The Mobile Web Comes of Age

Steven J. Vaughan-Nichols

The mobile Web has changed dramatically in recent years. Not so long ago, low-speed, small-screen mobile devices on cellular networks accessed the Internet with minimal functionality via the Wireless Application Protocol (WAP).

Now, wireless devices are much more powerful, in some cases as powerful as the PCs of just a few years ago. For example, Apple’s iPhone runs Mac OS X and has a 620-MHz ARM processor, 128 megabytes of RAM, and up to 16 gigabytes of flash memory. The iPhone has been the biggest force in accelerating the changes in what mobile devices can do on the Web, said Stephen O’Grady, co-founder of and analyst with RedMonk, a market research firm.

Other mobile devices—such as Nokia’s N810 Internet Tablet and mini-notebooks like Asus’s Eee PC 901, MSI’s Wind NB U100, and Acer Aspire—also offer high performance. Meanwhile, smaller devices, such as phones, now have larger screens with better resolution, making Web browsing more worthwhile, noted Patrick Gilbert, CEO and founder of 4smartphone.net, a provider of hosted mobile e-mail and other services.

Moreover, mobile networks are much faster. 3G cellular, advanced Wi-Fi versions, and Mobile WiMax provide theoretical maximum data rates of 3.6, 100, and 70 megabits per second, respectively. These capabilities have ushered in an era of new mobile browsers that can provide an experience like that of desktop browsers, Gilbert said.

Today’s mobile browsers include Apple’s Safari, Microsoft’s Internet Explorer Mobile, Mozilla’s Mobile Firefox, and Opera Mobile. This type of browser—unlike its predecessor, the minimally capable microbrowser—can better work with today’s interactive Web services and other powerful Web 2.0 applications.

“The part that was missing on mobile devices was the ability to have a fully functional browser in a form factor big enough to actually be useful,” explained Bob Cusick, managing director of Servoy, a vendor of application-development and deployment software.

For example, O’Grady said, “The iPhone’s implementation of [the] mobile Safari [browser], while imperfect, has given handsets the real Internet, rather than the hobbled version typical in devices that preceded it.”

Nonetheless, today’s mobile browsers still face technical limitations and other challenges, including the inability to run applications such as Adobe Flash, a mainstay of the desktop Web experience.

BEFORE THE MOBILE BROWSER

The early microbrowsers ran WAP, had a small footprint, were simple, and generally provided access only to text. The first was UP.Browser from Unwired Planet (now Openwave Systems), released in 1997 in conjunction with phone makers Ericsson, Motorola, and Nokia.

Because early mobile devices didn’t have much RAM or processor power, the first microbrowsers couldn’t render ordinary HTML pages correctly. They could only properly render the relatively few pages written specifically for them.

Within a few years, microbrowsers—such as Bluelark, i-mode, PalmScape, and Pocket Internet Explorer—gained the ability to display graphics. However, they tended to work well only with stripped-down websites designed for devices with screen-size, processor, and network-bandwidth constraints. For example, these sites worked with XHTML Mobile File but not JavaScript, which the host devices’ CPUs didn’t have the power to process.

JavaScript makes web pages more interactive, animated, and dynamic, particularly in terms of graphics and navigation. The inability to run JavaScript made the mobile-browsing experience unsatisfying for many users, who were accustomed to desktop browsing.

“The argument was that there are roughly 3 billion phones out there and that when these phones get on the Internet, their vast numbers will tilt the market toward the [mobile Web],” said technology entrepreneur and consultant Russell Beattie. “The problem is that these billions of users haven’t gotten on the Internet, and they won’t until the experience is better. That means better devices and full browsers.”

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The mobile Web has moved forward largely because wireless-access technologies have advanced, said Andrew Finkle, principal at afpr.com, a Web 2.0 and software consultancy. Older mobile browsers ran code written with subsets of HTML—such as compact HTML and the Wireless Markup Language—which limited page functionality.

Today’s mobile browsers work with the same Web-based technologies as PC-based browsers, including PDF code and JavaScript.

Basic browsers consist of an interface and a rendering engine that handles user inputs and turns HTML, XML, JavaScript and other code, as well as formatting information, into the intended display image.

**Rendering engines.** Today’s mobile-browser rendering engines are basically the same as desktop-browser engines, except that they display images that fit on wireless devices’ small screens.

WebKit, which Figure 1 shows, is a rendering engine that the WebKit Open Source Project developed. It serves as a popular framework for building desktop and mobile browsers. It has been used to build mobile browsers such as the one Nokia designed for its S60 smart phones, as well as Chrome and Safari.

Other major mobile-browser rendering engines include the Internet Explorer Mobile engine and Opera’s Presto. Mozilla is working on a mobile version of its Gecko rendering engine for Mobile Firefox.

Opera browsers, including Mobile Opera, use Presto 2.1. Millions of smart phones by vendors such as HTC Corp., Motorola, Nokia, Samsung, Sony-Ericsson, and T-Mobile work with Mobile Opera.

**JavaScript.** The ability to render JavaScript quickly is vital for accessing Web-based applications with desktop-like capabilities such as interactivity, said Sunil Doshi, director of products for Zergo Americas, a vendor of mobile-marketing products.

Google has just introduced its V8 JavaScript rendering engine for mobile systems with the release of the first Android smart phone: HTC Corp.’s G-1, which T-Mobile will sell in the US.

Unlike most other JavaScript rendering engines, V8 is a JavaScript compiler rather than an interpreter. Therefore, the code runs directly on the OS, rather than through an interpreter first. The V8 thus runs JavaScript pages several times faster than other engines.

Some browser makers are introducing similar JavaScript compilers to compete with V8. For example, Mozilla is working on TraceMonkey, scheduled to appear in Firefox 3.1. Several other browser designers plan to work with V8 or TraceMonkey. Safari uses the SquirrelFish JavaScript renderer.

**Thin-client approaches**

Several vendors are creating thin-client browsers, such as Bitstream’s ThunderHawk, Opera Mini, and Skyfire Labs’ Skyfire.

This approach lets even less-functional browsers—and thus older phones that can’t run a full mobile browser—offer a rich Web experience.

These systems run the rendering and other compute-intensive processing on server farms, which have fiber connections to the Internet and send the mobile client a representation of the webpage that the device couldn’t run on its own.

They use data compression to reduce the size of webpages by up to 80 percent before sending them.
to the browser, thereby reducing the need for fast network connections.

Doing rendering and other functions on the server also increases browser responsiveness and extends phones’ battery life.

STANDING IN THE WAY
“The screen size, speed, and input mechanisms for a mobile device will never catch up with what’s capable on a full-size computer,” noted Ron Feldman, CEO of Kwiry, a reminder-technology vendor.

Thus, they won’t be as attractive for Web browsing, said Jonathan Eunice, president of and principal analyst with Illuminata, a market research firm.

Anne Mitchell, CEO of the Institute for Social Internet Public Policy, agreed and said phones also can’t render graphics as well as PCs.

Wireless service providers might not be enthusiastic about the new browsers, said Bill Hughes, principal analyst for the Wireless Research Group at In-Stat, a market research firm. They have invested heavily in and based their financial models on WAP-based platforms and might not want to support the new technologies, he explained.

One major shortcoming for mobile browsers is the inability to run many plug-ins, particularly Adobe Flash animation, said Brad Kozak, creative director for Grokmedia, a marketing firm. “Because Flash is ubiquitous on the Web,” he explained, “that’s a big problem.”

Adobe has released Flash Lite, a smaller version of Flash that can run on mobile devices. However, Flash Lite offers inferior graphics and sound performance compared to the full-scale technology.

Because of this, Kozak said, few mobile phone manufacturers, carriers, or browser makers besides Opera are hurrying to support Flash Lite.

MOVING FORWARD
Industry observers expect mobile browsers, and the business models that vendors use, to evolve further during the next few years.

Business models
An important issue for vendors is how to make money, directly or indirectly, from the new browsers.

Traditionally, Servoy’s Casick noted, companies have invested time and money in browsers that they gave away to attract users to their platform or brand, like Microsoft did with Internet Explorer.

Some vendors hope manufacturers will pay a licensing fee to include their mobile browsers on their phones and PDAs to encourage customers to buy their devices.

Opera sells Opera Mobile to users whose phones don’t already have the browser.

Future capabilities
“Mobile browsers will gain all the capabilities of their desktop cousins, including more multimedia,” predicted 4smartphone.net’s Gilbert. He also said mobile-browser navigation will improve to meet the needs of touch screens and other wireless-device innovations. The Opera Mobile 9.5 browser already offers zooming and panning that make it easier to navigate webpages and load them quicker.

2ergo Americas’ Doshi said vendors will add support for plug-ins and other third-party programs to their mobile browsers.

Mobile browsers will also adopt Firefox’s add-on model, he added, to enable users to satisfy their personal preferences and work-related needs via third-party extensions.

Meanwhile, the World Wide Web Consortium’s Mobile Web Initiative has created a set of best practices (www.w3.org/TR/mobile-bp/#d0e630)—in areas such as exploiting device capabilities, navigation, and page layout and content—for optimizing website design to improve browsing for mobile users. It’s expected to become a formal W3C recommendation within the next few months.

RedMonk’s O’Grady said the future will belong to fully functional mobile browsers because they are like the desktop browsers users are accustomed to working with.

The upshot of mobile-browser developments, said Jason Cianchette, founder and president of Liquid Wireless, a mobile-media consultancy, is that “five years from now, people may surf the Internet more from their phones than their computers.”

“Today,” he added, “40 percent of US mobile customers surf the Internet with their phone. Five years from now, this could be close to 100 percent.”

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