Smartphones such as the Apple iPhone include web browsers which are capable of rendering HTML (web pages) in the same way as a desktop PC. So why then does the BBC offer a website "http://news.bbc.co.uk/mobile", as well as "http://news.bbc.co.uk/"?

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Abstract

This paper looks at the introduction of WAP, the transition from circuit switched WAP to packet switched mobile data and the issues surrounding these technologies for transferring large quantities of data. It also looks at problems with mobile hardware in displaying large websites. Finally it looks at why mobile specific websites can benefit content providers and mobile networks.

Smartphones are slowly becoming portable computing platforms. New mobile devices are offering higher screen resolutions, faster processors and more memory. Our "phones" are doing as much as our personal computers were doing a decade ago. Our mobile networks are also changing. Since the start of the Third Generation (3G) network commercial offering by Three, 3G coverage has spread to most major towns and cities and has sped up as technologies like High Speed Packet Access (HSPA) are introduced. This change have revolutionized the way in which services are provided for our mobiles. Companies that previously offered Wireless Application Protocol (WAP) pages are now able to offer JavaScript enabled, multimedia rich pages. However, this is not without it's limitations - mobile phones may be getting more powerful but they are still lagging far behind computers today. Mobile phone users also encounter problems with 3G coverage, often being restricted to the far slower General Packet Radio Service (GPRS) limiting their mobile web experience. Whilst many improvements have been made towards recreating the desktop web experience on the phone, we still need a mobile web to deal with several issues.

Interactive data services started on phones via the Wireless Application Protocol (WAP). It is a protocol suite designed to allow communications between devices on a mobile network and the mobile network's WAP gateway (Stuckmann, 2003, pp. 125-126). The gateway acts as a proxy passing requests from phone to the World Wide Web and from the World Wide Web to the phone and converting it to a mobile format (Wireless Markup Language or WML) (Stuckmann, 2003, pp. 125-126). In 1999, when introduced commercially in the UK (M2 Presswire, 1999), this system allowed the user of the device to receive lightweight, text only, pages from the World Wide Web on their phone (Stuckmann, 2003, p. 125). However, it was a commercial failure. Received poorly by consumers and the media, it did far less that advertisements and promotions claimed (Sunday Business, 2000). Many telecommunications companies promoted WAP as "Mobile Internet", something that simply was not delivered as devices nor networks could support it (Sunday Business, 2000).

Mobile data came to the fore over the next few years. Devices were becoming more advanced. At first they supported graphical content via WBMP (Wireless BitMaPped Graphics) which was part of the WAP 1.0 specification (Tull, 2002, p. 164). In the WAP 2.0 specification, this changed to be support for a subset of the World Wide Web Consortium's (W3C) eXtensible HyperText Markup Language, or XHTML, (Moll, 2008) bringing the technologies of the desktop to the phone. The commercial GPRS offerings were also an important advancement. GPRS offers packet-switched data (Heine & Sagkob, 2003) rather than circuit switched data, meaning lines were not being "rented" for the duration of data transfer (Ellis, Pursell, & Rahman, 2003). This is one of the key changes in mobile data over the last decade. As lines did not need to be reserved for data transfer, costs were beginning to lower and internet access on phones was no longer dial up but always on. A web browsing experience on the mobile phone was nearly a reality. It certainly was not the web experience that users were receiving on their desktop but it was more recognizable. Speed was still a problem for users but as Three launched the UK's first commercial Third Generation mobile network offering higher speed connectivity in major cities across the United Kingdom (The Times, 2009). Over the next couple of years, every British mobile network rolled out their own 3G network. Today UMTS and HSPA have allowed mobile data communications to provide reasonable speeds (Nomor Research GMBH, 2006, p. 4). Data Costs have also fallen, many phones include "unlimited" internet bundles or low daily access costs (Graham, 2009). These, and the growth of more powerful handsets, has led to the downfall of WAP and the growth of more comprehensive Internet Protocol (IP) over cellular radio solutions from companies.

Yet this does not mean there is not need for lightweight web pages, specially designed for mobiles. There are a multitude of issues with delivering the same content being delivered to desktops and laptops to mobile phones.

One such problem is screen size and resolution. Screens may be becoming bigger and higher resolution (DeviceAtlas, 2009b), particularly on touchscreen phones (DeviceAtlas, 2009a), such as Apple's iPhone, but they are still limited by other factors such as portability. Mobile phone screens are reaching resolutions comparable with those of desktop in the early millennium[1] but web pages are being designed for even higher resolutions and the phones reaching those kind of resolutions are not widespread[2]. As a result users, may have to scroll around content they could comfortably read on a desktop when it is displayed on the phone. They may also struggle with redrawing issues and other connected processing issues that scrolling causes. One way around this is to have a "column" (Research in Motion, 2009) or "mobile" (Opera Software, 2009) mode in the browser, which redraws all content into a vertical list. However, this is inefficient as much layout and formatting data is downloaded which is consequently unused. Another approach is to use services like Google or Bing's web rendering for mobile phones which will retrieve and compress content for your mobile. Some mobile networks, like Vodafone, even build these technologies into their mobile internet networks (Vodafone UK, 2009a). Clearly there is a demand for these lightweight pages, otherwise these companies wouldn't offer these services. This is one of the reasons many content providers still do offer them.

Another problem is processing power. While phones today do have powerful processors, they're often underpowered for the functionality they are expected to provide as people are used to the post-GHz desktop computer (Golding, 2004, p. 394). This leaves web browsers on phones often struggling to render pages in a timely fashion especially when technologies like JavaScript and other dynamic content are considered (Koch, 2009). With JavaScript becoming a major part of modern browsers and showing a resurgence in usage (Shankland, 2009), rendering these on mobile phones is infeasible for most users. All of these technologies are processor and resource intensive and decidedly not easy to support on mobile phones. Mobile friendly pages will often reduce JavaScript usage and make pages simpler in order to make them render faster. This is why content providers still offer them and users still use them.

Provision of high speed data networks also proves a problem. Whilst HSPA and UMTS are spread over most of the UK, as much as 20% of the UK population are not covered (Vodafone UK, 2009b). These users are using GPRS which offers approximately dial up speeds (56kbps) to them (Smith & Gervelis, 2003, p. 141). These are not the network speeds that the web today is designed for. Webpages today can commonly carry several hundreds

[1] The W3C list the most common display resolution in January 2000 as 800x600(World Wide Web Consortium, 2009) and manufacturers including Nokia recently released 800x480 resolution phones.

[2] DeviceAtlas list the average screen width at 184.03px (from 5236 devices) and average screen height as 220.04px (from 5218 devices) far below even the 640px by 480px resolution.

kilobytes of overhead in the form of images, stylesheets and JavaScript (King, 2009). Several hundred kilobytes of data would take tens of seconds to load over a GPRS connection [3]. Mobile versions of websites often omit JavaScript, reduce image size and even reduce the quantity of information being displayed (Hockenberry, 2007) in order to speed up load times. This is another reason these pages are so frequently available today as they are feasible in the worst case scenarios (GPRS only) and enhance performance in better cases.

Even when HSPA does work, the speed benefits do not come without a burden. This comes from making other performance sacrifices, like battery perfomance (CIOL Network, 2006). HSPA and UMTS use more power than GPRS or GSM and this means that while internet browsing may be faster, the customer does not get to browse for as long (Wingfield & Sharma, 2007). Processor usage also contributes to degrading battery performance and rendering hugely complex pages, pushes up processor load and the number of operations being carried out. The phone, in turn, uses more battery power to allow the processor to perform at this speed (Aalborg University, 2009). As a result using a simpler pages, that load faster can be beneficial in terms of both battery usage for radio and processor.

Lightweight mobile pages also offer benefits to the service provider. Mobile networks will have a lower load on their network infrastructure as less data is being transferred to the phone. This means they can delay the requirement to invest in their network to avoid contention issues (BBC, 2009). This is becoming a priority for networks as data consumption increases but the associated revenues do not (BBC, 2009). It also ensures faster data transfer for the data that is transferred as no Quality of Service (QoS)[4] routing occurs. All of these are very attractive for mobile networks as they keep their investment down, quality up and network infrastructure running stably.

Different mobile site versions may be the preference for content providers too. Often the content provider will not be happy with how content is displayed on certain devices. Content which may be in key positions on the desktop or laptop, often will appear offscreen or in odd positions on mobile screens. Certain content like Flash and other rich media may not be supported by mobile browser and this can mean the user browsing is left with a restricted service. By offering special mobile version, mobile specific content can be promoted and rich media can be dealt with as appropriate by using tools like the Real Time Streaming Protocol (RTSP) (Tarkoma & Kangasharju, 2009). There are also other benefits like location specific content (Hitching, 2009) which can be gleaned from emerging technologies like the browser GeoLocation support described in a recent W3C Technical Recommendation (W3C, 2009). All of these are factors in why mobile content providers want to offer simpler, mobile only versions.

Finally, these versions are offered as smart phones are used differently than computers by their users. Mobile devices tend to be used less to browse the web randomly, but rather to get answers to specific problems (Moll, 2008, pp. 23-24). Mobile web users act in a certain context and generally have less interest in anything outside that context. Relevant adverts have good conversion rates, however, those not relevant or context-aware do poorly (Arne, 2007). Between these two factors, this means content providers have little to benefit from advert heavy, bloated pages. Instead simple pages that communicate effectively, with simple relevant ads, are often a better choice.

In conclusion, there are many reasons that mobile specific site versions still exist. They offer benefits for everyone: the end-user, the mobile network and the content provider. It is not a leftover from a time of simpler mobile phones but rather an efficient way to use phone resources and to communicate with the users of these sites. For this reason, we have and will have mobile webpages for the near future.

[3] Take the example, 300KB over 56kbps. 56Kbps is 7KBps. 300 over 7 is 42.85 meaning it would take near to three quarters of a minute to transfer (presuming no compression technologies being used.)

[4] Quality of Service routing is when certain data is prioritized over other data for transfer. In most mobile networks QoS favours voice and video calls over general data transfer. This means data transfer can be subject to greater trip time and slower bandwidth.

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