

Browser–Less Surfing and Mobile Internet Access

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INTRODUCTION

Lately, we have seen the use of a number of new technologies (such as Javascript, XML, and RSS) used to show how Web content can be delivered to users without a traditional browser application (e.g., Microsoft Explorer). In parallel, a growing number of PC applications, whose main job previously was to manage local resources, now are adding Internet connectivity to enhance their role and use (e.g., while iTunes started as a media player for playing and managing compressed audio files, it now includes Web access to download and purchase music, video, podcasts, television shows, and movies).

While most attempts at providing Internet access on mobile devices (whether wireless phones or personal digital assistants) have sought to bring the traditional browser, or a mobile version of the browser, to these smaller devices, they have been far from successful (and a far cry from the richer experience provided by browsers on the PC using standard input and control devices of keyboards and a mouse). Next, we will highlight a number of recent trends to show how these physical and use-case constraints can be significantly diminished.

BACKGROUND

Mobile telephony and mobile computing continue to display unprecedented growth worldwide. Zee News (2005) reports that in some parts of the world, such as India, mobile phones are now more popular than traditional landline phones. Since 2000, many developed countries have spent large amounts of money on the installation and deployment of wireless communication infrastructure (Kunz & Gaddah, 2005). And this growth trend is not confined to the mobile phone handset market. It is also being experienced across other mobile devices. In fact, in 2004 more mobile phones shipped than both automobiles and personal computers (PCs) combined, making them the fastest adopted consumer product of all time (Clarke & Flaherty, 2005). Further, Wiberg (2005) points out that this increase in mobile device usage spans across business and non-business usage. Therefore, this growth is

not simply due to increased consumer demand; businesses are continually seeing new value in equipping employees with mobile computing and communication devices.

There has also been steady growth in the use of the Internet, as well as in the nature of Internet usage. The size of the Internet, measured in terms of the number of users, is more than 800 million users (Global Reach, 2004). While the majority of the users are English, other languages are experiencing significant growth in the number of users, and this growth is expected to continue, given the large numbers of non-English-speaking populations.

Some of the drivers for the increase in Internet usage include the growth in Web-enabled applications and the availability of high-speed, always-on Internet (Bink, 2004).

Kunz and Gaddah (2005) identify two broad technological developments that are converging to enable mobile computing (the use of the Internet through mobile devices). The first of these technological developments is the accessibility to the Internet regardless of location, as evidenced by the growth in wireless *hotspots*. Now users can connect to the Internet from various locations and access Internet content without being connected to a physical local area network (LAN) connection or other type of landline connection.

The second technological development is the drive to reduce the size of computer hardware (Kunz & Gaddah, 2005). This size reduction increases the portability of these devices, leading to the mobile nature of the devices as well as the desire to connect these devices to the Internet.

Unfortunately, being *able* to provide Internet access to mobile devices has not *ensured* a quality Web experience. The next section will profile the current mobile Web experience.

USER EXPERIENCE OF WEB ON MOBILE DEVICES

The Web Browser on a PC

Let us start with the typical experience of the Web. The most common way to navigate the Internet is through the

use of a browser, a software application that allows the user to locate and display Web pages (Webopedia, 2006). On the personal computer (PC), there are a variety of browsers available, including Microsoft Internet Explorer, Mozilla Firefox, Opera, Netscape, Apple Safari, and Konqueror (Wikipedia, 2006a).

A cross-section of definitions from the Web outlines the basic functionality of these browsers (<http://www.google.com/search?hl=en&lr=&q=define%3A+web+browser&btnG=Search>); the Web browser is a graphical interface (i.e., icons, buttons, menu options) that:

- interprets HTML files (resources, services) from Web servers, and formats them into Web pages; and
- provides the ability to both view and interact with Web content (including download and upload of media content).

Yet most modern browsers also include additional functionality, assisting with the management of the tool's functionality and the content to which they provide access. This functionality includes:

- **Bookmarking:** The ability to save and manage Web addresses.
- **Cookies and Form-Filling:** The ability of the browser to pre-fill form fields (e.g., address or contact information), or provide the Web server with identifying information in order to customize the content received from the server.
- **Searching:** The ability to conduct a Web or local file search.
- **History:** The automatic cataloging of previously visited Web sites.
- **Display Modification:** The ability to customize the way Web content is displayed (e.g., size of text, types of media files that can be viewed, etc.)

It is also important to note that in the typical use of a Web browser, the user searches for information on the Web, often starting with a broad search and successively narrowing that search to meet his or her information goal (i.e., to go from the general to the specific).

The Web Browser on a Mobile Device

For mobile devices, such as cell phones or personal digital assistants (PDAs), the Web browser application is often referred to as a microbrowser (also minibrowser and mobile browser; see Wikipedia, 2006b). The difference between a *full* browser and the microbrowser is that the code in the microbrowser application has been optimized to accommodate the smaller screens, memory, and bandwidth limitations of mobile devices. In addition, the Web servers often communicate

with these microbrowsers using variations on the standard HTML (hypertext markup language), again to accommodate the screen, memory, and bandwidth restrictions.

Internet usage on mobile devices poses a number of challenges that are different than those found on a traditional computing device such as a PC (Becker, 2005). As mentioned previously, the computing power (processor and memory configuration), the transmission bandwidth, and screen size on the mobile device are really just a fraction of what users have available to them on a PC. More importantly, the limitations in screen size and physical interface often require users to restrict the activities they might otherwise seek to accomplish on the Web.

The physical restrictions (that being the telephone keypad and four-way scroll and navigation keys) can be quite significant. On a PC, we have a full-sized QWERTY keyboard and mouse interface for entering searches and addresses, or navigating Web pages. On the mobile device, in particular the cell phone, these physical input and control devices are replaced with a keypad designed for dialing phone numbers (not entering text strings), and horizontal/vertical navigation keys that significantly slow simple scrolling and selection of content.¹ In user studies, Chen, Xie, Ma, and Zhang (2005) report that users, when browsing the Web on a phone, handheld computer, or personal digital assistant, spend the majority of their time scrolling the screen to locate and select the content of interest.

Despite these real challenges, Nugent (2005) expects that the need for mobile Web browsing will increase, and people will want these devices to stay small, weigh less, cost less, run cooler and longer on one charge, but continue to do more than today's devices. Lawton (2001) believes that meeting these needs will require faster wireless connections, larger displays, as well as new usage paradigms and/or content that fits these smaller devices.

This is the environment mobile users are operating in today. A user can either struggle with a small screen and content that does not fit within that screen, or lug around a larger device that has an adequately sized screen but more limited connectivity options.

Technology and Service Barriers

There are a number of technological hurdles that need to be overcome for widespread adoption of mobile Internet usage. Chan and Fang (2005) identify a number of technological barriers, which range from connectivity and bandwidth issues to the lack of standards and broad use of proprietary tools and languages. Kuniavsky (2006) also notes the numerous and often complex relationships that exist between the multiple service, application, and technology providers currently needed to deliver mobile computing to the user, and how none of these players is wholly responsible for the resulting user experience.

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