** parameter is only needed for Virtual LoadMasters.

If successful, the output provides a list of license types and associated IDs. The ID number is used when licensing using the **alsilicense** command.

3.4.5 License the LoadMaster

The LoadMaster can be licensed using the **license** or **alsilicense** commands. For further information, please refer to **Section 3.17.2**.

3.4.6 Set the Initial Password

The **Set_Initial_Passwd** command is used to set the password of the default LoadMaster user (**bal**).

https://<loadMasterIPAddress>/access/set_initial_passwd?passwd=<password1>

Parameter	Parameter Type	Description	Mandatory
Passwd	String	This is the password for the default administrator user (bal). The password should contain at least 8 alphanumeric characters.	Yes

Table 3-2: SetInitialPasswd Parameters

3.5 Virtual Services

3.5.1 Virtual Service Control

The basic forms of the Virtual Services commands are below. Virtual Services can be addressed either by using the IP address or the index (ID). The index is a numerical value that tracks the Virtual Service internally.

Properties for tcp/10.154.11.71:80 (Id:1) - Operating at Layer 7

Figure 3-1: Virtual Service ID

The index can be displayed by using the **showvs** or **listvs** command or, alternatively by checking the Virtual Service properties screen in the WUI, which displays the Virtual Service ID.

https://<LoadMasterIPAddress>/access/listvs

https://<LoadMasterIPAddress>/access/showvs?vs=<IPaddr>&port=<Port>&prot=<tcp/udp>

https://<LoadMasterIPAddress>/access/showvs?vs=<index>

https://<LoadMasterIPAddress>/access/addvs?vs=<IPaddr>&port=<Port>&prot=<tcp/udp> [&...]

https://<LoadMasterIPAddress>/access/delvs?vs=<IPaddr>&port=<Port>&prot=<tcp/udp>

https://<LoadMasterIPAddress>/access/delvs?vs=<index>

https://<LoadMasterIPAddress>/access/modvs?vs=<IPaddr>&port=<Port>&prot=<tcp/udp>[&. . .]

https://<LoadMasterIPAddress>/access/modvs?vs=<index>[&. . .]

The **delvs** command returns an OK status on success; otherwise the commands return the current settings of the Virtual Service.

The **addvs** and **modvs** command both allow the user to modify all the settings of a Virtual Service. The **addvs** command will first create the Virtual Service - while **modvs** will modify an existing Virtual Service.

The **listvs** command lists all Virtual Services on the LoadMaster.

(When creating a new Virtual Service, the default values set are non-transparent and subnet originating - except for UDP services, which are transparent (force L4).)

When the status of the Virtual Service is returned, the Real Servers associated with the Virtual Service are also returned.

Some commands depend on other commands as a prerequisite. If the prerequisites are not met, the command will do nothing.

Not all parameters are applicable on all setups. The parameters available for use depends on the configured environment

Sub-Virtual Services (SubVSs)

The Virtual Service commands can be used on SubVSs also. However, as SubVSs do not have IP addresses, the SubVS index must be used. The SubVS index can be found using the **listvs** command.

Properties for subVS 1 (Id:2) of tcp/10.154.11.71:80 - Operating at Layer 7

Figure 3-2: SubVS ID

Alternatively, check the ID SubVS properties screen in the WUI by clicking modify on a SubVS. In the example above, the SubVS ID is 2.

To display details about a particular SubVS, run the following command:

https://<LoadMasterIPAddress>/access/showvs?vs=<SubVSindex>

A new SubVS can be added by running one of the following commands:

https://<LoadMasterIPAddress>/access/modvs?vs=<VSIP>&port=<Port>&prot=<tcp/udp>&createsubvs=

https://<LoadMasterIPAddress>/access/modvs?vs=<index>&createsubvs=

A SubVS can be deleted from a Virtual Service by running the following command:

https://<LoadMasterIPAddress>/access/delvs?vs=<VSindex>

A Real Server can be deleted from a SubVS by running the following command:

```
https://<LoadMasterIPAddress>/access/delete/rs?vs=<SubVSindex>&rs=%21<RSindex>
```

To modify SubVS settings, run the following command:

```
https://<LoadMasterIPAddress>/access/modvs?vs=<SubVSindex> [&...]
```

SubVS index is an integer value.

The parameters that can be set in the **addvs** and **modvs** commands are described in the sections below. For ease of use, the parameters have been broken into sections based on where the corresponding field appears in the WUI.

3.5.1.1 Properties

Name	Type	Default	Range	Description
VSPort	I	<unset>	3-65530, *	The port for the Virtual Service. A wildcard port can also be specified by using an asterisk (*).
Protocol	S	<unset>	udp, tcp	The protocol to be used for the Virtual Service.
VSAAddress	A	Address		The IP address of the Virtual Service.
MasterVS	I (Read Only)	<unset>	0 – Not a parent Virtual Service 1 – Is a parent Virtual Service	Signifies whether or not the Virtual Service is a parent Virtual Service (i.e. if it has one or more SubVSs).

Table 3-3: Properties API Parameters

3.5.1.2 Basic Properties

Name	Type	Default	Range	Description
Enable	B	Y		Activate or deactivate the Virtual Service
VStype	S	<port dependent>	gen - Generic http - HTTP/HTTPS http2 - HTTP/2 ts - Remote Terminal tls – STARTTLS protocols log – Log Insight	Specifies the type of service being load balanced.

Name	Type	Default	Range	Description
NickName	S	<unset>		<p>Specifies the "friendly" name of the service.</p> <p>In addition to the usual alphanumeric characters, the following 'special' characters can be used as part of the Service Name:</p> <p style="text-align: center;">. @ - _</p> <p>However, there must be at least one alphanumeric character before the special characters.</p>

Table 3-4: Basic Properties API Parameters

3.5.1.3 Standard Options

Name	Type	Default	Range	Description
Cookie	S	<unset>		This parameter is only relevant when the persistence mode is set to cookie , active-cookie , cookie-src or active-cook-src . Enter the name of the cookie to be checked.
ForceL7	B	Y (if not UDP)	0 - Disabled 1 - Enabled	Enabling ForceL7 means the Virtual Service runs at Layer 7 and not Layer 4. This may be needed for various reasons, including that only Layer 7 services can be non-transparent.

Name	Type	Default	Range	Description
IdleTime	I	660	0-86400	<p>Specifies the length of time (in seconds) that a connection may remain idle before it is closed. The range for this parameter is 0 to 86400. There are some special values that can be set for this parameter:</p> <ul style="list-style-type: none"> - 0: Ensures the default L7 connection timeout is used. The default timeout value can be modified by setting the conntimeout parameter. - 1: Discards the connection after the packet is first forwarded – a response is not expected or handled. - 2: Uses a DNS-type of operation. The connection is dropped after the reply message. Setting it to 1 or 2 enables better performance and memory usage for UDP connections and they correspond better to how UDP is used.
Persist	S	none	<p>The list of relevant persist values are:</p> <ul style="list-style-type: none"> ssl cookie active-cookie cookie-src active-cook-src cookie-hash cookie-hash-src url query-hash host header super super-src src rdp rdp-src rdp-sb rdp-sb-src none 	<p>Specify the type of persistence (stickiness) to be used for this Virtual Service.</p> <p>Note: If setting the persistence mode to an option that requires a cookie (or query-hash), the cookie parameter must also be set.</p>

Name	Type	Default	Range	Description
SubnetOriginating	B	0	0 – Disabled 1 – Enabled	When transparency is not enabled, the source IP address of connections to the Real Servers is that of the Virtual Service. When transparency is enabled, the source IP address will be the IP address that is initiating connection to the Virtual Service. If the Real Server is on a subnet, and the Subnet Originating Requests option is enabled, then the subnet address of the LoadMaster will be used as the source IP address.
PersistTimeout	I	0	0-86400	The length of time (in seconds) after the last connection that the LoadMaster will remember the persistence information. Timeout values are rounded down to an even number of minutes. Setting a value that is not a number of whole minutes results in the excess being ignored. Setting a value to less than 60 seconds results in a value of 0 being set, which disables persistency.
QueryTag	S	<unset>		This is the query tag to be matched if the Persist type is set to query-hash .
Schedule	S	rr	rr wrr lc wlc fixed adaptive sh dl sdn-adaptive	Specify the type of scheduling of new connections to Real Servers that is to be performed. The value values are spelled out below: rr = round robin wrr = weighted round robin lc = least connection wlc = weighted least connection fixed = fixed weighting adaptive = resource based (adaptive) sh = source IP hash dl = weighted response time sdn-adaptive = resource based (SDN adaptive)

Name	Type	Default	Range	Description
ServerInit	I	0	0-6	<p>By default, the LoadMaster will not initiate a connection with a Real Server until it has received some data from a client. This prohibits certain protocols from working as they need to communicate with the Real Server before transmitting data.</p> <p>If the Virtual Service uses one of these protocols, specify the protocol using the ServerInit parameter to enable it to work correctly.</p> <p>0 = Normal Protocols 1 = SMTP 2 = SSH 3 = Other Server Initiating 4 = IMAP4 5 = MySQL 6 = POP3</p>
Transparent	B	Y	0 – Disabled 1 - Enabled	<p>When using Layer 7, when this is enabled - the connection arriving at the Real Server appears to come directly from the client. Alternatively, the connection can be non-transparent which means that the connections at the Real Server appear to come from the LoadMaster.</p>
UseforSnat	B	N	0 – Disabled 1 – Enabled	<p>By default, when the LoadMaster is being used to NAT Real Servers, the source IP address used on the Internet is that of the LoadMaster.</p> <p>Enabling this option allows the Real Servers configured to use the Virtual Service as the source IP address instead.</p> <p>If the Real Servers are configured on more than one Virtual Service which has this option set, only connections to destination port 80 will use this Virtual Service as the source IP address.</p>

Name	Type	Default	Range	Description
QoS	S	0 – Normal Service	0 - Normal-Service 1 - Minimize-Cost 2 - Maximize-Reliability 4 - Maximize-Throughput 8 - Minimize-Delay	The Quality of Service (QoS) parameter sets a Differentiated Services Code Point (DSCP) in the IP header of packets that leave the Virtual Service. This means that the next device or service that deals with the packets will know how to treat and prioritise this traffic. Higher priority packets are sent from the LoadMaster before lower priority packets.
StartTLSMode	I		0-6	0 = HTTP/HTTPS (the Service Type needs to be set to HTTP/HTTPS for this to work) The Virtual Service Type must be set to STARTTLS for the remaining values to be set: 1 = SMTP (STARTTLS if requested) 2 = SMTP (STARTTLS always) 3 = FTP 4 = IMAP 6 = POP3
ExtraPorts	S	<unset>	3-65530	Specify extra ports that the Virtual Service will listen to. To remove any existing extra ports, set the ExtraPorts parameter to an empty string.

Table 3-5: Standard Options API Parameters

When setting the persistence method to **cookie**, **active-cookie**, **cookie-src** or **active-cook-src**, the cookie name must also be set within the command.

For example:

```
https://<LoadMasterIPAddress>/access/modvs?vs=10.0.2.194&port=80&prot=tcp&persist=cookie&cookie=<cookie name>&
```

3.5.1.4 SSL Properties

Name	Type	Default	Range	Description
CertFile	S	<unset>		The Identifier for any installed certificate.
Ciphers	S	Default assignment	All supported ciphers	<p>Multiple ciphers can be assigned by inserting a colon between each cipher. When ciphers are assigned in this way, a Cipher Set called Custom_<VirtualServiceID> will be created/updated.</p> <p>Note: The assigned ciphers list will be overwritten when ciphers are added in this way. Ensure to include all ciphers to be assigned.</p> <p>For the list of ciphers which are assigned by default, and for a list of supported ciphers, refer to the SSL Accelerated Services, Feature Description.</p> <p>Note: Do not try to set the CipherSet parameter and the Ciphers parameter at the same time - use one or the other. Custom cipher sets can be created using a different command. For more information, refer to Section 3.11.2.1</p>

Name	Type	Default	Range	Description
CipherSet	S	Default	All available cipher sets	<p>This parameter can be used to assign a cipher set to a Virtual Service. System-defined cipher sets and custom cipher sets can be assigned using this parameter. The valid values are below:</p> <ul style="list-style-type: none"> - Default - Default_NoRc4 - BestPractices - Intermediate_compatibility - Backward_compatibility <ul style="list-style-type: none"> - WUI - FIPS - Legacy - <i><NameOfCustomCipherSet></i> <p>Note: Do not try to set the CipherSet parameter and the Ciphers parameter at the same time - use one or the other. Custom cipher sets can be created using a different command. For more information, refer to Section 3.11.2.1</p>
ClientCert	I	0	0-6	<p>0 = No client certificates required 1 = Client certificates required 2 = Client certificates and add headers 3 = Client Certificates and pass DER through as SSL-CLIENT-CERT 4 = Client Certificates and pass DER through as X-CLIENT-CERT 5 = Client Certificates and pass DER through as SSL-CLIENT-CERT 6 = Client Certificates and pass PEM through as X-CLIENT-CERT</p>
SSLReencrypt	B	N	0 - Disabled 1 - Enabled	<p>This parameter is only relevant if SSL Acceleration is enabled. When this option is enabled, the SSL data stream is re-encrypted before sending to the Real Server.</p>
SSLReverse	B	N	0 - Disabled 1 - Enabled	<p>Enabling this parameter means that the data from the LoadMaster to the Real Server is re-encrypted.</p>

Name	Type	Default	Range	Description
SSLRewrite	S	<unset>	<unset>, http, https	When the Real Server rejects a request with a HTTP redirect, the requesting Location URL may need to be converted to specify HTTPS instead of HTTP (and vice versa).
ReverseSNIHostname	S	<unset>		If this option is enabled, the host name is required to be sent in the TLS client hello message. If it is not sent the connection will be dropped.
SSLAcceleration	B	N	0 - Disabled 1 - Enabled	Enable SSL handling on this Virtual Service.
OCSPVerify	B	0 – Disabled	0 – Disabled 1 – Enabled	Verify (via Online Certificate Status Protocol (OCSP)) that the client certificate is valid.
TLSType	B	Disabled if SSL Acceleration is not enabled. TLS1.1 and TLS1.2 are enabled when SSL Acceleration is enabled.	0 – 14 bitmask	Specify which of the following protocols to support; SSLv3, TLS1.0, TLS1.1 or TLS1.2. The protocols can be enabled and disabled using a bitmask value. Refer to the table below to find out what number corresponds to which settings.
NeedHostName	B	0 – Disabled	0 - Disabled 1 - Enabled	When this parameter is enabled, the hostname is always required to be sent in the TLS client hello message. If it is not sent, the connection will be dropped.

Table 3-6: SSL Properties API Parameters

Number	SSLv3	TLS1.0	TLS1.1	TLS1.2
0	Enabled	Enabled	Enabled	Enabled
1	Disabled	Enabled	Enabled	Enabled
2	Enabled	Disabled	Enabled	Enabled
3	Disabled	Disabled	Enabled	Enabled
4	Enabled	Enabled	Disabled	Enabled
5	Disabled	Enabled	Disabled	Enabled
6	Enabled	Disabled	Disabled	Enabled
7	Disabled	Disabled	Disabled	Enabled
8	Enabled	Enabled	Enabled	Disabled
9	Disabled	Enabled	Enabled	Disabled
10	Enabled	Disabled	Enabled	Disabled
11	Disabled	Disabled	Enabled	Disabled
12	Enabled	Enabled	Disabled	Disabled
13	Disabled	Enabled	Disabled	Disabled

Number	SSLv3	TLS1.0	TLS1.1	TLS1.2
14	Enabled	Disabled	Disabled	Disabled

Table 3-7: TLSType bitmask values

3.5.1.5 Advanced Properties

Name	Type	Default	Range	Description
CopyHdrFrom	S	<unset>		This is the name of the source header field to copy into the new header field before the request is sent to the Real Servers.
CopyHdrTo	S	<unset>		Used in conjunction with the CopyHdrFrom parameter. The name of the header field into which the source header is to be copied.
AddVia	I		0 = Legacy Operation 1 = X-Forwarded-For 2 = None 3 = X-Client-Side 4 = X-Client-Side (No Via) 5 = X-Forwarded-For (No Via) 6 = Via Only	This corresponds to the Add HTTP Headers field in the WUI. Select which headers are to be added to HTTP requests. X-ClientSide and X-Forwarded-For are only added to non-transparent connections.
Cache	B	N	0 - Caching Disabled 1 - Caching Enabled	Enable or disable the caching of URLs.
Compress	B	N	0 - Disabled 1 - Enabled	When enabled, files sent from the LoadMaster are compressed with Gzip.
CachePercent	I	0	0-100	This parameter is only relevant if caching is enabled. Specify the maximum percentage of cache space permitted for this Virtual Service.
DefaultGW	A	<unset>		Specify the Virtual Service-specific default gateway to be used and to send responses back to clients. If not set, the global default gateway will be used.
ErrorCode	I	0	200-505	If no Real Servers are available, the LoadMaster can terminate the connection with a HTTP error code. Specify the error code number in this parameter. To unset the error code, set the parameter to an empty string.

Name	Type	Default	Range	Description
ErrorUrl	S	<unset>		When no Real Servers are available and an error response is sent back to the client, a redirect URL can also be specified.
PortFollow	I	<unset>	0 and 3-65530	This parameter was deprecated as of 7.1-24. For LoadMasters with version 7.1-24 or higher, use the FollowVSID parameter to set port following. Specify the ID of the Virtual Service to follow. Setting this value to 0 disables port following. 1 and 2 are not valid values so ensure that the Virtual Service that you want to follow has a value between 3 and 65530.
FollowVSID	I	<unset>		Specify the ID of the Virtual Service to follow.
LocalBindAddrs	A	<unset>	A space separated list of IP addresses	This corresponds to the Alternate Source Address in the Advanced Properties section of the WUI. Allow connections scaling over 64K Connections needs to be enabled in L7 Configuration for this feature to work.
NRequestRules	I (Read only)	<unset>		This displays the number of HTTP Header Modification request rules.
NResponseRules	I (Read only)	<unset>		This displays the number of HTTP Header Modification response rules.
RequestRules	List (Read only)			The list of request rules that are assigned to the Virtual Service.
ResponseRules	List (Read only)			The list of response rules that are assigned to the Virtual Service.
StandbyAddr	A	<unset>		Specify the IP address of the “Sorry” server that is to be used when no other Real Servers are available. This server will not be health checked and is assumed to be always available.
StandbyPort	I	<unset>		Specify the port of the “Sorry” server.
Verify	I	0	0-7 (bitmask)	Refer to Section 3.5.1.5.1 for further information on the Verify parameter.
AltAddress	A	<unset>	IP address	Specify the alternate address for this Virtual Service.

Name	Type	Default	Range	Description
AddVia	I		0-6	<p>Specify which headers to be added to HTTP requests. X-ClientSide and X-Forwarded-For are only added to non-transparent connections.</p> <p>0 = Legacy Operation(X-Forwarded-For)</p> <p>1 = X-Forwarded-For (+ Via)</p> <p>2 = None</p> <p>3 = X-ClientSide (+ Via)</p> <p>4 = X-ClientSide (No Via)</p> <p>5 = X-Forwarded-For (No Via)</p> <p>6 = Via Only</p>
PreProcPrecedence	S	<unset>		<p>This parameter should be used in conjunction with PreProcPrecedencePos. This parameter is used to specify the name of the existing rule whose position you wish to change.</p> <p>This parameter relates to Content Matching Rules only.</p>
PreProcPrecedencePos	Int16	<unset>		<p>This parameter, in conjunction with the PreProcPrecedence parameter, is used to change the position of the rule in a sequence of rules. For example a position of 2 means the rule will be checked second.</p> <p>This parameter relates to the Content Matching Rules only.</p>
RequestPrecedence	String	<unset>		<p>This parameter should be used in conjunction with RequestPrecedencePos. This parameter is used to specify the name of the existing request rule whose position you wish to change.</p> <p>This parameter relates to the following rule types:</p> <ul style="list-style-type: none"> Content Matching Add Header Delete Header Replace Header Modify URL

Name	Type	Default	Range	Description
RequestPrecedencePos	Int16	<unset>		This parameter, in conjunction with the RequestPrecedence parameter, is used to change the position of the rule in a sequence of rules. For example a position of 2 means the rule will be checked second.
ResponsePrecedence	String	<unset>		This parameter should be used in conjunction with ResponsePrecedencePos . This parameter is used to specify the name of the existing response rule whose position you wish to change. This parameter relates to the following rule types: Content Matching Add Header Delete Header Replace Header
ResponsePrecedencePos	Int16	<unset>		This parameter, in conjunction with the ResponsePrecedence parameter, is used to change the position of the rule in a sequence of rules. For example, a position of 2 means the rule will be checked second.

Table 3-8: Advanced Properties API Parameters

3.5.1.5.1 Verify Parameter

Verify is a bitmask. The valid values of the **Verify** parameter are as follows:

- Bit 0: set this to **1** to enable detection intrusion

Bit 0 needs to be set to **1** in order to use the other two bits.

- Bit 1 determines whether to reject or drop a connection. Setting it to 1 will drop the connection.
- Bit 2 determines whether to give just warnings on bad requests or also on malicious (but not invalid) requests

Bits 3 to 7 cannot be set – an error message displays if you try to do this.

The following table lists the valid integers and the values they set the fields to when used:

Integer	Detect Malicious Requests	Intrusion Handling	Warnings Checkbox
0	Disabled	N/A	N/A
1	Enabled	Drop Connection	Unchecked
2	Enabled	Send Reject	Unchecked
3	Enabled	Send Reject	Unchecked
4	Enabled	Drop Connection	Checked
5	Enabled	Drop Connection	Checked
6	Enabled	Send Reject	Checked
7	Enabled	Send Reject	Checked

Table 3-9: Verify Parameter Integers

You cannot set the **Verify** parameter to a value above 7 – 7 is the maximum value.

3.5.1.6 WAF Settings

Name	Type	Default	Range	Description
Intercept	B	0	0 – Disabled 1 – Enabled	Enable/disable the Web Application Firewall (WAF) for this Virtual Service.
InterceptOpts	S	<unset>		Most of the fields in the WAF Options section of the Virtual Service modify screen in the LoadMaster WUI can be set using this parameter. For more information, refer to Section 3.5.1.6.1 .
AlertThreshold	I	0 - disabled	0 - 100000	This is the threshold of incidents per hour before sending an alert. Setting this to 0 disables alerting.

Table 3-10: WAF Settings API Parameters

3.5.1.6.1 AFP InterceptOpts Parameter

The AFP **InterceptOpts** parameter is a special parameter – it can be used to set the value for multiple fields, rather than just one field as with most other parameters. The **InterceptOpts** parameter allows the specification of most of the fields in the **WAF Options** section of the Virtual Service modify screen in the LoadMaster WUI.

To enable WAF, set the **Intercept** parameter to **1**.

The names of the specific WUI fields that the **InterceptOpts** parameter is related to, are listed in the table below.

One or more field values can be set in one command. Multiple values can be set in the one command by separating the values with a semi-colon, for example:

```
https://<LoadMasterIPAddress>/access/modvs?vs=<VirtualServiceIPAddress>
&port=<Port>&prot=<tcp/udp>&InterceptOpts=opnormal;auditnone;reqdataena
ble;resdataenable;jsondisable;xmldisable
```

The table below outlines what each of the values mean.

The values that are related to the same WUI option are mutually exclusive.
For example, you cannot set **Basic Operation** to both **opnormal** and **opblock**.

Value	Related WUI Option	Default	Meaning
opnormal	Default Operation	Audit Only	Set the Basic Operation to Audit Only
opblock	Default Operation	Audit Only	Set the Basic Operation to Block Mode
auditnone	Audit mode	No Audit	Set the Audit mode to No Audit . No data is logged.
auditrelevant	Audit mode	No Audit	Set the Audit mode to Audit Relevant . Logs data which is of a warning level and higher.
auditall	Audit mode	No Audit	Set the Audit mode to Audit All . Logs all data through the Virtual Service. The Audit All option is not recommended for use in normal operation. Audit All should only be used when troubleshooting a specific problem.
reqdataenable	Inspect HTML POST Request Content	Disabled	Enable the Inspect HTML POST Request Content option
reqdatadisable	Inspect HTML POST Request Content	Disabled	Disable the Inspect HTML POST Request Content option
resdataenable	Process Response Data	Disabled	Enable the Process Response Data option
resdatadisable	Process Response Data	Disabled	Disable the Process Response Data option
jsondisable	Disable JSON Parser	Disabled	Disable the JSON parser. This option is only relevant if the Inspect HTML POST Request Content option is enabled.
jsonenable	Disable JSON Parser	Disabled	Enable the JSON parser. This option is only relevant if the Inspect HTML POST Request Content option is enabled.
xmldisable	Disable XML Parser	Disabled	Disable the XML parser. This option is only relevant if the Inspect HTML POST Request Content option is enabled.
xmlenable	Disable XML Parser	Disabled	Enable the XML parser. This option is only relevant if the Inspect HTML POST Request Content option is enabled.

Table 3-11: InterceptOpts paramater values

3.5.1.6.2 Assign an AFP Rule to a Virtual Service

An AFP rule can be assigned to a Virtual Service by running the following command.

```
https://<LoadMasterIPAddress>/access/vsaddwafrule?vs=<VSIPAddress>&port=<Port>&prot=<tcp/udp>&rule=<Prefix>/<RuleName>
```

For example:

```
https://10.11.0.30/access/vsaddwafrule?vs=10.11.0.35&port=80&prot=tcp&rule=C/modsecurity_crs_13_xml_enabler
```

The <RuleName> must be preceded with the relevant letter or word and a forward slash. The letter/word used depends on the type of rule being added:

This is case sensitive. The letter/word needs to be in in the correct case for the command to work.

- **C** or **Custom**
- **Z** or **ApplicationGeneric**
- **A** or **ApplicationSpecific**
- **G** or **Generic**

All of the parameters listed in the example command above are required for the **vsaddwafrule** command. If any of the parameters is omitted, a **String value missing** error will be displayed.

Multiple rules can be assigned in the same command by separating them with a space (or %20). For example:

```
https://10.11.0.30/access/vsaddwafrule?vs=10.11.0.35&port=80&prot=tcp&rule=C/modsecurity_crs_13_xml_enabler%20C/modsecurity_crs_10_ignore_stat
```

Be careful when assigning multiple rules in this way. If you add a rule that is already assigned it will result in a WAF Misconfigured state. If the Virtual Service is in this state, all traffic is blocked. AFP can be disabled for that Virtual Service to stop the traffic being blocked, if required, while troubleshooting the problem.

View a list of rules and rule IDs for an active ruleset by running the **vslistwafruleids** command, for example:

```
https://10.11.0.30/access/vslistwafruleids?vs=10.11.0.35&port=80&prot=tcp&rule=G/ip_reputation
```

A list of rules and their IDs will be displayed for the specified ruleset, for example:

```
<Response stat="200" code="ok">
  <Success>
    <Data>
      <ip_reputation>
        <InactiveRule1>
          2200000:REPUTATION/MALICIOUS:SLR: Client IP in
          Blacklist.
        </InactiveRule1>
        <InactiveRule2>
          2200002:REPUTATION/ANONYMIZER:SLR: Client IP in TOR
          Exit Nodes Blacklist.
        </InactiveRule2>
      </ip_reputation>
    </Data>
  </Success>
</Response>
```

The ID is the number displayed before the rule name.

Specific rules can be disabled per ruleset by including the **disablerules** parameter and specifying the rule IDs to be disabled, when adding rules.

For example:

```
https://10.11.0.30/access/vsaddwafrule?vs=10.11.0.35&port=80&prot=tcp&rule=G/ip_reputation&enablerules=2200000
```

Specific rules can be enabled per ruleset by including the **enablerules** parameter and specifying the rule IDs to be enabled, when adding rules. For example:

```
https://10.11.0.30/access/vsaddwafrule?vs=10.11.0.35&port=80&prot=tcp&rule=G/ip_reputation&enablerules=2200000
```

Multiple rules can be disabled/enabled in the one command by specifying a comma-separated list of IDs for the **disablerules/enablerules** parameter.

To only update rules (and not rulesets), run the **vsaddwafrule** command with a blank **rule** parameter, for example:

```
https://10.154.11.100/access/vsaddwafrule?vs=10.154.11.102&port=443&prot=tcp&rule=&disablerules=960020,958291
```

To enable all rules, run the **vsaddwafrule** command with a blank **disablerules** parameter, for example:

```
https://10.154.11.100/access/vsaddwafrule?vs=10.154.11.102&port=443&prot=tcp&rule=&disablerules=
```

Related WUI item

Virtual Services > View/Modify Services > Modify > WUI Options > Manage Rules

3.5.1.6.3 Unassign an AFP Rule from a Virtual Service

An AFP rule can be unassigned from a Virtual Service by running the following command. This command related to the **Available Rules** and **Assigned Rules** fields in the Modify Virtual Service screen in the WUI.

```
https://<LoadMasterIPAddress>/access/vsremoveafrule?vs=<VSIPAddress>&port=<Port>&prot=<tcp/udp>&rule=C/<RuleName>
```

For example:

```
https://10.11.0.30/access/vsremoveafrule?vs=10.11.0.35&port=80&prot=tcp&rule=C/modsecurity_crs_13_xml_enabler
```

The <RuleName> must be preceded with the relevant letter/word and a forward slash. The letter/word used depends on the type of rule being removed:

- **C** or **Custom**
- **Z** or **ApplicationGeneric**
- **A** or **ApplicationSpecific**
- **G** or **Generic**

All of the parameters listed in the example command above are required for the **vsremovewafrule** command. If any of them are omitted, a **String value missing** error will be displayed.

Related WUI item

Virtual Services > View/Modify Services > Modify > WAF Options > Assign Rules

3.5.1.7 ESP Options

Name	Type	Default	Range	Description
AllowedHosts	S	<unset>		This parameter is only relevant when ESP is enabled. Specify all the virtual hosts that can be accessed via this Virtual Service.
AllowedDirectories	S	<unset>		This parameter is only relevant when ESP is enabled. Specify all the virtual directories that can be accessed via this Virtual Service.
Domain	S	<unset>		The Single Sign On (SSO) domain in which this Virtual Service will operate.
Logoff	S	<unset>		This parameter is only relevant when ESP is enabled and when the Client Authentication Mode is set to Form Based . Specify the string that the LoadMaster should use to detect a logout event. Multiple logoff strings can be specified by using a space-separated list. If the URL to be matched contains sub-directories before the specified string, the Logoff String will not be matched. Therefore, the LoadMaster will not log the user off.
DisplayPubPriv	B	1 – Enabled	0 – Disabled 1 – Enabled	Display the public/private option on the login page. Based on the option the user selects on the login form, the session timeout value will be set to the value specified for either the public or private timeout.
DisablePasswordForm	B	0 – Disabled	0 – Disabled 1 – Enabled	Enabling this option removes the password field from the login page. This may be needed when password validation is not required, for example if using RSA SecurID authentication in a singular fashion.

Name	Type	Default	Range	Description
ESPLogs	I	7	Integer 0-7	<p>Enable ESP logging. Valid values are below:</p> <ul style="list-style-type: none"> 0 = Logging off 1 = User Access 2 = Security 3 = User Access and Security 4 = Connection 5 = User Access and Connection 6 = Security and connection 7 = User Access, Security and Connection <p>Note: The only valid values for SMTP services are 0 and 4. For SMTP services, security issues are always logged. Nothing is logged for user access because there are no logins.</p>
SMTPAllowedDomains	S	<unset>		Specify all the permitted domains that are allowed to be received by this Virtual Service.
EspEnabled	B	N	0 – Disabled 1 - Enabled	Enable or disable the Edge Security Pack (ESP) features.
InputAuthMode	I	0	0-5	<p>Specify the client authentication method to be used:</p> <ul style="list-style-type: none"> 0 = Delegate to Server 1 = Basic Authentication 2 = Form Based 3 = KCD 4 = Client Certificate 5 = NTLM
OutputAuthMode	I	Dependant on InputAuthMode value	0-2	<p>Specify the server authentication mode to be used:</p> <ul style="list-style-type: none"> 0 = None 1 = Basic Authentication 2 = Form Based 3 = KCD
ServerFbaPath	S	<unset>		<p>Only relevant when using form-based authentication as the Server Authentication Mode (OutputAuthMode). Set the authentication path for server-side Form Based Authentication (FBA). When used in Exchange environments, this does not need to be set.</p>

Name	Type	Default	Range	Description
ServerFBAPost	S	<unset>		Only relevant when using form-based authentication as the Server Authentication Mode (OutputAuthMode). Set the format string used to generate POST body for server side FBA. The value must be base64-encoded. When used in Exchange environments, this does not need to be set.
OutConf	S	<unset>		Enter the name of the outbound SSO domain.
SingleSignOnDir	S	<unset>		This parameter relates to the SSO Image Set drop-down in the ESP Options section of the modify Virtual Service screen. Specify the name of the image set to be used for the login screen. If no image set is specified, the default Exchange image set will be used.
AllowedGroups	S	<unset>		Specify the groups that are allowed to access this Virtual Service.
GroupSIDs	S	<unset>		Specify the group security identifiers (SIDs) that are allowed to access this Virtual Service. Each group must be separated by a semicolon.
IncludeNestedGroups	B	0 - Disabled	0 – Disabled 1 - Enabled	This parameter relates to the AllowedGroups parameter. Enable this option to include nested groups in the authentication attempt. If this option is disabled, only users in the top-level group will be granted access. If this option is enabled, users in both the top-level and first sub-level group will be granted access.
ExcludedDomains	String	<unset>		Any virtual directories specified within this field will not be pre-authorized on this Virtual Service and will be passed directly to the relevant Real Servers. Multiple excluded domains can be specified by using a space-separated list.

Name	Type	Default	Range	Description
AltDomains	String	<unset>		Specify alternative domains to be assigned to a Virtual Service when configuring multi-domain authentication. To specify multiple alternative domains, use a space separated list.
UserPwdChangeURL	String	<unset>		This is relevant when using form-based or LDAP authentication. Specify the URL that users can use to change their password. If a user's password has expired, or if they must reset their password, this URL and the UserPwdChangeMsg is displayed on the login form. This URL must be put into the exception list for authentication, if required.
UserPwdChangeMsg	String	<unset>		This parameter is only relevant if the UserPwdChangeURL parameter is set. Specify the text to be displayed on the login form when the user must reset their password.

Table 3-12: ESP Options API Parameters

3.5.1.8 Real Servers

Name	Type	Default	Range	Description
CheckType	S	<tcp>	The default value is dependent on the Virtual Service port. The list of values is: <ul style="list-style-type: none"> – icmp – https – http – tcp – smtp – nntp – ftp – telnet – pop3 – imap – rdp – bdata – ldap – none 	Specify which protocol is to be used to check the health of the Real Server.

Name	Type	Default	Range	Description
LdapEndpoint	S	<unset>	An existing endpoint name	Specify the name of an LDAP endpoint to use for the health checks. If LDAP is selected as the CheckType , the server IP address (or addresses) and ports from the LDAP endpoint configuration are used instead of the Real Server IP address and port. For further information on LDAP endpoints, refer to Section 3.11.7 .
CheckHost	A	<unset>		The CheckUse1.1 parameter must be enabled in order to set the CheckHost value. When using HTTP/1.1 checking, the Real Servers require a Hostname be supplied in each request. If no value is set then this value is the IP address of the Virtual Service.
CheckPattern	S	<unset>		When the CheckType is set to http or https - this corresponds to the Reply 200 Pattern in the WUI. This parameter only applies when the HTTP Method is set to GET or POST . When the CheckType is set to bdata : Specify the hexadecimal string which will be searched for in the response. Specify an empty value to unset CheckPattern.
CheckUrl	S	<unset>		When the CheckType is set to http or https - by default, the health checker tries to access the URL / to determine if the machine is available. A different URL can be set in the CheckUrl parameter. When the CheckType is set to bdata : Specify a hexadecimal string to send to the Real Server. The maximum character length for the CheckUrl parameter value is 126 characters.
CheckCodes	S	<unset>	300-599	A space-separated list of HTTP status codes that should be treated as successful when received from the Real Server.

Name	Type	Default	Range	Description
CheckHeaders	S	<unset>		Specify up to four additional headers/fields which will be sent with each health check request. Separate the pairs with a pipe, for example; Host:xyz UserAgent:prq.
MatchLen	S	0	0-8000	This parameter is only relevant when the CheckType is set to bdata . Specify the number of bytes to find the CheckPattern within.
CheckUse1.1	B	N	0 – Disabled 1 - Enabled	By default, the health checker uses HTTP/1.0 when checking the Real Server status. Enabling CheckUse1.1 means HTTP/1.1 will be used (which is more efficient).
CheckPort	I	<unset>	3-65530	The port to be checked. If a port is not specified, the Real Server port is used. Specify 0 to unset CheckPort.
NumberOfRSs	I (Read only)	<unset>		This displays the number of Real Servers that are assigned to the Virtual Service.
NRules	I (Read only)	<unset>		This displays the number of rules assigned to a Real Server when content switching is enabled.
RuleList	List(Read only)			A list of content rules assigned to the Real Servers.
CheckUseGet	I	N	0 - HEAD 1 - GET 2 - POST	When accessing the health check URL - the system can use the HEAD, the GET or the POST method.
ExtraHdrKey	S	<unset>		Specify the key for the extra header to be inserted into every request sent to the Real Servers.
ExtraHdrValue	S	<unset>		Specify the value for the extra header to be inserted into every request sent to the Real Servers.
CreateSubVS		<unset>		This parameter can be used to create a SubVS within a Virtual Service. This parameter has no value (entering createsubvs= will create a SubVS).
SubVS	I (Read Only)		0 – Disabled 1 – Enabled	This parameter displays details of any SubVSes which exist in the Virtual Service.

Name	Type	Default	Range	Description
CheckPostData	S	<unset>	Supports up to 2047 characters	This parameter is only relevant if the HTTP Method is set to POST . When using the POST method, up to 2047 characters of POST data can be sent to the server.
RSRulePrecedence	String	<unset>		This parameter should be used in conjunction with RSRulePrecedencePos . This parameter is used to specify the name of the existing rule whose position you wish to change.
RSRulePrecedencePos	Int16	<unset>		This parameter, in conjunction with the RSRulePrecedence parameter, is used to change the position of the rule in a sequence of rules. For example, a position of 2 means the rule will be checked second.
EnhancedHealthchecks	Boolean	0 – Disabled	0 – Disabled 1 – Enabled	Enabling the EnhancedHealthchecks parameter provides an additional health check parameter – RsMinimum . If the EnhancedHealthchecks parameter is disabled, the Virtual Service will be considered available if at least one Real Server is available. If the EnhancedHealthchecks parameter is enabled, you can specify the minimum number of Real Servers which should be available in order to consider the Virtual Service to be available.

Name	Type	Default	Range	Description
RsMinimum	Integer	1	1 to the number of Real Servers configured	<p>This parameter can only be set using the modvs command if the EnhancedHealthchecks parameter is enabled. Specify the minimum number of Real Servers required to be available for the Virtual Service to be considered up. If less than the minimum amount of Real Servers are available, a critical log is generated. If some Real Servers are down but it has not reached the minimum amount specified, a warning is logged. If the email options are configured, an email will be sent to the relevant recipients.</p> <p>When retrieving the value of this parameter – 0 is the default value if there are no Real Servers or 1 Real Server in the Virtual Service. However, 1 is always the minimum in reality.</p>

Table 3-13: Real Servers API Parameters

3.5.1.9 Miscellaneous

Name	Type	Default	Range	Description
Adaptive	S (Read only)	<unset>		<p>This parameter is read only and will only be displayed when the Scheduling Method is set to resource based (adaptive).</p>
MultiConnect	B	0	0 - Disabled 1 - Enabled	<p>Enabling this option permits the LoadMaster to manage connection handling between the LoadMaster and the Real Servers. Requests from multiple clients will be sent over the same TCP connection.</p> <p>Multiplexing only works for simple HTTP GET operations. This parameter cannot be enabled in certain situations, for example if WAF, ESP or SSL Acceleration is enabled.</p>

Name	Type	Default	Range	Description
non_local	B	0 - Disabled	0 – Disabled 1 – Enabled	By default, only Real Servers on local networks can be assigned to a Virtual Service. Enabling this option will allow a non-local Real Server to be assigned to the Virtual Service. This option will only be available if NonLocalRS has been enabled and the Transparent option has been disabled on the relevant Virtual Service.

Table 3-14: Miscellaneous API Parameters

3.5.2 Adding a Virtual Service Using a Template

To add a Virtual Service and automatically configure it with a template, run the following command:

```
https://<LoadMasterIPAddress>/access/addvs?vs=<VSIPAddress>&port=<port>&prot=<tcp/udp>&template=<TemplateName>
```

The port and protocol parameters are required, but if the template sets the ports then the values entered in the command will be ignored.

For commands on adding, removing and listing templates, refer to **Section 3.5.3**.

3.5.3 Manage Templates

3.5.3.1 Export a Virtual Service as a Template

An existing Virtual Service can be exported as a template by running the following command:

```
https://<LoadMasterIPAddress>/access/exportvstmp1t?vs=<VirtualServiceIPAddress>&port=<VirtualServicePort>&prot=<tcp/udp>
```

The Virtual Service index can also be entered for the **vs** parameter (and the other parameters are then not needed). To retrieve the Virtual Service ID, run the **listvs** command. For further information, refer to **Section 3.5.1**.

3.5.3.2 Upload a Template

Templates can be uploaded by running the following cURL command:

```
curl -X POST --data-binary "@<TemplateFileName.tmp1>" -k https://ba1:<password>@<LoadMasterIPAddress>/access/uploadtemplate
```

3.5.3.3 Display a List of Installed Templates

To display a list of the templates that exist on the LoadMaster, run the following command:

```
https://<LoadMasterIPAddress>/access/listtemplates
```

3.5.3.4 Delete a Template

To delete a template from the LoadMaster, run the following command:

https://<LoadMasterIPAddress>/access/deleteTemplate?name=<TemplateName>

3.5.4 Manage SSO

3.5.4.1 SSO Domains

Single-Sign On Domains can be managed by the following commands

https://<LoadMasterIPAddress>/access/adddomain?domain=<DomainName>

The maximum number of SSO domains that are allowed is 128.

https://<LoadMasterIPAddress>/access/deleteDomain?domain=<DomainName>

https://<LoadMasterIPAddress>/access/showdomain

https://<LoadMasterIPAddress>/access/showdomain?domain=<domain.name>

https://<LoadMasterIPAddress>/access/modddomain?domain=<domain.name> [¶mname=value...]

modddomain accepts the following additional (optional) parameters:

Name	Type	Default	Range	Additional Information
auth_type	S	"LDAP-StartTLS"	LDAP-Unencrypted LDAP-StartTLS LDAP-LDAPS RADIUS RSA-SECURID KCD Certificates RADIUS and LDAP-Unencrypted RADIUS%20and%20LDAP-StartTLS RADIUS%20and%20LDAP-LDAPS RSA-SECURID%20and%20LDAP-Unencrypted RSA-SECURID%20and%20LDAP-StartTLS RSA-SECURID%20and%20LDAP-LDAPS	Specify the transport protocol used to communicate with the authentication server.
ldap_endpoint	S	None	The name of an existing LDAP endpoint	Specify the LDAP endpoint to use. For further information on LDAP endpoints, refer to Section 3.11.7 .
radius_shared_secret	S (masked)	<unset>		The shared secret to be used between the RADIUS server and the LoadMaster.

Name	Type	Default	Range	Additional Information
logon_fmt	S	"Principalname"	"not%20specified" "Principalname" "Username" "Username%20only"	Specify the logon string format used to authenticate to the LDAP/RADIUS server. The Username%20only value is only available if the auth_type is set to a RADIUS or RSA-SecurID protocol. The Username value is not available if the auth_type is set to RADIUS or a RADIUS and LDAP protocol.
logon_fmt2	S	"Principalname"	"Not%20specified" "Principalname" "Username"	Specify the logon string format used to authenticate to the server.
logon_domain	S	<unset>		This parameter corresponds with the Domain/Realm field in the WUI. The logon domain to be used. This is also used with logon format to construct the normalized user name, for example: Principalname: <username>@<domain> Username: <domain>\<username>
logon_transcode	B	0	0 - Disabled 1 - Enabled	Enable or disable the transcode of logon credentials from ISO-8859-1 to UTF-8, when required.
max_failed_auths	I	0	0-999	The maximum number of failed login attempts before the user is locked out. 0 – Never lock out.
sess_tout_idle_pub	I	900	60-86400	The session idle timeout value in seconds. This value is used in a public environment.
sess_tout_duration_public	I	1800	60-86400	The maximum duration timeout value for the session in seconds. This value is used in a public environment.
sess_tout_idle_priv	I	900	60-86400	The session idle timeout value in seconds. This value is used in a private environment.
sess_tout_duration_private	I	2800	60-86400	The maximum duration timeout value for the session in seconds. This value is used in a private environment.
sess_tout_type	S	"idle time"	"idle time" "max duration"	Specify the type of session timeout to be used.
testuser	S	<unset>		The username that will be used to check the authentication server(s), if you are not using an LDAP endpoint.
testpass	S (masked)	<unset>		The password of the user that is used to check the authentication server(s), if you are not using an LDAP endpoint.

Name	Type	Default	Range	Additional Information
reset_fail_tout	I	60	60-86400	The number of seconds that must elapse before the Failed Login Attempts counter is reset to 0. This value must be less than the unlock_tout .
unlock_tout	I	1800	60-86400	The timeout value (in seconds) before a blocked account is automatically unblocked. This must be greater than the reset_fail_tout value.
server	S	<unset>		The address(s) of the server(s) that are to be used to validate this domain.
server2	A	<unset>	Valid IP address	When using dual factor authentication, use the server parameter to set the address of the RADIUS server(s) and use the server2 parameter to set the address of the LDAP server(s).
kerberos_domain	S	<unset>		The Kerberos Realm
kerberos_kdc	S	<unset>		The Kerberos Key Distribution Center
kcd_username	S	<unset>		The kcd_username should not contain double or single quotes.
kcd_password	S	<unset>		The kcd_password should not contain double or single quotes.
ldap_admin	S	<unset>		This, along with the ldap_password , is used to log in to the database to check if the user from the certificate exists.
ldap_password	S	<unset>		This, along with the ldap_admin , is used to log in to the database to check if the user from the certificate exists.
cert_check_asi	B	0 - Disabled	0 - Disabled 1 - Enabled	This option is only available when the Authentication Protocol is set to Certificates . When this option is enabled - in addition to checking the validity of the client certificate, the client certificate will also be checked against the altSecurityIdentities (ASI) attribute of the user on the Active Directory.
cert_check_cn	B	0 - Disabled	0 - Disabled 1 - Disabled	Enabling this parameter allows a fallback to check the Common Name (CN) in the certificate when the SAN is not available.
server_side	B	Y – Outbound KCD SSO domain	Y = Outbound KCD SSO domain N = Inbound configuration	Specify whether the configuration is inbound or outbound.

Name	Type	Default	Range	Additional Information
idp_entity_id	S	<unset>		Specify the Identity Service Provider (IdP) Entity ID. This is relevant when using SAML.
idp_sso_url	S	<unset>		Specify the IdP Single Sign On (SSO) URL. This is relevant when using SAML.
idp_logoff_url	S	<unset>		Specify the IdP Logoff URL. This is relevant when using SAML.
idp_cert	S	<unset>		Specify the IdP certificate to use for verification processing.
sp_entity_id	S	<unset>		Relevant when using SAML - the Service Provider (SP) entity ID is an identifier that is shared to enable the IdP to understand, accept and have knowledge of the entity when request messages are sent from the LoadMaster. This must correlate to the identifier of the relying party on the AD FS server.
sp_cert	S	<unset>		<p>It is optional to sign requests that are sent in the context of logon. Currently, the LoadMaster does not sign those requests.</p> <p>In the context of log off requests – it is mandatory and these requests must be signed. This is to avoid any spoofing and to provide extra security in relation to log off functionality. This ensures that users are not being hacked and not being logged off unnecessarily.</p> <p>In the sp_cert parameter, you can choose to use a self-signed certificate or third party certificate to perform the signing.</p> <p>To specify a self-signed certificate, set sp_cert to useselfsigned. To use a third party certificate, specify the name of the certificate to use (this certificate must be uploaded to the intermediate certificate section of the LoadMaster before it can be selected).</p>

Table 3-15: Moddomain parameters

https://<LoadMasterIPAddress>/access/showdomainlockedusers?

https://<LoadMasterIPAddress>/access/unlockdomainusers?domain=<example.com>&users=<exampleuser>

3.5.5.1.1 Upload RSA Files

If using **RSA-SecurID** as the **Authentication Protocol**, files need to be uploaded to the LoadMaster in order for the authentication to work.

To upload the **RSA Authentication Manager Config File**, run the following command:

```
curl -X POST --data-binary "@<RSAConfigFileName.zip>" -k  
https://<username>:<password>@<LoadMasterIPAddress>/access/setrsaconfig
```

To upload the **RSA Node Secret File**, run the following command:

```
curl -X POST --data-binary "@<NodeSecretFileName.zip>" -k  
https://<username>:<password>@<LoadMasterIPAddress>/access/setrsanodesecret?rsanspwd=<RSANodeSecretPassword>
```

3.5.5.1.2 Upload an Identity Provider (IdP) Metadata File (if using SAML)

The **uploadsamlidpmd** command is used to upload an IdP metadata file. This simplifies the configuration of the IdP attributes, including the **IdP Entity ID**, **IdP SSO URL** and **IdP Logoff URL**. The metadata file can be downloaded from the IdP. To upload an IdP metadata file, run the following command:

```
https://<LoadMasterIPAddress>/access/uploadsamlidpmd?domain=<DomainName>
```

3.5.5.1.3 Download the Service Provider Certificate (if using SAML)

If using a self-signed certificate, the **downloadsamlspcert** command is used to download the certificate from the LoadMaster. This certificate must be installed on the IdP server (for example AD FS) to be added to the relying party signature.

The AD FS server will require this certificate for use of the public key in order to verify the signatures that the LoadMaster generates.

To download the certificate, run the following command:

```
https://<LoadMasterIPAddress>/access/downloadsamlspcert?domain=<DomainName>
```

3.5.5.1.4 Sessions

The commands in this section relate to the open SSO sessions.

To filter the list of open sessions by user, run the **search** command and specify the user, for example:

```
https://<LoadMasterIPAddress>/access/ssodomain/search?domain=<SSODomainName>&user=<Username>
```

The match is based on a substring of the username and is not exact.

The **user** parameter is not case sensitive.

To retrieve a list of all open sessions for a specific SSO domain, run the following command:

```
https://<LoadMasterIPAddress>/access/ssodomain/queryall?domain=<SSODomainName>
```

To kill a particular session, run the following command:

```
https://<LoadMasterIPAddress>/access/ssodomain/killsession?domain=<SSODomainName>&key=<Cookie | Username,Host>
```

For example:

```
https://10.154.11.180/access/ssodomain/killsession?domain=qasp.com&key=b6bfa66e23ee2d9c3267704bfd20f053
```

Or:

```
https://10.154.11.180/access/ssodomain/killsession?domain=aktest.com&key="ldaptest@aktest.com,10.35.0.108"
```

To kill all open sessions for a particular domain, run the following command:

```
https://<LoadMasterIPAddress>/access/ssodomain/killallsessions?domain=<SSODomainName>
```

3.5.4.2 SSO Image Sets

Custom SSO image sets can be managed by using the following commands:

```
https://<LoadMasterIPAddress>/access/listssoimages
```

```
https://<LoadMasterIPAddress>/access/delssoimage?name=<Imagesetname>
```

To upload an SSO image set, use the below command:

```
curl -X POST --data-binary "@<pathToImageSet>" -k https://<LoadMasterIPAddress>/access/ssoimages?
```

The custom SSO image set must be in the format of a .tar file. A template tar file is available from the KEMP Support site: <https://support.kemptechnologies.com/hc/en-us/articles/202220783-Custom-Image-Set>. This can then be modified to gain the desired look and feel. For further information, please refer to the **Custom Authentication Form, Technical Note**.

3.5.5 WAF Settings

The following commands only work on a LoadMaster with an AFP-enabled license.

If you have an AFP license and AFP Support, KEMP provides a number of commercial rules, such as **ip_reputation**, which can be set to automatically download and update on a daily basis. These commercial rules are targeted to protect against specific threats. The KEMP-provided commercial rules are available when signed up to AFP Support.

You can also upload other rules such as the ModSecurity core rule set which contains generic attack detection rules that provide a base level of protection for any web application.

You can also write and upload your own custom rules if desired.

With the AFP-enabled LoadMaster, you can choose whether to use KEMP-provided rules, custom rules which can be uploaded or a combination of both. The sections below provide details about commands that are specific to commercial rules, custom rules and a command which relates to both types of rule.

3.5.5.1 Commands Relating to Commercial Rule Files

The commands in this section are all related to commercial rule files.

3.5.5.1.5 Display the Commercial WAF Rule Settings

The **getwafsettings** command displays the values of the WAF options relating to commercial rules that appear in the **WAF Settings** screen on the LoadMaster WUI.

https://<LoadMasterIPAddress>/access/getwafsettings

Related WUI Item

Virtual Services > WAF Settings

3.5.5.1.6 Enable Automatic Commercial Rule File Updates

The **setwafautoupdate** command allows you to enable the automatic downloading of updates to commercial WAF rule files. When this option is enabled, updated rules are downloaded on a daily basis from KEMP. The default installation time for these rule updates is 4am. The time at which the installation of these rule file updates can be set by running the **SetWafInstallTime** command. For more information, refer to **Section 3.5.5.1.8**.

You can see what this is currently set to by running the **GetWafSettings** command. For more information, refer to **Section 0**.

https://<LoadMasterIPAddress>/access/setwafautoupdate?enable=<yes/no>

Related WUI Item

Virtual Services > WAF Settings > Enable Automatic Rule Updates

3.5.5.1.7 Enable/Disable Automatic Installation of Commercial Rule File Updates

Automatic installation of updated commercial rule files can be enabled/disabled by running the following command.

https://<LoadMasterIPAddress>/access/setwafautoinstall?enable=<yes/no>

Related WUI Item

Virtual Services > WAF Settings > Enable Automated Installs

3.5.5.1.8 Set the Time of the Automatic Commercial Rule File Installation

The time of day of the automatic commercial rule file installation can be set by running the following command. This relates to the **When to Install** drop-down menu in the **WAF Settings** screen in the WUI.

https://<LoadMasterIPAddress>/access/setwafinstalltime?hour=<hour>

The hour is the hour value from the 24-hour clock (0-23), for example 13 is 1pm:

https://10.11.0.31/access/setwafinstalltime?hour=13

The range is 0-23. Minutes cannot be specified.

Related WUI Item

Virtual Services > WAF Settings > When to Install

3.5.5.1.9 Download AFP Commercial Rule File Updates Now

The AFP commercial rule file updates can be manually downloaded to the LoadMaster by running the following command. This relates to the **Download Now** button in the **WAF Settings** screen in the WUI.

https://<LoadMasterIPAddress>/access/downloadwafrules

Related WUI Item

Virtual Services > WAF Settings > Download Now

If there are no updates because the latest rules have already been downloaded, a message will be displayed which says **No updates available**.

3.5.5.1.10 Display the WAF Rule Change Log

A log of the changes which have been made to the KEMP Technologies WAF rule set can be downloaded by running the following command.

https://<LoadMasterIPAddress>/access/getwafchange log

3.5.5.1.11 Manually Install Commercial Rule Files

The commercial rule files can be manually installed by running the following command. This relates to the **Install Now** button in the **WAF Settings** screen in the WUI.

https://<LoadMasterIPAddress>/access/maninstallwafrules

Related WUI Item

Virtual Services > WAF Settings > Install Now

An error message will be displayed if any problems occur while installing the rules.

3.5.5.2 *Commands Relating to Custom Rule Files*

The commands in this section are all related to custom rules.

3.5.5.2.1 Upload a Custom Rule File or Rule Set

An AFP custom rule file can be uploaded by running a cURL command with the **addwafcustomrule** command and the **filename** parameter (required), for example:

```
curl -X POST --data-binary "@<FileName.conf>" -k  
https://ba1:<Ba1Password>@<LoadMasterIPAddress>/access/addwafcustomrule  
?filename=<FileName.conf>
```

In addition to uploading individual custom rule files, you can also upload custom rule sets (.tar.gz files). An example of uploading the OWASP core rule set is below:

```
curl -X POST --data-binary "@owasp-modsecurity-crs-master.tar.gz" -k  
https://ba1:<Ba1Password>@<LoadMasterIPAddress>/access/addwafcustomrule  
?filename=SpiderLabs-owasp-modsecurity-crs-2.2.9-5-gebe8790.tar.gz
```

This relates to the **Custom Rules** section in the **WAF Settings** screen in the LoadMaster WUI.

Related WUI Item

Virtual Services > WAF Settings > Custom Rules

3.5.5.2.2 Delete a Custom Rule File

A custom rule file can be deleted by running the following command:

```
https://<LoadMasterIPAddress>/access/delwafcustomrule?filename=<filename>
```

For example:

```
https://10.11.0.30/access/delwafcustomrule?filename=  
modsecurity_crs_10_ignore_static
```

This does not delete the associated data file.

Related WUI Item

Virtual Services > WAF Settings > Custom Rules > Delete

3.5.5.2.3 Download a Custom Rule File

A custom rule file can be downloaded to your local machine by running the following command:

```
https://<LoadMasterIPAddress>/access/downloadwafcustomrule?filename=<filename>
```

For example:

```
https://10.11.0.30/access/downloadwafcustomrule?filename=modsecurity_crs_55_response_profiling
```

If you run this command using cURL the file will be downloaded to your working directory in Linux.

Related WUI Item

Virtual Services > WAF Settings > Custom Rule Data > Download

3.5.5.2.4 Upload a Custom Rule Data File

A custom rule data file can be uploaded by running a cURL command with the **addwafcustomdata** command and the **filename** parameter (required), for example:

```
curl -X POST --data-binary "@<FileName.data>" -k
https://ba1:<Ba1Password>@<LoadMasterIPAddress>/access/addwafcustomdata
?filename=<filename.data>
```

Related WUI Item

Virtual Services > WAF Settings > Custom Rule Data > Add Data File

3.5.5.2.5 Delete a Custom Rule Data File

A custom rule data file can be deleted by running the following command:

```
https://<LoadMasterIPAddress>/access/delwafcustomdata?filename=<filename.data>
```

Related WUI Item

Virtual Services > WAF Settings > Custom Rule Data > Delete

3.5.5.2.6 Download a Custom Rule Data File

A custom rule data file can be downloaded by running the following command:

```
https://<LoadMasterIPAddress>/access/downloadwafcustomdata?filename=<filename>
```

For example:

```
https://10.11.0.30/access/downloadwafcustomdata?filename=modsecurity_35_bad_robots
```

Related WUI Item

Virtual Services > WAF Settings > Custom Rule Data > Download

3.5.5.3 *Command Relating to Custom and Commercial Rules*

The command in this section is related to both commercial and custom rules.

3.5.5.3.1 List AFP Rules

The **listwafrules** command displays a list of all installed rules (commercial and custom rules).

It also shows if the rules are active or not by displaying either **Active** or **Inactive** in the tag name. Active rules are ones that have been assigned to one or more Virtual Services.

https://<LoadMasterIPAddress>/access/listwafrules

Related WUI Item

Virtual Services > WAF Settings > Custom Rules

Virtual Services > View/Modify Services > Modify > WAF Options > Available Rules

3.5.5.4 *Commands Relating to Remote Logging*

The commands in this section relates to the WAF remote logging feature which allows the WAF audit logs to be sent to a central log repository.

3.5.5.4.1 Set the WAF Logging Format

Set the WAF logging format by using the following command:

https://<LoadMasterIPAddress>/access/setwaflogformat?logformat=<json/native>

3.5.5.4.2 Disable Remote Logging

WAF remote logging can be disabled by running the following command:

https://<LoadMasterIPAddress>/access/disablewafremotelogging

3.5.5.4.3 Enable Remote Logging

WAF remote logging can be enabled by running the following command:

https://<LoadMasterIPAddress>/access/enablewafremotelogging?remoteuri=<RemoteServerConsoleURI>&username=<RemoteUsername>&passwd=<RemotePassword>

3.6 Global Balancing

3.6.1 Manage Fully Qualified Domain Names (FQDNs)

3.6.1.1 *Add FQDN*

An FQDN can be added by running the following command:

https://<LoadMasterIPAddress>/access/addfqdn?fqdn=<FQDNName>

fqdn is a required parameter for this command.

3.6.1.2 *Delete FQDN*

An FQDN can be deleted by running the following command:

https://<LoadMasterIPAddress>/access/deletefqdn?fqdn=<FQDNName>

fqdn is a required parameter for this command.

3.6.1.3 List FQDNs

The existing FQDNs can be listed by running the following command:

https://<LoadMasterIPAddress>/access/listfqdns

3.6.1.4 Show FQDN

The **showfqdn** command displays various details relating to the specified FQDN:

https://<LoadMasterIPAddress>/access/showfqdn?fqdn=<FQDNName>

3.6.1.5 Modify FQDN

An existing FQDN can be modified by running the following command:

https://<LoadMasterIPAddress>/access/modfqdn?fqdn=<FQDNName>

The **modfqdn** command accepts the following optional parameters:

Name	Type	Default	Range	Additional Information
SelectionCriteria	S	"rr"	rr = round robin wrr = weighted round robin fw = fixed weighting rsr = real server load prx = proximity lb = location based all = all available	The selection criteria for addresses associated with the FQDN. For a description of each of these options, refer to the GEO, Product Overview .
FailTime	I	0	0-1440	If a failure delay is not set, normal health checking is performed. If set, this parameter defines the number of minutes to wait after a failure before finally disabling it. Once it is disabled, it will not normally be brought back into operation.
siterecoverymode	S	auto	auto – automatic manual - manual	This parameter defines the Site Recovery Mode. If this is set to automatic, upon site recovery the site is brought back into operation immediately. If this is set to manual, once the site has failed, the site is disabled. Manual intervention is required to restore normal operation.

Name	Type	Default	Range	Additional Information
failover	B	0 – disabled	0 – Disabled 1 – Enabled	This parameter is only relevant if the SelectionCriteria is set to lb (Location Based). Enable/disable FQDN failover.
publicRequestValue	I	0 – Public Sites Only	0 – Public Sites Only 1 – Prefer Public Sites 2 – Prefer Private Sites 3- Any Sites	Restrict responses to clients from public IP addresses to specific classes of site. For an explanation of the different settings and their values please see the section Public Requests & Private Requests including Table 3-17: Settings for the Public/Private Request parameters
privateRequestValue	I	0 – Private Sites Only	0 – Private Sites Only 1 – Prefer Private Sites 2 – Prefer Public Sites 3 – Any Sites	Restrict responses to clients from private IP addresses to specific classes of site. For an explanation of the different settings and their values please see the section Public Requests & Private Requests including Table 3-17: Settings for the Public/Private Request parameters
LocalSettings	B	0 – Disabled	0 – Disabled 1 – Enabled	Enabling this parameter provides two additional parameters for the FQDN – localttl and localsticky .
localttl	I	Defaults to the value of the global ttl value when an FQDN is created.	1 to 86400	The Time To Live (TTL) value dictates how long the reply from the GEO LoadMaster can be cached by other DNS servers or client devices. The time interval is defined in seconds. This value should be as practically low as possible. The default value for this field is 10.

Name	Type	Default	Range	Additional Information
localsticky	I	Defaults to the value of the global persist value when an FQDN is created.	0 to 86400	Stickiness, also known as persistence, is the property that enables all name resolution requests from an individual client to be sent to the same resources until a specified period of time has elapsed.
unanimouschecks	B	0 – Disabled	0 – Disabled 1 – Enabled	When this parameter is enabled, if any IP addresses fail health checking - the other FQDN IP addresses which belong to the same cluster will be forced down.

Table 3-16: ModFQDN parameters

Public Requests & Private Requests

The Public Requests & Private Requests options replace the old Isolate Public/Private Sites option which was available on LoadMasters with firmware up to and including 7.1-28. The new settings offer administrators greater flexibility when configuring an FQDN.

These new settings allow administrators to selectively respond with public or private sites based on whether the client is from a public or private IP. For example, administrators may wish to allow only private clients to be sent to private sites.

The following table outlines settings and their configurable values:

Setting	Value	Client Type	Site Types Allowed
Public Requests	Public Only	Public	Public
	Prefer Public	Public	Public, Private if no public
	Prefer Private	Public	Private, Public if no private
	All Sites	Public	Private and Public
Private Requests	Private Only	Private	Private
	Prefer Private	Private	Private, Public if no private
	Prefer Public	Private	Public, Private if no public
	All Sites	Private	Private and Public

Table 3-17: Settings for the Public/Private Request parameters

3.6.1.6 Add Map

A map can be added to the FQDN by running the following command:

```
https://<LoadMasterIPAddress>/access/addmap?fqdn=<FQDNName>&ip=<IPAddressesToAdd>&clust=<ClusterName>
```

The **clust** parameter is optional.

3.6.1.7 *Modify a Map*

To modify a map, run the following command:

https://<LoadMasterIPAddress>/access/modmap?fqdn=<FQDNName>&ip=<IPAddressToModify>

The **modmap** command accepts the following optional parameters:

Name	Type	Default	Range	Additional Information
Checker	S	"icmp"	none icmp tcp	Specify the type of checking to be done on this IP address
Weight	I	1000	1-65535	Specify the weight associated with the IP address. The address with the highest weight is returned. This is only relevant if the Selection Criteria for the FQDN is set to Weighted Round Robin or Fixed Weighting .
Enable	B	1 – Enabled	1 – Enable 0 – Disable	Enable or disable the IP address.
Cluster	I	<unset>		Specify the ID number of the cluster to associate with the IP address.
MapAddress	A	<unset>		This is only relevant when the Selection Criteria is set to Real Server Load , the Checker is set to Cluster Checks and the cluster is of type Remote LM or Local LM . Enter a Virtual Service IP address to be mapped from the relevant LoadMaster.
MapPort	I	<unset>		This is only relevant when the Selection Criteria is set to Real Server Load , the Checker is set to Cluster Checks and the cluster is of type Remote LM or Local LM . This parameter is used in conjunction with the MapAddress parameter to specify an IP address and port combination to be mapped. If this parameter is not set, the health check will check all Virtual Services with the same IP address as the one selected. If one of them is in an "Up" status, the FQDN will show as "Up". If a port is specified, the health check will only check against the health of that Virtual Service when checking the health of the FQDN.

Table 3-18: ModMap parameters

3.6.1.8 Delete a Map

To delete a map, run the following command:

```
https://<LoadMasterIPAddress>/access/delmap?fqdn=<FQDNName>&ip=<IPAdressToDelete>
```

3.6.1.9 Change the Location of a Map

To change the location of a map, run the following command:

```
https://<LoadMasterIPAddress>/access/changemaploc?fqdn=<FQDNName>&ip=<IPAddress>&lat=<LatitudeSeconds>&long=<LongitudeSeconds>
```

This command is only relevant when the **Selection Criteria** for the FQDN is set to **Proximity**.

The **lat** and **long** values should be entered as an integer containing the total seconds. This total seconds value is converted to degrees, minutes and seconds when displayed in the WUI.

There are 60 seconds in a minute and 60 minutes in a degree.

- Degrees = °
- Minutes = ′
- Seconds = ″

- 60″ = 1′
- 3600″ = 1°
- 3660 = 1°1′
- 3661 = 1°1′1″

You can also represent this as a decimal value for degrees where the minutes and seconds are divided by 3600 to get the decimal value.

3.6.1.10 Add a Location

To add a country or continent, run the following command:

```
https://<LoadMasterIPAddress>/access/addcountry?fqdn=<FQDNName>&ip=<IPAddress>&countrycode=<TwoCharacterCountry/ContinentCode>&iscontinent=<yes/no>
```

This command is only relevant when the **Selection Criteria** for the FQDN is set to **Location Based**. Refer to **Section 3.6.1.5** for details on how to modify the **Selection Criteria**.

The FQDN name is case sensitive.

The country code and continent codes used are the standard ISO codes.

When adding a country - the **iscontinent** parameter must be set to **no**.

When adding a continent - the **iscontinent** parameter must be set to **yes**.

The value for **countrycode** should be in uppercase.

To specify everywhere as the country, type **ALL** as the country code and set the **iscontinent** parameter to **yes**.

To add a custom location, run the following command:

```
https://<LoadMasterIPAddress>/access/addcountry?fqn=<FQDNName>&ip=<IPAd  
dress>&customlocation=<CustomLocationName>
```

It is also possible to add a country/continent and a custom location in the one command – simply include all of the parameters, for example:

```
https://<LoadMasterIPAddress>/access/addcountry?fqn=<FQDNName>&ip=<IPAd  
dress>&countrycode=<TwoCharacterCountry/ContinentCode>&iscontinent=<ye  
s/no>&customlocation=<CustomLocationName>
```

3.6.1.11 Remove a Location

To remove a country, run the following command:

```
https://<LoadMasterIPAddress>/access/removecountry?fqn=<FQDNName>&ip=<  
IPAddress>&countrycode=<TwoCharacterCountry/ContinentCode>&iscontinent=  
<yes/no>
```

This command is only relevant when the **Selection Criteria** for the FQDN is set to **Location Based**.

The FQDN name is case sensitive.

When removing a country - the **iscontinent** parameter must be set to **no**.

When removing a continent - the **iscontinent** parameter must be set to **yes**.

The value for **countrycode** should be in uppercase.

To specify everywhere as the country, type **ALL** as the country code and set the **iscontinent** parameter to **yes**.

To remove a custom location, run the following command:

```
https://<LoadMasterIPAddress>/access/removecountry?fqn=<FQDNName>&ip=<  
IPAddress>&customlocation=<CustomLocationName>
```

It is also possible to remove a country/continent and a custom location in the one command – simply include all of the parameters, for example:

```
https://<LoadMasterIPAddress>/access/removecountry?fqdn=<FQDNName>&ip=<IPAddress>&countrycode=<TwoCharacterCountry/ContinentCode>&iscontinent=<yes/no>&customlocation=<CustomLocationName>
```

3.6.1.12 *Change Checker Address*

To change the address of a checker, run the following command:

```
https://<LoadMasterIPAddress>/access/changecheckeraddr?fqdn=<FQDNName>&ip=<MapIPAddress>&checkerip=<CheckerIPAddress>&port=<CheckPort>
```

The **changecheckeraddr** command requires the following parameters:

Name	Type	Default	Range	Additional Information
checkerip	S	<unset>		Specify the address used to health check the IP address.
port	I	80	1-65530	Specify the port used to health check the IP address.

Table 3-19: ChangeCheckerAddr parameters

Specifying an empty value for the the **checkerip** or **port** parameters sets them to their default values (blank for the **checkerip** and **80** for the **port**).

3.6.2 *Manage Clusters*

3.6.2.1 *List Clusters*

Existing clusters can be listed by running the following command:

```
https://<LoadMasterIPAddress>/access/listclusters
```

3.6.2.2 *Show Cluster*

Details about a specific cluster can be displayed by running the following command:

```
https://<LoadMasterIPAddress>/access/showcluster?id=<ClusterID>
```

id is a required parameter for this command.

3.6.2.3 *Add Cluster*

A cluster can be added by running the following command:

```
https://<LoadMasterIPAddress>/access/addcluster?ip=<ClusterIPAddress>&name=<ClusterName>
```

The **ip** and **name** parameters are required for this command.

3.6.2.4 Delete Cluster

A cluster can be deleted by running the following command:

https://<LoadMasterIPAddress>/access/deletecluster?id=<ClusterID>

The **id** parameter is required for this command.

3.6.2.5 Modify Cluster

A cluster can be modified by running the following command:

https://<LoadMasterIPAddress>/access/modcluster?id=<ClusterID>

The **modcluster** commands accepts the following optional parameters:

Name	Type	Default	Range	Additional Information
type	S	"Default"	default remotelM localLM	Change the type of the cluster
name	S			Specify a name for the cluster
checker	S	"none"	none tcp icmp	Specify the method used to check the status of the cluster
checkerport	I	"0"	1-65530	Set the port used for checking the cluster. This parameter is only relevant if the checker is set to tcp .
enable	B	1 – Enabled	1 = Enabled 0 = Disabled	Enable/disable the cluster

Table 3-20: ModCluster parameters

3.6.2.6 Change Cluster Location

To change a cluster location, run the following command:

https://<LoadMasterIPAddress>/access/clusterchange1oc?ip=<ClusterIPAddresses>&latsecs=<LatitudeSeconds>&longsecs=<LongitudeSeconds>

The **latsecs** and **longsecs** values should be entered as an integer containing the total seconds. This total seconds value is converted to degrees, minutes and seconds when displayed in the WUI.

There are 60 seconds in a minute and 60 minutes in a degree.

- Degrees = °
- Minutes = ‘
- Seconds = “

- 60” = 1’
- 3600” = 1°

- 3660 = 1°1'
- 3661 = 1°1'1"

You can also represent this as a decimal value for degrees where the minutes and seconds are divided by 3600 to get the decimal value.

3.6.3 Miscellaneous Params

3.6.3.1 List the Miscellaneous Parameters

To list the GEO miscellaneous parameters, run the following command:

https://<LoadMasterIPAddress>/access/listparams

3.6.3.2 Modify Miscellaneous Parameters

The GEO miscellaneous parameters can be modified by running the following command:

https://<LoadMasterIPAddress>/access/modparams

The **modparams** command accepts the following optional parameters:

Name	Type	Default	Range	Additional Information
zone	S	<unset>		Specify the zone name.
SourceOfAuthority	S	<unset>		Set the response set for Source of Authority requests.
namesrv	S	<unset>		Set the response sent for Name Server requests.
SOAEmail	S	<unset>		Set the response email string sent for Source of Authority requests.
TTL	I	<unset>	1-86400	Set the Time To Live (TTL) (in seconds) of the responses returned by the LoadMaster.
persist	I	0	0-86400	This corresponds with the Stickiness WUI field. This determines how long (in seconds) a specific response will be returned to a host.

Name	Type	Default	Range	Additional Information
CheckInterval	I	120	9-3600	Set how often (in seconds) that devices will be checked. Note: The interval value must be greater than the ConnTimeout value multiplied by the RetryAttempts value (Interval > Timeout * Retry + 1). This is to ensure that the next health check does not start before the previous one completes. If the timeout or retry values are increased to a value that breaks this rule, the interval value will be automatically increased.
ConnTimeout	I	20	4-60	Set the timeout (in seconds) for the check request.
RetryAttempts	I	2	2-10	Set the number of times the check will be retried before the device is marked as failed.

Table 3-21: ModParams parameters

3.6.3.3 Upload a Location Data Patch File

A location data update file can be uploaded. To do this, run a cURL command:

```
curl -X POST --data-binary "@<GEOPatchFileName>" -k
https://<username>:<password>@<LoadMasterIPAddress>/access/locdataupdate
```

3.6.4 IP Range Selection Criteria

3.6.4.1 List the IP Addresses

To list the IP addresses set for the IP range selection criteria, run the following command:

```
https://<LoadMasterIPAddress>/access/listips
```

3.6.4.2 Show IP Address Details

To show details of a specific IP address which is set for the IP range selection criteria, run the following command:

```
https://<LoadMasterIPAddress>/access/showip?ip=<IPAddress>
```

3.6.4.3 Add IP Address

To add an IP address to the IP range selection criteria, run the following command:

```
https://<LoadMasterIPAddress>/access/addip?ip=<IPAddress>
```

3.6.4.4 Delete IP Address

To delete an IP address from the IP range selection criteria, run the following command:

```
https://<LoadMasterIPAddress>/access/delip?ip=<IPAddress>
```

3.6.4.5 Change the Location for an IP Address

To change the location for an IP address, run the following command:

```
https://<LoadMasterIPAddress>/access/modiploc?ip=<IPAddress>&lat=<LatitudeMinutes>&long=<LongitudeMinutes>
```

The **lat** and **long** values should be entered as an integer containing the total seconds. This total seconds value is converted to degrees, minutes and seconds when displayed in the WUI.

There are 60 seconds in a minute and 60 minutes in a degree.

- Degrees = °
- Minutes = ‘
- Seconds = “

- 60” = 1’
- 3600” = 1°
- 3660 = 1°1’
- 3661 = 1°1’1”

You can also represent this as a decimal value for degrees where the minutes and seconds are divided by 3600 to get the decimal value.

3.6.4.6 Delete IP Location

To delete the location for an IP address, run the following command:

```
https://<LoadMasterIPAddress>/access/deliploc?ip=<IPAddress>
```

3.6.4.7 Add IP Country

To add a country association to an existing IP address, run the following command:

```
https://<LoadMasterIPAddress>/access/addipcountry?ip=<IPAddress>&<parameter>=<value>
```

Name	Mandatory	Type	Default	Range	Additional Information
countrycode	No	S	<unset>	Valid country code	A valid, uppercase, two-digit country code must be used.
customloc	No	S	<unset>	Existing custom location	The name of an existing custom location.

Either the **countrycode** or **customloc** parameter must be entered when running the command.

3.6.4.8 *Remove IP Country*

To remove the country association from an IP address, run the following command:

```
https://<LoadMasterIPAddress>/access/removeipcountry?ip=<IPAddress>
```

3.6.4.9 *Add a Custom Location*

A custom location can be added by running the following command:

```
https://<LoadMasterIPAddress>/access/addcustomlocation?location=<CustomLocationName>
```

The **location** parameter is required.

3.6.4.10 *Edit a Custom Location*

To rename an existing custom location, run the following command:

```
https://<LoadMasterIPAddress>/access/editcustomlocation?cloldname=<OldCustomLocationName>&clnewname=<NewCustomLocationName>
```

3.6.4.11 *Delete a Custom Location*

To remove an existing custom location, run the **deletcustomlocation** command, using the following format:

```
https://<LoadMasterIPAddress>/access/deletcustomlocation?clName=<CustomLocationName>
```

3.6.5 IP Blacklist Settings

Refer to the subsections below for details on the RESTful API commands relating to the IP Blacklist Settings.

3.6.5.1 *Retrieve the IP Blacklist Settings*

To retrieve the IP blacklist settings, run the following command:

```
https://<LoadMasterIPAddress>/access/geoacl/getsettings
```

3.6.5.2 *Enable/Disable Automatic IP Blacklist Updates*

To enable/disable automatic updates, run the following command:

```
https://<LoadMasterIPAddress>/access/geoacl/setautoupdate?enable=<1/0>
```

3.6.5.3 *Enable/Disable Automatic Installation of the IP Blacklist Updates*

To enable/disable automatic installation of the updates, run the following command:

```
https://<LoadMasterIPAddress>/access/geoacl/setautoinstall?enable=<1/0>
```

3.6.5.4 Set the Time of the Automatic Installation

To set the time of the automatic installation, run the following command:

https://<LoadMasterIPAddress>/access/geoac1/setinstalltime?hour=<hour>

The hour is the hour value from the 24-hour clock (0-23), for example 13 is 1pm:

https://10.11.0.31/access/geoac1/setinstalltime?hour=13

The range is 0-23. Minutes cannot be specified. It is not possible to set the install time if automatic installation is disabled.

3.6.5.5 Download the Updates Now

To download the updates now, run the following command:

https://<LoadMasterIPAddress>/access/geoac1/updatesnow

3.6.5.6 Install the Updates Now

To install any downloaded updates now, run the following command:

https://<LoadMasterIPAddress>/access/geoac1/installnow

3.6.5.7 View the Blacklist

To retrieve the blacklist, run the following command:

https://<LoadMasterIPAddress>/access/geoac1/downloadlist

3.6.5.8 View Changes to the Blacklist

To retrieve a list of changes which were made to the blacklist, run the following command:

https://<LoadMasterIPAddress>/access/geoac1/downloadchanges

3.6.5.9 View the User-Defined Whitelist

To retrieve the contents of the user-defined whitelist (which overrides the blacklist), run the following command:

https://<LoadMasterIPAddress>/access/geoac1/listcustom

3.6.5.10 Add an Address to the Whitelist

To add an IP address or network (in CIDR format) to the whitelist, run the following command:

https://<LoadMasterIPAddress>/access/geoac1/addcustom?addr=<Address>

3.6.5.11 Remove an IP Address or Network from the Whitelist

To remove an IP address or network from the whitelist, run the following command:

https://<LoadMasterIPAddress>/access/geoac1/removecustom?addr=<Address>

3.6.6 Configure DNSSEC

To configure DNSSEC using the API, use the commands outlined in the below sections.

3.6.6.1 Generate the Key Signing Keys (KSKs)

To generate the KSKs, run the following command:

```
https://<LoadMasterIPAddress>/access/geogenerateksk?algorithm=<Algorithm>&keysize=<KeySize>
```

Name	Type	Default	Range	Description
algorithm	S	RSASHA256	RSASHA256, NSEC3RSASHA1, NSEC3RSASHA1	Specify the cryptographic algorithm to use. If this parameter is omitted, the default value is used.
keysize	I	2048	1024, 2048, 4096	Specify the key size (in bits). If this parameter is omitted, the default value is used.

Figure 3-3: GeoGenerateKSK parameters

3.6.6.2 Import the KSKs

To import the KSKs, run the following cURL command:

```
curl -F "publickey=@/tmp/example.com.+008+62284.key" -F "privatekey=@/tmp/example.com.+008+62284.private" -k https://<Username>:<Password>@<LoadMasterIPAddress>/access/geoimportksk
```

This command uploads both KSK files at the same time.

3.6.6.3 Delete the KSK Files

To delete the KSK files, run the following command:

```
https://<LoadMasterIPAddress>/access/geodeleteksk
```

3.6.6.4 Enable/Disable DNSSEC

To enable/disable DNSSEC, run the following command:

```
https://<LoadMasterIPAddress>/access/geosetdnssec?enable=<yes/no>
```

3.6.6.5 Retrieve the DNSSEC Configuration Settings

To retrieve the DNSSEC settings, run the following command:

```
https://<LoadMasterIPAddress>/access/geoshowdnssec
```

3.6.7 Enable/Disable GEO

3.6.7.1 Check if GEO is Enabled

To check if GEO is enabled, run the following command:

```
https://<LoadMasterIPAddress>/access/isgeoenabled
```

3.6.7.2 Enable GEO

GEO can be enabled by running the following command:

https://<LoadMasterIPAddress>/access/enablegeo

3.6.7.3 Disable GEO

GEO can be disabled by running the following command:

https://<LoadMasterIPAddress>/access/disablegeo

3.7 Statistics

Statistics for all the Virtual Services and Real Servers can be obtained by using the **stats** command.

If you run the **stats** command on the admin node when using LoadMaster clustering – the output will show the combined totals of all machines.

https://<LoadMasterIPAddress>/access/stats

If the command executes without error, the statistics for all the Virtual Services and Real Servers are returned in the following format.

The Real Server statistics are returned on a per Virtual Service basis

```
<Response stat="200" code="ok">
<Success>
<Data>
  <CPU>
    <total>
      <User>1</User>
      <System>1</System>
      <Idle>98</Idle>
      <IOWaiting>0</IOWaiting>
    </total>
    <cpu0>
      <User>1</User>
      <System>1</System>
      <HWInterrupts>0</HWInterrupts>
      <SWInterrupts>0</SWInterrupts>
      <Idle>98</Idle>
      <IOWaiting>0</IOWaiting>
    </cpu0>
    <cpu1>
      <User>1</User>
      <System>1</System>
      <HWInterrupts>0</HWInterrupts>
      <SWInterrupts>0</SWInterrupts>
      <Idle>98</Idle>
      <IOWaiting>0</IOWaiting>
    </cpu1>
  </CPU>
  <Memory>
```

```
<memused>290512</memused>
<percentmemused>14</percentmemused>
<memfree>1766100</memfree>
<percentmemfree>86</percentmemfree>
</Memory>
<Network>
  <eth0>
    <ifaceID>0</ifaceID>
    <speed>10000</speed>
    <in>0.0</in>
    <inbytes>1237</inbytes>
    <inbytesTotal>142167</inbytesTotal>
    <out>0.1</out>
    <outbytes>7725</outbytes>
    <outbytesTotal>1343557</outbytesTotal>
  </eth0>
</Network>
<TPS>
  <Total>0</Total>
  <SSL>0</SSL>
</TPS>
<VStotals>
  <ConnsPerSec>0</ConnsPerSec>
  <TotalConns>0</TotalConns>
  <BitsPerSec>0</BitsPerSec>
  <TotalBits>0</TotalBits>
  <BytesPerSec>0</BytesPerSec>
  <TotalBytes>0</TotalBytes>
  <PktsPerSec>0</PktsPerSec>
  <TotalPackets>0</TotalPackets>
</VStotals>
<Vs>
  <VSAddress>10.154.11.181</VSAddress>
  <VSPort>53</VSPort>
  <VSProt>udp</VSProt>
  <Index>1</Index>
  <Status>down</Status>
  <ErrorCode>0</ErrorCode>
  <Enable>1</Enable>
  <TotalConns>0</TotalConns>
  <TotalPkts>0</TotalPkts>
  <TotalBytes>0</TotalBytes>
  <TotalBits>0</TotalBits>
  <ActiveConns>0</ActiveConns>
  <BytesRead>0</BytesRead>
  <BytesWritten>0</BytesWritten>
  <ConnsPerSec>0</ConnsPerSec>
  <WafEnable>0</WafEnable>
</Vs>
<Vs>
  <VSAddress>10.154.11.181</VSAddress>
  <VSPort>53</VSPort>
  <VSProt>tcp</VSProt>
  <Index>2</Index>
  <Status>down</Status>
  <ErrorCode>0</ErrorCode>
  <Enable>1</Enable>
  <TotalConns>0</TotalConns>
```

```

    <TotalPkts>0</TotalPkts>
    <TotalBytes>0</TotalBytes>
    <TotalBits>0</TotalBits>
    <ActiveConns>0</ActiveConns>
    <BytesRead>0</BytesRead>
    <BytesWritten>0</BytesWritten>
    <ConnsPerSec>0</ConnsPerSec>
    <WafEnable>0</WafEnable>
</Vs>
<Vs>
  <VSAddress>10.154.11.182</VSAddress>
  <VSPort>53</VSPort>
  <VSProt>udp</VSProt>
  <Index>3</Index>
  <Status>down</Status>
  <ErrorCode>0</ErrorCode>
  <Enable>1</Enable>
  <TotalConns>0</TotalConns>
  <TotalPkts>0</TotalPkts>
  <TotalBytes>0</TotalBytes>
  <TotalBits>0</TotalBits>
  <ActiveConns>0</ActiveConns>
  <BytesRead>0</BytesRead>
  <BytesWritten>0</BytesWritten>
  <ConnsPerSec>0</ConnsPerSec>
  <WafEnable>0</WafEnable>
</Vs>
<Vs>
  <VSAddress>10.154.11.183</VSAddress>
  <VSPort>53</VSPort>
  <VSProt>tcp</VSProt>
  <Index>4</Index>
  <Status>down</Status>
  <ErrorCode>0</ErrorCode>
  <Enable>1</Enable>
  <TotalConns>0</TotalConns>
  <TotalPkts>0</TotalPkts>
  <TotalBytes>0</TotalBytes>
  <TotalBits>0</TotalBits>
  <ActiveConns>0</ActiveConns>
  <BytesRead>0</BytesRead>
  <BytesWritten>0</BytesWritten>
  <ConnsPerSec>0</ConnsPerSec>
  <WafEnable>0</WafEnable>
</Vs>
  <ChangeTime>1483701795</ChangeTime>
</Data>
</Success>
</Response>

```

The statistics are explained in the table below.

Section	Name	Additional Information
	User	The percentage of the CPU spent processing in user mode
	System	The percentage of the CPU spent processing in system mode
	Idle	The percentage of CPU which is idle

Section	Name	Additional Information
CPU	IOWaiting	The percentage of the CPU spent waiting for I/O to complete
	HWInterrupts	The percentage of hardware interrupts
	SWInterrupts	The percentage of software interrupts
Memory	Memused	The amount of memory in use
	Percentmemused	The percentage of memory used
	Memfree	The amount of memory free
	Percentmemfree	The percentage of free memory
Network	ifaceID	The ID number of the interface
	Speed	The speed of the link
	In	Inbound
	Out	Outbound
	Total (TPS)	The total number of Transactions Per Second (TPS)
	SSL (TPS)	The total number of SSL Transactions Per Second (TPS)
VStotals	ConnsPerSec	The number of connections per second
	BitsPerSec	The number of bits per second
	BytesPerSec	The number of bytes per second
	PktsPerSec	The number of packets per second
Vs	VSAddress	The IP address of the Virtual Service
	VSPort	The port of the Virtual Service
	VSProt	The protocol of the Virtual Service. This will either be tcp or udp .
	Index	The index (ID) number of the Virtual Service
	ErrorCode	The error code
	Enable	Displays whether the Virtual Service is enabled (1) or disabled (0)
	TotalConns	The total number of connections made
	TotalPkts	The total number of packets
	TotalBytes	The total number of bytes
	TotalBits	The total number of bits
	ActiveConns	The total number of connections that are currently active
	BytesRead	The total number of bytes read
	BytesWritten	The total number of bytes written
	WafEnable	Displays whether WAF is enabled (1) or disabled (0). The WAF statistics below will only be displayed if WAF is enabled on the Virtual Service.
	Requests	The total number of requests handled by the WAF (shows all requests, whether they were blocked or not). Two requests will be recorded for each connection – one incoming and one outgoing request.
Incidents	The total number of events handled by the WAF (i.e. requests that were blocked).	
Incidents_Hour	The number of events that have happened in the current hour (since xx.00.00).	

Section	Name	Additional Information
	Incidents_Day	The number of events that have happened since midnight (local time).
	Incidents_Dayover	The number of times the event counter has gone over the configured warning threshold today. For example, if the threshold is set to 10 and there has been 20 events, this counter will be set to 2. The warning threshold is set on a per-Virtual Service basis by setting the AlertThreshold parameter. For further information, refer to Section 3.5.1 .
ChangeTime	ChangeTime	The time of the last configuration change on the LoadMaster. The configuration has not changed if this value has not changed. This only works if session management is enabled. The time is represented in "Unix time or epoch time" (also known as Portable Operating System Interface (POSIX) time) format. This is a system for describing instants in time, defined as the number of seconds that have elapsed since 00:00:00 Coordinated Universal Time (UTC), Thursday 1 st January 1970, not counting leap seconds. For example, 1484150723 is the equivalent of GMT: Wed, 11 th January 2017 16:05:23 GMT. There are conversion tools available online to convert the value to an easily readable format.

Table 3-22: Statistics descriptions

3.8 SDN Statistics

The device information for the specified SDN controller can be retrieved by running the following command:

https://<LoadMasterIPAddress>/access/sdndeviceinfo?cid=<ControllerID>

Example output for the **sdndeviceinfo** command is provided below:

```
<Response stat="200" code="ok">
  <Success>
    <Data>
      <controller id="62">
        <deviceinfo>
          <uid>openflow:151936205333838</uid>
          <name>br3</name>
          <type/>
          <vendor>Nicira, Inc.</vendor>
          <product>Open vswitch</product>
          <firmware>2.3.1</firmware>
          <serial>None</serial>
          <ip>10.35.8.47</ip>
          <ifcount>3</ifcount>
          <status/>
          <portinfo>
            <port>
              <id>1</id>
              <name>prt3</name>
              <state/>
              <mac>52:34:63:89:05:17</mac>
              <curspeed>current_speed=0</curspeed>
              <maxspeed>max_speed=0</maxspeed>
            </port>
          </portinfo>
        </deviceinfo>
      </controller>
    </Data>
  </Success>
</Response>
```

```

    </port>
  <port>
    <id>2</id>
    <name>vnet5</name>
    <state/>
    <mac>fe:54:00:79:04:75</mac>
    <cursspeed>current_speed=10000</cursspeed>
    <maxspeed>max_speed=0</maxspeed>
  </port>
  <port>
    <id>local</id>
    <name>br3</name>
    <state/>
    <mac>8a:2f:67:8c:25:4e</mac>
    <cursspeed/>
    <maxspeed/>
  </port>
</portinfo>
</deviceinfo>
<deviceinfo>
  <uid>openflow:60003129350209</uid>
  <name>br1</name>
  <type/>
  <vendor>Nicira, Inc.</vendor>
  <product>Open vSwitch</product>
  <firmware>2.3.1</firmware>
  <serial>None</serial>
  <ip>10.35.8.47</ip>
  <ifcount>4</ifcount>
  <status/>
  <portinfo>
    <port>
      <id>3</id>
      <name>vnet6</name>
      <state/>
      <mac>fe:54:00:ed:2d:aa</mac>
      <cursspeed>current_speed=10000</cursspeed>
      <maxspeed>max_speed=0</maxspeed>
    </port>
    <port>
      <id>2</id>
      <name>prt11</name>
      <state/>
      <mac>de:8f:f3:cc:58:7a</mac>
      <cursspeed>current_speed=0</cursspeed>
      <maxspeed>max_speed=0</maxspeed>
    </port>
    <port>
      <id>1</id>
      <name>prt1</name>
      <state/>
      <mac>5e:b2:61:21:c8:20</mac>
      <cursspeed>current_speed=0</cursspeed>
      <maxspeed>max_speed=0</maxspeed>
    </port>
    <port>
      <id>local</id>
      <name>br1</name>
      <state/>
      <mac>36:92:91:35:d8:41</mac>
      <cursspeed/>
      <maxspeed/>
    </port>
  </portinfo>
</deviceinfo>
<deviceinfo>
  <uid>openflow:130736296040257</uid>
  <name>br2</name>
  <type/>
  <vendor>Nicira, Inc.</vendor>
  <product>Open vSwitch</product>
  <firmware>2.3.1</firmware>
  <serial>None</serial>

```

```

<ip>10.35.8.47</ip>
<ifcount>4</ifcount>
<status/>
<portinfo>
  <port>
    <id>2</id>
    <name>vnet7</name>
    <state/>
    <mac>fe:54:00:85:ca:9f</mac>
    <cursspeed>current_speed=10000</cursspeed>
    <maxspeed>max_speed=0</maxspeed>
  </port>
  <port>
    <id>1</id>
    <name>prt2</name>
    <state/>
    <mac>8a:8d:81:78:10:8b</mac>
    <cursspeed>current_speed=0</cursspeed>
    <maxspeed>max_speed=0</maxspeed>
  </port>
  <port>
    <id>3</id>
    <name>prt22</name>
    <state/>
    <mac>d2:10:88:e8:98:f6</mac>
    <cursspeed>current_speed=0</cursspeed>
    <maxspeed>max_speed=0</maxspeed>
  </port>
  <port>
    <id>local</id>
    <name>br2</name>
    <state/>
    <mac>76:e7:6a:7c:17:41</mac>
    <cursspeed/>
    <maxspeed/>
  </port>
</portinfo>
</deviceinfo>
<deviceinfo>
  <uid>openflow:217995646047043</uid>
  <name>br4</name>
  <type/>
  <vendor>Nicira, Inc.</vendor>
  <product>Open vSwitch</product>
  <firmware>2.3.1</firmware>
  <serial>None</serial>
  <ip>10.35.8.47</ip>
  <ifcount>4</ifcount>
  <status/>
  <portinfo>
    <port>
      <id>2</id>
      <name>vnet4</name>
      <state/>
      <mac>fe:54:00:ab:30:91</mac>
      <cursspeed>current_speed=10000</cursspeed>
      <maxspeed>max_speed=0</maxspeed>
    </port>
    <port>
      <id>1</id>
      <name>prt4</name>
      <state/>
      <mac>f2:fc:c5:31:1e:a0</mac>
      <cursspeed>current_speed=0</cursspeed>
      <maxspeed>max_speed=0</maxspeed>
    </port>
    <port>
      <id>3</id>
      <name>vnet8</name>
      <state/>
      <mac>fe:54:00:6a:f8:4e</mac>
      <cursspeed>current_speed=10000</cursspeed>
      <maxspeed>max_speed=0</maxspeed>
    </port>
  </portinfo>
</deviceinfo>

```

```

        </port>
    </port>
    <id>local</id>
    <name>br4</name>
    <state/>
    <mac>c6:44:11:0b:93:43</mac>
    <curspeed/>
    <maxspeed/>
</port>
</portinfo>
</deviceinfo>
</controller>
</Data>
</Success>
</Response>

```

The output is described in the table below.

Section	Name	Additional Information
Device Information	uid	The Unique Identifier (UID) for the device.
	name	The name of the device.
	vendor	The device vendor.
	product	The type of device.
	firmware	The firmware version of the device.
	serial	The serial number of the device.
	ip	The IP address of the device.
	ifcount	The number of interfaces on the device.
Port Information	status	The status of the device.
	id	The ID number of the port.
	name	The name of the port.
	mac	The MAC address of the port.
	curspeed	The current speed of the port.
	maxspeed	The maximum speed of the port.

Table 3-23: SDN Device Info output descriptions

The path information for the specified SDN controller (and corresponding Virtual Service configuration on the LoadMaster) can be retrieved by running the following command:

https://<LoadMasterIPAddress>/access/sdnpathinfo?cid=<ControllerID>

Example output for the **sdnpathinfo** command is provided below:

```

<Response stat="200" code="ok">
  <Success>
    <Data>
      <pathinfo>
        <path>
          <dir>fwd</dir>
          <source>10.35.8.49</source>
          <dest>10.35.8.89</dest>
          <pathelem>
            <switch>
              <idx>0</idx>
              <name>baloo</name>
              <dpid>00:08:a0:1d:48:92:4f:80</dpid>
            </switch>
          </pathelem>
          <import>
            <idx>25</idx>
            <name>25</name>
          </import>
        </path>
      </pathinfo>
    </Data>
  </Success>
</Response>

```

```

        <byte>3397596</byte>
    </inport>
    <outport>
        <idx>14</idx>
        <name>14</name>
        <byte>3395099</byte>
    </outport>
</pathelem>
<pathelem>
    <switch>
        <idx>1</idx>
        <name>bagheera</name>
        <dpid>00:08:40:a8:f0:87:04:80</dpid>
    </switch>
    <inport>
        <idx>15</idx>
        <name>15</name>
        <byte>3388430</byte>
    </inport>
    <outport>
        <idx>6</idx>
        <name>6</name>
        <byte>1566302</byte>
    </outport>
</pathelem>
</path>
<path>
    <dir>rev</dir>
    <source>10.35.8.89</source>
    <dest>10.35.8.49</dest>
    <pathelem>
        <switch>
            <idx>0</idx>
            <name>baloo</name>
            <dpid>00:08:a0:1d:48:92:4f:80</dpid>
        </switch>
        <inport>
            <idx>25</idx>
            <name>25</name>
            <byte>3397596</byte>
        </inport>
        <outport>
            <idx>14</idx>
            <name>14</name>
            <byte>3395099</byte>
        </outport>
    </pathelem>
    <pathelem>
        <switch>
            <idx>1</idx>
            <name>bagheera</name>
            <dpid>00:08:40:a8:f0:87:04:80</dpid>
        </switch>
        <inport>
            <idx>15</idx>
            <name>15</name>
            <byte>3388430</byte>
        </inport>
        <outport>
            <idx>6</idx>
            <name>6</name>
            <byte>1566302</byte>
        </outport>
    </pathelem>
</path>
</pathinfo>
</Data>
</Success>
</Response>

```

The output is described in the table below.

Section	Name	Additional Information
path	dir	The direction of the path.
	source	The source IP address.
	dest	The destination IP address.
switch	idx	The index number of the switch along the path.
	name	The name of the switch.
	dpid	The Data Path ID (DPID) of the switch.
inport	idx	The switch port number of the inbound traffic.
	name	The name of the inbound port.
	byte	The number of bytes transferred on the port.
outport	idx	The switch port number of the outbound traffic.
	name	The name of the outbound port.
	byte	The number of bytes transferred on the port.

Table 3-24: SDN Path Info output descriptions

3.9 Real Servers

A Real Server can be managed by using one of the commands below.

```
https://<LoadMasterIPAddress>/access/showrs?vs=<IPaddr>&port=<Port>&prot=<tcp/udp>&rs=<RS IPaddr>&rsport=<RS-Port>
```

```
https://<LoadMasterIPAddress>/access/de1rs?vs=<IPaddr>&port=<Port>&prot=<tcp/udp>&rs=<RS IPaddr>&rsport=<RS-Port>
```

```
https://<LoadMasterIPAddress>/access/de1rs?vs=<IPaddr>&port=<Port>&prot=<tcp/udp>&rs=!<RSIndex>
```

```
https://<LoadMasterIPAddress>/access/addrs?vs=<IPaddr>&port=<Port>&prot=<tcp/udp>&rs=<RS IPaddr>&rsport=<RS-Port>
```

```
https://<LoadMasterIPAddress>/access/modrs?vs=<IPaddr>&port=<Port>&prot=<tcp/udp>&rs=<RS IPaddr>&rsport=<RS-Port>
```

The **rs** parameter accepts integers (ID), service names (for SubVSs) and IP addresses. The ID can be found in the **<RSIndex>** element when doing a **showvs** command, for example:

```
...
<RS>
<Status>Up</Status>
<VSIndex>1</VSIndex>
<RsIndex>3</RsIndex>
<Addr>10.154.201.3</Addr>
<Port>80</Port>
```

```
<Forward>nat</Forward>
<Weight>1000</Weight>
<Limit>0</Limit>
<Enable>Y</Enable>
<Critical>N</Critical>
</Rs>
...
```

Id	IP Address	Port	Forwarding method	Weight	Limit	Rules Status	Operation
5	10.154.11.73	80	nat	1000	0	1 Enabled	Disable Modify Delete

Figure 3-4: Real Server ID

Alternatively, check the **Modify Virtual Service** screen in the WUI, which lists Real Server ID in the **Id** column in the **Real Servers** section.

For the **rs** parameter, when using `<RSIndex>`, always precede it with an exclamation mark (!).

For example:

```
https://<LoadMasterIPAddress>/access/showrs?vs=<IPaddr>&port=<Port>&prot=<tcp/udp>&rs=!<RSIndex>
```

The Real Server IP address (that the **rs** parameter can be set to) can be in either IPv4 or IPv6 formats:

- Example IPv4 address: 10.11.0.24
- Example IPv6 address: fdce:9b36:e54f:110::40:14

Some SubVS parameters, such as **critical**, need to be modified using the **RsIndex** of the SubVS, for example:

```
https://<LoadMasterIPAddress>/access/modrs?vs=<ParentVSIndex>&rs=!<RsIndexOfTheSubVS>&critical=<0/1>
```

To modify the settings of a Real Server which has been added to a SubVS, use the **VS Index** of the SubVS and the **RsIndex** of the Real Server, for example:

```
https://<LoadMasterIPAddress>/access/modrs?vs=<SubVSIndex>&rs=!<RsIndex>&critical=<0/1>
```

addrs and **modrs** accept the following additional (optional) parameters.

Name	Type	Default	Range	Description
weight	I	1000	1-65535	When using weighted round robin scheduling, the weight of a Real Server is used to indicate what relative proportion of traffic should be sent to the server. Servers with higher values will receive more traffic. The weight of a SubVS can also be updated using the modrs command - set the rs to the number that appears in the Id column for the relevant SubVS in the parent Virtual Service modify screen.
newport	I	<unset>	3-65535 (change the Port of the Real Server)	The port on the Real Server to be used.

Name	Type	Default	Range	Description
forward	S	nat	nat, route	The type of forwarding method used. The default method is NAT. Direct server return can only be used with Layer 4 services.
enable	B	1		Enable or disable the Real Server.
limit	I	0	0-100000	The maximum number of open connections that can be sent to a Real Server before it is taken out of rotation.
non_local	B	0	0 - Disabled 1 - Enabled	By default only Real Servers on local networks can be assigned to a Virtual Service. Enabling this option will allow a non-local Real Server to be assigned to the Virtual Service. This option will only be available if nonlocalrs has been enabled and the Transparent option has been disabled on the relevant Virtual Service.
critical	B	0	0 - Disabled 1 - Enabled	Enabling this parameter indicates that the Real Server is required for the Virtual Service to be considered available. The Virtual Service will be marked as down if the Real Server has failed or is disabled.
follow	I	<unset>	RsIndex of Real Server to follow	Specify what Real Server the health check is based on by setting this parameter to the RsIndex of the Real Server to be followed. This can either be set to the RsIndex of the same Real Server in order to health check based on that particular Real Server status, or another Real Server can be specified. For example – if Real Server 1 is down, any Real Servers which have their health check based on Real Server 1 will also be marked as down, regardless of their actual Real Server status.

Table 3-25: Real Servers Parameters

If the service is a Layer 7 service then setting the 'forward' parameter to 'route' will have no effect

3.9.1 Enabling/Disabling Real Servers

3.9.1.1 Globally Enable/Disable a Real Server

A Real Server can be enabled/disabled globally, i.e. for all Virtual Services by using the following commands:

https://<LoadMasterIPAddress>/access/enablers?rs=<IPAddr>

or

https://<LoadMasterIPAddress>/access/disablers?rs=<IPAddr>

The Real Server IP address (that the `rs` parameter can be set to) can be in either IPv4 or IPv6 formats:

- Example IPv4 address: 10.11.0.24
- Example IPv6 address: fdce:9b36:e54f:110::40:14

3.9.1.2 *Locally Enable/Disable a Real Server*

A Real Server can be disabled/enabled locally, i.e. for one specific Virtual Service, by using the following commands:

```
https://<LoadMasterIPAddress>/access/modrs?vs=<VirtualServiceIPAddress>
&port=<Port>&prot=<tcp/udp>&rs=<RealServerIPAddress>&rsport=<port>&enab
le=n
```

or

```
https://<LoadMasterIPAddress>/access/modrs?vs=<VirtualServiceIPAddress>
&port=<Port>&prot=<tcp/udp>&rs=<RealServerIPAddress>&rsport=<port>&enab
le=y
```

The Real Server IP address (that the `rs` parameter can be set to) can be in either IPv4 or IPv6 format.

- Example IPv4 address: 10.11.0.24
- Example IPv6 address: fdce:9b36:e54f:110::40:14

3.10 Rules & Checking

Content Rules can be managed using the RESTful API.

3.10.1 Show Rules

The rules which are in use within the system can be displayed by using the **showrule** command.

```
https://<LoadMasterIPAddress>/access/showrule?[name=<Rule
Name>]&[type=<0-4>]
```

Running the **showrule** command with no parameters will list all of the existing rules. The list can be reduced by either specifying the name of a rule or the type of the rules to be displayed.

The type is one of the following:

Value	Type	Description
0	MatchContentRule	The original rules.
1	AddHeaderRule	Rule to Add header field
2	DeleteHeaderRule	Rule to Delete a header field.
3	ReplaceHeaderRule	Rule to modify a header field.
4	ModifyURLRule	URL rewrite rule.

Table 3-26: Rule Types

3.10.2 Delete a Rule from the System

A rule can be deleted by using the **delrule** command.

```
https://<LoadMasterIPAddress>/access/delrule?name=<Rule Name>
```

3.10.3 Add / Modify a Rule on the System

Rules can be added or modified by using the **addrule** and **modrule** commands.

https://<LoadMasterIPAddress>/access/addrule?name=<Rule Name>

https://<LoadMasterIPAddress>/access/modrule?name=<Rule Name>

The following parameters can be set (dependent on the type of rule). When creating a Rule - if the "type" is not specified, it will default to zero, i.e. a MatchContentRule. If "type" is not specified when performing a modify operation, the type will not be changed.

Unless modifying/adding an **AddHeaderRule**, the **pattern** parameter must be supplied.

Type 0 (MatchContentRule)

Name	Type	Default	Range	Additional Information
matchtype	S	regex	– regex – prefix – postfix	The type of matching to be performed by the rule.
inhost	B	N		Prepend the hostname to request URI before performing the match.
nocase	B	N		Ignore case when comparing the strings.
negate	B	N		Invert the sense of the match.
incquery	B	N		Append the query string to the URI before performing a match.
header	S	<unset>	See below	The header field name that should be matched. If no header field is set, the default is to match in the URL. Set this to body to match on the body of a request.
pattern	S	<unset>		The pattern to be matched.
setonmatch	I	<unset>	1-9	If the rule is successfully matched, set the specified flag.
onlyonflag	I	<unset>	1-9	Only try to execute this rule if the specified flag is set. Using the onlyonflag and setonmatch parameters, it is possible to make rules dependent on each other, that is, only execute a particular rule if another rule has been successfully matched. For more detailed instructions on 'chaining' rules, please refer to the Content Rules, Feature Description document.
mustfail	B	0 - Disabled	0 – Disabled 1 - Enabled	If this rule is matched, then always fail to connect.

Table 3-27: Rule Type 0 Parameters

The **header** parameter is optional and is the header in which the match is to be performed.

Type 1 (AddHeaderRule)

Name	Type	Default	Additional Information
header	S	<unset>	Name of the header field to be added.
replacement	S	<unset>	The replacement string.
onlyonflag	I	<unset>	Range: 1-9 Only try to execute this rule if the specified flag is set. Using the onlyonflag and setonmatch paramters, it is possible to make rules dependent on each other, that is, only execute a particular rule if another rule has been successfully matched. For more detailed instructions on 'chaining' rules, please refer to the Content Rules, Feature Description document.

Table 3-28: Rule Type 1 Parameters

Type 2 (DeleteHeaderRule)

Name	Type	Default	Additional Information
pattern	S	<unset>	The pattern to be matched.

Table 3-29: Rule Type 2 Parameters

Type 3 (ReplaceHeaderRule)

Name	Type	Default	Additional Information
header	S	<unset>	The header field name where the substitution should be performed.
replacement	S	<unset>	The replacement string.
pattern	S	<unset>	The pattern to be matched.

Name	Type	Default	Additional Information
onlyonflag	I	<unset>	<p>Range: 1-9</p> <p>Only try to execute this rule if the specified flag is set.</p> <p>Using the onlyonflag and setonmatch paramters, it is possible to make rules dependent on each other, that is, only execute a particular rule if another rule has been successfully matched. For more detailed instructions on 'chaining' rules, please refer to the Content Rules, Feature Description document.</p>

Table 3-30: Rule Type 3 Parameters

Type 4 (ModifyURLRule)

Name	Type	Default	Additional Information
replacement	S	<unset>	How the URL is to be modified.
pattern	S	<unset>	The pattern to be matched.
onlyonflag	I	<unset>	<p>Range: 1-9</p> <p>Only try to execute this rule if the specified flag is set.</p> <p>Using the onlyonflag and setonmatch paramters, it is possible to make rules dependent on each other, that is, only execute a particular rule if another rule has been successfully matched. For more detailed instructions on 'chaining' rules, please refer to the Content Rules, Feature Description document.</p>

Table 3-31: Rule Type 4 Parameters

3.10.4 Add/Delete Real Server Rule

Rules can be added or deleted from Real Servers by using the **addrerule** and **delrrule** commands:

```
https://<LoadMasterIPAddress>/access/addrerule?vs=<IPAddr>&port=<Port>&prot=<tcp/udp>&rs=<RS IPAddr>&rsport=<RS-Port>&rule=<RuleName>
```

```
https://<LoadMasterIPAddress>/access/delrrule?vs=<IPAddr>&port=<Port>&prot=<tcp/udp>&rs=<RS IPAddr>&rsport=<RS-Port>&rule=<RuleName>
```

The **rs** parameter also accepts integers (ID). The ID (Real Server index) can be found in the **<RSIndex>** element when doing a **showvs** command, for example:

```
...
<Rs>
<Status>Up</Status>
<VSIndex>1</VSIndex>
```

```

<RsIndex>3</RsIndex>
<Addr>10.154.201.3</Addr>
<Port>80</Port>
<Forward>nat</Forward>
<Weight>1000</Weight>
<Limit>0</Limit>
<Enable>Y</Enable>
<Critical>N</Critical>
</Rs>
...

```

3.10.5 Add/Delete SubVS Rule

Content rules can be added or deleted from SubVSs by using the **addrerule** and **delrrule** commands:

```
https://<LoadMasterIPAddress>/access/addrerule?vs=<IPAddr>&port=<Port>&prot=<tcp/udp>&rs=!<RsIndexOfSubVS>&rule=<RuleName>
```

```
https://<LoadMasterIPAddress>/access/delrrule?vs=<IPAddr>&port=<Port>&prot=<tcp/udp>&rs=!<RsIndexOfSubVS>&rule=<RuleName>
```

To add a content rule to a Real Server which is assigned to a SubVS, run the following command:

```
https://<LoadMasterIPAddress>/access/addrerule?vs=<VSIndexOfSubVS>&rs=<RealServerIPAddress>&rport=<RealServerPort>&rule=<RuleName>
```

Content rules can be added to a SubVS, by using the **addprerule**, **addresponserule** and **addrequestrule** commands, depending on the type of rule being added:

```
https://<LoadMasterIPAddress>/access/addprerule?vs=<VSIndexOfSubVS>&rule=<RuleName>
```

```
https://<LoadMasterIPAddress>/access/addresponserule?vs=<VSIndexOfSubVS>&rule=<RuleName>
```

```
https://<LoadMasterIPAddress>/access/addrequestrule?vs=<VSIndexOfSubVS>&rule=<RuleName>
```

Content rules can be deleted from a SubVS, by using the **delprerule**, **delresponserule** and **delrequestrule** commands, depending on the type of rule being deleted:

```
https://<LoadMasterIPAddress>/access/delprerule?vs=<VSIndexOfSubVS>&rule=<RuleName>
```

```
https://<LoadMasterIPAddress>/access/delresponserule?vs=<VSIndexOfSubVS>&rule=<RuleName>
```

```
https://<LoadMasterIPAddress>/access/delrequestrule?vs=<VSIndexOfSubVS>&rule=<RuleName>
```

To get the **RsIndex** or **VsIndex**, run the **listvs** command. For further information, refer to **Section 3.5.1**.

3.10.6 Add Virtual Service Rules

Rules can be added to Virtual Services by using the **addprerule**, **addresponserule** and **addrequestrule** commands:

```
https://<LoadMasterIPAddress>/access/addprerule?vs=<IPAddr>&port=<Port>&prot=<tcp/udp>&rule=<RuleName>
```

```
https://<LoadMasterIPAddress>/access/addresponserule?vs=<IPAddr>&port=<Port>&prot=<tcp/udp>&rule=<RuleName>
```

```
https://<LoadMasterIPAddress>/access/addrequestrule?vs=<IPAddr>&port=<Port>&prot=<tcp/udp>&rule=<RuleName>
```

3.10.7 Delete Virtual Service Rules

Rules can be deleted from Virtual Services by using the **delprerule**, **delresponserule** and **delrequestrule** commands:

```
https://<LoadMasterIPAddress>/access/delprerule?vs=<IPAddr>&port=<Port>&prot=<tcp/udp>&rule=<RuleName>
```

```
https://<LoadMasterIPAddress>/access/delresponserule?vs=<IPAddr>&port=<Port>&prot=<tcp/udp>&rule=<RuleName>
```

```
https://<LoadMasterIPAddress>/access/delrequestrule?vs=<IPAddr>&port=<Port>&prot=<tcp/udp>&rule=<RuleName>
```

3.10.8 Check Parameters

The Service Check Parameters can be obtained by using the following command:

```
https://<LoadMasterIPAddress>/access/showhealth?
```

The output of the **showhealth** command will display the **RetryInterval**, **Timeout** and **RetryCount** values.

The Service Check Parameters can be modified by using the following command:

```
https://<LoadMasterIPAddress>/access/modhealth?RetryInterval=<IntervalValue>&Timeout=<TimeoutValue>&RetryCount=<CountValue>
```

Name	Type	Range	Default	Additional Information	Mandatory
RetryInterval	I	9-3600	120	Defined in seconds, this is the delay between health checks. This includes clusters and FQDNs.	N
Timeout	I	4-60	20	Defined in seconds, this is the allowed maximum wait time for a reply to a health check.	N
RetryCount	I	2-15	2	This is the consecutive number of times in which a health check must fail before it is marked down and removed from the load balancing pool.	N

Table 3-32: modhealth parameters

The Adaptive Check parameters can be obtained by using the following command:

https://<LoadMasterIPAddress>/access/showadaptive?

The Adaptive Check parameters can be modified by using the following command:

https://<LoadMasterIPAddress>/access/modadaptive?AdaptiveURL=<URL>&AdaptivePort=<Port>&AdaptiveInterval=<Interval>&MinPercent=%Value>

3.11 Certificates & Security

3.11.1 Certificate Management

Certificates can be managed using the following commands.

To list the currently installed certificates and their fingerprints, run the following command:

https://<LoadMasterIPAddress>/access/listcert

To list the currently installed intermediate certificates, run the following command:

https://<LoadMasterIPAddress>/access/listintermediate

To return an existing certificate as a BLOB, run the following command:

https://<LoadMasterIPAddress>/access/readcert?cert=<CertName>

To return an existing intermediate certificate as a BLOB, run the following command:

https://<LoadMasterIPAddress>/access/readintermediate?cert=<CertName>

By fault, for the **readcert** and **reasintermediate** commands, the BLOB is in PEM format. There is an optional parameter called **outform** that can be used to specify the format – either **PEM** or **DER**, for example:

https://<LoadMasterIPAddress>/access/readcert?cert=<CertName>&outform=<PEM/DER>

DER is Base64-encoded because it is a binary format.

To upload a certificate, run the following cURL command:

curl -X POST --data-binary "@<Filename>.<Extension>" -k https://<LoadMasterIPAddress>/access/addcert?cert=<CertName>&password=<Password>&replace=<0/1>

If you are uploading a certificate and key file, insert both the certificate and key in the same file.

Name	Type	Default	Additional Information	Mandatory
cert	S	<unset>	The identifier that the certificate is known as on the LoadMaster.	Y

Name	Type	Default	Additional Information	Mandatory
password	S	<unset>	The (optional) passphrase that was used to protect the certificate when it was created.	N
replace	B	<unset>	0 - Not replacing 1 - Replacing If you are replacing a certificate which already exists in the LoadMaster, set the replace parameter to 1 . If you are uploading a new certificate, set replace to 0 .	N

Table: addcert parameters

https://<LoadMasterIPAddress>/access/deletecert?cert=<CertName>

It is not possible to delete a certificate assigned to a Virtual Service. Remove the certificate from any Virtual Services before deleting.

https://<LoadMasterIPAddress>/access/addintermediate?cert=<CertName>

https://<LoadMasterIPAddress>/access/deleteintermediate?cert=<CertName>

https://<LoadMasterIPAddress>/access/backupcert?password=<Password>

https://<LoadMasterIPAddress>/access/restorecert?password=<Password>&Type=<type>

The password (passphrase) must be alpha numeric and is case sensitive. The minimum number of characters is 7 with a maximum of 64.

The **type** parameter has three possible values:

- **full** - All Virtual Service and intermediate certificates
- **third** - Intermediate certificates only
- **vs** - Virtual Service certificates only

The values for the **type** parameter are case sensitive. Ensure to use lowercase when setting this parameter.

Replace is a boolean value which tells the LoadMaster whether to replace an existing certificate with the same name or not.

Parameters relating to Certificates that can be managed using **get** and **set** commands are detailed in **Table 3-33**:

Name	Type	Additional Information
admincert	S	
localcert	S	This parameter is only relevant when using HA.

Table 3-33: Certificate Parameters

3.11.2 Cipher Sets

Custom cipher sets can be manipulated using the commands below.

It is not possible to modify or delete system-defined cipher sets.

3.11.2.1 *Modify a Custom Cipher Set/Create a New Custom Cipher Set*

The **modifycipherset** command can be used to update an existing custom cipher set or create a new custom cipher set.

If the name of an existing custom cipher set is specified, that cipher set will be updated. If a new name is used, a new cipher set will be created.

For example:

https://<LoadMasterIPAddress>/access/modifycipherset?name=<CustomCipherSetName>&value=<Cipher(s)>

Multiple ciphers can be assigned by separating them with a colon (:).

3.11.2.2 *Retrieve the Details of an Existing Cipher Set*

The **getcipherset** command can be used to retrieve the list of ciphers which are in the specified cipher set, for example:

https://<LoadMasterIPAddress>/access/getcipherset?name=<CipherSetName>

The valid values for the **name** parameter are below:

- Default
- Default_NoRc4
- BestPractices
- Intermediate_compatibility
- Backward_compatibility
- WUI
- FIPS
- Legacy
- <NameOfCustomCipherSet>

The values are case sensitive.

3.11.2.3 Delete a Custom Cipher Set

The **delcipherset** command can be used to delete an existing custom cipher set. For example:

https://<LoadMasterIPAddress>/access/delcipherset?name=<CustomCipherSetName>

A custom cipher set cannot be deleted if it is assigned to any Virtual Services. If this command is run when a cipher set is assigned to a Virtual Service, an error message will be returned which says **Command Failed: Cipher set in use.**

3.11.3 Remote Access

Parameters relating to Remote Access that can be managed using **get** and **set** commands are detailed in **Table 3-34**. Refer to **Section 2.4** for the **get** and **set** commands.

Name	Type	Range	Additional Information
admingw	A		When administering the LoadMaster from a non-default interface, this option allows the user to specify a different default gateway for administrative traffic only. To unset this, set the value to an empty string.
enableapi	B	0 – Disabled 1 - Enabled	Enables the programmable command API Interface. Note: If this is disabled, the API will no longer be accessible.
adminclientaccess	I	0 – Password only access (default) 1 – Password or client certificate 2 – Client certificate required 3 – Client certificate required (verify via OCSP)	This parameter is only relevant if Session Management is enabled.
tethering	B	0 – Disabled 1 – Enabled	Allow the LoadMaster to regularly check the KEMP website for new software versions.
geoclients	A		Set the addresses of the GEO LoadMasters which can retrieve service status information from the LoadMaster. To unset this, set the value to an empty string.
geosshport	I	3-65530	The port over which GEO LoadMasters will communicate with each other.
sshaccess	B		Specify over which addresses remote administrative SSH access to the LoadMaster is allowed.

Name	Type	Range	Additional Information
sshiface	S		Specify the addresses over which remote administrative SSH access to the LoadMaster is allowed.
sshport	I	3-65530	Specify the port used to access the LoadMaster via the SSH protocol.
wuiaccess	B		Enables or disables WUI access.
wuiiface	I		Specifies the interface for WUI.
wuiport	I		Specifies the port to access the WUI. This has a default value of 443.
geopartners	A		<p>Set the IP address of the GEO LoadMaster partner(s). These GEO LoadMasters will keep their DNS configurations in sync.</p> <p>To unset this, set the value to an empty string.</p> <p>Note: Before partnering GEO LoadMasters, a backup should be taken of the relevant GEO LoadMaster that has the correct/preferred configuration. This backup should then be restored to the other LoadMasters that will be partnered with the original LoadMaster. For more information and step-by-step instructions, refer to the GEO, Feature Description.</p>
multihomedwui	B		Allow WUI access from multiple interfaces. Apart from the main administrative interface, each interface can then be enabled to allow WUI access.
SSHPreAuth	S	Up to 5,000 characters	<p>Set the SSH pre-authentication banner, which is displayed before the login prompt when logging in via SSH. Space characters should be escaped by entering %20.</p> <p>This field accepts up to 5,000 characters. Anything past the 5,000 character limit will not be displayed.</p>

Table 3-34: Remote Access Parameters

3.11.3.1 Set Admin Access

The web administrative access interface and the administrative default gateway can be set in one step by running the following command with the associated parameters:

https://<LoadMasterIPAddress>/access/setadminaccess?wuiiface=<WUIInterfaceaddress>&wuiport=<Port>&wuidefaultgateway=<DefaultGatewayAddress>

Parameters relating to the **setadminaccess** command are shown in the following table:

Parameter	Type	Range	Additional Information	Mandatory
wuiiface	I	Valid interface index	The index of an existing interface. This index number corresponds to the interface number in the LoadMaster WUI, i.e. the index for eth0 is 0 .	Y

Parameter	Type	Range	Additional Information	Mandatory
wuiport	I	3-65535	Specify the port used to access the administrative web interface.	Y
wuidefaultgateway	S	Valid IP address	When administering the LoadMaster from a non-default interface, a different default gateway for administrative traffic only can be specified using this parameter.	N

Table 3-35: SetAdminAccess parameters

3.11.3.2 Get GEO Partner Status

To return the status of all configured GEO partners, run the following command:

https://<LoadMasterIPAddress>/access/getgeopartnerstatus

An empty list is returned if there are no GEO partners configured. If a status for a particular partner is not known, it is reported as “Unknown”.

3.11.4 Admin WUI Access

Parameters relating to Admin WUI Access that can be managed using **get** and **set** commands are detailed in **Table 3-36**. Refer to **Section 2.4** for the **get** and **set** commands.

Name	Type	Range	Description
wuicipherset	S	The valid values are below: <ul style="list-style-type: none"> - Default - Default_NoRc4 - BestPractices - Intermediate_compatibility - Backward_compatibility - WUI - FIPS - Legacy - <NameOfCustomCipherSet> 	Specify the cipher set to use for the LoadMaster WUI.
sessioncontrol	B		Enables or disables session control.

Name	Type	Range	Description
sessionbasicauth	B	0 – Disabled 1 – Enabled	If the sessioncontrol and sessionbasicauth parameters are both enabled, there are two levels of authentication enforced in order to access the LoadMaster WUI. The initial level is Basic Authentication where users log in using the bal or user logins, which are default usernames defined by the system.
sessionidletime	I	60-86400	Specifies the number of seconds that the WUI can be idle before logging the user out. This can be set from 60 to 86400 seconds.
sessionmaxfailattempts	I	1-999	Number of failed attempts before locking the user account.
sessionconcurrent	S	0-9	Limit the maximum number of concurrent logins that a single user can have to the LoadMaster WUI (a value of 0 means there is no limit).
WUIPreAuth	S	Up to 5,000 characters	Set the pre-authentication click through banner which will be displayed before the LoadMaster login page. This parameter can contain plain text or HTML code. The field cannot contain JavaScript. Space characters should be replaced with %20. This field accepts up to 5,000 characters. Anything past the 5,000 character limit will not be displayed.

Name	Type	Range	Description
WUITLSProtocols	I	0 – 14 bitmask	Specify whether or not it is possible to connect to the LoadMaster WUI using the following protocols; SSLv3, TLS1.0, TLS1.1 or TLS1.2. The protocols can be enabled and disabled using a bitmask value. Refer to Table 3-37 to find out which number corresponds to which settings.

Table 3-36: Admin WUI Access parameters

Number	SSLv3	TLS1.0	TLS1.1	TLS1.2
0	Enabled	Enabled	Enabled	Enabled
1	Disabled	Enabled	Enabled	Enabled
2	Enabled	Disabled	Enabled	Enabled
3	Disabled	Disabled	Enabled	Enabled
4	Enabled	Enabled	Disabled	Enabled
5	Disabled	Enabled	Disabled	Enabled
6	Enabled	Disabled	Disabled	Enabled
7	Disabled	Disabled	Disabled	Enabled
8	Enabled	Enabled	Enabled	Disabled
9	Disabled	Enabled	Enabled	Disabled
10	Enabled	Disabled	Enabled	Disabled
11	Disabled	Disabled	Enabled	Disabled
12	Enabled	Enabled	Disabled	Disabled
13	Disabled	Enabled	Disabled	Disabled
14	Enabled	Disabled	Disabled	Disabled

Table 3-37: WUITLSProtocols bitmask values

3.11.5 OCSP Configuration

Parameters relating to the Online Certificate Status Protocol (OCSP) configuration that can be managed using **get** and **set** commands are detailed in the table below. Refer to **Section 2.4** for the **get** and **set** commands.

Name	Type	Additional Information
OCSPPort	I	The port of the OCSP server.
OCSPUseSSL	B	Use SSL to connect to the OCSP server.
OCSPOnServerFail	B	Treat an OCSP server connection failure or timeout as if the OCSP server had returned a valid response, i.e. treat the client certificate as valid.
OCSPServer	A	The address of the OCSP server.

Name	Type	Additional Information
OCSPUrl	S	The URL to access on the OCSP server.
SSLStapling	B	Enable this parameter to enable the LoadMaster to respond to OCSP stapling requests. If a client connects using SSL and asks for an OCSP response, this is returned. Only Virtual Service certificates are validated. The system holds a cache of OCSP responses that are sent back to the client. This cache is maintained by the OCSP daemon. When the OCSP daemon sends a request to the server, it uses the name specified in the certificate (in the Authority Information Access field). If it cannot resolve this name, then it uses the default OCSP server specified in the OCSPServer parameter.
SSLRefreshInterval	I	Specify how often the LoadMaster should refresh the OCSP stapling information. The OCSP daemon caches the entry for up to the amount of time specified here, after which it is refreshed. Valid values range from 3600 (1 hour (default)) to 604800 seconds (7 days).

3.11.6 Hardware Security Module (HSM) Configuration

3.11.6.1 Get HSM Details

HSM details can be obtained by using the following command:

https://<LoadMasterIPAddress>/access/showhsm

3.11.6.2 Configure HSM Settings

The HSM settings can be configured by using the following command:

https://<LoadMasterIPAddress>/access/hsmconfig?<parameter>=<value>&<parameter>=<value>...

The following optional parameters can be used with the **hsmconfig** command.

Name	Type	Description
safeaddr	A	Specify the address of the Safenet HSM unit to be used.

Name	Type	Description
clpass	S	<p>Specify an administrator password for the partition on the HSM so that the LoadMaster can access the HSM.</p> <p>The HSM can handle multiple users - each LoadMaster accesses the HSM via the specified name, so multiple LoadMasters can access the same partition via multiple names.</p> <p>There can be multiple partitions as well, with each LoadMaster accessing one of the configured partitions.</p>
enable	B	<p>Enable or disable Safenet HSM:</p> <p>0 – Disabled</p> <p>1 – Enabled</p>

Table 3-38: Optional Parameters for the hsmconfig command

Starting the HSM may take some time.

Disabling the HSM will cause the LoadMaster to be unable to create new SSL (HTTPS) connections and will immediately drop existing connections until another HSM is added or the certificate configuration is changed.

It is strongly recommended to only change the HSM configuration when there are no active SSL connections.

3.11.6.3 Upload the CA Certificate

To upload the CA certificate that has been downloaded from the HSM, run the following cURL command:

```
curl -X POST --data-binary "@<CertificateName.extension>" -k https://<LoadMasterIPAddress>/access/hsmuploadca
```

3.11.6.4 Generate a Client Certificate

To generate the local client certificate that is to be uploaded to the HSM, use the command below.

The **clcertname** should be set to the FQDN of the LoadMaster. The **clcertname** specified is to be used in the **client register** command on the HSM.

```
https://<LoadMasterIPAddress>/access/hsmclientcert?clcertname=<name>
```

3.11.7 LDAP Configuration

Refer to the sections below for details about the different RESTful API commands relating to LDAP endpoint configuration.

3.11.7.1 Add an LDAP Endpoint

Add a new LDAP endpoint by running the following command:

```
https://<LoadMasterIPAddress>/access/addldapendpoint?name=<LDAPEndpointName>
```

The name cannot contain any spaces or special characters, for example:
!@#%\$%^&*()+={}|\\:;'"<>?/

You can also specify the following optional parameters when running the **addldapendpoint** command. If you do not specify these parameters – default values are used.

Name	Type	Description	Additional Information
ldaptype	I	Specify the transport protocol to use when communicating with the LDAP server.	0 – Unencrypted (default) 1 – StartTLS 2 – LDAPS
server	S	Specify the address, or addresses, of the LDAP server to be used.	You can also specify a port number, if desired. Separate multiple addresses with a space.
vinterval	I	Specify how often to revalidate the user with the LDAP server.	Range: 10 – 86400 seconds Default: 60

Name	Type	Description	Additional Information
referralcount	I	The LoadMaster offers beta functionality to support LDAP referral replies from Active Directory Domain Controllers. If this is set to 0 , referral support is not enabled. Set this field to a value between 1 and 10 to enable referral chasing. The number specified will limit the number of hops (referrals chased).	Multiple hops may increase authentication latency. There is a performance impact that depends on the number and depth of referrals required in your configuration. You must have intimate knowledge of your Active Directory structure to set the referral limit appropriately. The same credentials are used for all lookups, and so on. The use of Active Directory Global Catalog (GC) is the preferred configuration as the primary means of resolution instead of enabling LDAP referral chasing. A GC query can be used to query the GC cache instead of relying on LDAP and the referral process. Using Active Directory GC has little or no performance drag on the LoadMaster. For steps on how to add/remove the GC, refer to the following TechNet article: https://technet.microsoft.com/en-us/library/cc755257(v=ws.11).aspx
adminuser	S	Specify the username of an administrator user.	The username that is used to check the LDAP server.
adminpass	S	Specify the password for the specified administrator user.	The password that is used to check the LDAP server.

Table 3-39: addldapendpoint parameters

3.11.7.2 Modify an LDAP Endpoint

Modify an existing LDAP endpoint by running the following command:

https://<LoadMasterIPAddress>/access/modifyldapendpoint?name=<LDAPEndpointName>

You can also specify the following optional parameters when running the **modifyldapendpoint** command.

Name	Type	Description	Additional Information
ldaptype	I	Specify the transport protocol to use when communicating with the LDAP server.	0 – Unencrypted (default) 1 – StartTLS 2 – LDAPS
server	S	Specify the address, or addresses, of the LDAP server to be used.	You can also specify a port number, if necessary. Separate multiple addresses with a space.
vinterval	I	Specify how often to revalidate the user with the LDAP server.	Range: 10 – 86400 seconds Default: 60

Name	Type	Description	Additional Information
referralcount	I	The LoadMaster offers beta functionality to support LDAP referral replies from Active Directory Domain Controllers. If this is set to 0 , referral support is not enabled. Set this field to a value between 1 and 10 to enable referral chasing. The number specified will limit the number of hops (referrals chased).	Multiple hops may increase authentication latency. There is a performance impact that depends on the number and depth of referrals required in your configuration. You must have intimate knowledge of your Active Directory structure to set the referral limit appropriately. The same credentials are used for all lookups, and so on. The use of Active Directory Global Catalog (GC) is the preferred configuration as the primary means of resolution instead of enabling LDAP referral chasing. A GC query can be used to query the GC cache instead of relying on LDAP and the referral process. Using Active Directory GC has little or no performance drag on the LoadMaster.
adminuser	S	Specify the username of an administrator user.	The username that is used to check the LDAP server.
adminpass	S	Specify the password for the specified administrator user.	The password that is used to check the LDAP server.

Table 3-40: addldapendpoint parameters

3.11.7.3 Delete an LDAP Endpoint

Delete an existing LDAP endpoint by running the following command:

```
https://<LoadMasterIPAddress>/access/deleteldapendpoint?name=<LDAPEndpointName>
```

It is not possible to delete an LDAP endpoint that is currently in use.

3.11.7.4 Retrieve Details of All LDAP Endpoints

To retrieve the details of all existing LDAP endpoints, run the following command:

```
https://<LoadMasterIPAddress>/access/showldaplist
```

3.11.7.5 Retrieve Details of a Specific LDAP Endpoint

To retrieve the details of a specific LDAP endpoint, run the following command:

```
https://<LoadMasterIPAddress>/access/showldapendpoint?name=<LDAPEndpointName>
```

3.12 Interfaces

3.12.1 Get Interface Details

Obtain interface details by using the following command:

https://<LoadMasterIPAddress>/access/showiface?interface=<InterfaceID>

To view the interface ID for each of the interfaces, run the **stats** command. The interface IDs are displayed as the **ifaceID** in the XML output. For further information on the **stats** command, refer to **Section 3.7**.

Running the **showiface** command without using the **interface** parameter displays details for all existing interfaces.

3.12.2 Modify Interface Details

Interface parameters can be changed using the following command:

https://<LoadMasterIPAddress>/access/modiface?interface=<InterfaceID>¶meter=<value>

Only one parameter can be changed on each call. The parameters are checked in the order below.

Name	Type	Description	Additional Information
interface	I	The number of the interface to modify	To view the interface ID for each of the interfaces, run the stats command. The interface IDs are displayed as the ifaceID in the XML output. For further information on the stats command, refer to Section 3.7 .
addr	S	IP address	Specify the internet address of this interface.
mtu	I	MTU size Range: 512-9216	Change the maximum size of the Ethernet frame that will be sent from this interface.
hacheck	B	0 – Not used for HA checks 1 – Used for HA checks	This parameter is only relevant in a HA configuration. Specify whether or not to use this interface for HA checks.
gwiface	B	Use this interface as the default gateway	Specifies if this is a network gateway interface.
bondmode	I	1 = active-backup 4 = 802.3ad	The bondmode determines the way in which traffic sent out of the bonded interface is actually dispersed over the real interfaces.
partner	A	IP address of the partner machine (HA only)	This parameter is only relevant for LoadMasters in HA mode
shared	A	IP address of the shared address (HA only)	This parameter is only relevant for LoadMasters in HA mode

Name	Type	Description	Additional Information
adminwuienable	B	This option can only be set to yes (1) if the multihomedwui parameter is set to yes.	When both of the adminwuienable and multihomedwui parameters are enabled, the WUI can be accessed from the IP address of the relevant interface, and any Additional addresses set up for that interface. Refer to Section 3.11.3 for further information on the multihomedwui parameter.
geotraffic	B	0 – Do not use for GEO requests and responses 1 – Use for GEO requests and responses	Specify whether or not to use this interface for GEO responses and requests.

Table 3-41: Modify Interface Parameters

3.12.3 Additional Addresses

Additional Addresses can be added to an interface by using the command

```
https://<LoadMasterIPAddress>/access/addadditional?interface=<InterfaceID>&addr=<AdditionalAddressIP/prefix>
```

Additional Addresses can be deleted from an interface by using the command

```
https://<LoadMasterIPAddress>/access/deladditional?interface=<InterfaceID>&addr=<AdditionalAddressIP/prefix>
```

3.12.4 Bonded Interfaces

A bonded interface can be created by using the following command:

```
https://<LoadMasterIPAddress>/access/createbond?interface=<InterfaceID>
```

An interface can be added to a bonded interface by using the following command:

```
https://<LoadMasterIPAddress>/access/addbond?interface=<InterfaceID>&bond=<BondID>
```

An interface can be removed from a bonded interface by using the following command:

```
https://<LoadMasterIPAddress>/access/delbond?interface=<InterfaceID>&bond=<BondID>
```

A bond can be converted back to a port by using the following command:

```
https://<LoadMasterIPAddress>/access/unbond?interface=<InterfaceID>
```

To view the interface ID for each of the interfaces, run the **stats** command. The interface IDs are displayed as the **ifaceID** in the XML output. For further information on the **stats** command, refer to **Section 3.7**.

The BondID is the number of the bond in the **Interfaces** section of the main menu in the WUI. For example, **bnd2** will have a BondID of **2**.

3.12.5 VLANs

A new VLAN can be added to an interface using the following command:

```
https://<LoadMasterIPAddress>/access/addvlan?interface=<InterfaceID>&vlanid=<ID>
```

A VLAN can be removed from an interface using the following command:

```
https://<LoadMasterIPAddress>/access/delvlan?interface=<InterfaceID>&vlanid=<ID>
```

3.12.6 VXLANs

A VXLAN can be added by running one of the following commands:

```
https://<LoadMasterIPAddress>/access/addvxlan?interface=<InterfaceID>&vni=<VXLANNetworkIdentifier>&group=<GroupMulticastIP>
```

```
https://<LoadMasterIPAddress>/access/addvxlan?interface=<InterfaceID>&vni=<VXLANNetworkIdentifier>&remote=<RemoteVTEPIIPAddress>
```

A VXLAN can be deleted by running the following command:

```
https://<LoadMasterIPAddress>/access/delvxlan?interface=<InterfaceID>
```

To modify VXLAN details (for example set the IP address) please use the **modiface** command. For more information, refer to **Section 0**.

To retrieve VXLAN details, use the **showiface** command. For more information, refer to **Section 3.12.1**.

3.13 Host & DNS Configuration

Some parameters relating to Host & DNS Configuration can be managed using the **get** and **set** commands, for example:

```
https://<LoadMasterIPAddress>/access/get?param=hostname
```

Name	Type	Additional Information
Hostname	S	Set the hostname of the local machine.
ha1hostname	S	Set the hostname for the master LoadMaster
ha2hostname	S	Set the hostname for the slave LoadMaster
nameserver	A	The IP address of a DNS server which is to be used to resolve names locally on the LoadMaster. Setting this parameter to an empty string will delete the name servers. The last remaining name server cannot be deleted if the dnsseclient parameter is enabled. This parameter has been deprecated and replaced with the nameserver parameter.

Name	Type	Additional Information
nameserver	A	The IP address of a DNS server which is to be used to resolve names locally on the LoadMaster. Setting this parameter to an empty string will delete the name servers. The last remaining name server cannot be deleted if the dnssecclient parameter is enabled.
searchlist	S	Specify the domain name that is to be prepended to requests to the DNS name server.
dnssecclient	B	Enable or disable DNSSEC client capabilities on the LoadMaster. At least one name server must be configured before DNSSEC can be enabled. After changing this setting, the LoadMaster must be rebooted for the change to be applied. Once the setting is changed, it cannot be changed again until the LoadMaster has been rebooted. If using HA, please set the parameter on both devices separately. 0 - Disabled 1 – Enabled
DNSNamesEnable	B	When this option is enabled, the LoadMaster will try to resolve the DNS names once every hour: <ul style="list-style-type: none"> - If the address is not found, or if it is the same as before – nothing is done (except a log entry is generated). - If the address is different, the Real Server entry will be updated with the new address, if possible. - If the new address is invalid for some reason, for example if it is a non-local address and the nonlocalrs option has been disabled, no changes are made and a log is generated.

Table 3-42: Local DNS Parameters

3.13.1 Resolve DNS Names Now

To force a new resolution of DNS names, run the **resolvenow** command, for example:

https://<LoadMasterIPAddress>/access/resolvenow

The LoadMaster will try to resolve the DNS names:

- If the address is not found or if it is the same as before – nothing is done (except a log entry is generated).
- If the address is different, the Real Server entry will be updated with the new address, if possible.

- If the new address is invalid for some reason, for example if it is a non-local address and the **nonlocalrs** parameter has been disabled, no changes are made and a log is generated. The log is found in the normal syslog messages. The message "DNS update failed" appears and includes the reason why. It is a descriptive error message based on what is incorrect.

3.13.2 Hosts for Local Resolution

To list the existing hosts for local resolution, run the **gethosts** command, for example:

https://<LoadMasterIPAddress>/access/gethosts

To add a host IP address and host FQDN, run the **addhostentry** command, using the following format:

https://<LoadMasterIPAddress>/access/addhostentry?hostip=<HostIPAddresses>&hostfqdn=<HostFQDN>

To delete a host IP address and host FQDN, run the **delhostentry** command, using the following format:

https://<LoadMasterIPAddress>/access/delhostentry?hostip=<HostIPAddresses>

3.14 Route Management

3.14.1 Default Gateway

Parameters relating to Route Management that can be managed using **get** and **set** commands, for example:

https://<LoadMasterIPAddress>/access/get?param=dfltgw

Name	Type	Default	Additional Information
dfltgw	A (IPv4)	<unset>	Specify the IPv4 default gateway that is to be used for communicating with the internet.
dfltgwv6	A (IPv6)	<unset>	Specify the IPv6 default gateway that is to be used for communicating with the internet.

Table 3-43: Route Management Parameters

3.14.2 Additional Routes

Existing Additional Routes can be listed by running the following command:

https://<LoadMasterIPAddress>/access/showroute

Additional Routes can be added or deleted with the following commands:

https://<LoadMasterIPAddress>/access/addroute?dest=<DestIPAddress>&gateway=<GatewayIPAddress>

https://<LoadMasterIPAddress>/access/delroute?dest=<DestIPAddress>

3.14.3 Packet Routing Filter

The commands in this section relate to the global packet routing filter option. Packet filtering is enabled by default. It is not possible to disable the packet routing filter if GEO is enabled. Refer to **Section 3.6.5** for commands on enabling and disabling GEO.

To check if the packet routing filter is enabled or not, run the following command:

```
https://<LoadMasterIPAddress>/access/ac1control?isenabled
```

To enable/disable the packet routing filter, run the following command:

```
https://<LoadMasterIPAddress>/access/ac1control?enable=<0/1>
```

It is not possible to disable the packet routing filter if GEO is enabled. If you try to disable the packet routing filter with GEO enabled, you get the following error:

Cannot disable ac1control while GSLB is enabled

The following parameters can only be set if the packet filter is enabled.

Check if the connection is dropped or rejected when it is on the black list:

```
https://<LoadMasterIPAddress>/access/ac1control?isdrop
```

Enable dropping of black list entries:

```
https://<LoadMasterIPAddress>/access/ac1control?drop=1
```

Disable dropping of black list entries:

```
https://<LoadMasterIPAddress>/access/ac1control?drop=0
```

When the **Restrict traffic to Interfaces** option is enabled, restrictions are enforced upon routing between attached subnets. To check if the **Restrict traffic to Interfaces** option is enabled or disabled, run the following command:

```
https://<LoadMasterIPAddress>/access/ac1control?isifblock
```

- **Block** - enabled
- **Free** - disabled

To enable the **Restrict traffic to Interfaces** option:

```
https://<LoadMasterIPAddress>/access/ac1control?ifblock=1
```

To disable the **Restrict traffic to Interfaces** option:

```
https://<LoadMasterIPAddress>/access/ac1control?ifblock=0
```

3.14.4 VPN Management

3.14.4.1 Create a New VPN Connection

To create a new Virtual Private Network (VPN) connection, run the following command:

```
https://<LoadMasterIPAddress>/access/createvpncon?name=<VPNname>
```

3.14.4.2 Delete an Existing IPsec Connection

An existing IPsec connection can be deleted by running the following command:

```
https://<LoadMasterIPAddress>/access/deletevpncon?name=<VPNname>
```

3.14.4.3 Set the VPN Addresses

The VPN addresses can all be set at the same time by running the following command:

```
https://<LoadMasterIPAddress>/access/setvpnaddr?name=<VPNname>&localip=<LocalIPAddress>&localsubnets=<LocalSubnetAddress(es)>&remoteip=<RemoteIPAddress>&remotesubnets=<RemoteSubnetAddress(es)>
```

All of the parameters listed below are required when running the **setvpnaddr** command:

Name	Type	Default	Additional Information
localip	String	See additional information	In non-HA mode, the default is the LoadMaster IP address, i.e. the IP address of the default gateway interface. In HA-mode, the default is the shared IP address.
localsubnets	String	See additional information	Set the subnet for the local side of the connection. The local IP can be the only participant if applicable, given the /32 CIDR. When the localip is set, the localsubnet is automatically populated. Multiple local subnets can be specified using a comma-separated list. Up to 10 IP addresses can be specified.
remoteip	String	<unset>	Set the IP address for the remote side of the connection.
remotesubnets	String	<unset>	Set the subnet for the remote side of the connection. Multiple remote subnets can be specified using a comma-separated list. Up to 10 IP addresses can be specified.

Table 3-44: The **setvpnaddr** parameters

These parameters can also be set individually by running the commands listed below.

To set the **Local IP Address**, run the command below:

```
https://<LoadMasterIPAddress>/access/setvpnlocalip?name=<VPNname>&localip=<LocalIPAddress>
```

To set the **Local Subnet Address**, run the command below:

```
https://<LoadMasterIPAddress>/access/setvpnlocalsubnets?name=<VPNname>&localsubnets=<LocalSubnetAddress(es)>
```

To set the **Remote IP Address**, run the command below:

```
https://<LoadMasterIPAddress>/access/setvpnremoteip?name=<VPNname>&remoteip=<RemoteIPAddress>
```

To set the **Remote Subnet Address**, run the command below:

```
https://<LoadMasterIPAddress>/access/setvpnremotesubnets?name=<VPNname>
&remotesubnets=<RemoteSubnetAddress(es)>
```

3.14.4.4 Set the Perfect Forward Secrecy Option

To enable the **Perfect Forward Secrecy** option on a particular connection, run the command below:

```
https://<LoadMasterIPAddress>/access/setvpnpfseable?name=<ConnectionName>
```

To disable the **Perfect Forward Secrecy** option on a particular connection, run the command below:

```
https://<LoadMasterIPAddress>/access/setvpnpfsdisable?name=<ConnectionName>
```

3.14.4.5 Set the Connection Secret

To set the connection secret details, run the command below:

```
https://<LoadMasterIPAddress>/access/setvpnsecret?name=<VPNname>&localid=
<LocalID>&remoteid=<RemoteID>&key=<PreSharedKey>
```

All of the parameters are required for this command to work.

Name	Type	Default	Additional Information
localid	String	Same as the localip	Identification for the local side of the connection
remoteid	String	<unset>	Identification for the remote side of the connection. This can be the remoteip .
key	String	<unset>	The Pre Shared Key (PSK) string. This is the Shared key which is generated and managed on the Azure side. The key length should be at least 16 and at most 64 characters.

Table 3-45: Connection Secret Parameters

3.14.4.6 Start the Connection

To start the connection, run the command below:

```
https://<LoadMasterIPAddress>/access/startvpncon?name=<VPNname>
```

3.14.4.7 Stop the Connection

To stop the connection, run the command below:

```
https://<LoadMasterIPAddress>/access/stopvpncon?name=<VPNname>
```

3.14.4.8 Get the Connection Status

To view the status of the connection, run the command below:

```
https://<LoadMasterIPAddress>/access/getvpnstatus?name=<VPNname>
```

3.14.4.9 *List All Existing Connections*

To list the details about all of the existing VPN connections, run the command below:

https://<LoadMasterIPAddress>/access/listvpns

3.14.4.10 *Stop the IKE Daemon*

To stop the Internet Key Exchange (IKE) daemon, run the command below:

https://<LoadMasterIPAddress>/access/stopiked daemon

3.14.4.11 *Start the IKE Daemon*

To start the IKE daemon, run the command below:

https://<LoadMasterIPAddress>/access/startiked daemon

3.14.4.12 *Get the IKE Daemon Status*

To view the status of the IKE daemon, run the command below:

https://<LoadMasterIPAddress>/access/statusiked daemon

3.15 Access Lists

The Access Control List (ACL) commands allow you to switch on or off the ACL and set or get the related parameters. When running an ACL command without a specified Virtual Service IP address, the command is run for the global ACL. If a Virtual Service IP address is set, the command is only run for the ACL for that specific Virtual Service.

Only users with 'All Permissions' can run the global commands.

Users with 'All Permissions' and 'Virtual Service' permissions can run the Virtual Service-specific commands.

Show the addresses on the global black or white list:

https://<LoadMasterIPAddress>/access/ACLcontrol?list=<ListType>

List Type
black
white

Table 3-46: Access List Type

Add/remove an address to/from the global black or white list:

https://<LoadMasterIPAddress>/access/ACLcontrol?add=<ListType>&addr=<IP Address/CIDR>

https://<LoadMasterIPAddress>/access/ACLcontrol?del=<ListType>&addr=<IP Address/CIDR>

The **addr** can be an IPv4 or an IPv6 address. If the CIDR is not specified, the system uses a default of /32.

List the black or white list for a specific Virtual Service:

https://<LoadMasterIPAddress>/access/ac1control?listvs=<ListType>&vsip=<VirtualServerIPAddress>&vsprot=<VirtualServerProtocol>&vsport=<VirtualServerPort>

Virtual Server Protocol
tcp
udp

Table 3-47: Virtual Server Protocol

If the CIDR is not specified, the system will use its own default value which is /32.

Add/remove an address to/from a Virtual Service black or white list:

https://<LoadMasterIPAddress>/access/ac1control?addvs=<ListType>&vsip=<VirtualServerIPAddress>&vsprot=<VirtualServerProtocol>&vsport=<VirtualServerPort>&addr=<IPAddressToAdd/CIDR>&comment=<Comment>

The **comment** parameter is optional. The **comment** parameter accepts a maximum of 127 characters.

https://<LoadMasterIPAddress>/access/ac1control?delvs=<ListType>&vsip=<VirtualServerIPAddress>&vsprot=<VirtualServerProtocol>&vsport=<VirtualServerPort>&addr=<IPAddressToRemove/CIDR>

3.16 Cluster Control

Clustering can be configured using API commands. For details on each of the commands that can be used, refer to the sections below.

The clustering API commands are only available on LoadMasters which have a clustering license. To add the clustering feature to your license, please contact a KEMP representative. For further information on clustering, refer to the **LoadMaster Clustering, Feature Description**.

3.16.1 Clustering API Commands

The sections below provide details on each of the RESTful API commands relating to clustering. For step-by-step instructions on how to configure clustering via the RESTful API, refer to **Section 3.16.2**.

3.16.1.1 *Get the Status of the Cluster*

To retrieve the status of the cluster, run the command below:

https://<LoadMasterIPAddress>/access/cluster/status

The details for all nodes in the cluster is returned. It lists all the enabled nodes in the cluster in XML format.

If the LoadMaster is not in a cluster an error message will be returned via the WUI.

The status is represented by a number, as follows:

- 0 – The node is down
- 1 – The node is up
- 2 – The node is disabled - connections will not be sent to that node. If there are no Virtual Services in the node, the node will be in a Disabled state.
- 3 – The node has been disabled and the connections are being shut down in an orderly fashion. Drain stopping lasts for 10 seconds by default.
- 4 – The node is starting
- 5 - The node is the primary control node.

3.16.1.2 *Create a Cluster*

If a LoadMaster is not in currently in cluster mode, it can be converted to cluster mode by running the command below:

https://<LoadMasterIPAddress>/access/cluster/create?SharedAddress=<SharedIPAddress>

3.16.1.3 *Initiate a Node Joining a Cluster*

To initiate a node joining a cluster, run the following command on the LoadMaster:

https://<LoadMasterIPAddress>/access/cluster/joincluster

Running this command will make the LoadMaster available to be added to the cluster. To finish adding the node, please run the **addnode** command. Refer to **Section 3.16.1.4** for further information.

3.16.1.4 *Add a Node to the Cluster*

Before running this command, the node LoadMaster needs to be available to be added. To make the node LoadMaster available, run the **joincluster** command on the node LoadMaster. Refer to **Section 3.16.1.3** for further information on the **joincluster** command.

If the **addnode** command is run when the node LoadMaster is not available to be added, an error will be returned which says that the machine could not be contacted.

To add a node to the cluster (while the node LoadMaster is available to be added), run the following command on the shared IP address:

```
https://<LoadMasterIPAddress>/access/cluster/addnode?Address=<NodeIPAddress>
```

3.16.1.5 Enable a Node

When a node is first added to the cluster it is disabled by default. To enable a node, run the following command:

```
https://<LoadMasterIPAddress>/access/cluster/enablenode?nodeid=<NodeID>
```

The ID of the node can be found in the **ID** column in the **Cluster Control** screen in the LoadMaster WUI, or by running the **status** command (Section 3.16.1.1).

3.16.1.6 Disable a Node

To disable a node, run the following command:

```
https://<LoadMasterIPAddress>/access/cluster/disablenode?nodeid=<NodeID>
```

The ID of the node can be found in the **ID** column in the **Cluster Control** screen in the LoadMaster WUI, or by running the **status** command (Section 3.16.1.1).

3.16.1.7 Delete a Node

To delete a node from a cluster, run the command below:

```
https://<LoadMasterIPAddress>/access/cluster/deletenode?NodeId=<NodeID>
```

The ID of the node can be found in the **ID** column in the **Cluster Control** screen in the LoadMaster WUI, or by running the **status** command (Section 3.16.1.1).

3.16.2 RESTful API Clustering Example

The sections above provide details relating to each of the clustering RESTful API commands. This section provides step-by-step instructions on how to create a cluster and add a node to it, using these API commands. The example IP addresses which are used in the example commands are below:

- LoadMaster 1: **10.154.11.10**
- LoadMaster 2: **10.154.11.20**
- Shared IP Address: **10.154.11.30**
- Node ID: **2**

Follow the steps below in sequential order to create a cluster and add a node to it:

1. Create a cluster. Run this command on LoadMaster 1:

```
https://10.154.11.10/access/cluster/create?SharedAddress=10.154.11.30
```

2. Initiate the node (LoadMaster 2) joining a cluster. Run this command on LoadMaster 2:

https://10.154.11.20/access/cluster/joincluster

3. Add the node (LoadMaster 2) to the cluster. Run this command on LoadMaster 1:

https://10.154.11.10/access/cluster/addnode?Address=10.154.11.20

The **addnode** command must be run while the node LoadMaster is available to join the cluster. This command should be run immediately after the **joincluster** command.

If the **addnode** command is run when the node LoadMaster is not available to be added, an error will be returned which says that the machine could not be contacted.

4. Enable the node. Run this command on LoadMaster 1:

https://10.154.11.10/access/cluster/enablenode?nodeid=2

3.17 System Administration

Various system administration tasks can be completed using the RESTful API.

3.17.1 User Management

3.17.1.1 *Change the System Password*

To change the password of the default **bal** user, run the command below:

https://<LoadMasterIPAddress>/access/usersetsyspassword?currpassword=<CurrentPassword>&password=<NewPassword>

3.17.1.2 *List All Local Users*

To list all local users and their permissions, run the command below:

https://<LoadMasterIPAddress>/access/userlist

3.17.1.3 *Display Permissions for a Particular Local User*

To display permissions for a particular local user, run the command below:

https://<LoadMasterIPAddress>/access/usershow?user=<Username>

3.17.1.4 *Add a New Local User*

To add a new local user, run the command below:

https://<LoadMasterIPAddress>/access/useraddlocal?user=<Username>&password=<UserPassword>

Name	Type	Description	Mandatory
user	String	The username of the new user.	Yes
password	String	The password of the new user.	Yes – unless nopass or radius is set to yes.

Name	Type	Description	Mandatory
radius	Boolean	Determines whether the user will use RADIUS server authentication or not when logging in to the LoadMaster. The RADIUS server details must be set up before this option can be enabled.	No
nopass	Boolean	This option is only valid if session management is enabled. Set this option to yes to create a user with no password. This can be used to allow certificate-based access. For further information, please refer to Section 3.17.1.8 .	No

Table 3-48: UserAddLocal parameters

3.17.1.5 Delete a Local User

To delete a local user, run the command below:

https://<LoadMasterIPAddress>/access/userdellocal?user=<Username>

3.17.1.6 Change the Password of a Local User

To change the password of a local user, run the command below:

https://<LoadMasterIPAddress>/access/userchange1ocpass?user=<Username>&password=<NewPassword>&radius=<0/1>

The username is case sensitive - ensure to enter the username exactly as it has been set.

All parameters are required. The **radius** parameter determines whether the user will use RADIUS server authentication or not when logging in to the LoadMaster. The RADIUS server details must be set up before this option can be used.

3.17.1.7 Set Permissions for a Local User

To set permissions for a local user, run the command below:

https://<LoadMasterIPAddress>/access/usersetperms?user=<Username>&perms=<CommaSeparatedListOfPermissions>

Multiple permissions can be set at the same time by separating the values with a comma, for example:

https://<LoadMasterIPAddress>/access/usersetperms?user=<Username>&perms=real,vs

Running this command will overwrite any previous permissions for this user. For example, if a user had the **rules** permission and you ran the command listed above, the user would no longer have the **rules** permission but would have the **real** and **vs** permission.

Valid values for the perms parameter are listed and described in the table below.

Value	Description
real	This role permits enabling and disabling Real Servers. Users with the Real Servers permission cannot add SubVSs.
vs	This role permits managing Virtual Services. This includes SubVSs. Virtual Service modifications permitted include add, delete and modify for any subnet.
rules	This role permits managing Rules. Rule modifications permitted include add, delete and modify.
backup	This role permits performing system backups.
certs	This role permits managing SSL Certificates. Certificate management includes adding, deleting and modifying SSL Certificates.
cert3	This role permits managing intermediate Certificates. Certificate management includes the ability to add and delete intermediate certificates.
certbackup	This role permits the ability to export and import certificates.
users	This role is allowed access to all functionality within the System Configuration > System Administration > User Management WUI screen.
root	This role gives users all permissions except the permission to change the bal password and the permission to create or delete other users.
geo	This role is used only with the LoadMaster GEO product. For more information on GEO and the Global Server Load Balancing (GSLB) Feature Pack, refer to the GEO, Product Overview . To set the permissions to none, leave the parameter blank, for example &perms=

Table 3-49: Permissions Parameter – Valid Values

3.17.1.8 Local Certificate Management

To return a previously generated certificate for a user, run the **userreadcert** command, in the following format:

https://<LoadMasterIPAddress>/access/userreadcert?user=<Username>

To download a previously generated certificate for a user, run the **userdownloadcert** command:

https://<LoadMasterIPAddress>/access/userdownloadcert?user=<Username>

To generate a new certificate for a user, run the **usernewcert** command, in the following format:

https://<LoadMasterIPAddress>/access/usernewcert?user=<Username>&passphrase=<Passphrase>

The passphrase is optional. If entered, it will be used to encrypt the private key.

To delete an existing user certificate, run the **userdelcert** command, in the following format:

https://<LoadMasterIPAddress>/access/userdelcert?user=<Username>

3.17.2 Licensing

Similar to when initially licensing a LoadMaster, a license may be updated using the online or offline method.

Offline licensing requires a Binary Large Object (BLOB) file which is provided by KEMP.

When updating online, only a KEMP ID and password are needed.

For further information on licensing, refer to the **Licensing, Feature Description**.

3.17.2.1 License

The LoadMaster's licence can be updated offline by using the **license** command.

The License BLOB is emailed to the customer when requested. Each time a license is updated a new BLOB is needed.

The following is an example of a BLOB:

```
License Block (copy and paste from begin to end):
begin 0 /dev/null
hYE4t3iNKfk-YA42oB46lNGpZMq7Y9HEnBX6hCKNZBGomAaBYMaMpmXVYBnA+
h+++++
h+++++
h-Y0+++++fpOF+PYKtU-ZGWF1cbXK-S0vXSYZahlABq2jVm1e7CEUOYBx
h2NZ3bEH2mpiPUoBAaSB7Enog+NYNn+cT-S204NIieVyYf5fx11pHh1kU8yg0
h326f1WZpBuf1kkT8tYwvFT2F9RjtYa9z4W9O9bRvTZKmN+1Thvbcqo-IiLsH
hA57Nbb5cWmLbagFWu63rbUShZwVgVZ-gsTR0HZqMPCH2Q4oM0A1t0qRo97io
hegKgNv3mrWqQ7k9xuCJjQ+S8maYokFhthEMZrv9bCKSuxAP97EaYxXP9Ycm2
h1A5KNkO9j8B89DpN19jxfgYrIKSJrfz6981e9WD8K3ob6d5uwcc8JxqkeLXX
hIkI49ijAI9J7rpgoeheNrZaFwO2gK54w60WHdTMO2y58JC3SNs69Fj24mLtN
hyiGSNZV6XoMkXBzrP9vPEAA9YjHuRy4srTiEiGm4V97Q6C0AwM7W9asJI3fs
hPfyYt0LjY6CwAn+N0hI3Phjfu6kbbFkPNkVu4PMigBSDctKKwfoL5fTQhTKE
hE6PRwldzotz9ClZGPKglehdeA5kIQf5PiRo9yElQAWbaG3F-Yx8D2A1oTRbx
hnC8RZXI2zpkwQNiCdzByQ85XK1wOM6ataWKSiwMz50ttiVToXypB-HHRZqTN
h-aqA6wbSJNoD-vEO5FWnr4dPMFUsddv8UCgQfwbuTfFkCBipTFhk8yBWuSMV
CLFxaR0WUbggwLX9mmS++
+
end

Legacy License Key: OBG6Adv-idO9Pek-ufZPqan-PZN0tae
It has been issued a Single Perm license.
```

Figure 3-5: License BLOB

The BLOB is the body of text from the word begin to the word end, as is highlighted in the example in **Figure 3-5: License BLOB**. The BLOB must be copied and pasted into a text file (in the following example the file is called license.txt). For more information on licensing (including details on how to retrieve a BLOB), please refer to the **Licensing, Feature Description**.

There are a number of methods of using the license command for example, using a CURL command on Linux would look like the following:

```
curl -X POST --data-binary "@license.txt" -k https://<LoadMasterIPAddress>/access/license
```

This command uploads the BLOB file to the LoadMaster. The example command above assumes that the license.txt file is in the current directory. If the license.txt file is stored elsewhere, specify the path to the file after the @ symbol.

3.17.2.2 *AlsILicense*

The **AlsILicense** command updates the LoadMaster’s license online. To cause the LoadMaster to query the KEMP licensing system for an updated licence, and update the license if one is available, run the following command:

```
https://<LoadMasterIPAddress>/access/alsilicense?kempid=<KEMPID>&password=<KEMPIDPassword>
```

Name	Type	Description	Mandatory
kempid	String	The email address used when registering for a KEMP ID.	Yes
password	String	The KEMP ID account password.	Yes
http_proxy	String	Specify the HTTP(S) proxy server and port, in the format <ProxyAddress>:<Port> .	No
orderid	String	Specify the order ID received from KEMP.	No

Table 3-50: AlsILicense Parameters

3.17.2.3 *Accesskey*

The access key can be obtained by the following command:

```
https://<LoadMasterIPAddress>/access/accesskey?
```

3.17.2.4 *KillASLInstance*

If the Activation Server Lite (ASL) functionality was used to license a LoadMaster, the **KillASLInstance** command can be run to deactivate the client LoadMaster license:

```
https://<LoadMasterIPAddress>/access/KillASLInstance
```

3.17.3 *System Reboot*

The LoadMaster can be shut down or rebooted using the following commands:

```
https://<LoadMasterIPAddress>/access/shutdown?
```

```
https://<LoadMasterIPAddress>/access/reboot?
```

3.17.3.1 *Reset the LoadMaster to Factory Default Settings*

There are two options when performing a factory reset:

- Perform a factory reset as if it was triggered from the WUI. This resets the LoadMaster to factory defaults – all configuration data is deleted. The new IP address of the LoadMaster is set by DHCP (if available):

```
https://<LoadMasterIPAddress>/access/factoryreset?option=FullReset  
&magic=<UUIDofLicense>
```

- Reset the entire configuration to default settings – except for the networking parameters (which remain intact):

```
https://<LoadMasterIPAddress>/access/factoryreset?option=ConfigRes  
et&magic=<UUIDofLicense>
```

3.17.4 **Update Software**

3.17.4.1 *Upgrade to a Newer Version of Software*

The LoadMaster can be upgraded to a new version of software by using the **installpatch** command. There are a number of methods of using this command for example, using a CURL command on Linux would look like the following:

```
curl -X POST --data-binary "@<LM Patch File>" -k  
https://<LoadMasterIPAddress>/access/installpatch
```

This cURL command would install a patch (**<LM Patch File>**) on the system.

The file being uploaded must be a valid patch file. If the file does not work in the WUI it will not work via a RESTful API command.

3.17.4.2 *Check the Previously Installed Firmware Version*

You may want to check the previously installed LoadMaster firmware version in certain situations, for example, before you roll back to a previous firmware version. To check the previously installed firmware version, run the following command:

```
https://<LoadMasterIPAddress>/access/getpreviousversion
```

3.17.4.3 *Restore to a Previously Installed Version of Software*

The previous version of firmware on the LoadMaster can be restored by using the following command:

```
https://<LoadMasterIPAddress>/access/restorepatch
```

The machine needs to be rebooted in order for the change to take place.

3.17.4.4 List the Installed Add-On Packs

A list of any add-on packages that are installed on the LoadMaster can be displayed by running the following command:

```
https://<LoadMasterIPAddress>/access/listaddon
```

3.17.4.5 Upload or Update an Add-On Pack

Add-on packs can be uploaded by running the following POST command:

```
curl -X POST --data-binary "@<Path To Add-On Pack File>" -k
https://<LoadMasterIPAddress>/access/addaddon
```

If the add-on pack already exists, the add-on pack will be updated to the version being uploaded.

3.17.4.6 Delete Add-On Pack

Add-on packs can be deleted by running the following command:

```
https://<LoadMasterIPAddress>/access/deleteaddon?name=<AddOnPackName>
```

The name of the existing add-on packs can be displayed by running the **listaddon** command.

3.17.5 Backup/Restore

LoadMaster configurations can be backed up or restored using the following commands:

```
https://<LoadMasterIPAddress>/access/backup
```

If you run this command using cURL the file will be downloaded to your working directory in Linux.

Below is an example of a cURL command to restore a LoadMaster configuration:

```
curl -X POST --data-binary "@<Path To Backup File>" -k
https://<LoadMasterIPAddress>/access/restore?type=<1, 2 or 3>
```

type takes the integer range from 1 to 3:

Name	Type	Range	Additional Information
type	Integer	1-3	1 = LoadMaster Base configuration 2 = Virtual Service configuration 3 = GEO configuration

Table 3-51: Backup Parameters

3.17.5.1 Automated Backups

Parameters relating to automated backups that can be managed using **get** and **set** commands are detailed in **Table 3-52**. Refer to **Section 2.4** for the **get** and **set** commands.

Name	Type	Default	Range	Additional Information
backupday	Integer	Daily	0-7	Specify which day to perform the automated backup (or daily): 0 = Daily 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday 7 = Sunday
backupenable	Boolean	N		Enable automated timed backups (via FTP).
backuphost	String			The remote host.
backuphour	Integer	0	0-23	The hour to perform the automated backup. 0 = Midnight 23 = 11pm
backupminute	Integer	0	0-59	The minute to perform the automated backup. Note the range values are full minutes
backuppassword	String			The password of the remote user.
backuppath	String			Specify the remote path name.
backupuser	String			Specify the remote username.

Table 3-52: Backup Parameters

3.17.6 Date/Time Settings

Parameters relating to the date and time that can be managed using **get** and **set** commands are detailed in **Table 3-53**. Refer to **Section 2.4** for the **get** and **set** commands.

Name	Type	Additional Information
ntpghost	S	Specify the host from which the LoadMaster will set the time. Multiple hosts can be specified in a space-separated list. Please escape the spaces using %20. The time will be set from the first host to return a valid answer.
time	I	The time in hours, minutes and seconds.
timezone	S	The timezone where the LoadMaster is located
ntpkeyid	I	The NTP key ID. Valid values range from 1 to 99.
ntpkeysecret	S	The NTP shared secret string. The NTP secret can be a maximum of 40 characters long. If the secret is more than 20 characters long, it is treated as a hex string. Setting this value to an empty string will disable the NTPv4 feature.
ntpkeytype	S	Specify the NTP Key Type. The valid values are SHA-1 (SHA) and MD5 (M). Note that the values are case sensitive and must be in uppercase.

Table 3-53: Date/Time

It is not possible to set the time via a RESTful API command.

3.18 Logging Options

3.18.1 Manage System Logs

To download the system log files, run the following command:

https://<LoadMasterIPAddress>/access/logging/downloadlogs

To reset the system log files, run the following command:

https://<LoadMasterIPAddress>/access/logging/resetlogs

3.18.2 Ping Host

To perform a ping, run the following command:

https://<LoadMasterIPAddress>/access/logging/ping?addr=<IPAddress>&intf=<InterfaceID>

Parameter	Parameter Type	Parameter Description	Mandatory
addr	Address	Specify the host to perform the ping on.	Yes
intf	Integer	Specify the ID of the interface from which the ping should be sent from. If the interface is not specified here, the correct interface to ping an address on a particular network will be automatically selected.	No

Table 3-54: Ping parameters

The LoadMaster will try to auto-detect what type of ping to use (ping for IPv4 and ping6 for IPv6). However, it is also possible to force a ping6 on an IPv6 address by running the **ping6** command:

https://<LoadMasterIPAddress>/access/logging/ping6?addr=<IPAddress>&intf=<InterfaceID>

3.18.3 Run a Traceroute

To perform a traceroute, run the following command:

https://<LoadMasterIPAddress>/access/logging/traceroute?addr=<IPAddress>
>

3.18.4 Debug Options

3.18.4.1 Get/Set Debug Options

Parameters relating to Debug Options that can be managed using **get** and **set** commands are detailed in the table below. Refer to **Section 2.4** for the **get** and **set** commands. For example, to display the value of the `irqbalance` parameter, run the following command:

https://<LoadMasterIPAddress>/access/get?param=irqbalance

Name	Type	Parameter Description
<code>irqbalance</code>	B	The purpose of IRQBalance is distribute hardware interrupts across processors on a multiprocessor system. This should only be enabled after consultation with KEMP technical support.
<code>backupnetstat</code>	B	By default, the LoadMaster includes a Netstat output in backups taken. When this is included, backups take longer to complete. You can stop the Netstat output from being included by disabling this parameter.
<code>linearesplogs</code>	B	By default, the LoadMaster deletes older log files. If this parameter is enabled, older log files will no longer be deleted. If the filesystem fills up, further access via the LoadMaster is blocked.
<code>netconsole</code>	A	Netconsole is a kernel module which logs kernel printk messages over UDP allowing debugging of problems where disk logging fails. If this parameter is populated, the syslog daemon on a specific host will receive all critical kernel messages. This can help in understanding why a LoadMaster is rebooting. Netconsole is mainly used for capturing kernel panic output. To unset this, set the value to an empty string.
<code>netconsoleinterface</code>	I	The interface which hosts the Netconsole.

Table 3-55: Debug Options

3.18.4.2 Run the Other Debug Options

These other debug options commands can be run via the API:

- `/logging/ps`

The **ps** command does not work when run in a browser. Use a cURL command to run a **ps**.

- `/logging/meminfo`
- `/logging/ifconfig`
- `/listifconfig`
- `/logging/netstat`
- `/logging/interrupts`
- `/logging/partitions`
- `/logging/cpuinfo`

- /logging/df
- /logging/lspci
- /logging/lsmo
- /logging/slabinfo

For example:

https://<LoadMasterIPAddress>/access/logging/meminfo

3.18.4.3 *Reset Statistics*

Reset the statistics by running the following command:

https://<LoadMasterIPAddress>/access/logging/resetstats

3.18.4.4 *Flush SSO Authentication Cache*

The SSO authentication cache can be flushed by running the **ssoflush** command:

https://<LoadMasterIPAddress>/access/logging/ssoflush

3.18.5 *Extended Log Files*

3.18.5.1 *List the WAF Audit Files*

The WAF audit files can be listed by running the **listwafauditfiles** command:

https://<LoadMasterIPAddress>/access/listwafauditfiles

3.18.5.2 *Download the WAF Audit Logs*

The WAF Audit Logs can be downloaded by running the **downloadwafauditlog** command:

**https://<LoadMasterIPAddress>/access/downloadwafauditlog?file=wafaudit.
1**

The AFP logs are not generated in real time – they can be up to two minutes behind what the AFP engine is actually processing.

Name	Type	Parameter Description	Mandatory
file	S	The WAF audit file to be downloaded, in the format <wafaudit>.<number> . To retrieve a list of the WAF audit files, run the listwafauditfiles command. Only one filename should be specified per command.	Y
filter	S	The filter string. This can be a regular expression.	N

Table 3-56: DownloadWafAuditLog parameters

3.18.5.3 Run a TCP Dump

Run a TCP dump using the following command:

```
https://<LoadMasterIPAddress>/access/tcpdump?maxpackets=<MaximumNumberOfPackets>&maxtime=<MaximumTime>&interface=<InterfaceID>&port=<Port>&address=<Address>&tcpoptions=<OptionalParameters>
```

All parameters are optional.

Name	Type	Parameter Description	Mandatory
maxpackets	I	The maximum number of packets to capture. The default value for this parameter is 10000. Valid values range from 1 to 200000.	N
maxtime	I	The maximum number of seconds to capture. The default value for this parameter is 10. Valid values range from 1 to 600.	N
interface	I	The interface(s) to monitor. The default interface is eth0. A TCP dump can be captured either by one or all Ethernet ports.	N
port	I	The port to be monitored.	N
address	I	The (optional) address to be monitored.	N
tcpoptions	S	Any optional parameters needed. The maximum number of characters permitted is 255. You can use any options that you can have in a tcp dump command. For example, if you do not set the port parameter, you could set the port in the tcpoptions parameter. You could also set the protocol to udp. You can enter multiple options.	N

Table 3-57: TCP Dump parameters

The output of a TCP dump is a .pcap file, which is downloaded. You can use an application such as Wireshark to view the output.

3.18.6 Syslog Options

Parameters relating to Syslog Options that can be managed using **get** and **set** commands are detailed in **Table 3-58**. Refer to **Section 2.4** for the **get** and **set** commands.

Name	Type	Parameter Description
syslogemergency	A	Use this option to set the host(s) which will receive Emergency events only. Entries must be comma-separated. Up to 10 entries are supported in total for all levels.
syslogcritical	A	Use this option to set the host(s) which will receive Emergency and Critical events. Entries must be comma-separated. Up to 10 entries are supported in total for all levels.

Name	Type	Parameter Description
syslogerror	A	Use this option to set the host(s) which will receive Emergency, Critical and Error events. Entries must be comma-separated. Up to 10 entries are supported in total for all levels.
syslogwarn	A	Use this option to set the host(s) which will receive Emergency, Critical, Error and Warning events. Entries must be comma-separated. Up to 10 entries are supported in total for all levels.
syslognotice	A	Use this option to set the host(s) which will receive Emergency, Critical, Error, Warning and Notice events. Entries must be comma-separated. Up to 10 entries are supported in total for all levels.
sysloginfo	A	Use this option to set the host(s) which will receive All events. Entries must be comma-separated. Up to 10 entries are supported in total for all levels.
syslogport	I	Specify the port that syslog messages are sent to on the receiving hosts.

Table 3-58: Syslog Options

Up to 10 individual IP addresses and/or hostnames can be specified for each of the Syslog fields. Multiple IP addresses/hostnames must be differentiated using a comma-separated list.

3.18.7 SNMP Options

Parameters relating to SNMP Logging Options that can be managed using **get** and **set** commands are detailed in **Table 3-59**. Refer to **Section 2.4** for the **get** and **set** commands.

Name	Type	Additional Information
snmpcommunity	S	Specify the SNMP community string.
snmpcontact	S	Specify the contact address that is sent in SNMP responses.
snmpenable	B	0 - Disabled 1 - Enabled
snmptrapenable	B	Enable the generation of SNMP events whenever a significant event occurs.
snmpv1sink	A	Specify the sink address for SNMP type 1 traps.
snmpv2sink	A	Specify the sink address for SNMP type 2 traps.
snmpV3enable	B	Enable/disable SNMP V3. 0 - Disabled 1 - Enabled
snmpv3user	A	Specify the username.
snmpv3userpasswd	A	Specify the user password.
snmplocation	S	Specify the location that is sent in SNMP responses.

Name	Type	Additional Information
snmpclient	S	Specify the list of machines that can access the SNMP subsystem. If no clients are specified, anyone can access SNMP.
snmpHATrap	B	Send SNMP traps from the shared IP address. This option is only available when the LoadMaster is in HA mode.
snmpAuthProt	S	Specify the relevant authentication protocol: MD5 SHA SHA is a more secure protocol. Note: These values are case sensitive - please enter them in uppercase.
snmpPrivProt	S	Specify the relevant privacy protocol: DES AES AES is a more secure protocol. Note: These values are case sensitive - please enter them in uppercase.

Table 3-59: SNMP Logging Options

3.18.8 Email Options

Parameters relating to Email Logging Options that can be managed using **get** and **set** commands are detailed in **Table 3-60**. Refer to **Section 2.4** for the **get** and **set** commands.

Name	Type	Range	Additional Information
emailcritical	S		The email address to receive critical messages.
emaildomain	S		The domain, if required, for the user account authentication.
emailemergency	S		The email address to receive emergency messages.
emailenable	B		Enables or disables the email logging options.
emailerror	S		The email address to receive error messages.
emailinfo	S		The email address to receive informational messages.
emailnotice	S		The email address to receive notices.
emailpassword	S		The email user's password.
emailport	I	0-65535	The TCP port on which your mail server accepts connections (usually 25).
emailserver	S		The host name or address of the SMTP server to send mail messages through.
emailsslmode	I	0-3	Specify the type of security protocol that should be used on the connection: 0 = None 1 = STARTTLS, if available 2 = STARTTLS 3 = SSL/TLS
emailuser	S		The user account with access to send email messages.

Name	Type	Range	Additional Information
emailwarn	S		The email address to receive warnings.

Table 3-60: Email Logging Options

3.18.9 SDN Log Files

3.18.9.1 Debug Options

There are two modes that can be used to gather the SDN statistics.

The modes are described below:

- **Mode 1:** When set to mode 1, the statistics are taken from the switch port that is connected to the server and the statistics are relayed back to the LoadMaster.
- **Mode 2:** When set to mode 2, the information is taken from all of the switch ports along the path.

The SDN statistics mode can be managed using the **get** and **set** commands by using the parameter **sdnstatsmode** with a value of 1 or 2, for example:

https://<LoadMasterIPAddress>/access/set?param=sdnstatsmode&value=2

3.19 Miscellaneous Options

3.19.1 WUI Settings

Parameters relating to WUI Settings that can be managed using **get** and **set** commands are detailed in **Table 3-61**. Refer to **Section 2.4** for the **get** and **set** commands.

Name	Type	Range	Description
hoverhelp	B	0 – Disable 1 - Enable	This option allows the display of descriptive text when a cursor rests on a clickable option in the WUI screen.
motd	S		This is the Message of the Day (MOTD). Either plain text or a text file can be used. The maximum number of characters is 5,000. An error will be displayed if the MOTD is greater than 5,000 characters.
wuidisplaylines	I	10-100	Set the maximum number of lines which can be displayed on a single statistics page.

Table 3-61: WUI Settings Parameters

If the Message Of The Day (MOTD) is specified using the **set** command as above, the maximum number of characters that can be entered is 5,000. If you would like to enter a MOTD that is longer than 5,000 characters, use a plain text document to store the MOTD and use the command below to post it to the KEMP LoadMaster:

```
curl -d @<filename> -k
https://bal:<BalPassword>@<IPAddress>/access/setmotd
```

3.19.2 WUI Authentication and Authorization Options

Parameters relating to WUI Authentication and Authorization Options that can be managed using **get** and **set** commands are detailed in **Table 3-62**. Refer to **Section 2.4** for the **get** and **set** commands.

Name	Type	Range	Description
ldapbackupserver	A		Specifies the backup LDAP server for authentication.
ldapsecurity	I	0 = Not Encrypted 1 = StartTLS 2 = LDAPS	Specifies the security mode for LDAP authentication.
ldapserver	A		Specifies the LDAP server to use for authentication.
ldaprevalidateinterval	B		Specifies how often to revalidate the authentication to the LDAP server.
radiusbackupport	I	3-65535	Specifies the TCP port for the backup RADIUS server.
radiusbackupsecret	S		Specifies the password (secret) to the backup RADIUS server.
radiusbackupserver	A		Specifies the backup RADIUS server to use for authentication.
radiusport	I	3-65535	Specifies the TCP port for communication to the RADIUS server.
radiusrevalidateinterval	I	10-86400	Specifies when to revalidate the authentication to the RADIUS server.
radiussecret	S		Specifies the password (secret) to the RADIUS server.
radiusserver	A		Specifies the RADIUS server to use for authentication.
sessionlocalauth	B		Enables or disables local authentication.
sessionauthmode	I	Refer to Table 3-63: session auth mode values	Specifies the authentication mode for the load balancer.

Table 3-62: WUI Authentication and Authorization Options

Table 3-63 describes the Radius, LDAP and Local user options that are selected depending on the value given to the `sessionauthmode` parameter

Value	Radius		LDAP	Local	
	Authent.	Author.	Authent.	Authent.	Author.
7	No	No	No	No	No
263	Yes	No	No	Yes	Yes
775	Yes	Yes	No	Yes	Yes
23	No	No	Yes	Yes	Yes
22	No	No	Yes	No	Yes
788	Yes	Yes	Yes	No	No
790	Yes	Yes	Yes	No	Yes
791	Yes	Yes	Yes	Yes	Yes
789	Yes	Yes	Yes	Yes	No
773	Yes	Yes	No	Yes	No
262	Yes	No	No	No	Yes
774	Yes	Yes	No	No	Yes
772	Yes	Yes	No	No	No
278	Yes	No	Yes	No	No
279	Yes	No	Yes	Yes	Yes

Table 3-63: session auth mode values

3.19.3 L7 Configuration

Parameters relating to L7 Configuration that can be managed using `get` and `set` commands are detailed in **Table 3-64**. Refer to **Section 2.4** for the `get` and `set` commands.

Name	Type	Range	Description
addcookieport	B	0 - Disabled 1 - Enabled	When using the LoadMaster behind a NATing gateway, all client addresses are the same. To create individual cookies the remote port can also be added to the cookie. Enabling this option when not needed wastes resources.
addvia	B	0 - Disabled 1 - Enabled	When enabled, a VIA header field will be added to all cache responses. The Virtual Service address will be the address used.
allowemptyposts	B	0 - Disabled 1 - Enabled	By default the LoadMaster blocks POSTs that do not contain a Content-Length or Transfer-Encoding header to indicate the length of the requests payload. When this parameter is set to true, such requests are assumed to have no payload data and are therefore not rejected.

Name	Type	Range	Description
forcefullrsmatch	B	0 – Disabled 1 – Enabled	By default, when the LoadMaster is trying to locate a Real Server for use with content switching, it tries to use the same Real Server as currently selected, even if the port is not the same. Enabling this parameter forces the port to also be compared.
alwayspersist	S	0 = Only check persist on the first request of a HTTP/1.1 connection 1 = Check the persist on every request 2 = All persistent changes will be saved, even in the middle of a connection	This parameter also accepts no and yes as valid values. No and yes correspond to 0 and 1 respectively.
closeonerror	B	0 - Disabled 1 - Enabled	When enabled, the LoadMaster will always close the client connection when it sends back an error response. For Example, this changes the behaviour of the LoadMaster when sending back a 304 File not changed message after receiving an If-Modified-Since HTTP header.
dropatdrainend	B	0 - Disabled 1 - Enabled	If enabled, all open connections to disabled Real Servers will be dropped at the end of the Real Servers Drain Stop Time OR immediately if there are no Persist entries associated with the Real Server.
droponfail	B	0 - Disabled 1 - Enabled	By default, existing connections are not closed if a Real Server fails. Enabling this feature causes all connections to be immediately dropped on Real Server failure
expect100	I	0 = RFC Conformant 1 = Always Expect-100 2 = Ignore Continue-100	By default, the L7 module only waits for 100-Continue replies if it sees an Expect-100 header, use RFC-2616 Compliant . If the system will always wait for 100 Continue messages, use Require 100-Continue . If the client will always send the POST data even if a 100 Continue message is not sent, use RFC-7231 Compliant instead.
rfcconform	B	0 - Disabled 1 - Enabled	By default, the LoadMaster conforms to the RFC when parsing HTTP headers. Disabling this will allow interworking with some broken browsers.

Name	Type	Range	Description
rsarelocal	B	0 - Disabled 1 - Enabled	When checking to see if a client is on the local subnet, also check to see if the client is actually a Real Server.
localbind	B	0 - Disabled 1 - Enabled	In very high load situations, local port exhaustion can occur. Enabling this option allows the setting of alternate source addresses. This can be used to expand the number of available local ports.
transparent	B	0 - Disabled 1 - Enabled	Globally enable or disable the transparent handling of connections using the L7 subsystem. L4 connections are ALWAYS handled transparently.
slowstart	I	0-600	When using the Least Connection (or Weighted Least Connection) scheduling method, specify the time (in seconds) over which the load to a Real Server which has just come online will be throttled.
addforwardheader	I	0 = X-ClientSide 1 = X-Forwarded-For 2 = None	This option, only available when L7 Transparency is disabled, allows the addition of either X-ClientSide or X-Forwarded For to the HTTP header.
logsplitinterval	I	1-100	When using Log Insight Scheduling this is the number of messages which are received on a connection before the stream is rescheduled. The default value is 10.
authtimeout	I	30 – 300	The duration (in seconds) that a connection remains open for while authentication is ongoing. This value can be between 30 and 300.
clienttokentimeout	I	60-300	The duration (in seconds) to wait for the client token while the process of authentication is ongoing (used for RSA SecurID and RADIUS authentication). The default value for this parameter is 120.
ShareSubVSPersist	I	0 – Disabled 1 – Enabled	By default, each SubVS has an independent persistence table. Enabling this parameter will allow the SubVS to share this information.

Table 3-64: L7 Configuration

3.19.4 Network Options

Parameters relating to Network Options that can be managed using **get** and **set** commands are detailed in **Table 3-65**. Refer to **Section 2.4** for the **get** and **set** commands.

Name	Type	Range	Additional Information
snat	B	0 - Disabled 1 - Enabled	Enabling this options allows the LoadMaster to NAT connections from the Real Servers to the internet
allowupload	B	0 - Disabled 1 - Enabled	The LoadMaster has been optimized with HTTP workloads in mind. Enabling this option allows non HTTP uploads to work correctly.
conntimeout	I	0-86400	Specify (in seconds) the time a connection can be idle before it is closed. This is independent of Persistency Timeout. Setting a value of 0 resets to the default value of 660 seconds.
keepalive	B	0 - Disabled 1 - Enabled	By default, the system uses TCP keepalives to check for failed clients. Enabling this option improves the reliability of older TCP connections (SSH sessions). This is not normally required for normal HTTP/HTTPS services.
multigw	B	0 - Disabled 1 - Enabled	Use this option to enable the ability to move the default gateway to a different interface.
nonlocalrs	B	0 - Disabled 1 - Enabled	Enable this option to allow assigning non-local Real Servers to Virtual Services.
onlydefaultroutes	B	0 - Disabled 1 - Enabled	Enable this option to force traffic from Virtual Services, which have default route entries set, to be routed to the interface where the Virtual Service's default route is located.
resetclose	B	0 - Disabled 1 - Enabled	When enabled, the LoadMaster will close its connection to the Real Servers by using TCP RESET instead of the normal close handshake.

Name	Type	Range	Additional Information
subnetorigin	B	0 - Disabled 1 - Enabled	When transparency is disabled for a Virtual Service, the source IP address of connections to Real Servers is the Virtual Service. When enabled, the source IP address is the local address of the LoadMaster. If the Real Server is on a subnet, the subnet address of the LoadMaster will be used.
subnetoriginating	B	0 - Disabled 1 - Enabled	When transparency is disabled for a Virtual Service, the source IP address of connections to Real Servers is the Virtual Service. When enabled, the source IP address is the local address of the LoadMaster. If the Real Server is on a subnet, the subnet address of the LoadMaster will be used.
tcptimestamp	B	0 - Disabled 1 - Enabled	The LoadMaster can include a timestamp in the SYN when connecting to Real Servers. Only enable this only on request from KEMP Support.
routefilter	B	0 - Disabled 1 - Enabled	When enabled, this option only accepts IP frames from a host over the interface where the routing algorithm would route frames to the host. This is known as strict source route validation.
sslrenegotiate	B	0 - Disabled 1 - Enabled	By default, the LoadMaster allows a client to automatically renegotiate during an SSL transaction. Disabling this parameter causes SSL connections to terminate if a renegotiation is requested by the client.
sslforceserververify	B	0 - Disabled 1 - Enabled	By default, when re-encrypting traffic the LoadMaster does not check the certificate provided by the Real Server. Enabling this option forces the LoadMaster to verify that the certificate on the Real Server is valid, that is, the certificate authority and expiration are OK. This includes all intermediate certificates.

Name	Type	Range	Additional Information
dhkeysize	I	512, 1024 or 2048	Select the strength of the key used in the Diffe-Hellman key exchanges. If this value is changed, a reboot is required in order to use the new value. The default value is 2048 Bits .
http_proxy	S		This option allows clients to specify the HTTP(S) proxy server and port the LoadMaster will use to access the internet.

Table 3-65: Network Options

3.19.5 Application Front End (AFE) Configuration

The Intrusion Detection Rules can be updated using the following command:

https://<LoadMasterIPAddress>/access/updatedetect

There are a number of methods of using this command for example, using a CURL command on Linux would look like the following:

```
curl -X POST --data-binary "@<Detection Rules File>" -k https://<LoadMasterIPAddress>/access/updatedetect
```

The above example would install new detection rules (<Detection Rules File>) on the system.

File extensions can be added or deleted from the list of file extensions that should not be cached by using the following commands:

https://<LoadMasterIPAddress>/access/addnocache?param=<FileExtension>

https://<LoadMasterIPAddress>/access/delnocache?param=<FileExtension>

The <FileExtension> string must begin with a ".", for example:

https://<LoadMasterIPAddress>/access/addnocache?param=.jpg

File extensions can be added or deleted from the list of file extensions that should not be compressed by using the following commands:

https://<LoadMasterIPAddress>/access/addnocompress?param=<.FileExtension>

https://<LoadMasterIPAddress>/access/delnocompress?param=<.FileExtension>

The <FileExtension> string must begin with a "."

Parameters relating to AFE Configuration that can be managed using **get** and **set** commands are detailed in **Table 3-66**. Refer to **Section 2.4** for the **get** and **set** commands.

Name	Type	Range	Description
cacheSize	I	1-409	Specifies the cache size.
hostcache	B	0 - Disabled 1 – Enabled	Enable or disable using the host cache.
paranoia	I	0 = Low 1 = Default 2 = High 3 = Paranoid	Sets the sensitivity of the Intrusion Detection System (IDS) detection.
limitinput	I	0-100000	Limit the number of connections.

Table 3-66: AFE Configuration Parameters

Client limiting can be used to limit the default maximum number of connection attempts (per second) from a specified host. The limit can be set using the **set** parameter, for example:

https://<LoadMasterIPAddress>/access/set?param=limitinput&value=25

Setting the limit to zero disables the option.

A number of addresses or networks can be specified to be limited. To add an address, run the command below:

https://<LoadMasterIPAddress>/access/afeclientlimitadd?addr=<L7Address>&limit=<L7Limit>

To delete an address, run the command below:

https://<LoadMasterIPAddress>/access/afeclientlimitdel?addr=<L7Address>

To list the addresses and their limits, run the command below:

https://<LoadMasterIPAddress>/access/afeclientlimitlist?

3.19.6 HA Management

If using the LoadMaster for Azure product, please refer to the next section.

Parameters relating to HA Parameters that can be managed using **get** and **set** commands are detailed in **Table 3-67**. Refer to **Section 2.4** for the **get** and **set** commands.

Name	Type	Range	Description
hastatus	S	Normal HA: Active, Standby, Passive (all as expected). Cloud HA: Active, Standby, Passive (if status not yet set). Cluster: Active (if master), Standby (if slave), Passive (if disabled).	Retrieve the status of a HA or cluster unit. This is a read only parameter and cannot be set.
haif	I		The network interface used when synchronising the configuration between the members of the HA cluster
hainitial	B	0 – Disabled 1 – Enabled	Perform extra network checks at boot time. This may cause instability and should not be used.
haprefered	I	0 = No preferred host 1 = Prefer First HA 2 = Prefer Second HA	By default, neither partner in a HA cluster has priority. When a machine restarts after a switchover that machine becomes a slave. Specifying a preferred host means that when this machine restarts it will always become the master and the partner will revert to slave mode.
hastyle	B	0 = legacy heart beat 1 = carp	By default, the system uses a version of VRRP(carp) to check the status of the partner. The system can also support the legacy Heartbeat program. This option only takes effect when both machines are rebooted
hatimeout	I	1 = 3 seconds 2 = 6 seconds 3 = 9 second 4 = 12 seconds 5 = 15 seconds	The time the master must be unavailable before a switchover occurs.
havhid	I	1-255	When using multiple HA LoadMasters on the same network, this value identifies each cluster so that there are no potential unwanted interactions.
hawait	I	0-200	This is how long (in seconds) after the initial boot, before the LoadMaster becomes active. If the partner machine is running 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.
mcast	I		The network interface used for multicast traffic which is used to synchronize Layer 4 and Layer 7 traffic when Inter HA Updates are enabled.
vmac	B		This option creates a shared MAC address for both units. When failover occurs, the LoadMaster handles the MAC address handover too. This allows the switches to keep the MAC address and not worry about ARP caches or stale records.

Name	Type	Range	Description
Tcpfailover	B	0 – Disable 1 – Enable	When using L4 services, enabling updates allows L4 connection maintenance across a HA switchover. This option is ignored for L7 services. This parameter is now deprecated and has been replaced with the hal4update parameter.
hal4update	B	0 – Disable 1 – Enable	When using L4 services, enabling updates allows L4 connection maintenance across a HA switchover. This option is ignored for L7 services.
cookieupdate	B	0 – Disable 1 – Enable	When using L7 services, enabling this option allows sharing of persistency information between HA partners. If a HA switchover occurs, the persistency information will then not be lost. Enabling this option can have a significant performance impact. This parameter is now deprecated and has been replaced with the hal7update parameter.
hal7update	B	0 – Disable 1 – Enable	When using L7 services, enabling this option allows sharing of persistency information between HA partners. If a HA switchover occurs, the persistency information will then not be lost. Enabling this option can have a significant performance impact.
finalpersist	I	0, 60-86400	When a Real Server is disabled, the sessions persisting on that Real Server continue to be served until the Drain Time has expired or until no more sessions are being handled by the Real Server. No new sessions will be handled by the Real Server.
hamode	I	0 – HA mode disabled 1 – HA 1 mode 2 – HA 2 mode 3 – System is using cloud HA 4 – System is in a cluster	Specify the HA mode. If only using a single LoadMaster, use Non-HA Mode. In non-cloud HA mode, one LoadMaster must be specified as the first and another as second. HA will not work if both LoadMasters are specified the same.
hacheck	B	0 - Disable 1 - Enable	Enable HA health checking. At least one interface must be enabled.

Table 3-67: HA Parameters

Simply changing the HA mode does not switch between non-HA and HA. The partner and Virtual IP (VIP) Addresses also need to be set and a reboot is needed before the system is fully switched over. For instructions on how to set up HA via RESTful API, refer to **Section 3.19.7**.

After changing the **hastyle** or **hamode** a reboot is required for the changes to take effect.

3.19.7 Azure HA Parameters

These commands are only relevant to the LoadMaster for Azure product.

The Azure HA mode can be set by running the following command:

```
https://<LoadMasterIPAddress>/access/azurehamode?hamode=<master/slave/single>
```

The Azure HA parameters can be set by running the following command:

```
https://<LoadMasterIPAddress>/access/azurehaparam?partner=<PartnerHostNameOrIPAddress>&hcp=<HealthCheckPort>
```

Name	Type	Range	Additional Information
partner	S	Must be a valid IP address	Specify the host name or IP address of the HA partner unit.
hcp	I	Must be a valid port value	Set the port over which the health check will be run. The port must be the same on both the master and slave unit in order for HA to function correctly.

Table 3-68: Azure HA Parameters

The Azure HA parameters can be retrieved by using the following command:

```
https://<LoadMasterIPAddress>/access/getazurehaparams?
```

3.19.8 AWS HA Parameters

These commands are only relevant to the LoadMaster for AWS product.

The AWS HA mode can be set by running the following command:

```
https://<LoadMasterIPAddress>/access/awshamode?hamode=<master/slave/single>
```

The AWS HA parameters can be set by running the following command:

```
https://<LoadMasterIPAddress>/access/awshaparam?partner=<PartnerHostNameOrIPAddress>&hcp=<HealthCheckPort>
```

Name	Type	Range	Additional Information
partner	S	Must be a valid IP address	Specify the host name or IP address of the HA partner unit.
hcp	I	Must be a valid port value	Set the port over which the health check will be run. The port must be the same on both the master and slave unit in order for HA to function correctly.

Table 3-69: AWS HA Parameters

The AWS HA parameters can be retrieved by using the following command:

```
https://<LoadMasterIPAddress>/access/getawshaparams?
```

Example output for the `getawshaparams` command is below:

```
<?xml version="1.0" encoding="ISO-8859-1"?>
```

```
<Response stat="200" code="ok">
<Success><Data><AwsHA>
<HaMode>slave</HaMode>
<Partner>172.31.12.48</Partner>
<Port>5000</Port>
</AwsHA>
</Data>
</Success>
</Response>
```

3.19.9 SDN Configuration

3.19.9.1 Add an SDN Controller

To add a new SDN controller to the LoadMaster, run the command below:

```
https://<LoadMasterIPAddress>/access/addsdncontroller?ipv4=<IPv4Address>
&port=<SDNControllerPort>&https=<0/1>&user=<UserToAccessSDNControllerAPI>
&password=<PasswordForSDNUser>&clid=<ClusterID>
```

The parameters used in this command are described below:

Name	Mandatory	Type	Default	Range	Additional Information
ipv4	Yes	S	<unset>	Valid IPv4 address range	The IPv4 address of the SDN controller.
port	Yes	I	<unset>	Valid port range	The port of the SDN controller.
https	No	B	0 - HTTP	0 - HTTP 1 - HTTPS	The HTTP method to use.
user	No	S	<unset>		The username to be used to access the SDN controller RESTful API.
password	No	S	<unset>		The password to be used to access the SDN controller RESTful API.
clid	No	I	<unset>	1 - 6	The cluster ID for the new SDN controller. If a number is specified, the SDN controller will be added to the cluster with the relevant ID number. The cluster with the ID number specified must already exist. If a number is not specified, the SDN controller will be added to a new cluster.

Expected Output

```
<Response stat="200" code="ok">
<Success>Command completed ok</Success>
</Response>
```

3.19.9.2 Modify an SDN Controller

To modify an existing SDN controller, run the command below:

```
https://<LoadMasterIPAddress>/access/modsdncontroller?cid=<ControllerID>
&ipv4=<IPv4Address>&port=<SDNControllerPort>&https=<0/1>&user=<UserToAccessSDNControllerAPI>
&password=<PasswordForSDNUser>&clid=<ClusterID>
```

The parameters used in this command are described below:

Name	Mandatory	Type	Default	Range	Additional Information
cid	Yes	I	Auto incrementing number		The ID of the controller to be modified. To get the controller ID, run the getsdncontroller command.
ipv4	No	S	<unset>	Valid IPv4 address range	The IPv4 address of the SDN controller.
port	No	I	<unset>	Valid port range	The port of the SDN controller.
https	No	B	0 - HTTP	0 - HTTP 1 - HTTPS	The HTTP method to use.
user	No	S	<unset>		The username to be used to access the SDN controller RESTful API.
password	No	S	<unset>		The password to be used to access the SDN controller RESTful API.
clid	No	I	<unset>	1 - 6	The cluster ID for the new SDN controller. If a number is specified, the SDN controller will be added to the cluster with the relevant ID number. The cluster with the ID number specified must already exist. If a number is not specified, the SDN controller will be added to a new cluster.

Expected Output

```
<Response stat="200" code="ok">
<Success>
<Data>
<controllers>
<cluster id="2"/>
<cluster id="3"/>
<cluster id="5"/>
<cluster id="6"/>
<cluster id="7"/>
<cluster id="8"/>
<cluster id="9"/>
<cluster id="10"/>
<cluster id="11"/>
<cluster id="12"/>
<cluster id="13"/>
<cluster id="14"/>
<cluster id="15"/>
<cluster id="16"/>
<cluster id="17"/>
<cluster id="18">
<controller id="30">
<ipv4>172.16.0.6</ipv4>
<port>8443</port>
<https>yes</https>
<user>sdn</user>
<password>*****</password>
</controller>
</cluster>
<cluster id="19">
<controller id="31">
<ipv4>172.16.0.8</ipv4>
<port>8443</port>
<https>yes</https>
<user>sdn</user>
<password>*****</password>
</controller>
</cluster>
<cluster id="20">
```

```
<controller id="32">
<ipv4>172.16.0.8</ipv4>
<port>8443</port>
<https>no</https>
<user/>
<password/>
</controller>
</cluster>
</controllers>
</Data>
</Success>
</Response>
```

3.19.9.3 Delete an SDN Controller

To delete an SDN controller, run the command below:

```
https://<LoadMasterIPAddress>/access/deleteSDNcontroller?cid=<ControllerID>
&clid=<ClusterID>
```

Either the Controller ID or the Cluster ID must be specified. The Controller ID and Cluster ID can be found by running the **getsdncontroller** command. For more information, refer to **Section 3.19.9.4**.

Expected Output

```
<Response stat="200" code="ok">
<Success>Command completed ok</Success>
</Response>
```

3.19.9.4 Show the Existing SDN Controllers

To display a list of the SDN controllers that currently exist on the LoadMaster, run the command below:

```
https://<LoadMasterIPAddress>/access/getsdncontroller
```

An example of the returned output is below:

```
<Response stat="200" code="ok">
<Success>
<Data>
<controllers>
<cluster id="2">
<controller id="29">
<ipv4>172.16.0.6</ipv4>
<port>8443</port>
<https>yes</https>
<user>sdn</user>
<password>*****</password>
</controller>
</cluster>
<cluster id="3"/>
<cluster id="5"/>
<cluster id="6"/>
<cluster id="7"/>
<cluster id="8"/>
<cluster id="9"/>
<cluster id="10"/>
<cluster id="11"/>
<cluster id="12"/>
<cluster id="13"/>
<cluster id="14"/>
<cluster id="15"/>
<cluster id="16"/>
<cluster id="17"/>
</controllers>
</Data>
```

```
</Success>  
</Response>
```

The parameters that appear in the output are explained below:

- **Cluster ID:** The unique ID of the cluster that the SDN controller is a member of.

Any empty cluster parameter sections relate to clusters that were previously added but were later removed. Each time a new cluster is added it gets assigned a new ID number.

- **Controller ID:** The ID of the SDN controller.
- **IPv4:** The IPv4 address of the SDN controller.
- **Port:** The port of the SDN controller WUI.
- **HTTPS:** Displays whether HTTPS (**yes**) or HTTP (**no**) is used to access the SDN controller.
- **User:** The username to be used to access the SDN controller.
- **Password:** The password of the user to be used to access the SDN controller.

3.20 Setting Up HA via RESTful API

The two sections below provide step-by-step instructions on how to set up HA via RESTful API on a regular LoadMaster, and a LoadMaster for Azure:

3.20.1 Set up HA on a Regular LoadMaster using RESTful API

The example commands that are needed to set up HA via RESTful API on a regular LoadMaster are below:

1. Set device 1 to to HA1:

```
https://192.168.1.1/access/set?param=hamode&value=1
```

2. Reboot HA1:

```
https://192.168.1.1/access/reboot?
```

3. Set HA1's partner's address (HA2 address):

```
https://192.168.1.1/access/modiface?interface=0&PartnerIPAddress=192.168.1.2
```

4. Set the shared IP address for the HA pair:

```
https://192.168.1.1/access/modiface?interface=0&SharedIPAddress=192.168.1.10
```

5. Set HA2 to secondary:

```
https://192.168.1.2/access/set?param=hamode&value=2
```

6. Reboot HA2:

```
https://192.168.1.2/access/reboot?
```

7. Set HA2's partner's address (HA1's address):

```
https://192.168.1.2/access/modi face?interface=0&partner=192.168.1.1
```

8. Set the shared IP address for the HA pair:

```
https://192.168.1.2/access/modi face?interface=0&shared=192.168.1.10
```

Commands such as **reboot** take several seconds for the LoadMaster to complete. If scripting, please allow for a proper delay after the **reboot** command.

To remove HA, use the commands below:

1. Set to non-HA:

```
https://192.168.1.1/access/set?param=hamode&value=0
```

2. Reboot:

```
https://192.168.1.1/access/reboot?
```

3.20.2 Set up HA on a LoadMaster for Azure using RESTful API

The example commands that can be used to set up HA on a LoadMaster for Azure using RESTful API are below:

1. Set the master unit to master HA mode:

```
https://192.168.1.1/access/azurehamode?hamode=master
```

2. Set the HA parameters (partner address and health check port) for the master:

```
https://192.168.1.1/access/azurehaparam?partner=192.168.1.2&hcp=8444
```

3. Set the slave unit to slave HA mode:

```
https://192.168.1.2/access/azurehamode?hamode=slave
```

4. Set the HA parameters (partner address and health check port) for the slave:

```
https://192.168.1.2/access/azurehaparam?partner=192.168.1.1&hcp=8444
```

To remove HA, use the commands below:

```
https://192.168.1.1/access/azurehamode?hamode=single
```

```
https://192.168.1.2/access/azurehamode?hamode=single
```

4 Scripting Examples with the LoadMaster RESTful API

The LoadMaster RESTful API can be used in conjunction with many scripting methods and applications to allow users and applications to directly access the LoadMaster.

Refer to the **RESTful API Programmers Guide, Technical Note** for some detailed examples of how the RESTful API can be used.

5 Appendix A – get and set Parameters

A number of parameters can be retrieved and set using the **get** and **set** commands. A list of these parameters is provided below. For descriptions of what each of the parameters are, refer to the sections above.

This is not an exhaustive list.

dfltgw	finalpersist	slowstart	radiusbackupport
dfltgwv6	tcptimestamp	subnetorigin	radiusbackupsecret
admingw	paranoia	syslogcritical	radiusbackupserver
snat	cacheSize	syslogemergency	radiusport
hathetimeout	hostcache	syslogerror	radiussecret
hawait	resetclose	sysloginfo	radiusserver
haprefered	rfconform	syslognotice	radiusrevalidateinterval
hamode	keepalive	syslogwarn	ldapserver
haif	backupday	sslrenegotiate	ldapbackupserver
havhid	backupenable	emailenable	ldapsecurity
hastyle	backuphost	irqbalance	ldaprevalidateinterval
hainitial	backuphour	snmpenable	geoclients

tcpfailover	backupminute	snmpV3enable	geopartners
cookieupdate	backuppassword	snmpv3user	geosshport
vmac	backuppath	snmpv3userpasswd	ha1hostname
sshaccess	backupuser	snmpcontact	ha2hostname
sshport	backupuser	snmpcommunity	hostname
wuiaccess	emailuser	snmplocation	searchlist
mcast	emaildomain	snmpHaTrap	timezone
wuiiface	emailpassword	snmpv1sink	admincert
wuiport	emailserver	snmpv2sink	localcert
sshiface	emailsslmode	snmpclient	time
hoverhelp	emailport	snmptrapenable	ntphost
routefilter	emailcritical	motd	version
transparent	emailemergency	wuidisplaylines	Tethering
alwayspersist	emailerror	linearesplogs	multihomedwui
expect100	emailinfo	onlydefaultroutes	logsplitinterval

localbind	emailnotice	sessionauthmode	allowemptyposts
addcookieport	emailwarn	sessionidletime	OCSPPort
subnetoriginating	addvia	sessionmaxfailattempts	OCSPUseSSL
nonlocalrs	allowupload	sessioncontrol	OCSPOnServerFail
multigw	dropatdrainend	sessionlocalauth	OCSPServer
addforwardheader	droponfail	ntphost	OCSPUrl
conntimeout	closeonerror	netconsole	L7LimitInput
authtimeout	limitinput	netconsoleinterface	sdnstatsmode
clienttimeout	rsarelocal	namserver	SSLStapling

6 References

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

WUI, Configuration Guide

KEMP LoadMaster, Product Overview

SSL Accelerated Services, Feature Description

GEO, Feature Description

GEO, Product Overview

RESTful API Programmers Guide, Technical Note

Licensing, Feature Description

CLI, Interface Description

LoadMaster Clustering, Feature Description

Custom Authentication Form, Technical Note

User Management, Feature Description

Content Rules, Feature Description

Document History

Date	Change	Reason for Change	Version	Resp.
Sep 2015	Release Updates	Updates for 7.1-30	6.0	KG
Oct 2015	Minor changes	Updated header and footer	7.0	LB
Oct 2015	Release updates	Updates for 7.1-30a	8.0	LB
Nov 2015	Minor changes	Enhancements made	9.0	LB
Dec 2015	Release updates	Updates for 7.1-32	10.0	LB
Jan 2016	Release updates	Updated for 7.1-32a	11.0	LB
Mar 2016	Minor changes	Enhancements made	12.0	LB
May 2016	Minor changes	Enhancements made	13.0	LB
July 2016	Release updates	Updated for 7.1.35	14.0	LB
Aug 2016	Minor changes	Enhancements made	15.0	LB
Oct 2016	Release updates	Updated for 7.2.36	16.0	LB
Jan 2017	Release updates	Updated for 7.2.37	17.0	LB