

Position Paper: Toward a Mobile Rich Web Application – Mobile AJAX and Mobile Web 2.0

Jonathan Jeon, hollobit@etri.re.kr
Senior Member of Research Staff, ETRI
Seungyun Lee, syl@etri.re.kr
Research Director & Team Manager, ETRI

Introduction

The stated mission of the World Wide Web Consortium is to lead the World Wide Web to its full potential by developing protocols and guidelines that ensure long-term growth for the Web.

The goals of this workshop are to explore user and industry use cases and challenges around AJAX applications on mobile devices and to help shape ongoing work in making productive use of AJAX in mobile browsers.

Where we are

ETRI believes that the Mobile AJAX workshop is roughly asking “what’s next” for standardization of Mobile Web at the W3C.

Next Generation Web Application

Recently, Web 2.0 Trends, one of the Pragmatic Web Application Trends, derives the 2nd golden age of World Wide Web leading to great influence on the Web industry. The Web 2.0 trends do influence the wired Internet industry and the Mobile industry in particular.

As the Next Generation Web has become more mature, rich applications featuring responsive user interfaces and interactive capabilities have become increasingly popular. The capabilities represent a way to make programs easier to use and more functional, thus enhancing the user experiences.

There has been a shift in the direction of web development. A new breed of web application, dubbed AJAX (Asynchronous Javascript And XML), is emerging in response to the limited degree of interactivity in large-grain stateless Web interactions. At the heart of this new approach lies a *single page interface* model that facilitates rich interactivity. In this model, changes are made to individual user interface components contained in a web page, as opposed to refreshing the entire page.

Advantages of AJAX

AJAX has been a hot topic since Jesse James Garrett coined the term and published the essay "[AJAX: A New Approach to Web Applications](#)" in February, 2005 [3]. Numerous AJAX-based web applications and development toolkits have been rushing to the internet in the past year. Web-based applications have become richer and more responsive, not only closing the gap with the desktop but also presenting new and fun ways for user-web interactions.

AJAX is a web development technique used for creating interactive web applications. The intent is to make web pages feel more responsive by exchanging small amounts of data with the server behind the scenes, so that the entire web page does not have to be reloaded each time the user requests a change. This is intended to increase the web page's interactivity, speed, functionality, and usability [2] .

Most of AJAX's component Web technologies were developed and standardized during the past 10 years. These

technologies have improved recently, making them more suitable for enterprise use.

AJAX uses a combination of:

- XHTML (or HTML) and CSS, for marking up and styling information.
- The DOM accessed with a client-side scripting language, especially ECMAScript implementations such as JavaScript and JScript, to dynamically display and interact with the information presented.
- The XMLHttpRequest object is used to exchange data asynchronously with the web server. In some AJAX frameworks and in certain situations, an IFrame object is used instead of the XMLHttpRequest object to exchange data with the web server, and in other implementations, dynamically added <script> tags may be used.
- XML is sometimes used as the format for transferring data between the server and client, although any format will work, including preformatted HTML, plain text and JSON. These files may be created dynamically by some form of server-side scripting.

Conventional browser-based Web applications require the user to submit a request to the server, wait for the server to process the request and generate a response, and then wait for the browser to update the interface with the results. This request-waitresponse- wait pattern is extremely disruptive and lowers productivity.

Asynchronous JavaScript and XML is a standards-based programming technique designed to make Web-based applications more responsive, interactive, and customizable—in short, to recreate the seamless user experience of most other desktop applications. Therefore, AJAX offers many advantages over conventional approaches to Web application development, but it also has several shortcomings that have slowed widespread adoption.

ADVANTAGES

The primary advantages of AJAX style Web applications are less waiting and more control for the user. AJAX accomplishes this by

- Bandwidth usage - eliminating full-page post-backs in favor of smaller, incremental in place updates;
- Leveraging the client machine's processing power and temporal proximity by making the Web browser responsible for more aspects of the application execution; and
- Exploiting modern Web browsers' rich graphics capabilities—transparency, shading, animation, ordering, compositing, and soon—to add more glitz and interactivity to the presentation of information.
- Separation of data, format, style, and function - AJAX approach can tend to encourage programmers to clearly separate the methods and formats used for the different aspects of information delivery via the Web.

DISADVANTAGES

There are some issues. AJAX will not work in all web browsers. As its name suggests, AJAX requires JavaScript. This alone means that AJAX applications will not work in web browsers and devices that do not support JavaScript. For this reason it is not accessible to many typical Web users. AJAX also requires that XMLHttpRequest be supported, which many browsers do not.

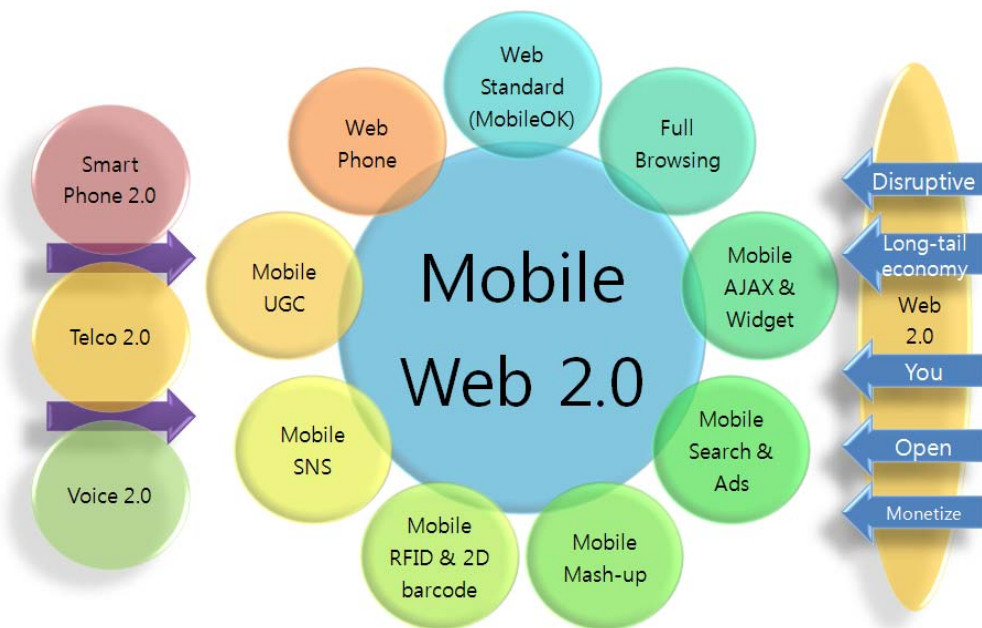
Another issue is about JavaScript Interoperability. AJAX relies on JavaScript, which is often implemented differently by different browsers or versions of a particular browser. Because of this, sites that use JavaScript may need to be tested in multiple browsers to check for compatibility issues.

Last issue with AJAX is how the application interface is updated. When updates to the interface occur, it may not be visually apparent that a change has occurred. The problem is even more troublesome for screen reader users. Screen readers typically read in a linear fashion. When changes happen in the interface, the screen reader user may not be aware of the change and the new content will likely not be read.

Mobile AJAX and Mobile Web 2.0

While the interests of web 2.0 have been increasing, it began to show up in the various points of views about the next generation mobile web. It has been called as “Mobile 2.0” or “Mobile web 2.0”. As the term Web 2.0 has no formal definition, Mobile Web 2.0 is not easy to clarify a hard boundary. However, this can be defined as one of paradigm for Next Generation Mobile Web. In more summarized view, we can categorize the Mobile Web 2.0 related technologies as figure 1 [1].

Mobile AJAX is a key trend of Mobile Web 2.0. Mobile AJAX is not really different from desktop AJAX as originally defined by Jesse James Garrett. The true potential of Mobile AJAX applications lies in deploying rich web applications on mobile devices. Mobile AJAX solves the same problems as AJAX in desktop browsers - it can provide Rich Web environment and better user experience, also it can provide reduction of traffic between server and mobile devices.



[Figure 1: Key trends of Mobile Web 2.0 Technology]

Problem of Mobile AJAX

Mobile devices have rather constrained capabilities in terms of CPU performance, memory, battery lifetime, screen size and bandwidth.

Furthermore web browsers on mobile devices usually fail to provide the necessary technologies and standards such as JavaScript, DOM and CSS. Also, there has to be a clear distinction between JavaScript and AJAX support. Currently, some browsers do support AJAX.

On the hardware-side one of the biggest problems is battery life. Data transmission tend to be draining battery power quite heavily, but also JavaScript XML/DOM/JSON operations mean heavy CPU load which not only results in slow performance, but again in heavy battery drainage.

Possibility of Mobile AJAX

Mobile AJAX has a lot of potential. Mobile AJAX has the power to make using web applications on mobile devices more natural and intuitive. Also, Mobile AJAX can make the creation of mobile web applications

possible that people will actually use - solving their needs while on the go. The Possibility of Mobile AJAX, there are three potential.

1) **Mobile Widget**

Recently, significant attention is beginning focused on mobile widgets. *Widgets* are interactive single purpose applications for displaying and/or updating local data or data on the Web, packaged in a way to allow a single download and installation on a user's machine or mobile device. Most Widget Engines will typically support HTTP, IRIs, and Unicode, as well as ECMAScript, various DOM levels, and the ability to render a markup language, like HTML and/or CSS, and multimedia resources such as images and sounds. Particularly, because of the rise in popularity of AJAX-style development, many Widget Engines now support the XMLHttpRequest object or some similar mechanism for making asynchronous data requests over HTTP.

Mobile AJAX and Widget like the needle and thread. The combination of AJAX and widgets reduces time to market, encourages innovation and enables a larger target market for mobile applications. By enabling development for the web and mobile browsers at the same time, widgets offer a far better value proposition to developers. If widgets 'call' or reuse services provided by other widgets, powerful applications can be rapidly developed from simple components.

2) **iPhone and Rich Mobile Web**

As we learn from iPhone, AJAX on the mobile phone can change the future. Recently, [a Forrester report](#) was released stating that the iPhone signals the beginning of the end for the mobile Web as we know it today. The iPhone is one of the first mobile devices, and definitely the first with a cell phone form factor, to provide a true mobile rich web browsing experience. AJAX on the phone can make the user interface richer and more responsive in mobile web applications.

Another biggest change the iPhone may bring about, especially for mobile application development, is that Apple decided to include the full-fledged Safari browser in the device, effectively choosing AJAX as a development environment for the iPhone. If it success, AJAX could emerge as the development platform of choice for mobile devices. That could potentially do away with many years' worth of attempts to establish mobile device-specific development platforms, such as BREW or WAP.

3) **Ubiquitous and Seamless Web Application**

Ubiquitous Web applications bring your data online and make it available anywhere there's an Internet connection. But happens when you're on a plane or when you can't find a WiFi hotspot or can't connect any network? Mobile AJAX on the phone needs to support Google Gears, or some kind of offline mode. If it possible, Mobile AJAX will enable you to read the most recent messages from web mail while offline or to edit your documents in Mobile Office Docs even without a network connection.

Where do we go from here?

How can we realize the possibility of Mobile AJAX? The answer can find from standardization. Currently, some activities are works in progress.

The W3C Rich Web Client Activity was created to operate three Working Groups: Web Application Formats, Web APIs and Compound Document Formats. The Web Application Formats Working Group is chartered to develop standards, such as XBL, and document formats for user interfaces, such as XUL. The Working Group is currently gathering use cases and requirements. The Web API Working Group is working to make Recommendations on XMLHttpRequest, the "Window" object, Drag 'n Drop, File Upload and many other APIs.

Another side, the intent of the W3C Mobile Web Initiative(MWI) is to facilitate advancement towards the ultimate goal of "one web" by making more web sites mobile friendly and reducing the adverse impact of differences in the delivery context that contribute to making the "mobile web" user experience distinct from that

of the "fixed web". Currently, the W3C MWI is focusing on developing best practices for "mobileOK" Web sites, device information needed for content adaptation, test suites for improving interoperability of mobile Web software and marketing and outreach activities.

Now, Mobile Web 2.0, a New Age of Mobile Web, will rapidly enhance and spread in mobile industry. Mobile Web 2.0 is not a story about "Web 2.0 in mobile". It's definitely for "New Age of Mobile Web". It is completely changing how and where we consume content and produces content in mobile. Mobile Web 2.0 and Mobile Rich Web is here and available now! So, in preparing the Mobile Rich Web environment, we need to consider as below:

- 1) Interoperability of Mobile AJAX platforms and application
- 2) Make the Best Practices for Mobile AJAX and Mobile Rich Web environment
- 3) Interoperability between Mobile Widgets and Mobile AJAX
- 4) Standardization for Mobile RWA(Rich Web Application)
- 5) Accessibility and security issues of Mobile AJAX
- 6) Offline capability of Mobile AJAX
- 7) MobileOK for Mobile AJAX
- 8) Mobile Mashup and Mobile AJAX
- 9) Browser extension and Mobile AJAX

The W3C should consider standardizing specifications that defines the architectures of Mobile Rich Web Applications and Mobile Web 2.0 systems operating within open mobile environments and some restricted environments.

As we continue our investigations, we will continue to cooperate with W3C and Open AJAX Alliance while we gain more experience in developing standards to the Mobile Web 2.0 and Mobile Rich Web Applications.

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