



# HTTP2

## Feature Description

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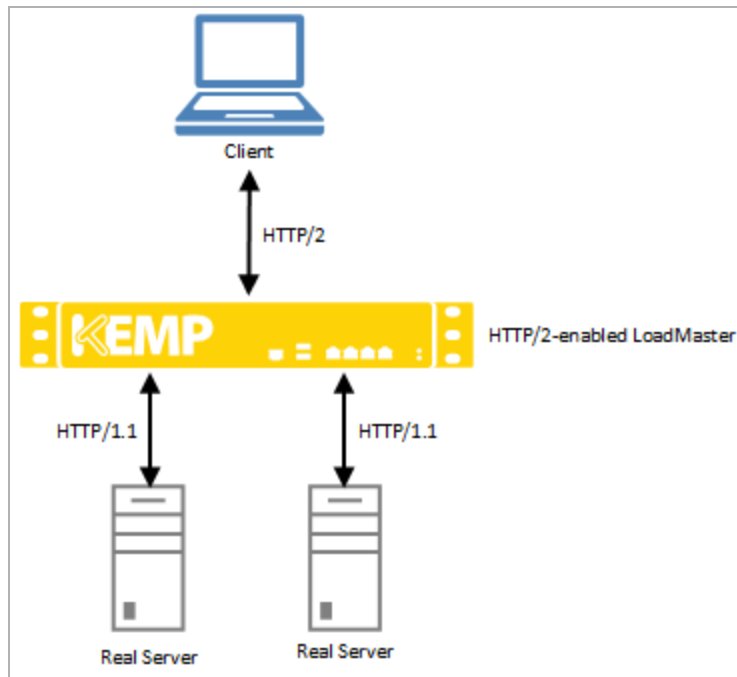
# 1 Introduction

Full HTTP/2 support is available across all Kemp Application Delivery Controllers (ADCs) and can be enabled at the push of a button. Kemp's HTTP/2 support greatly improves user experience on applications and websites, simplifying the performance upgrade path for site administrators.

HTTP/2 is the latest version of Hypertext Transfer Protocol (HTTP) and is designed to optimize the delivery of content on everything from websites to mobile apps leading to a much better end user experience. It is supported across modern browsers including the latest versions of Google Chrome, Mozilla Firefox, Apple Safari, Microsoft Internet Explorer, and Edge.

HTTP/2 has huge potential. There are a number of inflexibility, inefficiency and performance challenges with HTTP/1 that are solved by HTTP/2. Several of the benefits of HTTP/2 are below:

- **Multiplexing and concurrency:** Several requests can be sent in rapid succession in the same TCP connection. Responses can be received out of order – eliminating the need for multiple connections between the client and the server.
- **Stream dependencies:** The client can indicate to the server which of the resources are more important than others
- **Header compression:** HTTP header size is drastically reduced
- **Server push:** The server can send resources that the client has not yet requested



The LoadMaster also supports HTTP/2 – the LoadMaster can convert HTTP/2 traffic to HTTP/1.1 traffic in the back-end before it hits the Real Servers. These Real Servers do not need to have SSL enabled.

The HTTP/2 functionality in the LoadMaster provides optimizations, such as request pipelining and request multiplexing to reduce the request load on back-end servers. This results in a significantly improved end user experience when using a browser with HTTP/2 support. HTTP/2 works with a number of LoadMaster features, such as content switching, content caching, advanced persistence, header injection and the Web Application Firewall (WAF).

## 1.1 Document Purpose

The purpose of this document is to show you how to enable HTTP/2 in the LoadMaster and provide test website content for you to test the functionality against.

## 1.2 Intended Audience

This document is intended to be used by anyone interested in enabling HTTP/2 in the LoadMaster.

## 1.3 Limitations

Some limitations are listed below:

- Certain ciphers are not supported when using HTTP/2 – but these are automatically disabled when HTTP/2 support is enabled in the LoadMaster.
- If either NT LAN Manager (NTLM) or Kerberos authentication is enabled on a Virtual Service, HTTP/2 will be disabled. Similarly, if HTTP/2 support is enabled on a Virtual Service, NTLM/Kerberos authentication will be disabled.
- SAML authentication does not currently work correctly with HTTP/2.
- **TLS 1.2** must be enabled in the **Supported Protocols** in the **SSL Properties** section for HTTP/2 to work
- The **Process Responses** option in the **WAF Options** section cannot be enabled if HTTP/2 is enabled
- Content switching when matching inside a POST does not work with HTTP/2.
- When using HTTP/2, after killing a session the HTTP/2 client still has access to the application until the underlying connection is closed. Examples of closing the underlying connection are; the user closes the browser, the user does a hard reset (**Ctrl + F5**), or the connection reaches an idle timeout.
- When using HTTP/2, transparency is not used even if it is enabled. This is because one connection is mapped to multiple connections. HTTP/1.1 clients are still transparent when HTTP/2 and transparency are both enabled.
- Packet counts are not reported when using HTTP/2.

## 1.4 Support

If you have any questions or need assistance, please contact Kemp Support: <https://support.kemptechnologies.com>.

## 2 Enable HTTP/2 in a Virtual Service

Follow the steps below to enable HTTP/2 in a Virtual Service in the LoadMaster:

1. In the LoadMaster Web User Interface (WUI), go to **Virtual Services > View/Modify Services**.
2. Click **Modify** on the relevant Virtual Service.
3. Expand the **SSL Properties** section.

SSL Properties

SSL Acceleration Enabled: ☒ Reencrypt: ☐

Supported Protocols ☐ SSLv3 ☐ TLS1.0 ☒ TLS1.1 ☒ TLS1.2

Require SNI hostname ☐

Certificates

Self Signed Certificate in use.

Available Certificates

None Available

Assigned Certificates

None Assigned

>

<

Set Certificates

Manage Certificates

Ciphers

Cipher Set BestPractices

Modify Cipher Set

Assigned Ciphers

ECDHE-RSA-AES256-SHA384

ECDHE-ECDSA-AES256-SHA384

DHE-RSA-AES256-SHA256

DHE-DSS-AES256-SHA256

DH-RSA-AES256-SHA256

DH-DSS-AES256-SHA256

Client Certificates

No Client Certificates required

Strict Transport Security Header

Don't add the Strict Transport Security Header

4. Select the **Enabled** check box.

HTTP/2 is only available if **SSL Acceleration** is **Enabled**.

HTTP/2 also works with SSL re-encryption, which helps with applications that require both encrypted flows in addition to L7 functionality.

5. Select **BestPractices** as the **Cipher Set**.
6. Expand the **Advanced Properties** section.

Advanced Properties

Content Switching

Disabled

HTTP Selection Rules

Show Selection Rules

HTTP Header Modifications

Show Header Rules

Response Body Modification

Show Body Modification Rules

Enable HTTP/2 Stack

☒

Enable Caching

☒

Maximum Cache usage

No Limit ▼

Enable Compression

☐

Detect Malicious Requests

☐

Add Header to Request

:

Set Header

Copy Header in Request

To Header

Set Headers

Add HTTP Headers

Legacy Operation(X-ClientSide) ▼

"Sorry" Server

Port

Set Server Address

Not Available Redirection Handling

Error Code:

Redirect URL:

Set Redirect URL

Default Gateway

Set Default Gateway

Service Specific Access Control

Access Control

7. Select the **Enable HTTP/2 Stack** checkbox.
8. Configure any other settings as needed.

As with HTTP/1, enabling caching improves performance.

For details on each of the options in the WUI, refer to the [Web User Interface \(WUI\), Configuration Guide](#).

## 2.1 HTTP/2 Pass Through Service Type

In addition to the **Enable HTTP/2 Stack** option in **Advanced Properties**, there is also a **HTTP/2 Pass Through** Virtual Service Type. However, this only offers generic pass through. This option has no impact and should not be selected.



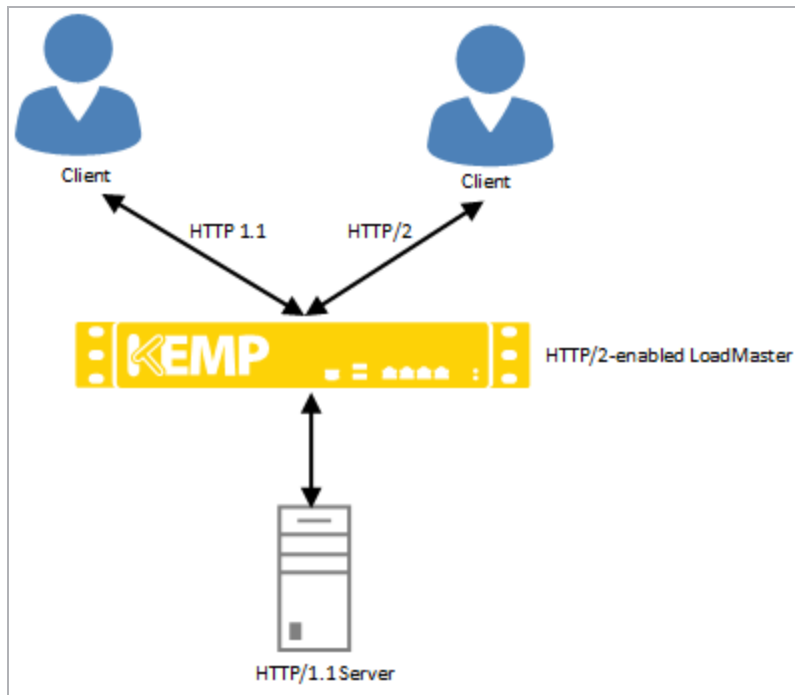
## 2 Enable HTTP/2 in a Virtual Service

HTTP/2 does not support transparency. Subnet originating, alternate source address functionality, caching, compression and body rewrites all work, as required.

# 3 Evaluating HTTP/2

To assist with the evaluation of HTTP/2, Kemp have provided a simple web page that consists of an image made up of 1024 individual image ‘tiles’. This page provides a visual guide to the optimization available with HTTP/2 as the tiled image renders much faster with HTTP/2.

## 3.1 Example Test Environment



The test environment is focused on providing a visual comparison of the same page being loaded using HTTP/2 and HTTP 1.1. A web page is hosted on a Real Server and the LoadMaster is configured with a Virtual Service for HTTP/2 and a Virtual Service for HTTP 1.1. Both Virtual Services use the same Real Server.

The following are recommended in order to evaluate HTTP/2 correctly:

- **Browser:** Google Chrome is probably the best browser to use for HTTP/2 testing. To check what browsers support HTTP/2, please visit the following website: <http://caniuse.com/#feat=http2>
- **LoadMaster:** Use LoadMaster firmware version 7.1.35 or later.

- **Web Server:** Any HTTP 1.1 capable server will suffice. The sample page provided is a simple web page with multiple images.

For the test, Kemp created a:

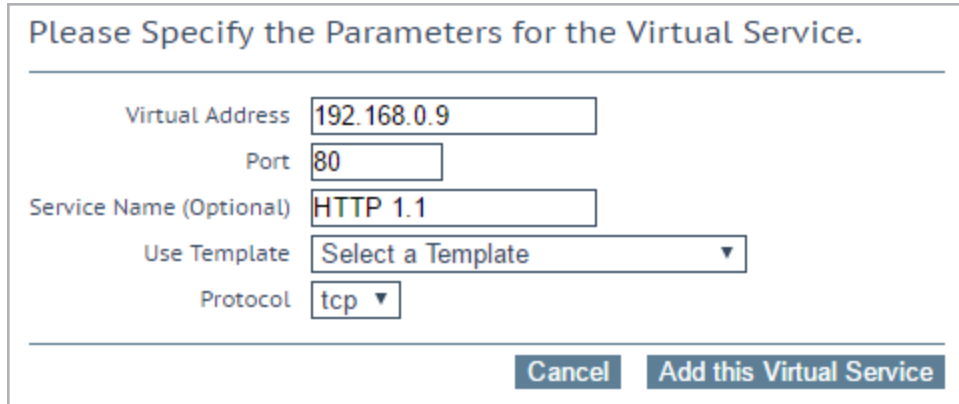
- HTTP 1.1 Virtual Service on port 80 with **SSL Acceleration** disabled.
- HTTP/2 Virtual Service on port 8080 with **SSL Acceleration** enabled.

In the example below, the Virtual Services are on 192.168.0.9 and the Real Server is on 192.168.0.10.

### 3.1.1 Create the HTTP 1.1 Virtual Service

To create the HTTP 1.1 Virtual Service, follow the steps below:

1. In the main menu of the LoadMaster WUI, go to **Virtual Services > Add New**.



Please Specify the Parameters for the Virtual Service.

Virtual Address	<input type="text" value="192.168.0.9"/>
Port	<input type="text" value="80"/>
Service Name (Optional)	<input type="text" value="HTTP 1.1"/>
Use Template	<input type="text" value="Select a Template"/>
Protocol	<input type="text" value="tcp"/>

2. Enter a valid IP address in the **Virtual Address** text box.
3. Enter **80** in the **Port** text box.
4. Enter a **Service Name**, for example **HTTP 1.1**.
5. Click **Add this Virtual Service**.
6. Configure any other details as needed.
7. Expand the **Real Servers** section.
8. Click **Add New**.

Please Specify the Parameters for the Real Server

Real Server Address	<input type="text" value="192.168.0.10"/>
Port	<input type="text" value="80"/>
Forwarding method	<input type="text" value="nat"/>
Weight	<input type="text" value="1000"/>
Connection Limit	<input type="text"/>

9. Enter the **Real Server Address**.

10. Enter **80** as the **Port**.

11. Click **Add This Real Server**.

### 3.1.2 Create the HTTP/2 Virtual Service

To create the HTTP/2 Virtual Service, follow the steps below:

1. In the main menu of the LoadMaster WUI, go to **Virtual Services > Add New**.

Please Specify the Parameters for the Virtual Service.

Virtual Address	<input type="text" value="192.168.0.9"/>
Port	<input type="text" value="8080"/>
Service Name (Optional)	<input type="text" value="HTTP2 Test"/>
Use Template	<input type="text" value="Select a Template"/>
Protocol	<input type="text" value="tcp"/>

2. Enter a valid IP address in the **Virtual Address** text box.

3. Enter **8080** (or any other available port) in the **Port** text box.

4. Enter a **Service Name**, for example **HTTP2 Test**.

5. Click **Add this Virtual Service**.

6. Expand the **SSL Properties** section.

SSL Properties

SSL Acceleration

Enabled: ☒ Reencrypt: ☐

Supported Protocols

☐ SSLv3
 ☐ TLS1.0
 ☒ TLS1.1
 ☒ TLS1.2

Require SNI hostname

☐

Self Signed Certificate in use.

Available Certificates

None Available

Assigned Certificates

None Assigned

Set Certificates

Manage Certificates

Cipher Set

BestPractices

Modify Cipher Set

Assigned Ciphers

ECDHE-RSA-AES256-SHA384  
 ECDHE-ECDSA-AES256-SHA384  
 DHE-RSA-AES256-SHA256  
 DHE-DSS-AES256-SHA256  
 DH-RSA-AES256-SHA256  
 DH-DSS-AES256-SHA256

Client Certificates

No Client Certificates required

Strict Transport Security Header

Don't add the Strict Transport Security Header

7. Tick the **Enabled** check box.

SSL is mandatory for HTTP/2.

8. Select **BestPractices** as the **Cipher Set**.

9. Expand the **Advanced Properties** section.

Advanced Properties

Content Switching

Disabled

HTTP Selection Rules

Show Selection Rules

HTTP Header Modifications

Show Header Rules

Response Body Modification

Show Body Modification Rules

Enable HTTP/2 Stack

☒

Enable Caching

☒

Maximum Cache usage

No Limit ▼

Enable Compression

☐

Detect Malicious Requests

☐

Add Header to Request

:

Set Header

Copy Header in Request

To Header

Set Headers

Add HTTP Headers

Legacy Operation(X-ClientSide) ▼

"Sorry" Server

Port

Set Server Address

Not Available Redirection Handling

Error Code:

▼

Redirect URL:

Set Redirect URL

Default Gateway

Set Default Gateway

Service Specific Access Control

Access Control

10. Select the **Enable HTTP/2 Stack** check box.

11. Configure any other details as needed.

As with HTTP/1, enabling caching improves performance.

12. Expand the **Real Servers** section.

13. Click **Add New**.

Please Specify the Parameters for the Real Server

Real Server Address

192.168.0.10

Port

80

Forwarding method

nat ▼

Weight

1000

Connection Limit

<-Back

Add This Real Server

14. Enter the **Real Server Address**.

15. Enter **80** as the **Port**.

16. Click **Add This Real Server**.

The HTTP/2 Virtual Service on the LoadMaster will communicate with the server using HTTP 1.1.

### 3.1.3 Performing Tests

To test the performance gains from HTTP/2, the simplest way is to visualize the impact by using a web page which contains a large number of elements, such as images. Kemp have provided a sample web page that displays an image made up of 1024 image 'tiles'. Simply browse to the HTTP/2 and HTTP 1.1 Virtual Services to see the difference in performance. Ensure you use a HTTP/2-enabled browser, such as Chrome, when performing this test.

The Kemp HTTP/2 test page is available here: <http://kemptechnologies.com/files/assets/tools/Kemp-TechPreview-HTTP2-TestPage.zip>

Other tools and utilities for testing HTTP/2 are listed here: <https://blog.cloudflare.com/tools-for-debugging-testing-and-using-http-2/>

# References

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

**Web User Interface (WUI), Configuration Guide**



# Last Updated Date

This document was last updated on 27 July 2023.