



The Mobile Web Handbook

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Links and updates of this book can be found at
<http://quirksmode.org/mobilewebhandbook>.

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Introduction

Introduction

The Mobile Web Handbook explores the differences between mobile and desktop web development that we should be aware of when creating websites for both. It's not very technical — there are only a dozen or so simple code examples. It discusses no libraries or tools. It's about mobile web fundamentals.

There is no mobile web distinct from the desktop web. Developing websites for mobile is pretty much the same as developing for desktop, especially now that responsive design techniques allow us to adapt our CSS layouts to both huge desktop screens and tiny mobile ones.

Still, there's "The Mobile Web" in the title of this book, and that's not an oversight or marketing trick. It serves as a convenient shorthand for "touch-based small-screen web on more browsers than you've ever heard of." Mobile web development is not fundamentally different from desktop, but there are subtle distinctions that may cause you trouble if you're unaware of them.

It's best to see mobile web development as a layer that you apply on top of regular web development, and which contains a few new concepts and techniques that you must understand in order to create compelling mobile experiences. This book concentrates on that mobile layer, and highlights three topics:

1. On desktop we have only five browsers, but on mobile it's more like 20 or 30. These are not all separate browsers: many of them are subtly different versions of the same browser, especially of Android WebKit. Why is that? How do you handle it? Why is Android so complicated? How will the mobile browser market develop?
2. On desktop, there's only one single viewport: the browser window. On mobile, this viewport was split into two, and a third viewport was added. Why do we need three viewports? How do they work?
3. Desktop has its keyboard and mouse events, and touchscreen browsers need special JavaScript events to react to the user's touch actions. This may seem logical but Microsoft, of all companies, challenged that logic and raised interesting philosophical questions about the relationship between JavaScript events and interaction modes. On a practical level, the touch events have some special features that you need to know about.

Browsers, viewports, and touch events are the main themes of this book. There are also a few smaller items: the rise and fall of browsers and operating systems; what proxy browsers are; why a few CSS declarations such as `position: fixed` are more difficult to get right on mobile than on desktop; and becoming an accomplished mobile web

developer by setting up a device lab and reconsidering outdated development practices. As a bonus, you will learn *why* responsive design works. (Not *how*. You already know how. But do you know *why*?)

So here we go. It's going to be quite a journey.

What This Book Doesn't Cover

In order to manage your expectations, here are a few topics that are not treated in this book. This is about the mobile web, so there is no information on native apps. You can use this book for creating hybrid apps (that is, apps written in HTML, CSS, and JavaScript but wrapped in native code), but only for the web component, not for the native one.

I'm not a designer, so I don't say anything about design except for some very vague general tips. No design patterns, either.

The mobile market is very volatile, and browsers and devices that are a hit now could be a memory in a year's time. That's why I try to steer clear of inspecting individual devices and browsers, though sometimes I make an exception for Safari on iOS because it's so very influential on web development thinking.

Finally, the most complicated caveat: this book only investigates fundamental differences between desktop and mobile, and generally ignores topics such as AppCache, which, though more important on mobile than on desktop, are not unique to mobile. This is sometimes a subtle distinction, but it helped me a lot in keeping the scope of this book, and of my research, to manageable levels.

Companion Site

Writing a book about the mobile web is challenging because it's one of the fastest-changing environments ever — faster by far than the traditional desktop web. I write this in summer 2014, and by the time you read it things will have changed. That's why I try to concentrate on fundamental issues and problems, and don't pay too much attention to quick-shifting details such as browser bugs.

Still, you need to know about the bugs as well. That's why I created a companion site at <http://quirksmode.org/mobilewebhandbook> that contains links to my browser research to back up what's in this book — or, as time progresses, to show which mobile browsers have mended the errors of their ways, or changed, or done something else of note.

In this book I occasionally give browser compatibility notes, but more often I'm rather vague; for instance, saying that “many browsers” support this or that. The companion site always gives a breakdown of those browsers, and includes notes on bugs.

Tablets

The Mobile Web Handbook focuses on mobile devices; that is, small devices that fit in the palm of your hand and can establish a connection over a mobile network. It does not really cover tablets or other types of devices.

Still, a lot that's in the Handbook also applies to tablets. Tablets, too, have touch-based browsers, and although they have larger screens than mobile phones, they're still smaller than most desktop screens and have three viewports instead of one.

Besides, what exactly is a tablet?

Samsung, in particular, tends to bring out more and more very large phones, which you can easily see as small tablets instead. The Microsoft Surface is a tablet with an attachable keyboard, which converts it more or less into a laptop computer.



Is the Samsung Galaxy Note 8.0, released in Q2 2014, a huge phone or a mini tablet? Or is the distinction meaningless?

Right now we can't tell if tablets are going to remain a separate device category, or if they'll quietly fold into the phone and laptop categories. From a technical perspective it doesn't really matter, though. Tablet browsers are mobile browsers in all respects, and obey the same rules and restrictions. Although this book will hardly mention tablets again, you can safely assume that anything you build for mobile will work on a tablet as well, with the obvious caveat that a tablet screen is bigger than a phone screen and your responsive design should accommodate that.

Thank You

This book didn't spring from my forehead fully formed. Plenty of people were involved, and I'd like to thank all of them. Vitaly Friedman saw the potential of this book, signed me up, and was the general editor for all chapters. Markus Seyfferth arranged all practical matters such as contracts and printing. Stephanie Rieger was good enough to be the technical editor for all chapters. Stephen Hay signed on for the cover, illustrations, and overall book design. Patrick Lauke edited the Touch and Pointer Events chapter, a topic he knows more about than most other web developers I know combined. Max Firtman went over the Browsers and Android chapters and provided valuable feedback.

Then a compelling presentation by Jason Grigsby and a discussion with the MSIE team caused me to overhaul the Touch and Pointer Events chapter once more. Finally, Vasilis van Gemert read through the entire second draft from the perspective of a teacher, while Owen Gregory signed up for those last finicky copy edits that make a good book a great one. Thank you all, ladies and gentlemen. The book wouldn't have been as good as it is now without your timely help. All remaining errors are, unfortunately, my own.

Now let's get started with a general overview of the mobile world. You'll find that it differs a lot from the desktop world we're used to.



Chapter 1

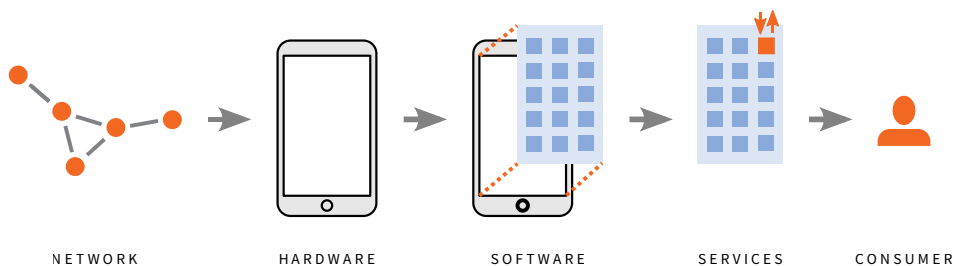
The Mobile World

Chapter 1

The Mobile World

In order to understand mobile web development we have to understand the mobile world. Where the desktop situation is pretty well understood, mobile is so different that it pays to examine it in detail and carefully note how it's different. Not only will that explain why certain browsers are more important than others, it will also make you sensitive to several issues that don't play a role on desktop at all but are vital on mobile. In particular, the role of the mobile network operators is quite different from the desktop ISPs.

The Mobile Value Chain



The mobile value chain extends from the network operators, via device vendors, software makers, and service providers to the consumer. This chapter will study the first three links in the chain.

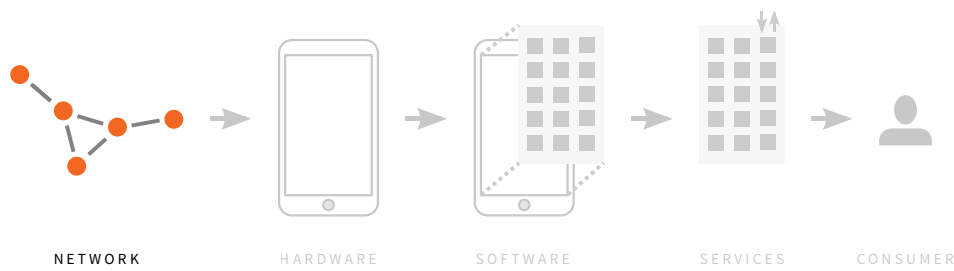
Traditionally, the mobile value chain was formed by operators (called *carriers* in the US) and device vendors. Recently, operating system vendors entered the value chain, and they are being followed by service providers. In fact, the software and service layers are rapidly gaining in importance, and thus software vendors such as Google and Microsoft, and service providers such as Facebook and WhatsApp are becoming equal partners to operators and device vendors.

Each link in the chain enhances the value of the others. For example, a mobile network is worthless without mobile phones, and vice versa, while mobile phones can't do without a first-rate operating system and important service apps. Thus the four parts of the mobile value chain are dependent on one another. Despite that, they sometimes act against one another because each of them has the same goal: commanding consumer mindshare and money. Each of them would love to lock the consumer into a vertical silo of its own making, where anything the consumer does is controlled by the company and makes money for the company. (Apple is, of course, the most successful example.)

At the same time, operators and device vendors fear becoming commoditized; that is, becoming indistinguishable from their direct competitors. If all network connections are the same, why would consumers care which operator they're with? If nearly every phone runs Android, why would consumers care what kind of phone they buy? They don't, and that's why the Android vendors have their minds set on differentiation. We'll get back to that.

On a large scale, studying the mobile market is mainly a process of predicting which companies — and which parts of the value chain — will be more successful than others in avoiding commoditization.

Operators



The operators own and maintain the mobile networks. Until now, they were the winners of the mobile game because they made incredible amounts of money, especially on text messages, and they dominate the consumer market by subsidizing devices.

Operators have no points of differentiation: in the end, consumers care very little whether they're on Vodafone's or T-Mobile's network. Besides, operator profits are falling as a result of changing consumer habits: customers are sending fewer text messages, preferring to use other IM solutions such as BlackBerry Ping and WhatsApp.

Some operators understand they have to work with (web) developers and offer them APIs for payments, like Blue Via does; but not all do so, and even the ones who do have to compete with Apple's App Store and

Telefónica's Blue Via initiative (<http://smashed.by/bluevia>) offers a fairly easy API for mobile payments. Purchases from developers are paid via the monthly invoices Telefónica sends to its clients anyway. Better, clients don't have to register because they're already registered with Telefónica. The disadvantage is that it only works on Telefónica's networks and a few others. Operators could play a major role in online payments, but so far haven't built a global payment system — and time is running out.

Google Play, which have become the standard for mobile purchasing. The operators, then, are in trouble. I expect them to gradually become less important, as other mobile players, especially device, OS, and service vendors, win consumer mindshare – and the consumer money flow. At the time of writing, though, they still have a powerful position.

Connection Providers

In a large part of the world, operators are just connection providers. However, in many, but not all, developed countries, they have a much larger role, actively deciding which devices consumers will get.

Let's start with the simpler case. In most developing nations, average consumers buy a phone at a specialist store, or a Samsung, Nokia, or other branded store and, once they have the hardware, get a SIM card, usually pre-paid, at another store. They top up their SIM card when it's necessary (and they have the money). In fact, many consumers get more than one SIM card. They search for the best deal for voice, then for SMS, and possibly in future for data as well, and switch networks based on what they want to do right now. This, in turn, makes dual (or even triple) SIM card devices popular: consumers aren't going to manually switch SIM cards several times per day.

In this model, operators are not all that powerful. They offer a service and compete against other companies offering the same service, with consumers paying avid attention to pricing and quality. Simple.

Operator Subsidies

In many developed countries operators play a quite different role, since they actually sell phones to consumers and offer a subsidy.

These subsidies are a powerful weapon because the psychological mechanism behind them is so devious that nearly all consumers fall for it.

Operators offer phones to consumers for a lower price than they can find elsewhere. If you buy a new high-end Android phone in the operator's store, you might pay only €100 or so, while the normal sales price is more like €600. Of course, the operators don't give you €500 out of their own pocket: they earn it back (with interest) on the two-year contract that you're obliged to sign.

Although operator subsidies exist in many developed countries, sometimes they're forbidden by law, for instance in Belgium and Italy. Here consumers buy phones and subscriptions separately.

Although buying a smartphone for the full price and a separate contract for connectivity is cheaper in the long run, the psychological difference between €100 and €600 is so huge that most consumers don't even think about buying a phone anywhere else than in an operator's store. (My sister saw through the operators' cunning plan without my having to brief her, and bought her iPhone directly from Apple. I was very proud of her. But she's an exception.)

Here's something you should do every few months. Go to an operator's store, pretend you know nothing about smartphones, and ask for advice on purchasing a phone. The store clerk will efficiently steer you towards the type of phone that the operator currently wants you to buy.

Store clerks earn a slight commission on any phone they sell, but the exact amount depends on the type of phone. By changing the commission, operators make sure clerks drive consumers toward the devices they want to be sold right now.

At the time of writing, that device is always an Android phone, and often a Samsung. Consumers are familiar with the brand, and most Android vendors are able to produce phones fairly cheaply due to economies of scale. This lower price frees up extra money for the bottom line — and even a little for store clerks, independent resellers, and consumers.

Through this process, operators gain considerable power over device vendors. If the operators decide that they don't want to sell certain types of phones, they can simply remove them from their stores. Sometimes they're contractually obliged to offer the phones, but in that case they place the devices at the back of their stores and slash the clerks' commission, with the obvious result that nobody buys them anymore.

The takeaway for us web developers is that by deciding which phones will be offered to unsuspecting consumers, operators influence the mobile browser market, because those devices' default browsers will get more market share. Thus, keeping track of operators' current preferences is important.

Subsidies or No Subsidies?

So what's the difference between providing a subsidy and not providing one? Obviously, subsidies and the commission system give operators more power over device vendors, which usually translates into lower device prices for them (and they get bulk discounts anyway).

Also, the subsidies cause more high-end devices to be sold, since more people (think they) can afford them.

Conversely, many consumers in unsubsidized countries opt for mid-range or cheap phones, because there is no subsidy and people in developing countries have less disposable income. Since consumers have to pick a phone themselves, brand awareness becomes more important.

When confronted with devices of a similar price, will the average consumer pick a Samsung or a Nokia? Device vendors try to influence consumers' brand awareness through ad campaigns and flagship stores. Samsung, in particular, has the advantage that its brand is also known in related electronics fields like TVs and household appliances.

Nokia and Samsung have specific phones for both types of markets. Vendors that exclusively create expensive high-end smartphones, such as BlackBerry and HTC, have more trouble in the unsubsidized markets, although BlackBerry is still fashionable in some countries, such as Indonesia. In general, though, the subsidized markets are more important for these vendors, which makes them more vulnerable to operator whims.

From the operators' perspective, subsidized markets are ideal, since they give them lots of power. As we saw earlier, their big worry is that, like in unsubsidized markets, they will become dumb pipes, only good for transferring data packages from A to B.

Avoiding this fate is their prime purpose right now, and they generally understand that they have to offer something to developers. Unfortunately they're not very good at developer relations, because what they

offer is complicated, restricted to their own network, and may be gone after one or two years, when the next reorganization brings in new managers who want to do things differently simply because they can.

Developer and Consumer Mindshare

And what about Apple? It is a special case, which is why operators don't like the Cupertino giant. As one would expect, Apple's hefty pricing leads to a lower sales market share in unsubsidized countries, but even there sales are decent and growing. Apple is expensive, but it has such a huge brand awareness and customer loyalty that the price tag doesn't really matter. iPhones are becoming status symbols for the up-and-coming middle class in developing countries.

Apple's real power lies in the subsidized markets, though. There, it can break the operators' power over the consumer quite easily, because a small but dedicated (and affluent) slice of smartphone buyers wants an iPhone, and isn't interested in anything else. When a store clerk is confronted with such a consumer he'll give in and sell an iPhone instead of the current operator offering, because a sale is better than no sale. But operators don't like it.

The reason Apple — and only Apple — has this power is because it is popular with both consumers and developers. Google has a lot of developer mindshare, but not so much consumer mindshare. The traditional mobile companies such as Samsung and Nokia have a lot of consumer mindshare, but not very much developer mindshare. Only Apple has both, and that gives it enough power to occasionally ignore operators.

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