The need for mobile speed

Better user experiences, greater publisher revenue

The need for mobile speed

Chapter 1

How fast should mobile sites be?

Chapter 2

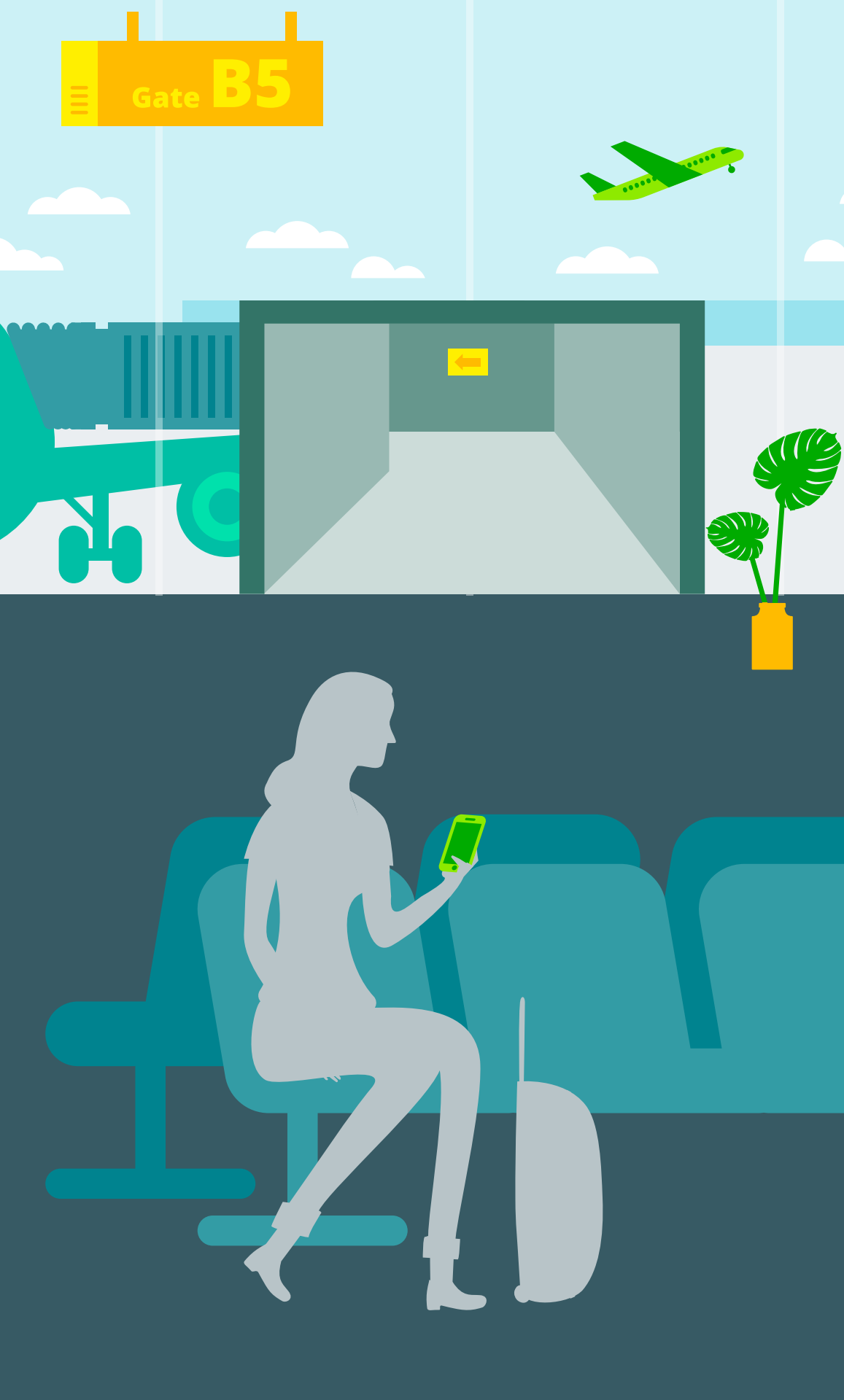Why are mobile sites so slow?

Chapter 3

Why does mobile speed matter?

Chapter 4

How can you make mobile sites fast?

DoubleClick
by Google

Introduction

We depend on our mobile phones for just about everything — finding information when we need it, booking flights and even enjoying our favorite TV shows. We don't just expect to have all the world's information at our fingertips — we expect to get it the instant we're looking for it. Unfortunately, mobile sites don't always live up to this expectation, despite major advancements in network speed and device processing power. Slow loading sites frustrate people with bad user experiences and negatively impact publishers.

To study the extent of this problem, we evaluated over 10,000 mobile web domains. Using data generated from Webpagetest.org, Google Analytics and DoubleClick, we looked for what makes mobile sites slow and determined the impact speed has on user engagement and revenue. We found:

- Over half of all mobile site visits are abandoned if the page doesn't load within 3 seconds[1]

- 3 out of 4 mobile sites take longer than 10 seconds to load and the average time to load is 19 seconds[2]

- While there are several factors impacting revenue, our model projects that publishers whose mobile sites load within 5 seconds earn up to 2X greater mobile ad revenue than those whose sites load within 19 seconds[3]

Mobile web speed is a problem, but you can fix it on your mobile site and put yourself at the front of the pack.

1.Google Data, Aggregated, anonymized Google Analytics data from a sample of mWeb sites opted into sharing benchmark data, n=3.7K, Global, March 20162.
2. Webpagetest.org, Sampled 11.8K global mWeb homepage domains loaded using a fast 3G connection timing first view only (no cached resources), February 2016
3. Google Data, Aggregated, anonymized Google Analytics and DoubleClick AdExchange data from a sample of mWeb sites opted into sharing benchmark data, n=4.5K, Global, June 2015 - May 2016

**Chapter 1**

How fast should mobile sites be?

People need mobile speed every day.

Imagine you've just landed at the airport in a new city for an important business meeting. Hurrying through the terminal, you're looking at your phone for a restaurant recommendation to take your client to dinner. From baggage claim to the taxi line, only two pages load. What are you going to do?

Closing out slow-loading sites is something most people know well. The world's fastest cars can go from 0-60 in less than three seconds,[4] but the majority of mobile sites don't load that quickly.

53% of visits are abandoned if a mobile site takes more than three seconds to load[5]
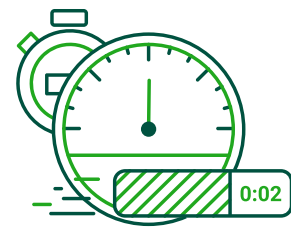
1 out of 2 people expect a page to load in less than 2 seconds[6]

4. Autosaur, "Fastest Car In The World: The Ultimate Guide" March, 2016
5. Google Data, Aggregated, anonymized Google Analytics data from a sample of mWeb sites opted into sharing benchmark data, n=3.7K, Global, March 2016
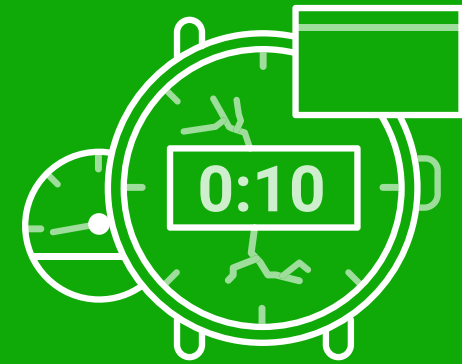6. Akamai Technologies, "Consumer Web Performance Expectations Survey", 2014

1

77% of mobile sites take longer than 10 seconds to load on 3G networks

0:10

19 seconds
is the average load time for mobile sites on 3G networks

0:19

Measuring mobile sites

You could finish washing your hands faster than the time it takes most sites to load on a 3G or 4G connection.[7] Three out of four mobile sites we analyzed took 10 seconds or longer to load.[8] And that's just homepages. Leaf pages — which constitute the majority of web content — tend to be almost half as slow.[9]
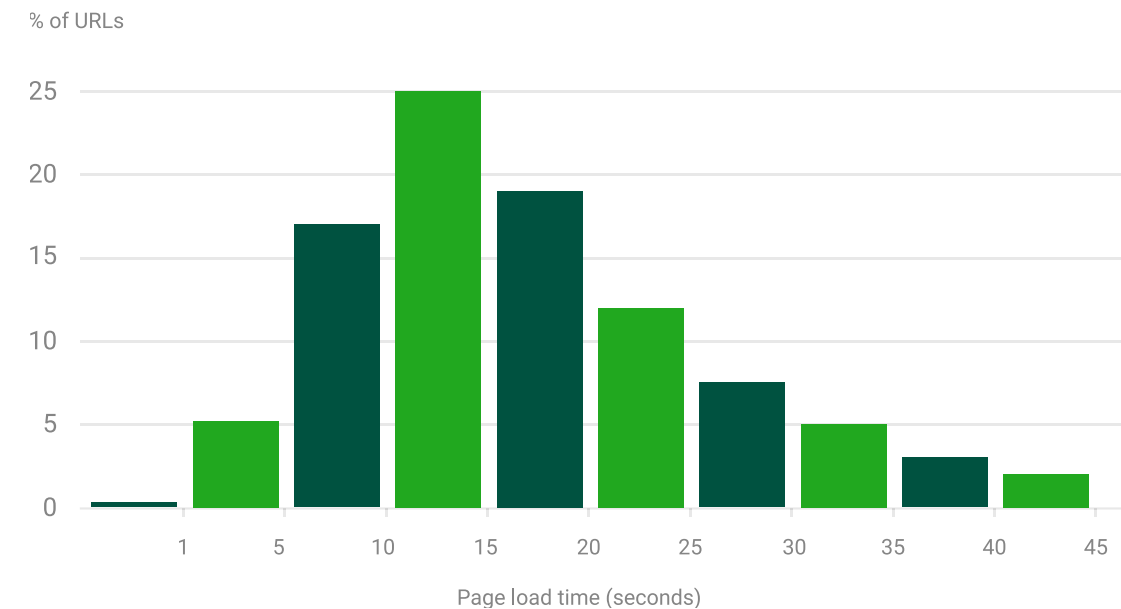
Average load times are even slower. On 3G networks, the average load time for a homepage is 19 seconds.[10] You could go up 60 floors in one of the world's fastest elevators[11] and still be waiting for a single page to load. **On a 4G network the average time isn't much better: 14 seconds.**[12]

% of URLs

Page load time (seconds)

7. CBS, "95 percent of people wash their hands improperly: Are you one of them?" June 2013
8. Webpagetest.org, Sampled 11.8K global mWeb homepage domains loaded using a fast 3G connection timing first view only (no cached resources), February 2016
9. Webpagetest.org, Sampled 11.8K global mWeb homepage domains loaded using a fast 3G connection timing first view only (no cached resources), February 2016
10. Webpagetest.org, Sampled 11.8K global mWeb homepage domains loaded using a fast 3G connection timing first view only (no cached resources), February 2016
11. Business Insider, "Asian Skyscrapers Dominate A New List Of The World's Fastest Elevators", January 2013
12. Webpagetest.org, Sampled 11.8K global mWeb homepage domains loaded using a fast 3G connection timing first view only (no cached resources), February 2016

Why are mobile sites so slow?

A mobile site is like a backpack — it can be a neat and organized way to carry what you need, so long as you don't overload it.

If you overload your backpack, not only will it weigh you down, but the items in your bag could get wrinkled, bruised or damaged from overcrowding.

Let's examine the three key factors we've found to **slow down mobile load times: file size, element order and server requests.** The ads, images, videos and measurement technology on a site weigh it down with excess data and requests.

Bus Schedule

What weighs mobile sites down?[16]
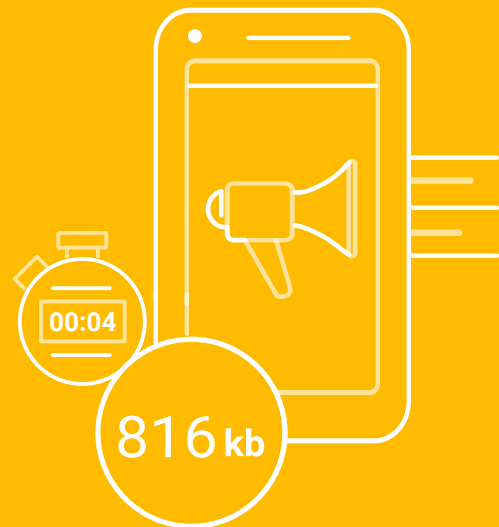
816KB is the average size of ads, which takes **4 seconds** to load over a fast 3G connection

00:04

816 kb

7s
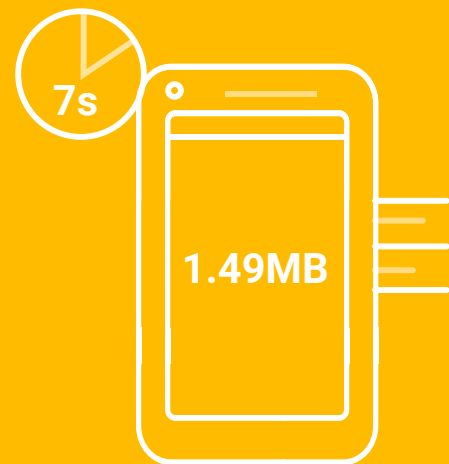
1.49MB

1.49MB is the average size of content, which takes **7 seconds** to load over a fast 3G connection

Large file sizes weigh down your mobile site

Humans achieved the power of flight with light wood and canvas, and we broke the sound barrier with an aluminum alloy plane.[13] Mobile sites should also strive to leave density and excess weight behind.

The average mobile web page is 2.5MB[14] in size. This means the data alone takes 13 seconds to download on a fast 3G connection.[15] To make mobile sites faster, start by optimizing images (and reducing their size) for mobile screens. Be sure to pare down JavaScript file sizes and minimize the number of fonts on your page.

16. Webpagetest.org, Sampled 11.8K global mWeb homepage domains loaded using a fast 3G connection timing first view only (no cached resources), February 2016

13. Smithsonian, "Bell X-1 Glamorous Glennis"
14. Webpagetest.org, Sampled 11.8K global mWeb homepage domains loaded using a fast 3G connection timing first view only (no cached resources), February 2016
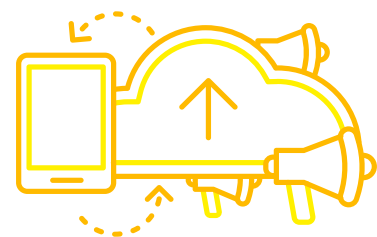15. Webpagetest.org, Sampled 11.8K global mWeb homepage domains loaded using a fast 3G connection timing first view only (no cached resources), February 2016

Element load order can make or break your page

The order your site loads content, ads and analytics also matters. Instead of loading all elements together, prioritize the resources that show above the fold.

Too many large file requests and ad tech requests will slow a page down and harm the user experience. It's like trying to carry a load of groceries all at once — one or two bags are fine, but any more than that and you're slowing yourself down with unwieldy bulk — and you'll probably lose some groceries in the process.
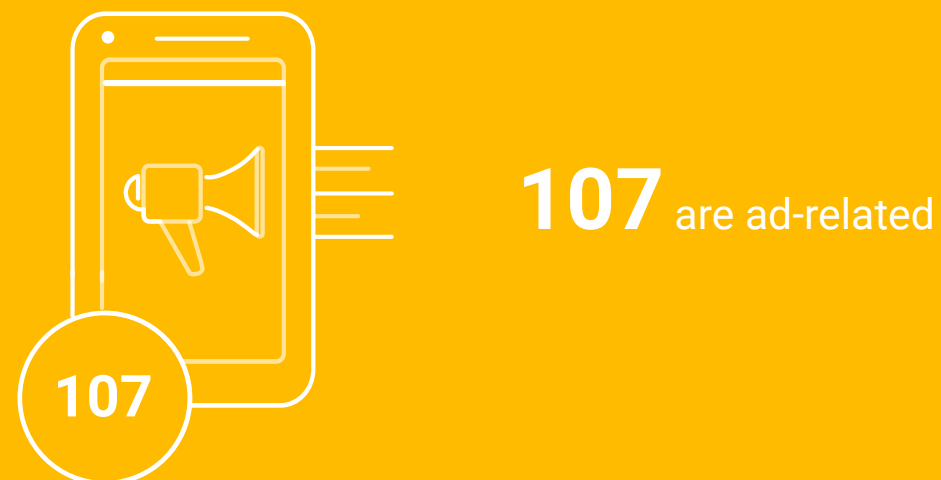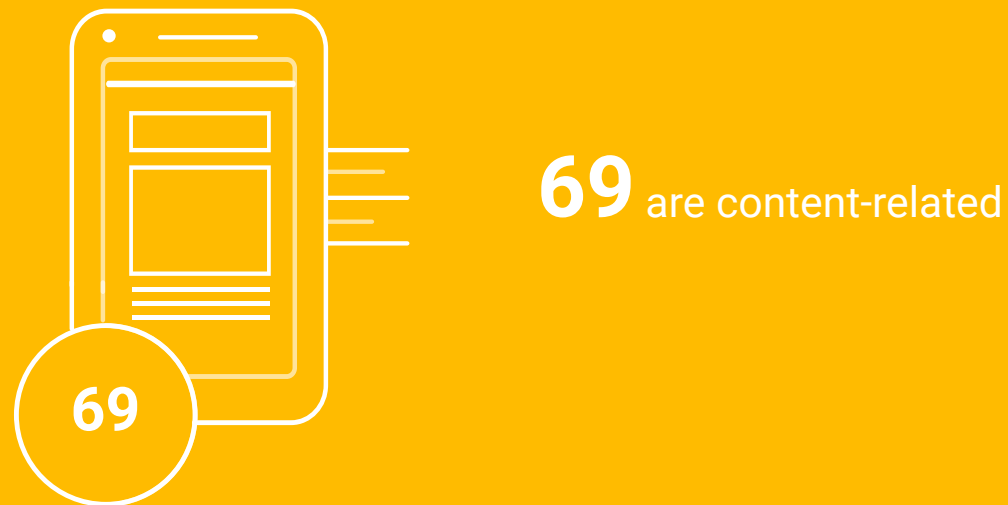
Nearly **half** of all server requests come from ad-related calls[17]

17 .Webpagetest.org, Sampled 11.8K global mWeb homepage domains loaded using a fast 3G connection timing first view only (no cached resources), February 2016

Out of the 214 average server requests per mobile web page:[19]

69 are content-related

69

107 are ad-related

107

Server requests create mobile web traffic jams

When a phone's browser makes a request to get ads, provide analytics or display content, it is one more task the page has to carry out before a site's content is fully loaded. Each mobile page makes an average of 214 server requests,[18] some of which happen simultaneously and some that can only happen one after the other — in any case, that's 214 potential causes for slow mobile sites.

Even if the browser can make parallel requests, it can only push through so many of the 214 requests at one time. Since every server request adds load time, you should review each request on your site to understand the benefit it provides. Are ad set ups causing too much delay? Are too many analytics trackers being used? Are you properly balancing synchronous (sequential) and asynchronous (simultaneous) server requests? Over time, server requests can accumulate on your site like barnacles on a boat and cause drag.

19. Webpagetest.org, Sampled 11.8K global mWeb homepage domains loaded using a fast 3G connection timing first view only (no cached resources), February 2016

18. Webpagetest.org, Sampled 11.8K global mWeb homepage domains loaded using a fast 3G connection timing first view only (no cached resources), February 2016

Chapter 3

Why does mobile speed matter?

Mobile speed is good for everyone, everywhere.

Let's say you're sitting at your neighborhood cafe, trying to figure out what to do with your day. You whip out your phone and start reading an article on a site that's quick. If you're shown a relevant ad, you're more likely to engage with it than if the site is slow and lagging.

When sites are fast, users engage more with content and ads. The net result: publishers can monetize their content and advertisers can achieve their brand goals.

As we studied mobile latency, we saw how mobile speed affects engagement. We measured this in terms of bounce rates, session length, pageviews per visit and viewability. More importantly, we studied the impact on publisher revenue.

46% of consumers say that waiting for pages to load is what they dislike the most when browsing the mobile web.[20]

46%

20. Google Webmaster Central Blog, "#MobileMadness: a campaign to help you go mobile-friendly", April, 2015

DoubleClick
by Google

Faster load times mean more chances for engagement

We saw a correlation between slow mobile sites and high bounce rates. When sites load slowly, users are more likely to abandon the page — every time a user leaves your site, you lose traffic to monetize.

Imagine you're headed to a museum to see the hot new exhibit, and you have a choice between waiting in the longer regular line or the fast-moving VIP line. You'll want to pick the shorter VIP line, of course. Meanwhile, if the regular line is too long, it might convince you to turn around and go home if it's your only option.

It's the same with mobile speed. **Creating a fast and smooth mobile web experience keeps users engaged.** Quick sites make people more likely to click through to more pages, reading further to consume more content.

Sites that loaded in 5 seconds vs 19 seconds were observed to have:
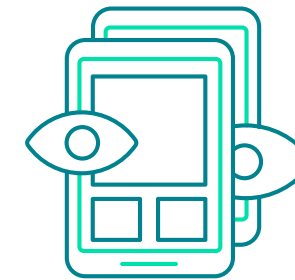
60% greater pageviews per visit[21]
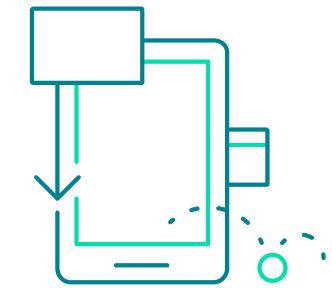
35% lower bounce rates[22]

21. Google Data, Aggregated, anonymized Google Analytics data from a sample of mWeb sites opted into sharing benchmark data, n=3.8K, Global, March 2016
22. Google Data, Aggregated, anonymized Google Analytics data from a sample of mWeb sites opted into sharing benchmark data, n=2.8K, Global, March 2016

Entry

VIP

Sites that loaded within 5 seconds vs 19 seconds were observed to have:

70% longer average sessions[25]

25% higher viewability[26]

Less time spent waiting means more time on site

We also found a correlation between mobile speed and both pageviews per session and session lengths. And as people spend more time on the site, ad viewability also likely increases, as display ads must be on the screen for one full second to be considered viewable.[23] In a world where advertisers place more emphasis on viewable impressions, this is an important metric for publishers to track.

These metrics are important but publishers ultimately care about revenue. While there are several factors impacting revenue, our model projects that publishers whose mobile sites load within 5 seconds earn up to **2X greater mobile ad revenue** than those whose sites load within 19 seconds.[24]

25. Google Data, Aggregated, anonymized Google Analytics data from a sample of mWeb sites opted into sharing benchmark data, n=3.5K, Global, March 2016
26. DoubleClick for Publishers, Google Active View ad viewability for 10.7K mWeb homepage domains with >70% measurable ad viewability, Global, February 2016

23. For more information on what it means for something to be considered viewable, visit the DoubleClick for Publishers help section.
24. Google Data, Aggregated, anonymized Google Analytics and DoubleClick AdExchange data from a sample of mWeb sites opted into sharing benchmark data, n=4.5K, Global, June 2015 - May 2016

How can you make mobile sites fast?

Getting up to speed is a 3-step process.

An engineer knows that every decision can impact performance, so projects must be continually assessed to develop the optimal design.

Mobile speed is no different: it requires **assessment, execution and monitoring.** Let's look at what you can do to figure out what's slowing your site down, fix it and make plans for future maintenance.
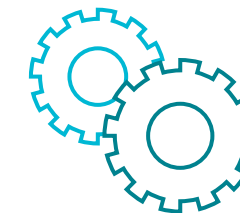
Assessment   **Execution**   **Monitoring**

Assess your site's performance

From bicycles to minivans, anything with moving parts needs regular inspections. However smoothly they seem to be running, you have to check occasionally and study the diagnostics. **Anything out of tune will affect speed**. The same is true for mobile sites, and you'll need a toolbox to assess the situation.

When running diagnostics on your mobile site, look for:

☑ **Content size:** Find out how many bytes your page is serving and what files constitute the bulk of the bytes

☑ **Ad tech:** Look for bulky ad tech and evaluate the number of ad-related calls — each one increases your load time

☑ **Video ads:** Review latency for your video ad partners and find out which of them may be causing delays

Your mobile toolkit

Here are some tools you can use to assess the current status of your site:

- **PageSpeed Insights:** This tool measures the performance of web pages, assigns a Page Speed Score to indicate how the page is performing (ranging from 0 - 100; 85+ is good), and suggests how to speed up the page.

- **WebPageTest:** This open source tool will run speed tests from multiple locations across the world, across browsers, and using real consumer connection speeds to provide rich insights including resource loading waterfall charts, page speed optimization checks, and suggestions for improvements.

- **Google Analytics:** Site Speed reports in Google Analytics offer insights into how quickly users are able to see and interact with content, as well as what the drop off points are.

- **Chrome DevTools:** Chrome DevTools is a versatile real-time tool for evaluating your website's performance right in the browser. You can simulate network and CPU speeds, examine network loading details and see how your site's code is impacting your page.

- **Mobile-Friendly Test:** Designed specifically for mobile sites, this tool analyzes exactly how mobile-friendly the site is, and focuses on elements beyond speed as well.

Execute a plan to optimize your site

Once you know what's slowing down your site, you know what parts need to be fixed — or replaced and redeveloped.

Key modifications to bring your site up to speed:

☑ Assess your ad-related calls to remove low performing monetization partners

☑ Pick third-party ad partners with lower latency

☑ Remove or reduce any bulky content

☑ Reduce or consolidate data and analytics tags

☑ Prioritize loading elements that are visible above the fold first

Developing and improving the architecture of your mobile site is important for faster mobile sites. You should also investigate open source solutions like Accelerated Mobile Pages (AMP) and Progressive Web Apps.

For additional ideas and suggestions on how to create great mobile web experiences, visit Google's best practices and industry insights hub, Think with Google.

Monitor your site to keep your speed up

Getting your site up to speed is a huge part of the process, but like anything fast your mobile site will still need regular tuning. To save yourself future delays and troubleshooting, you need to create a maintenance plan so your team always has a manual handy.

Ongoing optimizations for mobile speed:

☑ Regularly audit the ad tech on your site, flagging and removing anything that adds latency

☑ Whenever you update your analytics data, evaluate your requests and remove outdated collection pixels

☑ During any development work, look to streamline content, optimizing it by size

☑ Target 50 or fewer requests and 1,000 or fewer bytes per page

Maintenance Plan

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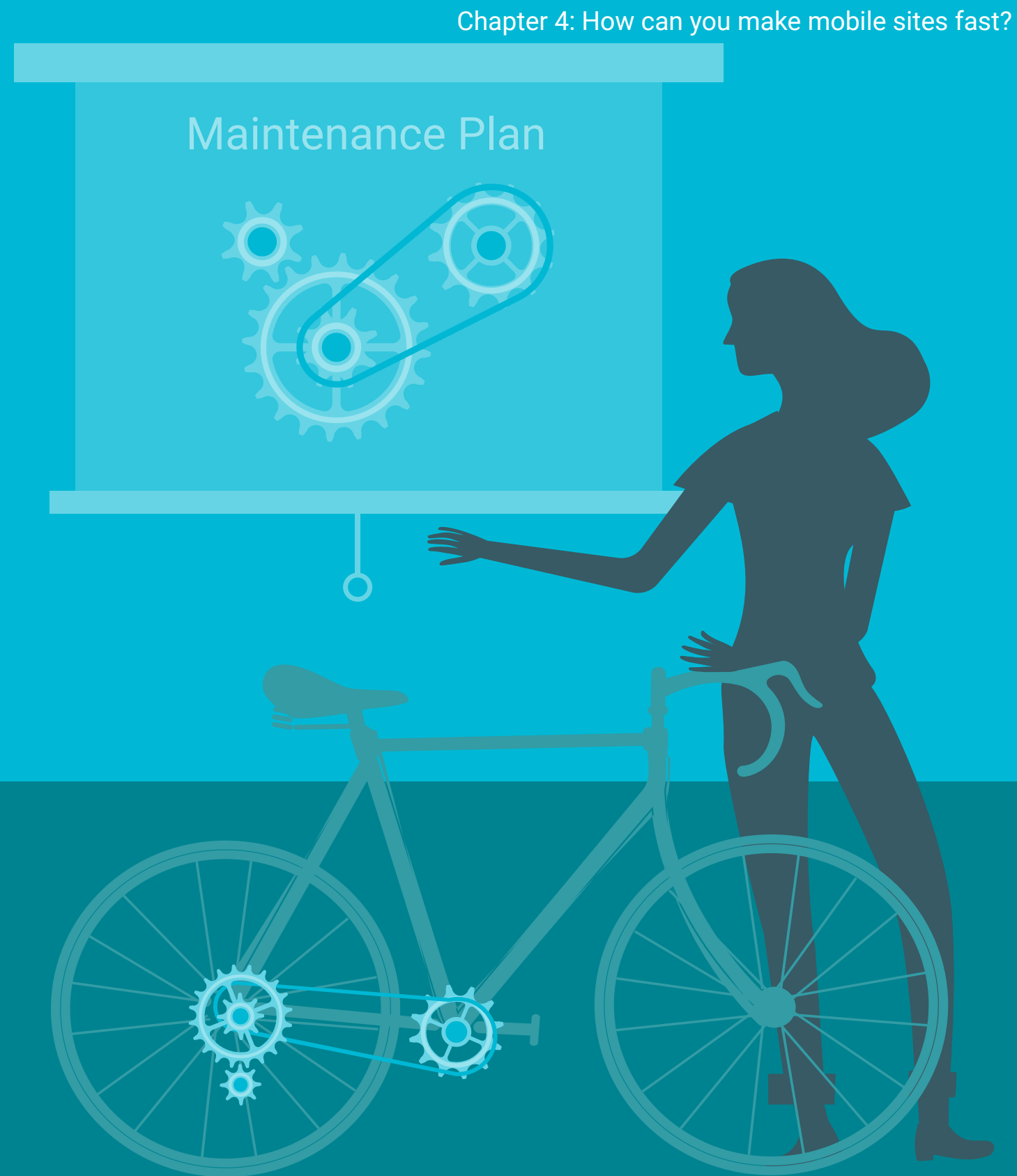
Conclusion

People crave speed, and they expect it everywhere. From 4G mobile networks to electric cars and same-day deliveries, our lives are faster and more efficient than ever. As the pace of the world picks up, slow mobile sites will be left behind, losing more and more users and revenue — and brand loyalty. Mobile sites that load quickly benefit users and publishers alike.

By assessing your current site, executing a plan and constantly monitoring progress, you can bring your site up to peak mobile speed and earn the trust of a bigger audience.