Capitalize on Mobile Commerce with Responsive Web Design
Introduction
While many factors contribute to successful commerce, mobile’s influence on everything from the in-store experience to the ultimate purchase is undeniable. In 2015, mobile discussions mainly centered on how to best take advantage of its growing influence in commerce. One key approach has been the adoption of Responsive Web Design (RWD). While largely accepted as an industry best practice, RWD is not without its shortcomings — namely it’s negative impact on site and application performance. This e-book focuses on RWD and outlines three ways to extract maximum value from it.

Welcome to the Mobile-First World
We are a mobile-first world, and the numbers prove it:

- Roughly 2/3 of Americans own at least two digital devices
- 4 out of 5 smartphone users check their phones within 15 minutes of waking up
- On average, U.S. smartphone users access 26.7 apps per month
- Nearly 68% of emails are opened on mobile devices (i.e., smartphones and tablets)
- Mobile users check their phones 221 times a day

Akamai’s own research provides further proof of the major inroads mobile has made into our lives: 38.2% of all global traffic comes from mobile. And “mobile” shoppers who shop on multiple devices (i.e., tablet, desktop, and mobile) outspend the average desktop-only counterparts by $810 a year per shopper and are 2x more likely to make purchases of $250 or more. This is further supported by findings from Forrester showing that “36% of U.S. online smartphone users research physical goods on their devices at least once a week and about 30% are using shopping apps monthly.”

That said, the fact remains that mobile commerce conversion rates across industries are lower than on desktops — in Q4 2015, conversion rates on a smartphone were 1.53% globally, compared to 4.53% for desktop. As a result, many in the retail, travel, and hospitality industries are (overly) cautious about dedicating budget and efforts to this channel — but that needs to change. The value of the mobile channel is far more than is represented in legacy last-click attribution metrics.
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Mobile Jump-Starts Transactions

According to Google, 82% of smartphone users turn to their phones inside a store when making purchase decisions. Furthermore, Google also found that 93% of people who use mobile for research go on to complete a purchase of a product or service through other means. In other words, even though someone doesn’t purchase directly from a mobile device, that mobile device can be a critical factor in the purchase process. In fact, mobile devices influenced more than $1 trillion in total purchases in 2015 according to Forrester.

THE PATH TO PURCHASE IS INCREASINGLY DIGITAL

According to 2016 reports by Google:

- Shopping-related searches increased 120% in the last year
- Mobile makes up 88% of all “near me” searches, with those mobile searches growing at 146% year over year
- 50% of consumers who conduct a local search on their smartphone visit a store within a day, and 18% of those searches lead to a purchase
- 82% of shoppers say they consult their phones on purchases they’re about to make in a store

While Thanksgiving 2015 saw mobile traffic overtake desktop traffic by an even larger margin than in 2014 [See Figure 2], Black Friday 2015 was also a record setter with a 300% boost in cellular usage. This signals the very nature of how consumers use their devices in their shopping journeys. First, they search for products and stores using whatever device is most convenient, be it mobile, desktop, or tablet, via WiFi connections at home or work. Then they get in their cars or onto public transportation with their smartphones — and connect to 3G/4G networks — as they travel to stores. Once in stores, they again get on their devices — and stores’ congested WiFi networks — to confirm pricing and inventory.
Companies that can ensure a frictionless experience on devices are positively impacting revenues. Do it well enough, and your organization will eventually see more sales directly via mobile devices.

Consider the recent implementations by Home Depot to make the pre-shopping experience as interactive as possible and reduce customer friction by reaching customers where it is most convenient for them — often on the mobile device. Knowing their stores are large and are sometimes perceived as challenging to navigate, Home Depot developed an app to better equip their customers to find items in their store. They architected their app with store inventory and beacon technology, allowing customers to build a shopping list that once in store, that will guide them to products on their list or direct them to in-store associates for assistance when necessary.

In addition to improving the general shopping experience for customers, Home Depot also identified a potential pain point for customers looking to purchase paint. Standard practice for these customers was to visit the physical store, pick out paint swatches, then return home to compare those swatches in the rooms they wanted paint. Home Depot sought to reduce the requirement to make multiple trips between the store and home and improve customer experience by developing an augmented reality (AR) app. This app allows users to see how different colors will look on their walls without needing to visit the store first. Those using the app will be able to identify which color paint works best for their room and have it in mind when visiting the store, improving customer shopping efficiency and reducing the burden on store staff.

Similar approaches have been adopted by brands like Ikea and Walmart, and the latter saw the benefits borne out by more than 70% of traffic coming from mobile devices during the 2015 holiday season resulting in an overall increase in annual revenues. This is a global trend: worldwide, the mobile share of retail commerce jumped to 35% in Q4 2015 [See Figure 3].

![Mobile Transactions Are Increasing](image)

The amount of shoppers who made a purchase on a mobile device increased 2.5x from 2009 to 2014.12
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Mobile Lags in Delivering a Sophisticated, Friction-free Experience

The challenge is for your company to deliver a mobile experience on par with consumer expectations in other realms of their lives — and the bar keeps rising. While consumers love the convenience of always-on connectivity in the palm of their hands, their mobile device experiences sometimes fall short.

Sites designed for desktop users are often difficult to navigate on mobile devices and users are forced to pinch and zoom, or they struggle to smoothly use drop-down menus, forms, and shopping carts. Even sites designed for mobile, such as mDot sites, can frustrate users because they lack the features and information — such as product details, videos, or product reviews — available on the desktop site. To further complicate the issue, mobile networks struggle to deliver the large, high-quality content consumers demand. As a result, it can take insufferable amounts of time to access data and images via mobile devices due to high network latency (i.e., the time delay between requests and responses) and packet loss.

The effect on users is real: 49% of consumers expect a page to download in less than 2 seconds and 18% expect a page to load instantly.\textsuperscript{13} This shows the influence of sites like Facebook on consumer expectations. Consumers may not realize it, but Facebook downloads articles in the background, giving the impression that when the user clicks the link, the article appears instantly. The real issue for businesses isn’t consumers’ increasing expectations, it’s how they react to bad experiences. If customer expectations aren’t met, 50% will abandon [See Figure 4]. Overall, mobile users are least likely to return to a website where they had a dissatisfying experience.\textsuperscript{14} In fact, the same expectations carry over to mobile apps: a survey by Quixey found that one of the two main reasons respondents disliked using mobile apps was because “they are slow and have inconsistent performance.”\textsuperscript{15}

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Exacerbating matters is the variety of mobile devices — which are brought to market across different carriers, operating platforms, and browsers — making it difficult to ensure a consistent user experience. Consider the fragmentation of Android devices alone. Between 2014 and 2016, the number of different Android devices climbed from nearly 12,000 to more than 24,000 [See Figure 5].

**Android Device Fragmentation in 2016: 24,093 Devices**

![Android Device Fragmentation](image)

Let's not overlook the common concern of whether to reach users via the mobile web or a mobile app. The fact is, it’s challenging to become one of the handful of apps users turn to repeatedly on their devices. On average, 20% of apps are used only once. The most successful apps usually employ some sort of loyalty program to encourage continued usage. But even very successful apps, such as the Starbucks app, still rely on a mobile-friendly website to service customers who are not ready or willing to download the app.

With 50% of transactions happening across devices, you need to focus on delivering a consistent experience across devices instead of focusing on the device itself. That’s why you should employ a multi-prong strategy that addresses both the mobile browser and mobile apps.

**RWD: The What and Why**

As previously mentioned, Responsive Web Design is gaining popularity due to its ability to ensure a seamless experience across the multi-device shopping journey. Consider a recent survey of North American retailers: nearly 60% of respondents said mobile — including responsive design and app development — was in their top three priorities for digital business in 2016.

At its simplest, responsive design refers to a set of techniques that allow a website to dynamically display a fluid layout that serves the desktop or mobile device. The goal of responsive design is to optimally deliver a site that allows easy navigation without the need to pinch and zoom or scroll horizontally on a wide range of devices. In the past, mDot and tDot sites would often lag behind the www site as it took time to integrate new features into multiple, different sites. With a single code base due to RWD, new features can be rolled out to all sites and devices at the same time.
Unfortunately, misunderstandings about RWD leave many businesses feeling frustrated and disappointed about this design approach. First, let's clarify the intent of RWD. Conceptually, RWD means designing a single website that “responds” to the current device screen size and screen orientation by using fluid grids to change the page design accordingly.

From a technology standpoint, the RWD framework calls upon a combination of flexible grids, flexible layouts, fluid images, and intelligent use of Cascading Style Sheets (CSS) media queries. Media queries are CSS triggers you can use to set various break points to change the look of your site based on a minimum or maximum screen size. In other words, you can make sure your site is consistent whether someone is viewing it on a device with a 200-pixel wide screen or an 800-pixel wide screen. By dynamically scaling images and page layouts, RWD eliminates the need for device users to pinch and zoom or resize to get the optimal view.

RWD enables you to deliver a seamless experience across many devices by making it appear as if your web pages were written exclusively for the device that's accessing your site. In this way, RWD helps circumvent the issues caused by device fragmentation — and even helps future-proof an online presence for devices that haven’t yet been launched. The advantages of RWD also include a single code base, which translates into less maintenance, along with a single URL, which can improve SEO.

**Why Responsive Web Design Often Falls Short**

While RWD is a great solution to the display portion of the user experience problem, it can negatively impact performance in the form of over-downloading, specifically on mobile devices. RWD downloads all of the content on a page, even elements that may be hidden via CSS — and that can mean lots of unnecessary content is downloaded [See Figure 6].

Because RWD operates on a single code base, the same HTML is delivered to all devices, and CSS is used to render the display depending on device characteristics. Browsing a responsive website on a small screen (i.e., mobile device) usually means that less content is shown, images are smaller, and so on. But when using RWD, this reduction rarely translates to a reduced payload. Add to this the fact that cellular bandwidth is typically 3-4 times slower than fixed lines. Even worse, latency on cellular networks is often 10 times higher than on fixed lines. Combined with congestion and packet loss concerns, cellular network performance is far behind the times when it comes to satisfying user expectations.

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**GOOGLE HAS SPOKEN: MOBILE-FRIENDLINESS MATTERS**

Starting on April 21, 2015, Google incorporated the “mobile friendliness” of a site in its ranking algorithm.
3 Easy Ways to Overcome the Shortcomings of Images in Responsive Web Design

By taking advantage of unique technologies from Akamai, your business can ensure its website and applications display quickly and reliably on any mobile device. In other words, you can deliver a seamless user experience that keeps prospective and existing customers coming back.

A common rule across the vast majority of websites is that the heaviest content is the images. Very likely your images account for at least 40% or more of the total weight of your page. When users surf your website on a desktop via a broadband connection, downloading this heavy content often poses no issues — but when they are accessing your site or app via a mobile device, images take longer to download. Add to this that mobile users are often connecting over cellular networks, and images and scripts can render more slowly due to the less powerful processor on the device.

RWD delivers images in a fluid manner and scales them to fit the device. While great for display, this can be bad for performance. When a large, high-resolution image is delivered to a small device, the image might fit the device window, but the actual size and weight of the image do not change. To further compound the problem, mobile devices often are downloading content over a network (like 3G/4G) suffering from high latency. In fact, the average responsive website uses roughly the same amount of image bytes, regardless of screen size. As a result, user performance will suffer [See Figure 7].

1) Adapt to network conditions

Akamai’s Adaptive Image Compression adjusts compression parameters in real time based on changing end-user network conditions, delivering the optimal balance between image quality and download time [See Figure 8]. This way, users enjoy high-quality images when network conditions are good without suffering from slow performance when conditions are poor. Adaptive Image Compression is a hands-off solution that does not require any changes to the website and automatically applies compression to any image request.

Another option is to maintain a single “master” or pristine image that gets resized for different devices based on the rules you set. You can enable this through Akamai Image Converter Cloudlet, which lets you dynamically adjust image dimensions, format, crop, and more in the cloud as needed for each situation. You simply add a query string to the image URL to instruct the Image Converter Cloudlet which action to take and which parameters to apply. The advantage to this solution is that it solves many of the use cases required for responsive images. Resizing the image will allow different-sized images to be delivered for different view-port sizes and screen resolutions. In addition, you can ensure the best visual experience by automatically cropping the image.
Automatically create and deliver web-ready images

Traditionally, retailers have implemented a desktop only approach for images. Let’s examine how this can complicate image management. A retailer may need to resize a single product image into a product view, and a thumbnail image, resulting in three different image variants. Then, to properly optimize for mobile and tablet, retailers must create the correct image sizes for various devices, so that a mobile user is not forced to download a full-size image only to have it displayed on the device as postage stamp sized. Newer browsers also enable more efficient image formats such as WebP for Chrome and JPEG 2000 for the Safari browser. Creating and storing all the proper sizes and variants can put a strain on resources for both storage and maintenance -- as the number of images created for a single product easily can jumps to 108 or more [See Figure 9].

Akamai Image Manager provides a full suite of image management functionalities that can be integrated directly into your digital asset management workflow. Through configuration policies, you can upload a single pristine image to Akamai cloud storage and automatically create all the size and quality image variants you need. This allows you to address all the variables you need to serve desktop and different mobile device families. For instance, you may create the same dimension image for a Retina device but at a higher quality than for older Android devices. Image Manager also allows you to take advantage of newer, high-performance image formats. You could automatically serve WebP images to someone on a Chrome browser or JPEG 2000 to someone on the Safari browser without any server-side changes. Your website simply calls a single image URL and Akamai will deliver the best image, automatically tuned to the right human-perceptible image quality and adjusted to device size. Both Image Converter and Image Manager can be used in conjunction with Adaptive Image Compression to further optimize image delivery over variable network conditions.

By utilizing a cloud-based image management solution, you improve your mean time to recover and disaster-recovery backup size is decreased because you will no longer need to store a range of image sizes — and that means a faster site recovery.

2) Enhance the perception of a fast page load

Regardless of the actual time it takes a page to download, users consider a page to be downloaded as soon as it appears to be visually complete and they can interact with it [See Figure 10]. With that in mind, you can take advantage of Akamai’s automated Front End Optimization (FEO), which streamlines and speeds up existing web content in real time. To be effective, FEOs need to be customized for the end-user environment, because different browsers and devices behave differently.

Akamai’s platform handles different situations seamlessly, creating multiple possible optimizations and intelligently applying the appropriate ones to each request based on real-time factors such as the end-user’s browser version, device, and network speed. Using a range of techniques — including the delayed loading of third-party scripts and running all JavaScript asynchronously — Akamai FEO intelligently reduces requests and bytes and accelerates rendering while taking advantage of the full capabilities of each user’s specific setup to deliver the best possible experience.

Users don’t care why pages load slowly; they just get frustrated at the wait and often give up in frustration. Perhaps worse, they then consider their experience to be a reflection of the brand.

![Figure 9](image1.png)

![Figure 10](image2.png)
3) Take advantage of server-side device awareness

As mentioned previously, RWD can be prone to over-downloading since it sends the same images and HTML to the mobile device that it sends to the desktop. Adaptive Delivery offers an alternative approach where the web server detects the device and delivers specific distinct layouts based on device and screen size. While this has the benefit of sending the user a smaller version of a website that holds only what a small screen needs, it can be more difficult to maintain and can put more load on origin servers, causing scalability issues. The ideal solution is to combine Adaptive Delivery with a responsive client side. That brings us to RESS (Responsive + Server Side components), which is a slight deviation from “pure” responsive web design [See Figure 11]. In the RESS method the front end of the site will have the advantages of a fluid RWD design while the back-end code will utilize Akamai’s Edge Device Characteristics to remove portions of the code based on the device — only sending the code needed, thereby improving performance and caching.

Customer Success Story: Hautelook

By taking advantage of the power of Akamai’s unique technologies, businesses can generate greater returns from their investments in RWD. Consider the example of Hautelook. Hautelook operates a premier members-only site, offering private, limited-time sale events on the world's top brands for women's and men's fashion, accessories, beauty, kids, home, and travel. When selling fashion and apparel, images are critical to encouraging online purchases. Consumers want to fully visualize a product before they hit the buy button. In fact, Hautelook prides itself on delivering images that allow shoppers to feel as though they are having a live, in-person shopping experience.

With over two-thirds of Hautelook’s customers on non-PC devices, the online retailer must create a range of image variants to satisfy shoppers on different devices. For some time, the company used an internally developed image management tool to enable this level of visualization. While Hautelook’s software could resize images on the fly, the company was still challenged by management and scalability issues. It was also complicated and expensive to maintain the software in its data center. Plus, Hautelook struggled to scale the software to support daily peak traffic.

Using the Akamai Image Converter Cloudlet, Hautelook offloaded management of numerous components in its data center by eliminating its on-premise image solution. Just as important, it was able to scale images appropriately based on the shopper’s device and connection. For instance, it could deliver high-resolution images to those using devices with Retina displays over WiFi and lower-resolution images to those on smaller phones and slower cellular connections. Moreover, being able to instantly access new versions of image-resizing software helped ensure the retailer’s daily product releases without delay.

Akamai’s Ion Mobile solution enables us to deliver incredibly performant [sic] mobile experiences to our users all around the globe. Using this solution, we can reduce loading times and provide a much better experience on the mobile platform.” — Andrew Vilcsak, Mobile Engineering Lead, Airbnb.
Conclusion: Make Responsive Web Design Pay Off

As a best practice, Responsive Web Design is an integral part of many mobile strategies. While this design approach offers many benefits, it's important to recognize its shortcomings in terms of performance impact. To deliver a truly seamless and satisfying end-user experience across devices, companies must pair RWD with technologies designed to overcome these deficiencies.

Akamai provides a range of integrated, on-demand services proven to help consistently deliver an optimal experience to consumers anywhere, on any device. With Akamai’s solutions in place, retailers and travel & hospitality brands can supercharge their mobile web and application delivery and drive higher commerce returns globally.

Want to find out how your responsive site stacks up? Get a complimentary report on your site’s performance.
Source

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