The Tealium Advantage

How Multi-CDN Architecture Creates the World's Fastest Tag Management Delivery Network

January 2013

Table of Contents

Introduction

Tag management systems (TMS) have been one of the fastest-growing categories in digital marketing over the last few years. The growth has in turn created an influx of tag management vendors. However, not all tag management solutions are the same. During the vendor selection cycle, one of the key considerations should be the tag management architecture, since it directly impacts the performance of the tag management system.

This paper outlines the two key components of TMS architecture: design and network.

What is Tag Management?

Tag management is a system that lets users manage their digital marketing tags on the fly without taxing IT organizations. This includes adding new tags or deleting/editing existing ones. Unlike container tags where all tags are loaded on all pages—whether needed or not—one of the core value propositions of an enterprise TMS is its ability to load the required digital marketing tags based on business rules or conditions. Requirements may vary from client to client, but the following are some examples of common load conditions:

- Load a tag only on the confirmation page
- Load an AdWords tag only on the confirmation page *and* only if AdWords is the source of traffic
- Load an affiliate tag on the confirmation page *only* if the traffic was attributed to the affiliate in the last 30 days
- Load a tag for registered users only
- Load a tag randomly for only 30 percent of site visitors

A key criteria of any enterprise TMS is therefore the conditional logic that can be applied when loading tags.

Tag Management Performance

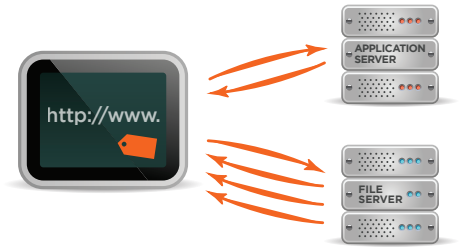
There are several factors that affect the performance of tag management systems. Of course, there are several JavaScript techniques—such as asynchronous tag loading and slow tag killing—that can improve TMS performance. For a more detailed explanation of each, we invite you to review the white paper "How Tealium Improves Site Performance." However, there are two primary areas that determine the performance of a TMS. They are the TMS Design and the TMS Network, both of which are explained in this paper.

Tag Management System Design

As mentioned previously, one of the primary roles of a TMS is to determine which tags to load under which conditions. Most traditional vendors utilize an application server for this logic. In this method, when a web page loads, a request is made to an application server. The application server determines which tags need to be loaded (based on logic defined by the user) and sends a request back to the page outlining which tags should be loaded. Once the instruction is received, the page subsequently loads the tags from a file server, at which point they're executed. This application server request is subsequently made on every single page, regardless of whether new tags are needed.

A more scalable and better-performing design (Figure 1) is to bypass the application server round-trip, thus improving performance. In this method, the logic that dictates which tags to load can be incorporated in a small JavaScript file which is loaded once per session and then cached in the browser. When the page loads, the JavaScript executes and determines which tags to load. The subsequent tags are then loaded from a file server and fire the corresponding pixels. In this model, the application server is eliminated, resulting in savings of between 200ms and 500ms depending on the vendor.

Figure 1 – Traditional vs. modern tag loading



Traditional TMS

Step 1: Tag application server determines which tags need to be loaded and sends instructions back to the visitor's browser.

Step 2: Once instructions are received, the web page requests those files from the file server.

Modern TMS

Tealium's on-page JavaScript determines which tags need to be loaded and requests those files from the file server.

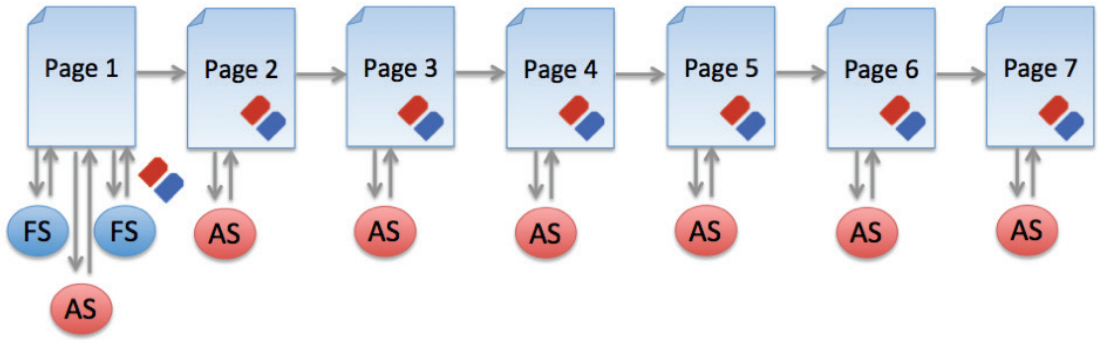
Two Different Approaches

In order to better demonstrate the difference, consider figures 2 and 3, which both show a session (or visit) consisting of 7 page views and running two web analytics solutions (shown as red and blue tags).

In the traditional model (Figure 2), when the visitor lands on Page 1, the solution loads the main library from a file server (referred to as "FS"). The JavaScript then makes a request to an application server (referred to as "AS"). The application server determines which tags need to be loaded on the page and sends instructions back to the browser. The browser then sends a request to a file server where the necessary tag libraries are downloaded.

On each ensuing page (pages 2-7), the original library makes a call to the application server to determine what tags are needed. The application server sends back a request with instructions on which tags to load. But this time, because the tags are already cached in the browser, there's no more call to the file server. So even though no new tags are needed, an extra request to the application server is added to the process. Tag management gets in the way of tagging, introducing an unnecessary point of failure, and extra time for completion.

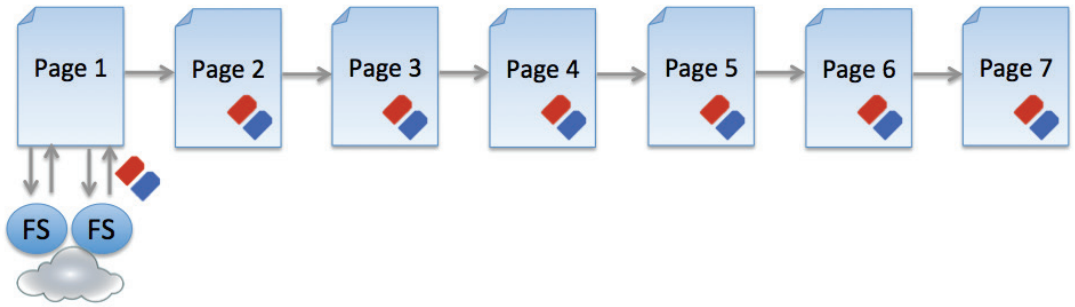
Figure 2 – Tag management with additional point of failure



Now contrast this with the Tealium method. When the initial JavaScript file is loaded, it can determine which tags need to be loaded and makes another request to the file server to download any required tags.

On each ensuing page (pages 2-7), the libraries associated with the two analytics tools are already cached in the browser. As the visitor goes from one page to next, there's no requirement to load any additional libraries and therefore no additional connections or requests are introduced. This method is optimal, scalable, eliminates unnecessary server calls and is therefore faster as it shaves about 200ms to 500ms from each page load compared to traditional tag management techniques.

Figure 3 – Tag management with no application server calls



	Tealium Design	Traditional Design
Lag time introduced	None	200ms – 500ms depending on vendor
Server point of failure	None	Yes

The Tag Management Network

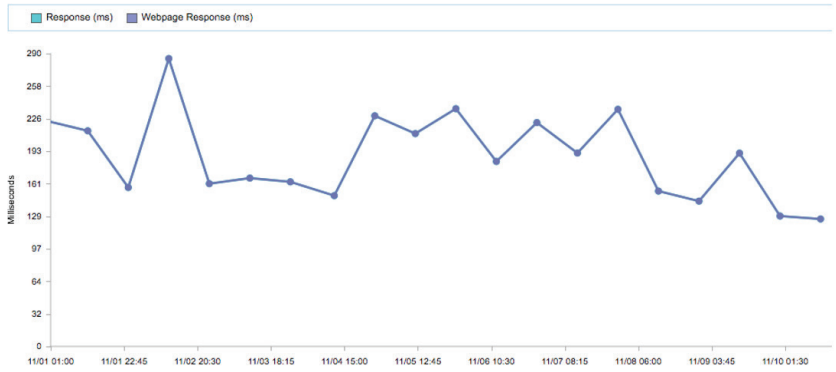
The network denotes the delivery network through which tags are loaded. The speed and reliability of the network plays a key role in TMS performance. Tealium has created a best-of-breed network for delivering tags to customer sites. The Tealium network consists of multiple content delivery networks (CDNs), all optimized for small objects and constantly tuned for performance. Tealium is the first tag management vendor to use a multi-CDN approach to ensure optimal performance.

Before we dive into the details, it is important to discuss a bit about CDNs. A CDN is a collection of servers spread around the globe designed to serve content from servers near the user. As a result, a San Diego visitor is going to get content from a server in San Diego—or nearby—as opposed to a server on the other side of the globe. CDNs provide faster delivery of content to all visitors.

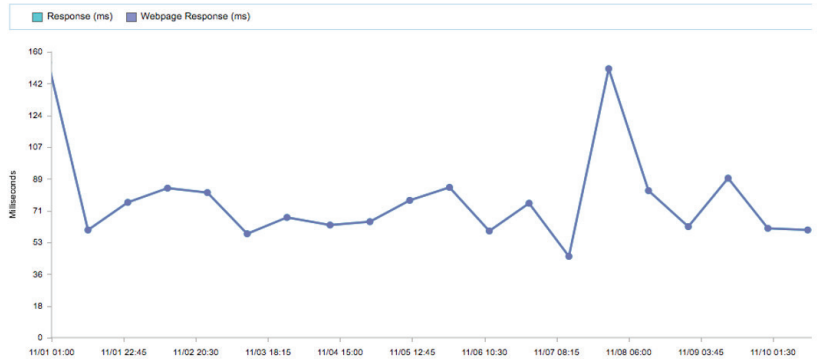
However, not all CDNs are the same. In our tests we often see a great level of disparity between different CDNs. For example, some CDNs have a better performance in North America while others perform better in Europe, Asia or Latin America. Figures 4, 5 and 6 show response times for three leading CDNs across the globe, North America and Europe during the same periods.

Figure 4 – Response times for CDN 1 across the globe, North America and Europe

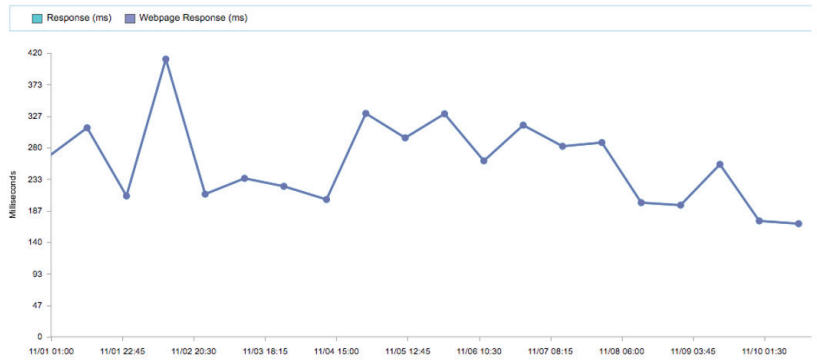
CDN 1
All Traffic



CDN 1
North America



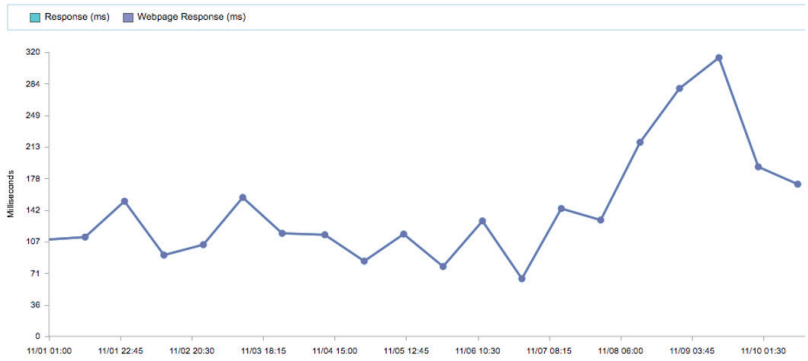
CDN 1
Europe



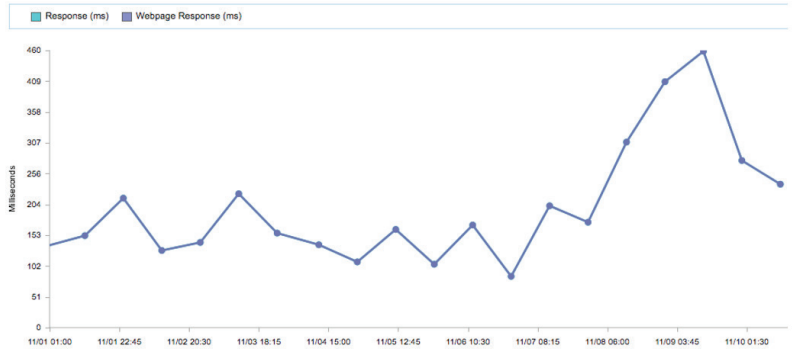
Source: Catchpoint, a leading performance-monitoring service

Figure 5 – Response times for CDN 2 across the globe, North America and Europe

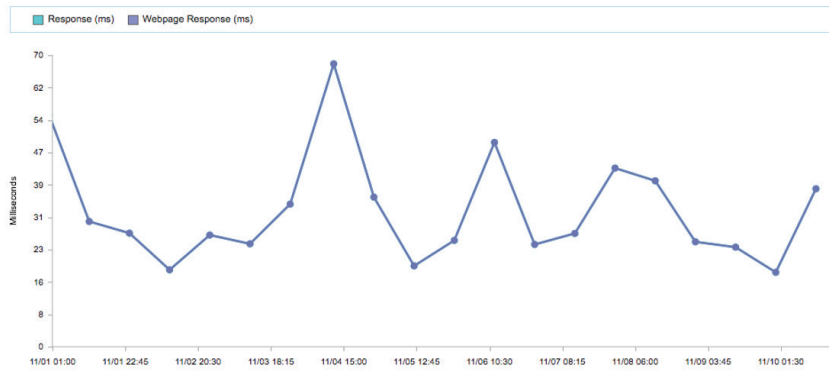
CDN 2
All Traffic



CDN 2
North America



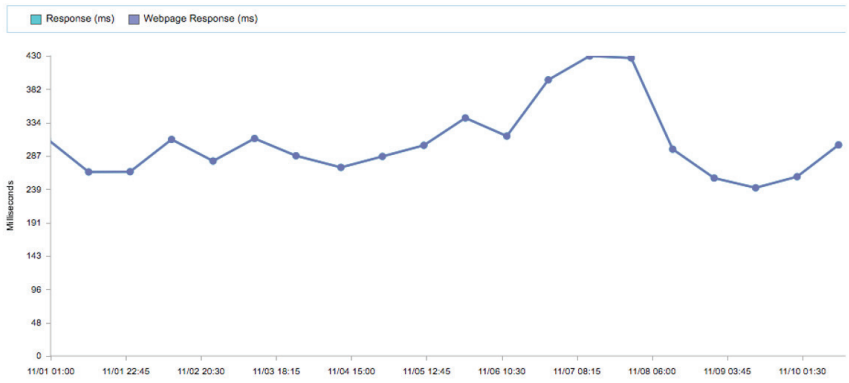
CDN 2
Europe



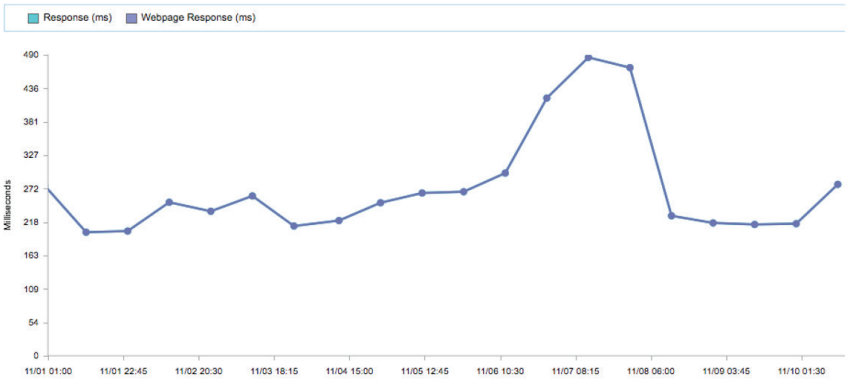
Source: Catchpoint, a leading performance-monitoring service

Figure 6 – Response times for CDN 3 across the globe, North America and Europe

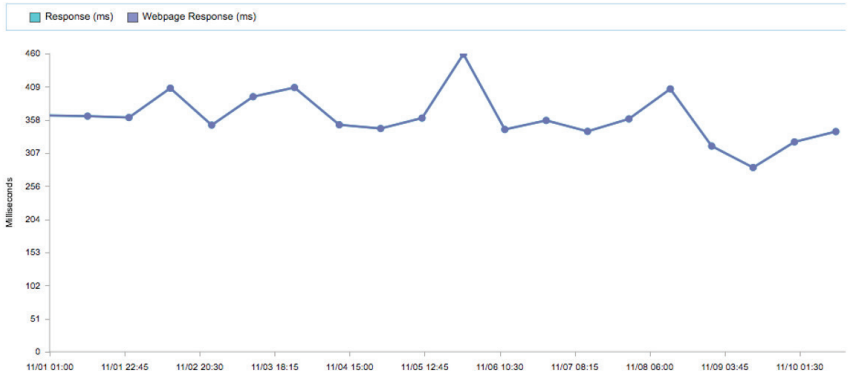
CDN 3
All Traffic



CDN 3
North America



CDN 3
Europe



Source: Catchpoint, a leading performance-monitoring service

These figures clearly show differences in performance depending on three key factors:

1. Not all CDNs are equal. You can see, for example, that the average response time of CDN 3 is higher than CDNs 1 and 2.
2. CDNs have regional strengths. CDNs 1 and 3 show better performance in North America while CDN 2 shows better performance in Europe.
3. CDN performance can vary by time. A perfect example would be CDN 3. You can see that during the 2012 US election, held on November 6, CDN 3 response time increases in North America, but not in Europe. This CDN is indicative of a network that serves many media sites in the US, and therefore notices a big increase in network traffic during a high US news cycle.

The Tealium network takes all these factors into consideration. The network consists of three leading CDN providers: Akamai, Limelight Networks and Edgecast. Each CDN is constantly monitored every 10 minutes for performance across 30 regions in the world. For each region, the network serves tags from the CDN showing the best performance during that time. This two-dimensional optimization guarantees that tags are delivered from the fastest CDN in any given region, at any given time.

To show this in action, consider figures 7 and 8. Figure 7 shows the peaks and valleys of three networks during a specific period of time. Figure 8, however, shows the best response times associated with the same three networks during the same period. Because Tealium creates a "competitive marketplace" for its customers' tag delivery, customers take advantage of the best performance of leading CDNs at any one point.

In real-world testing, Tealium found this multi-CDN strategy shaved an additional 100ms in tag delivery time over an already fast single-CDN approach, ensuring complete redundancy and creating the fastest tag delivery network in the world.

Figure 7 – Response comparison of three CDNs using a leading performance-monitoring service

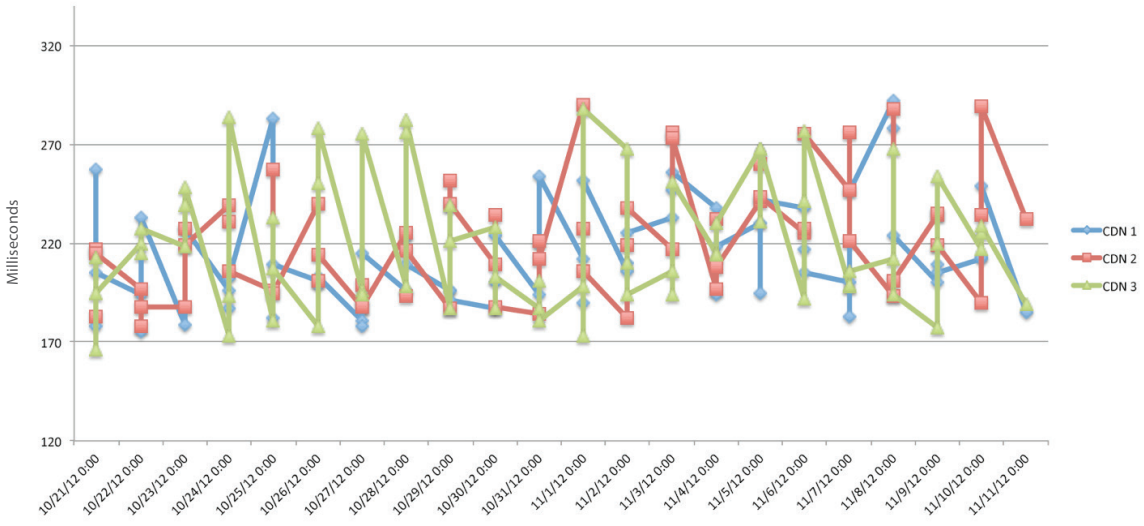
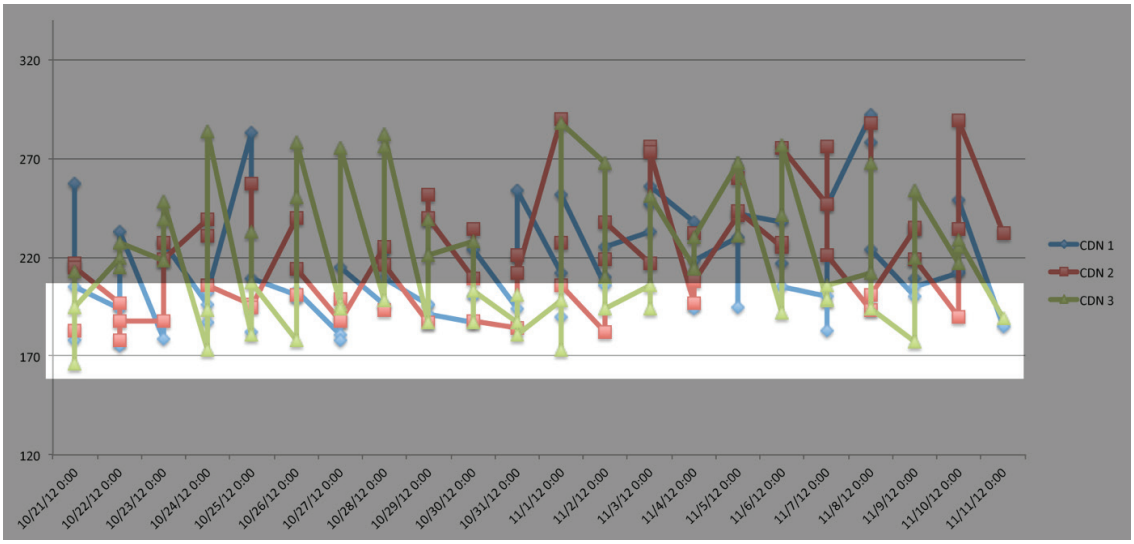


Figure 8 – Tealium serves its customers' tags from within this zone of peak performance, choosing the best-performing CDN at any one time.



Conclusion

To summarize, let's review the steps taken by tag management systems and how each step can be optimized:

- An initial file is loaded from a network. Performance gains are achieved using a superior network.
- The system has to decide which tags to load. Traditional TMS architecture introduces an unnecessary application server request whereas a modern TMS can do this instantly within the client browser.
- Following the conditional logic, proper tags are loaded on the page. Performance gains are achieved using a superior network.

These steps are demonstrated in the table below.

Step	Tealium	Others	Advantage
Load initial file	Use optimized multi-CDN	Traditional CDN or vendor tag delivery network	Tealium
Determine which tags to load	No extra round trip to the server introduced	Extra round-trip, point of failure introduced	Tealium
Load tag libraries	Use optimized multi-CDN	Traditional CDN or vendor tag delivery network	Tealium

The Tealium technological advantage can therefore be summarized as a combination of better design and better network architecture, making it the fastest tag management solution on the market today.

For more information about Tealium solutions, visit www.tealium.com or email info@tealium.com.

TEALIUM

UNITED STATES
11085 Torreyana Road
San Diego, CA 92121
(858) 779-1344

UNITED KINGDOM
20 Hanover Square
London, W1S 1JY
+44 (0) 7771 924754

GERMANY
Neuer Wall 50
20354 Hamburg
+49 408 22186462

CONNECT
www.tealium.com
info@tealium.com
Twitter: @tealium