

◆ Com 2.0: A Path Towards Web Communicating Applications

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Providing key architecture and components that allow users to produce their own communicating Web applications as easily as producing Web content for digital assets today would open new perspectives for communication actors and would increase potential connections by an order of magnitude. The end of the walled garden model in the telecommunication world leads to an ecosystem where the user interoperates more directly with the communication service providers to define services based, for example, on presence, address book, or instant messaging. Com 2.0 is to the communication world what Web 2.0 has been to the Web: a second perceived generation of communication services. Com 2.0 uses the Web as a platform for communication and thus enables a true convergence of communication, information, and entertainment in a way that turns the user into a communication service provider. © 2008 Alcatel-Lucent.

Introduction

In order to understand how Web 2.0 is changing the world of communication, we first need to recall briefly the common understanding of its basis. Web 2.0 [3] refers to a perceived second generation of Web-based communities and hosted services such as social networking sites, wikis, and folksonomies which aim to facilitate collaboration and sharing between users. As defined by Tim O'Reilly in 2004, Web 2.0 players recognize each other by sharing a set of characteristics changing the ways software developers and end users use the Internet. More than providing any major technical updates, they are using the Web as a platform, harnessing collective intelligence, putting the focus on data, changing the software release cycle conception through permanent beta, using lightweight programming models, and providing rich user experiences on different types of devices. The next question is "Why does this matter?" According to Alexa Internet global traffic rankings [1], as of November 2007, among the 10 most visited Web

sites worldwide, 6 were not in the top 10 in 2005, and all are full Web 2.0 services (YouTube*, Windows Live*, Facebook*, orkut*, Wikipedia*, and hi5*). This gives an idea of the sound trend it represents. The Com 2.0 concept applies Web 2.0 paradigms to the communication sphere and enables new offers for communication services. This letter illustrates how Web 2.0 paradigms can be applied to the communication sphere, discusses a first experimentation, highlights the limitations of current technologies, and concludes with next steps and challenges.

Web Communicating Applications

Many Internet brands and Voice over Internet Protocol (VoIP) operators are providing more user-friendly interfaces from their portal to network presence or address book services, or are exposing more network functionality as Web services. For example, Google Talk* presence data is available when you log on to Gmail*, and standard Extensible Messaging and

Presence Protocol (XMPP) can be used to fetch that presence information.

Com 2.0 is to the communication world what Web 2.0 has been to the Web—a second perceived generation of communication services. Com 2.0 uses the Web as a platform for communication and thus enables a true convergence of communication, information, and entertainment in a way that turns the user into a communication service provider.

As an example, the “click to dial” feature has long been well known. But to be more specific, we have to state clearly what we are expecting as a “click to” feature—there are at least three different levels of “click to.” These include:

- The classical implementation of “click to” is limited to opening a form requesting the user’s contact information (without any authentication) and issuing a voice call back. A more integrated option, also available for some time now, is launching a local communication client from a Web page. This only requires registering the client application as the correct protocol handler for the browser. Skype* and JAJAH* have automated the page parsing in some light browser extensions to insert Hypertext Markup Language (HTML) code allowing a smooth navigation from a Web page toward their client.
- The second “click to” application that extends the browser, keeping users inside the browser to place their call, is similar to SIPphone’s Gizmo Call [4].
- A third, and more interesting trend allows the caller to issue an audio or video call by using a Web resource created specifically by the callee that uses a blog or a Web site to advertise for it, like wengovisio.com [5].

In all cases, the voice call is enabled from a Web page. Nevertheless, in the third case, each end user that wishes to receive a voice call uses the Web as a platform and preinstalls the resources that will be used by the caller. The focus is now on the data. That is, the value of the voice call is now greater than the communication itself. It becomes, for example, the location of the site from which the call was placed—a key metric for advertisers. It also becomes much simpler to update communication software—in this case, the callee manages the resource instead of

Panel 1. Abbreviations, Acronyms, and Terms

AJAX—Asynchronous JavaScript and XML
HTML—Hypertext Markup Language
IP—Internet Protocol
SIP—Session Initiation Protocol
URI—Uniform resource identifier
VOIP—Voice over IP
W3C—World Wide Web Consortium
XML—Extensible Markup Language
XMPP—Extensible Messaging and Presence Protocol

the caller, and this allows perpetual beta implementations and efficient deployment, similar to the download and activation of JAJAH buttons [2].

A similar approach blending Web and telephony is promoted by the Ribbit SmartSwitch*, which is accessible through an Adobe Flash* or Adobe Flex* applications programming interface (API); nevertheless, it is still oriented toward developers—Web pages must be specifically designed to support calls. Moreover, in this case, the backend basically mediates network protocols to stream the voice call through proprietary flows. In contrast, the application of Web 2.0 technologies to voice service should permit nondeveloper users to manage their Web communication assets.

To sum up, the simple fact of turning the callee into a communication service provider reflects a good example of a Web 2.0 application to the communication world and potentially changes the way people are communicating. Still, there is a major lack of generic tools allowing a Web communication application to be agnostic regarding browsed sites and being directly managed by end users. The Com 2.0 vision is to provide users with the correct environment to create blended communication services as easily as creating a Web site today.

Mashups build a new user experience by blending two or more Web services to provide a brand new user experience; a well-known example is the presentation of Flickr* pictures on a Google Map*. Existing yellow pages Web sites offer a good example of a poor user experience because they do not provide any bridge to the user’s communication system: i.e., the retrieved information cannot be used to populate

the user's network address book. Providing tools to enhance a yellow pages Web site in order to add or remove information from the user's network address book would be a good illustration of a communication Web mashup.

Com 2.0 promotes communication mashups in order to extend the Web browser and enhance existing Web pages.

Web 2.0 is changing the world of communication by transforming the user into a potential communication service provider. Instead of building telco applications accessible from the Web, Com 2.0 tends to apply Web 2.0 technologies to the communication field to extend Web navigation with communication features. Hence, the application environment can be opened to new communication behaviors.

Experimentation

Web 2.0 applications require usage to be tested with end users before scaling toward mass deployment. Experimentation is part of the core strategy to introduce new Com 2.0 services, and the aim is to test innovation against end user behavior very early in the development process.

The development of Web communicating applications comes with a set of requirements in terms of asynchronous messaging. Web technologies have yielded opportunities to address these requirements using AJAX [3]. Beyond AJAX programming and how this way of scripting turns the Web and Web sites into powerful desktop applications, the main Web 2.0 innovations consist here in considering the Web as a platform, that is, a digital environment allowing users and other sites to interact with communication data and/or with each other.

In order to test usage in different contexts, as the first step in our process of implementing the Com 2.0 vision, we chose to build a specialized AJAX library for telecom and make it available on fixed and mobile platforms. This library, called NavCom, can be reused in several applications together with a set of server-side enablers.

A key aspect of the NavCom AJAX library is its architecture. NavCom provides a layered architecture that is designed specifically to enable different kinds of usage—the scripts can be easily embedded in an

Panel 2. Definitions

Ajax or AJAX—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.

Long tail theory—Businesses with distribution power can sell a greater volume of otherwise hard to find items at small volumes than of popular items at large volumes.

Walled garden—A mechanism to restrict the users to a defined environment, i.e., forcing them by some means to stay within the confines of a digital space. This restriction, often defined by a single company, is a means of exercising control and supposedly maximizing revenue.

operator toolbar inside a Web browser, in a widget, or on the server side in order to access the user's network address book or presence information, or to issue a VoIP call.

Figure 1 shows the Com 2.0 AJAX architecture. The NavCom bar is the user application and it includes an action bar and menu. The NavCom client provides the interface needed to instantiate the graphical components and to manage user profiles.

The communication library manages the data model including the buddy list, graphical Web controls, contacts manager, and presence agent. The core of the library enables the transparency of the AJAX container, making the application independent of browser brands or operating system versions.

Existing Web pages, in general, do not display presence information even when they contain clear contact or communication identity information like a phone number or Session Initiation Protocol (SIP) uniform resource identifier (URI). Standard Web browsers do not offer any way for the end user to

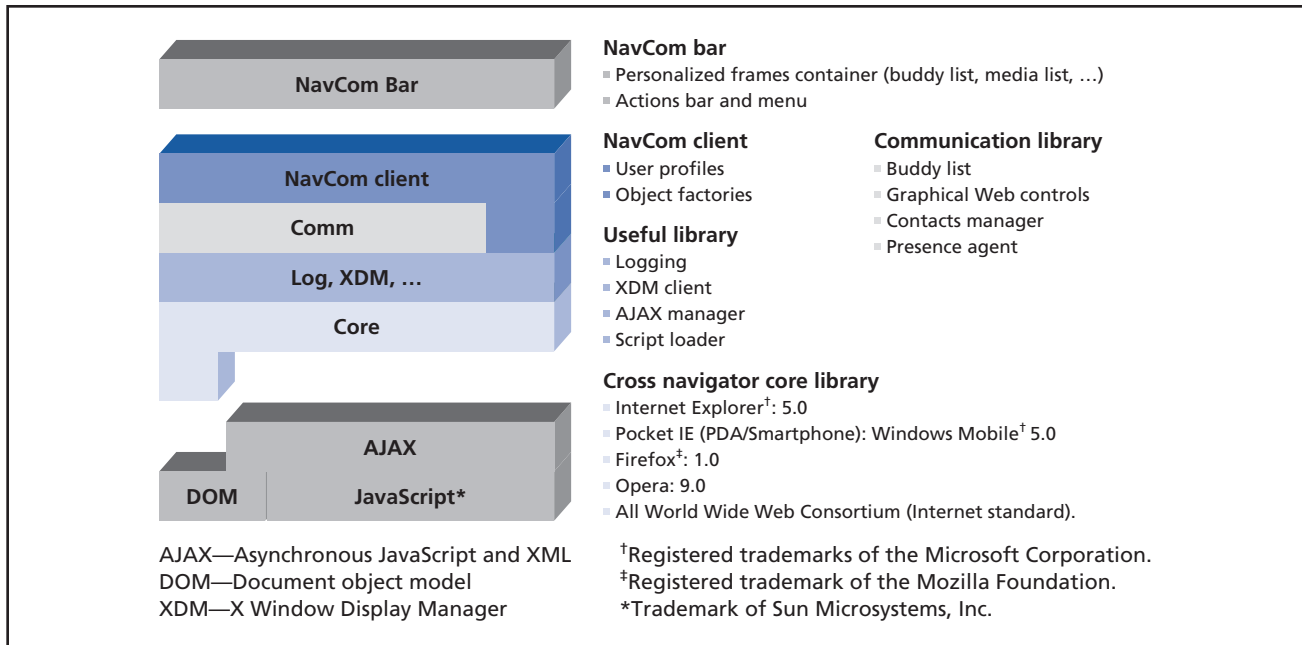


Figure 1.
Com 2.0 AJAX architecture.

leverage this information in order to display the contact's presence data or to issue a voice call. The NavCom library was provided to application developers and has been used successfully to enrich Web-based yellow pages service by inserting some communication components in a client-based mashup manner. One of the key benefits of this method is the ability to enhance existing Web pages with personalized communication information relevant to the user. Based on the context of the Web page, the AJAX components allow asynchronous data loading of the Web user's communication information.

The same NavCom library was also used to build a mobile terminal application that allows users to set up their own mobile communication portal.

With regard to presence functions, this experimentation does not attempt to manage the interoperability issues of the different presence services at the server side, but to provide client-side components in a blended Web approach to aggregate/federate presence information from several sources via XMPP and proprietary Web protocols, and to allow for integration of communication service provider presence information.

In addition to the AJAX library, the server enablers are providing advanced network features like a scripts loader to ease user account management,

long polling and streaming patterns for notifications, and a call by the top call manager. Future enablers concerning anonymization and tracking have been identified, to provide statistics on services usage.

NavCom architecture provides new use cases for the IMS communication service providers. These components allow the end user transparently to access services within Web pages and can be used in mashups, widgets, or operator toolbars.

Lessons Learned

As a first lesson based on our experimentation learned, it clearly appears that the cross-domain issues impose mashup limitations. Mashup can be performed at the server level, e.g., between two Web servers, or at the client level, e.g., by combining two Web pages from two sources inside the user's browser. In the latter case, the components have to deal with current cross-domain issues of the Web protocols where these kinds of requests are forbidden for security reasons. Different technical alternatives are possible today, but the mainstream solution consists of providing a proxy to avoid this issue. The World Wide Web Consortium (W3C*) is currently working on specifying access control for cross-site request management [6], but nevertheless an open mashup

environment at the client side is still far from being easily accessible to the end user.

A second lesson learned is that a standard Web notification mechanism is missing. There are important needs to provide Web applications with notification solutions like streaming or long polling patterns to enable robust semi-real-time Web-based communication use cases. Redefining proprietary solutions to handle asynchronous communication in a Web page is slowing down innovation in this area.

The third lesson learned is that navigation features are limited on mobile platforms, especially because there is no true Web push (AJAX) mechanism for mobile devices. The landscape in this area is fragmented and each browser brand and even each terminal operating system provides a different level of compliance to the Web standards. All lag behind standards for fixed Web browsers. This is a major technological barrier to innovation in this field. It also illustrates the importance of architecture not only to address user needs that vary according to expertise, as well as the level of technical involvement they can afford, but also to enable agnostic development across specific and unique mobile platforms.

This experimentation has proven that the same components can be reused in different Web applications and different contexts, allowing users to experience the same communication environment on fixed and mobile terminals. It also has been shown that we are still very far away from a democratization of open communication mashup and standard mobile Web application environments which opens the door to the potential for a jungle of specific deals managed by Internet brands trying to capture users into their silo applications.

Next Steps

One of the great challenges in Com 2.0 is fixed mobile convergence. Today Mobile Web 2.0 applications are considered an extension of fixed services, and end user adoption for such tools is weak. Newcomers are trying to leverage the opportunity to enter the communication arena. Google is proposing Android* as an open communication platform for mobile devices, and Apple provides an integrated Web browser on the iPhone. On the other hand, telecom

players come to the table with valuable experience in real-time interaction, customer awareness and acceptance of the interruptive nature of communications in an always-on environment, open systems development, and a multiple player landscape, as well as mobility. This should allow the telecom industry to play a key role in the application domain proposing new communication behaviors. Further experimentation based on the Com 2.0 vision should highlight some of these new communication behaviors, especially in the media industry, where a number of players are expected to propose options for end users to manage their real-time interaction within their media experience.

Conclusion

Web users are looking for more contextual and personalized services, a step that will include moving from a fixed to a mobile environment where communication has a big part to play.

On one hand, by using Web 2.0 paradigms such as user-generated content, semantic tags, sharing, large communities, customization, and personalized services, Web navigation is being enhanced and users are becoming the actors and the content providers of the Internet. Players that provide users with a framework to manage content themselves will replace traditional Web service providers.

On the other hand, the shape of the communication services ecosystem is quickly evolving. Facing the end of the walled garden model in the communication world, service providers will essentially be assessed according to their operational excellence—their capability to manage their customer assets, to provide integrated end-to-end solutions, and to ensure authentication and privacy based on lightweight user interfaces, lightweight development models, and lightweight business models. According to a programmableweb.com survey, today about 60 percent of the blended services actually used are cartographical services, but tomorrow, communication mashup usage may explode if we can provide the correct enablers. These mashups will occur whether open and managed by the end user or closed and managed by service providers. In both cases, Com 2.0 will produce a paradigm shift in the communication area.

Acknowledgements

The author would like to acknowledge the contributions of the following members of the Alcatel-Lucent Bell Labs and of the Application Business Division for their contribution to this work: Nicolas Bouche, Vincent Billaut, Thibault Briere, Yann Lopez, and Bruno Aidan.

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(Manuscript approved April 2008)

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